PaperCut NG Manual

Release: 19.0

Notice

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1. Overview

PaperCut NG/MF is a comprehensive print management system designed to seamlessly monitor and control your resources with easy to use administrative and user tools that can be securely accessed from anywhere on the network though a web browser.

Print management requirements vary from organization to organization, and often change dramatically within an organization over time. PaperCut NG/MF is designed for flexibility and scalability and can be configured to meet your print management needs now and in the future. It is used in a wide variety of environments ranging from universities with large printer fleets supporting over 100,000 users to smaller organizations that track printing for a fewer than 50 users on 3 or 4 printers. You can implement a basic system within a few minutes, or if you need more than simple monitoring and reporting, you can configure powerful features that include differential pricing, blocking filters and programmatic control via APIs and scripting. No matter where you start, you can easily adjust parameters to implement changes as gradually or quickly as you want.

Possible implementations can include:

- Silent activity monitoring
- Visible activity monitoring and expense tracking by work area, projects and departments
- Quota/allowance enforcement
- Charge per-print system
- Combinations of all of the above to accommodate various user / group profiles

In addition PaperCut NG/MF provides SysAdmins with a kit of tools to manage printers including:

- Detailed logging and reporting
- Notifications for printer errors and low toner
- Job blocking filters and re-direction

1.1. Benefits

✔ Some of the key benefits of PaperCut NG/MF are:

- Transfers accountability to users or departments by individually tracking activity.
- Creates environmental awareness by drawing users' attention to the impact of their specific usage.
- Reduces overall printing cost through job filtering, enforcing flexible quotas, or direct cost recovery.
- Discourages overuse of IT resources by establishing a managed print environment.
- Improves efficiency by allowing administrators to create rules that can steer printing to designated printers for load balancing, to implement Find-Me printing, or to redirect print jobs based on criteria defined using advanced scripting tools.
- Improves network reliability by implementing rules to prevent printer queue jams, queue

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hogging, and inappropriate printing types.

- Protect intellectual property and conform to audit objectives by enabling features such as print auditing and digital signatures.

1.2. Key features

✔ Some of the key features of PaperCut NG/MF are:

- Track all printing activity by user, client account, printer and document metadata.
- Enforce per user quotas, or group account budgets
- Differential print cost/charging allowing costs to be assigned on a per printer basis with advanced options to charge different amounts based on document type (e.g. color, grayscale or duplex), page size, user or group.
- Hardware neutral solution supports all major printer types and operating systems. No hardware vendor lock-in!
- Both cross-platform and multi-platform support. Run a mix of Windows and/or Linux print servers and support clients ranging from Windows, Mac, Linux, Unix and Novell OES.
- User Web Tools allow end users to track usage, transfer funds, request refunds and upload documents from unauthenticated (wireless) laptops.
- Provides end users with advanced options to allocate print jobs to shared accounts, cost centers, faculties or departments.
- Single sign-on user authentication with native Active Directory integration or synchronization with LDAP user accounts. (no separate passwords to manage!)
- Flexible hold/release queue support with Release Station software allowing administrators to implement management approved or secure user release printing environments.
- Service Oriented Architecture utilizing the latest software design methods including, test driven development, XML Web Services and layered architecture. This ensures scalability and stability by design.
- Advanced reporting and charts available in standard formats including PDF, Excel, and HTML. All reports accessible from anywhere on the network via a standard web browser.
- Ability to run on top of leading 3rd party Relational Database Management Systems (RDBMS) including Microsoft SQL Server, Oracle, MySQL and PostgreSQL Database.
- Enterprise level security and encryption based on SSL.
- Open architecture with a powerful scripting language, source code access and API documentation.

Note:
For information about the system requirements, see PaperCut NG System Requirements.

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1.3. How does PaperCut NG/MF work?

Before explaining how PaperCut NG/MF works at a technical and end user level, read through the following key concepts.

1.3.1. Key concepts

- **Client/Server model**— Client software is a small program that runs on each workstation and communicates with a server. The printing process on most networks works on a client/server model with clients (workstations) submitting jobs to a server. PaperCut NG/MF also uses the client/server model in the optional client software to communicate with end users.
- **Application Server**—An Application Server is a server program responsible for centrally processing business logic and providing services to end users. PaperCut NG/MF uses the Application Server model to provide a business logic unit for calculating user costs and providing a web browser interface to end users.
- **Print server**— A print server is a system responsible for hosting print queues and sharing printer resources to desktop clients/workstations. Users on the workstations submit print jobs to a print server rather then directly to the printer itself. A print server can be a dedicated server but on many networks this server can also perform other tasks such as file serving.
- **Print queue**—A print queue is first-in-first-out queue listing all jobs pending on a given printer.
- **Information provider**—A provider is a software component or program responsible for providing information to an Application Server. PaperCut NG/MF uses providers to submit print queue/job information to its Application Server. This information provider is called the *Print Provider*. Other important providers included with PaperCut NG/MF include user directory and authentication providers.
- **Web Print server**— Web Print server is the PaperCut terminology for a server that allows laptop (wireless) users to upload Microsoft Office and PDF files to be printed on network printers from personal computers that are not authenticated to the network and do not have network printer drivers.
- **User ID/Username**— In a multi-user environment, users log on to a network or computer using a username and password. These are often managed by services such as Active Directory or LDAP. The username is known as the user's identity. PaperCut NG/MF uses this identity to track printing.
- **Shared account**— A shared account is a PaperCut NG/MF term used to represent an account (pool of funds or allocation group) accessible to multiple users. Accounts usually represent "work areas" such as Departments, Faculties, Projects, Clients, Client/Matter, or Cost Centers.
- **Web interface**—A web interface is a software program that interacts withusers via a web browser. Examples range from Google, Microsoft SharePoint, Hotmail, Internet banking and

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router management consoles. PaperCut NG/MF provides a web interface for system administration and management. Web interfaces offer administration flexibility by allowing access from any location on the network and avoid the need for installation of separate software.

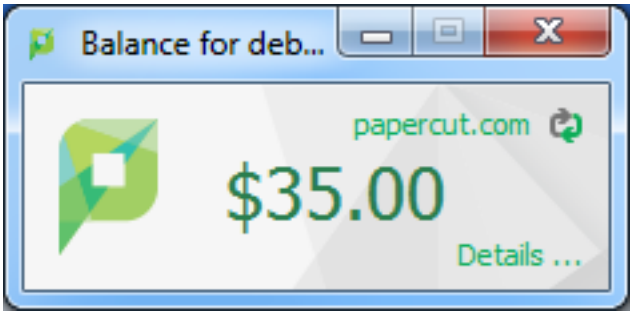
- **Scripting language**—A scripting language is a programming language that allows control of one or more software applications. In PaperCut NG/MF, you can use scripting to perform various administrative functions such as modifying parameters for users, shared accounts or printers. It can also be used for programmatic control during the print process to provide functionality such as print job re-direction, user notifications / warnings and confirmation for large or expensive print jobs.

1.3.2. Understanding the print process flow

To help explain what PaperCut NG/MF is and how it works we'll introduce the system by example. We'll start with a simple high school example:

The student's perspective (transparent quota control):

1. Chris is a student at a local high school. He has logged onto the network using his username, `chris.j.smith`, and is surfing the Internet. He selects Print from his web browser to print out a web page for his school assignment.
2. The network administrator has allocated Chris a printing credit budget of $20.00 a month. He can see his current account balance of $10.00 in the PaperCut User Client.



3. A confirmation screen listing the number of pages and the cost of the print job is displayed on the Workstation.
4. Chris confirms the print job.
5. 5 pages come out of the printer.
6. The network administrator has set a cost-per-page inside PaperCut on the printer at $0.10. Chris' 5 page document costs $0.50.
7. Chris' account balance is now at $9.50. He cancontinue to print until he submits a print job that has a cost that is higher than the balance in his account.

The teacher's perspective (allocation to accounts):

1. Matt is an English and Mathematics teacher at the same local high school.
2. Matt needs to print out a 279 page document for his next class.

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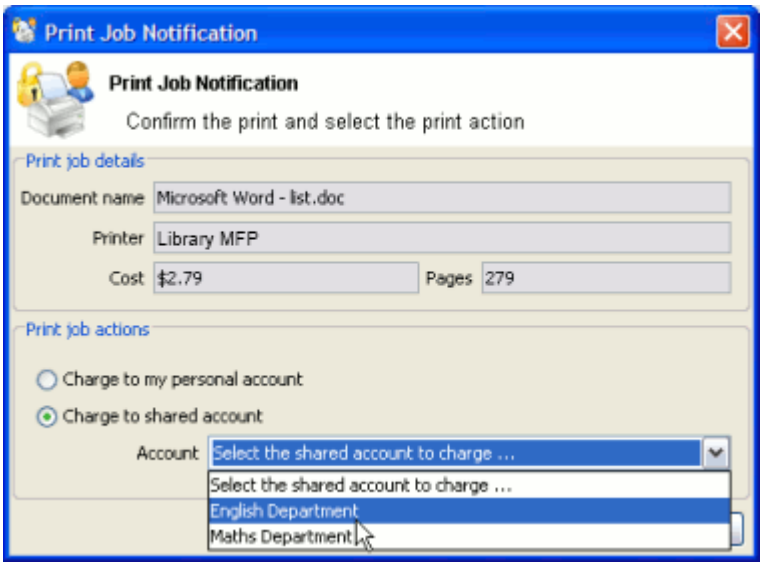
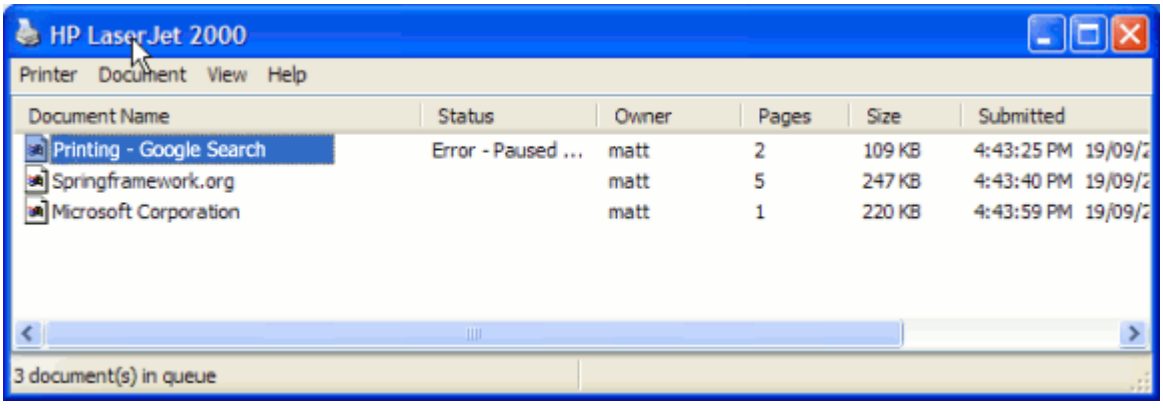
3. The network administrator has configured PaperCut to charge users in the faculty group $.01 per page, and has granted Matt access to charge to his personal account or to the English or math department's shared accounts.
4. Matt clicks **Print** in the application.
5. The PaperCut User Client displays a popup and presents Matt with information about the print jobs and requests an account selection. In this case accounts represent Departments but could also represent projects or other work areas.
6. Matt selects the English department's shared account from the list.



7. The print job is printed and the English department account is charged $2.79 for the print job.

The technical perspective (behind the scenes):

1. When the teacher, Matt, prints from his application, his workstation transfers the print job to the server and places it in the print queue.



2. The PaperCut Print Provider intercepts the print job in the queue prior to printing, pauses it, and analyzes the information determining:
    a. Who printed the document
    b. The number of pages in the document
    c. Other information such as duplex, grayscale mode, paper size, etc.
3. The *Print Provider* submits the job's information to the *Application Server* to process the

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business logic.

4. The *Application Server* determines that Matt needs to select the account to charge. It notifies the *Client Software* on Matt's desktop.
5. The *Client Software* displays the Popup requesting for the user to select an account.
6. After Matt selects the account, the *Application Server* is notified of Matt selection. The business logic validates that Matt is authorized to charge to the selected account.
7. The *Application Server* charges the appropriate account, logs the job and instructs the *Print Provider* to resume or unpause the print job in the print queue allowing it to proceed to the printer.

1.3.3. Architecture overview

PaperCut NG/MF was developed using the latest software development strategies, a strong influence being Service Oriented Architecture (SOA). The *Print Provider*, *Application Server* and *Client Software* all communicate with one another using XML-based web services over HTTP.

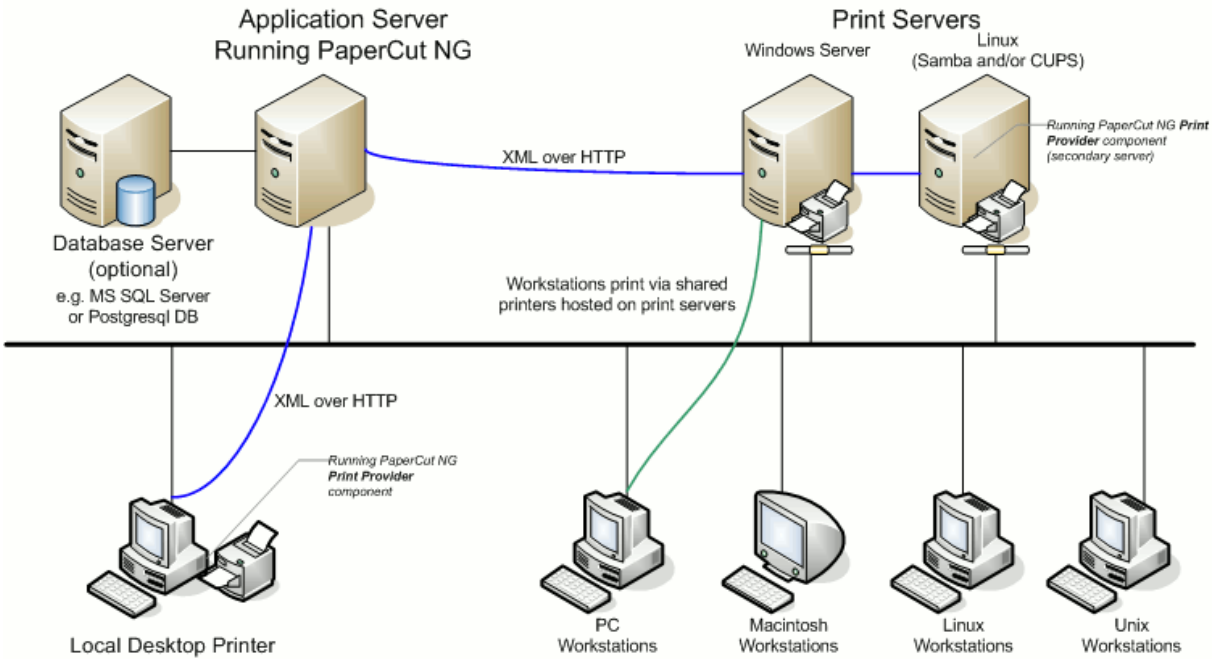

Figure 1: Architecture - an advanced configuration

A more detailed explanation of the architecture and support for multiple servers, Web Print servers, server clustering, and payment gateways is provided in subsequent sections of this User Guide.

1.4. The top-ten hidden features!

Much of PaperCut NG/MF flexibility and usefulness comes not from the features you can see, but from the advanced hidden features. PaperCut NG/MF is packed full of handy tools, utilities and options and you will read about these throughout this guide. To provide a quick overview now, the most popular hidden features are:

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1.4.1. One: Zero-install User Client deployment

PaperCut NG/MF is implemented using 100% server-side logic and no client software is required. A simple lightweight User Client is, however, provided so end users have access to advanced features such as shared accounts and the option of viewing their account balance in a popup window.

Deploying client software can be a time consuming and fiddly process. To streamline the process PaperCut NG/MF allows its client to be run directly off a network share - you do not need to install locally, or mess around with deployment tools! Just set the executable as a startup program and it runs and auto-updates itself thereafter.

See User Client for more information.

1.4.2. Two: Remote administration

1.4.3. Three: Mobile Printing & BYOD

Mobile Printing & BYOD enables printing from user-owned devices without the overhead of installing printer drivers and managing workstation authentication to the server.

For example, in Web Print Microsoft Office or Adobe PDF files are uploaded using the same User Web Tools available on network computers. Mobile Printing & BYOD is fully integrated into PaperCut's standard print charging/accounting/quota process. It does not matter if you're a staff user allocating to a faculty or department account, or a student charging to your free print quota, the user account allocation experience the same as that seen when printing from a networked desktop system.

PaperCut's Mobile Printing & BYOD has been widely deployed across education campuses and is an ideal solution for offering print services via student owned laptops, netbooks or hand held devices.

See for more information.

1.4.4. Four: Shared accounts

Many organizations want to track their printing on more than a per-user level. With shared accounts, users can allocate jobs to cost areas such as Faculties, Departments, Projects, Clients, Cost Centers, or Pools. Shared accounts are selected via a customizable popup window. Two popup window types are available:

- *Standard* - A simple account selection window design ideal for most users.
- *Advanced* - An advanced account selection window designed for the power user including features such as search, preference list, recent selections, comment entry and invoicing options. This is ideal for businesses including Engineering, Law, Accounting and Architecture Firms.

Access to accounts is controlled via integrated network group membership or optionally PIN's.

See Shared accounts for more information.

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1.4.5. Five: Secondary servers and Site Servers

PaperCut NG/MF is an enterprise level application designed to be managed and controlled from a central location. Multi-server environments are common in large organizations and PaperCut NG/MF handles them with ease. All servers are configured to report back to the central *Application Server*. This ensures that all management, logging and control is centralized. Secondary servers and workstations with local printers run a light weight monitoring component that communicates to the central server via XML Web Services calls.

You can compliment secondary servers with a Site Server, which ensures continuity of print services even if the Application Server is unavailable due to a network outage. For more information, see Resiliency with Site Servers.

Servers and workstations can run the Site Server and secondary server software on any supported operating system no matter what operating system is used on the Application Server because PaperCut NG/MF supports mixed or heterogeneous networks as well!

See Multi-server and multi-site deployments for more information.

1.4.6. Six: Scripting

Scripting can be applied on a per printer basis to provide programatic control during the print process. Possible applications include:

- Route the job to the cheapest compatible printer and notify the user of the change (least-cost routing)
- Prompt users to print large color jobs on a compatible low cost grayscale printer
- Charge printing during class time to the department
- Inform user when printer is in error and suggest a compatible alternative

See Advanced scripting (print scripting) for more information.

1.4.7. Seven: Customizable web interface

The end user interface can be quickly customized to make it look like an official part of your organization's infrastructure. With some simple HTML, you can make the PaperCut NG/MF end user interface look just like your existing web site or intranet site.

See Customize the User web interface for more information.

1.4.8. Eight: XML Web Services and command-line control

Many things these days are Web Services enabled. Not to be outdone, PaperCut NG/MF exposes dozens of API's via secured XML Web Services. This provides advanced administrators and developers with the ability to programmatically remotely control, integrate and manage the application. The possibilities are endless... some of our users now have their library fines hooked into the PaperCut NG/MF system!

In addition to the Web Services API's, SysAdmins can hook into the inner workings of PaperCut NG/MF using server commands and scripting.

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With server commands you can use batch files or scripts to automate system functions such as:

- Schedule "online" backups to coordinate with your existing backup processes. You do not need to take the system down to take a data snapshot.
- Create users in PaperCut NG/MF automatically and as part of your existing user creation scripts.
- Automatically import/sync list of accounts from a file, 3rd party system or existing directory structure. (Great for Engineering and Architecture firms)

See The XML Web Services API and Server commands (server-command) for more information.

1.4.9. Nine: 3rd party database support

PaperCut NG/MF ships with its own preconfigured and self-maintaining database. The system, however, is database independent and can be run on top of a number of leading database systems. Maybe you have an existing Microsoft SQL Cluster and want to take advantages of this infrastructure. No problem! PaperCut NG/MF can be quickly configured to hook into your preferred database.

See Deployment on an external database (RDBMS) for more information.

1.4.10. Ten: The development team

Software is only as good as the development process. PaperCut NG/MF is developed in an open and transparent fashion by a small development team. Suggestions and feedback are encouraged and source code access is provided to our customers. The team works closely with key system users to architect new features. A member of the development team is online for 8 hours a day and is always happy to chat. Come visit us on our Live Web Chat page!

See the PaperCut Software website https://www.papercut.com for more information.

1.5. Example user information sheets

Usually administrators are responsible for educating users about policy or system changes when PaperCut NG/MF is deployed on their network. Providing the right information and guidelines for users is important for the success of any new system.

This section contains examples of information sheets that you can distribute to users. The purpose of these information sheets is to assist the administrator in providing important information about the new system and how to use it. These examples can act as templates or starting points for your own information sheets.

You can enhance the information sheets to include information such as:

- Details of your organization's printing policy, such as the standard cost per page and whether or not more printing balance can be added after the user has run out.
- Location of the printers.
- How to report problems or receive assistance, such as refunding a failed print job.

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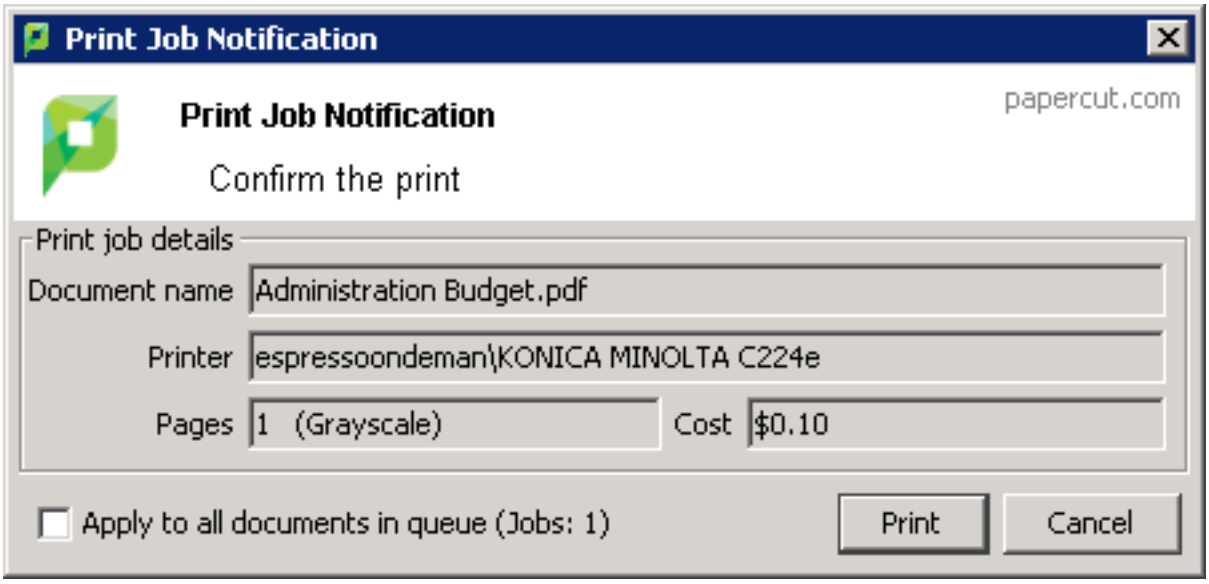
- How to contact the help desk.
- How to provide feedback about the new system.

1.5.1. Example 1: Printing with the popup confirmation window

New software to manage printing costs has been installed on the network. To allow effective printing, make sure you understand the following points:

1.5.1.1. Popup Confirmation dialog

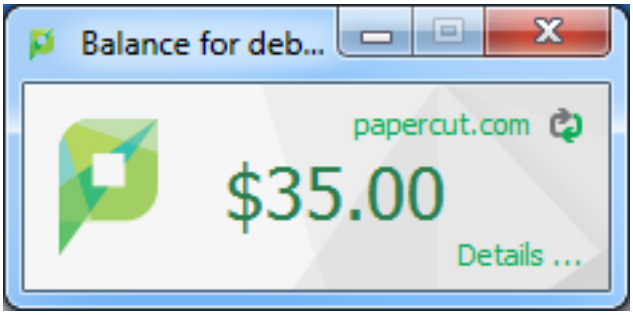
After sending a print job, a popup dialog is displayed asking you to confirm the details. Click **Print** to confirm the job and agree to the cost. Otherwise, click **Cancel** if you no longer want to print the job.



Note:
Large documents might take a while to display the number of pages and cost.

1.5.1.2. The Printing Balance window

After logging on to a workstation a window showing your printing balance is displayed.



If the balance window is not visible (or if you have closed or minimized it) click the icon in your system tray to show it again.

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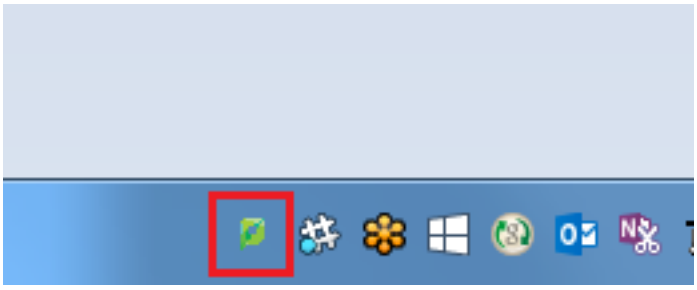


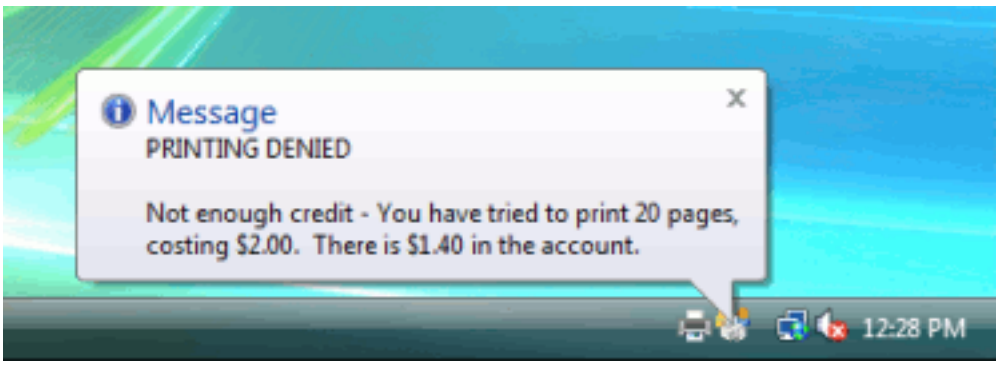
When you confirm a print job by clicking **Print** in the popup dialog the cost is deducted from your printing balance.

1.5.1.3. Resolving problems

If the popup window is not displayed or the icon is missing from your system tray, the print control system is not active and printing is denied. Try restarting your system, or ask for assistance if problems continue.

1.5.1.4. Printing denied message

If you do not have enough printing balance for a job, a **Printing Denied** message is displayed, and your document will not be printed.



1.5.1.5. Apply to all documents in queue

This option is displayed at the bottom of both the standard and advanced account selection. When checked, the settings being applied to the current print job are applied to all waiting jobs automatically. The text lets you know how many jobs this affects (e.g. "Jobs: 5").

This setting is useful when printing a batch of documents for the same purpose. For example, when printing a letter, diagram and spreadsheet for a client, the client account can be selected on the account selection popup along with any other appropriate settings, and the settings are applied to all three jobs. This saves the time taken to apply the settings for each job.

1.5.2. Example 2: Printing with shared accounts (for staff)

New software to manage printing costs has been installed on the network. The system allows the college to track printing expenses according to the individual, faculty or department. To allow effective printing, make sure you understand the following points:

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1.5.2.1. Shared account selection popup window

After sending a print job, a popup dialog is displayed asking you to confirm the details. The print job can be charged to your personal account (using your personal printing balance), or to a shared account (a faculty, using the faculty budget). After choosing an account to charge, click **Print** to confirm the job and agree to the cost. Otherwise, click **Cancel** if you no longer want to print the job.

Select your personal account when printing non-faculty related documents. For example:

- Printing your personal bank or phone statement.
- Occasional personal use of a photo printer.

Select a shared account for faculty printing. For example:

- Student handouts.
- Student reports.
- Course syllabus.
- Class lists.

Selecting the right faculty account from the list is important. Different staff members need access to different faculty accounts. If an account that you require is missing from the list, please contact the SysAdmin. Note that the use of faculty accounts is monitored and faculty heads are provided with printing reports.

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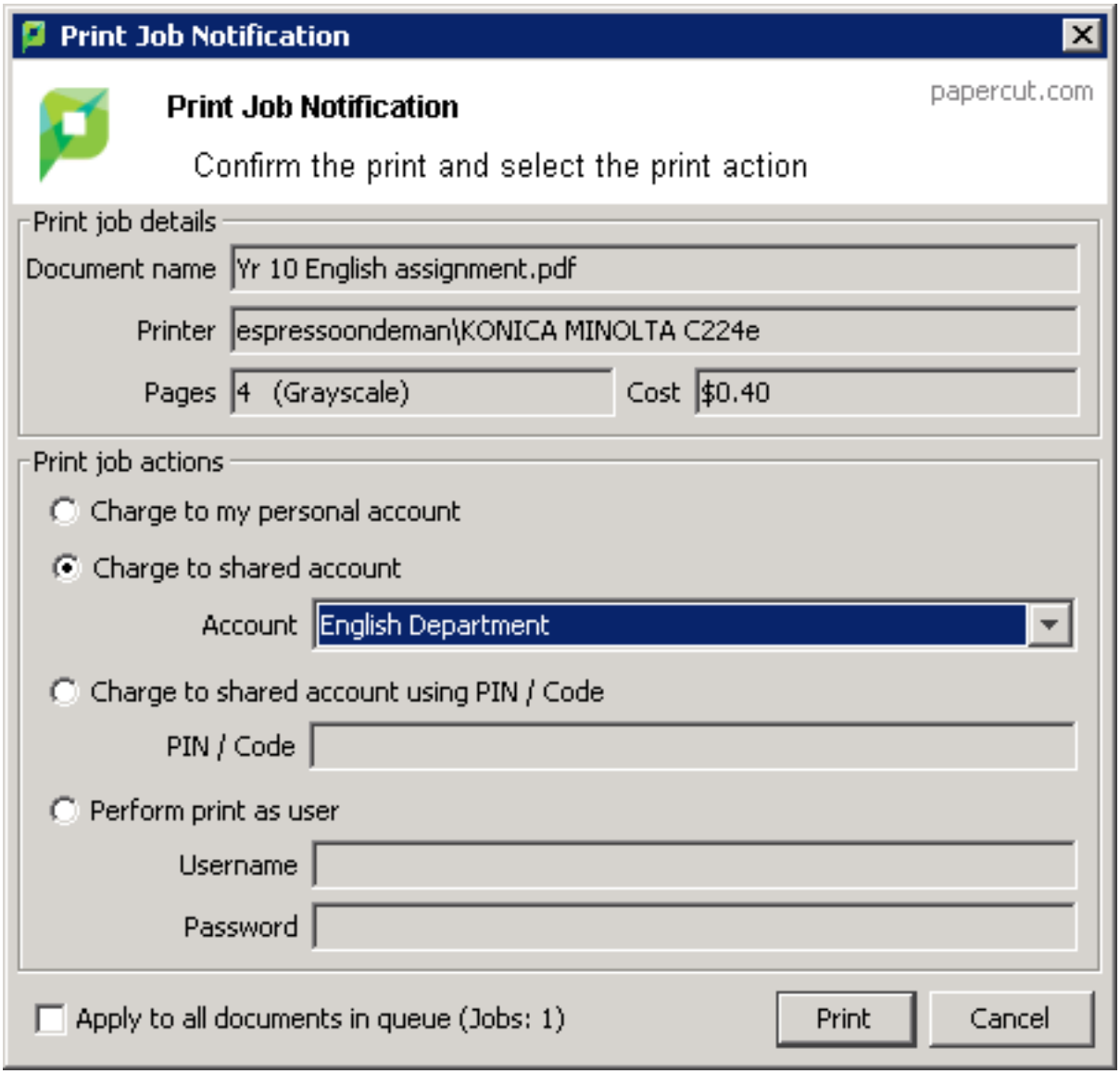
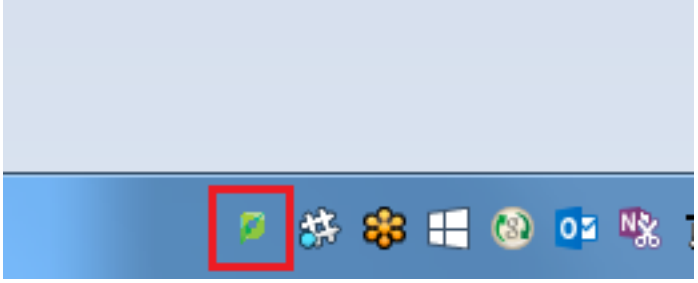


Note:
Large documents might take a while to display the number of pages and cost.

1.5.2.2. Resolving problems

If the popup window is not displayed or the icon is missing from your system tray, the print control system is not active and printing is denied. Try restarting your system, or contact the network administrator if problems continue.



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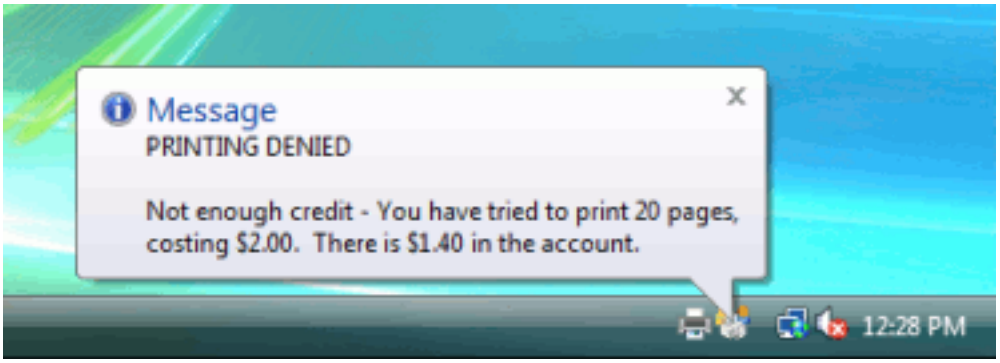
1.5.2.3. Printing denied message

If you do not have enough printing balance for a job, a **Printing Denied** message is displayed, and your document will not be printed.



1.5.2.4. Apply to all documents in queue

This option is displayed at the bottom of both the standard and advanced account selection. When checked, the settings being applied to the current print job are applied to all waiting jobs automatically. The text lets you know how many jobs this affects (e.g. "Jobs: 5").

This setting is useful when printing a batch of documents for the same purpose. For example, when printing a letter, diagram and spreadsheet for a client, the client account can be selected on the account selection popup along with any other appropriate settings, and the settings are applied to all three jobs. This saves the time taken to apply the settings for each job.

1.5.3. Example 3: Printing using a Release Station

The printing procedure has been changed on the network. Now when you print a job, it is not printed immediately, but instead is held in a queue. You need to attend a Release Station and release the job to print. This new system ensures that you are present and ready to collect your job.

1. Select Print from your application (e.g. **File > Print**)
2. Walk up to the Release Station located next to the printer.
3. Log in to the Release Station using your network username and password.

4. After login the system displays a list of print jobs. Search for your document by looking for your user name or document name.

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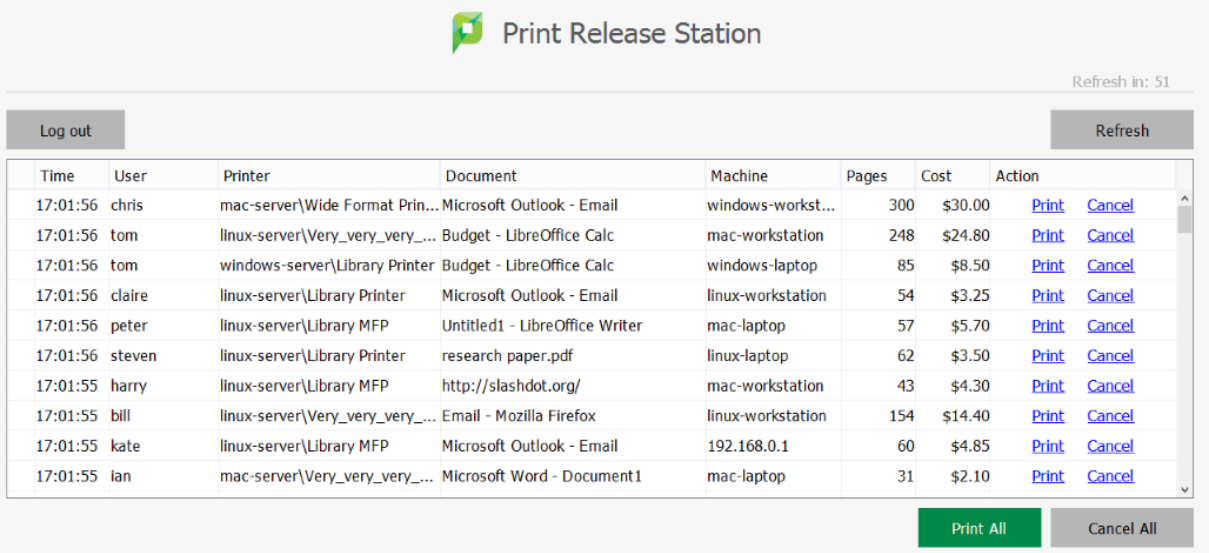

Note: If you can't find your print job, it might have 'timed out'. Print jobs are held by the Release Station for 30 minutes. If they have not been released after this time they are deleted.

5. Check the cost and details of the job.
6. Click **Print** to release the job. It can take up to 30 seconds for the printer to warm up after clicking **Print**.

1.5.4. Example 4: Refunding a print job (for staff)

Selected staff members have been granted access to refund print jobs in the new print control system.

Reasons for refunding a print job include:

- There was a paper jam or the document failed to print correctly.
- The document failed to print at an acceptable quality.

As a staff member, you will make an assessment about whether or not to issue a refund. A print job can be fully or partially refunded. A full refund is the more common scenario.

1.5.4.1. Refund

To issue a refund:

1. Log in to the PaperCut NG/MF Admin web interface at `http://servername:9191/admin` using your network username and password.
2. Find the user to refund from the **Users** tab by entering their username in the **Quick find** box or clicking their username.
3. Click the **Job Log** tab. The recent print jobs printed by the user is displayed, with the most recent at the top.
4. Find the print job that needs refunding; then click the **refund** link next to it.

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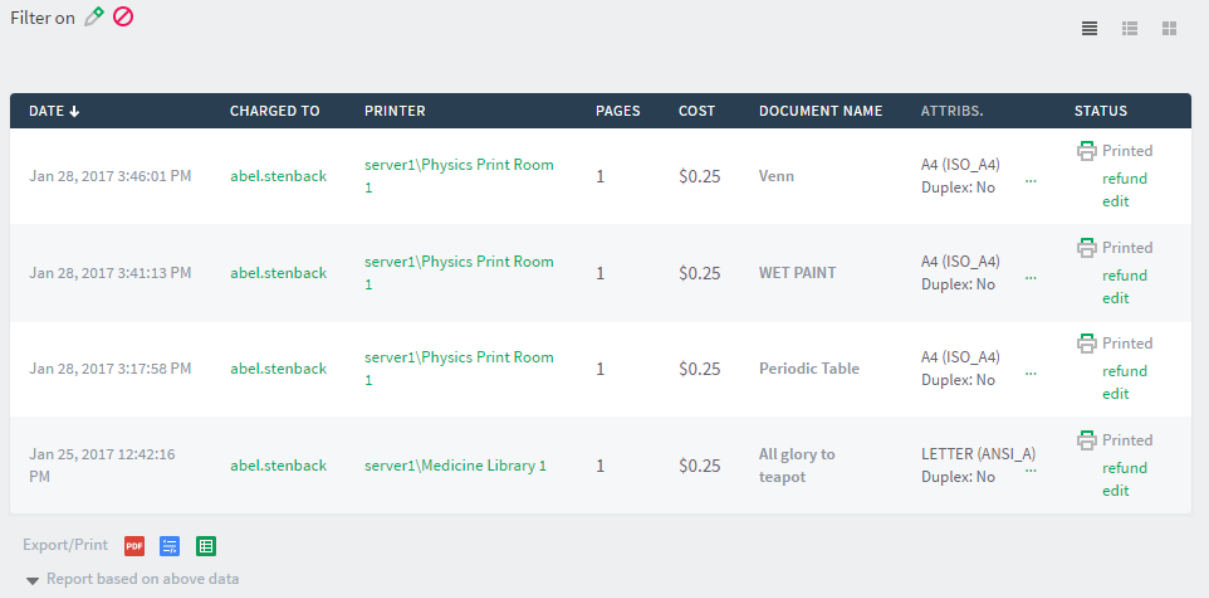
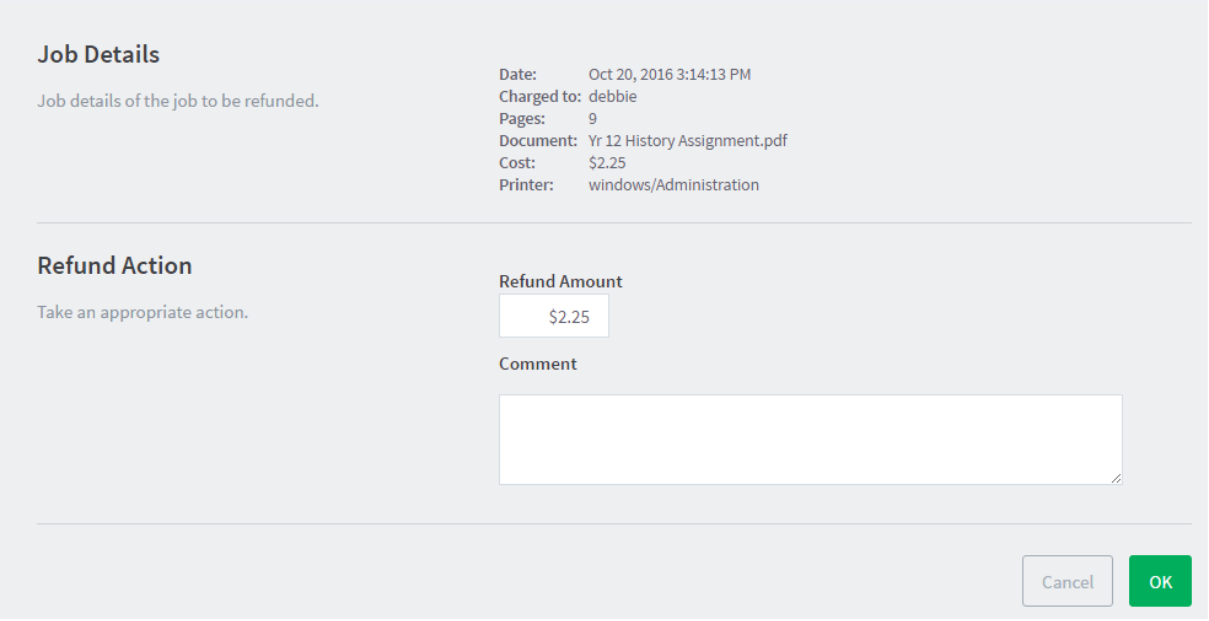


5. Enter a comment.



6. Click **OK**.

1.5.4.2. Process refund requests

Users can send refund requests via the User web interface. For more information, see Refund print jobs.

To process a refund request:

1. Select **Printers > Refunds**.

   The **User Refund Requests** page is displayed.
2. Locate the user's refund request.
3. To approve/reject click the **approve**/ **reject** link.

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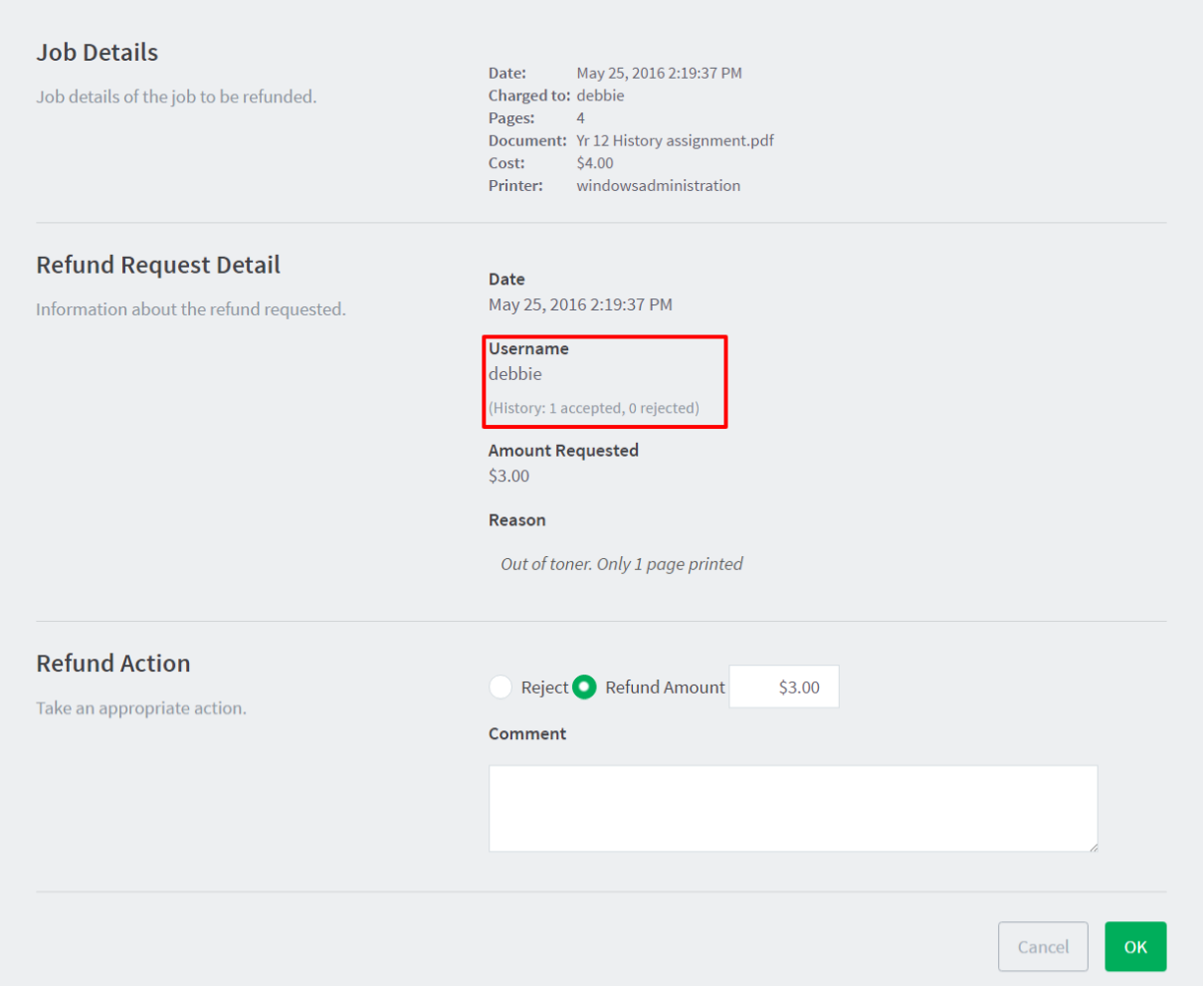
4. To view an overview of user's refund requests, click the **other** link. Use this to edit the refund amount and write a comment.



1.5.5. Example 5: Adding credit using a TopUp/Pre-Paid Card

New software to manage printing costs has been installed on the network. Without sufficient printing credit in your account, printing is denied. To add more credit you can buy TopUp/Pre-Paid Cards from the nominated venues around the college. Each card is a voucher or coupon with a unique number. Make sure your card number is kept secret until use.

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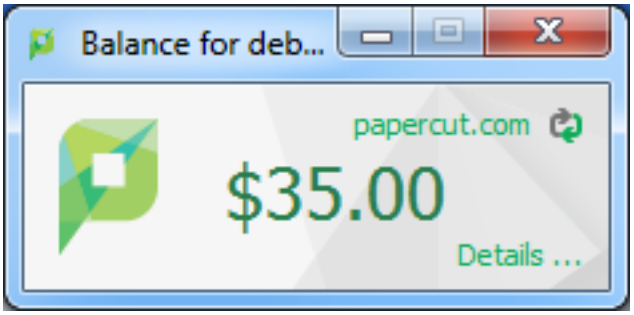
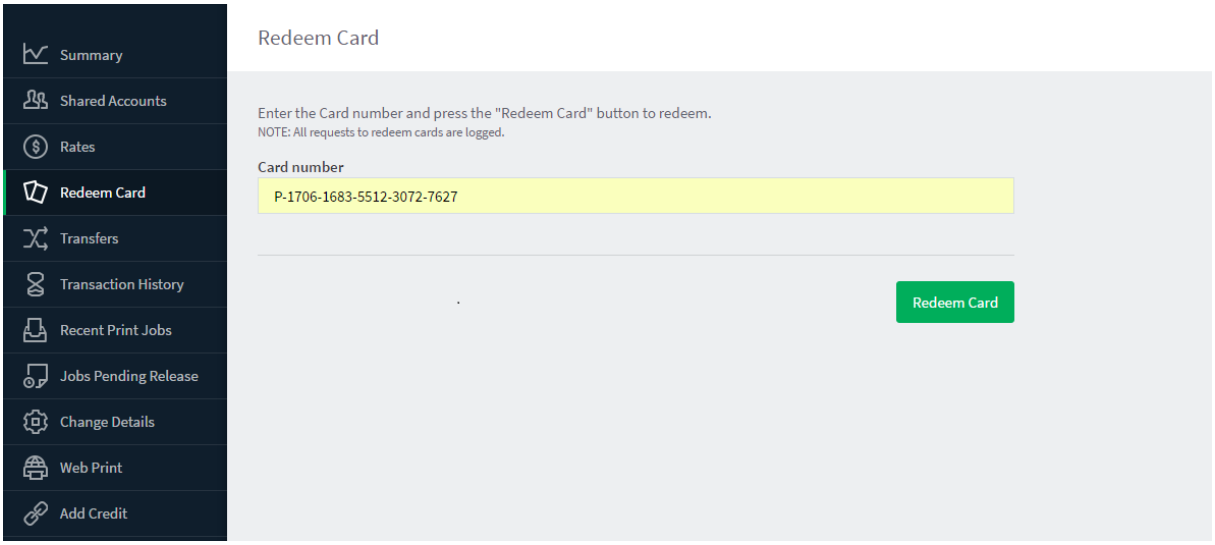
To add credit to your account using a card:

1. Log in to a computer. Soon after login, your printing balance window is displayed.
2. Click the **Details** link on the balance window.



   A web page is displayed requesting your network username and password.
3. Log in to the User web interface.
4. In the left hand menu, click **Redeem Card**.
5. Enter the number from the card. Enter it exactly as shown on the card including any dashes (-).



6. Click **Redeem Card**. The value of the card is immediately be added to your printing balance.
7. Click **Summary** from the left menu and check your balance to confirm the card's value has been added to your account.

Note:
The card is valid for a single usage only. Recycle or dispose of the card after use.

1.5.6. Example 6: Printing from a wireless network or laptop (Web Print)

The Web Print system allows students to print to college printers from their own laptops without installing drivers. It works by offering a facility to upload documents in formats such as PDF, DOC etc using a standard web browser. You access Web print from the print system's User Web Tools.

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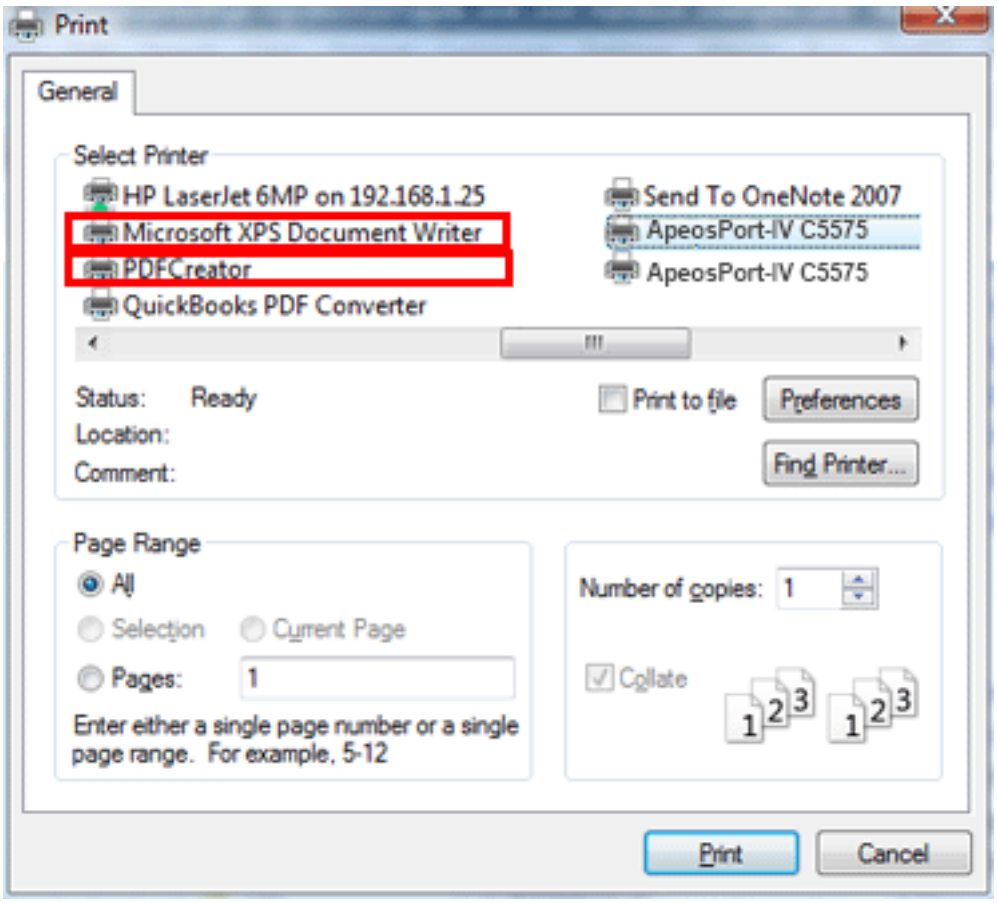
The system can print documents that have the following file formats:

Table 2: Web Print Supported Applications and File Formats

Application	File Format(s)
Picture File	BMP, DIB, GIF, JFIF, JIF, JPE, JPEG, JPG, PNG, TIF, TIFF
Adobe Reader 9, Adobe Reader X (10), Adobe Reader XI (11)	PDF
Microsoft Office Excel 2007, 2010, 2013, 2016, 365	XLS, XLSX, etc.
Microsoft Office PowerPoint 2007, 2010, 2013, 2016, 365	PPT, PPTX, etc.
Microsoft Office Word 2007, 2010, 2013, 2016, 365	DOC, DOCX, etc.
Microsoft XPS Document Writer	XPS

Free PDF printers are available for download from several websites such as PDF Creator. Printing from any application using the normal print function produces a PDF document that you can upload using this system.

All Vista and higher versions of Microsoft Operating Systems have a virtual XPS printer that works similarly to the PDF printers.



To print a document:

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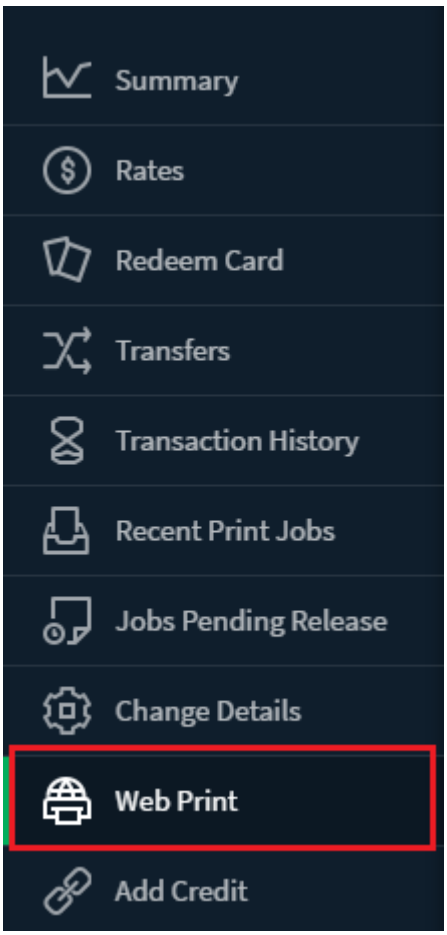
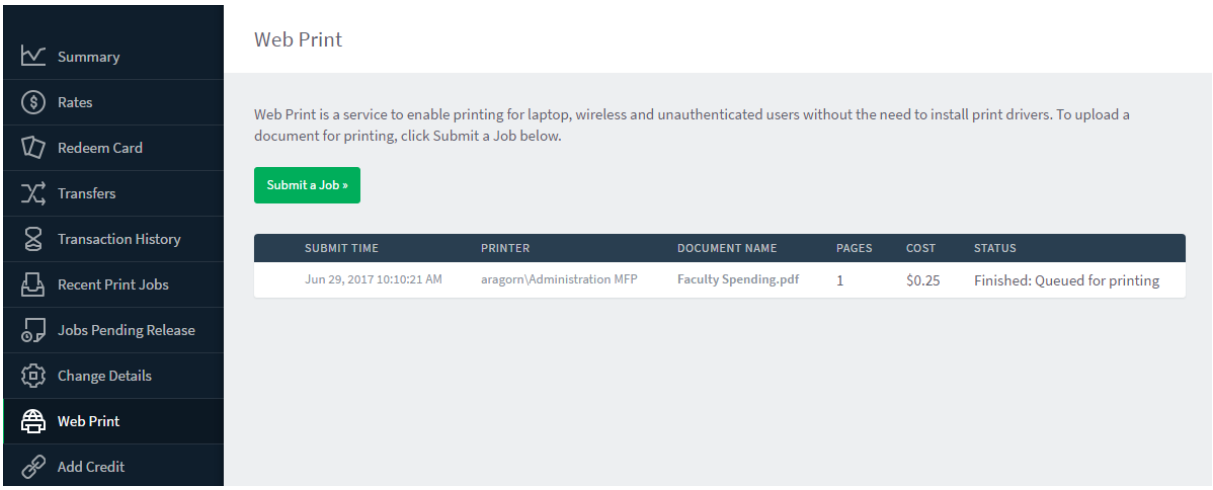
1. Open your browser to `https://[server-name]:9192/user` and log in using you network username and password. Select the **Web Print** link in the navigation menu.



2. The front page contains a list of your active and recently submitted Web Print jobs. At first the list is blank. Later the list shows the status of submitted jobs.



You might see a message at the top of the Active Jobs page with other information that you need to know to use Web Print.

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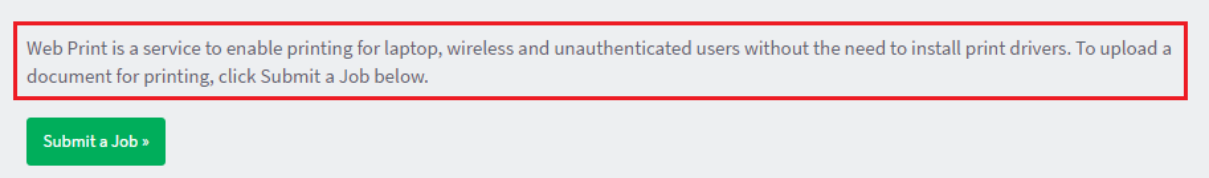
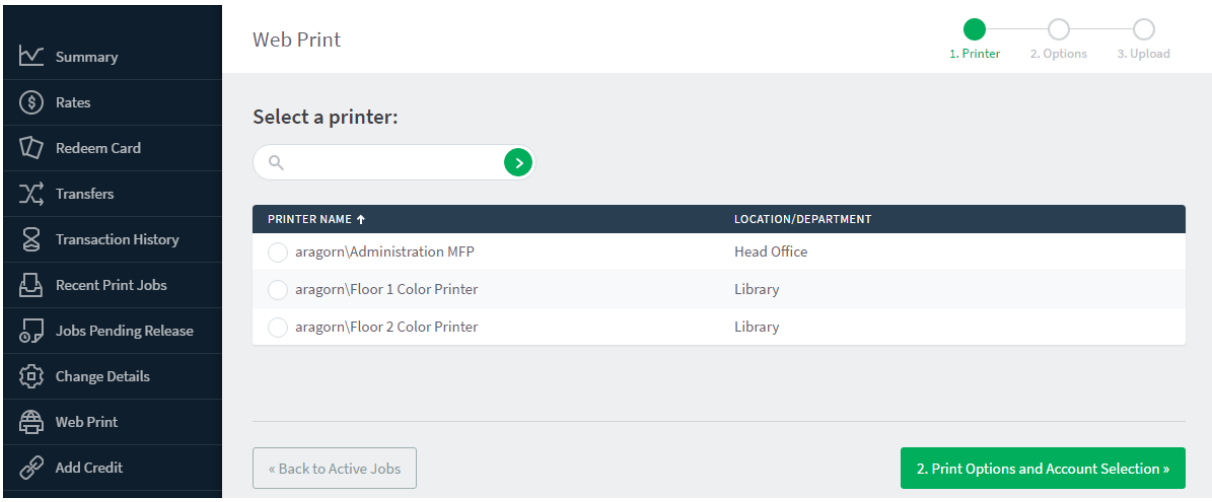
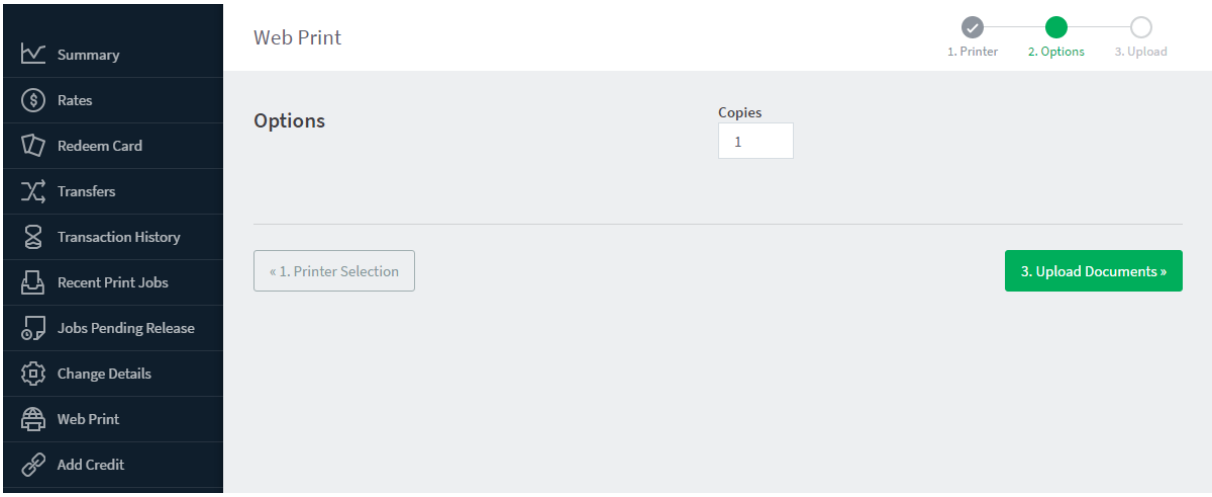


3. Click **Submit a Job** to start the Web Print wizard.
4. The first step of the Web Print wizard is selecting a printer where your job will be printed.



Instead of the Printer List you might see a click able map or other graphical representation of the printers that are available.

5. Select the number of copies to print. (Users who have permission to print to shared accounts will see additional options on this page.)



6. After selecting the print options and/or account selection settings, the third and final step in the Web Print wizard is to upload a document to print. This page lists the applications and associated file extensions that are supported. Once you have selected a document and clicked **Upload & Complete**, the file uploads to the server.

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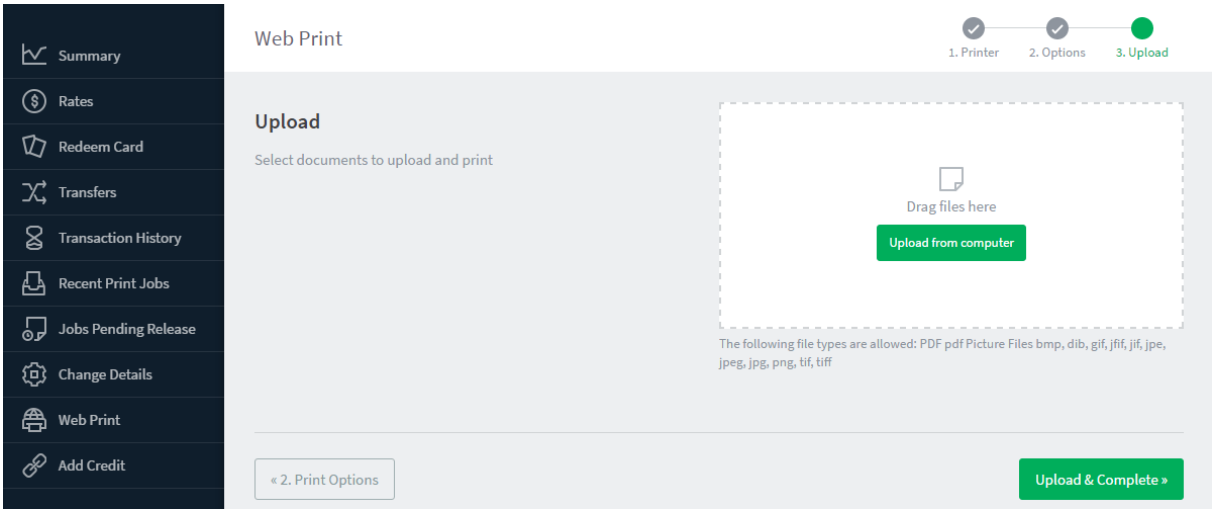

7. Once the document upload is complete you are returned to the front Web Print page. The table now displays the status of your job. Jobs can be queued during times of high load. The status changes to indicate the progress of the job from rendering to printing, and job details such as cost and number of pages is populated when known. You can stay at this page to track the status of the job or navigate away or close the browser. The job will not be affected.

> **Note:**
> If the printer selected in step 4 has print release enabled, your job is held until you release it by logging into the Release Station.

1.6. About this guide

The PaperCut NG/MF Manual covers the setup, management and configuration of PaperCut NG/MF.

For information regarding how to configure and install PaperCut NG/MF, see the Quick Start Guide in Tour, and the accompanying sections, such as Configuring secondary print servers and locally attached printers. Prior to installing the application, take a few moments to read key sections of this manual. In addition, people new to print control might also find the accompanying implementation guide available from the PaperCut Software website useful in managing the deployment process.

The latest version of this manual in HTML and a printable PDF format are available from the PaperCut Software International Pty. Ltd. website at https://www.papercut.com.

1.6.1. Prerequisites

PaperCut NG/MF is a network based server application. Experience with basic network concepts, such as server administration and network connectivity is expected. Prior to installing or evaluating PaperCut NG/MF you should be familiar with:

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- The concept of sharing printers and print servers
- Understanding of client-server relationships
- Understanding of basic security concepts such as permissions, groups and users.

1.6.2. Terminology used in this document

To make reading this manual easier, the names of all of the screens, tabs and actions from PaperCut NG/MF are marked up in a different font. The **User Details screen** for instance.

A sub-screen or tab is indicated with an arrow. **User Details > Adjustments** means: select *Adjustments & Charges* tab from the *User Details* screen.

User Interface Buttons are indicated by: Click **OK**.

System output and keyboard input is indicated with a `different` font as well.

Field labels are indicated by **Username**.

Note:
Note are marked like this.

Tip:
Tips provide useful advice to make your life easier.

Example:
Examples of how the function could be used.

Important:
Important notes are marked like this.

Caution:
Indicate situations where you have to be careful what you are doing.

Caution:
Where extreme care has to be taken.

1.7. Licensing and support

This section describes how to install the PaperCut NG/MF license you receive after purchase, and also provides information about gaining support and assistance.

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1.7.1. Installing a license

PaperCut NG/MF licenses are issued as a digitally signed file. Installing the license file into the application enables the software for use within your organization.

To install the license file supplied by your vendor:

1. Save the license file to your hard disk. Your desktop is a handy location. Files are typically named `PaperCut NG/MF-[orgname].license`.

   Tip:
   There is no need to unzip the file. You can load the file into the system as supplied.

2. Click the **About** tab.
3. In the **Register** area, click **Browse**.
4. Locate the license file saved in step 1; then click **Open**.
5. Click **Install license**.
6. Verify license information is correctly listed in the **About** page.

   Note:
   The file supplied is a digitally signed and zipped text file containing your license information. It's converted to ZIP format to minimize size. If you're interested in viewing the contents of the file, rename the file to .zip and open it in any ZIP extraction utility.

If you have a question about your license or need assistance please email the PaperCut Software International Pty. Ltd. technical support team and they are more than happy to assist you.

1.7.2. Technical support & further information

The PaperCut Software development team is always happy to assist customers with further technical questions. Please feel free to contact us via email or phone. The development team can also be contacted via the live web chat feature available on the PaperCut Software International Pty. Ltd. website at http://www.papercut.com/.

You can also find lots of other useful information in the Knowledge Base located at: https://www.papercut.com/kb/ The Knowledge Base is updated regularly and is a good place to start if your question is not addressed in this user manual.

1.7.3. End User License Agreement (EULA)

END USER LICENSE AGREEMENT

1. ***AGREEMENT***

   This End User License Agreement is between PaperCut Software International Pty Ltd (ACN 124 440 400) of Level 1, 3 Prospect Hill Rd, Camberwell, Victoria, 3124, Australia

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(PaperCut), and:

a. if there has been no charge for the license (an Evaluation License), the company or other entity that installed the Software for the purpose of the evaluation; or

b. if there has been a charge for the license (a Production License), the company or other entity that applied for the Production License as set out in the Company Details tab on the Website.

2. *DEFINITIONS*

Affiliate means an entity owned by, controlling, controlled by, or under common control with, directly or indirectly, an entity. For this purpose, one entity "controls" another entity if it has the power to direct the management and policies of the other entity (for example, through the ownership of voting securities or other equity interest, representation on its board of directors or other governing body, or by contract).

Agreement means the terms and conditions in this End User License Agreement and the Support Policies, and, if this is a Production License any details in the Contract Details, as may be amended by a Variation.

Authorised Platform means servers, workstations, printers, multi-function devices and mobile devices that are owned, leased or controlled by You or Your Affiliates on which the Software is designed to be used.

Confidential Information means any non-trivial, non-public information, however recorded, preserved, disclosed or communicated (whether directly, indirectly, orally or by writing), disclosed by either party or its Representatives to the other party or its Representatives in connection with this agreement that is or, ought to have been, understood by the parties using reasonable business judgment, to be confidential. The Software and related documentation, License Keys and this agreement, including the terms, pricing and Fees payable, are agreed to be the Confidential Information of PaperCut.

Contract Details means the details of any transaction for a Production License that relate to the Software license, including the maximum number of Users (or other license metric that is applicable to the particular Software program), the Maintenance & Support service and applicable Fees and Taxes, that are advised to You and/or are selected, or entered, by You on the Website prior to You placing Your order for the Production License, or to which You have otherwise agreed in writing with PaperCut.

Discloser means the party that makes a disclosure of Confidential Information.

Effective Date means:

a. for an Evaluation License, the first date of installation of the Software on any of Your Authorized Platforms; or

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b. for a Production License, the date outlined where the person clicked "I Agree" during the sign-on process.

Evaluation License means the right to use the Software in accordance with clause 4.1.

Expiration Date means the last day of the production license period you may use the software.

Fees means the amount payable for the relevant Software license, the Maintenance & Support service or other items acquired under the Agreement, as applicable, exclusive of Taxes.

Fixed Term means the period between the Effective Date and the Expiration Date.

Intellectual Property Rights means copyright, moral rights, trade mark, design rights, service marks, patent, semiconductor or circuit layout right, trade secrets, know-how, database rights or other rights in the nature of intellectual property rights (whether registered or unregistered), or any right to registration of such rights, existing anywhere in the world, or protected by statute from time to time, whether created before, on or after the Effective Date.

License Key means any form of license file, lock, password or other mechanism that may be used to control access to, or manage use of, the Software.

PaperCut Marks means all trademarks, service marks, logos or other words or symbols identifying the Software, Maintenance & Support service,PaperCut Customer Care service or PaperCut's business (whether owned by PaperCut or any PaperCut Affiliate), , and all trademarks, service marks, logos or other words or symbols identifying any third party software that is licensed by the third party to PaperCut and integrated in the Software.

Maintenance & Support means the services described in clause 5.

Production License means the right to use the Software in accordance with clause 4.2.

Recipient means the party that receives a disclosure of Confidential Information.

Representatives means the employees, agents, contractors of a party, or those of any Affiliate, and the professional representatives of a party providing advice in relation to this Agreement, including the lawyers, bankers, auditors, accountants and insurers of a party.

Software means the object code version of PaperCut's software program made available to You, and any Updates and Upgrades that may be made available to You by PaperCut in its discretion, under this Agreement. The term Software does not include any beta, pre-release or other special release programs.

Support Polices means PaperCut's document that describes the policies, processes and scope of support services for the Software, as are posted on the Website under the heading

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'Support'. The Support Policies may be updated by PaperCut in its discretion from time to time.

Taxes includes goods and services taxes or other sales taxes, duties, withholding taxes, levies, imposts or other charges or duties levied by any federal, state or local government which arise out of or in connection with the Software, Maintenance & Support service or this Agreement, and any interest, penalties or liabilities incurred on such amounts, but excludes taxes based on the net income of PaperCut.

Update means any bug fixes, patches or workarounds for the Software that have been produced primarily to overcome defects in the Software without significantly altering the functionality of the Software.

Upgrade means a version of the Software that has been produced primarily to extend, alter or improve the Software by providing additional functionality or performance enhancements (whether or not defects are also corrected). Upgrades do not include any software that is marketed by PaperCut as a different product. PaperCut shall determine in its discretion whether any software is an Upgrade or a different product.

User means an identifier (individual's name or generic term such as "purchasing officer") that is listed as a user in the Software's database. Any User that is defined by a generic term may only be used by a single individual. All Users from You and/or Your Affiliates who have identifiers listed as users in the Software's database are included in aggregate in the total number of Users.

Variation means any addition, deletion or substitution to any part of this Agreement that is made in accordance with this Agreement.

You (and Your) refer to the other party to this Agreement, being the entity that is the licensee of the Software.

Website means PaperCut's website from which You can acquire the Software, Maintenance & Support service, additional Software programs, add more Users or other license usage or extended Your Maintenance & Support service.

3. *AGREEMENT AND LICENSE*

3.1 In the case of an Evaluation License, the person that installs the Software and clicks "I Agree" during the installation process warrants to PaperCut that he/she has authority to enter into this Agreement on behalf the entity that is his/her employer.

3.2 In the case of a Production License, the person that clicked "I Agree" during the sign-on process warrants to PaperCut that he/she has authority to enter into this Agreement on behalf the entity that was entered into the Company Details tab on the Website during the sign-on process.

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3.3 By using the Software You accept this Agreement as from the Effective Date, and acknowledge that You are bound by the terms and conditions of the Agreement

3.4 PaperCut may send a "proof of purchase" confirmation email or other document (Order Confirmation) after You acquire a Production License, summarizing the Contract Details. If You do not notify PaperCut in writing of any discrepancy in the Contract Details as set out in the Order Confirmation within 48 hours of receiving it, then you accept the Contract Details as set out in the Order Confirmation.

3.5 PaperCut will send a notification email to the nominated address confirming EULA acceptance. This notification will inform you that personal data is collected, stored and retained with PaperCut for the purpose of providing our software and service in accordance with our Privacy Policy.

Evaluation

3.6 If You requested a free-of-charge Evaluation License for the Software (via the Website or other means), then PaperCut will make the Software available for You to download from the Website, subject to Your acceptance of this Agreement. If You accept this Agreement then You acquire an Evaluation License, from the Effective Date until the license is terminated in accordance with clause 3.7. There is no Fee payable for an Evaluation License.

3.7 PaperCut does not provide Maintenance & Support services for Evaluation Licenses, but may, in its discretion, provide assistance, advice and error correction services to support Your evaluation of the Software.

3.8 A Evaluation License:

a. terminates automatically after 40 days from the Effective Date, unless extended by agreement with PaperCut;

b. will be terminated if the Agreement terminates in accordance with clause 12.

Upgrading to a Production License

3.9 You may upgrade an Evaluation License to a Production License by completing and agreeing the Contract Details via the sign-on process on the Website and agreeing to pay the relevant Fees and Taxes. You may also order Maintenance & Support services at the same time. The Production License and any Maintenance & Support service will be provided on the terms and conditions of this Agreement. In the case of a Production License, PaperCut will provide You with a License Key to enable You to use the Software.

Production License

3.10 Where you acquire a Production License by agreeing to the Contract Details with PaperCut, including by completing the Contract Details in the sign-on process, then You acquire a license for the Software in accordance with clause 4.2 and the right to receive and install any Updates for that Software that may be issued by PaperCut from time to time. You

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must install Updates promptly, especially Updates that have been made available for security issues. There are no additional Fees for this right to receive Updates.

Limited Feature Validity of License

The Scan to Cloud feature will only be activated with the Production License during the Maintenance & Support period. When this period ceases, the Scan to Cloud service may be deactivated.

The OCR Reader feature will only be activated with the Production License during the Maintenance & Support period. When this period ceases, the OCR Reader may be deactivated.

Maintenance & Support

3.11 Where You ordered Maintenance & Support services in the Contract Details, upon acceptance of your order, PaperCut will provide the Maintenance & Support services for 12 months from the Effective Date in accordance with clause 5.

Additional Licenses, Usage or Maintenance & Support.

3.12 If You wish to add more Software programs, add more Users or other license usage, or extended Your Maintenance & Support service – and such items are available from PaperCut at the time, You may order those items by completing and agreeing to the relevant Contract Details with PaperCut via the Website, and agreeing to pay PaperCut's then current Fees and Taxes for such items. Any such items will be provided on the terms and conditions of this Agreement.

3.13 If You do not extend Your Maintenance & Support service so that Maintenance & Support service is provided continuously, and subsequently wish to reinstate Maintenance & Support service, then You must back pay all the Maintenance & Support service fees outstanding prior to the Maintenance & Support service being reinstated..

Variations

3.14 Subject to clauses 3.9 and 3.12, this Agreement, or any part of it, may be varied by the parties agreeing to the Variation in writing (and the Variation will be binding when both parties have signed the Variation).

4. *LICENSES*

Evaluation License

4.1 From the Effective Date until the license is terminated in accordance with this Agreement, PaperCut grants You a non-exclusive, non-transferable, limited use license solely to install and run the Software on one or more computers that are Authorized Platforms, so You and your Affiliates can evaluate the Software to determine whether to acquire a Production License. Under this Evaluation License You and Your Affiliates may use the Software for testing and evaluation in a production environment prior to the termination of the Evaluation License.

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Production License

4.2 Subject to PaperCut's receipt of the applicable Fees and related Taxes in accordance with the Contract Details, PaperCut grants You a non-exclusive, non-transferable, indivisible, limited use license solely to install and run the Software on one or more computers that are the Authorized Platforms, for use by You or Your Affiliates from the Effective Date until the license is terminated in accordance with this Agreement, for:

a. up to the maximum number of Users or other license metric set out in the Contract Details, for Your internal business data processing/printing requirements in accordance with, and subject to any other limitation of use set out in, the Contract Details; and

b. for testing, disaster recovery and backup (hot or cold), without additional Fees.

c. For a Fixed Term Production License:

   (i) terminates automatically at the Expiration Date, unless extended by agreement with PaperCut;

   (ii) will be terminated if the Agreement terminates in accordance with clause 12.

Delivery and installation

4.3 PaperCut will make the Software available for download from the Website. If You specifically request, PaperCut will ship to You a physical copy of media with the software loaded on it, at additional cost. You are responsible for copying and installing the Software on the Authorized Platforms. You must follow any instructions provided by PaperCut when installing the Software. All Software is deemed to be accepted by You upon successful installation on the first Authorized Platform.

Prohibited Actions

4.4 Nothing in this Agreement permits You to:

a. use the Software to provide any facility management or service bureau service, or for the benefit of any third party (other than an Affiliate);

b. disclose the Software or any online or hardcopy documentation related to the Software to any third party (other than an Affiliate);

c. adapt, translate, publish, communicate to the public, or create any derivative work or translation of the Software, unless expressly permitted by law;

d. sub-license, lease, rent, loan, assign, novate or otherwise transfer the Software to any third party;

e. reverse engineer, reverse compile, decompile or disassemble the object code of the Software or any part of the Software (or other underlying data), or otherwise attempt to derive the source code of the Software, except to the extent the permitted by law;

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f. use any part of the Software other than as an integrated part of the overall Software program;

g. remove, alter or obscure any PaperCut Marks, or any proprietary or restricted use notice on the Software;

h. allow the Software to become the subject of any charge, lien, encumbrance or security interest; or

i. deal in any other manner with any or all of Your rights and obligations under this Agreement.

Compliance

4.5 You acknowledge and agree that the License Key may prevent, hinder or reduce availability of features where You are using the Software in excess of the usage rights that You have agreed to pay for.

4.6 During the period of this Agreement and for 2 years thereafter, You must permit PaperCut, or its nominee, to inspect and have access to the Software, the usage logs in the Software, and to any records kept in connection with this Agreement, for the purposes of ensuring that You (and Your Affiliates) are complying with the terms of this Agreement. If PaperCut requires access to Your offices (or those of Your Affiliates) in order to access the Software or the relevant records then:

a. PaperCut must provide reasonable advance notice to You;

b. any access must be during business hours or other times agreed by You;

c. PaperCut must use reasonable endeavors to minimize any disruption to Your business; and

d. if PaperCut uses a nominee to conduct the inspection, such nominee must not be a competitor to You and must sign a non-disclosure agreement with PaperCut that protects any information found during the inspection on terms that are no less protective than those terms that are included in clause 9 of this Agreement.

5. *Maintenance & Support*

5.1 This clause 5 applies during the period when You have acquired Maintenance & Support services for a Production License.

5.2 If and when PaperCut makes an Update or Upgrade generally available to customers with Maintenance & Support services for the Software, the Update or Upgrade will be made available to You at no additional charge. You must, at your own cost, download and install the Update or Upgrade within a reasonable period.

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5.3 If You (or any of Your employees or employees of any of Your Affiliates) believe that there is a defect in the Software, those employees should report it to Your internal support desk personnel, and Your internal support desk personnel should report it to PaperCut's support email address 24/7, or call PaperCut's support helpline during business hours. You must ensure that Your internal support desk personnel are technically competent and trained in the use of Software. They must use reasonable efforts to resolve the issue prior to contacting PaperCut for assistance.

5.4 PaperCut will use its best efforts to provide a remedy or a workaround for any defect in the Software that is reported to its support helpline in a timeframe that is reasonable, given the nature of the issue and the impact on Your business operations.

5.5 PaperCut shall have no obligation to provide Maintenance & Support services:

a. for any Software which has not had any Update or Upgrade installed prior to the date that PaperCut has notified its customers as being the "end of life" date for that version. PaperCut shall provide its customers with at least 90 days' notice by posting notice on the Website of an "end of life" date for that particular version;

b. to any adaptations, translations or derivative works made to the Software; or

c. for any Evaluation License.

5.6 PaperCut shall have no obligation to provide Maintenance & Support services where faults arise from:

a. misuse, incorrect use of or damage to the Software from whatever cause (other than any act or omission by PaperCut), including failure or fluctuation of electrical power;

b. failure to maintain the necessary environmental conditions for use of the Software;

c. use of the Software in combination with any equipment or software other than Authorized Platforms;

d. any breach of Your obligations under this Agreement;

e. having the Software maintained by a third party; or

f. user error.

5.7 If it is necessary for PaperCut to attend Your (or Your Affiliates') premises to provide Maintenance & Support services, or PaperCut determines that the work it performed in relation to a logged issue was caused by any of the items in clause 5.6, then You must pay for such work at PaperCut's then current Fees and charges as well as any expenses (and travel time) incurred by PaperCut in performing such work.

5.8 Maintenance & Support Plus – PaperCut offers extended support services beyond standard business hours based on the same terms of support at an additional cost to You.

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6. *FEES AND TAXES*

6.1 PaperCut will provide You with the ability to download the Software from our Website as an Evaluation License for use in accordance with this Agreement without charge.

6.2 Where You agree on the Contract Details to pay the Fees, charges and Taxes for any Production License, Maintenance & Support, additional Software, additional Users or extended usage rights, further period of Maintenance & Support or other thing acquired under this Agreement by credit card (or other online payment mechanism supported by PaperCut) then you must complete the relevant details and authorizations stated on the Website. PaperCut will provide you with a tax invoice/receipt promptly following receipt of Your payment.

6.3 Where You agree on the Contract Details to pay the Fees, charges and Taxes for any Production License, Maintenance & Support, additional Software, additional Users or extended usage rights, further period of Maintenance & Support or other thing acquired under this Agreement following receipt of a tax invoice, PaperCut will provide You with a tax invoice for the Fees and Taxes at the start of the license or the supply of the service, and You must pay this tax invoice within 14 days of receipt.

6.4 You are solely responsible for ensuring that PaperCut receives the net amount of the Fees for any transaction under this Agreement. This means:

a. You must pay any fee for receiving the Software on physical media;

b. You must pay any fee associated with the use of a credit card (or other payment mechanism accepted by PaperCut);

c. You must pay any fee associated with a bank charge or transfer fee;

d. You must pay any fee incurred by PaperCut for any charge back or other payment failure, plus PaperCut's administration fee for dealing with a failed payment (other than where a refund of the Fees is required to be provided by law););

e. You are responsible to pay all Taxes. All payments under the Agreement must be made free and clear and without deduction for any and all present and future Taxes. Payments due to PaperCut under the Agreement must be increased so that the amounts received by PaperCut, after provision for Taxes and all Taxes on such increase, will be equal to the amounts required under the Agreement as if no Taxes were due on such payments.

6.5 You irrevocably authorize PaperCut to deduct from your credit card (or any debit card accepted by PaperCut) any amount due and payable under this Agreement without further reference to You.

6.6 You must pay a late charge for any failure to make any payment by the date required under the Agreement, calculated daily using a rate that is 4% over the Reserve Bank of

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Australia's Cash Rate, from the date that the payment first becomes overdue, to the date that the payment is received by PaperCut, both dates inclusive.

6.7 If any Fee, charge or Tax is not received by the required date, PaperCut may suspend Your access to the Software or suspend or cease providing services to You until the outstanding amounts (including applicable late charges, damages, costs and expenses) are paid. You do not have any claim for breach of contract or otherwise for any action taken by PaperCut under this clause.

7. *TRADEMARKS*

7.1 You acknowledge and agree that PaperCut is the owner and/or licensee of the PaperCut Marks. You do not acquire any right to use, or interest in, any of the PaperCut Marks. You must not at any time or in any way assert any ownership of, or any right in, the PaperCut Marks and You must not contest the right of PaperCut or any PaperCut Affiliate or any of their licensors to the use of any of the PaperCut Marks.

7.2 PaperCut will not use Your (or those of Your Affiliates) trademarks, logos or branding without your prior written consent. You give us consent to incorporate any trademark, logo or branding that You provide us into the Software in order to take advantage of the Software features that allow the use of customers' branding. PaperCut may disclose the fact that You (and Your Affiliates) are customers and the nature of Your (and Your Affiliates') use of the Software to third parties in private conversations and documentation, but PaperCut will not use Your name (or the names of Your Affiliates) in PaperCut's general marketing materials, websites, etc., without Your prior written consent.

8. *PROPRIETARY RIGHTS*

8.1 All Intellectual Property Rights created by any person that are adaptations, translations and derivative works in the Software or related documentation, are and shall remain the exclusive property of PaperCut (and its licensors, if any) or shall vest in or be transferred to PaperCut immediately upon creation, as the case may be.

8.2 Except for the rights expressly granted by PaperCut to You under this Agreement:

a. PaperCut and its licensors, if any, reserve all right, title and interest in and to the Software or related documentation and all Intellectual Property Rights in them;

b. no right, title or ownership interest in or to the Software or related documentation whether by implication, estoppel or otherwise, is granted, assigned or transferred to You under or in connection with this Agreement.

8.3 You must not make any unauthorized copies of the whole or part of the Software or related documentation. You acknowledge and agree that the unauthorized disclosure, use or copying of the Software or related documentation may cause PaperCut serious financial loss that may not be adequately compensated by monetary damages. Accordingly, in the event of any unauthorized disclosure, use or copying of the Software or related documentation, You agree

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that PaperCut shall have the right to seek injunctive relief to stop such unauthorized disclosure, use or copying.

Third Party Proprietary Rights:

8.4 Third party software. The Software may include third party software from whom PaperCut has obtained a licensed right.

Licenses for Attributions to third party software and relevant license information are provided in the file THIRDPARTYLICENSEREADME.txt in the root folder of the Software installation.

9. *CONFIDENTIAL INFORMATION*

9.1 The Recipient must not use any of the Discloser's Confidential Information except in connection with the performance of its obligations specified in this Agreement.

9.2 The Recipient must not disclose the Discloser's Confidential Information to any third party without obtaining the Discloser's prior written consent, provided that the Recipient may disclose the Discloser's Confidential Information to:

a. its employees, agents and contractors, and those of any of its Affiliates, who have entered into a written agreement with the Recipient that is no less protective of the Discloser's Confidential Information than this Agreement provided those persons have a need to know such information for the purposes of this Agreement;

b. to its lawyers, bankers, auditors, accountants and insurers, who have a need to know the information in order to provide professional advice to the Discloser relating to this Agreement.

9.3 You must ensure that each person who is issued with a License Key does not disclose their License Key to any other person.

9.4 The Recipient must use, and must ensure that any person to whom it is permitted by this Agreement to disclose the Discloser's Confidential Information to uses, the same measures to protect the Discloser's Confidential Information as it uses to protect its own confidential information, but in no event less than reasonable measures.

9.5 The restrictions in this clause 9 shall not apply to information that:

a. is independently developed by the Recipient without any access to the Confidential Information of the Discloser;

b. becomes known to the Recipient without restriction, from a third party who, to the Recipient's knowledge, was not bound by a confidentiality agreement with the Discloser, or otherwise prohibited from disclosing the information to the Recipient, or had the right to disclose it;

c. was available to the Recipient on a non-confidential basis prior to disclosure by the

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Discloser;

d. was lawfully in the possession of the Recipient before the information was disclosed to it by the Discloser, and that was not subject to a confidentiality obligation;

e. is or becomes part of the public domain through no act or omission of the Recipient;

f. the parties agree in writing is not confidential or may be disclosed; or

g. is required to be disclosed under an order or requirement of a court, administrative agency, or other governmental body (but only to the minimum extent required to comply), provided however, that Recipient shall provide prompt notice to Discloser of any potential disclosure and shall use its reasonable efforts to prevent disclosure of such information..

Privacy

9.6 The parties must:

a. comply with the requirements of the any privacy law in the country in which the party is located and in any country to which the personal information is to be sent; and

b. only use, manipulate, store and handle personal information for the purposes of meeting its obligations under this Agreement.

9.7 You warrant that:

a. Each individual about whom PaperCut will obtain personal information from You as a result of this Agreement has agreed to the handling and processing of his or her personal information as outlined in our Privacy Policy;

b. You have obtained the informed consent from each individual about whom PaperCut will obtain personal information from You as a result of this Agreement, including the individual's consent to transfer his or her personal data outside of his or her country of residence as outlined in our Privacy Policy; and

c. PaperCut, its Representatives and their permitted successors, assignees and sub-licensees may use that individual's personal information in any manner that may be reasonably contemplated by this Agreement, including a transfer overseas for the purpose of providing support and error correction services, and as outlined in our Privacy Policy. Consent to use of data

9.8 You agree that PaperCut may collect and use technical information – including but not limited to technical information about your system setup, license, and feature usage – that is gathered periodically to facilitate the provision of Software updates, product improvement, product support and other services to You. PaperCut may use this information to improve, provide, and develop our products, services and technologies. PaperCut will not disclose this information in a form that personally identifies you.

9.9 Obtaining Updates

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a. By clicking the "Check for updates" button, You authorize PaperCut to gather system, version and licensing information to facilitate the provision of software updates, product support, and other services to You (if any) related to the PaperCut software.

b. You agree that our systems may from time to time automatically update the PaperCut Mobility Software that You have installed to a newer version. This may involve the automated collection of system information. ou agree to receive these automatic updates without any additional notice.

10. *LIMITATION OF LIABILITY*

10.1 Except as set out in this Agreement, to the extent permitted by law, and subject to clause 10.2, PaperCut's total, cumulative liability to You (and Your Affiliates) for any claim whether it be for breach of contract (including under an indemnity), in tort (including negligence), breach of statutory duty or otherwise, arising out of or in connection with the Software, the Maintenance & Support service, this Agreement or the relationship between the parties, shall be limited to:

a. where the claim arises in connection with the Software, the total of all Fees paid by You for the Production License; or

b. where the claim arises in connection with the Maintenance & Support, the total of all Fees paid by You for the Maintenance & Support during the Maintenance & Support year in which the claim first arose; or

c. or any other claim, USD$10,000

10.2 To the extent permitted by law, PaperCut will not be liable for any loss, damage or expense which is indirect, consequential, special or exemplary damages, nor for any lost profits, lost revenue, lost data or business interruption, even if PaperCut has been advised of, knows of, or should have known of the possibility of such loss, damage or expense.

10.3 You acknowledge and agree that owing to the nature of the Software, PaperCut does not represent or warrant that:

a. access to the Software will be continuously available; or

b. the Software will be error free.

10.4 You act as agent for Your Affiliates in respect of this Agreement and are responsible to PaperCut for their acts and omissions.

11. *INDEMNIFICATION*

11.1 In addition to any rights You may have at law, PaperCut undertakes at its own expense to indemnify and defend You or, at PaperCut's option, settle any claim or action brought against You alleging that the use or possession of the Software in accordance with this Agreement infringes any Intellectual Property Right enforceable in the United States, Canada, United Kingdom, any country in the EU, Switzerland, Australia, New Zealand, China, Hong Kong,

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Singapore and Japan (an "Infringement Claim") and shall be responsible for any losses, damages, expenses or costs (including reasonable legal fees) incurred by, or awarded against You as the result of, or in connection with, any such Infringement Claim, provided that:

a. You promptly notify PaperCut of the Infringement Claim in writing, specifying the nature of the claim in reasonable detail and providing access to, and copies of, documents, software any other material, that are relevant to the Infringement Claim, as well as providing prompt access to any Representative who may be relevant to PaperCut's defense of Infringement Claim;

b. You do not make any admission of liability, agreement or compromise in relation to the Infringement Claim without the prior written consent of PaperCut;

c. You grant PaperCut the sole right to defend, negotiate and settle the Infringement Claim, at PaperCut's expense, or at PaperCut's option, PaperCut may permit You to defend the Infringement Claim in which case:

   (i) PaperCut will pay any costs associated with Your defense, and will provide security for such costs; and

   (ii) You must follow any reasonable request from PaperCut to avoid, dispute, defend and/or compromise the Infringement Claim;;

d. You provide PaperCut with reasonable assistance, at PaperCut's expense, to defend, negotiate and settle the Infringement Claim.

11.2 PaperCut will have no obligation under this clause 11 or otherwise with respect to any Infringement Claim based upon:

a. any use of the Software not in accordance with this Agreement, or documentation provided by PaperCut;

b. the combination, operation or use of the Software with any other product, equipment, business method, software or data;

c. any modification of the Software by any person other than PaperCut or its authorized agents or subcontractors; or

d. any use of the Software after PaperCut has provided You a new software version, patch or correction that would have overcome the infringement.

11.3 If any Infringement Claim is made, or in PaperCut's opinion is likely to be made, then PaperCut may (at its sole option and expense) either:

a. procure for You the right to continue using the affected Software, or substantially similar software that does not substantially affect the functionality of the Software, in accordance with this Agreement;

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b. replace or modify the affected Software so that it becomes non-infringing but performs substantially the same functions; or

c. if neither (a) or (b) is commercially reasonable, as determined in PaperCut's sole discretion, then PaperCut may terminate Your rights to use the affected Software and pay damages of up to an amount of the Fees paid for the license for the Software.

11.4 Subject to any rights that You may have under statute, this clause 11 states PaperCut's entire liability and Your sole and exclusive remedy for any claims related to any infringement of the Intellectual Property Rights in respect of the Software..

12. *TERMINATION*

12.1 PaperCut may immediately terminate this Agreement for cause by giving You written notice if You:

a. breach any of the provisions of clauses 4, 6, 7.2, 8.3, 9 or 13.5;

b. breach any other provision of the Agreement and You do not remedy it within 14 days of PaperCut providing You written notice of the breach;

c. cease to carry on business, are unable to pay Your debts as they fall due, You enter into liquidation or have a controller, managing controller, liquidator or administrator appointed or suffer any similar event in any jurisdiction; or

d. merge with, sell substantially all of Your assets, or You are subject to a change of control. A "change of control" shall be deemed to occur when an entity acquires fifty percent (50%) or more of Your voting shares or equity interest, or fifty percent (50%) or more of Your assets, in the event of a change of a majority of Your Board of Directors (or majority of the partners if a partnership), or if there is any other effective change of control.

12.2 You may immediately terminate this Agreement for cause by giving PaperCut written notice if PaperCut:

a. breaches any of the provisions of this Agreement and PaperCut does not remedy it within 30 days of You providing PaperCut written notice of the breach; or

b. ceases to carry on business, is unable to pay its debts as they fall due, enters into liquidation or has a controller, managing controller, liquidator or administrator appointed or suffer any similar event in any jurisdiction.

12.3 If this Agreement terminates:

a. any license for Software and its related Maintenance & Support terminates immediately;

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b. each party shall immediately return to the other – or at the other party's request, destroy – any of the other's Confidential Information;

c. You must ensure that all copies of the Software installed pursuant to this Agreement are uninstalled and deleted from all hardware in your possession or control within 14 days of the date this Agreement is terminated.

12.4 Any termination of this Agreement shall not prejudice, limit or restrict any other rights or remedies either party may have arising prior to such termination. To the extent permitted by law, PaperCut shall be under no obligation to refund any amounts paid by You for any of the Software or Maintenance & Support services that have been provided prior to any termination of this Agreement.

13. *GENERAL*

Notices

13.1 Any notice that is given under this Agreement:

a. by PaperCut NG/MF may be:

(i) posted to You;

(ii) emailed to You at any email address provided by You;

(iii) included on any invoice (which may be emailed or posted to You); or

(iv) posted on the Website. You must review the Website regularly for notices.

b. by You must be posted to PaperCut at the address stated on the latest invoice.

13.2 A notice is deemed to be received:

a. when posted from Australia to an address in Australia; within 3 business days of the date when it was posted;

b. when posted from an address outside of Australia, within 7 days of the date when it was posted; or

c. when emailed; within 1 business day of the date that the email was sent, provided no notice of failure has been received by the sender;

d. when posted on the Website, within 3 business days of the date it was posted.

Relationship of Parties

13.3 The parties to this Agreement are independent contractors. Nothing in this Agreement shall be deemed to create an agency, employment, partnership, fiduciary or joint venture relationship between the parties, constitute any party the agent of another party, nor authorize any party to make or enter into any commitments for or on behalf of any other party.

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Compliance with Laws

13.4 You must comply with all laws which are relevant to You performing Your obligations under this Agreement.

Assignment

13.5 You must not assign or transfer this Agreement or any rights or obligations under this Agreement, in whole or part, without the prior written consent of PaperCut.

13.6 PaperCut may assign or transfer this Agreement, in whole or part, without Your consent to any PaperCut Affiliate or in connection with a merger, acquisition, or purchase of fifty percent (50%) or more of its assets. PaperCut may assign or transfer all or part of any of its rights to receive any Fees and Taxes or other monies due under this Agreement, to any person without Your consent. Notwithstanding clause 9, PaperCut may disclose any of Your Confidential Information which is reasonably necessary to affect any assignment or transfer.

Waiver

13.7 No failure or delay by a party to exercise any right or remedy provided under this Agreement or by law shall constitute a waiver of that or any other right or remedy, nor shall it preclude or restrict the further exercise of that or any other right or remedy. No single or partial exercise of such right or remedy shall preclude or restrict the further exercise of that or any other right or remedy.

Remedies

13.8 Except as specifically provided otherwise in this Agreement, the rights and remedies provided under this Agreement are cumulative and in addition to, and not exclusive of, any rights or remedies provided by law.

Severability

13.9 If any part of this Agreement is determined to be invalid, illegal or unenforceable by any court or competent authority, such part will be severed from the remainder of the Agreement and the remaining provisions will continue in force.

Force Majeure

13.10 Except for Your obligations to pay PaperCut under this Agreement, neither party shall be in breach of this Agreement nor liable to the other party for any failure or delay in performance caused by events beyond the party's reasonable control.

Agreement

13.11 All clauses which naturally survive termination of the Agreement, including clauses 4.6, 7.1, 8, 9, 10, 12.3(b), 12.4 and 13, will survive termination of this Agreement.

13.12 The parties are entitled to rely on any notice or communication in electronic format, including any facsimile or email, that on its face appears authentic, and that has the purported

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author's name on it to the same extent as if it were a document written by the author. The parties consent to this Agreement being signed or varied through electronic communication.

13.13 To the extent permitted by law:

a. PaperCut excludes any warranty or guarantee not expressly stated in this Agreement, whether express, implied or statutory, including any guarantees or warranties of acceptability and fitness for a particular purpose;

b. this Agreement constitutes the entire agreement between the parties regarding the subject matter and supersedes all prior or contemporaneous agreements, arrangements, understandings and communications, whether written or oral.

Export

13.14 You acknowledge and agree that the Software may be subject to applicable export and import laws. You agree not to export the Software or any direct product thereof, directly or indirectly in violation of these laws, nor will they be used for any purpose prohibited by these laws, including nuclear, chemical or biological weapons proliferation.

Governing Law

13.15 If You are resident, domiciled or incorporated in the USA, this Agreement will be governed by the laws of the State of Oregon, USA, without regard to its conflict of law principles. The parties submit to the exclusive jurisdiction of the courts in the State of Oregon. You hereby agree any claims will be brought exclusively in the federal or state courts located in Oregon and the parties hereby irrevocably consent to the personal jurisdiction and venue of the courts located in Oregon for the purpose of litigating any and all such claims.

13.16 If You are resident, domiciled or incorporated in the United Kingdom, this Agreement will be governed by the court of England and Wales, without regard to its conflict of law principles. The parties submit to the exclusive jurisdiction of the courts of England and Wales. You hereby agree any claims will be referred to and finally resolved by arbitration under the London Court of International Arbitration (LCIA) Rules and the parties hereby irrevocably consent to the personal jurisdiction and venue of the courts located in England for the purpose of litigating any and all such claims.

13.17 In all other cases, this Agreement will be governed by the laws of the State of Victoria, Australia, without regard to its conflict of law principles. The parties submit to the exclusive jurisdiction of the courts in the State of Victoria, Australia.

14. *COUNTRY-SPECIFIC PROVISIONS*

The following provisions apply to the extent required under local laws.

Australia:

Australian Consumer Law

14.1 Our goods come with guarantees that cannot be excluded under the Australian

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Consumer Law (ACL). You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

14.2 The Maintenance & Support services that are provided to remedy any defect in the Software may be a "Warranty Against Defects" as defined in the ACL.

The Maintenance & Support services are provided by PaperCut Software International Pty. Ltd. (ACN 124 440 400) Level 1, 3 Prospect Hill Rd, Camberwell, Victoria, 3124, Australia, tel +61 3 9809 5194, email address customer.service@papercut.com.

In order to make use of the Maintenance & Support services, You must contact PaperCut's support helpline during the period of your agreement for Maintenance & Support service using process in clause 5.3. When you make use of the Maintenance & Support services, PaperCut will use its best efforts to provide a remedy or a workaround for any defect in the Software in a timeframe that is reasonable given the nature of the issue and the impact on your business operations. This service is not available for Evaluation Licenses. The costs for the service in respect of the Production Licenses are included within the Fees that are set out in the Contract Details. No additional fees are payable by you for the Maintenance & Support for Production Licenses. You are responsible for any expenses you incur in using the Maintenance & Support. The benefits that we provide to consumers under our Warranty Against Defects are in addition to any other rights or remedies a consumer may have in respect of these goods or services under the ACL. The provision of Maintenance & Support services may result in the loss of user generated data.

14.3 To the extent permitted by law, PaperCut's liability for a failure to comply with any statutory guarantee is limited to one or more of the following, at PaperCut's option:

a. the replacement of the goods or the supply of equivalent goods;

b. the repair of the goods;

c. the payment of the cost of replacing the goods or of acquiring equivalent goods;

d. the payment of the cost of having the goods repaired, unless it is not fair or reasonable for PaperCut to rely on this term of the Agreement.

14.4 If You are entitled to the benefit of a guarantee under the ACL then in respect of goods and/or services which are not of a kind that are ordinarily acquired for personal, domestic or household use or consumption, PaperCut's liability for a failure to comply with such guarantee is limited to one of the following, at PaperCut's option:

a. supplying the goods and/or services again; or

b. payment of the cost of having the goods and/or services supplied again, unless it is not fair or reasonable for PaperCut to rely on this term of the Agreement.

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USA:

USA Government Rights

14.5 If You are a US civilian agency, the US government acquires certain parts of this commercial computer software and/or commercial software documentation or other technical data subject to the terms of this Agreement as specified in the 48 C.F.R. 12.212 (Computer Software) and 12.211 (Technical Data) of the Federal Acquisition Regulation (FAR) and its successors. If acquired by or on behalf of any agency within the Department of Defence (DOD), the US Government acquires certain parts of this commercial computer software and/or commercial software documentation subject to the terms of this Agreement as specified in 48 C.F.R. 227.7202-3 of DOD FAR Supplement (DFARS) and its successors. The US Government Rights clause is in lieu of, and supersedes any other FAR, DFARS or other clause or provision that addresses US Government rights in computer software or technical data.

European Union:

Data Protection Agreement

14.6 The transfer of personal data between the Controller (end user) and Processors (third parties), you are consenting to the disclosure of your personal data to entities or facilities located outside the country of your residence (including for the avoidance of doubt, outside of the European Union). In the event these entities or facilities are not located in your country of residence, PaperCut will be subject to the European Union General Data Protection Regulation 2016/279. You agree and acknowledge that PaperCut is not required to ensure that these entities or facilities comply with the privacy legislation of your country of residence.

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2. Installation

This section covers the initial installation and configuration of PaperCut NG/MF in your network environment. Initial installation takes only a few minutes on a currently configured server. This guide walks you through installation and configuration step-by-step. The process is summarized below:

1. System requirements check.
2. Download and install PaperCut NG/MF.
3. Complete the configuration wizard.
4. Test the client software.
5. Test printing and remote access.

PaperCut NG/MF is a cross-platform solution and the installation procedure varies depending on the target operating system(s).

- Windows: Quick install: Windows
- Mac: Quick install: Apple Mac
- Novell: Installation on Novell OES Linux (iPrint)
- Linux: Quick install: Linux (CUPS and/or Samba)

2.1. Implementation by example

PaperCut NG/MF is a feature-packed application designed to meet the print management requirements of all types of organizations. It's unlikely that any single organization would use or need all the features in PaperCut NG/MF. The key to a successful implementation is with identifying the features that are most needed, and utilizing them in the correct manner.

This section covers common implementation scenarios in a case study form. It discusses the requirements common to the scenario, and how these requirements are satisfied using key features. The aim of this section is to guide implementers towards identifying and utilizing the most appropriate features.

Locate the scenario that's the closest fit to your organization. It might also be beneficial to read other scenarios that might apply to your situation. For example, a large business can benefit from some of the ideas presented in the small business case and so on.

2.1.1. Scenario: The small school

Fast River School has a student population of 200 and caters to students in Kindergarten through 6th grade. A teacher is responsible for each class. The school has two computers in each class room and a small computer lab for older students. All computers are networked. A single server acts as a domain controller and a file and print server. The students in each year level log on to the computers using the username and password allocated to their class.

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Requirements

1. Each grade level has a monthly printing budget of $50.
2. If the budget is exceeded, teachers can discuss additional funding with the school principal.
3. Student use of color printers should be approved by teachers.
4. The teacher for each grade level should have access to activity reports in order to track the class's printing volume.
5. The school principal needs a summary report of class printing activity at the end of each semester.

Implementation

Initial installation

Install PaperCut NG/MF on the school's file and print server. The initial installation process is covered in Installation.

Requirement 1

You can automate the monthly budget by applying a $50.00 monthly quota to the `[All Users]` group. The domain login accounts used for each year level are automatically placed in the `[All Users]` group. For more information, see :

- Groups in PaperCut NG/MF
- Set up quota allocations

Requirement 2

Teachers can be warned when their class's balance has reached a low balance limit. The notification can be via email. The notification option is located under: **Options > Notifications > Low Balance Notifications** . Select the email option for email notifications.

Requirement 3

The SysAdmin can set up the printers so only selected users (i.e. teachers) can approve jobs issued to color printers. By selecting the **Only managers can release** option on a given printer, jobs are held in a queue. Teachers can then approve the student print jobs by accessing the web based release software accessed via the URL:

`http://server_name:9191/release`

Where `server_name` is the name of the organization's print server.

Requirement 4

Teachers can view print activity and account balance by connecting a web browser to:

`http://server_name:9191/user`

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Where `server_name` is the name of the organization's print server. Access to the end user pages is covered in Interface levels.

- **Requirement 5**

  Summary reports can quickly be generated by any user with PaperCut NG/MF's SysAdmin access. For more information about granting administrator access and running reports, see Assigning administrator level access.

2.1.2. Scenario: The large school

North Shore High has a student population of 2000 students. Their network consists of:

- Three student Windows PC labs and one Mac lab with other computers scattered around the school for student use.
- A mixture of Mac and Windows laptops used by staff.
- A Windows Active Directory environment hosted on a number of servers.
- Printers are hosted on two separate Windows servers.
- Some teaching staff have desktop printers attached locally to their workstations.
- Each lab has a black and white laser printer.
- Two high-end color copier/printers and large format printers are located in a print room situated away from the computer labs.

Students have their own login account and small home directories for storage.

Requirements

1. The system must support the mixed Mac and Windows environment.
2. The system should support multiple print servers and locally attached desktop printers.
3. The school wants to experiment with hosting printers on a Linux system with the aim of using Linux for print serving tasks to help save on future Windows licensing costs.
4. Students are to be granted a small $5 a month printing budget. Final year students have a $10 a month allowance.
5. If students need additional printing, they must purchase it. The payment process should be simple and easy to manage.
6. Jobs issued to printers situated in the print room should be held in a queue and only printed on the physical printers after the user has arrived at the room to collect the job.
7. Staff members should have the option of charging printing to department accounts or to a small personal account, depending on the type of print job.
8. Student printing should be archived for a period of 4 weeks. This allows IT staff to determine the individual students responsible for printing inappropriate material when incidents are reported.
9. The system should be proactively monitored to ensure as little disruption to the service as

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possible.

Implementation

Initial installation

The mixture of operating systems and multiple-servers makes this a complex installation. Prior to deployment, it is advisable for the network manager and/or network administrator to plan the deployment and familiarize themselves with the PaperCut NG/MF software.

Requirement 1

PaperCut NG/MF is a cross platform solution designed for all major operating systems. Given the existence of an existing domain environment, the installation of Windows systems is typically straightforward. The Macs, however, can be set up in a number of different ways. Network administrators should consult Mac printing in detail.

Requirement 2

Multi-server installations are commonplace on larger networks. One system needs to be nominated as the primary PaperCut NG/MF server. This system is responsible for running the "brains" of the system and storing all data. The other servers, *secondary servers*, report back to the central primary server via XML Web Services. The system architecture, deployment considerations, and recommendations are outlined in Multiple print servers.

Requirement 3

Linux is becoming ever popular in the server space. First web hosting, and now common file and print services are being serviced with the Linux operating system. PaperCut NG/MF is available for Windows, Mac and Linux systems. Not only that, its architecture allows all three systems to run side-by-side sharing a common central server. This school can experiment with hosting printers on Linux by running a Linux based secondary server alongside their main Windows servers. See Configure a Linux or Novell iPrint secondary print server for additional information.

Requirement 4

Quotas or allowances are allocated to users on a per-group basis. By adding network domain groups to PaperCut NG/MF that represent the respective student groups, SysAdmins can automate the allocation process. See Set up quota allocations for further information.

Requirement 5

The purchase of additional quota/credit is best managed by the TopUp/Pre-Paid Card system. The system reduces the data entry and management requirements associated with manual transactions. More information on TopUp/Pre-Paid Cards is covered in TopUp/Pre-Paid cards.

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- **Requirement 6**

  Print release in the print room is best achieved with the Release Station. By running a special full-screen application on a dedicated terminal in this room, students can release their jobs once they arrive at the room. The Release Station and secure printing in general is covered in detail at Secure print release.

- **Requirement 7**

  Tracking and allocating staff printing to departments is best achieved by using Shared accounts. When set up, teaching staff are presented with a popup window asking them to select an account to charge. You can control account access via domain group membership or via PINs. More information on shared accounts is available at Shared accounts.

- **Requirement 8**

  The requirement to archive, audit and view all print activity can be accomplished by enabling Print Archiving (viewing and content capture). This allows approved staff to visually inspect the contents of all print jobs.

- **Requirement 9**

  The requirement to proactively monitor the print system can be accomplished using the PaperCut System Health interface. This allows you to monitor your entire print environment using your existing monitoring tools, such as PRTG and Zabbix. You might already be monitoring the status of your printers and servers, which can help a lot, but often does not tell the whole story. It's not just about monitoring individual components, but also the overall system usage.

2.1.3. Scenario: The university

West Face University has a student population of 10,000 full-time students and off-campus and part-time students. IT services centrally control the network, however, individual faculties and departments also offer and manage some of the specialist IT infrastructure. All major operating systems are in used on both the workstations and servers.

Requirements

1. Centrally managed printers are hosted in a clustered print server environment. The solution needs to support clustering.
2. IT services wants to provide the option for department labs to also have their printers controlled via the central system.
3. User Client needs to be optional. It would be preferable for students to have access to their account details via a web browser.
4. The design of the web interface should be customizable.
5. The system must be secure and support SSL-based encryption.
6. The system should run on top of a database system and allow data access to facilitate custom

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reports using packages such as Crystal Reports.

7. An open source system would be preferable.

Implementation

Initial installation

University-wide deployments can be quite involved. Most large universities that have deployed PaperCut NG/MF have worked closely with the PaperCut NG/MF development team during implementation. A lot can be gained by arranging a teleconference or similar with the development team. We're always happy to help our customers deploy the ideal solution.

Requirement 1

PaperCut NG/MF supports clustering at all application layers including the print server, the database server, and the Application Server on both Microsoft Windows and Linux. Setting up PaperCut NG/MF in Microsoft Clustering Services is covered in Clustering and high availability. The PaperCut NG/MF development team has experience using Linux-HA (High-Availability Linux) and other tools to support customers who use Linux.

Requirement 2

Printers and labs hosted by individual faculties and departments outside the central IT services area can optionally be joined into the campus-wide system via PaperCut NG/MF's secondary server support. Central IT staff can approve these secondary servers via IP address and grant selected staff administrator level access to the system's Admin web interface on a case-by-case basis. See Configuring secondary print servers and locally attached printers for more information on secondary servers.

Requirement 3

PaperCut NG/MF's User Client, which is optional is most environments, allows users to access their accounts and view their account balance, transaction and printing history, and use advanced tools such as TopUp/Pre-Paid Cards and transfers. More information on the web-based users tools is available at Interface levels.

Requirement 4

You can easily change the design and layout of the User web interface using HTML and Cascading Style Sheets. Customizing the User web interface design is covered in Customize the User web interface.

Requirement 5

PaperCut NG/MF provides secure connections for report access and administration via SSL-based encryption. Larger universities often have their own certificate signing procedure for SSL

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based servers. PaperCut NG/MF can even accept these signed certificates. SSL-based encryption is set up by default and is accessed via a URL such as:

https://[server_name]:9192/admin

Information on using a custom SSL certificate is covered in Generate SSL/HTTPS keys.

- **Requirement 6**

  Hosting the PaperCut NG/MF system on top of an external database system such as Microsoft's SQL Server offers a number of advantages including easy data access, better performance and scalability, and the ability to take advantage of existing backup processes. More information on external RDMS support is available at Deployment on an external database (RDBMS).

  The data structure is simple and administrators with report writing skills will quickly be able to access the data for custom reporting via tools such as MS Access or Crystal Reports.

- **Requirement 7**

  PaperCut NG/MF is a commercial system with commercial level support. However, unlike many other commercial applications, PaperCut Software International Pty. Ltd. does offer source code access. A number of universities have used the source code access for:

  - *auditing* - verifying that the software is secure.
  - *customization* - knowing how the application works and how to implement add-ons.

  Large universities should also look at the large school scenario. Features such as shared accounts and secure printing are also applicable to many university environments.

2.1.4. Scenario: The small business

Northwoods Inc. is a small twelve-person Engineering and Architect Drafting office serving the local area. Their network consists of a mix of Windows 7 and 8 workstations connected on a Workgroup based network. Wireless network access is also provided to employees with laptops. Most staff work on a project basis and you need to track use by project code and sub-project. Some staff work on a freelance basis and management want to track and charge for color printer use on a monthly basis.

Requirements

1. The system must be easy to set up and maintain as there is no full-time IT staff.
2. The system must work in a Windows workgroup environment.
3. Staff are to have unlimited access (i.e. no budgets).
4. Staff need to allocate their printing to projects and cost centers so printing and drafting costs can be passed back onto the clients (chargeback).
5. Managers need access to view real-time reports.
6. Data should be able to be exported to Excel on a monthly basis for billing.

Implementation

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- ## Initial installation

  One system on the network needs to be allocated the task of hosting the printer and the PaperCut NG/MF application. Users will print via this system so it needs to be left on most for most of the time. An existing file server is ideal, however, someone's desktop system will also suffice (must be left on at all times).

- ## Requirement 1

  PaperCut NG/MF is well known for its ease-of-use. It is a self-maintaining system with a simple to use web-based interface. Apart from the initial set up, and the recommendation to incorporate the application's data into a backup procedure, no further technical administration and support is required.

- ## Requirement 2

  Workgroup environments are common on small networks. They differ from a domain environment in that they are not centrally authenticated via a server. Users can use a system that automatically logs in as "a user" or maybe they just log in locally on their workstations. For more information on the ways in which PaperCut NG/MF can be installed in a workgroup environment, see Running in a Workgroup environment.

- ## Requirement 3

  You can set up all users as "unrestricted". In this mode, users can start of with a zero balance and count down as they print. Their balance indicates their printing value to date.

- ## Requirement 4

  You can create shared accounts to represent the current projects with sub-accounts used to represent areas under these projects (sub-projects). You can configure users with the relevant Account Selection option with user interaction either via the User Client or via the printing device (if available), forcing users to allocate printing to the project/client. In addition, the Advanced Account Selection option allows premiums to be charged for special printing such as reproduction of expensive mylar film. Selected staff can run monthly or quarterly invoice reports at any time to quickly determine printing associated with a given client/project. For more information on shared accounts and reporting, see Shared accounts

- ## Requirement 5

  PaperCut NG/MF records data in real-time. Full print logs and reports are available at any time and can be accessed using a standard web browser. The manager can log in to the Admin web interface and access the reports at any time.

- ## Requirement 6

  You can export all reports and activity lists to Microsoft Excel. To access the Excel data, click the small Excel icon located next to the report name, or the icon at the bottom of the print log.

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2.1.5. Scenario: The medium to large business

SandComp is a large manufacturing company consisting of 3000 employees spread over 4 sites. All sites are connected via a fast Wide Area Network (WAN). Printers are hosted on local servers with the largest site hosting printers in a Microsoft Cluster environment.

Requirements

1. Must support a Microsoft Cluster environment.
2. Must centrally store print data on a server located at the main office.
3. Must not cause disruption if the WAN link goes down between offices.
4. The consulting division needs to be able to track printing by project (client/matter format) so costs can be passed back to their clients.
5. The finance department needs secure print release on their shared printers stored in the utility room.
6. The system should be proactively monitored to ensure as little disruption to the service as possible.

Implementation

- #### Initial installation

  The implementation of PaperCut NG/MF in this environment would best be managed using staggered or step-by-step approach. First, install and test the software on the central offices' clustered environment, then rolled out to the other offices, and finally implement the secure printing and client popups. A staggered approach is likely to minimize disruption allowing network administrators to focus on the tasks at hand.

- #### Requirement 1

  PaperCut NG/MF supports Microsoft Clustering Services up to 2008 R2. The installation process is documented in Clustering and high availability.

- #### Requirement 2

  You can install the print servers at the remote locations as *secondary servers* reporting back to the primary server. All data is stored in one location. The services communicate using XML Web Services and consume only a few bytes per print job. This means the system works well over the WAN.

- #### Requirement 3

  PaperCut NG/MF has a *fail-open* design. This means that if a failure occurs, such as the network fails between servers, printing continues as normal. Businesses with WAN deployments should consider implementing a Site Server at each site to ensure continuity of

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Find-me Print and copy services during a WAN outage. For more information, see Resiliency with Site Servers.

- **Requirement 4**

  The consulting division can make use of the share accounts feature to track their printing by client. More information on shared accounts is available in Shared accounts. These advanced users would benefit from using the advanced popup. The advanced popup offers advanced searching features allowing end users to quickly located the appropriate account and enter job comments as required.

- **Requirement 5**

  You can facilitate secured print release by setting up a terminal (a low-end PC will do) in the finance department's utility room. When a member of the finance department prints to a shared printer, their document will hold in the queue until that member goes to the utility room and releases the print job with his or her username and password. This process ensures that documents stay secure and can't be "accidentally" collected by other people.

- **Requirement 6**

  The requirement to proactively monitor the print system can be accomplished using the PaperCut System Health interface. This allows you to monitor your entire print environment using your existing monitoring tools, such as PRTG and Zabbix. You might already be monitoring the status of your printers and servers, which can help a lot, but often does not tell the whole story. It's not just about monitoring individual components, but also the overall system usage.

2.1.6. Scenario: The public library or Internet cafe/kiosk

The Sandy Beach Cafe is a typical Internet cafe offering Internet access, faxing, printing and other services. This business has 50 computers and two printers. A black & white laser printer called "Black and White Printer" and a high-end color inkjet system named as "Color Printer". They want to implement a pay-per-print system that meets the following process and requirements:

Requirements

1. The customer prints the job to the appropriate printer.
2. At the front desk, the customer pays a staff member for the print job.
3. The staff member releases the job for printing.
4. The customer collects the print job.

Implementation

PaperCut NG/MF's hold/release queues are ideally suited to the Internet cafe scenario. More information on the hold/release queues is available at Secure print release. PaperCut NG/MF provides both an application interface for *Release Station managers* (i.e. desk staff) as well as a convenient web browser-based interface. To summarize a typical implementation:

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1. The PaperCut NG/MF server software is installed on the system hosting the printers. An existing server or desktop system will suffice.
2. Workstations are configured to print to the printers shared on the system set up in step 1.
3. In the Admin web interface, the printers should have the **manager only release** option selected.
4. Desk staff can view and control pending print jobs, their cost, and other details via the web based release interface accessible at the URL:
   `http://server_name:9191/release`

2.2. Capacity planning

This section discusses capacity planning considerations to allow administrators to plan future infrastructure requirements and make decisions about how to deploy the application.

PaperCut NG/MF is designed to be self-maintaining, however, it is important that the administrator understands the disk-space requirements and how this changes overtime.

2.2.1. Database sizing and growth

The most important part of capacity planning for PaperCut NG/MF is the size and growth of the underlying database. All other aspects of the system manages itself, but care must be taken to ensure there is enough disk space to hold the growing database.

The size and growth of the database depends on the database being used. Each database uses a different format to store their data, therefore the growth characteristics of databases differ. This section outlines the database growth characteristics of:

- The internal database (Apache Derby)
- Microsoft SQL Server

For more information on running PaperCut NG/MF on external databases, see Deployment on an external database (RDBMS).

Database growth is very dependent on the usage patterns and therefore differs significantly from site to site. The best way to predict database growth is based on the rate of print jobs performed. Although, there is some overhead for other data (like users, groups, printers, etc.), this data is static and does not grow over-time. The majority of database growth is caused by print and transaction logs.

The growth calculations performed below provide an indication of growth per 1000 or 10000 print jobs. Then using these numbers and your estimate of the rate of printing in your organization, you make a growth estimate. See Sample database growth calculation for an example of this calculation.

2.2.1.1. Internal database growth

Most PaperCut NG/MF installations use the internal database. This database is suitable for most organizations, however, some prefer to run using an external database (see Deployment on an external database (RDBMS)).

The following graph shows the database size increase with the number of print jobs.

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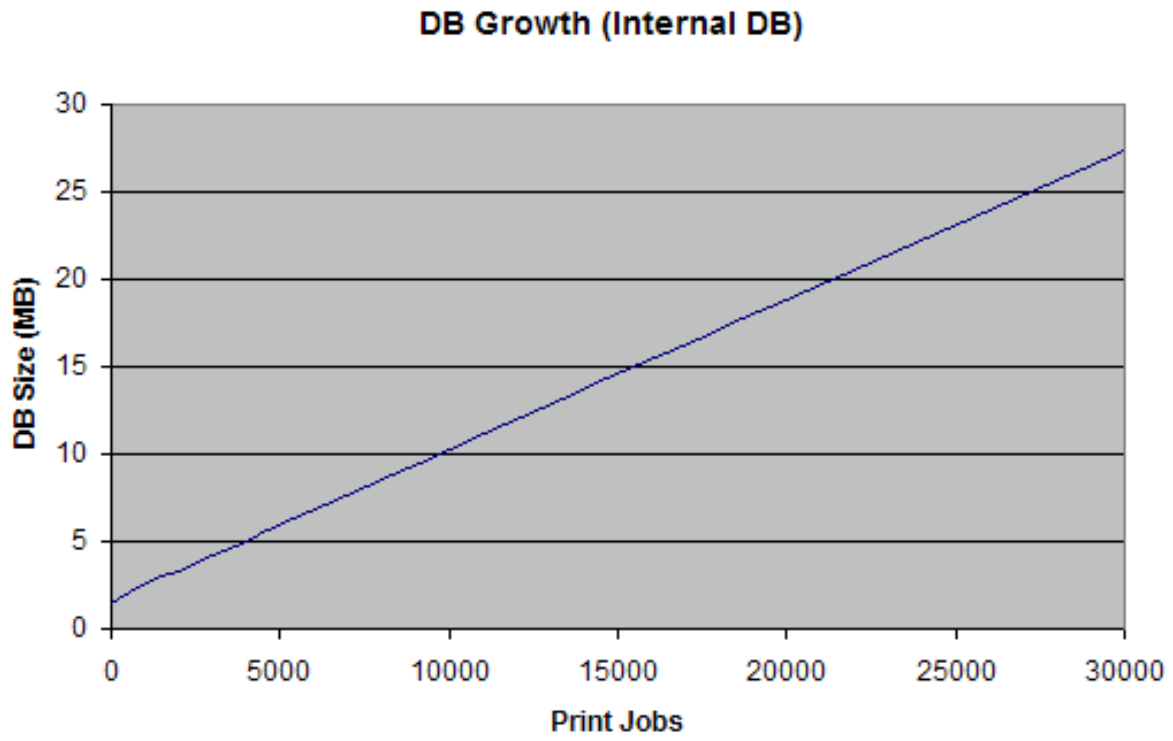

Figure 3: Database growth using the internal database

These results show that the internal database grows by approximately 8.5MB per 10,000 print jobs.

SQL Server database growth

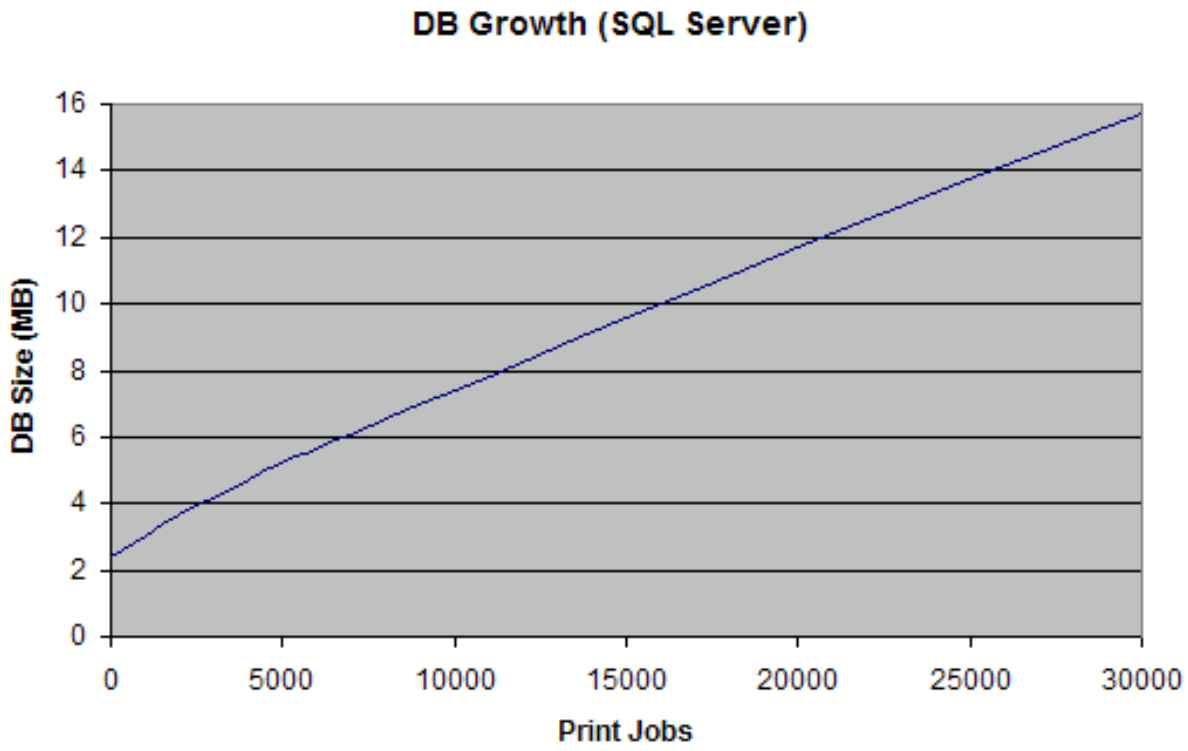

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Figure 4: Database growth using a Microsoft SQL Server database

These results show that a Microsoft SQL Server database grows by approximately 4.5MB per 10,000 print jobs.

Sample database growth calculation

This section provides a sample of how to estimate the database growth for your environment. To perform this calculation you need to make a number of assumptions. Adjust these assumptions to suit your organization. The assumptions are:

- 1 print job per user per day
- 20 working days in a month
- Therefore, 20 print jobs per user per month

Here is a sample database growth calculation based on a 500 user site using the internal database:

1. Calculate the total number of print jobs expected for the month. (i.e. the total number of users multiplied by the number of print jobs). 500 * 20 = 10,000. So in this example, PaperCut NG/MF is handling 10,000 print jobs a month.
2. Calculate the monthly growth rate by dividing the jobs per month by 10,000 and then multiplying by the database growth rate (i.e. for the internal DB this is 8.5MB for 10,000 jobs). So, 10,000 / 10,000 * 8.5 = 8.5MB/Month. Therefore in this situation the internal database will grow by approximately 8.5MB per month.
3. To estimate the growth per year, multiply the above by 12. Therefore in this situation, the database will grow by 10.2 * 12 = 122.4MB per year.

2.2.2. Print archives sizing and growth

If PaperCut NG/MF is configured to use Print Archiving then additional disk space is required to store the archive files. The amount of space required depends on a number factors unique to your site:

- Number of print jobs
- Average size of print jobs spool files
- Archive retension policy
- Backup plan

Proactivly monitor your archive directorty size over time to understand your specific requirements. For further information, see Print Archiving (viewing and content capture).

2.2.3. Network bandwidth planning

With modern switched Ethernet networks, bandwidth is rarely a factor when planning PaperCut NG/MF deployments. The bandwidth consumed by PaperCut NG/MF is usually dwarfed by the print document data - e.g. the Postscript spool data sent across the network. Bandwidth does, however, become a consideration when planning deployments crossing physical site boundaries such as networks linked via a WAN.

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PaperCut NG/MF uses an XML based web services protocol for communication between client-to-server and server-to-server. This protocol is very bandwidth efficient and designed to work well on low bandwidth and high latency networks.

2.2.3.1. Bandwidth estimates

Bandwidth consumption can be summarized as follows:

Server-to-server

Other than normal print server traffic (standard job spooling), PaperCut NG/MF generates XML-RPC based Web Services based traffic on port 9191. Connections are made from the print server to the main PaperCut NG/MF Application Server (primary server). Normal activity is around 1-2kb of traffic for each print job. Connections are instigated from the secondary server. Network packets are only sent during printing activity.

Client-to-server

Connections are instigated by the client inbound to the server on port 9191 and 9192 (Encrypted SSL). While at idle, the client consumes a few bytes once every minute (a keep-alive heartbeat). During print activity, up to 1-2kb per print job can be consumed depending on client popup settings.

If using account selection popups, the client must download the latest account list from the server whenever it is updated. The accounts are downloaded in a very efficient compressed format (approximately 20 bytes per account). If you have 10's of thousands of accounts, and many clients running on remote sites with limited bandwidth, see Manage large client billing databases.

2.2.4. Manage large client billing databases

When using the Account selection, the User Client displays a list of client accounts for the user to choose from. This account list is downloaded from the server whenever the account list is updated (i.e. new accounts added). The accounts are downloaded in a very efficient compressed format (taking approximately 10-20 bytes per account). This works very well on the vast majority of sites that have less than 10,000 accounts and are running on fast network connection.

On sites that have 10's of thousands of accounts and many workstations on remotes with bandwidth-limited WAN connections the accumulated bandwidth usage could be significant. To reduce this bandwidth usage, you can configure the clients to load the accounts from a file stored locally at each site. When the accounts are updated on the server, you can recopy the file to each site. This distributes the client account list to all users at a site by sending the account list over the network only once, instead of one copy per workstation/client.

The process works as follows:

1. On the server the administrator sets up a scheduled task to run the server command to generate the client accounts file as follows:

```
server-command create-user-client-accounts-file
```

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This creates the client account file in `[app-path]/server/data/client/client-accounts.dat`.

For more information running `server-command`, see Server commands (server-command). See below for a sample batch file.

2. Copy the `client-accounts.dat` to each of the sites running the client software. Copy the file to a shared location accessible by all users running the client (e.g. a file share).

Tip:
If you are using Microsoft distributed file system (DFS), you can copy the client account file to the distributed share. DFS then efficiently distributes the file to all your remote sites.

3. Configure the User Client to run with the

`--accounts-file "\\fileserver\path\to\client-accounts.dat"`

option. Clients at each site should use the accounts file stored locally at that site. The account file location can also be specified in the client's `config.properties` file. For more information on client configuration settings, see Configure the User Client using the command-line.

4. Clients then load the accounts from the file and not directly from the server. The client only loads the accounts from the server if it fails to load the accounts file (i.e. the file does not exist).

Below is an example batch script that you can schedule to run regularly on your PaperCut NG/MF server. Schedule this to run whenever your shared accounts are updated (e.g. once a day). Modify the script to reflect where PaperCut NG/MF is installed and where the client file is distributed.

```
REM Batch file to create and distribute the client accounts file
REM Create the client account file
[app-path]\server\bin\win\server-command create-user-client-
accounts-file
REM === COPY TO SERVER 1 ===
REM Copy to destination server
REM Create temp file, so clients do not load an incomplete file.
copy /y [app-path]\server\data\client-accounts.dat
\\svr1\share\accounts.tmp
 >
REM Rename the temp file the final account file name used by the
User Clients
move /y \\svr1\share\accounts.tmp \\svr1\share\client-
accounts.dat

REM === COPY TO SERVER 2 ===
copy /y [app-path]\server\data\client-accounts.dat
\\svr2\share\accounts.tmp
move /y \\svr2\share\accounts.tmp \\svr2\share\client-
accounts.dat
```

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Known limitations

There is one minor limitation of using the client account file approach. When the account selection popup is displayed, it lists all the defined accounts (even if the user does not have permission to charge to these accounts). The server still enforces security to ensure that users can only charge to the accounts they have permission to access.

2.3. Installation on Windows

2.3.1. Quick install: Windows

Important:
This guide assumes that you are using Windows Server 2008. The process is similar for other Windows operating systems. If you're upgrading from a previous PaperCut NG/MF version, refer to the directions outlined in Upgrade from a previous version.

Step 1: System requirements & network setup

Before installing PaperCut NG/MF for either evaluation or production use, verify the system requirements:

- The operating system version supported and patches up-to-date (see PaperCut NG System Requirements).
- PaperCut NG/MF needs to be installed on the system directly hosting the printer(s), that is, the print server.
- Printers are configured correctly and work *before* installing PaperCut NG/MF.
- In workgroup environments (i.e. where no domain is present), some additional configuration is required. For more details see Running in a Workgroup environment.

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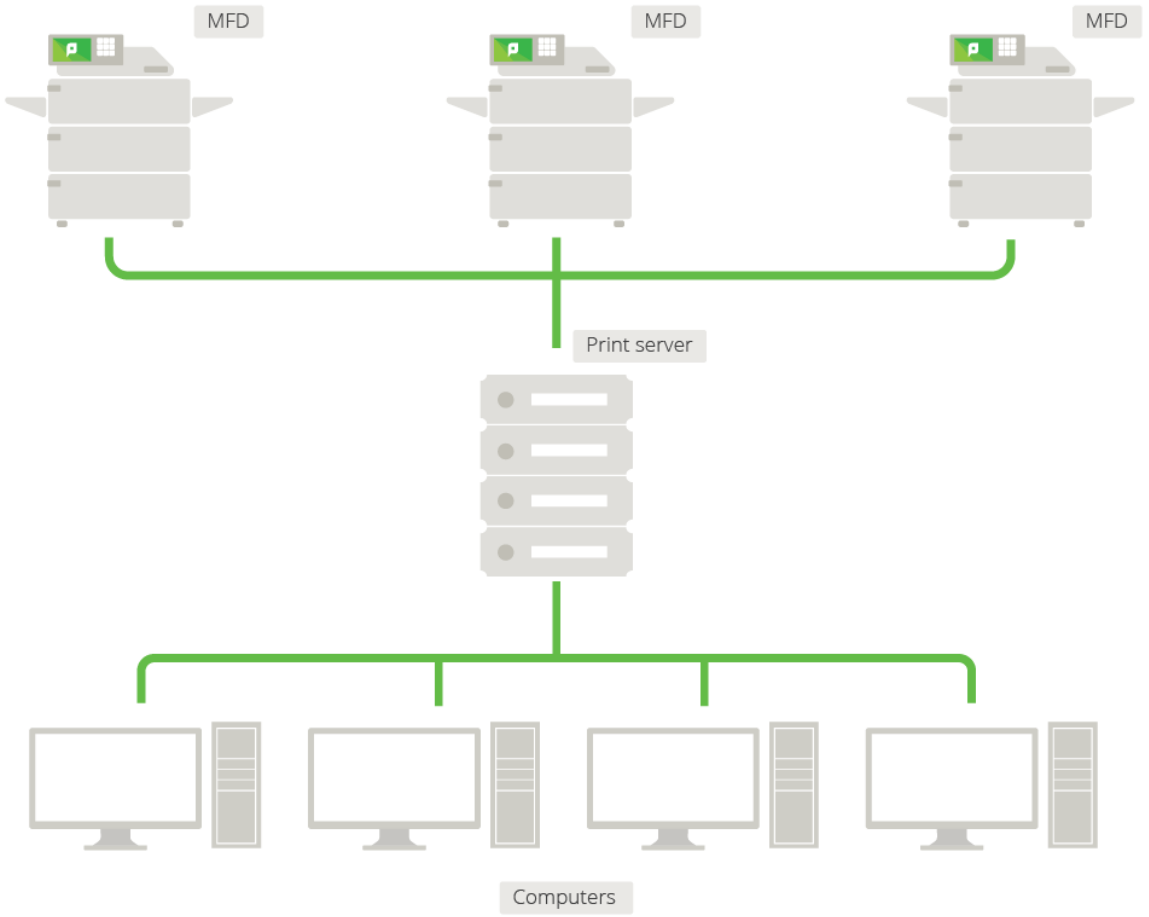

Figure 5: Network printer configuration

Step 2: Print queue configuration

When using Release Stations or account selection popups, PaperCut pauses jobs on the Windows print queue to hold jobs prior to printing. It is important, especially in charging environments, that the queue is secured to prevent users from resuming jobs themselves and bypassing PaperCut. There are two ways a Windows print queue can be secured:

1. Configure the queue using the PaperCut TCP/IP Port.
2. Restrict the print queue security permissions to prevent users from performing management functions.

Using the PaperCut TCP/IP port

Queues configured to use the PaperCut TCP/IP Port automatically ensure that manually resumed jobs will not be printed. You will already be using a PaperCut TCP/IP Port if you are using hardware page count validation. You can see which port is being used in the **Ports** tab under **Printer Properties**. If you are not currently using PaperCut TCP/IP ports, see Windows printer queue configuration.

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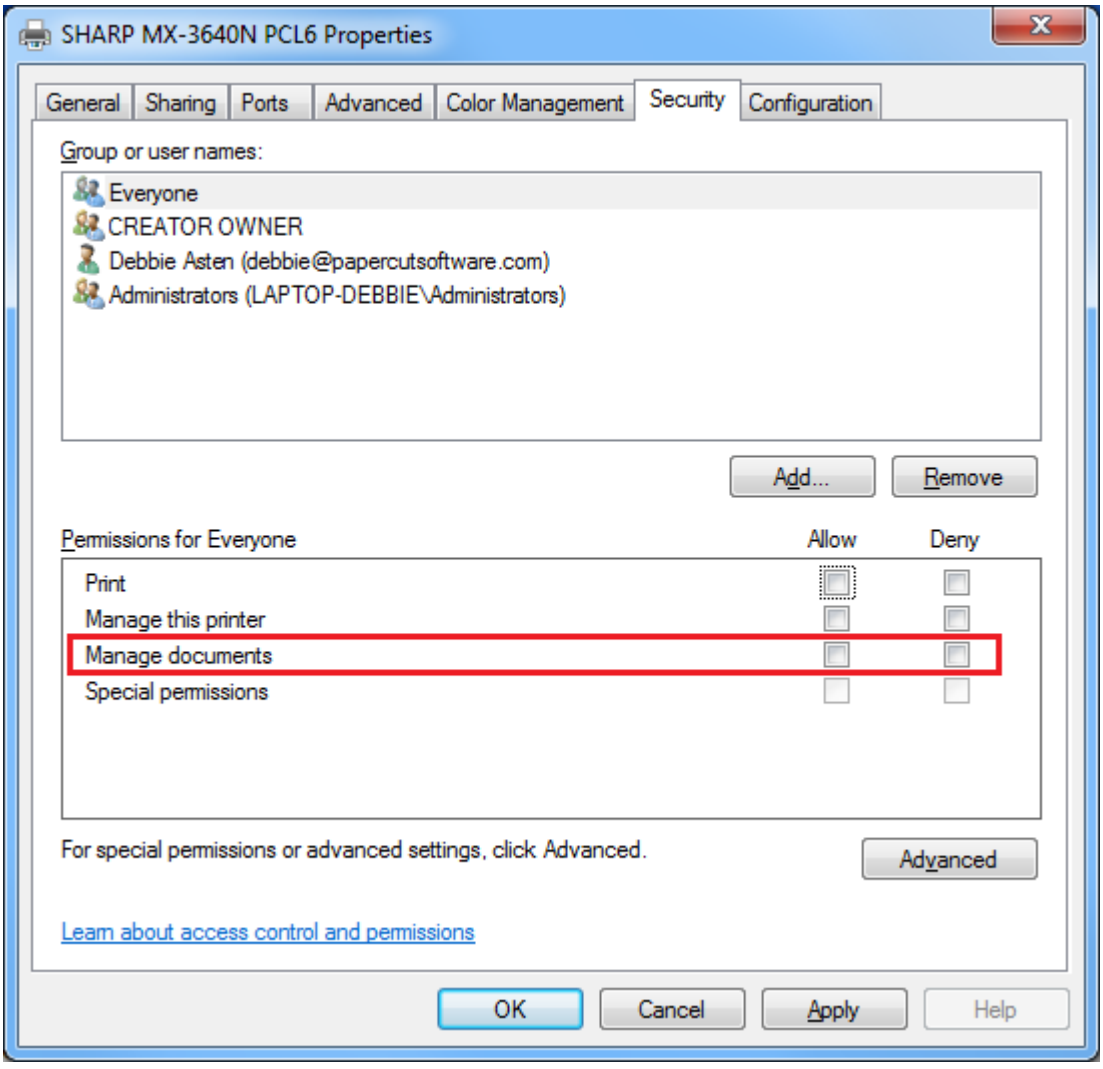
Restricting Windows print queue security permissions

This method works for most versions of Windows. However, it might interfere with printing on Windows 8.1 and Windows 2012R2. On these systems you should secure printing using PaperCut TCP/IP ports.

To restrict security permissions for a queue:

1. Log onto the server hosting the printers as an Administrator.
2. Open the printer configuration screen: **Start > Printers**
3. Right-click a printer; then select **Printer properties**.
4. Select the **Security** tab.
5. Select the **CREATOR OWNER** user.
6. In the **Permissions** area, clear the **Manage Documents** check box.



7. Click **OK**.
8. Perform these steps for each of the monitored printers.

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Tip:

When using Windows 2008 Server, use the Server Manager, navigate to the Print Management Console and globally set the security permissions by right-clicking the **Print Server(s) > Properties > Security** and editing the permissions there. This applies only to printers added *after* the global permissions are changed, not for pre-existing printers.

Windows Server 2008 R2 only

Windows Server 2008 R2 installations can experience an issue where print jobs are not removed from the print queue when completed. These jobs stay in the queue with a status of 'Sent to Printer'. To work around this, configure the Printer Driver Isolation so that jobs are removed from the queue when completed.

1. Log onto the server hosting the printers as an Administrator.
2. Using the Server Manager, navigate to the Print Management Console: **Server Manager > Roles > Print and Document Services > Print Management > Print Servers > PrintServerName > Drivers**
3. Right-click a printer driver; then select **Set Driver Isolation > None**.
4. Perform these steps for each of the monitored printers drivers.

Windows 2008 R2 installations might require hotfix KB2906850 to be installed. Consult with your Microsoft experts regarding the suitability of this hotfix.

Tip:

If you receive an "Access denied" error when changing both the **CREATOR OWNER** permissions and the **Print Driver Isolation** settings, turn off the **Render print jobs on client computers** found under the Sharing Tab for that printer.

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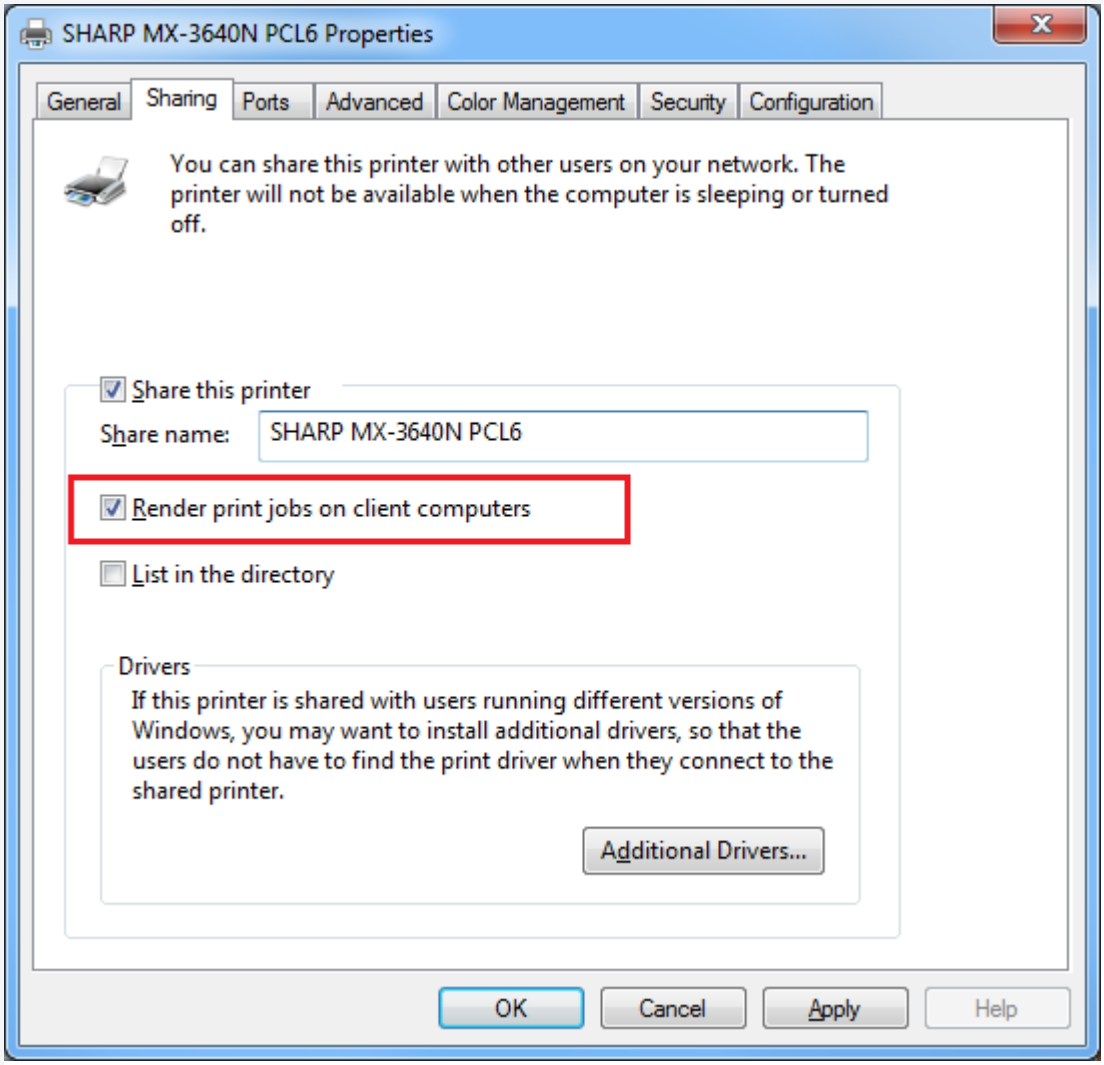

Step 3: Download and install PaperCut NG/MF

PaperCut NG/MF is supplied as a standard Windows `pcng-setup-<version>.exe` install program. You can download the latest version from https://www.papercut.com/products/ng/download/. After the download is complete, run the setup wizard as an administrator. A system restart is not usually required, but you should install on live production systems during periods of low activity, for example, not during backup operations or other administration activities.

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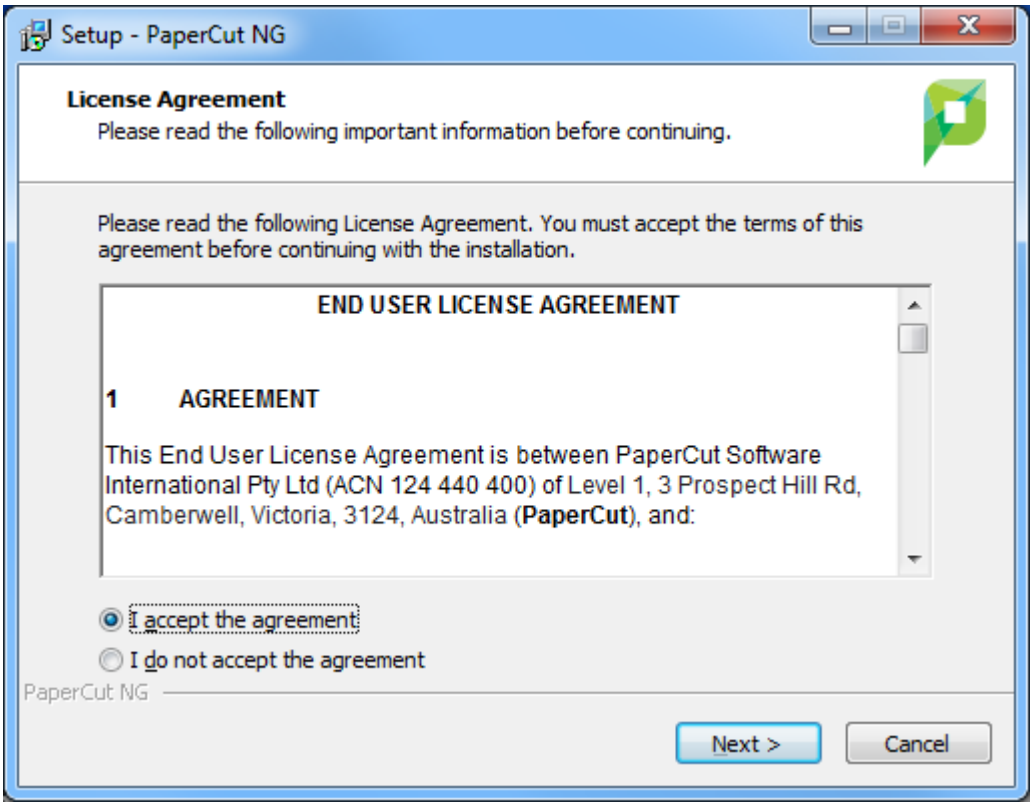
1. Double-click the `pcng-setup-<version>.exe` install program.



2. Read the End User License Agreement (EULA).
3. Select **I accept the agreement**; then click **Next**.
4. Read the installation information; then click **Next**.
5. Select the installation location; then click **Next**.
6. Select **Standard installation (primary server)**; then click **Next**.
7. Select whether or not you want to create a desktop shortcut; then click **Next**.
8. Click **Install**.
9. Click **Finish**.

Step 4: Run the Configuration Wizard

After you install PaperCut NG/MF, a web browser is displayed with the PaperCut NG/MF **Configuration Wizard Welcome** screen.

Note:
If the **Configuration Wizard Welcome** screen is not displayed, you can access it by going to the following URL:

- `http://localhost:9191/admin`

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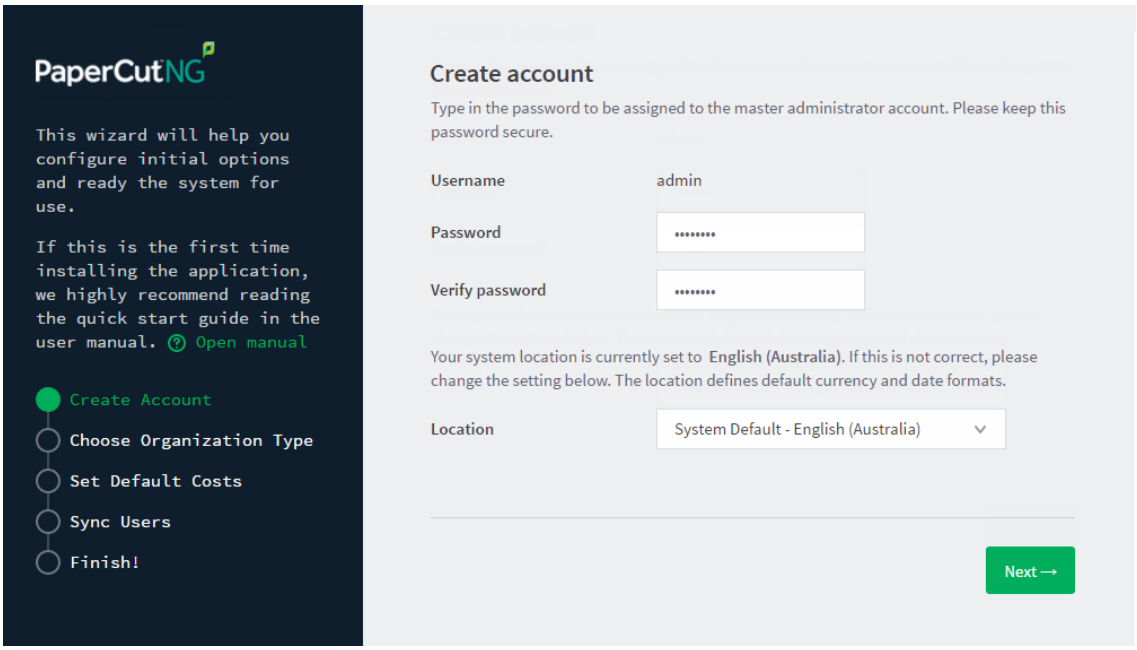
1. ## Administrative password



   a. Complete the following fields:

      - **Password**—enter the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. The password must be at least six characters.

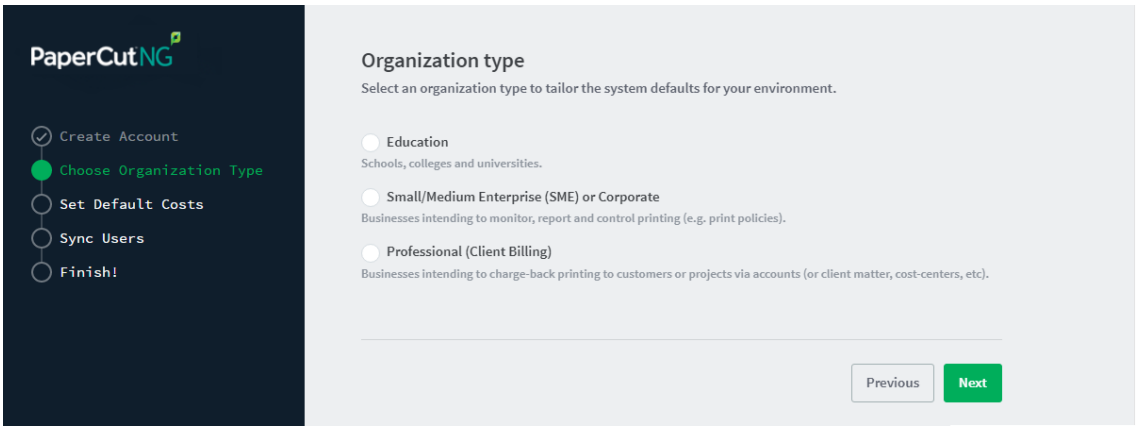
        Tip:
        Keep this password secure. If you forget your password, you can reset it. For more information, see Resetting the Admin Password.

      - **Verify password**—re-enter the password.
      - **Location**—select the system's physical location and language.

   b. Click **Next**.

2. ## Organization type

   The **Organization type** screen is displayed.



   This selection determines which system defaults are used.

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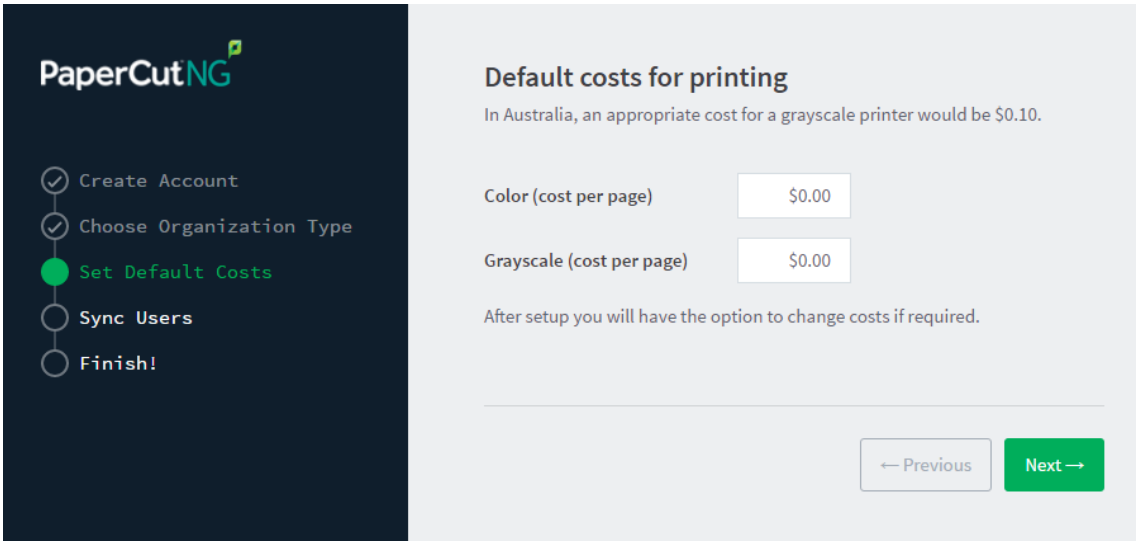
a. Select **Education**.
b. Select **Small/Medium Enterprise (SME) or Corporate**.
c. Select **Professional (Client Billing)**.
d. Click **Next**.

3. ## Default cost for printing

The **Default costs for printing** screen is displayed.



Important:
For an education implementation, where users are charged for their printing, leave these values as zero during the implementation stage, otherwise, students will not be able to print as they cannot yet add credit to their account.

If required, you can change this setting after installation.

a. Complete the following fields:
   - **Color (cost per page)**—enter the default cost per page for color printing on all printers.
   - **Grayscale (cost per page)**—enter the default cost per page for grayscale printing on all printers.
b. Click **Next**.

4. ## Initial user credit (Education organization type only)

If you selected **Education** as the organization type, the **Initial user credit** screen is displayed.

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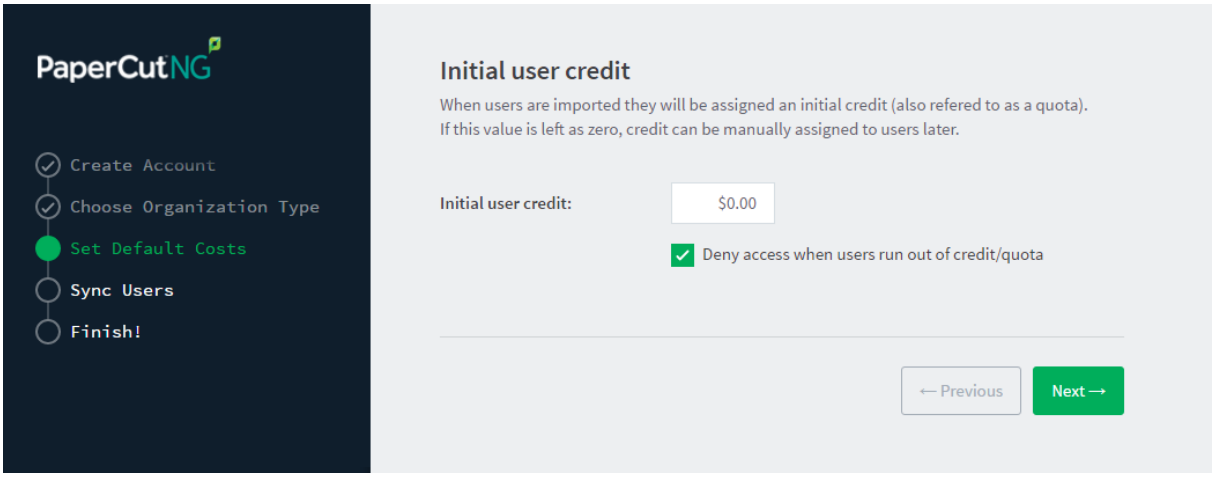

If you selected **Small/Medium Enterprise (SME) or Corporate)** or **Professional (Client Billing)** as the organization type, go to step 5.

a. Complete the following fields:

- **Initial user credit**—enter the amount of credit each/quota each user will receive when the system is first enabled. You can change these settings after setup.
- **Deny access when users run out of credit/quota**—select this check box to prevent users from printing when they run out of credit/quota.

> **Tip:**
> If you are evaluating PaperCut NG/MF it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation.

b. Click **Next**.

5. User/group synchronization

The **User/group synchronization** screen is displayed.

PaperCut NG/MF extracts user information out of your user directory. PaperCut NG/MF automatically tries to detect the available directory services, saving you hours of configuration time.

> **Note:**
> To speed up the installation, you can click **Skip this step** and synchronize the users/groups later.

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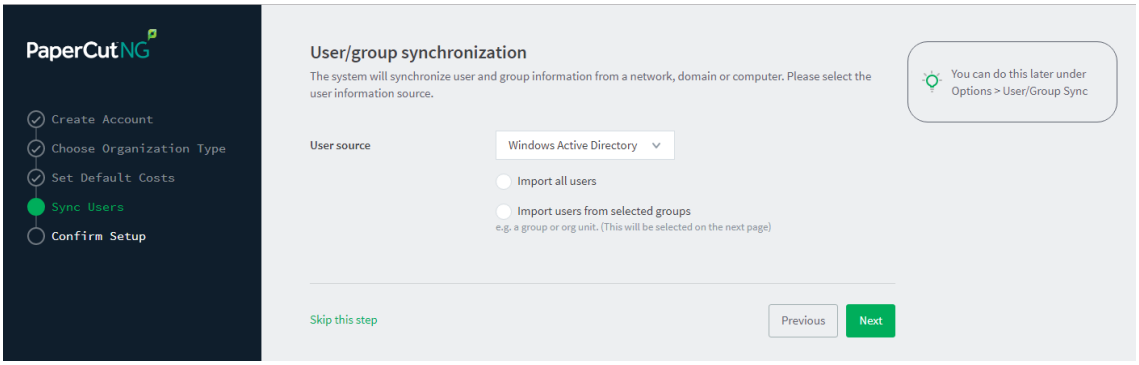

a. In **User source**, select the source of user data:
   - **Windows Standard**
   - **Windows Active Directory**
   - **LDAP**
   - **Azure AD Secure LDAP**
   - **Google Cloud Directory**

b. Select one of the following options:
   - **Import all users**—import all domain user accounts. This includes all system accounts as well as user accounts. Importing all users is suitable for organizations that do not have user groups (user groups are not imported into PaperCut NG/MF with this options), and does not have a large number of system account.
   - **Import users from selected groups**—import users from selected user groups. This is useful when:
     - only a subset of users will use the printers
     - you want to report on individual user groups or apply different policies or pricing to different groups
     - you have many system accounts

c. Click **Next**.
   - For LDAP and Azure AD Secure LDAP, the Server Details page is displayed.
   - For Google Cloud Directory, the Google Cloud Directory Details page is displayed.

d. Complete the following as required:

   LDAP

   i. Complete the following fields:
      - **LDAP Server Type**—Determines which LDAP fields are used to get user and group information. PaperCut NG/MF supports the following server types:
        - Unix / Open Directory
        - Microsoft Active Directory
        - Novell eDirectory

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However, it is easy to support other server types by adjusting the LDAP fields PaperCut NG/MF searches. For more information, see Advanced LDAP configuration.

- **LDAP Server Address**—The hostname or IP address of the LDAP server.
- **Use SSL**—Indicates if an encrypted SSL connection is used to connect to the LDAP server. The LDAP server requires SSL support to be enabled and should accept connections on the standard LDAPS port 636.
- **Base DN**—The Base DN of the LDAP server. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations require a blank Base DN to operate. Some examples:

  ```
  DC=myschool,DC=edu,DC=au,DC=myorganization,DC=com OU=OrgUnit,DC=domain,DC=com,DC=local
  ```

- **Admin DN**—The DN of the user who has permission to connect to and query the LDAP server. This is typically an administrative user, although it can be a user that only has read-only access to the LDAP server. An example of the DN of the Administrator user on a Windows AD domain "domain.com", would be `CN=Administrator,CN=Users,DC=domain,DC=com`. The exact format of the DN depends on the LDAP server. Some examples:
  - Windows Active Directory: `CN=Administrator,CN=Users,DC=domain,DC=com`
  - Windows Active Directory (in organizational unit): `CN=administrator,OU=OrgUnit,DC=domain,DC=com`
  - Mac Open Directory: `uid=diradmin,CN=users,DC=domain,DC=com`
  - Unix Open LDAP: `uid=root,DC=domain,DC=com`, or `uid=ldapadmin,DC=domain,DC=com`
  - Novell eDirectory: `CN=root,DC=domain,DC=com`, or `CN=ldapadmin,OU=users,DC=domain,DC=com`.

  The Admin DN and password is optional if your LDAP server allows anonymous binds for querying.
- **Admin password**—The password for the above user.

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> **Tip:**
> Some LDAP servers are configured to allow 'anonymous' LDAP query access. In these situations, you can leave **Admin DN** and **Admin password** blank.

ii. Click **Test LDAP settings** to test and confirm your settings before continuing.

iii. Click **Next**.

Azure AD Secure LDAP

i. Complete the following fields as required:

- **Accept self-signed certificate**—Select this check box if you are using a self-signed certificate that does not need to be validated. If you are using a certificate signed by a trusted authority, clear this checkbox.
- **Azure LDAP External Address**—Your LDAP external address copied above from Azure AD Secure LDAP.
- **Base DN**—Your Azure DNS Domain Name. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations require a blank Base DN to operate. Some examples:

```
DC=myschool,DC=edu,DC=au,DC=myorganization,DC=com
OU=OrgUnit,DC=domain,DC=com,DC=local
```

- **AAD DC Administrator username**—The Azure Active Directory DC administrator username. For example, admin@papercut.com.
- **Admin password**—The password for the above user.

ii. Click **Test Settings** to test and confirm your settings before continuing.

iii. Click **Next**.

Google Cloud Directory

> **Note:**
> Remember, this functionality is available for organizations using G Suite Education, G Suite Enterprise for Education, G Suite Enterprise, and Cloud Identity Premium.

> **Important:**
> Before you start, make sure you can log in to Google as a Super Admin.

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1. Log in to admin.google.com using your Super Admin user login details. The **Google Admin console** is displayed.
2. Click the **Apps** tile. The **Apps** screen is displayed.
3. Click the **LDAP** tile. The LDAP screen is displayed.
4. Click **ADD CLIENT**.
5. Type a name for the LDAP client connection you'll be configuring to use for PaperCut NG/MF (for example, "PaperCut MF"), and optionally type a description; then click **CONTINUE**. The **Access permissions** screen is displayed.

   Note:
   This adds PaperCut NG/MF to the list of permitted LDAP clients. You can find more information about configuring access permissions from Google.

6. In the **Verify user credentials** section, select either:
   - **Entire domain <domain name>**
   - **Selected organizational units**; then click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
7. In the **Read user information** section, select either
   - **Entire domain <domain name>**
   - **Selected organizational units**; then either click **Copy from Verify user credentials** or click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
8. In the **Read group information** section, click the switch to set it to **On**; then click **ADD LDAP CLIENT**. Google displays a confirmation message and information about downloading the certificate.
9. On the same screen, click **Download certificate**; then save the downloaded certificate (which is a PDF file) in a secure location.
10. Click **CONTINUE TO CLIENT DETAILS**. The **Settings for <LDAP client name>** screen is displayed.

    Note:
    The service status, displayed at the top right of the screen, is initially set to **OFF**.

11. Click anywhere in the **Service Status** box. The **Service Status** screen is displayed.
12. Select **On for everyone**. The service status is updated for everyone.

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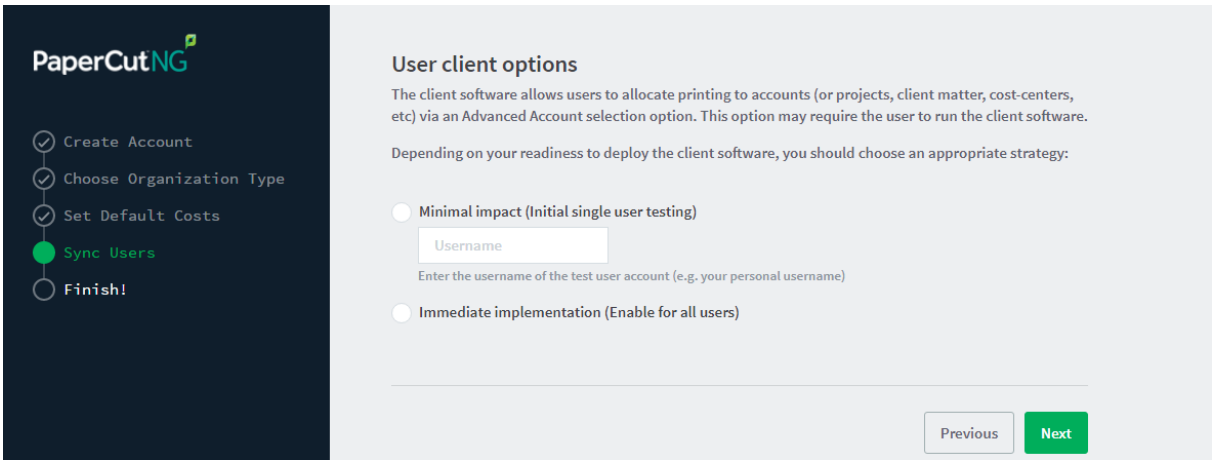
13. Click **SAVE**.

> **Note:**
> Depending on the size of your organization, it can take up to 24 hours for Google Cloud Directory changes to apply.

6. User Client options (Professional Client Billing organization type only)

If you selected **Professional (Client Billing)**, as the organization type, the **User client options** screen is displayed.



If you selected **Education** or **Small/Medium Enterprise (SME) or Corporate**, go to step 7.

Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either via the User Client or via the printing device. For more information, see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client may be optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future.

However, in environments where user interaction for Account Selection is required and can only be done via the User Client (and cannot be done at the printing device), running the User Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device.

The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated.

a.

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Depending on the Account Selection configuration for users (whether or not user interaction is required and whether or not your environment caters for this on the User Client AND on the printing device), select an appropriate User Client deployment strategy

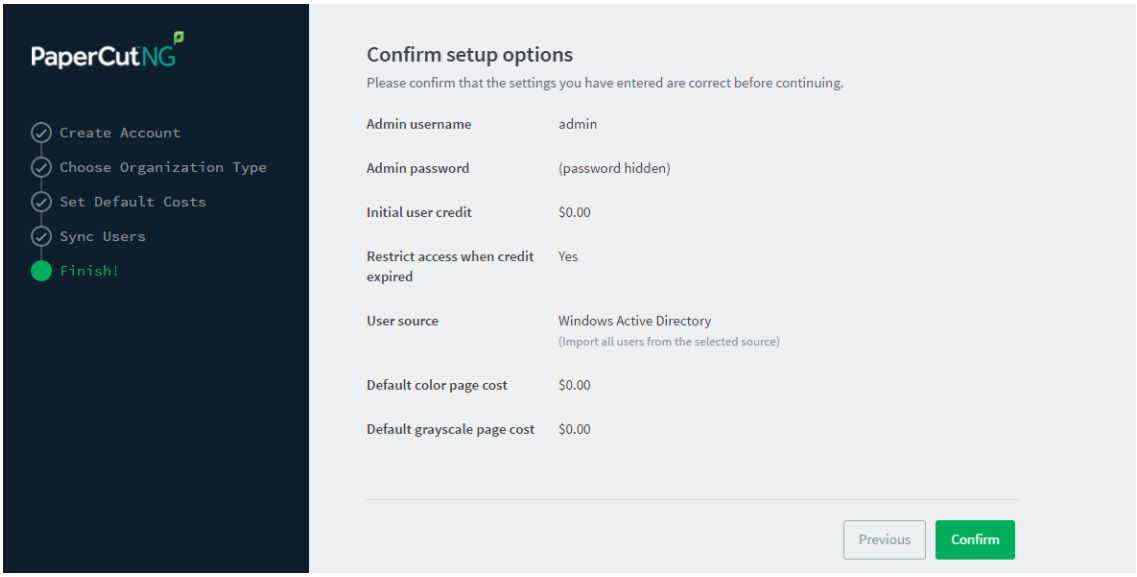
- **Minimal impact (Initial single user testing)**—the Account Selection option requiring user interaction is enabled only for a single user for testing purposes. You need to nominate the testing account; this can be an existing system/domain account used for testing purposes or your own user account. The username should be in the format used to log in to the domain/system (usually the short form). Depending on the environment, you can test the user interaction for Account Selection either on the User Client or on the printing device. The minimal impact strategy allows you to test Account Selection with user interaction using the nominated test system/domain user account, after which you can configure other users with similar Account Selection options.
- **Immediate implementation (Enable for all users)**—the Account Selection option requiring user interaction is enabled only for all users. If you have configured your users with Account Selection that requires user interaction, and this can only be done on the User Client (and cannot be done on the printing device), then you must install the User Client on all user desktops immediately to prevent disruption of user printing services.

  If in doubt, select the minimal impact strategy. This ensures the impact is isolated to only the nominated test account.

b. Click **Next**.

7. Confirm setup options

The **Confirm setup options** screen is displayed.



a. Check the settings you have entered. If you want to change anything, you can return to any of the configuration screens to alter the options.

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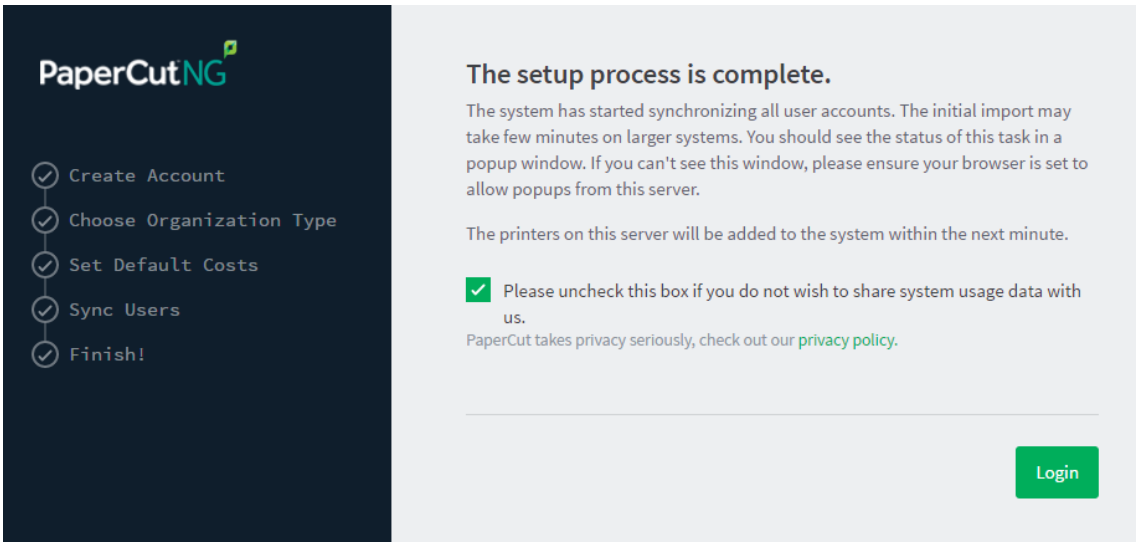
b. Click **Confirm**.

The **Initial user import** screen is displayed.

c. Click **Close**.

8. ### Setup complete

After completing the configuration wizard you are presented with a user synchronization status screen, showing the progress and results of the setup.



a. Click **Login** to access the Admin web interface and begin familiarizing yourself with the options and features available.

Click **Login** to access the interface and begin familiarizing yourself with the options and features available. Take some time to explore, and refer back to the relevant sections of this manual as required.

Step 5: Check printer configuration

PaperCut NG/MF automatically detects the print queues on the print server on which PaperCut NG/MF is installed. To view the printer list:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.

2. If the printers are not displayed, print a document. The first job triggers registration of the printer with PaperCut NG/MF.

Step 6: Sharing the User Client Software (optional)

The PaperCut NG/MF client software install package is located in the following directory:

```
[app-path]/client
```

1. Share this software over the network so workstations can access/install the client application. The directory is automatically shared in read-only form as `PCClient` as part of the install

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process.

2. Confirm that you can access the client software via the network by browsing to:

   `\\server\PCClient`.

Step 7: User Client deployment (optional)

The PaperCut User Client can now be deployed if required. Some features of the User Client are:

- Display of notification messages, such as why a print job was denied.
- Display of print policies, such as to encourage duplex printing.
- Allowing users to carry out Account Selection with user interaction, such as searching for and locating a specific shared account and assigning it to a job.
- Allowing users to confirm the details and/or cost of their print job before printing.
- Display of users' current balance (useful in schools where print quotas are used).
- Allowing user authentication when printing from public terminals or other unauthenticated systems.

Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either on the User Client or on the printing device.

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client is optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future. However, in environments where user interaction for Account Selection is required and can only be done on the User Client (and cannot be done on the printing device), running the User Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device. The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated. For more information about the Account Selection options with and without user interaction (via the User Client or printing device), see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

Step 8: Testing

Following a fresh installation, it is highly recommended to test core features of the system. For further details, see Testing the installation.

What next?

Take some time to explore the features of PaperCut NG/MF before continuing reading at Implementation by example or Tour. Business users might be interested in trying the popup client

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software as covered in Client software. If desired, the client software should also be deployed to other workstations. This procedure is detailed in User Client.

2.3.2. Running in a Workgroup environment

A workgroup environment differs from a network domain model. In the domain model, users authenticate using a common username/password as defined in a central server. Users can typically access and use any PC on the network by using their username and password. In a workgroup, the computers are loosely coupled and user identity is validated locally rather than centrally. The computers are either set up to automatically log in as a general "user", or user accounts are set up on the computers as required.

Users can still authenticate with PaperCut NG/MF on Windows by entering their details into the User Client utility. For more information see Option 2: Authenticating via popup.

PaperCut NG/MF offers a number of options for running and authenticating users in a workgroup. The two common options are:

- Option 1: Common username and passwords on all systems
- Option 2: Authenticating via popup

2.3.2.1. Option 1: Common username and passwords on all systems

1. Nominate a system to host the printers and the PaperCut NG/MF server software.
2. Set up the printers and share with appropriate names.
3. On the nominated host system, ensure that the `Guest` account is disabled.
    a. Open the `Local Users` screen: **Start > Control Panel > Administrative Tools > Computer Management > Local Users and Groups > Users**
    b. Right-click the **Guest** user; then select **Properties**.
    c. On the **General** tab, select **Account is disabled**.
    d. Click **OK**.
4. This should also be performed for any system running a Release Station.
5. On the nominated host system, set up user accounts for all users via **User Accounts** in the **Windows Control Panel**.
6. Set permission on the printer so only these users can access the printer shares (i.e. don't allow guest).
7. Install the PaperCut NG/MF server software and complete the configuration wizard.
8. Instruct each user to log onto their workstation using an account with the same username and password as set up for them on the nominated host system. This ensures that their jobs list in the queue under their username.

2.3.2.2. Option 2: Authenticating via popup

1. Nominate a system to host the printers and the PaperCut NG/MF server software.
2. On the nominated host system, ensure that the `Guest` account is disabled.

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a. Select **Start > Control Panel > Administrative Tools > Computer Management > Local Users and Groups > Users**.

   The **Local Users** screen is displayed.

b. Right-click the `Guest` user; then select **Properties**.

c. On the **General** tab, select **Account is disabled**.

d. Click **OK**.

3. This should also be performed for any system running a Release Station.
4. On the nominated system, set up user accounts for all users.
5. Install the PaperCut NG/MF server software and complete the configuration wizard.
6. Print from another workstation. The job should list in PaperCut NG/MF under the user "guest".
7. Click the **Users** tab.

   The **User List** page is displayed.
8. In the **Actions** menu, click **Bulk user actions**.

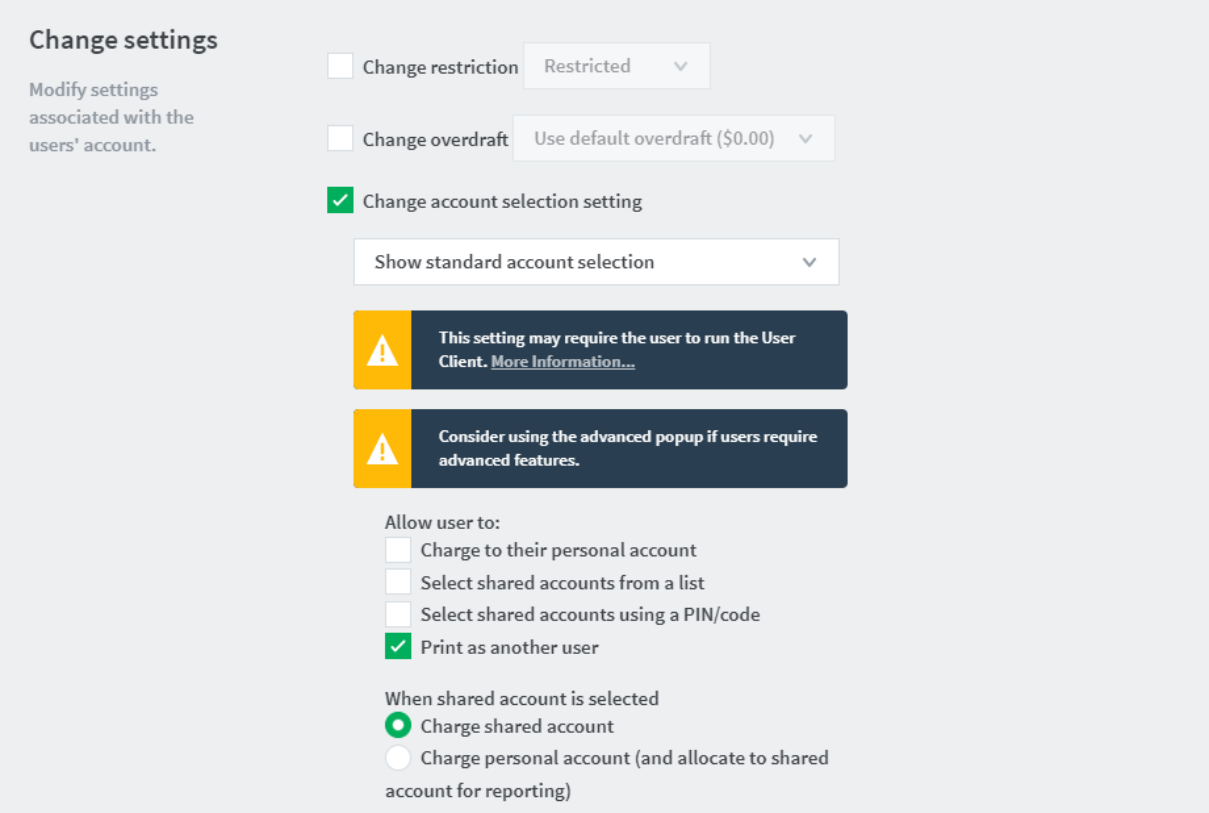
   The **Bulk User Operations** page is displayed.
9. In the **Change settings** area:

   a. Select the Change account selection setting check box.

   b. Select **Show standard account selection**

   c. Clear the **Allow user to charge to their personal account** check box

   d. Select the **Allow user to perform printing as another user** check box



10. Install the client software on each workstation. See User Client.

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11. When the user prints to the shared printer, a popup now asks the user to enter a username and password.

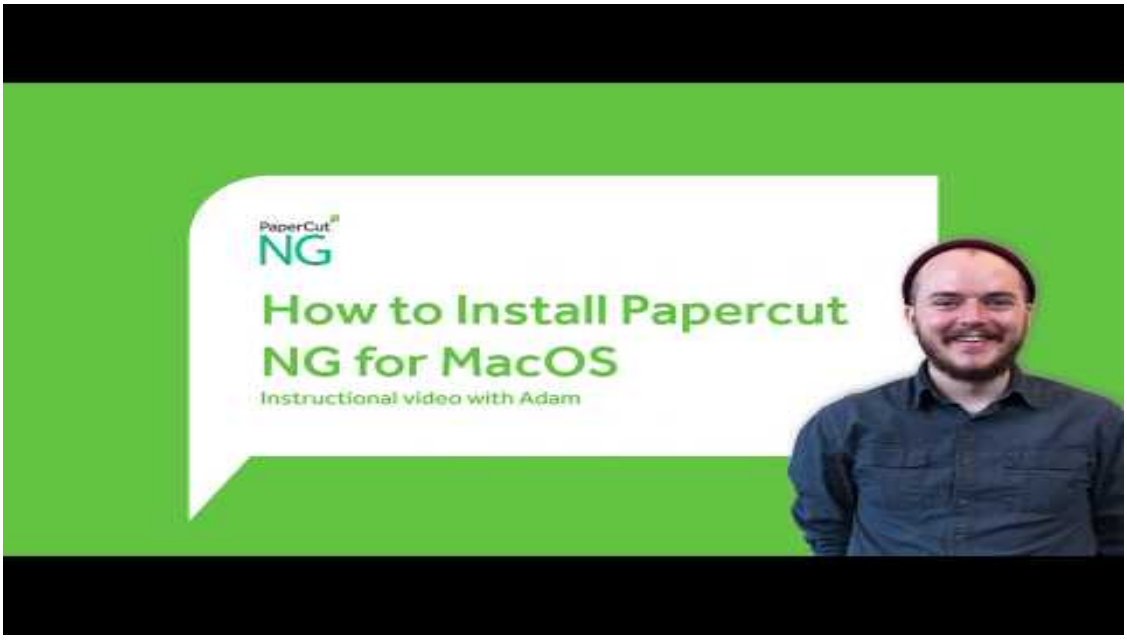
2.4. Installation on Mac

2.4.1. Quick install: Apple Mac

Important:

This guide assumes that you are installing on Mac OS X (either server or workstation) hosting and sharing printers. This guide refers to this system as the 'server'. This represents the role of the system rather than the 'edition' of the operating system. PaperCut NG/MF equally supports both the server and workstation versions of Mac OS.

The following section assumes knowledge of general Mac OS X server management. Although the installation process is graphical, it would be an advantage to have knowledge of the command-line, creating users, editing configuration files and an understanding file permissions.



Step 1: System requirements

Before proceeding with the installation the SysAdmin should take a few moments to verify system requirements. Is the operating system version supported and are patches up-to-date? (see PaperCut NG System Requirements).

Step 2: Print queue setup

Most small to medium Mac networks configure their workstations to print directly to the physical printers. This method of printing is *not* supported by PaperCut NG/MF and instead administrators must set up global server hosted print queues. Some administrators are familiar with server queues,

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while others might need to invest some time into understanding Mac printing in more detail. The topic of Mac printing is complex and is deserves its own chapter! Read the first section of Mac printing in detail and ensure your organization's printers are set up as required.

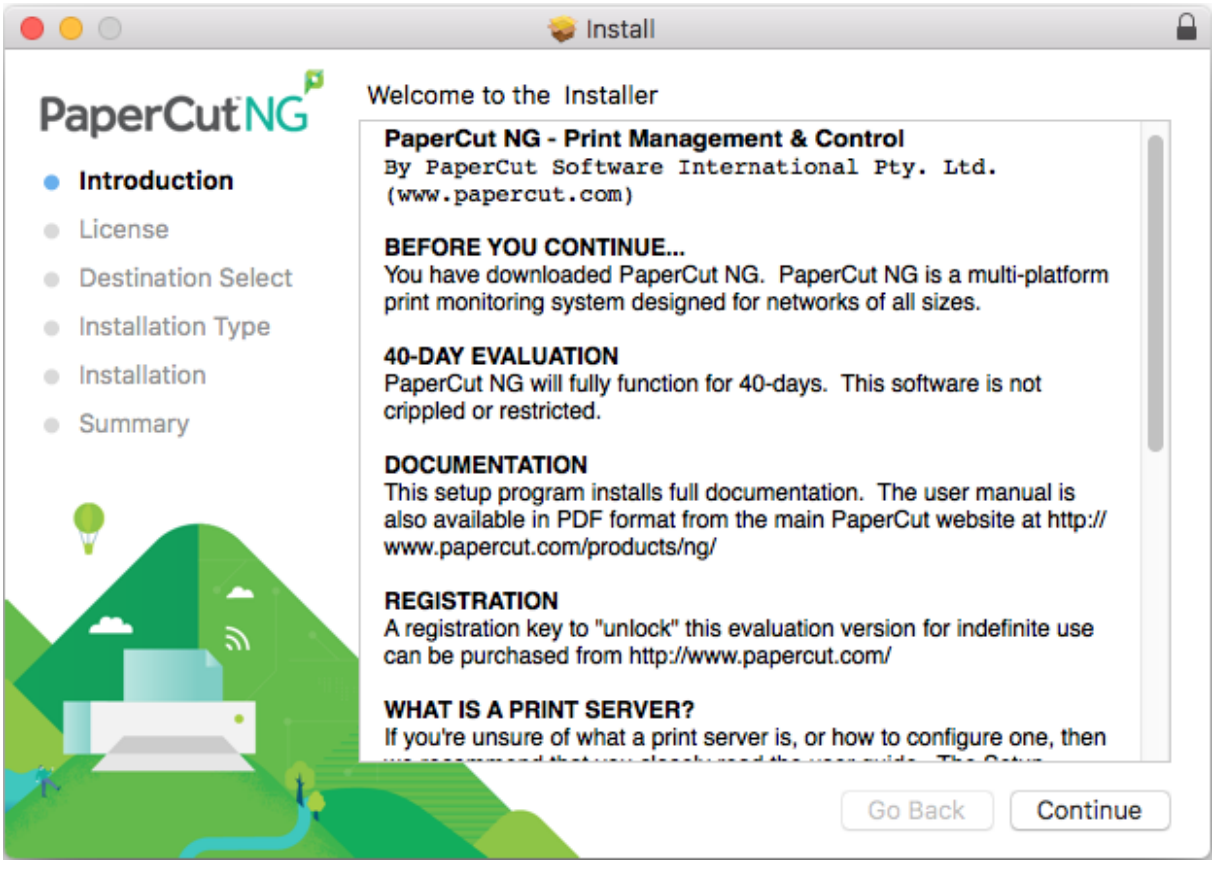
Administrators should ensure that the server based print queues are set up and working as expected *before* attempting to install PaperCut NG/MF.

Step 3: Download and install PaperCut NG/MF

PaperCut NG/MF is supplied as a standard disk image containing the installer. Log on as an `admin` level account. Download and double-click Mac installer. Double-click the installer package named `PaperCut NG/MF Standard Installation.pkg`. Follow the directions on the screen. The installation process takes between two and five minutes depending on the speed of the system. A system restart is not required but administrators are advised to perform installation on live production systems during periods of low activity - for example, not during backup operations or other administration activities.

The default install location is `/Applications/PaperCut NG/MF`

Important:
Make sure you're installing the correct package. The similarly named `PaperCut NG/MF secondary server Installation.pkg` installs only part of the application and is designed for more advanced networks.



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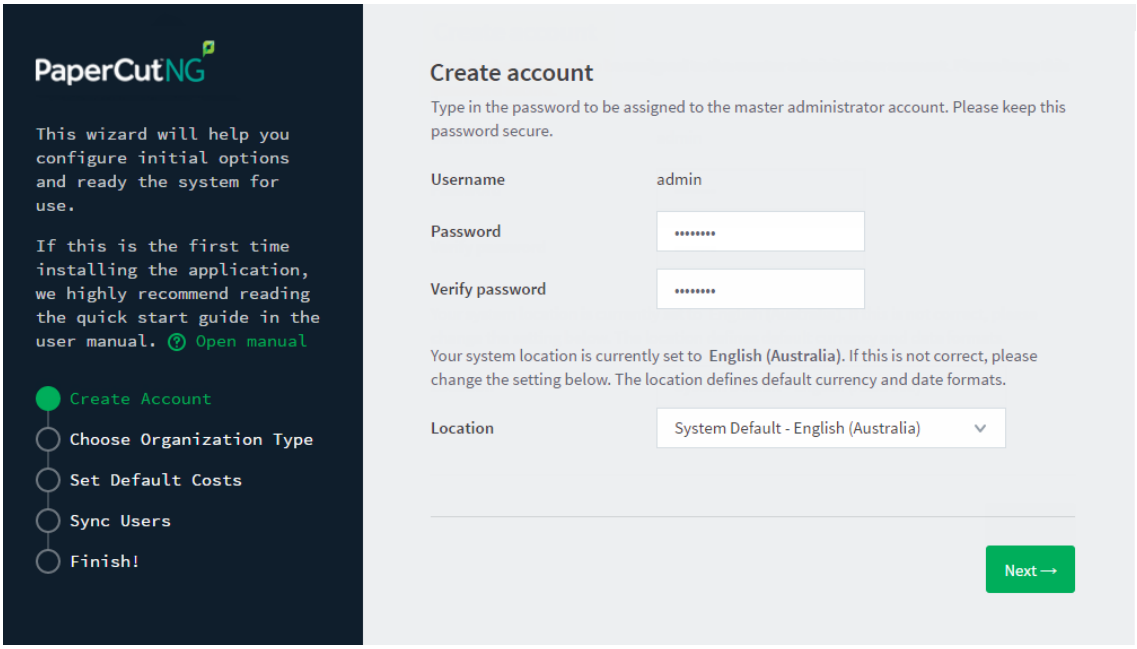
Step 4: Run the Configuration Wizard

After you install PaperCut NG/MF, a web browser is displayed with the PaperCut NG/MF **Configuration Wizard Welcome** screen.

Note:
If the **Configuration Wizard Welcome** screen is not displayed, you can access it by going to the following URL:

- `http://localhost:9191/admin`

1. ### Administrative password



   a. Complete the following fields:
      - **Password**—enter the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. The password must be at least six characters.

        Tip:
        Keep this password secure. If you forget your password, you can reset it. For more information, see Resetting the Admin Password.

      - **Verify password**—re-enter the password.
      - **Location**—select the system's physical location and language.

   b. Click **Next**.

2. ### Organization type

   The **Organization type** screen is displayed.

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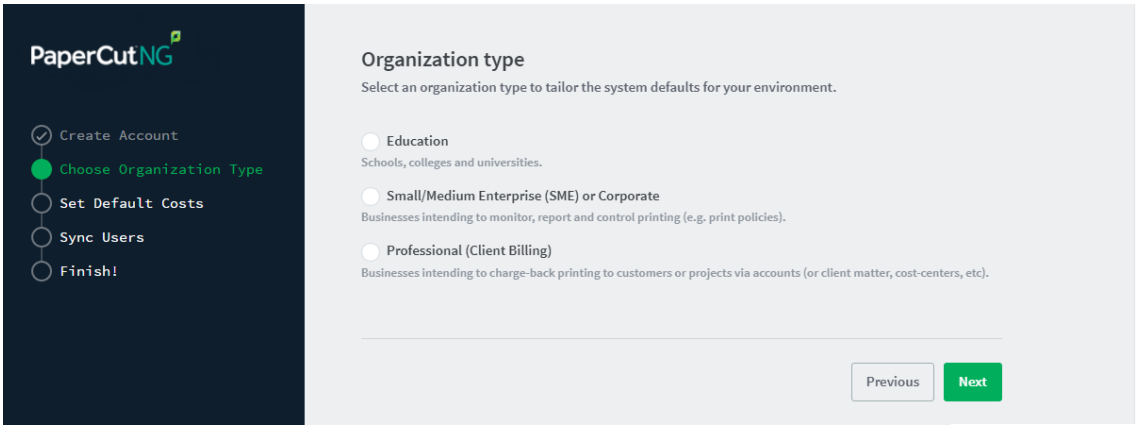


This selection determines which system defaults are used.

a. Select **Education**.

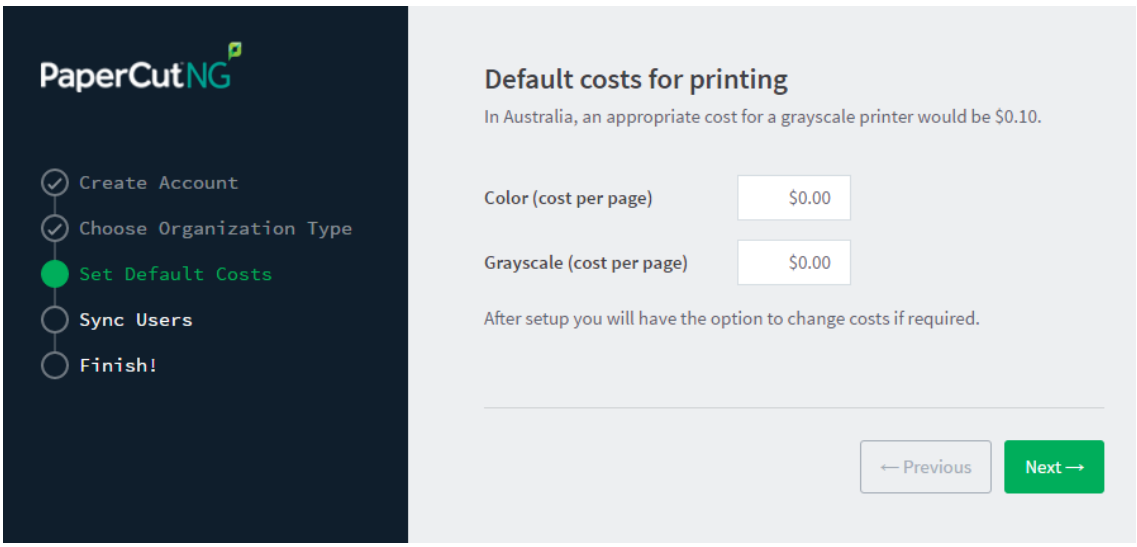
b. Select **Small/Medium Enterprise (SME) or Corporate**.

c. Select **Professional (Client Billing)**.

d. Click **Next**.

3. Default cost for printing

The **Default costs for printing** screen is displayed.



Important:
For an education implementation, where users are charged for their printing, leave these values as zero during the implementation stage, otherwise, students will not be able to print as they cannot yet add credit to their account.

If required, you can change this setting after installation.

a. Complete the following fields:

- **Color (cost per page)**—enter the default cost per page for color printing on all printers.

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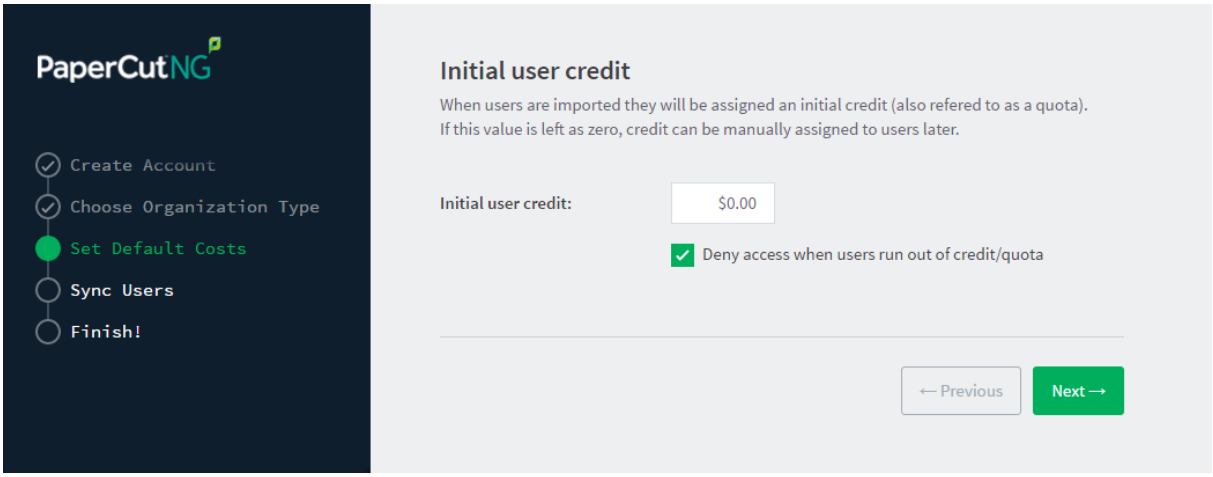
- **Grayscale (cost per page)**—enter the default cost per page for grayscale printing on all printers.

b. Click **Next**.

4. Initial user credit (Education organization type only)

If you selected **Education** as the organization type, the **Initial user credit** screen is displayed.



If you selected **Small/Medium Enterprise (SME) or Corporate)** or **Professional (Client Billing)** as the organization type, go to step 5.

a. Complete the following fields:

- **Initial user credit**—enter the amount of credit each/quota each user will receive when the system is first enabled. You can change these settings after setup.
- **Deny access when users run out of credit/quota**—select this check box to prevent users from printing when they run out of credit/quota.

> **Tip:**
> If you are evaluating PaperCut NG/MF it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation.

b. Click **Next**.

5. User/group synchonization

The **User/group synchronization** screen is displayed.

PaperCut NG/MF extracts user information out of the system or domain.

> **Tip:**
> To speed up the installation, you can click **Skip this step** and synchronize the users/groups later.

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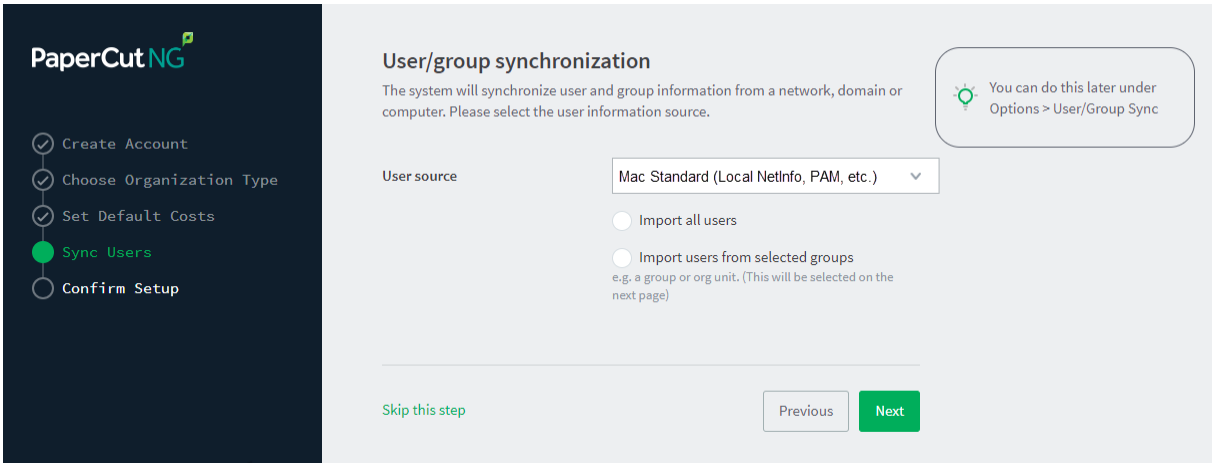

a. In **User source**, select the source of user account data:
   - **Mac Standard** (PAM, Local NetInfo, etc.)—if the user accounts are set up and defined on the local system. This option works with most Mac networks.
   - **Samba**—if the central user directory is a Windows Domain. The Samba option is available only if Samba is installed on the system. The Samba option is appropriate on medium to small networks currently operating in a Windows Domain environment.
   - **Azure AD Secure LDAP**—for organizations using Microsoft Azure AD Secure LDAP as a cloud based user directory service.
   - **LDAP** (Open Directory)—for large networks with existing Open Directory domains. This includes networks running Mac OS X Server with Open Directory, and Windows domains running Active Directory. PaperCut NG/MF does it's best to auto discover LDAP settings, but some knowledge of LDAP and/or Open Directory is required. More information on LDAP is available in Synchronize user and group details with LDAP.
   - **Google Cloud Directory**—for organizations using Google Cloud Directory as a cloud based user directory service.

b. Select one of the following options:
   - **Import all users**—import all domain user accounts.
   - **Import users from selected groups**—import a subset of users from a given group. This is useful when only a subset of users will use the printers.

c. Click **Next**.
   - For Samba, LDAP, and Azure AD Secure LDAP, the Server Details page is displayed.
   - For Samba, LDAP, and Azure AD Secure LDAP, the Server Details page is displayed.

d. Complete the following as required:

   Samba

   i. Complete the following fields:

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- **Domain Server**—The name of the Windows domain server.
- **Admin username**—The username of the user who has permission to connect to and query the domain server. The username/password you specify here is an Admin user on your Windows domain that has permission to add machines to the domain.
- **Admin password**—The password for the above user.

ii. Click **Test Samba Settings** to test and confirm your settings before continuing.

iii. Click **Next**.

LDAP

i. Complete the following fields:

- **LDAP Server Type**—Determines which LDAP fields are used to get user and group information. PaperCut NG/MF supports the following server types:
  - Unix / Open Directory
  - Microsoft Active Directory
  - Novell eDirectory

  However, it is easy to support other server types by adjusting the LDAP fields PaperCut NG/MF searches. For more information, see Advanced LDAP configuration.
- **LDAP Server Address**—The hostname or IP address of the LDAP server.
- **Use SSL**—Indicates if an encrypted SSL connection is used to connect to the LDAP server. The LDAP server requires SSL support to be enabled and should accept connections on the standard LDAPS port 636.
- **Base DN**—The Base DN of the LDAP server. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations require a blank Base DN to operate. Some examples:

  ```
  DC=myschool,DC=edu,DC=au
  DC=myorganization,DC=com
  OU=OrgUnit,DC=domain,DC=com, DC=local
  ```
- **Admin DN**—The DN of the user who has permission to connect to and query the LDAP server. This is typically an administrative user, although it can be a user that only has read-only access to the LDAP server. An example of the DN of the Administrator user on a Windows AD domain "domain.com", would be `CN=Administrator,CN=Users,DC=domain,DC=com`. The

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exact format of the DN depends on the LDAP server. Some examples:

- Windows Active Directory: `CN=Administrator,CN=Users,DC=domain,DC=com`
- Windows Active Directory (in organizational unit): `CN=administrator,OU=OrgUnit,DC=domain,DC=com`
- Mac Open Directory: `uid=diradmin,CN=users,DC=domain,DC=com`
- Unix Open LDAP: `uid=root,DC=domain,DC=com`, or `uid=ldapadmin,DC=domain,DC=com`
- Novell eDirectory: `CN=root,DC=domain,DC=com`, or `CN=ldapadmin,OU=users,DC=domain,DC=com`.

The Admin DN and password is optional if your LDAP server allows anonymous binds for querying.

- **Admin password**—The password for the above user.

> **Tip:**
> Some LDAP servers are configured to allow 'anonymous' LDAP query access. In these situations, you can leave **Admin DN** and **Admin password** blank.

ii. Click **Test LDAP settings** to test and confirm your settings before continuing.

iii. Click **Next**.

Azure AD Secure LDAP

i. Complete the following fields as required:

- **Accept self-signed certificate**—Select this check box if you are using a self-signed certificate that does not need to be validated. If you are using a certificate signed by a trusted authority, clear this check box.
- **Azure LDAP External Address**—Your LDAP external address copied above from Azure AD Secure LDAP.
- **Base DN**—Your Azure DNS Domain Name. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some examples:

```
DC=myschool,DC=edu,DC=au,DC=myorganization,DC=com
OU=OrgUnit,DC=domain,DC=com,DC=local
```

- **AAD DC Administrator username**—The Azure Active Directory DC

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administrator username. For example, admin@papercut.com.

- **Admin password**—The password for the above user.

ii. Click **Test Settings** to test and confirm your settings before continuing.

iii. Click **Next**.

Google Cloud Directory

> **Note:**
> Remember, this functionality is available for organizations using G Suite Education, G Suite Enterprise for Education, G Suite Enterprise, and Cloud Identity Premium.

> **Important:**
> Before you start, make sure you can log in to Google as a Super Admin.

1. Log in to admin.google.com using your Super Admin user login details. The **Google Admin console** is displayed.
2. Click the **Apps** tile. The **Apps** screen is displayed.
3. Click the **LDAP** tile. The LDAP screen is displayed.
4. Click **ADD CLIENT**.
5. Type a name for the LDAP client connection you'll be configuring to use for PaperCut NG/MF (for example, "PaperCut MF"), and optionally type a description; then click **CONTINUE**. The **Access permissions** screen is displayed.

   > **Note:**
   > This adds PaperCut NG/MF to the list of permitted LDAP clients. You can find more information about configuring access permissions from Google.

6. In the **Verify user credentials** section, select either:
   - **Entire domain <domain name>**
   - **Selected organizational units**; then click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
7. In the **Read user information** section, select either
   - **Entire domain <domain name>**
   - **Selected organizational units**; then either click **Copy from Verify user credentials** or click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)

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8. In the **Read group information** section, click the switch to set it to **On**; then click **ADD LDAP CLIENT**. Google displays a confirmation message and information about downloading the certificate.
9. On the same screen, click **Download certificate**; then save the downloaded certificate (which is a PDF file) in a secure location.
10. Click **CONTINUE TO CLIENT DETAILS**. The **Settings for <LDAP client name>** screen is displayed.

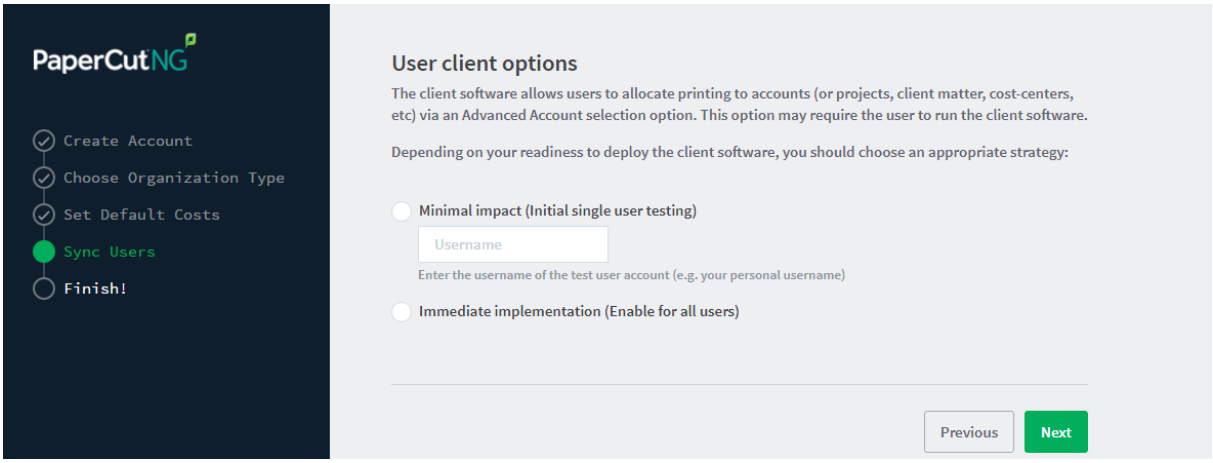
> **Note:**
> The service status, displayed at the top right of the screen, is initially set to **OFF**.

11. Click anywhere in the **Service Status** box. The **Service Status** screen is displayed.
12. Select **On for everyone**. The service status is updated for everyone.
13. Click **SAVE**.

> **Note:**
> Depending on the size of your organization, it can take up to 24 hours for Google Cloud Directory changes to apply.

6. User Client options (Professional Client Billing organization type only)

If you selected **Professional (Client Billing)**, as the organization type, the **User client options** screen is displayed.



If you selected **Education** or **Small/Medium Enterprise (SME) or Corporate**, go to step 7.

Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either via

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the User Client or via the printing device. For more information, see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client may be optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future.

However, in environments where user interaction for Account Selection is required and can only be done via the User Client (and cannot be done at the printing device), running the User Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device.

The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated.

a. Depending on the Account Selection configuration for users (whether or not user interaction is required and whether or not your environment caters for this on the User Client AND on the printing device), select an appropriate User Client deployment strategy

   - **Minimal impact (Initial single user testing)**—the Account Selection option requiring user interaction is enabled only for a single user for testing purposes. You need to nominate the testing account; this can be an existing system/domain account used for testing purposes or your own user account. The username should be in the format used to log in to the domain/system (usually the short form). Depending on the environment, you can test the user interaction for Account Selection either on the User Client or on the printing device. The minimal impact strategy allows you to test Account Selection with user interaction using the nominated test system/domain user account, after which you can configure other users with similar Account Selection options.
   - **Immediate implementation (Enable for all users)**—the Account Selection option requiring user interaction is enabled only for all users. If you have configured your users with Account Selection that requires user interaction, and this can only be done on the User Client (and cannot be done on the printing device), then you must install the User Client on all user desktops immediately to prevent disruption of user printing services.

     If in doubt, select the minimal impact strategy. This ensures the impact is isolated to only the nominated test account.

b. Click **Next**.

7. ## Confirm setup options

   The **Confirm setup options** screen is displayed.

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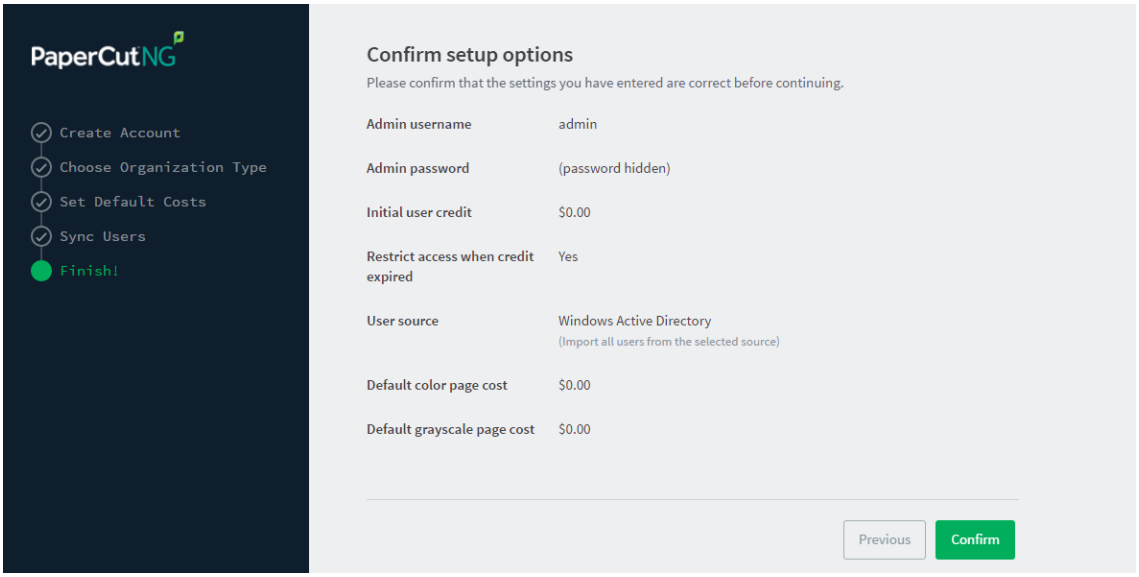


a. Check the settings you have entered. If you want to change anything, you can return to any of the configuration screens to alter the options.

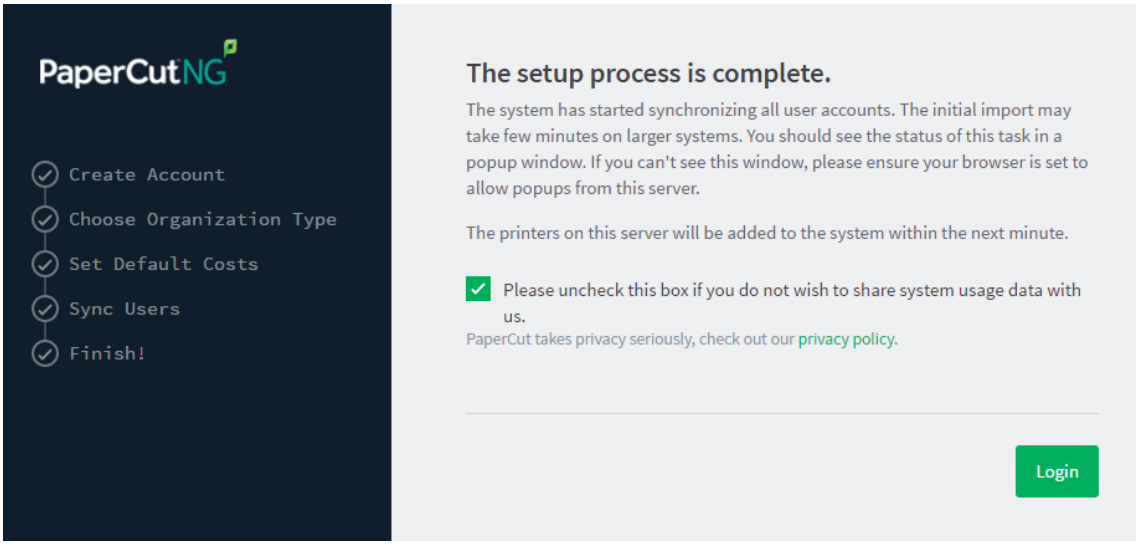
b. Click **Confirm**.

   The **Initial user import** screen is displayed.

c. Click **Close**.

8. ### Setup complete

After completing the configuration wizard you are presented with a user synchronization status screen, showing the progress and results of the setup.



a. Click **Login** to access the Admin web interface and begin familiarizing yourself with the options and features available.

Step 5: Check the printer configuration

When you install PaperCut NG/MF, your networked printers are automatically added to the system. Any new printers added to your network are also automatically added to PaperCut NG/MF. You can, however, change the configuration so that new printers are not automatically added. You will need to

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do this if you have printers you do not want monitored by PaperCut NG/MF. For more information, see Add and remove/delete/ignore printers.

The monitored printers are listed on the **Printer List** page. If the printers are not displayed, try printing a document. The first job triggers registration.

Step 6: Sharing the User Client software

The PaperCut NG/MF client software is located in the directory `/Applications/PaperCut NG/MF/client`. You can share this directory over the network so workstations can access/install the client application. If you're running Mac OS X Server, use **Server Admin** to add a read-only file share called `PCClient`. Sharing with Protocols AFP for Mac clients, and SMB for Windows clients is recommended.

Users can have the client software start automatically using the OS X "Open at Login" feature. Manually start the PaperCut NG/MF client software, command-click the dock icon, select **options** and the Open at Login" from the small pop up menu.

Step 7: Deployment for a Professional (Client Billing) installation

Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either on the User Client or on the printing device.

The User Client

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client may be optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future. However, in environments where user interaction for Account Selection is required and can only be done via the User Client (and cannot be done at the printing device), running the User Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device. The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated. For more information about the Account Selection options with and without user interaction (via the User Client or printing device), see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

Account Selection

After deploying the User Client on user workstations (if required), you can configure users with the required **Account Selection** option (whether or not user interaction is required). For example, in a Professional (Client Billing) installation, users who print jobs for clients are often given the

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Advanced Account Selection option, however, other **Account Selection** options might be better suited for some users based on their job function.

You can configure the required **Account Selection** option on one user at a time or update for all users in bulk.

Use the **User Details** page to configure the required **Account Selection** option for a single user.

To configure the required **Account Selection** option for all users in bulk:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.

   > **Tip:**
   > By default the action is applied to all users (the special `[All Users]` group). To apply the action to a subset of users (a user group), select that group from the list.
3. In the **Change settings** area, select the **Change account selection setting** check box; then select **Show advanced account selection** from the list.
4. If you do not want to allow users to charge printing to their personal account (i.e. they must select a shared account) then clear the **Allow user to charge to their personal account** check box.
5. Click **OK**.

   A confirmation window is displayed.
6. Click **OK**.
   Once completed, the configured **Account Selection** option is enabled for the selected users. If you have configured users with an **Account Selection** option that requires user interaction, then it is recommended that you test this from the User Client on a desktop or on the printing device (if applicable). Ensure that user interaction provided is as per the configured **Account Selection** option. Once the interaction is completed, ensure that the job is printed, logged and appropriate account charged.

Step 8: Testing

Following a fresh installation, it is highly recommended to test core features of the system. For further details, see Testing the installation.

What next?

Take some time to explore the features of PaperCut NG/MF before continuing reading at Implementation by example or Tour. Business users might be interested in trying the popup client software as covered in Client software. If desired, the client software should also be deployed to other workstations. This procedure is detailed in User Client.

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2.4.2. Mac printing in detail

This section of the manual is split into different sections for ease of use, one section covering Mac OS 10.8+ installations, and another covering Windows hosted print queue setup. In most cases only one section applies on your network. As Mac systems have become more popular recently, many sites are opting for Mac print servers to support their Mac workstations. You can install PaperCut NG/MF directly on a Mac print server, offering native, end-to-end Mac printing.

2.4.2.1. Terminology

Below is an overview of the common terminology.

Print queue: There are typically two ways of providing shared multi-system access to a printer:

1. Configure each system to print directly to the device. The device needs to be networkable (e.g. have an Ethernet connection) and support multiple connections.
2. Configure a shared print queue. In this setup, only one system connects directly to the device (e.g. a server) and in turn the device is shared on the network via a print queue. Other systems on the network print to the shared queue rather than directly to the device.

Option 2 is regarded as a better solution on multi-user networks as it provides a higher level of scalability, allows for centralized administration, and allows administrators to move or remap devices without needing to propagate changes to workstations. PaperCut NG/MF requires a shared print queue as it works by intercepting the jobs as they pass through the server's queue.

CUPS: CUPS is the print queue system used by Mac. This is the same queue system used by many other UNIX based platforms including popular Linux distributions. Apple is a major supporter of CUPS.

IP Printing: This is a generic term used to describe a number of print protocols that are used to exchange print documents between a computer, a server queue, or a physical printer. (Note: This term is also occasionally used incorrectly to describe the "JetDirect" print protocol discussed below)

IPP: This is an acronym for Internet Printing Protocol. This is the "native" print protocol used by CUPS and the Mac. It's a modern protocol designed to work well on modern networks including local networks, or even over the internet or a WAN.

LPR: LPR/LPD is the traditional UNIX based print protocol.

JetDirect/Socket: This is a very simple print protocol used to transmit print jobs to a physical printer on a TCP network. The printer accepts connections on port 9100. In Windows, this print protocol is often referred to as a `Standard TCP/IP Port`, and in some cases generally as IP Printing. Almost all network printers support this method.

Bonjour Printing: This is not a print protocol, but instead is Apple's method of publishing printers on a network so workstations can locate the device/queue.

Where possible PaperCut NG/MF works with all print protocols, however, we do recommend some over others. The following set up procedure highlights methods that have shown to work in most environments.

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PaperCut's recommended setup procedure is:

- Install the printers on the server using a compatible driver.
- Test printing from the server.
- Share your printers.
- Set up the workstations to connect to the server's shared print queues.

2.4.2.2. Optional hardware configuration

Some printer models support several of the connection methods listed above. If the printer offers the option to disable these protocols through their web administration page, you should turn off all except the connection method that you will use. This minimizes the chance of incorrect configuration, and the chance of a workstation user discovering the printer directly. Some printers also support access control via IP address. If this is available, consider setting access control so only the server IP can submit print jobs directly to the printer.

2.4.2.3. Handling unauthenticated systems (e.g. laptops)

Print queues in Mac OS X by default are unauthenticated. Authentication in an Open Directory environment is instead performed at the time of system login. Unauthenticated systems such as laptops fall outside this. The introduction of unauthenticated systems on your network mandates the need for an extra layer of authentication. To address this need, PaperCut offers two options:

- Popup authentication via the PaperCut client software.
- Authentication via a Release Station or the web-based release interface (end user login > **Jobs pending release**).

It is your decision whether or not the authentication policy/procedure is to be applied to all systems on the network, or just "untrusted" laptops.

Network-wide policy

This is the simplest solution and provides a consistent procedure and policy across all your users irrespective of their access method (such as via workstation or their own laptop). Select your authentication method and enable this option on ALL print queues. The set up procedure for both methods is summarized as follows:

Using popup authentication

1. Select the **Unauthenticated printer** option on all printers. You can apply this to multiple printers via **Copy settings from Printer to Printer**.
2. Ensure that all workstations have the PaperCut client software installed. This includes both authenticated lab systems and laptops. The PaperCut client must be running to be able to print successfully.
3. Instruct users that they need to enter their username and password in the PaperCut client. You you can set PaperCut NG/MF to save the credentials for a defined period of time if required.

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Using hold/release queue authentication

1. Select the **Enable the hold/release queue** check box on all print queues. Jobs do not print until a user has authenticated and released the job.
2. Set up Release Stations, or, on the **Options** tab in the PaperCut Admin web interface, select the **Allow users to view held jobs** check box.
3. Instruct users on how to release their jobs. This procedure must be followed by all users.

Laptop only policy (advanced)

One problem with the network-wide policy discussed above is that the authentication method (e.g. client popup or hold/release queue) also applies to authenticated systems. In some ways this is a positive (i.e. provides a consistent policy), while in other ways it can be viewed as an unnecessary on trusted authenticated systems. This section discusses a solution appropriate for larger sites.

The solution is to set up two servers. One server hosts a set of queues for authenticated systems, while the other server provides queues for unauthenticated systems. Network router or firewall rules are used to ensure that only authenticated systems have access to the authenticated queues. Laptops systems must use the other queues. This is best done with partitioned IP address ranges and/or subnets. An experienced network administrator can assist with restricted server access by IP address.

2.4.2.4. Eliminating popup authentication via Mac Login Hook

You can use popup authentication to provide a secure environment. For example, there might be a mix of lab systems and unauthenticated laptops. The lab systems are managed and secured via authentication against a central user directory source, while the unmanaged systems (e.g. laptops) are limited to local user authentication only so user identity is indeterminate. Use popup authentication at the print queue level to provide an added level of user verification.

This is an advanced topic and is targeted at experienced Mac administrators with command-line knowledge. The double-authentication is eliminated by having the system login also perform the PaperCut log in via the system login hook. After the administrator has confirmed that the workstation is securely authenticating via a central directory service, they endorse the system by copying a shared secret file onto the workstation. To perform this endorsement, follow these steps:

1. Setup the PaperCut client on the workstation and configure it to start via the login hook as explained in detail in Multi-User Install.
2. Use a secure method (e.g. USB key or `scp`) to copy the file located on the PaperCut primary server at:

   `[app-path]/server/data/pc-shared-secret.dat`

   to the workstation in either of the following locations:

   `/etc/pc-shared-secret.dat or /Library/PCClient/pc-shared-secret.dat`
3. Set ownership and permissions on the file using the command line as follows:

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```
sudo chown root /etc/pc-shared-secret.dat sudo chmod 600
/etc/pc-shared-secret.dat
```

4. Test login and verify that PaperCut popup authentication step has been eliminated by printing to an unauthenticated printer. Confirm that the job prints and logs as expected.
5. Repeat the steps above for each trusted directory authenticated system (e.g. lab system) on the network, or use system imaging processes.

2.4.3. Mac hosted print queues for OS 10.8+

This section discusses printer setup on systems where print queues are hosted on Mac OS 10.8+. There are some very minor differences between the two setup instructions, but they follow the same structure. See Windows hosted print queues if you have Windows hosted print queues.

2.4.3.1. Installing the printers

Install the printer on the system running PaperCut using a compatible driver. For example, a driver supplied by Apple or the manufacturer. If there is a choice of driver, we recommend a Postscript or PPD based driver. Follow the manufacturer's suggested setup procedure for this part of the implementation. If the manufacturer supports various connection methods, we recommend using JetDirect/Socket if possible. Here is an example of a procedure that sets up a standard printer using a plain JetDirect/Socket connection:

1. Select **System Preferences**.
2. Select **Print & Scan** (in 10.9, this is named **Printers and Scanners**) .
3. Click **+** to add a new printer.
4. Click the **IP** tab.
5. In the Protocol list, select **HP Jetdirect - Socket**.
6. Enter the printer's IP address.
7. Give the printer a simple name *without* spaces.
8. Select the driver or printer model from the list; then click **Add**.

Print some test pages to the newly configured printer, such as printing a web page from Safari. Confirm that printing works as expected before continuing. Be sure to test multiple options such as Duplex and Grayscale. If printing is not working as expected, see the troubleshooting section below.

Note:
If you are adding new printers, configure PaperCut to monitor the new print queues. For more information, see Add and remove/delete/ignore printers.

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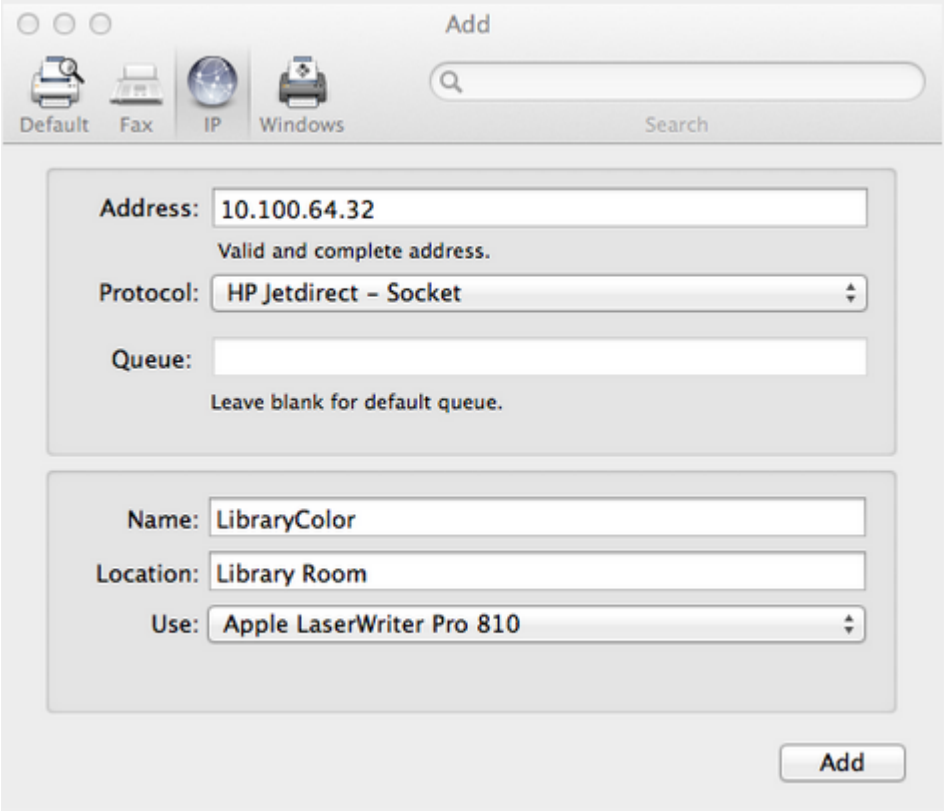

Tips and troubleshooting

- Always try HP Jetdirect/Socket first, and use proprietary connection methods as a last resort
- If your printer does not support HP JetDirect/Socket, consider using IPP as an alternative
- If you are not able to install or find a driver for your printer, try the **Generic Postscript Driver/Printer**

2.4.3.2. Sharing the printers

On Mac OS 10.8, Apple removed the ability to share printers using the Server Admin app. Sharing printers is now easier, however, LPD has since been removed as an sharing option, and the default sharing method is now IPP. To share your printers, follow the below steps:

1. Open **System Preferences > Print & Scan** on the print server (in 10.9, this is named **Printers and Scanners**)
2. Click the printer you want to share

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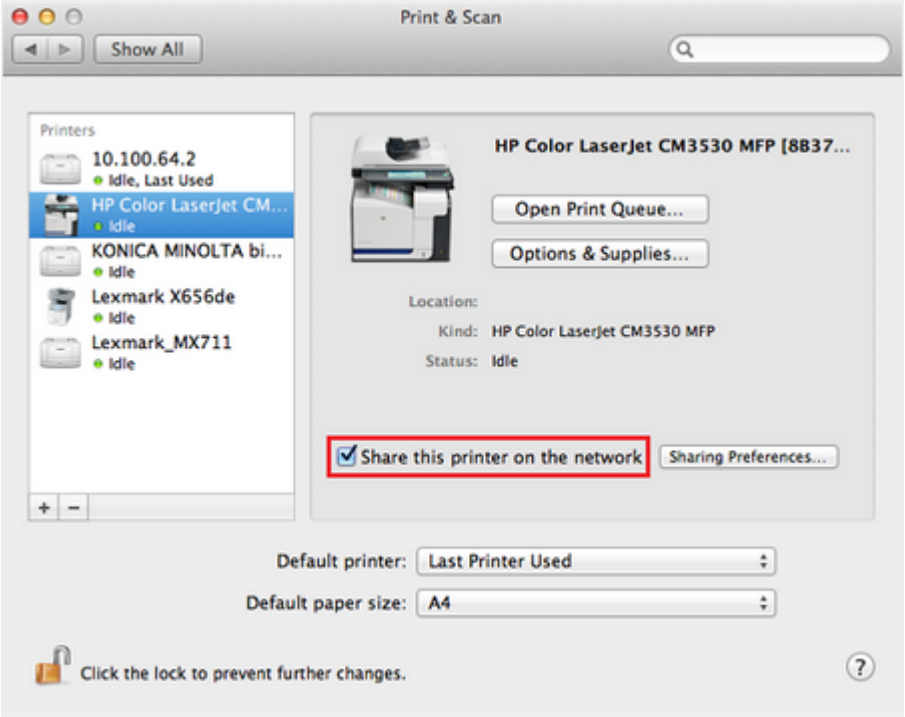
3. Select **Share this printer on the network**.



2.4.3.3. Setting up the printers on Mac workstations

Once the printers are set up on the server and shared, the next step is to install the printers on the workstations. This section includes the manual setup of print queues to workstations, as well as discussing a method of automating deployment via the Workgroup Manager. The goal is to add the printer on the workstation so it communicates with the server's print queues rather than directly to the printer. Protocols include IPP, LPD, or LPD added via Bonjour. The recommended setup is to use IPP, as this is the native protocol.

Manual setup

1. Open **System Preferences > Print & Scan** on the workstation (in 10.9, this is named **Printers & Scanners**)
2. Click **+**.
3. Select IP as the type; then select **Internet Printing Protocol - IPP** as the **Protocol**. If IPP is not compatible with this device, select **Line Printer Daemon - LPD** as the **Protocol**)
4. In the **Address**, enter your server name (or IP Address).
5. In **Queue**, enter the the printer's **Queue Name** prefixed with **printers/**. For example: **printers/my_office_printer**.
6. Select the appropriate driver under **Print Using**.
7. Select **Printer Software**. If your model is not listed here, install the manufacturer's driver and repeat these steps again
8. Take some time to test printing from the workstation, and confirm that all functions of the printer are working.

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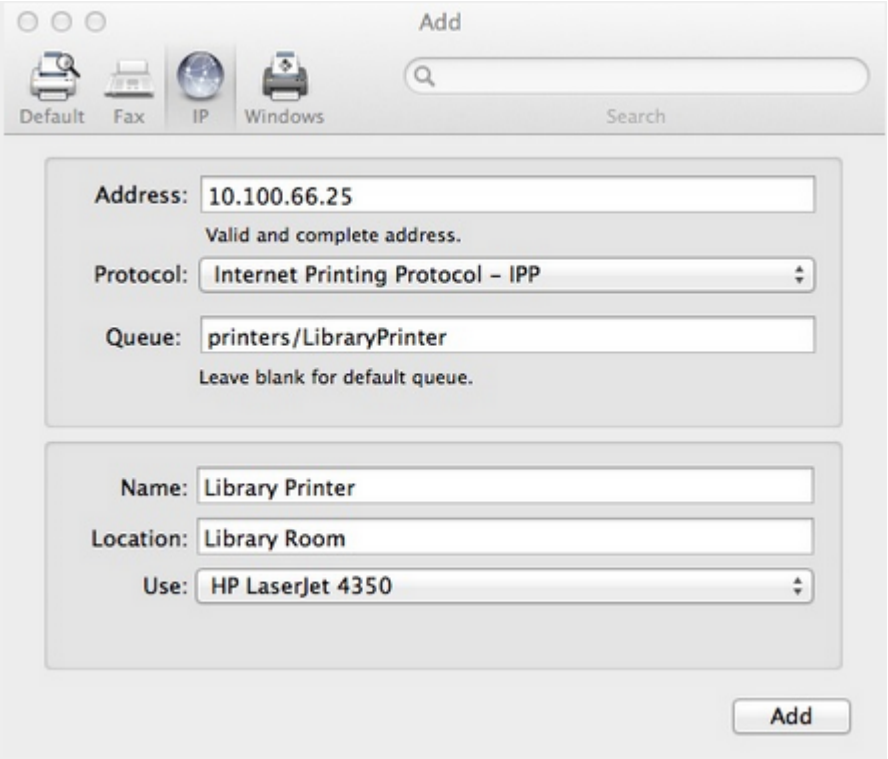
Note:
If you have trouble connecting, ensure the queue name you are entering is correct. The queue name of the printer is set when the print queue is first created on the Mac server, and might be different to the visible printer name. The queue name is displayed on the print server under **System Preferences** > **Print & Scan** > **[select printer]** > **Options & Supplies** > **General** > **Device Name**.

If you have problems obtaining a driver for your printer, try the **Generic Postscript Driver**. This option works with most printers. If after a test print the printer stops with a connection error, check the printer sharing permissions on the server or try the alternate method discussed below.



Publishing the printer via Workgroup Manager

Manually installing the printer on each desktop on a large network can be tedious. Large networks using Open Directory can automate the process with Workgroup Manager. The key to successfully deploying/publishing printers via the Workgroup Manager is to publish the configuration from a working workstation rather than the server itself. The reason behind this is that it would publish the server's printer configuration. Since the server is configured to print direct to the device and not to the queue, this would be the incorrect configuration for user workstations. Instead, install the Workgroup Manager software on a configured workstation/client and publish its known configuration. We recommend having a workstation setup that is for Workgroup Manager administration and deployment only.

1. Select one workstation on your network. Follow the manual set up procedure as discussed above.
2. Test and confirm this workstation is configured and printing correctly. Also select other

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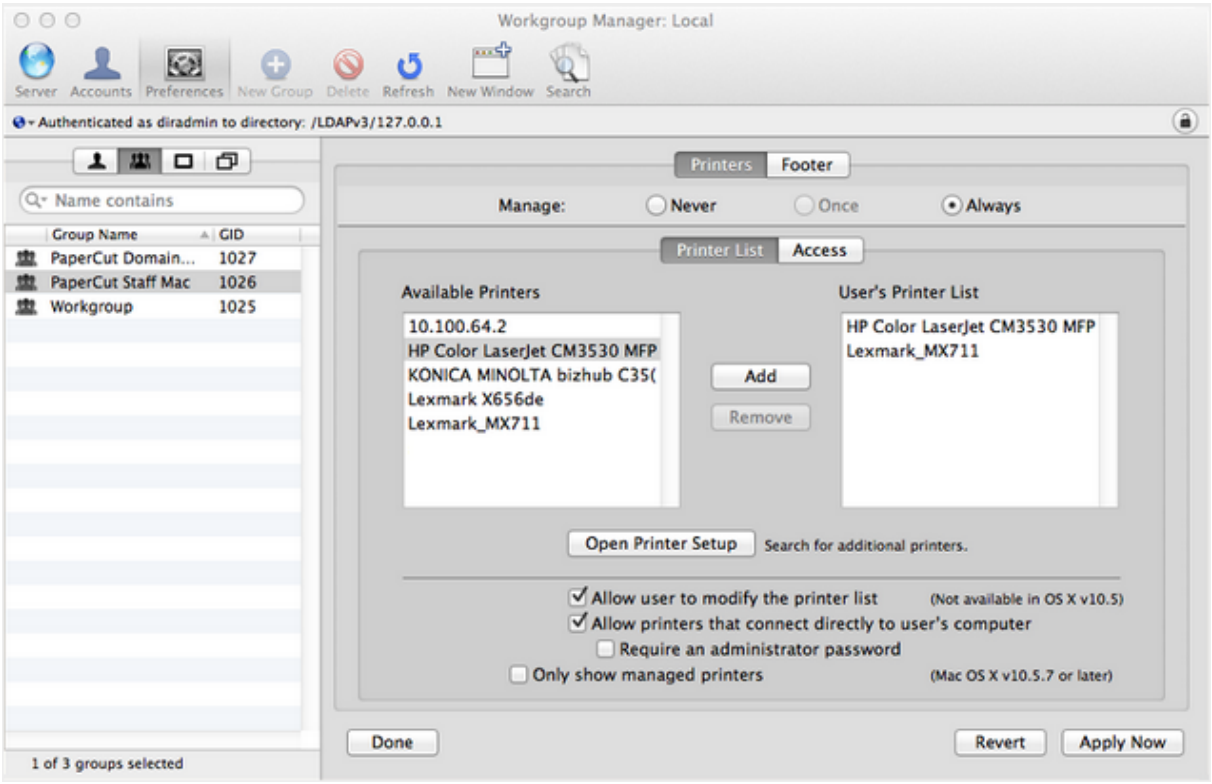
settings as appropriate such as tray, duplex and other defaults. It is important to test this step before continuing. If printing is not working, this needs to be fixed before Workgroup Manager is used to publish your print queues.

3. Install the **Workgroup Manager** on this client workstation found on the Mac OS X Server install disk).
4. Open the Workgroup Manager, connect to your directory, then select an appropriate user group or computer group used to manage client settings.
5. Enter the **Settings/Preferences** area; then select **Printing**.
6. Select **Manage Always**; then add printer(s) set up in step 1.
7. Save the settings and exit (e.g. click **Done**).
8. Log onto another workstation and confirm that printer settings are being published as expected.



2.4.4. Windows hosted print queues

This section discusses printer configuration on Mac OS X workstation in environments systems where the print queues are hosted on a Windows operating system. See Mac hosted print queues for OS 10.8+ if your print queues are hosted on Mac OS 10.8+.

When a printer from a Windows environment is shared and added to a Mac system, **Print and Scan** requests printer access credentials in the form of username and password. Any user that prints to this printer uses these supplied credentials. This means that the administrator that added the printer to the workstation is the owner of all documents printed from the workstation irrespective of the current logged in user.

The ideal solutions varies from network to network and depends on factors including:

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- Your existing network configuration
- The mix and makeup of operating systems used on the network
- The underlying directory technologies (Active Directory, LDAP, etc.) if used
- Whether Macs are used by a single owner or multiple users

The following sections outline common set up scenarios and their pros and cons. Your solution might fit one of these scenarios or might be composed of a combination.

2.4.4.1. Scenario One: My own Mac (single user)

Many networks, particularly those in a business environment, have a dedicated desktop system for each user. This allows the desktop system's global settings to be customized for the user. Common examples include:

- Dedicated computers used in a business
- Staff laptops or desktops used in education

Requirements

- Printers hosted and shared from a Windows or Linux server.
- Mac systems used by a single user (or small group of known users).
- Each user has a domain account and password.
- The username associated with the account on the Mac matches the domain username (either the account used to log in, or the account set up as the automatic log in account).
- Running Mac OS X 10.8 or higher.

Installation

Check the user account information:

1. Start up the Mac, log in as the local administrator, and ensure the system is connected to the network.
2. Select **System Preferences**
3. Depending on your Mac OS version, select **Accounts** or **Users and Groups**.
4. Click **MyAccount**. *(Skip this step in Mac OS 10.8 and 10.9)*
5. Ensure that the **Short name** associated with the account matches the user's domain account username. If not, create a new working account as appropriate.

Set up the printers

1. Select **System Preferences > Print and Scan**.
2. Click **+** to add a new printer.
3. Control-click the toolbar; then select **Customize Toolbar**.
4. Drag the **Advanced** icon onto the bar; then click **Advanced**.

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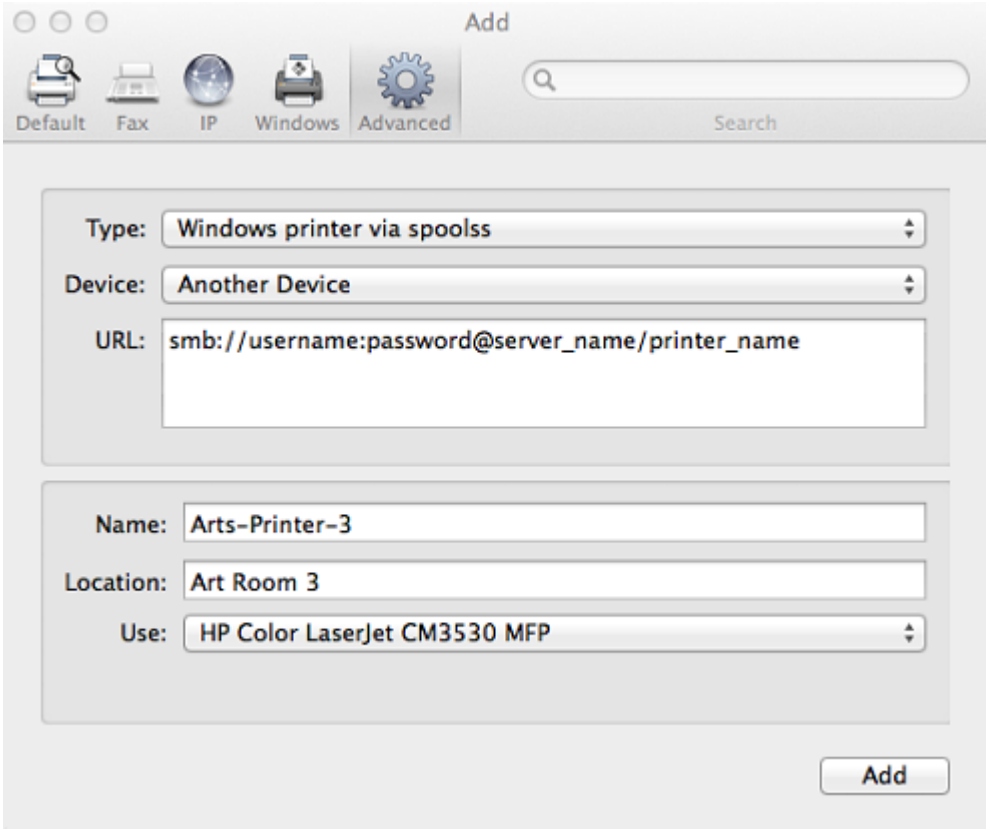
5. Select the **Windows printer via spoolss** device type.
6. Enter a **Device URL**, such as: `smb://username:password@server_name/printer_name`
   - Tip: server_name is the name of the server hosting the printer, and printer_name is the printer's share name
   - You might need to include the port in the DeviceURL: `smb://server_name:139/printer_name`
   - OS X can struggle with printer share names containing spaces. We recommend a share name without spaces
7. In **Name**, enter a friendly and informative printer name.
8. Choose a driver for this printer by selecting **Select Software** from the list.
9. Click **Add**.
10. Test print and ensure jobs are logged in PaperCut NG/MF as the correct user.



Install the PaperCut NG/MF User Client software

1. Open **Finder**; then select **Go** > **Connect to Server**.
2. Enter `smb://servername/pcclient` where `servername` is the name of the server hosting PaperCut NG/MF. If you are prompted for a username and password, this is a username that has access to connect to the SMB share on your Windows server.
3. Drag the `PCClient` application across to the local **Applications** directory.

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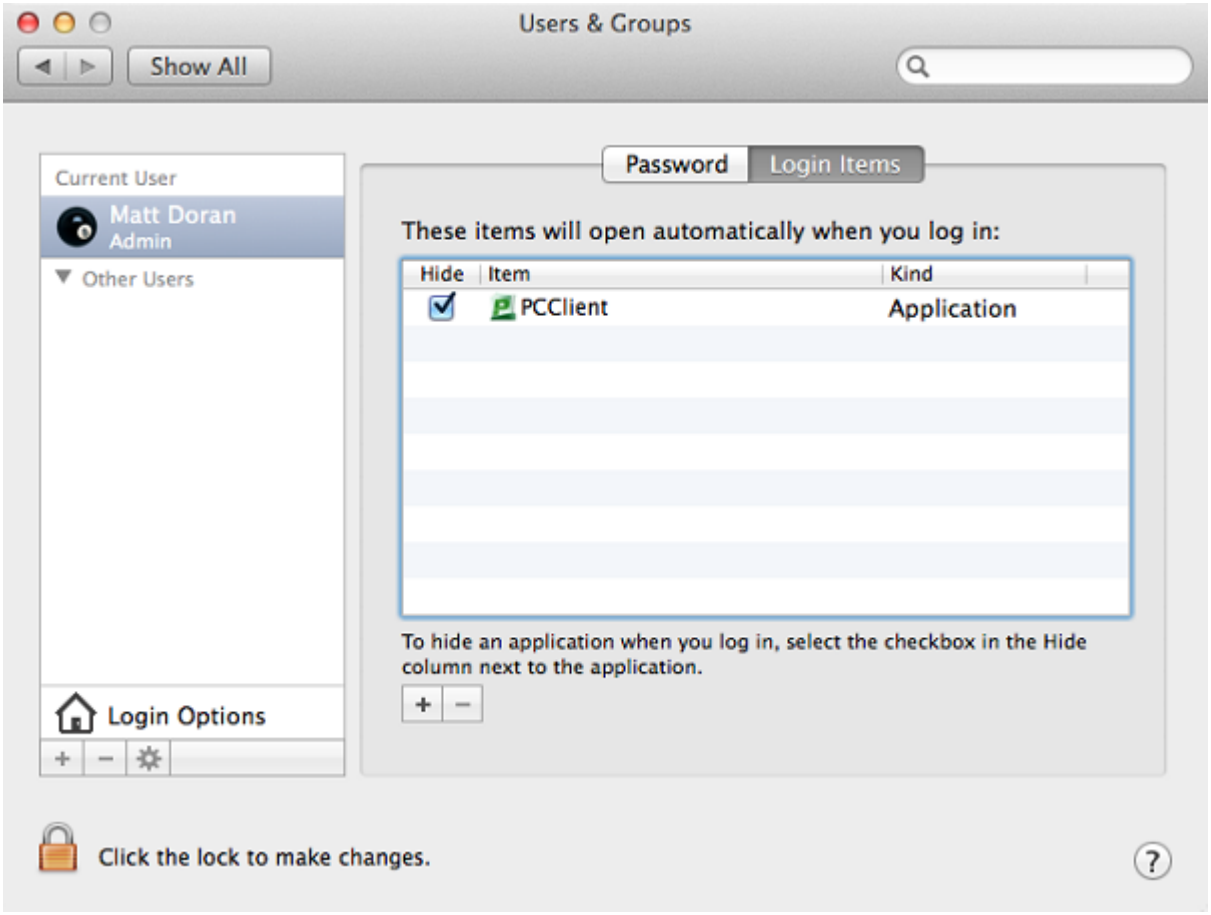
4. Open **System Preferences**
5. Select **Users & Groups**.
6. Click the **Login items** tab.
7. Click **+**; then select the newly installed `PCClient` application. Select the **PC Client** check box when it is displayed.
8. Restart the system and ensure the client starts upon login.



Tips and troubleshooting

- Get the user to log in to the Mac. Verify that the `PCClient` program starts automatically and shows the user's balance.
- Print to the newly set up printer. On the server's print queue, ensure that the job is displayed under the correct username.
- Ensure that the print job successfully reaches the printer and that the user gets charged in PaperCut.
- Check that the balance has changed to reflect the new balance in the `PCClient` program.

2.4.4.2. Scenario Two: The multi-user Mac with popup authentication

Schools and universities often have Macs available for student use in dedicated computer labs. In these environments the Macs are shared by many users and Scenario One is not appropriate.

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Larger Mac networks already using LDAP or Active Directory authentication, or planning on doing so, might want to consider Scenario Three explained in the next section.

Scenario Two uses a popup authentication model. For more information, see Popup authentication.

The end user's perspective:

1. The user sees the `PCClient` program running.
2. When the user prints a job, the client pops up a window requesting the user to enter a username and password. See Popup authentication.
3. The user enters a domain username and password.
4. If the credentials are valid, the job is charged to the user account.

The explanation:

1. The print event is performed as a generic user - For example, "`macuser`", "`student`", etc.
2. In PaperCut NG/MF, the "macuser" account is set up to use popup authentication by enabling the option **Unauthenticated user**. See Popup authentication for further details.
3. The popup requests the user to enter a username and password.
4. The password is authenticated and printing is charged against the supplied account.

Requirements

- Printers are hosted and shared off a Windows, Mac or Linux server.
- The Mac systems are set up to log in under a generic account name. (e.g. macuser, student, etc.)
- The domain contains a user account matching the generic account.

Installing the PaperCut NG/MF User Client software

1. Open **Finder**; then select **Go** > **Connect to Server**.
2. Enter `smb://servername/pcclient` where `servername` is the name of the server hosting PaperCut NG/MF. If you are prompted for a username and password, this is a username that has access to connect to the SMB share on your Windows server.
3. Enter account details for an account able to connect to the SMB share if requested
4. Drag the `PCClient` application across to the local **Applications** directory.
5. Command-click the newly copied `PCClient` application in the **Applications** directory. Select **Open Package Contents**.
6. Navigate to `Contents/Resources/`.
7. Double-click the `install-login-hook.command` script.
8. Restart the system and ensure the client starts upon login.

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Configure the popup settings

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select `macuser`.
3. In the **Account Details** area, complete the following:
   - **Balance**—set the account balance to zero.
   - select the **Restricted** check box.
4. In the Advanced Options area, select the **Unauthenticated user (enable popup authentication)** check box.
5. Click **Apply**.

If users log in to the Mac using their AD/LDAP username, you can eliminate the authentication popup by configuring the client as described in Popup authentication.

Tips and troubleshooting

- Get the user to log in to the Mac. Verify that the `PCClient` program starts automatically.
- Print to the newly set up printer. On the server's print queue, ensure that the job is displayed under the correct username.
- An authentication popup should display on the Mac. Enter a valid domain username and password.
- Charge the corresponding user for the job. Also check that the balance has changed to reflect the new balance in the `PCClient` program.

2.4.4.3. Scenario Three: Multi-user Macs using LDAP or Active Directory authentication

Larger networks often run the Macs in a domain environment either authenticating with an Active Directory or an LDAP network. In an authenticated domain environment, the identity of the user (the user's username) is known and verified at the time of log in. With the help of the TCP/IP Printing Services for Microsoft Windows, and the LPR/LPD support on the Mac, print jobs can be identified on the server and associated with the user's login name. This avoids the need for the popup authentication used in Scenario Two.

Using the LPR and IPP printing protocols on Windows print servers

LPR is a legacy protocol developed for UNIX that clients use to send print jobs to print servers. Microsoft has supported this protocol for a number of years via an add-on module called Print Services for UNIX (PSfU). Under certain conditions Windows LPD printers can cause issues when using PaperCut hold/release print queues. The information included here is to help customers understand the issue and document suggested workarounds.

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The mechanism used by the Windows PSfU subsystem to accept LPR and IPP print jobs is different from other implementations in Windows such native SMB based printers. In SMB the event notification to applications such as PaperCut is well behaved and reliable. Event notification for LPR and IPP based printing does not use the same set of underlying APIs and under some conditions the PaperCut print monitoring layer receives notification *after* the print job has started. This means that some print jobs can start to print before the hold instruction is issued. This job is then suspended in a **Paused Printing** state (i.e. both paused and printing) and this results in all other jobs on that queue being held up by the paused job.

The symptoms are generally not consistent, suggesting an underlying race condition bug in Windows. Things that can affect the problem include:

- Running the print server on a virtual machine
- The number of processors/cores
- The current load on the print server
- The version and patch level of Windows

Because the issue is in the underlying Windows print subsystem, it is not possible for PaperCut to quickly implement a reliable solution and Microsoft is unlikely to implement a fix to this legacy subsystem. If a site does experience this issue there are some steps that can help alleviate or fix the issue.

1. Use the SMB protocol for Windows based print server queues. Note that using SMB can place some constraints on how users authenticate and how anonymous users are able to print at your site. This is the recommended approach.
2. Use two print queues. Queue *A* is virtual and queue *B* is the real queue attached to the physical printer. Users print to *A* using LPR and PaperCut can always place a hold on the print job. PaperCut then redirects the job to *B* on release. Managing virtual print queues is documented in section Find-Me printing and printer load balancing. Configure queue *A* to use a port with no printer (e.g. `LPT1:`), it should be permanently *paused* (**Printer > Pause Printing**), and the virtual queue configuration for *A* in PaperCut should forward jobs to *B* (setting **Jobs may be redirected to these destination queues**).

   If queue *A* is un-paused then the job will error, however, it can still be re-directed as needed.

Requirements

- Macs set up in multi-user mode authenticating off a domain. Either Active Directory or LDAP.
- Printers hosted on a Windows print server.
- The server needs the TCP Printing Services installed (also known as Print Services for Unix).

Installation

On the server hosting the printers, set up TCP/IP Printing:

1. Log in to the server as a system `administrator`.
2. Select **Control Panel > Add Remove Programs**.

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3. Click **Add/Remove Windows Components**.
4. Select **Other Network File and Print Services**.
5. Click **Details**.
6. Select **Print Services for Unix**.
7. Click **Next** to complete the installation.

Some systems running firewall software can block LPD printing. On systems running firewall software, ensure that incoming connections from the local network are allowed on port 515.

On each Mac, add the required printers:

1. Select **Applications > Utilities**.

   Open the **Printer Setup Utility**
2. Click **+** to add a new printer.
3. Click the **IP** tab in the top toolbar.
4. From the **Protocol** list, select **Line Printer Daemon - LPD**.
5. In **Address**, enter the IP address of the server hosting the printers .
6. In **Queue**, enter the printer's share name .
7. In **Name**, define a user friendly name; then select the printer type.
8. Click **Add**.
9. Repeat for other printers as necessary.

Installing the PaperCut NG/MF User Client software

1. Open **Finder**; then select **Go > Connect to Server**.
2. Enter `smb://servername/pcclient` where `servername` is the name of the server hosting PaperCut NG/MF. If you are promted for a username and password, this is a username that has access to connect to the SMB share on your Windows server.
3. Enter account details for an account able to connect to the SMB share if requested
4. Drag the `PCClient` application across to the local **Applications** directory.
5. Command-click the newly copied `PCClient` application in the **Applications** directory.
6. Select **Open Package Contents**.
7. Navigate to `Contents/Resources/`.
8. Double-click the `install-login-hook.command` script.
9. Restart the system and ensure the client starts upon login.

Tips and troubleshooting

- Restart the system and ensure the `PCClient` application starts on login and lists the user's account balance.
- Ensure print jobs correctly show in the PaperCut job logs under the user's PaperCut account.

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- Charge the corresponding user for the job. Also check that the balance has changed to reflect the new balance in the `PCClient` program.

Additional information and tips

The client install process is also covered in User Client. After the first Mac is set up and the printing process is tested, provide the simplified client install notes covered in Deployment on Mac OS X to end users or other SysAdmins.

The `PCClient` client can accept command line options as explained in Configure the User Client using the command-line. If the client is started via the login hook, you can define the command-line options in the file:

```
/Applications/PCClient.app/Contents/Resources/login-hook-start
```

Look for the line starting with client_args and the associated comments above.

2.5. Installation on Linux (CUPS and Samba)

2.5.1. Quick install: Linux (CUPS and/or Samba)

Important:
The following section assumes knowledge of general Unix/Linux system management including using the command-line, creating users, editing configuration files and understanding file permissions.

Step 1: System requirements

Before proceeding with the installation the SysAdmin should take a few moments to verify system requirements.

- Is the operating system version supported and are patches up-to-date? (see PaperCut NG System Requirements).
- Are printer(s) installed and hosted on this system and are they exposed to the network either via CUPS or Samba? Administrators should ensure that the print queues are set up and working as expected before attempting to install PaperCut NG/MF.
- In a multi-user environment, printers are often shared with other network users. Other workstations should connect to these printers as "Network Printers". Ensure workstations are configured to print to the shared print queues. For example, a Windows workstation can connect to a samba exposed printer via `\\[samba_server]\[printer]`. Other Linux or Mac workstations use IPP via CUPS.
- Ensure that printers are configured correctly and work.

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Step 2: Create the host user account and firewall settings

PaperCut NG/MF runs and installs under a non-privileged user account called "papercut". The installation location for the application is the `papercut` user's home directory. Create a user account on this system called `papercut`. This is usually done by logging in as `root` and using a user management GUI tool or at the command prompt entering:

```
shell> useradd -m -d /home/papercut papercut
```

The syntax for `useradd` and `groupadd` can differ slightly on different versions of Linux. They can also be called `adduser` and `addgroup`.

The user's home directory (the `-d` option) denotes the install location. `/home/papercut` is the recommended location. Administrators can, however, also consider alternate install locations depending on personal preference. Alternatives include:

- `/usr/local/papercut`
- `/opt/papercut`

Important:
These instructions assume the install location is `/home/papercut`. If an alternate home location is defined, some of the paths listed in subsequent sections will require modification.

Some Linux distributions impose strict resource usage limits on user accounts (`ulimit`). The `papercut` account is a special account used for hosting an application and needs to be granted sufficient resource limits, such as the ability to open many files. On systemd Linux distributions, this limit is automatically configured so you do not need to do anything. For other distributions, the methods of setting user-level `ulimit` levels vary, however, the common solution is to add the following line to `/etc/security/limits.conf`:

```
papercut - nofile 65535
```

Many Linux distributions have strict default firewall policies. PaperCut NG/MF uses TCP Ports 9191 (for HTTP), 9192 (for HTTPS/ SSL), 9193 (for Binary) and 9195 (for HTTPS/ SSL on supported devices) and these ports must be open. Take some time now to ensure these ports are open. Consult your distribution documentation for details on how to open firewall TCP ports.

Step 3: Download and install PaperCut NG/MF

PaperCut NG/MF is supplied as a self-extracting and self-installing archive. The installation is performed as the newly created `papercut` user and installs to that user's home directory. Temporary `root` access is required for part of the install. Make sure the root password or `sudo` password is handy. For more detail about the install process including installing to a different location, see PaperCut NG/MF on Linux.

Log on as the newly created `papercut` user and download and execute the installer. You can execute the file from any directory.

```
shell> su - papercut
shell> wget [download url from PaperCut Software website]
```

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```
shell> sh ./pcmf-setup-*-linux-*.sh
```

Follow the installation instructions and enter the root password when requested.

Important:

Ensure you `login` as the user `papercut` so that the user's environment is sourced so the home directory (install location) is correctly defined.

```
358920 blocks
4731 blocks
Applying default permissions...
Setting permissions on Application Server files...
Setting permissions on Print Provider files...

The install needs to perform some tasks as root.  Tasks include:
        * Setting setuid-root on the authentication provider
        * Installing a CUPS backend
        * Configure the server's boot scripts

Would you like to perform these tasks now?  [yes or no]
yes
Enter root password when requested:
Password:
Setting authpam as setuid root...
Installing SysV style boot scripts...
Attempting to locate CUPS installation...
Found CUPS backed_directory at /usr/lib/cups/backend
Linking Print Provider into CUPS backend directory
Creating client configuration file...
Config file successfully written.
Starting the application server...
Starting Application Server.............started (pid: 4361).
Configuring.....
```

The installation process takes between two and five minutes depending on the speed of the system. A system restart is not required but administrators are advised to perform installation on live production systems during periods of low activity, for example, not during backup operations or other administration activities.

Step 4: Run the Configuration Wizard

Tip: If the installer doesn't work, check the log file located in: `C:\Users\%username%\AppData\Local\Temp\Setup log %install date%`

After installation, you are prompted to open a web browser at :

`http://[server-name]:9191/admin`

The configuration stages are explained below:

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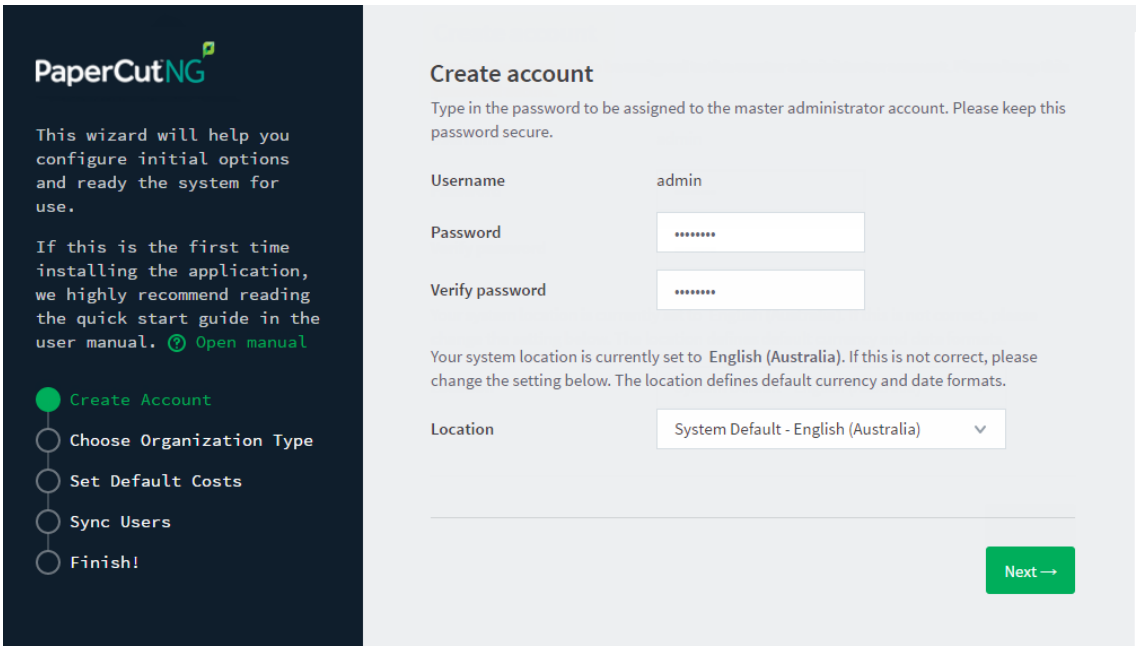
1. Administrative password



a. Complete the following fields:

- **Password**—enter the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. The password must be at least six characters.

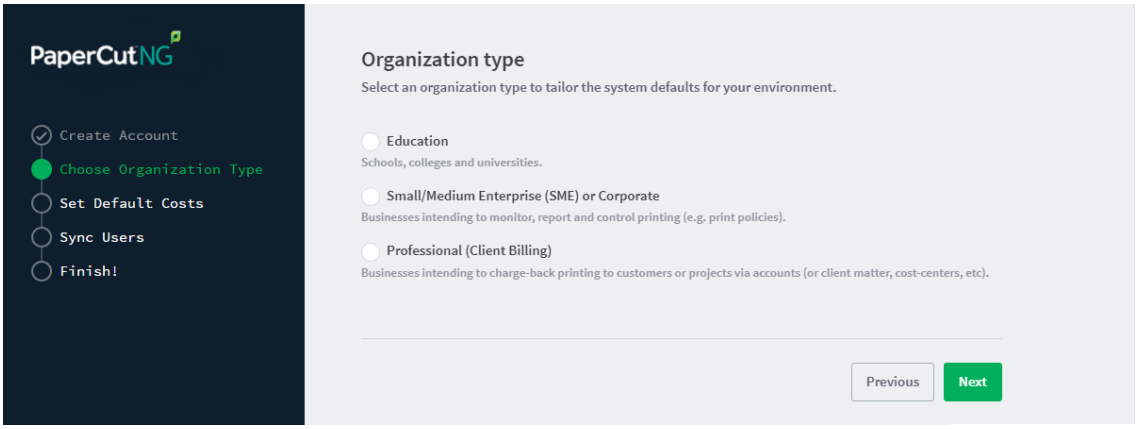
> **Tip:**
> Keep this password secure. If you forget your password, you can reset it. For more information, see Resetting the Admin Password.

- **Verify password**—re-enter the password.
- **Location**—select the system's physical location and language.

b. Click **Next**.

2. Organization type

The **Organization type** screen is displayed.



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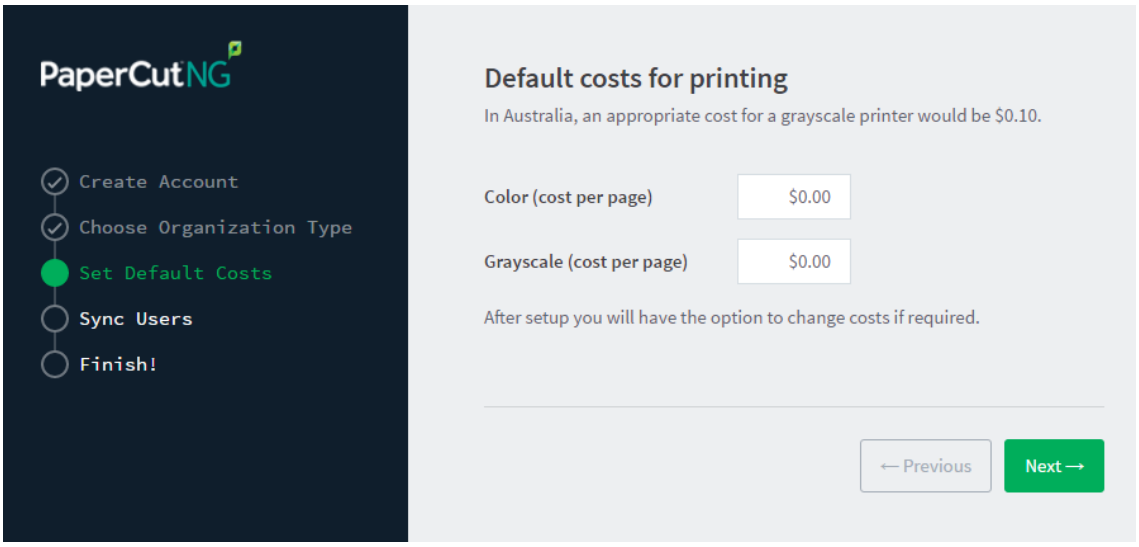
This selection determines which system defaults are used.

a. Select **Education**.
b. Select **Small/Medium Enterprise (SME) or Corporate**.
c. Select **Professional (Client Billing)**.
d. Click **Next**.

3. Default cost for printing

The **Default costs for printing** screen is displayed.



Important:
For an education implementation, where users are charged for their printing, leave these values as zero during the implementation stage, otherwise, students will not be able to print as they cannot yet add credit to their account.

If required, you can change this setting after installation.

a. Complete the following fields:
   - **Color (cost per page)**—enter the default cost per page for color printing on all printers.
   - **Grayscale (cost per page)**—enter the default cost per page for grayscale printing on all printers.
b. Click **Next**.

4. Initial user credit (Education organization type only)

If you selected **Education** as the organization type, the **Initial user credit** screen is displayed.

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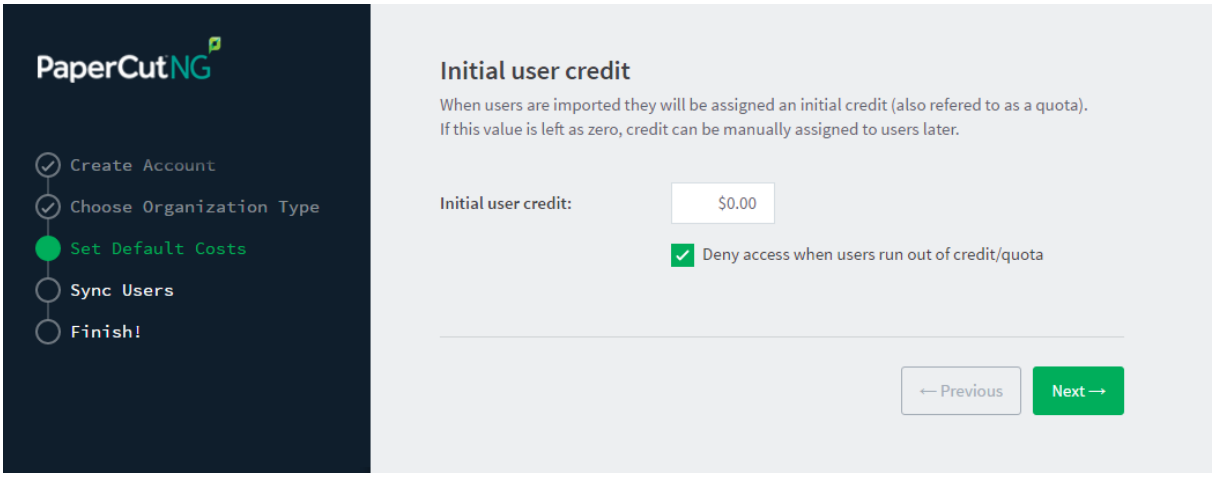

If you selected **Small/Medium Enterprise (SME) or Corporate)** or **Professional (Client Billing)** as the organization type, go to step 5.

a. Complete the following fields:

- **Initial user credit**—enter the amount of credit each/quota each user will receive when the system is first enabled. You can change these settings after setup.
- **Deny access when users run out of credit/quota**—select this check box to prevent users from printing when they run out of credit/quota.

> **Tip:**
> If you are evaluating PaperCut NG/MF it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation.

b. Click **Next**.

5. User/group synchronization

The **User/group synchronization** screen is displayed.

PaperCut NG/MF extracts user information out of the system or domain.

> **Tip:**
> To speed up the installation, you can click **Skip this step** and synchronize the users/groups later.

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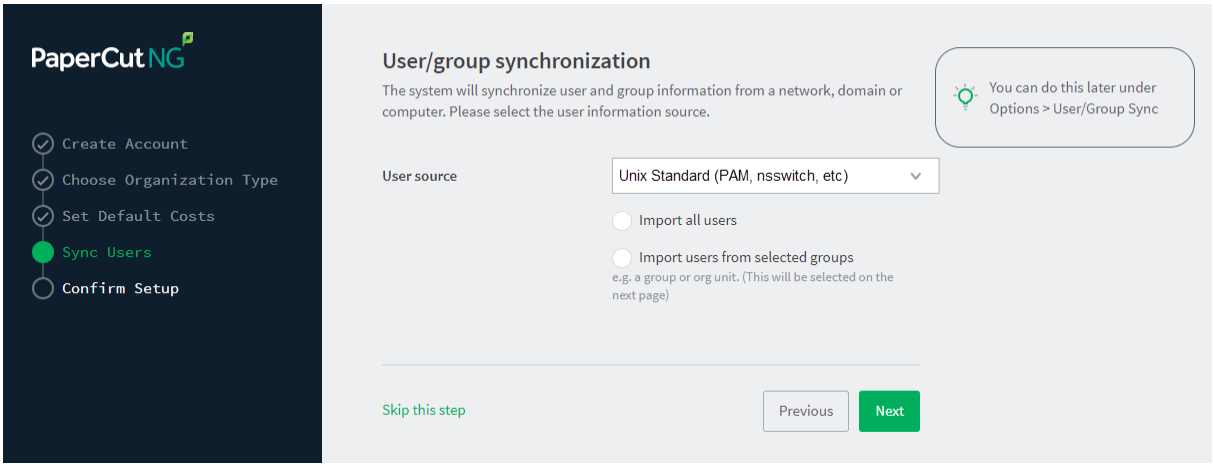

a. In **User source**, select the source of user account data:
   - **Unix Standard** (PAM, Local NetInfo, etc.)—if the user accounts are set up and defined on the local system as standard Unix accounts or mapped into the system from a central directory service such as LDAP via nsswitch.conf and PAM. Most large established networks use this option.
   - **Samba**—if the central user directory is a Windows Domain. The Samba option is available only if Samba is installed on the system. The Samba option is appropriate on medium to small networks currently operating in a Windows Domain environment.
   - **Azure AD Secure LDAP**—for organizations using Microsoft Azure AD Secure LDAP as a cloud based user directory service.
   - **LDAP** (Open Directory)—for large networks with existing Open Directory domains. This includes networks running Open LDAP and Windows domains running Active Directory. PaperCut NG/MF does its best to auto-discover LDAP settings, but some knowledge of LDAP and/or Open Directory is required.
   - **Google Cloud Directory**—for organizations using Google Cloud Directory as a cloud based user directory service.

b. Select one of the following options:
   - **Import all users**—import all domain user accounts.
   - **Import users from selected groups**—import a subset of users from a given group. This is useful when only a subset of users will use the printers.

c. Click **Next**.
   - For Samba, LDAP, and Azure AD Secure LDAP, the Server Details page is displayed.
   - For Google Cloud Directory, the Google Cloud Directory Details page is displayed.

d. Complete the following as required:

   Samba

   i. Complete the following fields:

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- **Domain Server**—The name of the Windows domain server.
- **Admin username**—The username of the user who has permission to connect to and query the domain server. The username/password you specify here is an Admin user on your Windows domain that has permission to add machines to the domain.
- **Admin password**—The password for the above user.

ii. Click **Test Samba Settings** to test and confirm your settings before continuing.

iii. Click **Next**.

LDAP

i. Complete the following fields:

- **LDAP Server Type**—Determines which LDAP fields are used to get user and group information. PaperCut NG/MF supports the following server types:
  - Unix / Open Directory
  - Microsoft Active Directory
  - Novell eDirectory

  However, it is easy to support other server types by adjusting the LDAP fields PaperCut NG/MF searches. For more information, see Advanced LDAP configuration.
- **LDAP Server Address**—The hostname or IP address of the LDAP server.
- **Use SSL**—Indicates if an encrypted SSL connection is used to connect to the LDAP server. The LDAP server requires SSL support to be enabled and should accept connections on the standard LDAPS port 636.
- **Base DN**—The Base DN of the LDAP server. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations require a blank Base DN to operate. Some examples:

  ```
  DC=myschool,DC=edu,DC=au,DC=myorganization,DC=com OU=OrgUnit,DC=domain,DC=com,DC=local
  ```

- **Admin DN**—The DN of the user who has permission to connect to and query the LDAP server. This is typically an administrative user, although it can be a user that only has read-only access to the LDAP server. An example of the DN of the Administrator user on a Windows AD domain "domain.com", would be `CN=Administrator,CN=Users,DC=domain,DC=com`. The

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exact format of the DN depends on the LDAP server. Some examples:

- Windows Active Directory: `CN=Administrator,CN=Users,DC=domain,DC=com`
- Windows Active Directory (in organizational unit): `CN=administrator,OU=OrgUnit,DC=domain,DC=com`
- Mac Open Directory: `uid=diradmin,CN=users,DC=domain,DC=com`
- Unix Open LDAP: `uid=root,DC=domain,DC=com`, or `uid=ldapadmin,DC=domain,DC=com`
- Novell eDirectory: `CN=root,DC=domain,DC=com`, or `CN=ldapadmin,OU=users,DC=domain,DC=com`.

The Admin DN and password is optional if your LDAP server allows anonymous binds for querying.

- **Admin password**—The password for the above user.

> **Tip:**
> Some LDAP servers are configured to allow 'anonymous' LDAP query access. In these situations, you can leave **Admin DN** and **Admin password** blank.

ii. Click **Test LDAP settings** to test and confirm your settings before continuing.

iii. Click **Next**.

Azure AD Secure LDAP

i. Complete the following fields as required:

- **Accept self-signed certificate**—Select this check box if you are using a self-signed certificate that does not need to be validated. If you are using a certificate signed by a trusted authority, clear this check box.
- **Azure LDAP External Address**—Your LDAP external address copied above from Azure AD.
- **Base DN**—Your Azure DNS Domain Name. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations require a blank Base DN to operate. Some examples:

```
DC=myschool,DC=edu,DC=au,DC=myorganization,DC=co
m OU=OrgUnit,DC=domain,DC=com,DC=local
```

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- **AAD DC Administrator username**—The Azure Active Directory DC administrator username. For example, admin@papercut.com.
- **Admin password**—The password for the above user.

ii. Click **Test Settings** to test and confirm your settings before continuing.

iii. Click **Next**.

Google Cloud Directory

> **Note:**
> Remember, this functionality is available for organizations using G Suite Education, G Suite Enterprise for Education, G Suite Enterprise, and Cloud Identity Premium.

> **Important:**
> Before you start, make sure you can log in to Google as a Super Admin.

1. Log in to admin.google.com using your Super Admin user login details. The **Google Admin console** is displayed.
2. Click the **Apps** tile. The **Apps** screen is displayed.
3. Click the **LDAP** tile. The LDAP screen is displayed.
4. Click **ADD CLIENT**.
5. Type a name for the LDAP client connection you'll be configuring to use for PaperCut NG/MF (for example, "PaperCut MF"), and optionally type a description; then click **CONTINUE**. The **Access permissions** screen is displayed.

   > **Note:**
   > This adds PaperCut NG/MF to the list of permitted LDAP clients. You can find more information about configuring access permissions from Google.

6. In the **Verify user credentials** section, select either:
   - **Entire domain <domain name>**
   - **Selected organizational units**; then click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
7. In the **Read user information** section, select either
   - **Entire domain <domain name>**
   - **Selected organizational units**; then either click **Copy from Verify user credentials** or click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)

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8. In the **Read group information** section, click the switch to set it to **On**; then click **ADD LDAP CLIENT**. Google displays a confirmation message and information about downloading the certificate.
9. On the same screen, click **Download certificate**; then save the downloaded certificate (which is a PDF file) in a secure location.
10. Click **CONTINUE TO CLIENT DETAILS**. The **Settings for <LDAP client name>** screen is displayed.

> **Note:**
> The service status, displayed at the top right of the screen, is initially set to **OFF**.

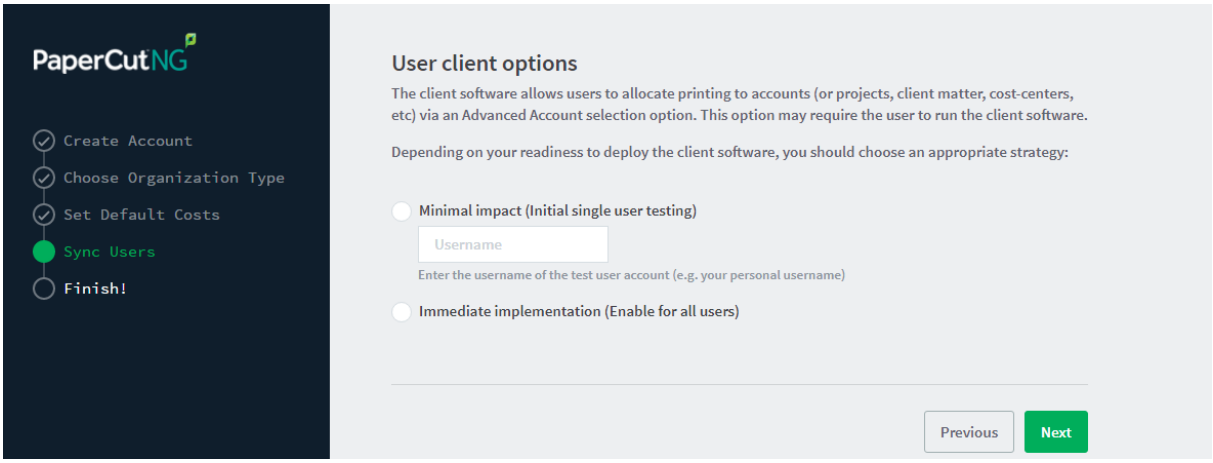
11. Click anywhere in the **Service Status** box. The **Service Status** screen is displayed.
12. Select **On for everyone**. The service status is updated for everyone.
13. Click **SAVE**.

> **Note:**
> Depending on the size of your organization, it can take up to 24 hours for Google Cloud Directory changes to apply.

For more information on user/group synchronization on Linux, see PaperCut NG/MF on Linux.

6. User Client options (Professional Client Billing organization type only)

If you selected **Professional (Client Billing)**, as the organization type, the **User client options** screen is displayed.



If you selected **Education** or **Small/Medium Enterprise (SME) or Corporate**, go to step 7.

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Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either via the User Client or via the printing device. For more information, see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client may be optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future.

However, in environments where user interaction for Account Selection is required and can only be done via the User Client (and cannot be done at the printing device), running the User Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device.

The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated.

a. Depending on the Account Selection configuration for users (whether or not user interaction is required and whether or not your environment caters for this on the User Client AND on the printing device), select an appropriate User Client deployment strategy

   - **Minimal impact (Initial single user testing)**—the Account Selection option requiring user interaction is enabled only for a single user for testing purposes. You need to nominate the testing account; this can be an existing system/domain account used for testing purposes or your own user account. The username should be in the format used to log in to the domain/system (usually the short form). Depending on the environment, you can test the user interaction for Account Selection either on the User Client or on the printing device. The minimal impact strategy allows you to test Account Selection with user interaction using the nominated test system/domain user account, after which you can configure other users with similar Account Selection options.
   - **Immediate implementation (Enable for all users)**—the Account Selection option requiring user interaction is enabled only for all users. If you have configured your users with Account Selection that requires user interaction, and this can only be done on the User Client (and cannot be done on the printing device), then you must install the User Client on all user desktops immediately to prevent disruption of user printing services.

     If in doubt, select the minimal impact strategy. This ensures the impact is isolated to only the nominated test account.

b. Click **Next**.

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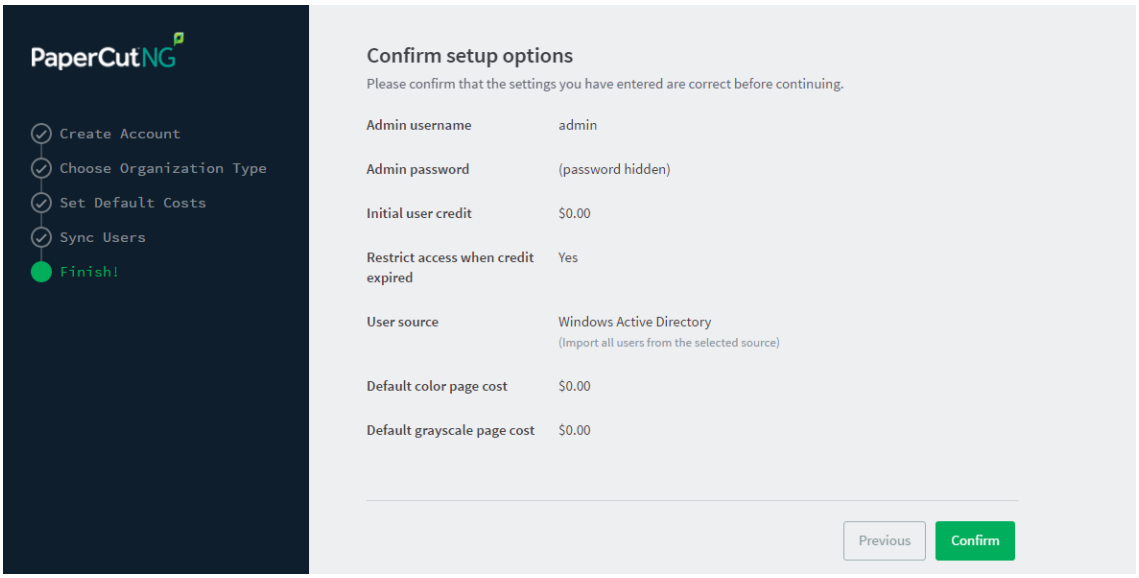
7. Confirm setup options

The **Confirm setup options** screen is displayed.



a. Check the settings you have entered. If you want to change anything, you can return to any of the configuration screens to alter the options.

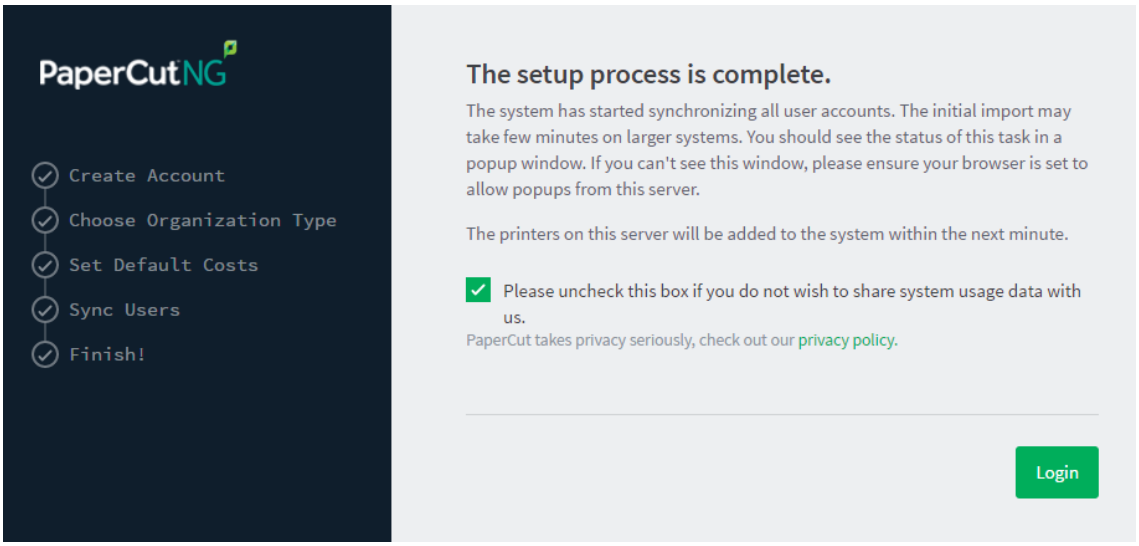
b. Click **Confirm**.

   The **Initial user import** screen is displayed.

c. Click **Close**.

8. Setup complete

After completing the configuration wizard you are presented with a user synchronization status screen, showing the progress and results of the setup.



a. Click **Login** to access the Admin web interface and begin familiarizing yourself with the options and features available.

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Step 5: Check the printer configuration

Unlike Windows and Mac with single print system environments, Linux is a more complex environment with a choice of print system implementations. At this stage some manual printer configuration is required. See Linux print queue integration and follow the steps for integrating with the print queues in your environment before returning to this section and following on with the next step.

Printers hosted on a machine other than the PaperCut NG/MF server, require additional installation steps to be configured as 'secondary' servers. See Configuring secondary print servers and locally attached printers for details.

Step 6: Share the User Client software

The PaperCut NG/MF client software is located in the directory `[app-path]/client`. It is useful to share this directory over the network so workstations can access/install the client application. Common sharing methods include:

- Samba - used to share files to Windows based workstations. Mac OS X Server tools such as the Workgroup Manager or other 3rd party tools such as SharePoint can help with sharing the client directory via Samba. Similar GUI tools exist on Linux.

  Advanced SysAdmins can share this directory by hand-editing the `/etc/smb.conf` file. The following configuration shares the directory in read-only form:

  ```
  [pcclient]
  path = /home/papercut/client
  comment = PaperCut Client
  public = yes
  only guest = yes
  read only = yes
  ```

- NFS - a popular sharing method used for Linux/Unix based workstations.

Step 7: Deployment for a Professional (Client Billing) installation

Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either on the User Client or on the printing device.

The User Client

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client may be optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future. However, in environments where user interaction for Account Selection is required and can only be done via the User Client (and cannot be done at the printing device), running the User Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to

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carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device. The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated. For more information about the Account Selection options with and without user interaction (via the User Client or printing device), see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

Account Selection

After deploying the User Client on user workstations (if required), you can configure users with the required **Account Selection** option (whether or not user interaction is required). For example, in a Professional (Client Billing) installation, users who print jobs for clients are often given the **Advanced Account Selection** option, however, other **Account Selection** options might be better suited for some users based on their job function.

You can configure the required **Account Selection** option on one user at a time or update for all users in bulk.

Use the **User Details** page to configure the required **Account Selection** option for a single user.

To configure the required **Account Selection** option for all users in bulk:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.

   Tip:
   By default the action is applied to all users (the special `[All Users]` group). To apply the action to a subset of users (a user group), select that group from the list.
3. In the **Change settings** area, select the **Change account selection setting** check box; then select **Show advanced account selection** from the list.
4. If you do not want to allow users to charge printing to their personal account (i.e. they must select a shared account) then clear the **Allow user to charge to their personal account** check box.
5. Click **OK**.

   A confirmation window is displayed.
6. Click **OK**.
   Once completed, the configured **Account Selection** option is enabled for the selected users. If you have configured users with an **Account Selection** option that requires user interaction, then it is recommended that you test this from the User Client on a desktop or on the printing device (if applicable). Ensure that user interaction provided is as per the configured **Account Selection** option. Once the interaction is completed, ensure that the job is printed, logged and

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appropriate account charged.

Step 8: Testing

Following a fresh installation, it is highly recommended to test core features of the system. For further details, see Testing the installation.

What next?

Take some time to explore the features of PaperCut NG/MF before continuing reading at Implementation by example or Tour. Business users might be interested in trying the popup client software as covered in Client software. If desired, the client software should also be deployed to other workstations. This procedure is detailed in User Client.

2.5.2. PaperCut NG/MF on Linux

This section is designed to supplement the Install Guide (see Quick install: Linux (CUPS and/or Samba). It provides an in-depth explanation of the Linux installation process, the directory layout and tools.

Information in this section is technical in nature. It is expected that readers have prior experience with:

- The Unix command line environment
- Unix file permissions
- Configuring CUPS and/or Linux print queues
- Or basic Samba configuration

2.5.3. The installation process

The Linux version of PaperCut NG/MF is supplied as a pre-compiled self-installing application. The installation process is designed to work with all major Linux distributions. Due to the varied nature of some installations and administrator preferences, often some manual configuration is required. This section describes the installation process in detail as well as some additional options available to SysAdmins.

2.5.3.1. Manual extraction

The Linux version of PaperCut NG/MF is supplied in a self-extracting, self-installing archive. The archive is a `tar` archive compressed with `gzip`, and headed with a shell script to facilitate self-extracting. After extraction is complete, the installation script named `install` is executed to begin the install process. Some SysAdmins might want to inspect the contents of the archive, and possibly the installation process itself prior to the actual install. The self-extracting installer takes a number of command line arguments. The `-e` argument extracts the archive into the current working directory ready for inspection. Further options and documentation is available via the `--help` option.

```
Usage: pcmf-setup.sh [-e|-i|-l] [-v] [-n] [list ...]
    -e       Extract the files and then exit without installing.
```

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```
-i      Install after extracting the files (default).
-l      List the contents of the archive and exit without
        extracting.
-v      Verbose. Print the names of the files as they are extracted.
list    The list of files to extract."
```

2.5.3.2. The install process

Even though the majority of the installation process is completed under the identity of the non-privileged user account called `papercut`, most administrators want to know what the install process does. The main steps are outlined below:

Extraction

The first stage in the install process extracts the archive to `/tmp` or a location as defined by an environment variable `TMPDIR`. The command-line programs `tar` and `gunzip` are used during this phase.

Installation

After extraction is complete, the installation script is called. The install script, called `install`, presents the EULA and request acceptance. The script then determines the install location. This is the `papercut` user's home directory. The home directory is determined by the `HOME` environment variable, or if not set, the result of a call to `getpwnam()`.

Files are then copied into the `papercut` user's home directory. Care is taken not to overwrite any existing data or configuration files if this is an install-over-the-top upgrade.

Permissions

To ensure the default installation is secure by default, permissions are applied to key files. The following area of the application are restricted to the `papercut` user only:

Table 6: Secured Application Areas

Area	Comments
`~/server/server.properties`	Contains server configuration including the default admin password.
`~/server/data`	This directory contains application data including database files. Some of this data might contain sensitive information.
`~/server/bin/linux-x64`	This directory contains a setuid-root binary. Even though the binary is no use to an end user or hacker, good security practice stipulates that you should allow only the `papercut` user access to this directory.

You can check and reapply permissions at any time post-install by running the scripts:

```
~/server/bin/linux-*/setperms
~/providers/print/linux-*/setperms
```

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Firewall

The PaperCut NG/MF *Application Server* (`pc-app` process) listens on port 9191. This port is used for browser based administration access, for client access, and other services. Ensure that any firewall or local IP filtering software such as `iptables` is set to allow local network traffic access to this port.

Root level tasks

A small part of the install process needs to run as the `root` account. The tasks conducted as root include:

- Setting the `authpam` binary as setuid-root. This binary is used for password verification.
- Installing a CUPS backend. This is done by placing a symlink in the CUPS lib/backend directory.
- Setting up SYSV style start scripts if the system uses this boot process. This is done by placing symlinks in the:

  ```
  /etc/init.d/
  /etc/rc3.d/
  /etc/rc5.d/
  and so on...
  ```

- Setting up SYSD services if the system uses this boot process. This is done by placing the following service definition files in `/etc/systemd/system` directory:

  ```
  pc-app-server.service
  pc-event-monitor.service
  pc-connection-monitor.service
  pc-web-print.service
  ```

If the administrator decides not to run the root-level tasks during the install process, the tasks can be run again post-install by executing the shell scripts:

```
~/server/bin/linux-*/roottasks
~/providers/print/linux-*/roottasks
```

Alternatively the administrator can view the scripts and make the required changes by hand.

2.5.3.3. Linux print queue integration

PaperCut NG/MF is able to integrate with and monitor CUPS, Samba, and Novell iPrint based print queues. The configuration and an explanation of the integration methods follows:

CUPS configuration overview

If the print queues are managed and controlled via CUPS, modify the Device URI on each printer so the `papercut` back end is incorporated into the print process.

1. On the print server, open a terminal.
2. Type the following commands:

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```
cd ~/providers/print/linux-*
sudo ./configure-cups
-h
```

The options available in this tool are displayed.

3. To monitor all printers on your network, type:

```
--add-all
```

4. To monitor a subset of printers in your network:
   a. Type `--list-all`

      A list of all printers on your network is displayed.

   b. For each printer you want to add, type `--add <printer name>`

Alternatively, you can do it manually via the CUPS web Admin web interface or by editing the CUPS `printers.conf` file:

1. Open `printers.conf` (e.g. `/etc/cups/printers.conf`)
2. Prefix the DeviceURL for each printers with "`papercut:`". For example:

```
DeviceURI socket://192.168.1.200:9100
```

   Would become:

```
DeviceURI papercut:socket://192.168.1.200:9100
```

3. Restart `cupsd` so the new configuration is detected (e.g. `/etc/init.d/cupsd reload`)

CUPS integration explained

CUPS, the Common UNIX Printing System, is a popular system for managing printers on Linux servers. CUPS uses a chain-of-commands concept where `filters` and `backends` combine together to form a process steam - a workflow. PaperCut NG/MF hooks into this workflow at the backend level, intercepting the job before it's passed on to physical printer hardware.

The interception is done by wrapping or proxying the real CUPS `backend`. CUPS calls the PaperCut NG/MF backend, which processes the job. If the job is approved, it passes the document onto the real backend. If the job is denied, it is deleted and proceeds no further. The PaperCut NG/MF backend is usually set up and installed by default during the standard installation.

Setting up the PaperCut NG/MF CUPS backend proxy is a relatively simple task. All the administrator needs to do is prefix the existing `DeviceURI` with `papercut:`. For example, the entry:

```
DeviceURI socket://192.168.1.200:9100
```

would become:

```
DeviceURI papercut:socket://192.168.1.200:9100
```

The printer registers itself with PaperCut NG/MF on the first print event.

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PaperCut NG/MF CUPS architecture

The PaperCut NG/MF CUPS backend is a native compiled binary. In PaperCut NG/MF documentation it is referred to it as a *Print Provider* - a component that provides print event information to the *Application Server*. It's responsible for analyzing the print job and then communicating this information to the *Application Server* component. Communication is via an XML-RPC based Web Services call. This means that the backend does not need to be on the same server as the system hosting the Application Server component.

Samba configuration overview

If the print queues are exposed to network workstations using Samba *(Samba Website)*, and a print system other than CUPS is used (e.g. BSD, LPRNG, SYSV, etc.) the `smb.conf` needs some additional configuration. The "`print command`" needs to be replaced with a PaperCut NG/MF command.

1. Open the `smb.conf` (e.g. `/etc/samba/smb.conf`)
2. Under the `[global]` section insert the line:

```
print command=/home/papercut/providers/print/linux-
x64/samba-print-provider
-u "%u" -J "%J" -h "%h" -m "%m" -p "%p" -s "%s"
-a "[standard print command]" &
```

> **Important:**
> The above information is displayed on a single line. Note the use of the & (ampersand) on the end of the line.

where `[standard print command]` is the command that would normally called for printing. Typical examples of commands usually used for printer are listed below:

Table 7: Standard print commands

Type	Command
BSD, AIX, QNX, LPRNG or PLP	`lpr -r -P%p %s`
SYSV or HPUX	`lp -c -d%p %s; rm %s`

More information on standard print commands is available under the Samba documentation installed on your system (see `man smb.conf`).

Samba integration explained

Samba is used to provide file and print sharing to Windows systems and is a popular solution. One of the main reasons for its popularity is that it avoids the need for expensive Microsoft Windows server licenses!

Samba exposes the locally set up Linux/Unix printers as network shared Windows printers. It does this by wrapping the underlying print system - usually CUPS or LPR/LPD. In the case of LPR,

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Samba calls the standard `lp` command line programs to perform printing. PaperCut NG/MF works by wrapping or proxying the "`print command`". More information on how Samba interacts with the underlying print system is available in the Samba documentation.

A typical entry in the Samba configuration file `smb.conf` defining the PaperCut NG/MF print command wrapper would be:

```
print command=/home/papercut/providers/print/linux-x64/samba-
print-provider
-u "%u" -J "%J" -h "%h" -m "%m" -p "%p" -s "%s"
-a "[standard print command]" &
```

Important:
The above information is displayed on the one line. Note the use of the & (ampersand) on the end of the line.

where `[standard print command]` is the command that would normally be called for printing.

The `%u`, `%p`, etc., are Samba substitution variables. These are replaced with content such as the username, printer name, etc. and are used by PaperCut NG/MF in the reporting and logging.

The printer registers itself with the PaperCut NG/MF web interface after the first print is received.

PaperCut NG/MF Samba architecture

The PaperCut NG/MF Samba print command wrapper is a native compiled executable. The PaperCut NG/MF documentation refers to it as a *Print Provider*. It's responsible for analyzing the print job and then communicating this information to the *Application Server* component. Communication is via an XML-RPC based Web Services call. This means that the command does not need to be on the same server as the system hosting the Application Server component.

Novell iPrint configuration

PaperCut NG/MF works by directly integrating with the Novell iPrint Print Manager.

The configuration process is detailed in Step 5 - Printer/iPrint configuration.

The development team at PaperCut Software has worked with the Novell iPrint engineers during 2008 to ensure an iPrint API was available that allow iPrint users to have access to the same feature set as seen on Windows, Mac and Linux CUPS. PaperCut NG/MF uses this API set to intercept and account for jobs as they pass into the iPrint queue.

2.5.4. Advanced configuration & logs

The majority of PaperCut NG/MF configuration is conducted in the *Application Server*'s web interface. Some additional configuration options are available in the following configuration files:

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Table 8: Advanced Configuration

Config File	Comments
`~/server/server.properties`	Contains server configuration including the default admin password, the server's TCP port and external database connection parameters.
`~/providers/print/linux-x64/print-provider.conf`	The *Print Provider*'s configuration file used by both the Samba and CUPS Print Providers. This file defines items such as the *Application Server*'s IP address and port, process timeouts and other.

2.5.4.1. Advanced logging

Most important application logging is available via the **Application Log** tab of the Admin web interface. Some additional advanced level logging is maintained in standard text files located at:

```
~/server/logs/*
~/providers/print/linux-x64/print-provider.log
```

Administrators can consult these logs when attempting to diagnose or troubleshoot problems.

2.5.4.2. Maintain correct user name when print jobs are redirected on CUPS

When print jobs on CUPS are redirected to a second print queue the job seems to come from a user account called `lp`. Note that the job is still correctly tracked against the user and the approriate accounts are charged as needed. However, some users can be confused when their jobs appear to be printed by another user at the device.

Administrators can edit the file `~/providers/print/linux-x64/print-provider.conf` and uncomment the `RedirectCommand` entry. This forces PaperCut NG/MF to pass the user's name to the CUPS subsystem on redirection. This is not the default behaviour as it can cause authentication problems, depending on how your network printer queues are configured, and you should verifty that users can still print after making this change.

2.5.5. Backups & system management

Suggested backup procedures are detailed in Manage system backups. Common system management functions are covered in System management.

Administrators managing Linux servers should also consider adopting the following management policies:

- Regularly check for PaperCut NG/MF updates. You can apply updates with a simple, *install-over-the-top* procedure.
- Remember to add the PaperCut NG/MF backend or command when configuring new printers.
- Always check PaperCut NG/MF's functionality after a system updates (i.e. new versions of CUPS or Samba, or configuration changes).

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2.5.6. User directory and authentication

PaperCut NG/MF synchronizes its user directory with the underlying operating system or network. The Linux version of PaperCut NG/MF ships with two user directory implementations. Due to the nature of Linux, some organizations might have customized user directory implementations. PaperCut NG/MF can support customization in this area. This section details the user/group/authentication options available as standard, as well has how one would go about developing customized implementation.

2.5.6.1. Standard Unix

The **Standard Unix** user directory provider uses standard Unix API's to enumerate user and group information. This allows group information to be defined on either the local system or via another source as configured via `nsswitch.conf`. For example, you can configure the system using `nsswitch.conf` to obtain user directory information from a centralized LDAP server or Novell's eDirectory.

User password authentication is performed via PAM. (Note: For administrators wanting to customize the PAM authentication method at the application level, PaperCut NG/MF reports itself as "papercut".)

2.5.6.2. Samba/Windows domain

If the user and group information is provided by a Windows Domain such as an NT Style Domain or Active Directory, the **Samba** option is most appropriate. This option would normally be used on networks where the printers are hosted on a Linux server and exposed to Windows users via Samba. The server needs Samba installed and configured, but does not need to be a member of the domain.

At the technical level, the Samba support is implemented as a set of Perl script wrappers around standard Samba commands such as `net` and `smbclient`. Administrators should ensure these Samba commands are on the `papercut` user's path.

The wrapper script is located in `[app-path]/server/bin/[arch]/sambauserdir`.

2.5.6.3. Custom

Some large networks, particularly those found at established universities, have custom user directory and authentication services not directly supported by PaperCut NG/MF. To support these networks, administrators can use scripting and other technologies to build a new custom *User Directory Information Provider*.

PaperCut NG/MF works by handing off user, group and user authentication tasks to a separate program/process. The external process must accept a set of commands as command-line arguments and return the answer in a tab delimited prescribed format on standard out. For more information on the format, see Custom user directory information providers. The source code for the standard PaperCut NG/MF supplied *User Directory Information Provider* is also supplied as part of the installation, and is a good example. The source code is provided in:

```
~/server/examples/providers/
```

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Organizations wanting to build a custom *User Directory Information Provider* are encouraged to contact the PaperCut NG/MF development team. They are more than happy to assist.

2.5.7. Unix command-line Release Station client

In a modern Linux environment, the most commonly used print system is usually CUPS. You can configure PaperCut NG/MF to integrate with CUPS to conveniently track printing. On Legacy Unix systems CUPS is often not an option and printing is performed via the Line Printer tools such as `lp` or `lpr`. LPR/LPD is a non-authenticated printing protocol so the identity of the user associated with a print job can't be trusted. Instead, the authentication must be performed at the PaperCut NG/MF application layer. The PaperCut NG/MF User Client with popup authentication as discussed at Scenario Two: The multi-user Mac with popup authentication is a good option but not appropriate for a terminal-only environment. Terminal-only environments can be supported via a Release Station queue (see Secure print release for more detail). Jobs held in a Release Station queue are normally accessed and released via a dedicated terminal or a web browser based interface, however, for the benefit of terminal-only users, a command-line job release client is also provided.

This process is best explained using an example:

1. John uses the `lp` command to print a Postscript document from his Unix terminal session. The job arrives in the queue under the username identity "john". (Although the name can't be trusted.)
2. The administrator has enabled the PaperCut NG/MF Release Station on this print queue. The job is placed into a holding state.
3. John must now authenticate and then release the job. He wants to do this via the command-line Release Station client.
4. John enters the command `release-print-job`. This command was set up by the SysAdmin.
5. John enters his username and password, confirms the job's name, cost and page count and releases the job for print. The following is an example of the output seen:

```
Please enter your username: john
Please enter your password:
Current balance: $8.00
18:04:13 - Name: "Configuring Linux", Pages: 2, Cost: $0.40
Print this job? [yes]
Released 1 job(s).
```

6. The job prints and John's account is charged.

Enabling the Release Station on a printer is a global option - it affects all jobs from all users. In some environments it might not be appropriate to have all jobs controlled via a Release Station - for example, jobs originating from Windows systems are already authenticated and should print directly. An alternate strategy is to have two queues for the same printer. The first queue does not use the Release Station option and only allows printing from authenticated workstations/users, while the other queue has the Release Station option enabled.

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You can expose PaperCut NG/MF managed print queues for access via LPR/LPD using various methods. Use the PaperCut NG/MF LPD Service when the queues are hosted on a Windows system. An LPD interface is available for CUPS if the queues are hosted on Linux.

Tip:
Windows SysAdmins can control which queues are exposed via LPR/LPD by setting printer permissions. Queues set up to explicitly *deny* permission to access from the SYSTEM account are *not* accessible via LPR.

2.5.7.1. Installing the command-line Release Station client

The following installation instructions assume prior Unix system administration experience.

1. Ensure that Java 1.8 or newer is installed on your system. To check, type `java -version` at the terminal. If you do not have Java 8 (1.8) or higher, install it before continuing. Java is available for all major Unix operating systems.
2. Copy the Release Station files from your primary server to the system for which you want to set up the command line Release Station client. These files are located in `[app-path]/release`. If your primary server is running Windows, this folder is shared by default (accessible via `smb://[server]/release`). You can use tools such as Samba (`smbclient`) to help copy these files. Ensure all files in the folder are copied taking care to preserve the existing heirarchy.

   The recommended location to install the Release Station command line client is `/usr/local/papercut/release/`.
3. Ensure that the command line Release Station client has execute permissions for all users. Use the following command:
   ```
   chmod 755 ./pc-release-cmd-line.sh
   ```
4. For convenience, you can create an alias for the command line Release Station client. This is typically done by entering the following line in a global profiles file, or each user's `.profile` file:
   ```
   alias "release-print-job" = \
   "/usr/local/papercut/release/pc-release-cmd-line.sh
   ```
5. Users can now release their print jobs by typing `release-print-job`.

You can also create a 'wrapper' for `lp` to run the command line Release Station client after a user has sent a print job. The following script `print-doc` provides an example:

```
#!/bin/sh
echo "Printing document using lpr..."
/usr/bin/lpr "$@"
echo "Printing done, calling program to release job..."
sleep 1
cd /usr/local/papercut/release
./pc-release-cmd-line.sh
echo "Done."
```

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For the convenience of users, install the command line Release Station client on all systems where printing from the terminal can be performed.

2.5.8. Remove PaperCut NG/MF from a Linux server

You can completely remove PaperCut NG/MF from a system:

1. Remove all files from the `papercut` user's home directory.
2. Remove the `papercut` user account and home directory.
3. Remove any server start scripts matching:

```
/etc/init.d/papercut
/etc/rc*.d/*papercut
```

2.5.9. Linux FAQ

2.5.9.1. Troubleshooting & installation questions

How can I run the root installation tasks manually?

If you do not run the root level tasks during installation, or if they fail, you can manually run them later by running the following shell scripts as root:

```
~/server/bin/linux-*/roottasks
~/providers/print/linux-*/roottasks
```

I am unable to open a browser to `http://[server_name]:9191/admin`. What is wrong?

The first step is to check to see if the PaperCut NG/MF is listening on the port. The command:

```
netstat -anp | grep 9191
```

should list the `pc-app` as the owner of the process on port 9191. If nothing is listed, check that the Application Server has started (e.g. `ps -ef | grep pc-app`).

If the server is already running, the next step is to ensure no IP filtering is applied to the port. Some Linux distributions have strict `iptables` filters enabled by default. Ensure that port 9191 is accessible from all local network systems.

I want to use a custom script to start the server. Is this possible?

The SYSV style start script included should work with all systems using an `/etc/rc*.d` style boot process. Some administrators might want to replace the `app-server` with a custom script that better fits in with their Linux distributions style guide. Administrators should consider storing this script outside the PaperCut NG/MF install structure so it's not overwritten in any further upgrade.

However, if the system is using SYSD, use the service definition files (see Root Level Tasks) for configuration changes. Do not modify the `app-server` script.

Can I run/install PaperCut NG/MF under an account other than "papercut"?

No. At the moment the installation, and other scripts, assume the existence of a user called `papercut`. This might, however, change in the future. E-mail your thoughts to the development

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team!

Is an RPM or .deb package available?

No. At the moment we're supplying it as a self-extracting and self-installing archive. This allows the flexibility to support install-over-the-top for upgrades and maintain full control over the installation process. The process also allows PaperCut NG/MF to run and install on systems not using RPM or apt. We also plan on supporting other Unix based operating systems in the future such as FreeBSD and Solaris. The current installation method should work with all standard Linux distributions.

2.5.9.2. General questions

Is PaperCut NG/MF open source?

PaperCut NG/MF in not "open source" in reference to it being available under the GPL or another popular open source license. Source code is, however, provided to customers upon request as needed for security reviews. As a company, PaperCut Software is transparent in our development approach, works closely with our users, and support a number of open source projects both financially and with code submission. PaperCut NG/MF, however, remains a commercial application with commercial support at the current time.

2.6. Installation on Novell OES Linux (iPrint)

Important:
The following section assumes knowledge of general Novell OES Linux system management including using the command-line, creating users, editing configuration files, and understanding file permissions.

Step 1: System requirements and printer setup

Before starting the installation, take a few moments to verify you have the system requirements.

- Is the operating system version supported and are patches up-to-date? (see PaperCut NG System Requirements).
- PaperCut NG/MF is designed to integrate with iPrint on Novell OES Linux. If your printers are currently hosted on iPrint on a Netware server or even under legacy NDPS, migrate your queues over to an OES Linux based server. Ensure your printing is correctly working under iPrint on OES Linux before continuing to the next step.

Important:
iPrint and the print queues must be configured and confirmed to work *before* progressing to step 2.

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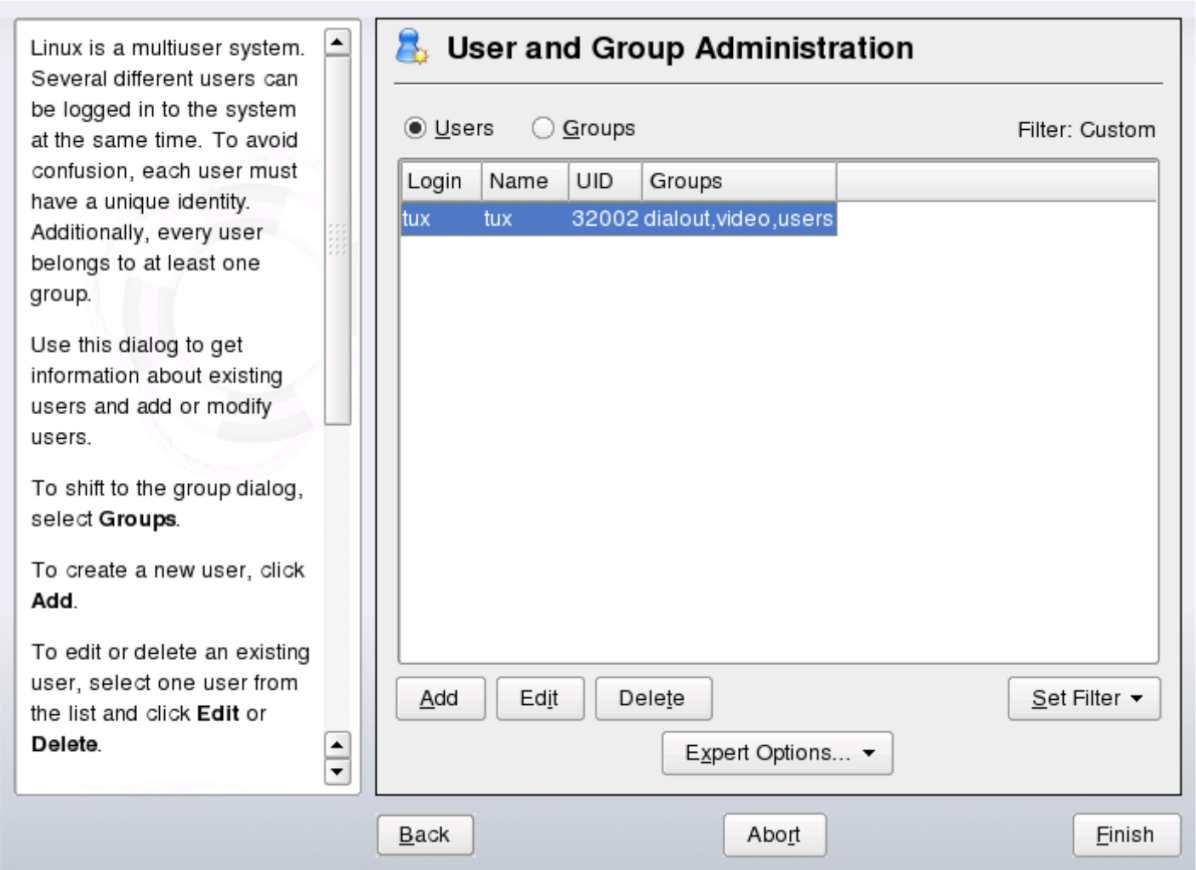
Step 2: Create the host user account and firewall settings

PaperCut NG/MF runs and installs under a non-privileged user account called "papercut". The `papercut` user's home directory location is the application install location. `/home/papercut` is recommended, however, Administrators might choose an alternate install location depending on personal preference. Alternatives include:

- `/usr/local/papercut`
- `/opt/papercut`

The host user account is *not* an eDirectory account but a local system account. One way to create the "papercut" account on OES Linux is:

1. Open **YaST Control Panel**; then under **Security and Users** select **User and Group Administration**.



2. Select **Users**; then click **Add** to create a new user. The **New Local User** screen is displayed.
3. On the **User Data** tab, enter a username of `papercut` and assign a password.

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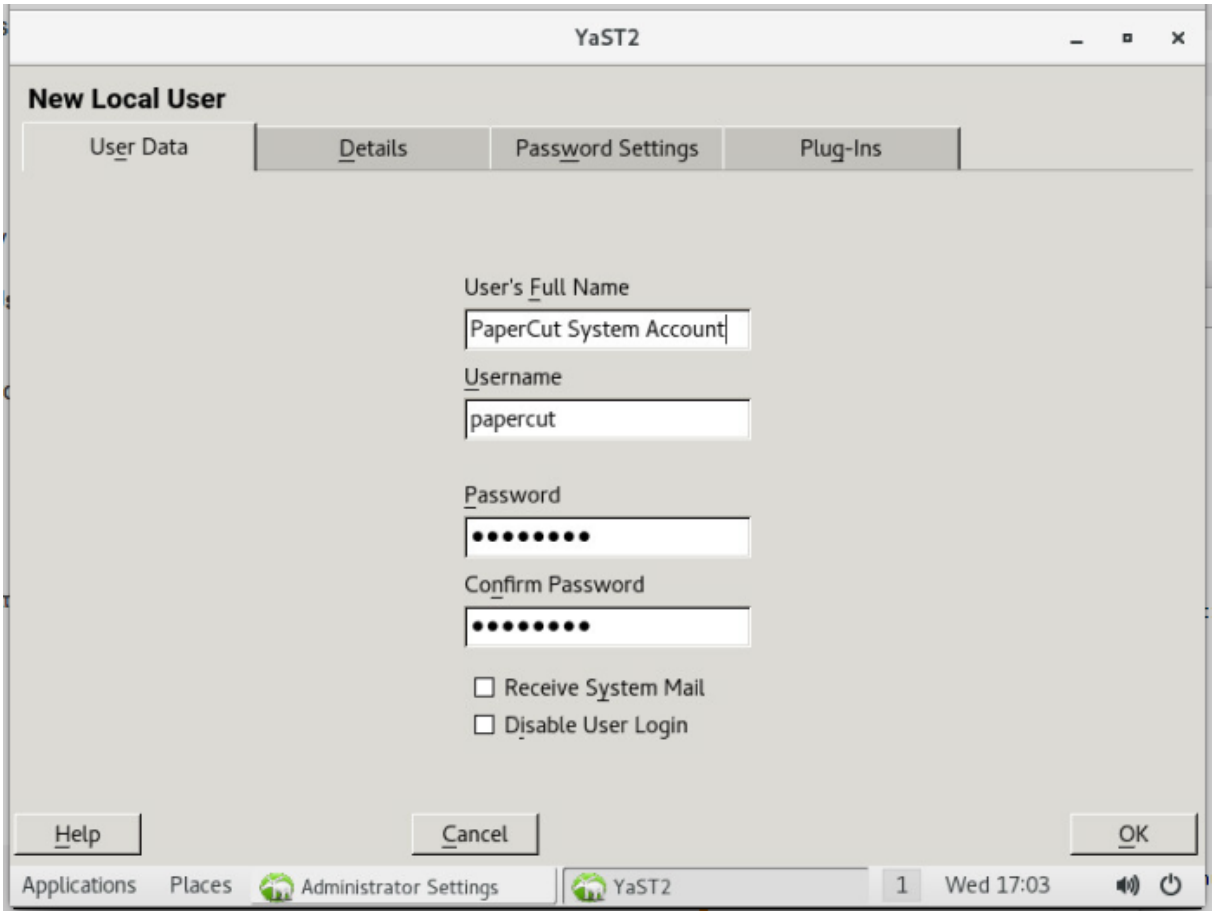
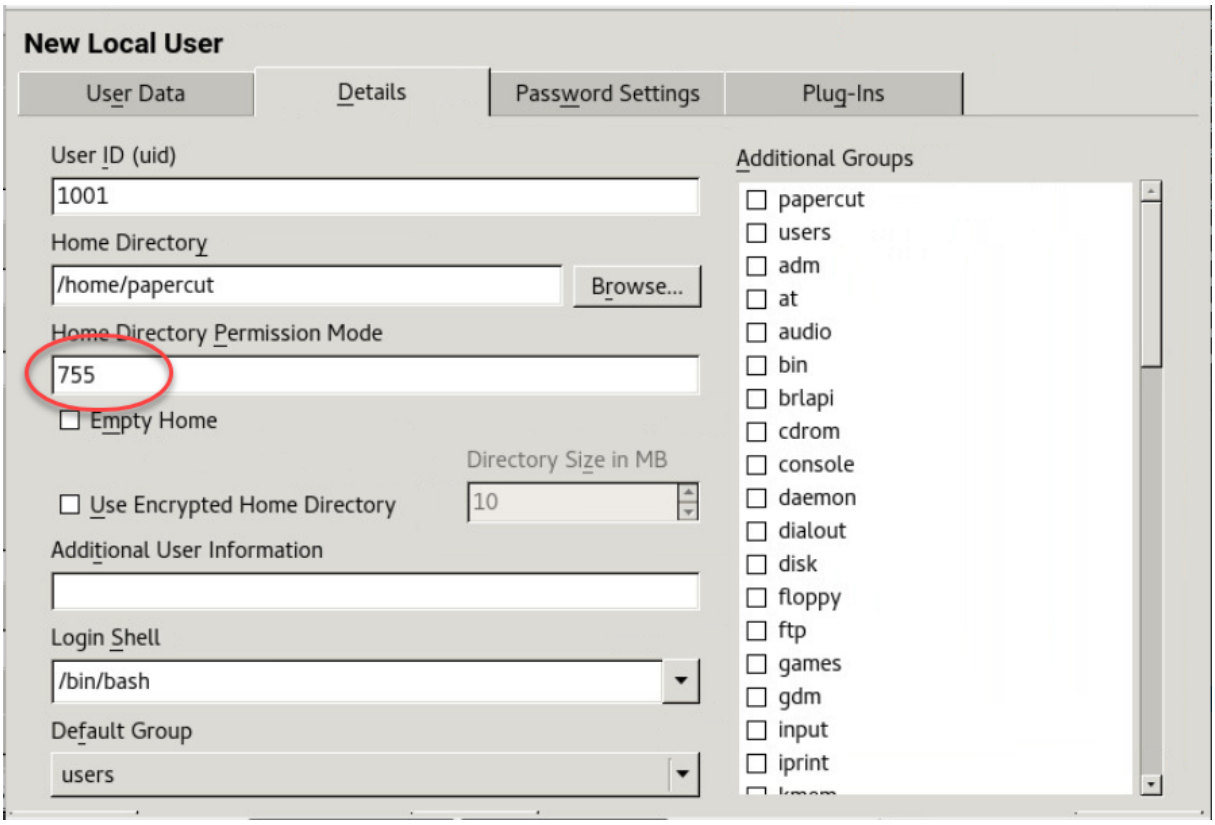


4. On the **Details** tab, select `Empty Home` with permissions `755` and change the `Home Directory` path to define an alternate install location.



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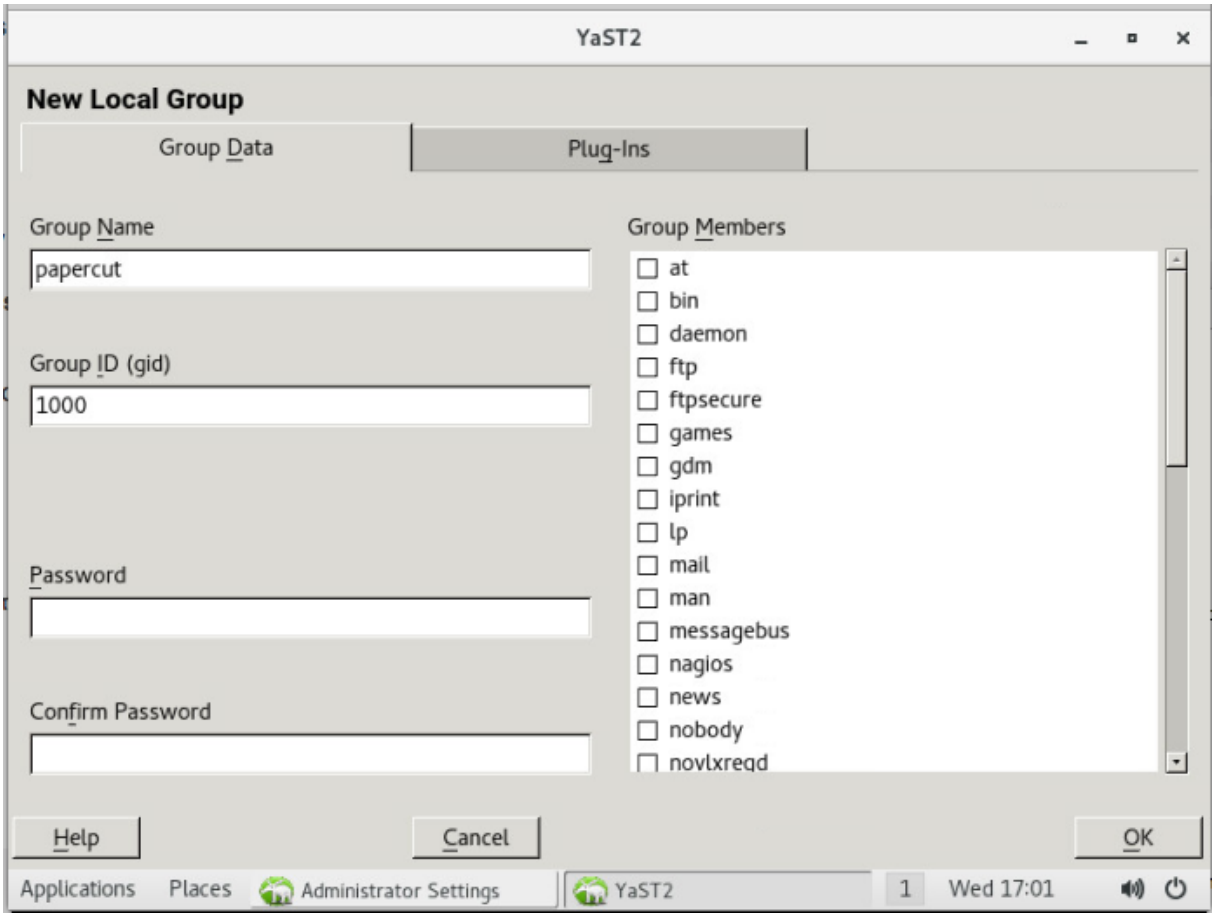
5. Click **OK**. The **User and Group Administration** screen is displayed.
6. Select **Groups**; then click **Add**. The **New Local Group** screen is displayed.



7. Type the group's name as `papercut`.
8. In the **Group Members** list, select the new user you just added.
9. Click **OK**; then click **Accept** to create the account.

> **Important:**
> This quick start guide assumes the install location is `/home/papercut`. If an alternate home location is defined, some of the paths listed in subsequent sections will require modification.

A default OES Linux installation imposes strict resource usage limits on user accounts (`ulimit`). The `papercut` account is a special account used for hosting an application so needs to be granted satisfactory resource limits such as the ability to open many files. On systemd Linux distributions, this limit is automatically configured so you do not need to do anything. For other distributions, the methods of setting user-level `ulimit` levels vary, however, the common solution is to add the following line to `/etc/security/limits.conf`:

```
papercut - nofile 65535
```

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Novell OES Linux has a strict default firewall policy. PaperCut NG/MF uses TCP Ports 9191 (for HTTP), 9192 (for HTTPS/ SSL), 9193 (for Binary) and 9195 (for HTTPS/ SSL on supported devices) and these ports must be open. To open these ports:

1. Open **YaST Control Panel**; then select **Firewall** under **Security and Users**.
2. Select **Allowed Services**, then click **Advanced**.
3. Add ports `9191` and `9192` to the **TCP Ports** list (separated by spaces).
4. Click **OK**, **Next**, then **Accept** to apply the changes.

Step 3: Download and install PaperCut NG/MF

PaperCut NG/MF is supplied as a self-extracting and self-installing archive. The installation is performed under the rights of the newly created `papercut` account and temporary `root` access is required. Make sure the root password is handy. (Administrators who are after a detailed explanation of the install process should also consult the background information in PaperCut NG/MF on Linux).

Log on as the newly created `papercut` user and download and execute the installer from the command prompt. Here is an example using `wget` to fetch the installer:

```
shell> su - papercut
shell> wget [download url from PaperCut Software website]
shell> sh ./pcmf-setup-novell-oes-linux.sh
```

Follow the installation instructions and enter the root password when requested.

Important:
Ensure you `login` as the user `papercut` so that the user's environment is sourced and the home directory (install location) is correctly defined.

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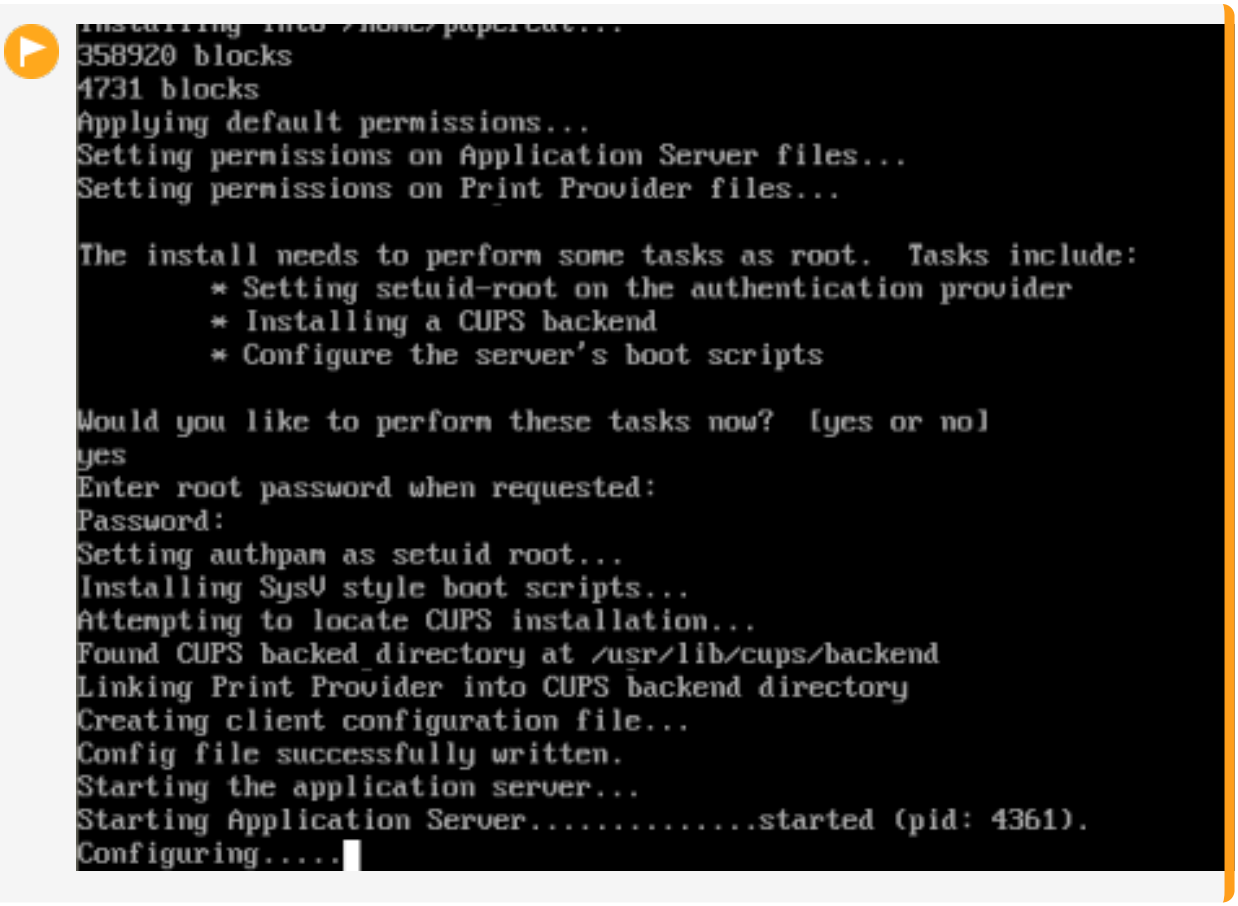

The installation process takes between two and five minutes depending on the speed of the system. A system restart is not required but administrators are advised to perform installation on live production systems during periods of low activity - for example, not during backup operations or other administration activities.

Step 4: Run the Configuration Wizard

Tip: If the installer doesn't work, check the log file located in: `C:\Users\%username%\AppData\Local\Temp\Setup log %install date%`

After installation, you are prompted to open a web browser at :

`http://[server-name]:9191/admin`

The configuration stages are explained below:

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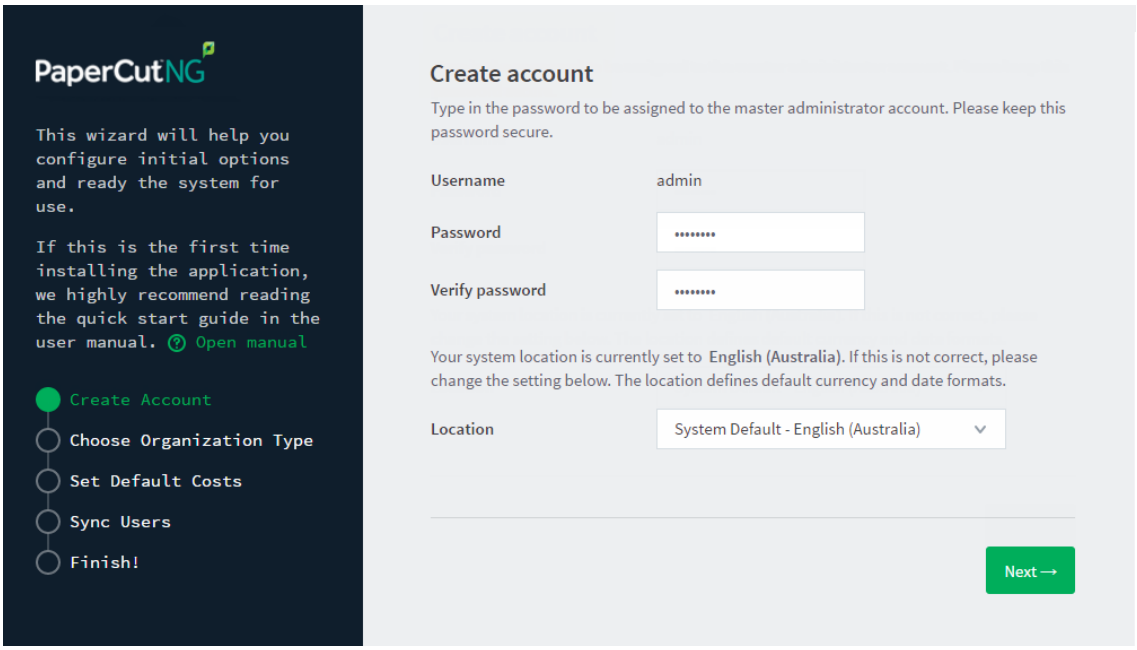
1. Administrative password



a. Complete the following fields:

- **Password**—enter the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. The password must be at least six characters.

> **Tip:**
> Keep this password secure. If you forget your password, you can reset it. For more information, see Resetting the Admin Password.

- **Verify password**—re-enter the password.
- **Location**—select the system's physical location and language.

b. Click **Next**.

2. Organization type

The **Organization type** screen is displayed.

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This selection determines which system defaults are used.

a. Select **Education**.

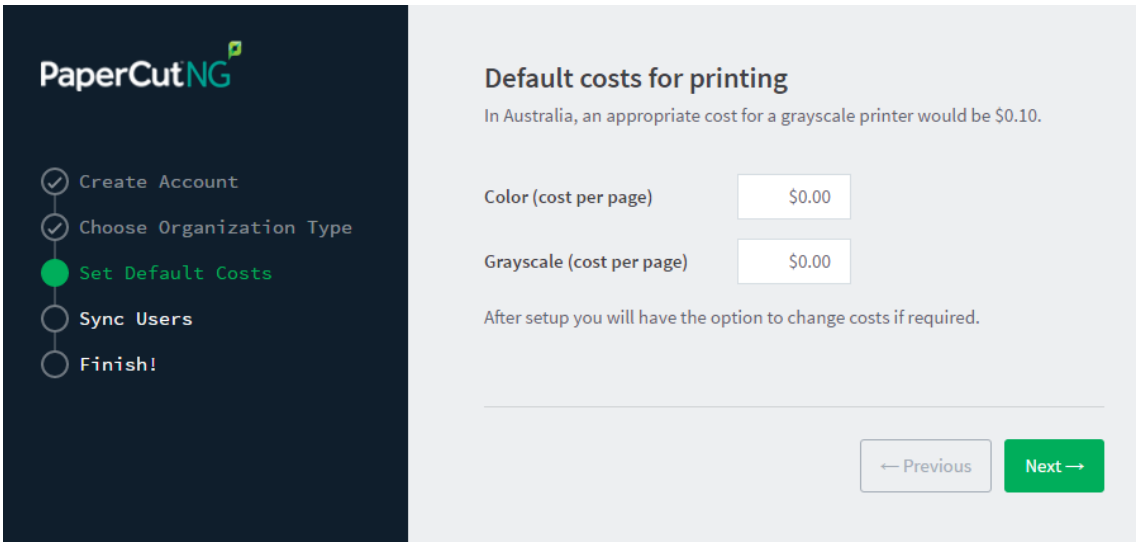
b. Select **Small/Medium Enterprise (SME) or Corporate**.

c. Select **Professional (Client Billing)**.

d. Click **Next**.

3. Default cost for printing

The **Default costs for printing** screen is displayed.



Important:
For an education implementation, where users are charged for their printing, leave these values as zero during the implementation stage, otherwise, students will not be able to print as they cannot yet add credit to their account.

If required, you can change this setting after installation.

a. Complete the following fields:

- **Color (cost per page)**—enter the default cost per page for color printing on all printers.
- **Grayscale (cost per page)**—enter the default cost per page for grayscale printing on all printers.

b. Click **Next**.

4. Initial user credit (Education organization type only)

If you selected **Education** as the organization type, the **Initial user credit** screen is displayed.

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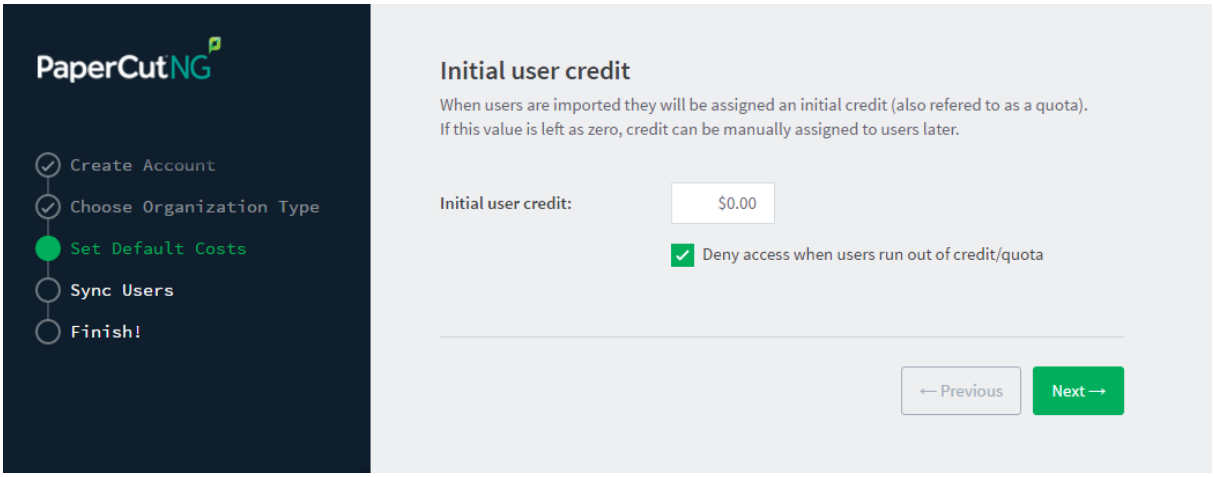

If you selected **Small/Medium Enterprise (SME) or Corporate)** or **Professional (Client Billing)** as the organization type, go to step 5.

a. Complete the following fields:

- **Initial user credit**—enter the amount of credit each/quota each user will receive when the system is first enabled. You can change these settings after setup.
- **Deny access when users run out of credit/quota**—select this check box to prevent users from printing when they run out of credit/quota.

> **Tip:**
> If you are evaluating PaperCut NG/MF it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation.

b. Click **Next**.

User/Group Synchronization

> **Tip:**
> To speed up the installation, you can click **Skip this step** and synchronize the users/groups later.

PaperCut NG/MF extracts user information out of the System or Domain. This is usually LDAP or Google Cloud Directory. The options presented here vary depending on the Operating System and its environment. During evaluation, most sites import all users from the system/domain into PaperCut NG/MF. An option also exists to import a subset of users from a given group. This option is useful when only a subset of users will use the printers.

LDAP

PaperCut NG/MF has native support for eDirectory LDAP schemas. This is the default user import option for most sites.

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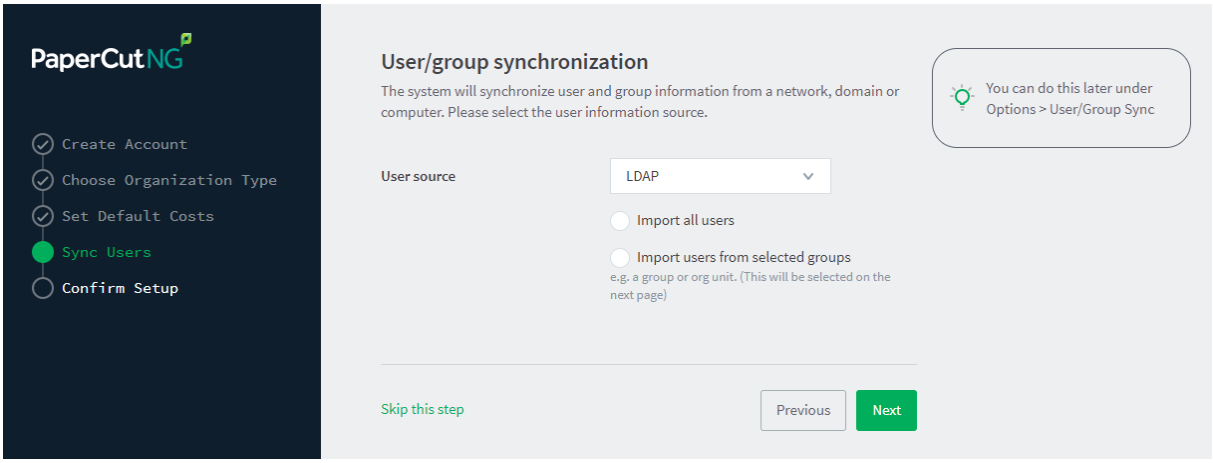
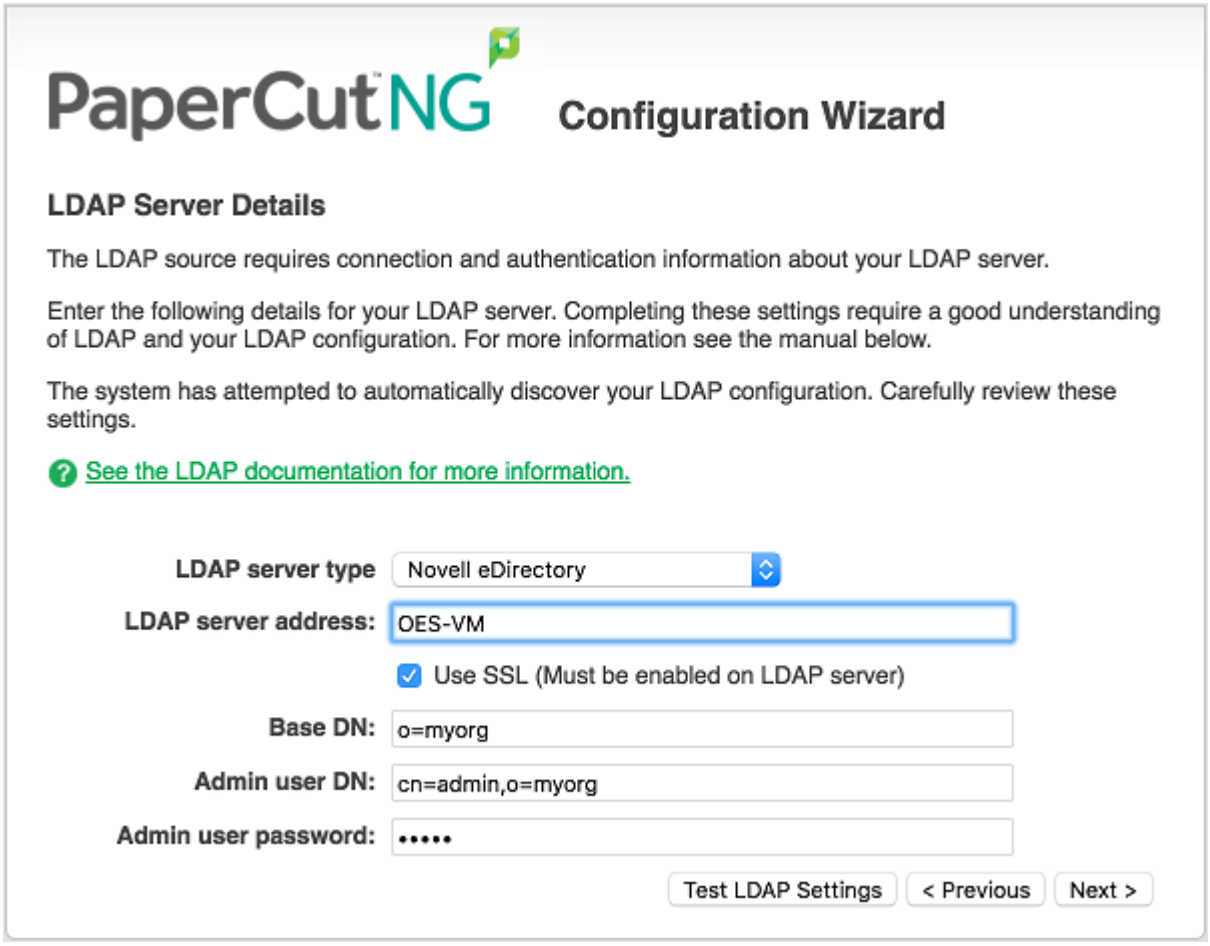


PaperCut NG/MF does its best to auto-discover LDAP settings, but some knowledge of eDirectory and/or LDAP is required. More information on LDAP is available in Synchronize user and group details with LDAP.



Google Cloud Directory

You also have the option to use Google Cloud Directory as the sync source. To set up Google Cloud Directory as the sync source, follow these instructions.

On the Google Cloud Directory Details screen:

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Note:
Remember, this functionality is available for organizations using G Suite Education, G Suite Enterprise for Education, G Suite Enterprise, and Cloud Identity Premium.

Important:
Before you start, make sure you can log in to Google as a Super Admin.

1. Log in to admin.google.com using your Super Admin user login details. The **Google Admin console** is displayed.
2. Click the **Apps** tile. The **Apps** screen is displayed.
3. Click the **LDAP** tile. The LDAP screen is displayed.
4. Click **ADD CLIENT**.
5. Type a name for the LDAP client connection you'll be configuring to use for PaperCut NG/MF (for example, "PaperCut MF"), and optionally type a description; then click **CONTINUE**. The **Access permissions** screen is displayed.

   Note:
   This adds PaperCut NG/MF to the list of permitted LDAP clients. You can find more information about configuring access permissions from Google.

6. In the **Verify user credentials** section, select either:
   - **Entire domain <domain name>**
   - **Selected organizational units**; then click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
7. In the **Read user information** section, select either
   - **Entire domain <domain name>**
   - **Selected organizational units**; then either click **Copy from Verify user credentials** or click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
8. In the **Read group information** section, click the switch to set it to **On**; then click **ADD LDAP CLIENT**. Google displays a confirmation message and information about downloading the certificate.
9. On the same screen, click **Download certificate**; then save the downloaded certificate (which is a PDF file) in a secure location.
10. Click **CONTINUE TO CLIENT DETAILS**. The **Settings for <LDAP client name>** screen is displayed.

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> **Note:**
> The service status, displayed at the top right of the screen, is initially set to **OFF**.

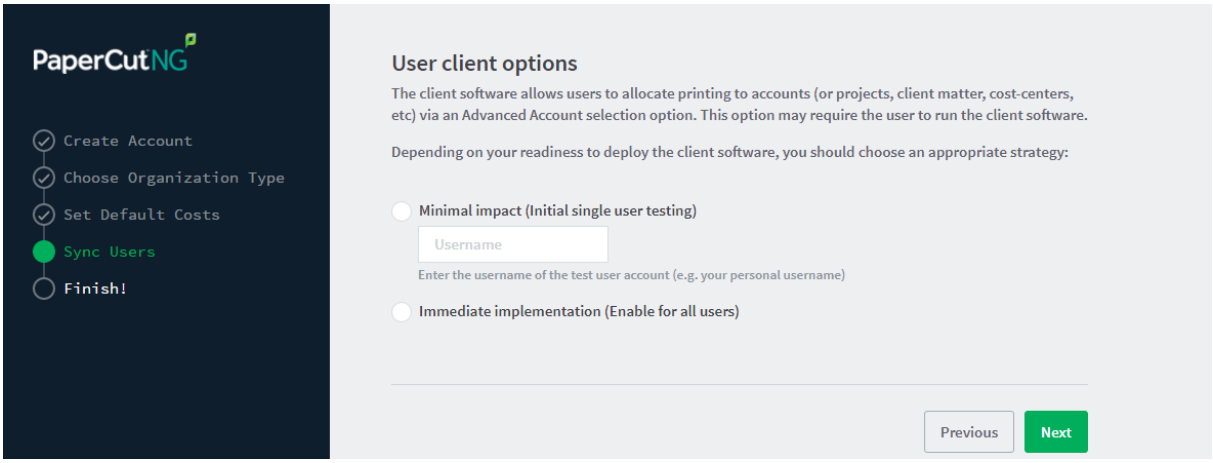
11. Click anywhere in the **Service Status** box. The **Service Status** screen is displayed.
12. Select **On for everyone**. The service status is updated for everyone.
13. Click **SAVE**.

> **Note:**
> Depending on the size of your organization, it can take up to 24 hours for Google Cloud Directory changes to apply.

---

5. User Client options (Professional Client Billing organization type only)

If you selected **Professional (Client Billing)**, as the organization type, the **User client options** screen is displayed.



If you selected **Education** or **Small/Medium Enterprise (SME) or Corporate**, go to step 7.

Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either via the User Client or via the printing device. For more information, see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client may be optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future.

However, in environments where user interaction for Account Selection is required and can only be done via the User Client (and cannot be done at the printing device), running the User

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Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device.

The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated.

a. Depending on the Account Selection configuration for users (whether or not user interaction is required and whether or not your environment caters for this on the User Client AND on the printing device), select an appropriate User Client deployment strategy

- **Minimal impact (Initial single user testing)**—the Account Selection option requiring user interaction is enabled only for a single user for testing purposes. You need to nominate the testing account; this can be an existing system/domain account used for testing purposes or your own user account. The username should be in the format used to log in to the domain/system (usually the short form). Depending on the environment, you can test the user interaction for Account Selection either on the User Client or on the printing device. The minimal impact strategy allows you to test Account Selection with user interaction using the nominated test system/domain user account, after which you can configure other users with similar Account Selection options.
- **Immediate implementation (Enable for all users)**—the Account Selection option requiring user interaction is enabled only for all users. If you have configured your users with Account Selection that requires user interaction, and this can only be done on the User Client (and cannot be done on the printing device), then you must install the User Client on all user desktops immediately to prevent disruption of user printing services.

  If in doubt, select the minimal impact strategy. This ensures the impact is isolated to only the nominated test account.

b. Click **Next**.

6. Confirm setup options

The **Confirm setup options** screen is displayed.

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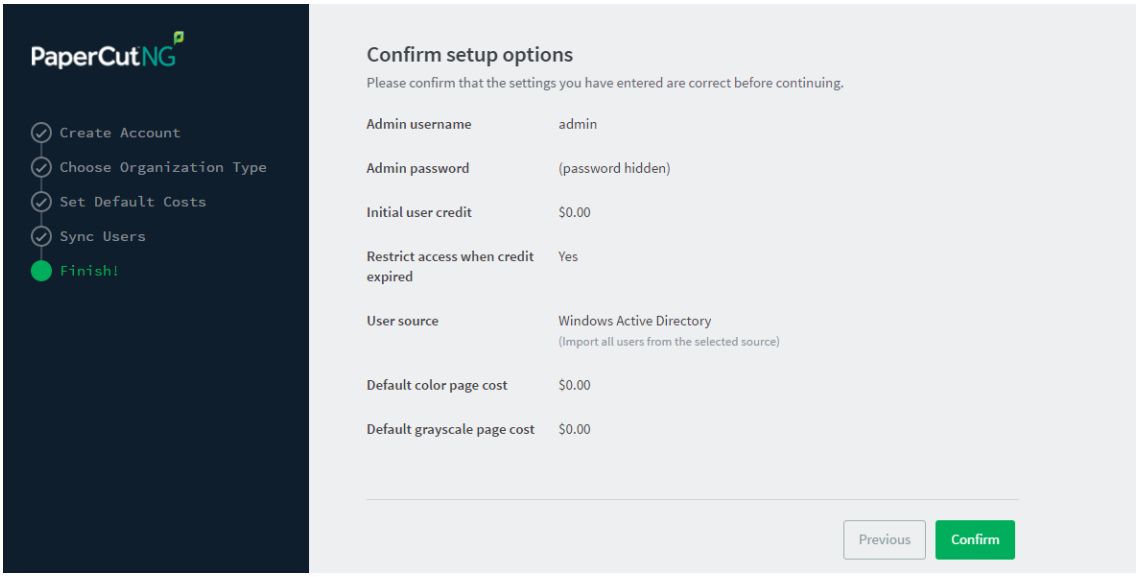


a. Check the settings you have entered. If you want to change anything, you can return to any of the configuration screens to alter the options.

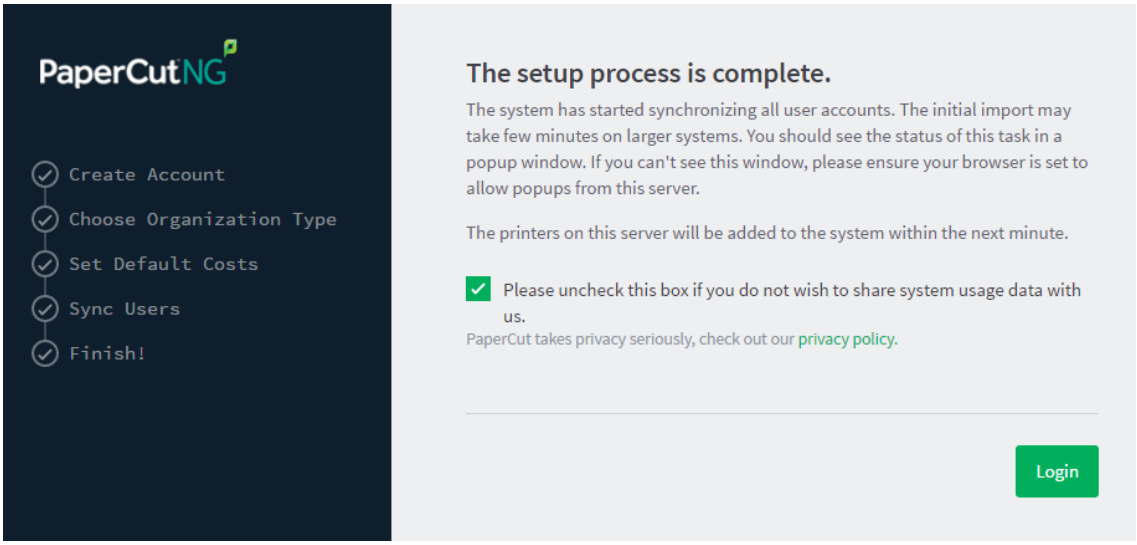
b. Click **Confirm**.

   The **Initial user import** screen is displayed.

c. Click **Close**.

7. Setup complete

After completing the configuration wizard you are presented with a user synchronization status screen, showing the progress and results of the setup.



a. Click **Login** to access the Admin web interface and begin familiarizing yourself with the options and features available.

Step 5: Configure the iPrint printer

PaperCut NG/MF works by directly integrating with the Novell iPrint Print Manager. iPrint must, however, be configured to use PaperCut NG/MF as an accounting control source. In the current release, this configuration is done manually at the individual print queue level:

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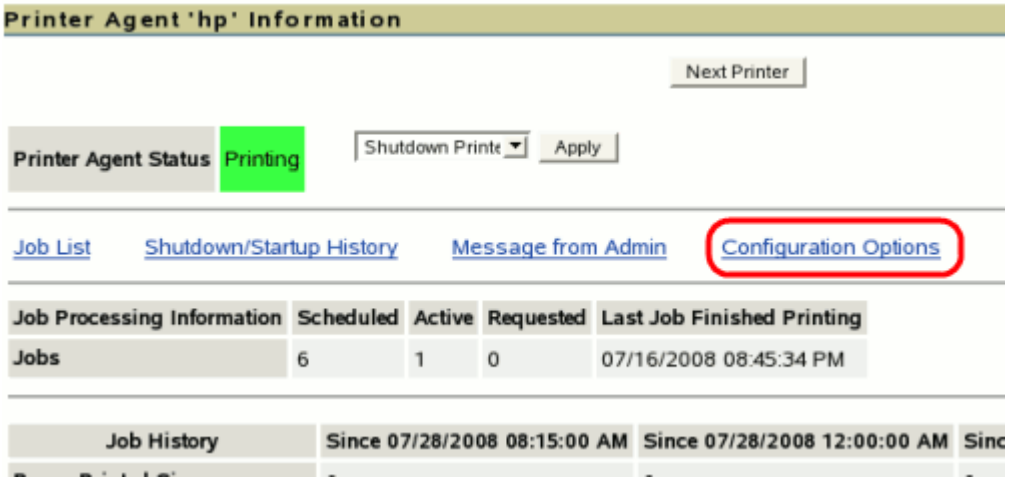
1. Log in to iManager, expand **iPrint**; then select **Manage Printer Manager**.
2. Select the Printer Manager associated with one of your print queues.
3. Click the **Manage health monitor** link. A list of all your printers is displayed.

4. Select a *Printer Agent* from the list.
5. Click **Configuration Options**.



6. Enter `papercut` under the **Accounting Autoload Command**. Take care to write this all in lower case with no spaces.

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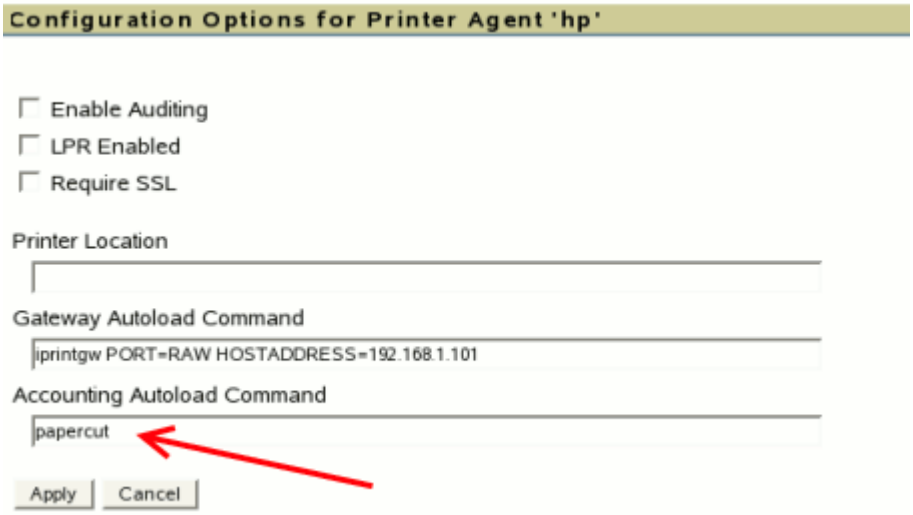

7. Click **Apply**.
8. Click **Back**, then **Back** and repeat steps 4 through 7 for all printers you want monitored/controlled by PaperCut NG/MF
9. In line with best practice, backup the new printer configuration (`padbtxt.xml`) as follows:
    a. In iManager open up the active *Print Manager*.
    b. Select **Manager health monitor > Advanced iPrint Manager Information > iPrint Manager Internal**
    c. Click **Backup Database**.
10. Finally restart the *Printer Manager* in iManager by clicking **Shutdown** then **Startup**. After this, all jobs on the queues are tracked.

2.6.1. Step 6 - Sharing User Client software

The PaperCut NG/MF client software is located in the local directory:
`/home/papercut/client`
This software needs to be shared over the network so workstations can access/install the client application. Novell iManager provides a number of file sharing options. One simple solution is to add a read-only NCP or Samba share called `PCClient` pointing to `/home/papercut/client`. Established networks will benefit from ensuring the client files are available in their Distributed Files Services. The deployment of the client software (e.g. zero-install deployment) is covered in User Client.

Step 6: Deployment for a Professional (Client Billing) installation

Every print job must be charged to an account via the process of Account Selection. This may or not require user interaction and is configured at the user level. When Account Selection requires user interaction, then depending on your environment, the user can do so either on the User Client or on the printing device.

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The User Client

In environments where user interaction for Account Selection is required and the user has both these options (User Client and printing device), running the User Client may be optional. Hence, deploying it immediately is also optional. If you choose not to deploy it now, you can still deploy it in the future. However, in environments where user interaction for Account Selection is required and can only be done via the User Client (and cannot be done at the printing device), running the User Client is mandatory. Hence, deploying it immediately is also mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused in the print queue and does not appear on the printing device. The User Client can be deployed directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however, this is not usually recommended because it makes the process of updating the User Client more complicated. For more information about the Account Selection options with and without user interaction (via the User Client or printing device), see Shared accounts, User Client, and Assigning accounts to print jobs at the device.

Account Selection

After deploying the User Client on user workstations (if required), you can configure users with the required **Account Selection** option (whether or not user interaction is required). For example, in a Professional (Client Billing) installation, users who print jobs for clients are often given the **Advanced Account Selection** option, however, other **Account Selection** options might be better suited for some users based on their job function.

You can configure the required **Account Selection** option on one user at a time or update for all users in bulk.

Use the **User Details** page to configure the required **Account Selection** option for a single user.

To configure the required **Account Selection** option for all users in bulk:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.

   > **Tip:**
   > By default the action is applied to all users (the special `[All Users]` group). To apply the action to a subset of users (a user group), select that group from the list.
3. In the **Change settings** area, select the **Change account selection setting** check box; then select **Show advanced account selection** from the list.
4. If you do not want to allow users to charge printing to their personal account (i.e. they must select a shared account) then clear the **Allow user to charge to their personal account** check box.
5. Click **OK**.

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A confirmation window is displayed.

6. Click **OK**.
   Once completed, the configured **Account Selection** option is enabled for the selected users. If you have configured users with an **Account Selection** option that requires user interaction, then it is recommended that you test this from the User Client on a desktop or on the printing device (if applicable). Ensure that user interaction provided is as per the configured **Account Selection** option. Once the interaction is completed, ensure that the job is printed, logged and appropriate account charged.

Step 7: Testing

Following a fresh installation, it is highly recommended to test core features of the system. For further details, see Testing the installation.

What next?

Take some time to explore the features of PaperCut NG/MF before continuing reading at Implementation by example or Tour. Business users might be interested in trying the popup client software as covered in Client software. If desired, the client software should also be deployed to other workstations. This procedure is detailed in User Client.

2.7. Testing the installation

Once the installation is complete, it is now time to test the system.

2.7.1. Testing for an Education or Small/Medium Enterprise installation

1. Click the **Printers** tab.
   The **Printer List** page is displayed.
2. Select a printer.
   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Click the **Job Log** tab.
4. Check that your print job is listed in the log.
5. Click the **Users** tab.
   The **User List** page is displayed.
6. Select a user.
   The **User Details** page is displayed.
7. Click **Job Log**.
8. Check that your user account is charged an appropriate amount.

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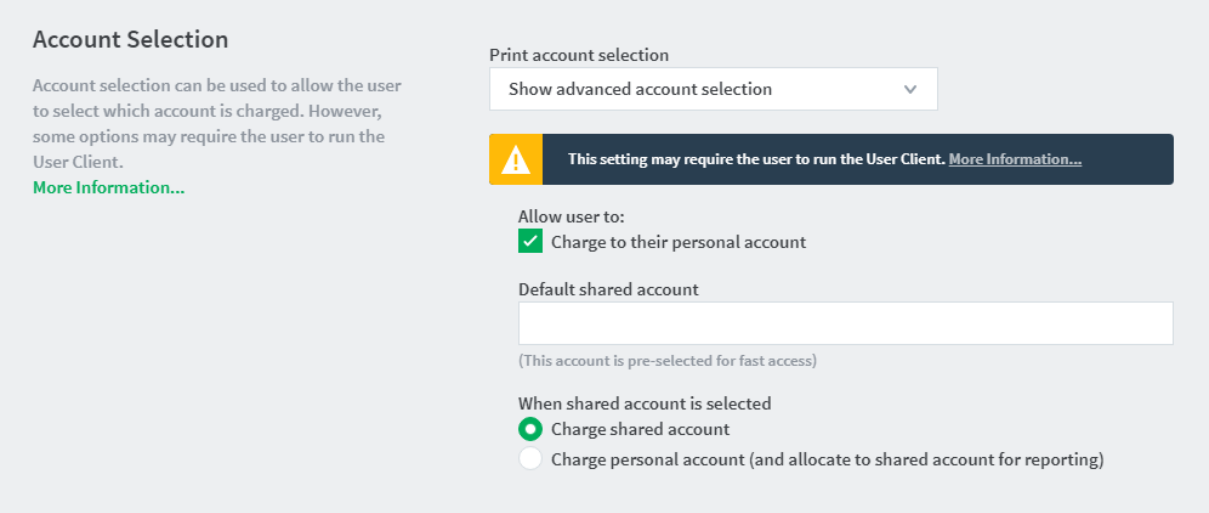
2.7.2. Testing for a Professional (client billing) installation

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select your test user account. The **quick find** feature can assist here.
3. In the **Account Selection** area, select **Show advanced account selection**.



Now you need to log onto a workstation, start the client, and test printing. The following instructions assume testing is performed from a Windows desktop system. For other platforms, see the client deployment process as described in User Client.

1. Log in to a workstation and open Windows Explorer (the file explorer). In the address bar enter:

   ```
   \\[server-name]\PCClient
   ```

   Where `[server-name]` is the hostname of the system on which you installed PaperCut. Explorer should connect to the share containing the client software.
2. Browse to the `win` directory; then double-click `pc-client.exe`. The client launches and an icon is displayed in the task tray.
3. Print a test document, such as a web page or basic document.
4. The client popup window should display. Select **My Personal Account**.

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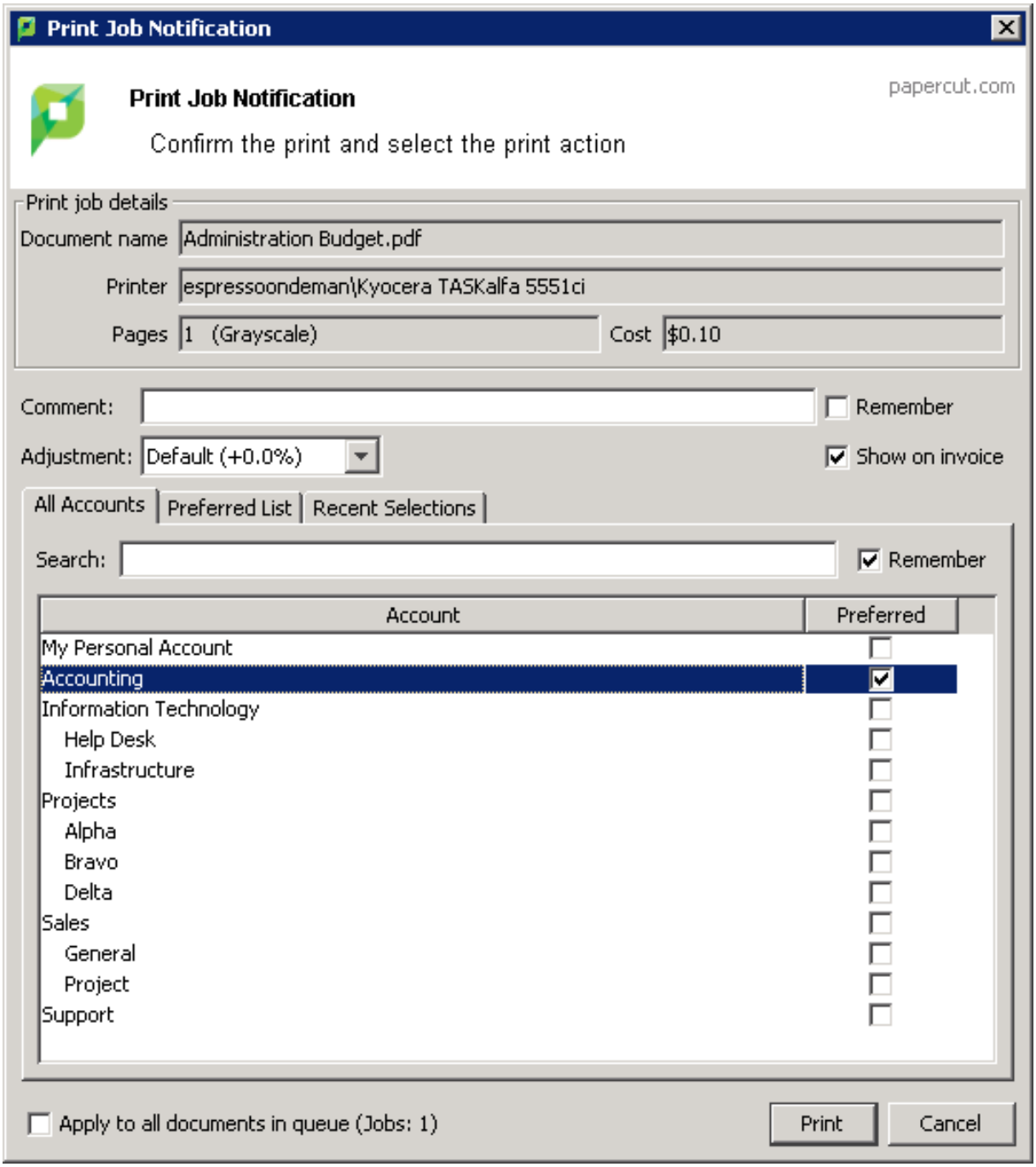

5. Click the **Printers** tab.

   The **Printer List** page is displayed.
6. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
7. Click the **Job Log** tab.
8. Check that your print job is listed in the log.
9. Click the **Users** tab.

   The **User List** page is displayed.
10. Select a user.

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The **User Details** page is displayed.

11. Click **Job Log**.
12. Check that your user account is charged an appropriate amount.

2.8. Advanced implementation

PaperCut NG/MF offers a number of installation options for more complex implementations.

2.8.1. Multi-server and multi-site deployments

The PaperCut NG/MF solution is designed with distribution in mind. The solution is built using Service Oriented Architecture, which allows its components to be installed on different machines of varying OS'. This allows PaperCut NG/MF to be installed in a variety of configurations, adapting to your network design as no two sites are the same.

The simplest and most common installation is to install PaperCut NG/MF onto a site's print server (where the site has only one). For a school or a small organization the implementation doesn't need to be any more complex than this. This is a single Application Server, single print server deployment and suits the majority of deployments.

Some more complex implementation examples exist below, as a way of showing what's possible. You can extend or merge some of these concepts to suit your network and create your ideal PaperCut NG/MF deployment.

PaperCut NG/MF operates at a layer above your network print services. For this reason, design your solution to provide your printing services first, then integrate the PaperCut NG/MF application into your network second. i.e. if you want a print server per site to stop large jobs traversing network links, do so. You can also use clustering to provide high up time to printing services.

2.8.1.1. PaperCut Site Server

All of the solution designs in the next section can be complemented with the PaperCut Site Server.

The PaperCut Site Server gives the risk averse customer peace of mind that access to printing resources won't be interrupted by unexpected network dropouts. Deploying the PaperCut Site Server ensures the critical services of the PaperCut primary server are supported locally during a disaster. Site Servers are simple to install and hide the complexity of database replication from Administrators.

Whilst initially designed for usage in multi site solutions, this isn't the only usage of the Site Server. Think of the Site Server as a proxy to the Application Server that can also perform a set of the Application Server tasks with the last known set of data during an outage.

2.8.1.2. Deployment examples

Scenario A - Single site, multiple print servers

It is quite common for sites to have multiple print servers, even if they are a customer at a single physical location.

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- **iOS printing**—Deploy supporting printing from iOS devices using a Mac server to compliment a Windows print server.
- **Admin / Curriculum**—A number of schools separate printing in the Administration section of the school from general staff/student printing.
- **Clustering**—Each node of a clustered resource is installed as a print server.

Each of the print servers in this scenario must be installed and configured to communicate with the Application Server. For more information, see Configuring secondary print servers and locally attached printers.

The PaperCut Site Server could add benefit in this deployment scenario if your Application Server were deployed within the private cloud. The Site Server would offer a local level of redundancy in the event the connection to the cloud resources were to drop. One of the print servers could play this role in addition to being a PaperCut Print Provider host.

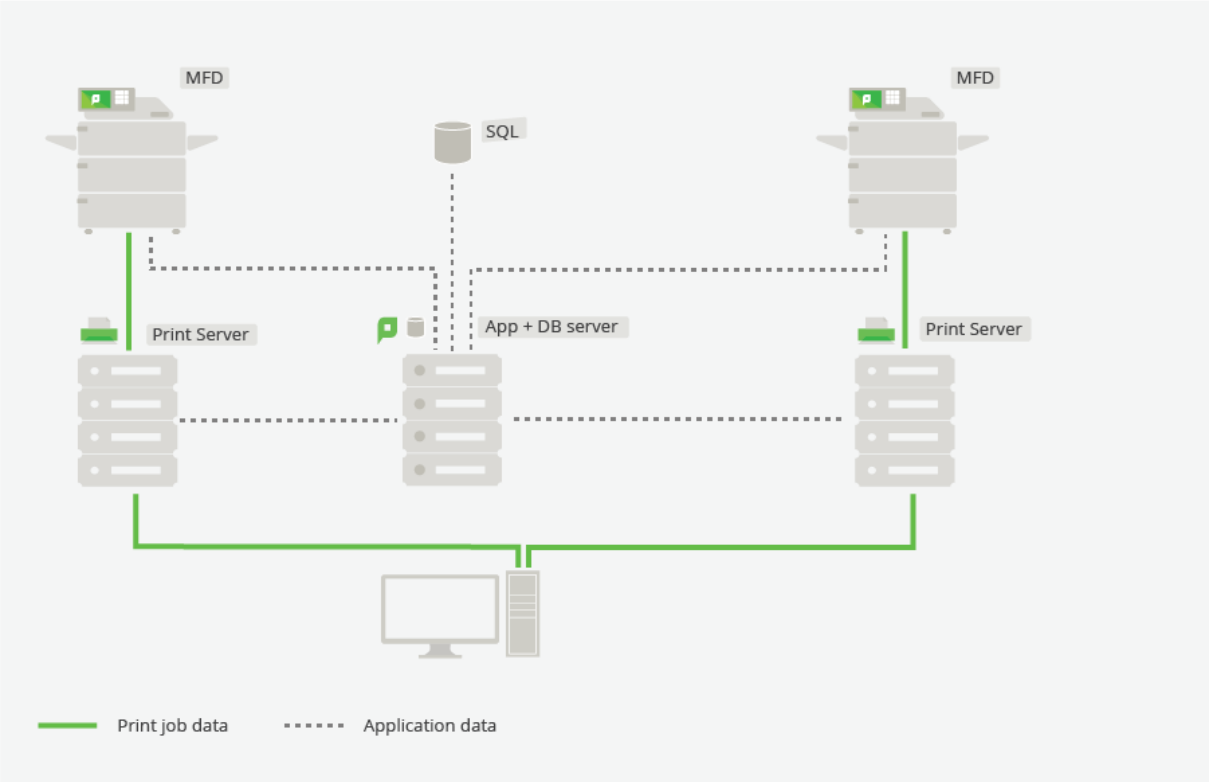

Figure 9: Multiple site / multiple print server deployment

Scenario B - Multiple site, single server

Not all multi-site installations rely on a print server on each site. This might be because the sites are small and don't warrant the resources, or because they are quite large and have resources centralized in a data center or on the private cloud.

In either case, if all printing is centralized through a single Application Server, single print server installation, the installation is the same as if it were a single site with a single server.

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The PaperCut Site Server could add benefit in this deployment if each of the sites wanted to ensure key business services of MFD usage and Print Release were supported during a network outage between a site and Application Server.

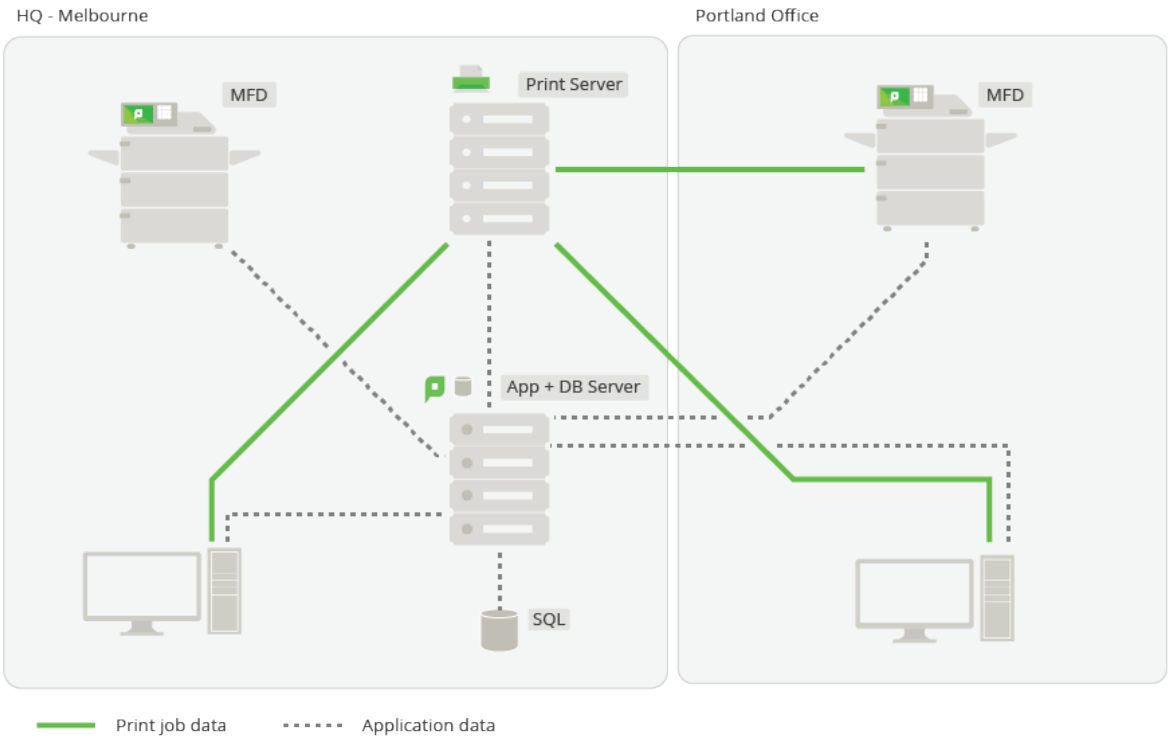

Figure 10: Multiple site / single server deployment

Scenario C - Multiple site, multiple print server

The deployment of print servers into remote sites allows for print jobs to be spooled within the local site, alleviating the need for these jobs to be sent to a centralized print server to only be sent back again to the remote site where the destination printer is located. This might be the choice of design for customers with

- **Low bandwidth** between sites
- **Large print jobs** generated on sites (architects, design firms, etc)
- **Historical infrastructure** that supports this

The PaperCut solution supports this design though the deployment of Configuring secondary print servers and locally attached printers on each of the print servers. This allows the print jobs to remain locally spooled, with only light-weight transactional data and control information being transmitted between sites.

The PaperCut Site Server would add significant benefit in this design, possibly being installed onto one of the existing print servers. This would provide local support for Application Server functions should the link between primary and secondary sites be unavailable.

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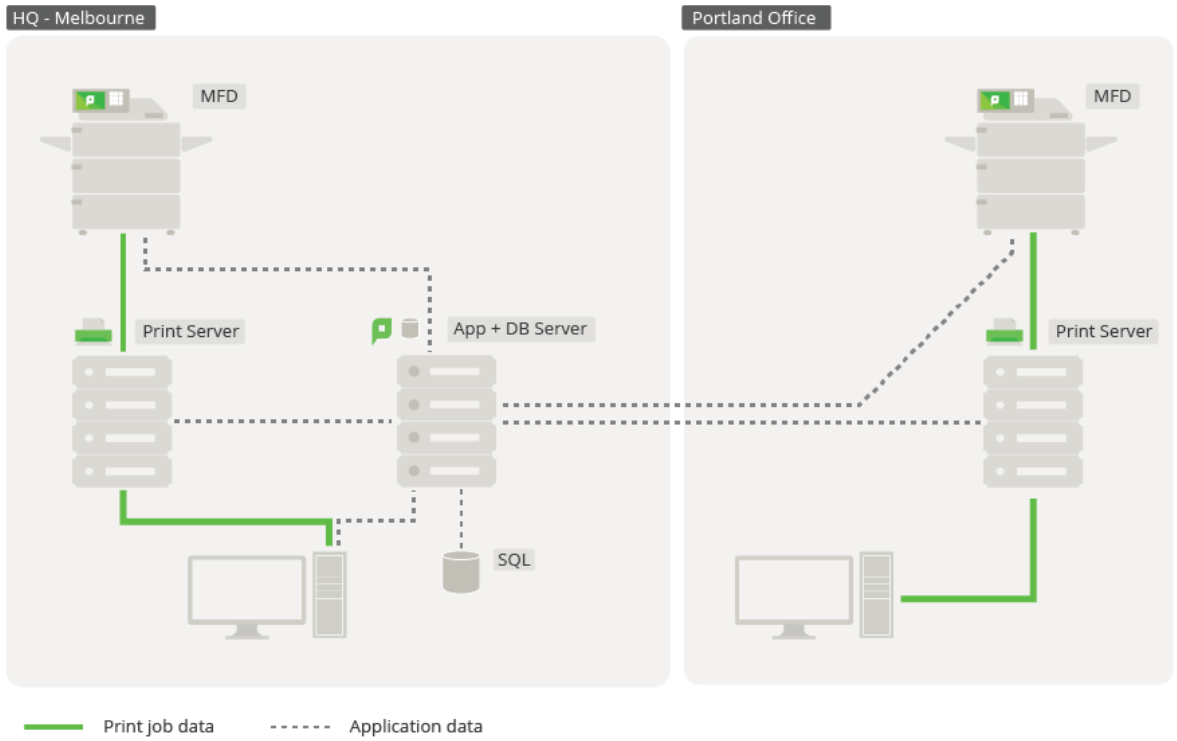

Figure 11: Multiple site / multiple print server deployment

Scenario D - Multiple site, multiple print server, multiple Application Servers

It is also possible to install PaperCut into each site of a multiple site organization as if each site itself were a separate installation of PaperCut. PaperCut has the ability to link separate Application Servers together for reporting purposes. Each individual site then has the ability to function and be administered autonomously, relying only on the links between the sites when there is a need to run a report from the Central Reports

Each of the individual autonomous sites would use one of the previous installation options. The PaperCut Site Server could then be considered for deployment to offer the same benefits listed above within these installations.

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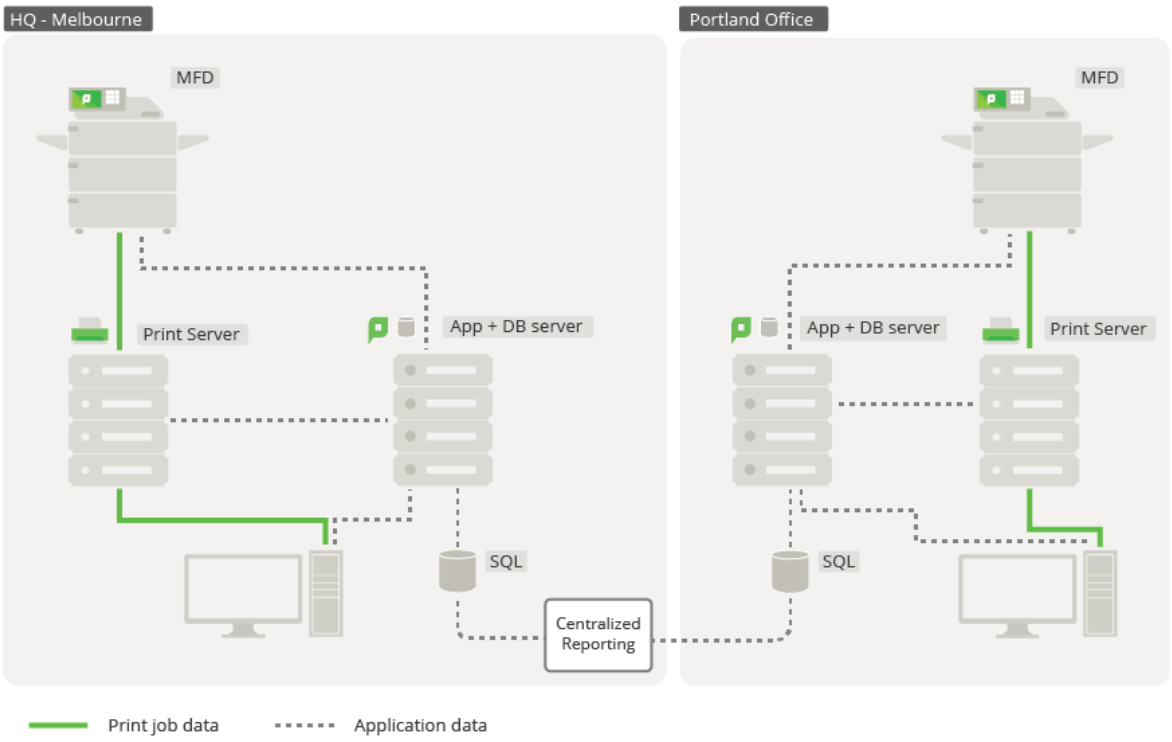

Figure 12: Multi Site/Multi Server deployment

Scenario variations

All of these scenarios can be complemented with other approaches to address high availability, resilience and scalability, including:

- Clustered print server.
- Clustered Application Server.
- Deployment on an external database (RDBMS).
- Clustered Database Server.
- Off-premises (Private cloud hosted server backed by infrastructure provider).

2.8.1.3. Comparison table

The following table should assist with comparing deployment architectures. Different models offer different benefits and challenges. The key is to select the model that addresses your primary requirements, and to understand any constraints that need to be managed in your environment.

Table 13: Deployment model comparisons

Deployment type	Benefits	Considerations
1 site, multi server	• Printing load distribution • Central Application Server administration • Removes single-point sensitivity at print server layer	• Multiple print servers to manage

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Deployment type	Benefits	Considerations
Multi site, single server	• Central administration • Simple deployment • Simple user management • Simple queue and device management • Job roaming across sites (Find-Me)	• Requires robust WAN • Least complex setup
Multi site, multi print servers	• Central administration • Simple user management • Reduced WAN traffic • Reflects commonly used architectures • Job roaming across sites (Find-Me)	• Requires robust WAN • Requires more servers • Decentralized queue management • Multiple find-me queues • More complex setup
Multi site, multi Application Servers	• Doesn't require robust WAN • Enables decentralized and parallel deployment and setup • Decentralized administration • Enables rolling updates • Consolidated reporting is available	• Each site requires an independent implementation • Overall setup for all sites requires more time • No job roaming across sites (Find-Me)

2.8.1.4. Further resources

For further details of setup for each scenario, refer to the following resources. and .

Scenario A - Single site, multiple print servers

- Configuring secondary print servers and locally attached printers.
- Resiliency with Site Servers.

Scenario B - Multi Site, single server

- Capacity planning.
- Resiliency with Site Servers.

Scenario C - Multi site, multi print server

- Configuring secondary print servers and locally attached printers
- Capacity planning.

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- Resiliency with Site Servers.

Scenario D - Multi site, multi print server, multi Application Server

- See Central Reports.
- Deployment on an external database (RDBMS)
- Resiliency with Site Servers.

2.8.2. Resiliency with Site Servers

For customers with distributed deployments, considerations such as redundancy and resilience to network outages are often a high priority.

A robust solution should defend critical points of failure, to ensure an organization can still continue to operate whilst a network is under duress. For PaperCut this means a robust deployment should ensure the availability of printing over failing and unreliable network links.

The installation of PaperCut Site Servers give customers peace of mind that access to printing resources won't be interrupted by unexpected network dropouts.

The Site Server duplicates the key features of a PaperCut primary server to a local site during an outage. MFDs are configured to connect to a Site Server as if it were the primary server to remove their reliance on WAN links. PaperCut secondary servers (Print Providers) are also aware of their local Site Server, providing a failover server if the primary server cannot be contacted.

This simple but effective design delivers high availability to MFDs and support for Secure Print Release including Find-Me Printing.

The Site Server installs in minutes with minimal configuration steps and no ongoing administration. Installers and Administrators need no specialist skills in database management or replication to provide business continuity. The Site Server ensures it is kept up to date with the current state of the primary server, transparently performing the role of the primary server when needed. Once a connection to the primary server can be re-established, the merge of local Site Server logs and transactions back to the primary server is also seamlessly managed by the Site Server.

The close relationship between the Site and primary servers allows the support of the same set of Operating Systems and Databases for installations. It's perfectly valid to promote an existing PaperCut secondary server (Print Provider) to a PaperCut Site Server to improve a site's resiliency.

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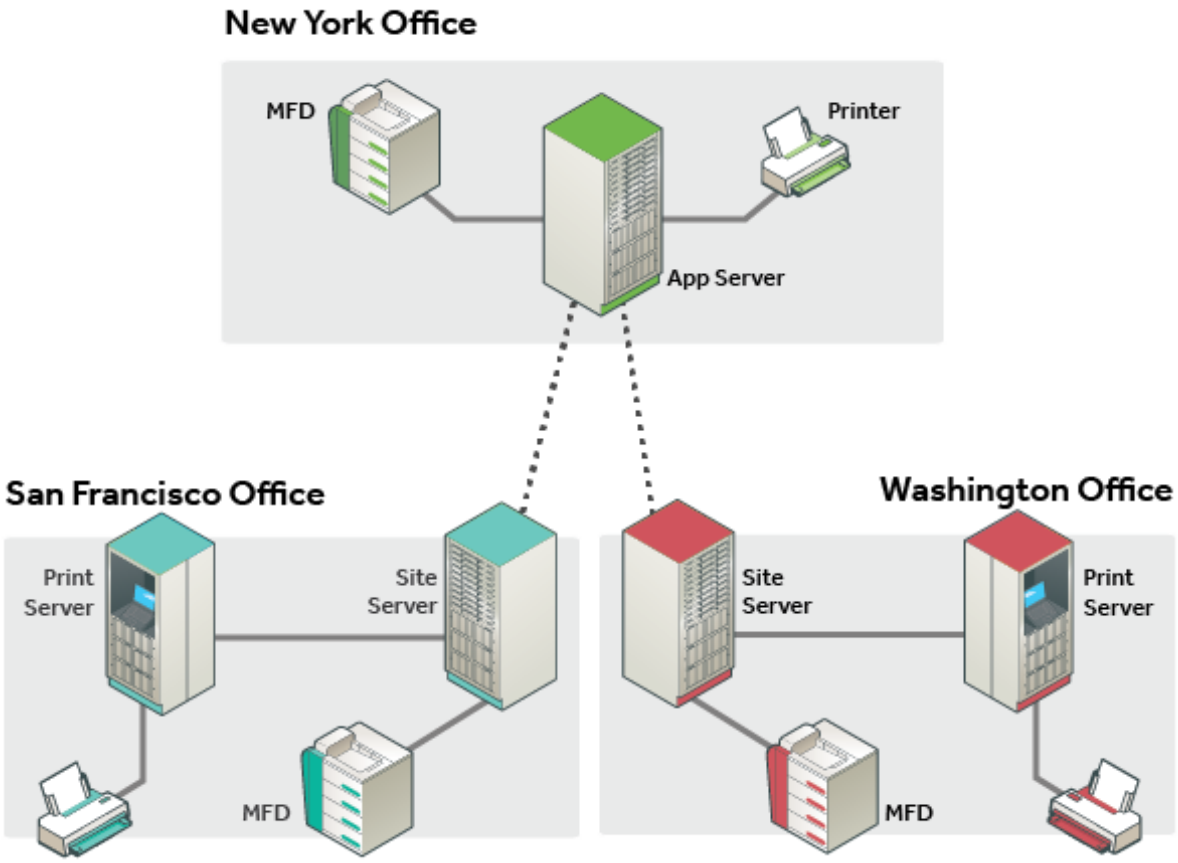

Figure 14: Site Server example

2.8.2.1. Technical overview

The goal of the Site Server is to support access to printing and copying, and is designed to be implemented with equal ease for existing PaperCut customers and new PaperCut Customers. The diagrams below highlights the change in design for existing customers implementing a Site Server, or for new customers that want to incrementally build a solution and phase a Site Server in after a basic *single server* solution is functioning.

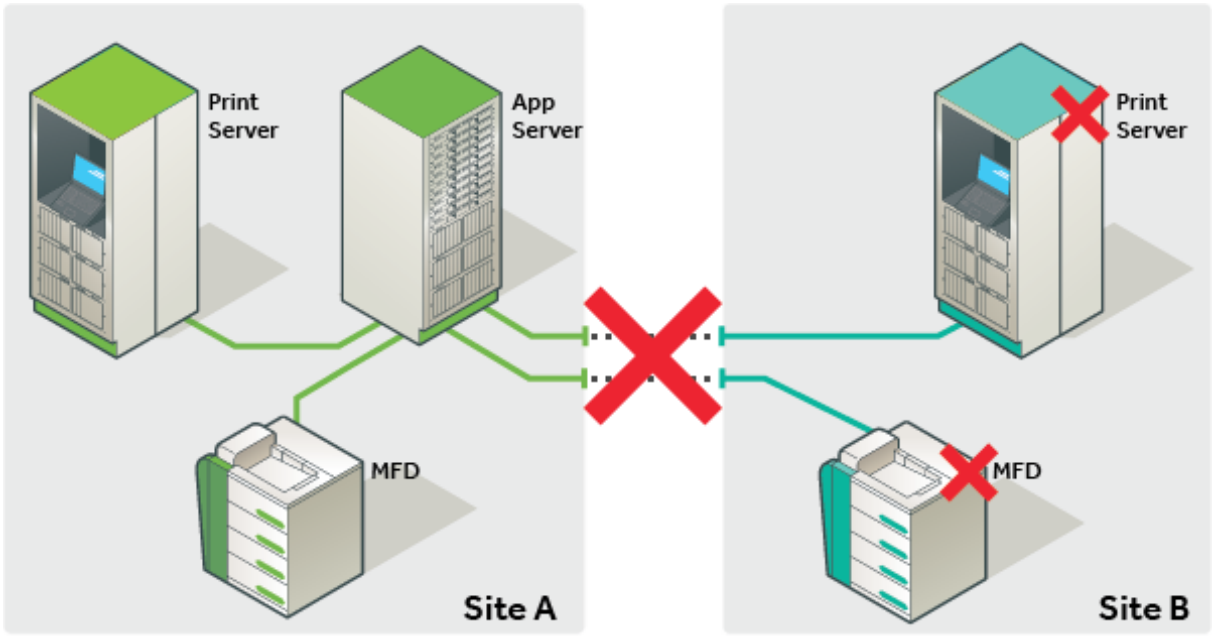

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Figure 15: WITHOUT Site Server

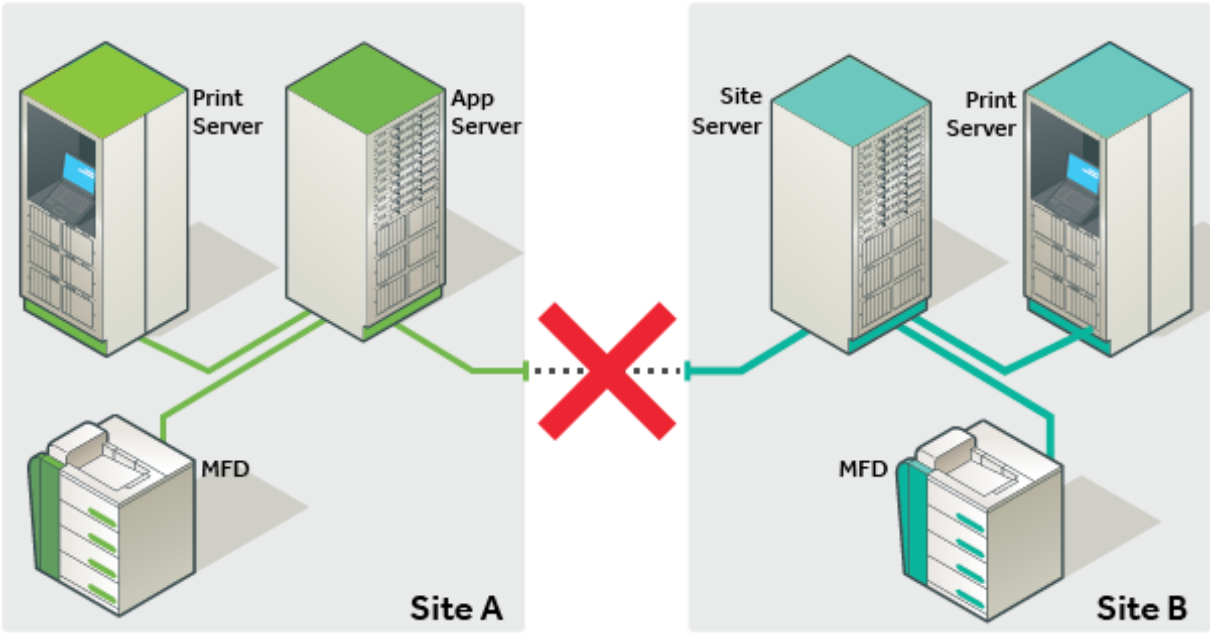

Figure 16: With Site Server

These images show the changes in how elements of a PaperCut solution communicate when a Site Server is deployed.

- MFDs now communicate with the Site Server. This ensure an outage between Site Server and Application Server is defended by the Site Server.
- Print servers also communicate with the Site Server when the Application Server is unavailable.

During normal operation where the Site Server and the Application Server are connected, the two servers together deliver the full set of PaperCut functionality. In anticipation of an outage, the Site Server also caches an up to date set of Application Server data.

In the unlikely event of an outage, the Site Server immediately takes over to deliver business continuity. When the link is re-established, normal operation resumes and offline job logs and transactions are submitted to the Application Server.

What you will need

The Site Server implements the core functions of the Application Server, and as such the majority of requirements are the same.

Table 17: What you will need

Operating System	All eligible choices for an Application Server. Can be chosen independently from the Application Server.
Database	All eligible choices for an Application Server. Can be chosen independently from the Application Server.
Database licensing	PaperCut database replication is provided by PaperCut. No database enterprise licensing is required.

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Server specs	Follow the suggested sizing requirements of the Application Server.
SSL	Server to server communication is encrypted by default. We recommend using a certificate for your Application Server signed by a CA. Your CA of choice should provide instructions for your installation.
Versioning	Your Application Server must be v15.0 or greater, and your Site Servers must be of the same version.
Licensing	The Site Server component is a license feature of the PaperCut Application. Licenses must be arrange **prior** to installation.
Ports	**Site Server:** The Site Server listens on port 9191 for Print Provider connections and the inbound ports for your chosen Device Connections. **Application Server:** The Application Server listens on port 9192 for connections from the Site Server and 9191 for Print Provider connections.

Where to deploy

An effective way to consider where a PaperCut Site Server should be deployed is to install a Site Server in **any network segment** where you have **concerns about the link reliability** between this segment and the Application Server and an outage to this segment would impact your business.

- Remote sites
- City offices
- Separate campuses
- Individual buildings with poor links
- Local sites where servers are on the Private Cloud

2.8.2.2. Offline operations

Site Servers ensure the access to print and copy services is supported during a network outage. However, some services will remain unavailable during an outage, as detailed below.

Supported functions

Table 18: Supported Functions

Function	Normal Operations	Offline with NO Site Server	Offline WITH Site Server
Basic printing (Failure mode)	Yes	Yes	Yes
Hardware terminals (CPad, Alpha, VCC…)	Yes	No	Yes
Secure Print	Yes	No	Yes
Find-Me Print	Yes	No	Yes
User Balances	Yes	No	Yes
Filters and conversions	Yes	No	Yes

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Function	Normal Operations	Offline with NO Site Server	Offline WITH Site Server
Release Stations	Yes	No	Yes
Mobility Print	Yes	No	Yes
Mobile Print (Web Print, GCP, iOS, Email to Print)	Yes	No	No
Payment Gateways, Kiosks	Yes	No	No
Scripting	Yes	No	No

To ensure continuity, Offline Policies allow an Administrator to define the application behavior ahead of any outage that disrupts PaperCut normal operations.

Note: *For more information, see Changing print job settings at the device, Assigning accounts to print jobs at the device.

Offline policies

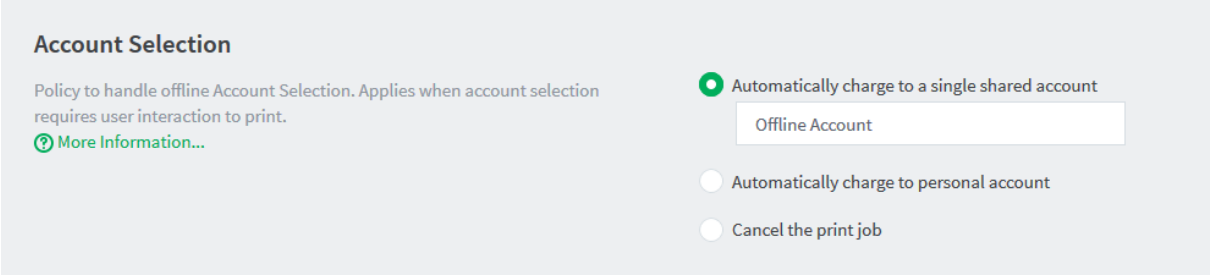
The User Client, scripting services, and payment options are not available during an outage. Offline Policies fill the gaps allowing users to continue to work. Offline policies are available after installing your first Site Server.

To set the offline policies:

1. Select **Sites > Offline Policies**.

   The **Offline Policies** page is displayed.
2. Complete the following details as described below:
   - Account Selection
   - Restricted Credit
   - Unauthenticated Users
   - User Password Authentication
3. Click **Apply**.

Account selection



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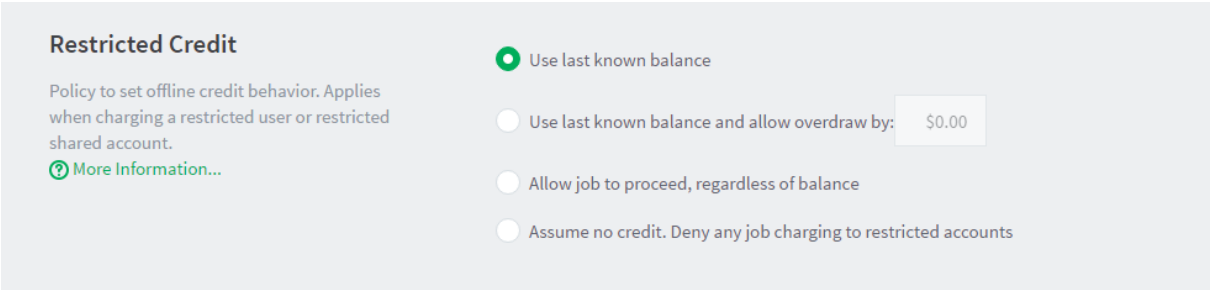
If you have configured users with Account Selection options that require user interaction (that can be done either via the User Client or at the printing device), then you must specify the account that print jobs are charged to during an Application Server outage (when the ability to assign accounts via the User Client or the printing device may be unavailable to users).

Important: This applied account overrides the ability to assign accounts via the User Client or the printing device. If the config key `system.site.offline-change-print-job-settings.enabled` is set to Y, then users are allowed to change this applied account at the printing device.

The policy options are:

- **[default] Automatically charge to a single shared account**—The print job is charged to a specified shared account (the default is "Offline Account").
- **Automatically charge to personal account**—The print job is charged to the user's personal account.
- **Cancel the print job**—If a shared account must be selected by the end user and this is not possible, the job is canceled.

Restricted credit



The *Offline Credit Policy* determines how PaperCut should determine whether to assume credit is available or to deny the job when the Application Server is unavailable. As an example, organizations can choose to allow an overdraft should the ability for users to top up their accounts be impacted whilst the central Application Server cannot be contacted.

The following policies are defined for *restricted* users and accounts whilst a site is in offline mode:

1. **[default] Use last known balance**—Only deny jobs when the user's balance (as known by the Site Server) is used up.
2. **Use the last known balance and allow overdraw by**—Only deny jobs when the User's balance known by the Site Server, plus a specified offline overdraft amount is used up.
3. **Allow job to proceed, regardless of balance**—Treat the account as unrestricted and allow all jobs to proceed. The account might go into negative when the Application Server is available again.

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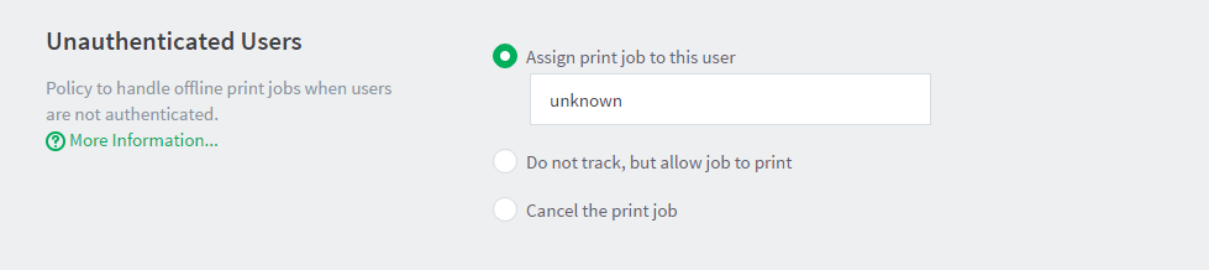
4. **Assume no credit. Deny any job charging to restricted accounts**—Only unrestricted accounts can be used when offline with this policy. For example, when offline, Staff are able to use resources, whereas Students are not.

Important:
The first three policies might result in accounts being deficit when the Application Server is online again.

Unauthenticated users

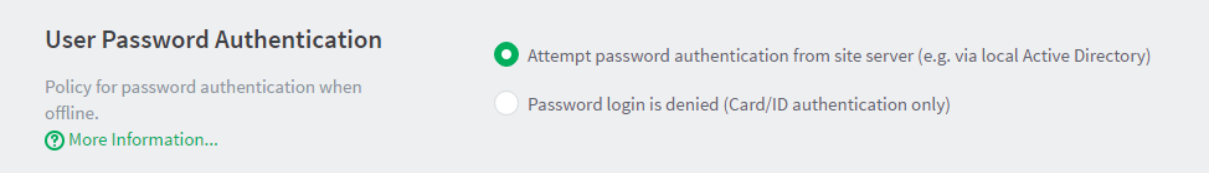


The *User Authentication Policy* determines the behavior in offline mode where PaperCut cannot validate the owner of the job. This is anticipated for sites that rely on the Handling unauthenticated (non-domain) laptops feature of PaperCut. For unauthenticated users, the following policies are available:

1. **[default] Assign print job to this user**—(The default user is "unknown"). Configure the preconfigured user as unrestricted, so that jobs allocated to this user are not denied based on the *Offline Credit Policy*. You can also configure this user to charge to a specified shared account (which should also be unrestricted).
2. **Do not track, but allow job to print**—Jobs pass through *physical* queues unimpeded to the destination printers. However, jobs sent to *virtual* queues do not print.
3. **Cancel the print job**—Any print jobs sent from the unauthenticated users are canceled immediately.

Important:
This policy also applies for users who have not been encountered by PaperCut previously. i.e. new domain users who have not been previously synced into PaperCut.

User password authentication



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PaperCut normally performs user authentication from an external directory source, such as Active Directory. In normal operations, this validation is performed by the Application Server. When offline, you can choose between the following options:

- **Attempt password authentication from the Site Server**—(external authentication is on). The Site Server attempts to authenticate the user via the external source as configured. This option requires the authentication source to be able to be contacted by the Site Server during the interruption that is preventing access to the Application Server.
- **Password login is denied**—(external authentication is off). Authentication from an external source is not available. This means that offline username/password login to a device or Release Station is not available, other than for Internal users.

2.8.2.3. Install a Site Server

Site Servers are an architectural component of the PaperCut solution. Setup is a straightforward process. Like most architecture projects, the time is best spent planning.

1. Planning

Planning is the most critical step of a successful Site Server deployment. Take a few moments prior to installation to run through a checklist of items:

- Arrange a license to include the required number of Site Servers.
- Consider a signed certificate by a trusted CA for your Application Server
- Plan to install/update the Application Server to v15.0.
- Discuss and choose the appropriate Offline Policies for your site.
- Choose a Site Server location that ensures a reliable connection to the devices and print servers it needs to support.
- Plan for minor disruption for any existing embedded or hardware devices you reconfigure to use the Site Server.
- Review the critical functions the Site Server supports to understand offline behaviour.

2. Apply your license

Your Application Server must be licensed for Site Servers before installing the Site Server software.

3. [optional] Import a trusted signed certificate

Where practical, consider implementing a signed certificate for SSL communications. For more information, see Generate SSL/HTTPS keys.

4. Installation

Before installing a Site Server, verify that the primary server (central Application Server) is set up and running correctly.

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Windows

On a Windows server, install the Site Server software by selecting the **Site Server installation (advanced)** option in the installation wizard. If the PaperCut primary server software was previously installed on the server, uninstall it prior to installing the Site Server software.

Linux

Follow the existing Quick install: Linux (CUPS and/or Samba) section of the PaperCut manual, with the additional parameter of `--site-server` when executing the installer.

Mac

On a Mac server, install the Site Server by downloading the latest Mac DMG disk image and run the contained installer called **PaperCut NG/MF Site Server Install (advanced).pkg**

Tip: It is recommended that you restrict Site Server connections to the Application Server to a fixed set of IP addresses. To specify the list of IP addresses or subnets that are allowed to submit information to the Application Server, see Restrict access to the Application Server.

5. Post installation setup

1. Set a unique name for the Site Server you are configuring.

2. Enter the name or IP of the Application Server this Site Server connects to.

3. Enter the credentials of a user with administrator access to PaperCut on the primary server.

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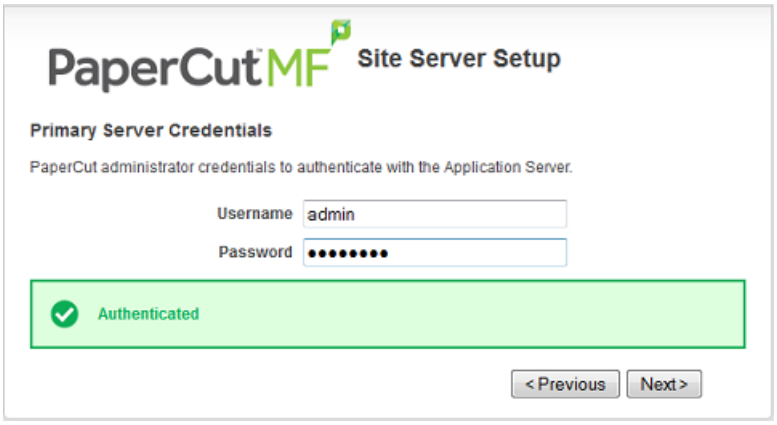
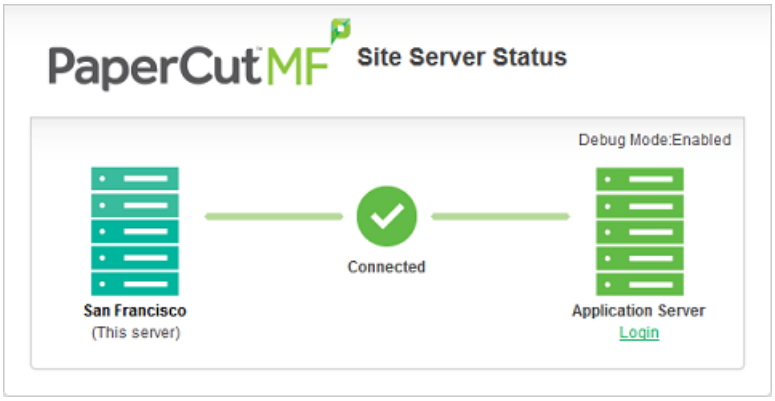


The Site Server is now connected to the Application Server and begins the data synchronization process.



4. The Site Server requires no additional configuration at the local machine. You can use the **Login** link under the Application Server image to access the PaperCut Admin web interface. The **Sites** tab is now available.

SITE NAME ▲	HOSTNAME	LAST CONTACTED	HOSTED DEVICES
OnlineMelbourne	LAPTOP-DEBBIE	Jan 10, 2017 3:07:50 PM	0

5. Select **Sites > Offline Policies** to set the *Offline Policies* for your installation.

Advanced Site Server configuration

The majority of the Site Server configuration is done in the Admin web interface, however, there are additional configuration options available in the `print-provider.conf` file.

2.8.2.4. Connect multiple print servers to a Site Server

If you have installed the Site Server onto an existing PaperCutConfiguring secondary print servers and locally attached printers, the Print Provider is automatically configured to work with the new Site Server. However, if you have more than one print server connected to the Site Server, the Print Provider on these servers needs to be upgraded to the same version of the Application Server and also configured in the following file to connect to the Site Server address:

1. Open the following file in a text editor:

   `[app-path]\providers\print\win\print-provider.conf`

2. Locate the line starting with `ApplicationServer=` then enter the Site Server IP

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address. For example:

```
ApplicationServer=mainserver.localdomain.com
```

3. Locate the line starting with `ApplicationServerPort=` then enter the port connecting to the Site Server. For example:

```
ApplicationServerPort=9191
```

4. Restart the server running Print Provider. If you do not want to restart the server, manually restart the **PaperCut Print Provider** service.

2.8.2.5. Connect directly with the Application Server when the Site Server is down

With the standard configuration, if your Site server is unavailable, the Print Providers will not work, even if the Application Server is available. You can, however, configure your Print Providers to attempt to connect directly with the Application Server if the Site Server is unavailable.

1. Open the following file in a text editor:

```
[app-path]\providers\print\win\print-provider.conf
```

2. Add a new line with `RedirectFallbackServer=` then the Application Server IP address and port. For example:

```
RedirectFallbackServer=mainserver.localdomain.com:9191
```

3. Restart the server running Print Provider. If you do not want to restart the server, manually restart the **PaperCut Print Provider** service.

Release Station configuration

The Standard Release Stations and Mobile Print Release—releasing print jobs using your mobile device apps are both supported by the Site Server to allow held jobs to be released in both online and offline operation.

- Connect the Standard Release Station to the Site Server by editing the Release Station's `connection.properties` file and changing the `server-ip` setting to the Site Server address.

> **Note:**
> The port used in the `connection.properties` file is an HTTP port only. Do not change it to an SSL port. The SSL port set up in the `server.properties` file is used for communication by the Release Station.

- Access the Site Server version of the mobile release app by using the Site Server address in the URL, e.g. `http://[site-server]:9191/mr`

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Testing your installation

The **Sites** tab of the Admin web interface shows at a glance the status of all Site Servers. While the Site Server is connected, PaperCut operates as per normal.

To verify that your Site Server is providing resilience, you can take the site offline. You can achieve this by simulating network failure (pulling the plug), or by disabling the site in the **Sites** tab.

1. On the **Sites** tab, select the site.
2. In the **Site Connection** area, choose **Disable connection (force offline)**.
3. Click **Apply**.

You can validate the site as being in offline mode using the Site Server URL (`http://[Site Server]:9191/admin`). Printing and copying should continue according to the offline policies defined in the installation section. Validating the application of the policies via copy and print transactions ensures your settings have been applied correctly.

To complete the test, return the Site to online by selecting **Enable connection** in the Site record. Validate your transactions have been uploaded to the Application Server by searching either the User, Device, Printer, or Job log.

Tip:
Jobs performed offline are marked as such in the print log. You can see which jobs are offline by inspecting the job details in the job log. In addition, when creating job log reports, you can now filter by offline jobs, to report only the jobs performed offline in a specified period.

Important:
Version upgrades to the Application Server result in the Site Servers supporting their local site in offline mode until they are also upgraded. Make sure you upgrade the Site Servers as part of your upgrade procedure.

2.8.2.6. Common questions about Site Servers

Do I need to backup my PaperCut NG/MF Site Server?

No. The Site Server does not maintain its own data and does not need backing up. If a Site Server fails, you can quickly establish a new one by re-installing. By contrast, the Application Server does maintain important configuration and history data and should be backed up.

Does the Site Server replicate the entire PaperCut NG/MF database?

No. The Site Server does replicate key tables from the PaperCut NG/MF database related to configuration. This includes User, Group, Printer, Device and Attribute tables. Importantly, the Site Server does not replicate the Printer Log table from the Application Server, as this data is not needed. For many customers, the Printer Log table is by far the largest table in the database.

Is communication between the Site Server and Application Server secure?

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Yes. The Site Server performs all communication with the Application Server over a secure HTTPS connection. A Site Server cannot be connected to the Application Server without the approval of a PaperCut NG/MF administrator with sufficient admin rights.

Do I need to run a Site Server on an external database?

No. The PaperCut NG/MF Site Server also ships with an internal database in the same way the Application Server does. However, if you prefer an external database, we support these too.

What database replication technology do you use?

PaperCut NG/MF developed its own database replication strategy to remove the requirement for costly enterprise database licenses.

Is failover automatic, and how quickly does it happen?

The failover from online to offline mode for the Site Server is an automatic process and happens without the need for intervention from an administrator. The failover time is also instantaneous for the MFDs and configurable for the Print Provider, so users can continue to function without interruption.

How do I check the status of a Site Server?

You can validate the status of a Site Server through the PaperCut NG/MF Admin web interface via the **Sites**tab as well as via the `http://[site-server]:9191/admin` URL.

Will features, such as conversion to greyscale or force duplex work in offline mode?

Yes. Filters and restrictions set at the queue level are supported when the Site Server is offline from the Application Server. However, print scripts and any conversions controlled by script do not run when offline.

Will username and password login methods be supported if the Application Server isn't available?

Yes. Site Servers attempt to validate usernames and passwords when the Application Server is unavailable. However, if a link between a Site Server and the Application Server is unavailable, there is a high likelihood that the directory server is not available to validate credentials.

Will cross server releasing of print jobs work during an outage?

Cross server releasing of print jobs (where the physical queue and virtual queue are on different print servers) is supported during an outage when both source and target queues reside on print servers connected to the same Site Server.

Will Site Servers replace the need for clustering?

Customers implementing clustering of the Application Server to maintain high service levels should continue to do so. The Site Server offers additional protection, but many features of the Application Server, such as Web Print, BYOD printing and external payment gateways are not currently available through a Site Server.

Will Site Servers improve scalability of my system?

In the initial release, we are not claiming scalability benefits for the Site Server. However, the Site

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Server is distributing workload - and as we gather more data and continue to build the solution, we will likely see some scalability benefits.

How do I specify the Site Server network address for my Web Services device?

Where a Site Server has multiple IP addresses, devices that look for PaperCut NG/MF might need to know which IP address is the correct address to connect to. On the Application Server, this is easily set under **Options > Advanced > Server Address** . On the Site Server, you can specify the address to use on the **Sites > Site Server Details** page in **Override Network Address**.

What happens to my existing held print jobs when the Application Server becomes unavailable?

Jobs that were printed to a local print server prior to an outage are redisplayed in your held jobs list a few minutes after the Application Server becomes unavailable.

2.8.3. Configuring secondary print servers and locally attached printers

This section covers the setup of a secondary print server in "Quick Start" format. For a detailed explanation of the underlying technology and what's happening behind the scenes see the subsequent sections.

A secondary print server is a system that directly hosts a printer. In many situations it can be a dedicated server, however, a secondary server can also be a desktop system hosting a directly attached USB printer. If this printer is to be controlled and tracked by PaperCut NG/MF, a small *monitoring* component needs to be installed. The monitoring component intercepts the local printing and reports this use back to the primary *Application Server*. A secondary server can be either :

1. A server style system hosting many printers.
2. A desktop style system hosting printer(s) also shared to other network users.
3. A desktop style system with the printer used only for local users (not shared).

The monitoring service is also referred to as a *Print Provider* as its task is to provide information back to the main *Application Server*.

The process of setting up a secondary print server, depends on the operating system. Read the section appropriate to the required operating system.

Tip:
For resilience against network outages, consider installing Site Servers at each of your secondary print server locations. Refer to Multi-server and multi-site deployments for a broader discussion of multi-site and WAN scenarios.

If you have a networked environment but do not have a print server, you can configure your computers to print directly to a printer. For more information, see Configuring Direct Printing.

2.8.3.1. Configure a Windows secondary print server

This section describes the process of setting up a secondary Windows print server.

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Step 1 - Ensure primary server is set up correctly

Before installing a secondary server you should ensure the Application Server is set up and running correctly. Verify that the Application Server is functioning correctly. For example, verify that:

- Printers on this server are being tracked.
- Users can log in to user pages from their workstations.
- Administrators can access the system.

Step 2 - Ensure firewall software is set to allow access to port 9191

Secondary server needs to communicate (initiate a TCP connection) on port 9191. Make sure any firewall software on the primary *Application Server* is not set to block any incoming local network traffic on this port. A good way to test is to open a browser on the planned secondary server, then check you can access the administration web interface on port 9191.

Step 3 - Install the Print Provider

Install the Print Provider software on the secondary server. On a Windows server, this is done by selecting the **Secondary Print Server** option in the installation wizard. If the PaperCut Application Server software was previously installed on the server, you must uninstall it prior to installing the secondary server software.

Step 4 - Configuration

The Print Provider on the secondary server needs to know where the primary server is installed.

1. Open the following file in a text editor such as Notepad:

   `[app-path]\providers\print\win\print-provider.conf`
2. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the Application Server.
3. Restart the server so the new configuration is detected. If you do not want to restart the server, manually restart the **PaperCut Print Provider** service.

Step 5 - Test

The secondary server should now be configured. Log in to the system as "admin" and verify that the printers are listed on the **Printers** tab. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

Automated install

You can automate the installation of the secondary server component on Windows systems. This is handy when the *Print Provider* component needs to be installed on a number of desktop systems running locally attached printers. For more information see, Automating secondary server deployment on Windows.

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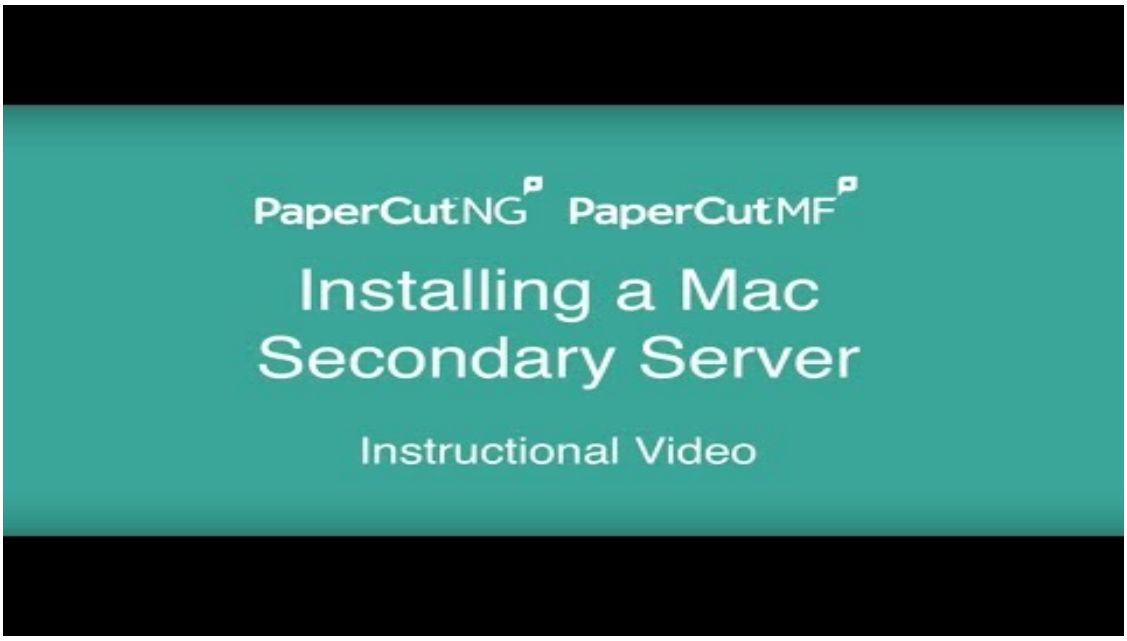
2.8.3.2. Configure a Macintosh secondary print server

This section describes the process of setting up a secondary Mac print server. The primary *Application Server* can either be a Windows, Mac or a Linux basis system. PaperCut NG/MF has full support for "mixed" or heterogeneous printing environments.



Step 1 - Ensure primary server is set up correctly

Before installing a secondary server you should ensure the Application Server is set up and running correctly. Verify that the Application Server is functioning correctly. For example, verify that:

- Printers on this server are being tracked.
- Users can log in to user pages from their workstations.
- Administrators can access the system.

Step 2 - Ensure firewall software is set to allow access to port 9191

Secondary server needs to communicate (initiate a TCP connection) on port 9191. Make sure any firewall software on the primary *Application Server* is not set to block any incoming local network traffic on this port. A good way to test is to open a browser on the planned secondary server, then check you can access the administration web interface on port 9191.

Step 3 - Check that the host user account exists

PaperCut NG/MF runs under a non-privileged user account called "papercut". This invisible system account is created automatically upon first install. Advanced SysAdmins can, however, have a

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preference to create this account manually. If you fall into this category, create the `papercut` account now prior to installation.

Step 4 - Install the Print Provider

Install the Print Provider software onto the secondary server. Download the latest Mac DMG disk image and execute the contained installer called `PaperCut NG/MF secondary server Installation.pkg`.

Step 5 - Configuration

The Print Provider on the secondary server needs to know where the primary server is installed. The installer attempts to open the appropriate configuration file automatically after the install completes. However, your IT environment configuration might prevent this from happening. If it does not automatically open, open the following file in a text editor:

```
[app-path]/providers/print/mac/print-provider.conf
```

To configure a secondary server:

1. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the primary server.
2. Save the file and exit the text editor.
3. Double-click the command script `/Applications/PaperCut NG/MF/Control Printer Monitoring.command`, and enable monitoring on the appropriate printers.

Step 6 - Test

The secondary server should now be configured. Log in to the system as "admin" and verify that the printers are now listed on the **Printers List** page. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

2.8.3.3. Configure a Linux or Novell iPrint secondary print server

This section describes the process of setting up a secondary print server on a Linux system. The primary *Application Server* can either be a Windows, Mac, Novell or a Linux based system. PaperCut NG/MF has full support for "mixed" or heterogeneous printing environments.

Step 1 - Ensure primary server is set up correctly

Before installing a secondary server you should ensure the Application Server is set up and running correctly. Verify that the Application Server is functioning correctly. For example, verify that:

- Printers on this server are being tracked.
- Users can log in to user pages from their workstations.
- Administrators can access the system.

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Step 2 - Ensure firewall software is set to allow access to port 9191

Secondary server needs to communicate (initiate a TCP connection) on port 9191. Make sure any firewall software on the primary *Application Server* is not set to block any incoming local network traffic on this port. A good way to test is to open a browser on the planned secondary server, then check you can access the administration web interface on port 9191.

Step 3 - Check that the host account exists

On the secondary server, create a user account called `papercut`. Set the `papercut` user's home directory to the desired install location. This is normally `/home/papercut`. The method of creating this account is the same as that used for the primary server setup. For more information, see Installation.

Step 4 - Install the Print Provider

Install the *Print Provider* software onto the secondary server by copying all files and directories from the primary *Application Server*'s directory:

```
[app_path]/providers/print/linux-x64/* (64-bit)
```

To the equivalent location on the secondary server:

```
/home/papercut/providers/print/linux-x64/ (64-bit)
```

on the secondary server. Perform the copy operation as the `papercut` user so that files are owned by the `papercut` user. You can use any method to copy the files, including over the network or via a USB key. If the primary server is also Linux, the simplest way would be use Secure Copy (`scp`) as follows:

```
shell> su - papercut
shell> mkdir -p providers/print
shell> cd providers/print
shell> scp -r
primary.server.name:/home/papercut/providers/print/* .
```

After the copy operation is performed, execute the `setperms` and `roottasks` scripts as *root*:

64-bit

```
shell> su - root
shell> sh ~papercut/providers/print/linux-x64/setperms
shell> sh ~papercut/providers/print/linux-x64/roottasks
```

Step 5 - Configuration

The *Print Provider* on the secondary server needs to know where the primary server is installed (e.g. Its IP address).

1. Open the following file in a text editor:

   ```
   /home/papercut/providers/print/linux-x64/print-provider.conf
   (64bit)
   ```

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2. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the primary server.

You now need to integrate the binaries copied in step 4 into the CUPS, Samba or Novell iPrint print queues.

This process is detailed in Linux print queue integration and Step 5 - Printer/iPrint configuration.

Step 6 - Test

The secondary server should now be configured. Perform some test printing on all of this secondary server's printers. Log in to the system as "admin" and verify that the printers are now listed on the **Printers List** page. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

2.8.3.4. Print monitoring architecture

This section covers PaperCut NG/MF print monitoring architecture from a technical perspective.

PaperCut NG/MF is designed using the latest software design principles. An important design principle used is Service Oriented Architecture (SOA). PaperCut NG/MF divides key operational areas into components. These components communicate using an XML Web Services standard. Two of the main services are:

Table 19: PaperCut NG/MF services/components

Service/Component	Description
The Application Server	The central logic service responsible calculating user costs and providing the web and Admin web interface.
Print Provider Service	A service responsible for monitoring and analyzing print jobs and reporting this information using XML Web Services to the Application Server.

In a single server setup, you do not need to be concerned with the two components as they automatically act as one (it's only noticeable in that two processes are running on the server). On a multi-server/system environment a deeper understanding of the architecture is required.

2.8.3.5. Multiple print servers

Many large networks, or even smaller networks with a legacy design, can have more than one print server. Reasons for separating printers across servers/systems include:

- Legacy design - That's the way the previous admin set it up.
- Networks with 100 printers or more might need multiple servers to spread the printing load.
- Networks spanning multiple physical sites or subnets can have separate servers minimize cross-site network traffic.
- Servers can exist to support different operating systems
- A local desktop printer attached to a system is also a remote *print server*.

One of the servers on the network needs to be nominated as the primary server. This system runs the *Application Server* software responsible for providing the user interface, storing the data, and

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managing the application logic. The system nominated for this task is usually a print server (but could be any server). It needs to be a system with spare capacity to run the PaperCut NG/MF Application Server software. This system should have good performance, have at least 500 Mb of free hard-disk space, and be included in an off-disk backup routine.

Other print servers are known as secondary servers. These servers run the Print Provider component and communicate back to the central server. The following diagram illustrates this setup.

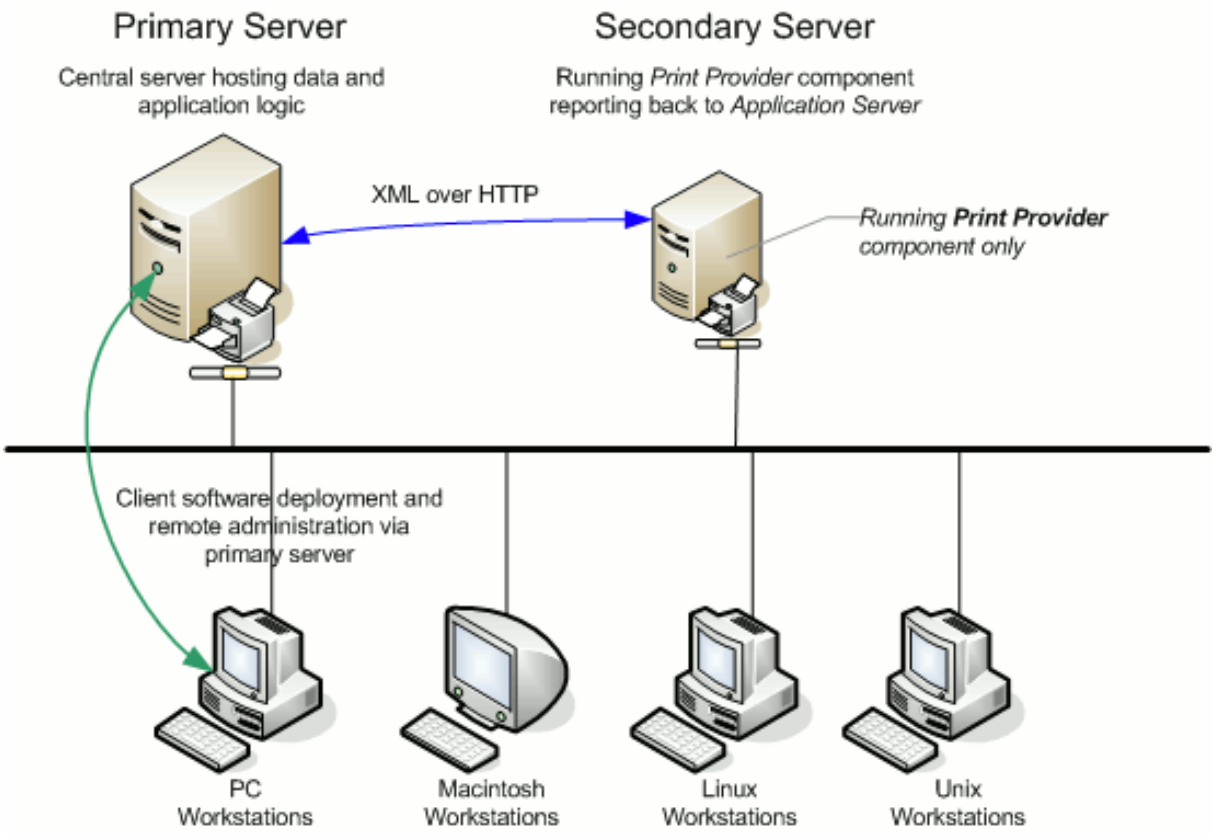

Figure 20: Secondary server reporting back to primary server (application server)

When a client prints to a secondary server, the Print Provider intercepts the print job and forwards the information to the central server for processing. Communication is via XML Web Services over HTTP on the PaperCut Application Server's nominated port (normally port 9191). The web services protocol is specifically designed to facilitate easy firewalling, scalability, and works over a wide range of network speeds.

PaperCut NG/MF Service Oriented Architecture offers many advantages for network administrators including:

- Secondary servers run the minimum amount of software
- Communication between servers uses minimal bandwidth. Physically separated servers connected via WAN links, VPNs or other slow links are supported with minimal or no impact on printing performance.
- All data, logging and configuration information is stored on one single central server facilitating central backup from one location.
- Management is conducted centrally from one location.

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PaperCut NG/MF's SOA design allows advanced setups including:

- Decentralized deployment
- Separation of concern (servers dedicated to separate tasks such as database server,Application Server and print server)
- Options to remove points of failure via clustering or fail-over

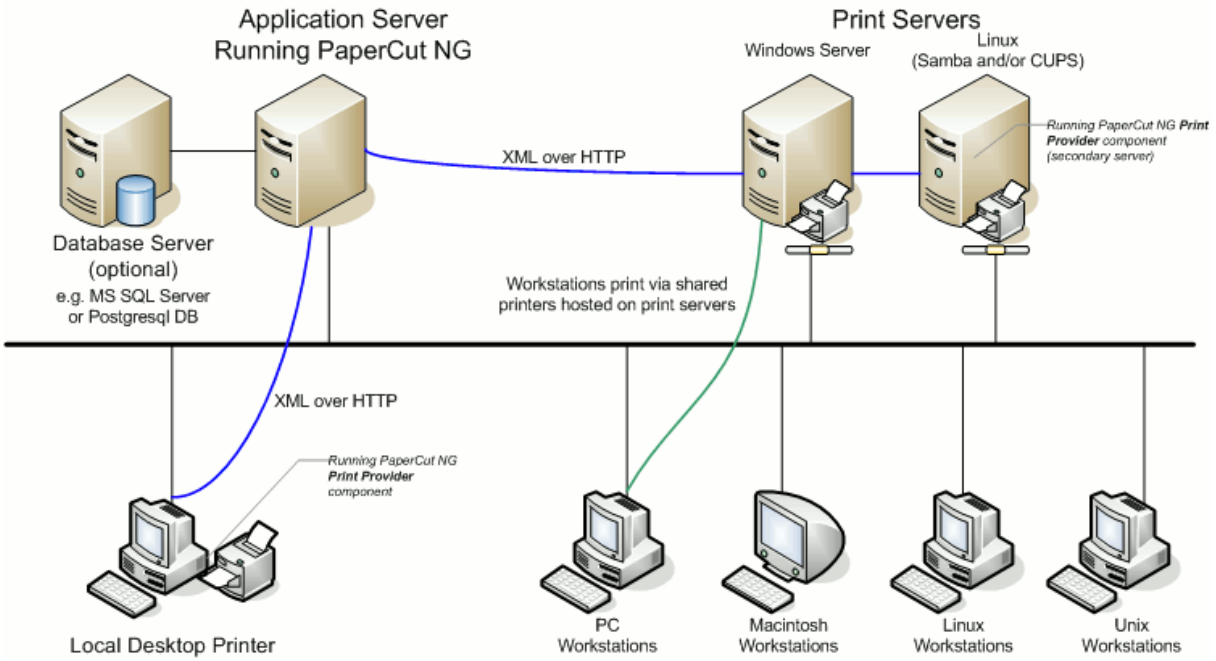

Figure 21: Architecture - an advanced configuration

2.8.3.6. Automating secondary server deployment on Windows

The secondary server installation process can also be automated via command line switches issued to the installer program. This is useful when you need to install the *Print Provider* on a number of desktop systems hosting local attached printers.

To automate the installation:

1. Copy the windows installer program, `pcmf-setup.exe`, into a directory accessible to the target systems (i.e. A network share or mapped drive).
2. Copy the `print-provider.conf` file from main server. This file is located at `[app-path]/providers/print/win`. Place the file in the *same* directory as the install program (as performed in step 1.)
3. Edit the `print-provider.conf` file and define the correct server name or IP address of the main Application Server in the line starting with `ApplicationServer=`.
4. Use a batch file or equivalent to start the install program as follows:

   ```
   pcmf-setup.exe /TYPE=secondary_print /SILENT
   ```

   Note: The installer requires administrator level - needed to install a system service.

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Note:

- The executable name of the installer program can vary depending on the version.
- Replacing the `/SILENT` option with `/VERYSILENT` suppresses all visual output during the installation process.
- The copy of the `print-provider.conf` file is used during the install process to ensure the installation is aware of the location of the main Application Server.
- For a full list of command-line arguments, see Automate installation on Windows.

2.8.4. Configuring Direct Printing

This section describes how you can track and report on printing that is sent directly from a computer to a printer, without the need for a print server.

This solution is ideal for businesses that have distributed branches with a modest number of computers, such as post offices, bank branches, gas stations, retail outlets. It also suits small businesses with a collection of computers in an environment without dedicated IT support. Direct Print allows you to monitor local printers without a print server. The combination of a Direct Printing configuration and a private cloud implementation of PaperCut can eliminate the need for any local infrastructure.

Important:

Direct Printing is not recommended for environments using quotas or charging, such as education. This is because users can turn off PaperCut NG/MF's tracking from their computer. It might be possible, depending on permissions, for a user to disable the Direct Print Monitor, which would turn off print tracking on their computer.

Scenario 1: Small business

Matt's Accounting is a small business with five employees working in a Windows environment. They want to track their printing costs per client, but do not want the overhead of having to set up and maintain a print server and dedicated Application Server. They have two choices for the Application Server:

- purchase a low cost PC that can be used as an Application Server
- use a cloud-based Application Server

They have chosen to use a cloud-based Application Server.

Since they do not have a dedicated print server and also do not have the experience to manage a print server, they want to print directly from their computers to the printer. This PaperCut NG/MF solution is easy to set up and requires no IT infrastructure changes.

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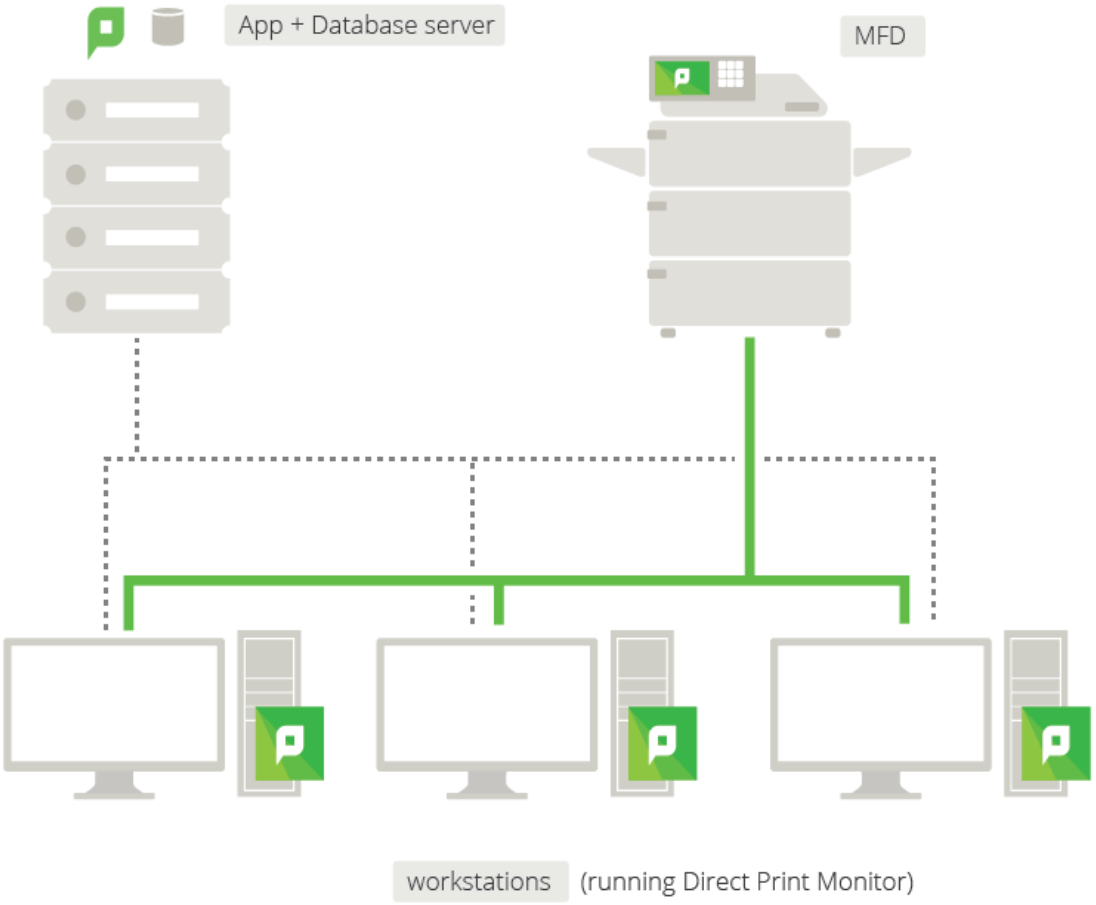

Figure 22: Direct Printing setup - small office

Scenario 2: Business with distributed small branches

Dash About Inc. is a medium sized taxi company that comprises a head office plus 20 home-based offices used by the drivers. They currently have PaperCut set up in their head office and now want to roll out PaperCut to each home office. They do not want the network overhead of print jobs being sent to head office and then back to the home offices via their VPN, but also do not want to set up a print server in each home office. Direct Printing is ideal in this situation as a print server is not required.

Dash About have already set up an automated PaperCut install process for new computers and want to incorporate the Direct Printing installation into this process.

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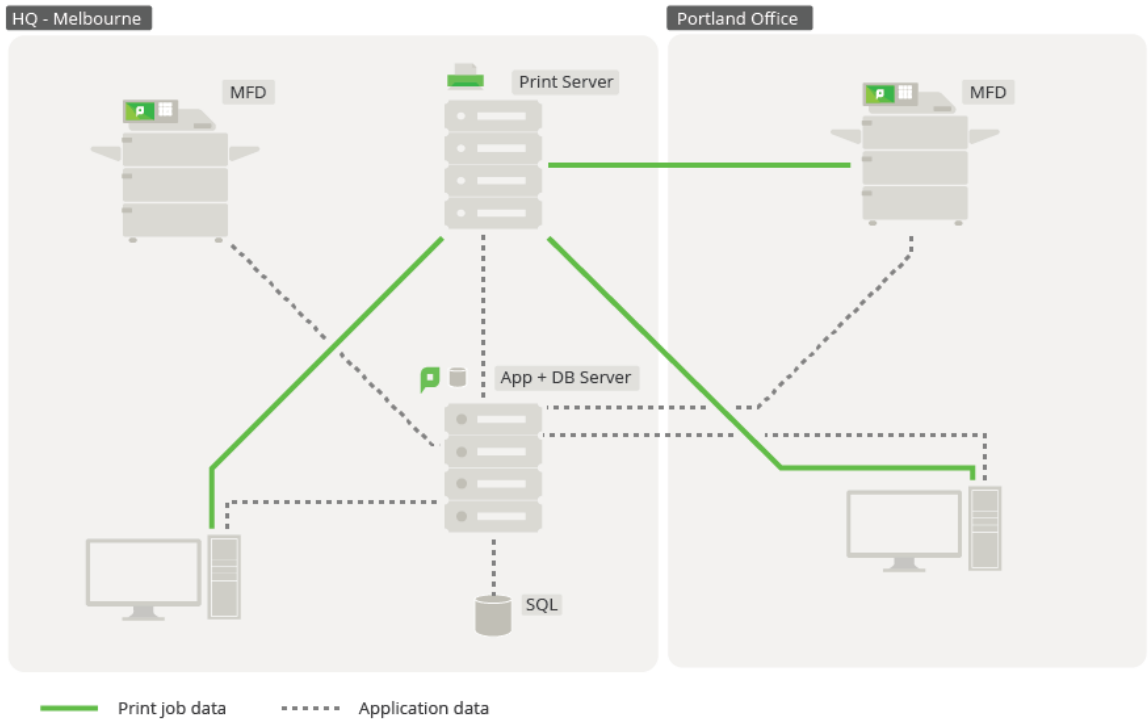

Figure 23: Direct Printing setup - distributed branch

How does it work?

Direct Printing allows print jobs to be sent directly from a user's computer to a printer, without an intervening print server. This requires print queues (sometimes referred to as "printers" or "drivers") to be set up on each computer for each printer. For example, on Windows, this is done through the **Devices and Printers** control panel.

With this setup, there are multiple computers each with a print queue directed at the same physical printer. However, you do not want each print queue to be displayed as a separate printer in PaperCut NG/MF. Direct Printing consolidates the print jobs from multiple print queues into a single printer.

Each computer that prints directly to a printer needs the following components:

- a print queue that sends jobs directly to a printer rather than to a print server queue. The print queue can use either the IP address or hostname of the printer.
- a small monitoring component, known as a *Direct Print Monitor*. This monitoring component reports back to the Application Server.

Direct Printing simplifies the configuration, management, and reporting of print jobs. The Application Server automatically merges the information from multiple computers into one printer in the **Printer List**. This process is called *linking*.

Each linked print queue automatically uses the printer's configuration, which means you do not need to configure each print queue individually. PaperCut NG/MF reports the summarized data at the printer level rather than for each individual print queue.

The process of setting up Direct Printing, depends on the operating system.

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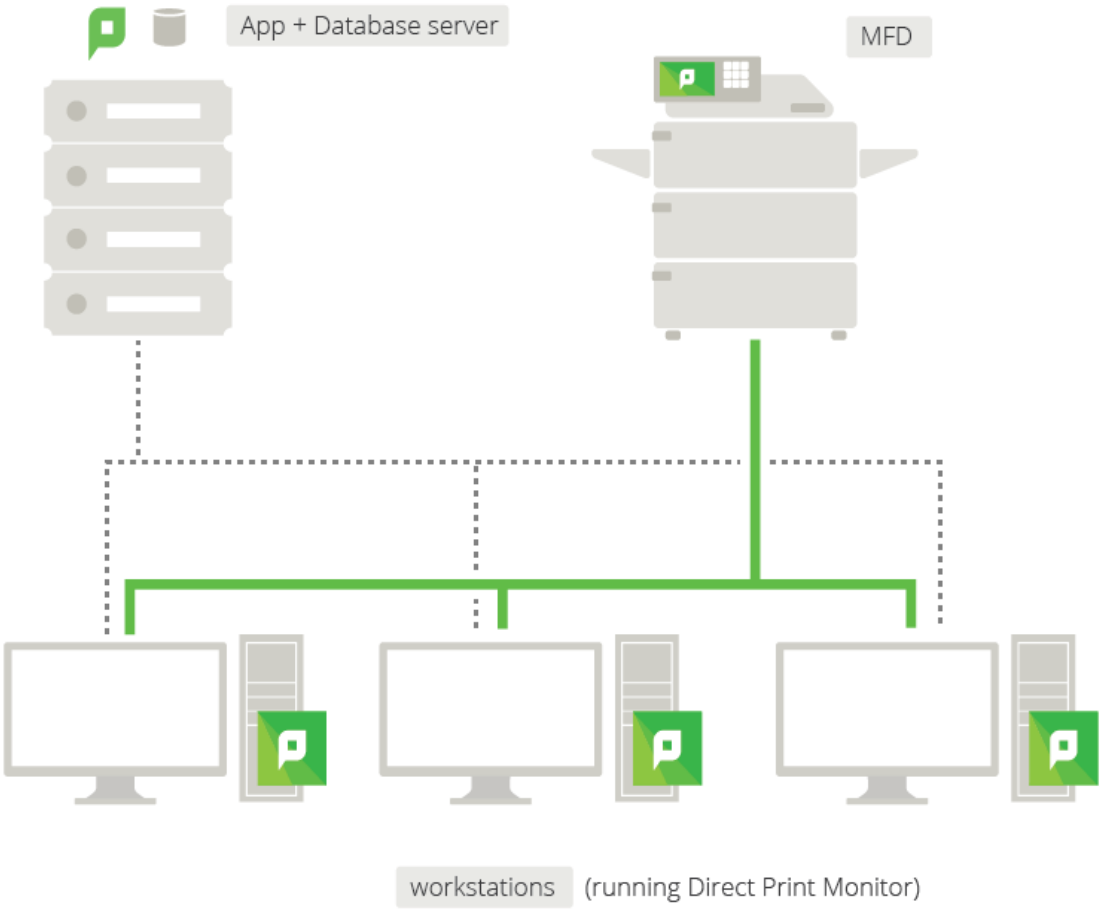

Figure 24: Direct Printing architecture

2.8.4.1. Install the Direct Print Monitor

The way in which you install Direct Printing depends on your operating system. For more information see:

- Install the Direct Print Monitor on a Windows computer
- Install the Direct Print Monitor on a Mac computer
- Install the Direct Print Monitor on a Linux computer

Install the Direct Print Monitor on a Windows computer

This section describes the process of setting up Direct Printing on Windows computers. The primary *Application Server* can be either a Windows, Mac, or a Linux based system. PaperCut NG/MF has full support for "mixed" or heterogeneous printing environments.

If your organization does not have a dedicated print server at one or more sites, you should consider setting up Direct Printing. Direct Printing allows you to track and report on local printing that is sent directly from a computer to a printer, without a print server. The following steps show how to install Direct Print on Windows machines. For more information about installing Direct Print on other operating systems, see:

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- Install the Direct Print Monitor on a Linux computer
- Install the Direct Print Monitor on a Mac computer

Step 1: Ensure the primary server is set up correctly

Before installing the Direct Print Monitor, you should ensure that the primary server (Application Server) is set up and running correctly.

Verify that:

- PaperCut NG/MF release 16.0 or above is installed.
- Users can log in to user pages from their computers.
- Administrators can access the system.
- The Application Server is accessible from each computer requiring Direct Printing, that is, you can ping the Application Server.

Step 2: Ensure firewall software is set to allow access to the port used by the Application Server

A computer with the Direct Print Monitor installed needs to communicate (initiate a TCP connection) on the port used by the Application Server (by default this is port 9191). Ensure that any firewall software on the primary Application Server is not set to block any incoming local network traffic on this port.

Step 3: Change the default configuration (optional)

The Direct Print Monitor installation configuration file is installed in the following location on the Application Server:

```
[app-path]/providers/direct-print-monitor/win/direct-print-monitor.conf
```

Note:
If you need to change the configuration after deploying Direct Printing, you must change the configuration on every computer using Direct Printing.

The Direct Print Monitor configuration file is automatically generated with the hostname of the Application Server when the Application Server is installed. If required, you can change the default configuration, however, the default configuration suits most implementations. For example, you can change the IP address of the Application Server to a Fully Qualified Domain Name (FQDN).

Step 4: Install the Direct Print Monitor on each computer

Install the Direct Print Monitor on each Windows computer. You can either:

Manually install the Direct Print Monitor

If you do not have many computers on which you want to install the software, manual installation might be easier.

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Note:
If the computer has a PaperCut NG/MF Print Provider installed, uninstall it.

1. Ensure the following files are in a shared folder that is accessible to the target computers (i.e. a network share or mapped drive):

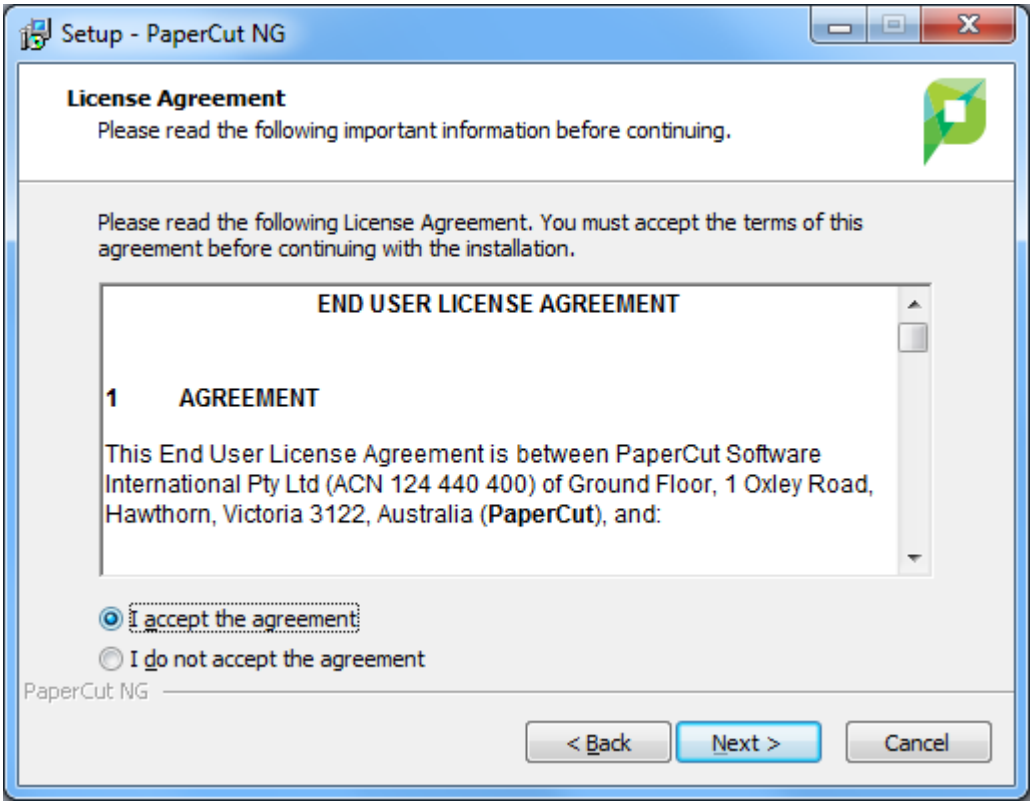
   `[app-path]\providers\direct-print-monitor\win\`

   This folder contains the following files:

   - `pc-direct-print-monitor.exe`
   - `direct-print-monitor.conf`

   Note:
   These two files must be in the same folder for the Direct Print Monitor installation to work.

2. On each computer, navigate to the shared folder on the Application Server.
3. Double-click `pc-direct-print-monitor.exe`.



4. Read the End User License Agreement.
5. Select **I accept the agreement**; then click **Next**.

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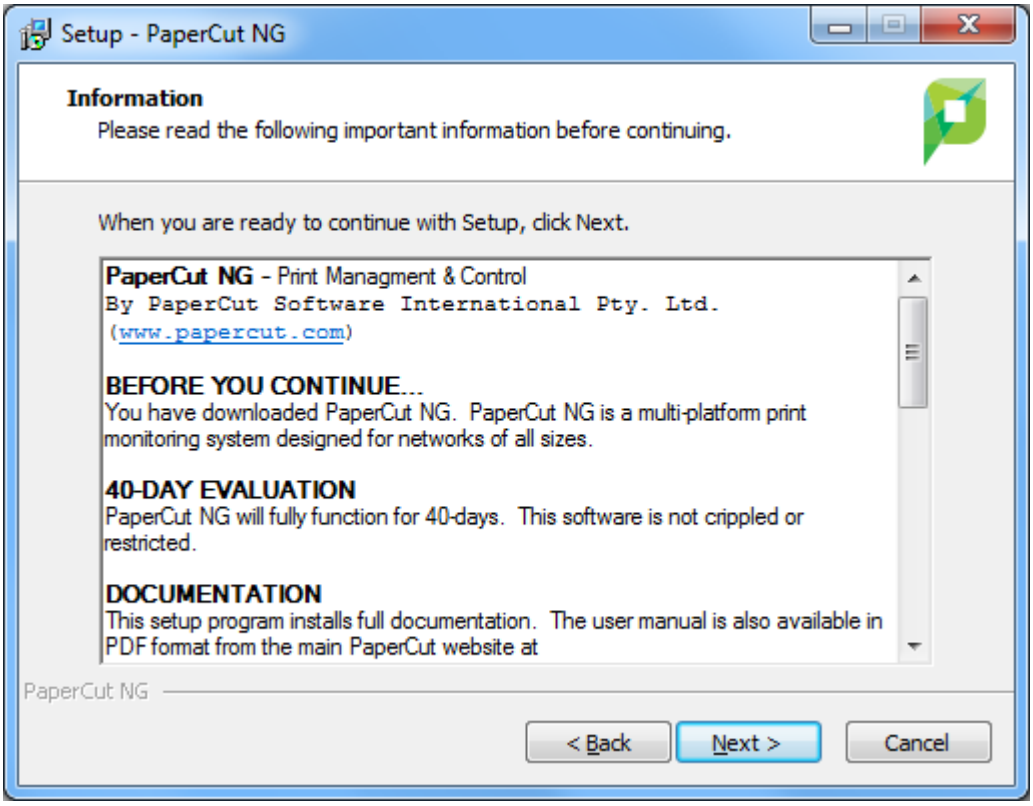
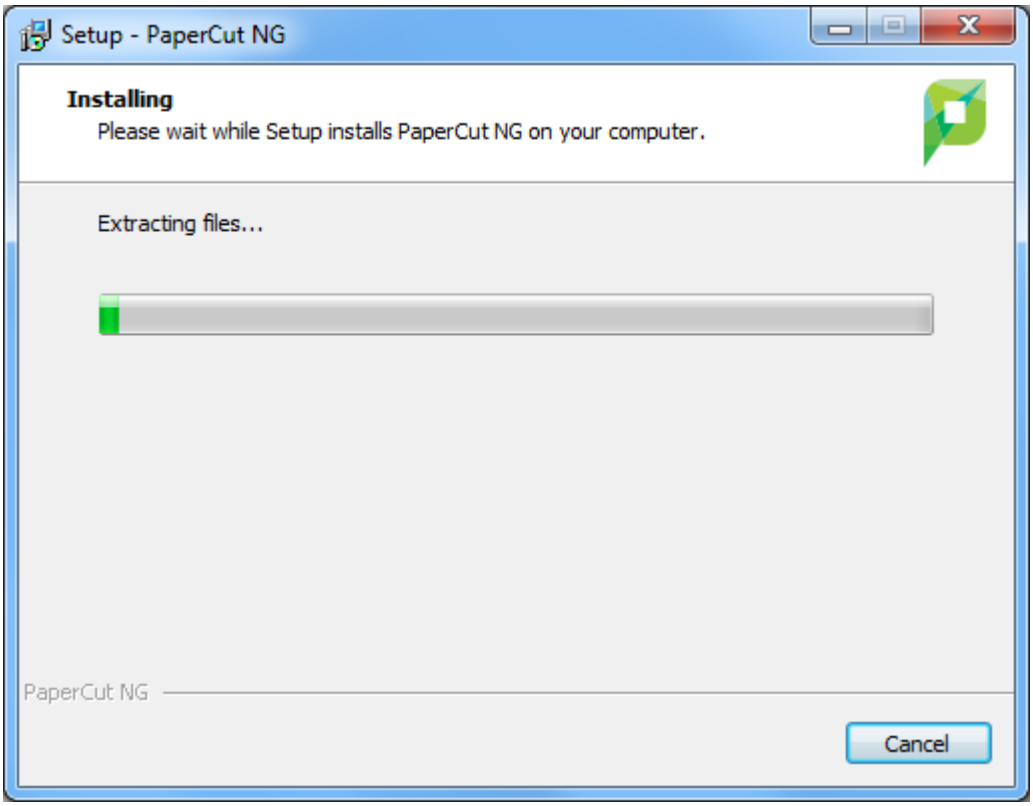


6. Click **Next**.



When the installation is complete, the **Completing the PaperCut Setup Wizard** screen is displayed.

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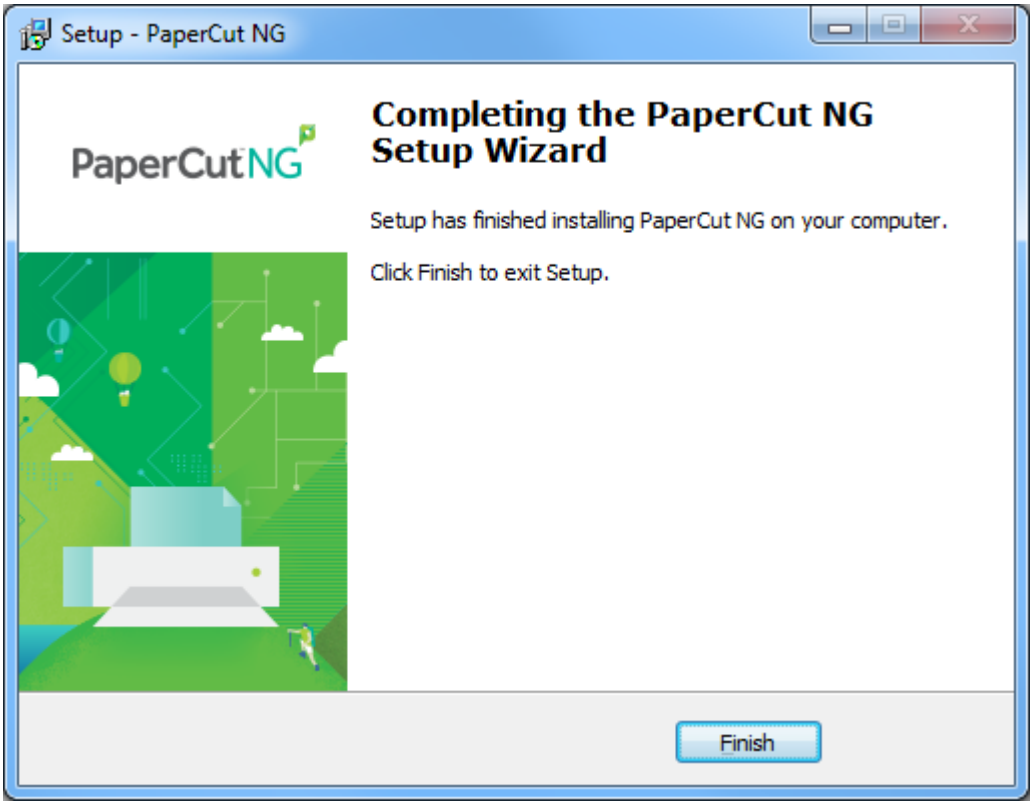

7. Click **Finish**.

The Direct Print Monitor is installed.

Automate the Direct Print Monitor installation

If you have a large number of computers, or existing automated install processes in place, then we recommend you automate the install process. The Direct Print Monitor installation process can also be automated via command line switches issued to the installer program. This is useful if you need to install the Direct Print Monitor on a number of computers.

To automate the installation:

1. Ensure the following files are in a shared folder that is accessible to the target computer (i.e. a network share or mapped drive):
   - `pc-direct-print-monitor.exe`—Windows installer program
   - `direct-print-monitor.conf`

   Note:
   On Windows Application Servers, these files are located by default in the following shared folder:

   ```
   [app-path]\providers\direct-print-monitor\win\
   ```

2. Use a batch file or equivalent to start the install program. For example, for Windows use the following:

   ```
   pc-direct-print-monitor.exe /TYPE=secondary_print /SILENT
   ```

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Note:

- Replacing the `/SILENT` option with `/VERYSILENT` suppresses all visual output during the installation process.
- The copy of the `direct-print-monitor.conf` file is used during the install process to ensure the installation is aware of the location of the main Application Server.
- For a full list of command-line arguments, see Automate installation on Windows.

Important:

You cannot install the Direct Print Monitor on a computer that has a Print Provider installed. This includes computers that are acting as Application Servers, Site Servers, and secondary servers.

Step 5: Test

The Direct Print Monitor should now be configured.

1. Log in to the Application Server as "admin" and verify that the printer queues are linked to the printer:
    a. Click the **Printers** tab.
    The **Printer List** page is displayed.
    b. Select a printer.
    The **Printer Details** page is displayed showing the **Summary** tab contents.
    c. Click the **Queues** tab.
    d. Verify that the printer queues are linked to the printer.
2. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

Install the Direct Print Monitor on a Mac computer

The process to install the Direct Print Monitor on a Mac computer is the same no matter which operating system your Application Server is on.

If your organization does not have a dedicated print server at one or more site, you should consider setting up Direct Printing. Direct Printing allows you to track and report on local printing that is sent directly from a computer to a printer, without a print server.

Step 1: Ensure the primary server is set up correctly

Before installing the Direct Print Monitor, you should ensure that the primary server (Application Server) is set up and running correctly.

Verify that:

- PaperCut NG/MF release 16.0 or above is installed.
- Users can log in to user pages from their computers.

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- Administrators can access the system.
- The Application Server is accessible from each computer requiring Direct Printing, that is, you can ping the Application Server.

Step 2: Ensure firewall software is set to allow access to the port used by the Application Server

A computer with the Direct Print Monitor installed needs to communicate (initiate a TCP connection) on the port used by the Application Server (by default this is port 9191). Ensure that any firewall software on the primary Application Server is not set to block any incoming local network traffic on this port.

Step 3: Install Direct printing

Install the Print Provider software onto each computer.

1. Download the latest Mac DMG disk image from:

   ```
   http://www.papercut.com/products/ng/download/direct-print/?platform=mac
   ```

2. Distribute the installer to the target computers using your preferred method, for example, via a share drive or a portable memory device.
3. On each computer, open the downloaded `.dmg` file.
4. Double-click `PaperCut NG/MF secondary server Installation.pkg` and follow the prompts to install the Print Provider.

Step 4: Configure the Direct Print Installer on each computer

The Print Provider on the computer needs to know where the Application Server is installed and that it should be running in Direct Printing mode. The installer attempts to open the appropriate configuration file automatically after the install completes. However, your IT environment configuration might prevent this from happening. If it does not automatically open, open the following file in a text editor:

```
[app-path]\providers\print\mac\print-provider.conf
```

1. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the Application Server.
2. Locate the line with `#DirectPrintingMode=false` and change it to:

   ```
   DirectPrintingMode=true
   ```

   Note:
   Make sure you remove `#` at the beginning of the line.

3. Save the file and exit the text editor.

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4. Double-click the command script `/Applications/PaperCut NG/MF/Control Printer Monitoring.command`, and enable monitoring on the appropriate printers.

Note:

- If required, you can also modify the other default configuration details. For more information see Add and remove/delete/ignore printers
- If you need to change the configuration after deploying Direct Printing, you need to manually update the `print-provider.conf` file on each computer.

Step 5: Test

The Direct Print Monitor should now be configured.

1. Log in to the Application Server as "admin" and verify that the printer queues are linked to the printer:
   a. Click the **Printers** tab.
      The **Printer List** page is displayed.
   b. Select a printer.
      The **Printer Details** page is displayed showing the **Summary** tab contents.
   c. Click the **Queues** tab.
   d. Verify that the printer queues are linked to the printer.
2. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

Install the Direct Print Monitor on a Linux computer

The process to install the Direct Print Monitor on a Linux computer is the same no matter which operating system your Application Server is on.

If your organization does not have a dedicated print server at one or more site, you should consider setting up Direct Printing. Direct Printing allows you to track and report on local printing that is sent directly from a computer to a printer, without a print server.

Step 1: Ensure the primary server is set up correctly

Before installing the Direct Print Monitor, you should ensure that the primary server (Application Server) is set up and running correctly.

Verify that:

- PaperCut NG/MF release 16.0 or above is installed.
- Users can log in to user pages from their computers.
- Administrators can access the system.

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- The Application Server is accessible from each computer requiring Direct Printing, that is, you can ping the Application Server.

Step 2: Ensure firewall software is set to allow access to the port used by the Application Server

A computer with the Direct Print Monitor installed needs to communicate (initiate a TCP connection) on the port used by the Application Server (by default this is port 9191). Ensure that any firewall software on the primary Application Server is not set to block any incoming local network traffic on this port.

Step 3: Check that the host user account exists

On the computer, create a user account called `papercut`. Set the `papercut` user's home directory to the desired install location. This is normally `/home/papercut`. The method of creating this account is the same as that used for the primary server setup. For more information, see Installation.

Step 4: Install the Direct Print Monitor

Install the Print Provider software onto the computer by copying all files and directories from the primary Application Server's directory:

For Linux Application Servers:

```
[app_path]/providers/print/linux-x64/* (64-bit)
```

For Windows Application Servers:

```
[app_path]/providers/print/win/* (64-bit)
```

To the equivalent location on the computer:

```
/home/papercut/providers/print/linux-x64/ (64-bit)
```

Perform the copy operation as the `papercut` user so that files are owned by the `papercut` user. You can use any method to copy the files, including over the network or via a USB key. If the primary server is also Linux, the simplest way would be use Secure Copy (`scp`) as follows:

```
shell> su - papercut
shell> mkdir -p providers/print
shell> cd providers/print
shell> scp -r
primary.server.name:/home/papercut/providers/print/* .
```

After the copy operation is performed, execute the `setperms` and `roottasks` scripts as *root*:

64-bit

```
shell> su - root
shell> sh ~papercut/providers/print/linux-x64/setperms
shell> sh ~papercut/providers/print/linux-x64/roottasks
```

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Step 5: Configure the Direct Print Monitor on each computer

The Print Provider on the computer needs to know where the primary server is installed (e.g. Its IP address) and that it should be running in Direct Printing mode.

1. Open the following file in a text editor:

   `/home/papercut/providers/print/linux-x64/print-provider.conf (64-bit)`

2. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the primary server.
3. Locate the line with `#DirectPrintingMode=false` and change it to:

   `DirectPrintingMode=true`

   Note:
   Make sure you remove `#` at the beginning of the line.

4. Save the file and exit the text editor.
5. Integrate the binaries copied in step 4 into the CUPS, Samba, or Novell iPrint print queues.

   This process is detailed in Linux print queue integration and Step 5 - Printer/iPrint configuration.

Note:

- If required, you can also modify the other default configuration details. For more information see Add and remove/delete/ignore printers
- If you need to change the configuration after deploying Direct Printing, you need to do it manually by updating the `print-provider.conf` file on each computer.

Step 6: Test

The Direct Print Monitor should now be configured.

1. Log in to the Application Server as "admin" and verify that the printer queues are linked to the printer:
   a. Click the **Printers** tab.

      The **Printer List** page is displayed.

   b. Select a printer.

      The **Printer Details** page is displayed showing the **Summary** tab contents.

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c. Click the **Queues** tab.

d. Verify that the printer queues are linked to the printer.

2. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

2.8.4.2. Link direct print queues to a printer

The Direct Print Monitor intelligently creates printers in the Application Server Printer List. It creates one printer with multiple print queues (that is, one from each computer). Every print queue with an IP address or hostname that matches the printer, is linked to the printer.

Linking the print queues to a printer allows PaperCut NG/MF to consolidate the information from all linked queues and report on the printer as a whole. It also allows the print queues to dynamically use the configuration of the printer. If any print queues do not automatically link, you must manually link the print queue to the printer.

The linking process works as follows:

1. The first print queue added on a computer with the Direct Print Monitor installed creates a printer in the Printer List.
2. If a print queue on any other computer (with a Direct Print Monitor installed) has the same IP address or hostname as the printer, then a new printer is *not* created and the print queue is linked to the printer created in step 1.

Tip:
You should always use a consistent IP address or hostname for print queues to ensure they are automatically linked.

This process is automatic and works in most of cases. There might, however, be some rare situations where a print queue does not automatically link to the printer, or a print queue is incorrectly linked to the printer. In these cases, you need to manual link or unlink the relevant print queues.

When you add a computer to your environment and install the Direct Print Monitor, the Application Server detects the network address of the print queue and automatically links the print queue to the printer if it matches.

When you remove a computer from your environment, the print queue remains in PaperCut NG/MF. You need to unlink the print queue on the decommissioned computer, then manually delete the printer from the **Printer Details** page.

For more information, see:

- Link a print queue to a printer
- Unlink a print queue from a printer

View linked print queues

Check that all print queues have been linked to the appropriate printer.

1. Click the **Printers** tab.

   The **Printer List** page is displayed.

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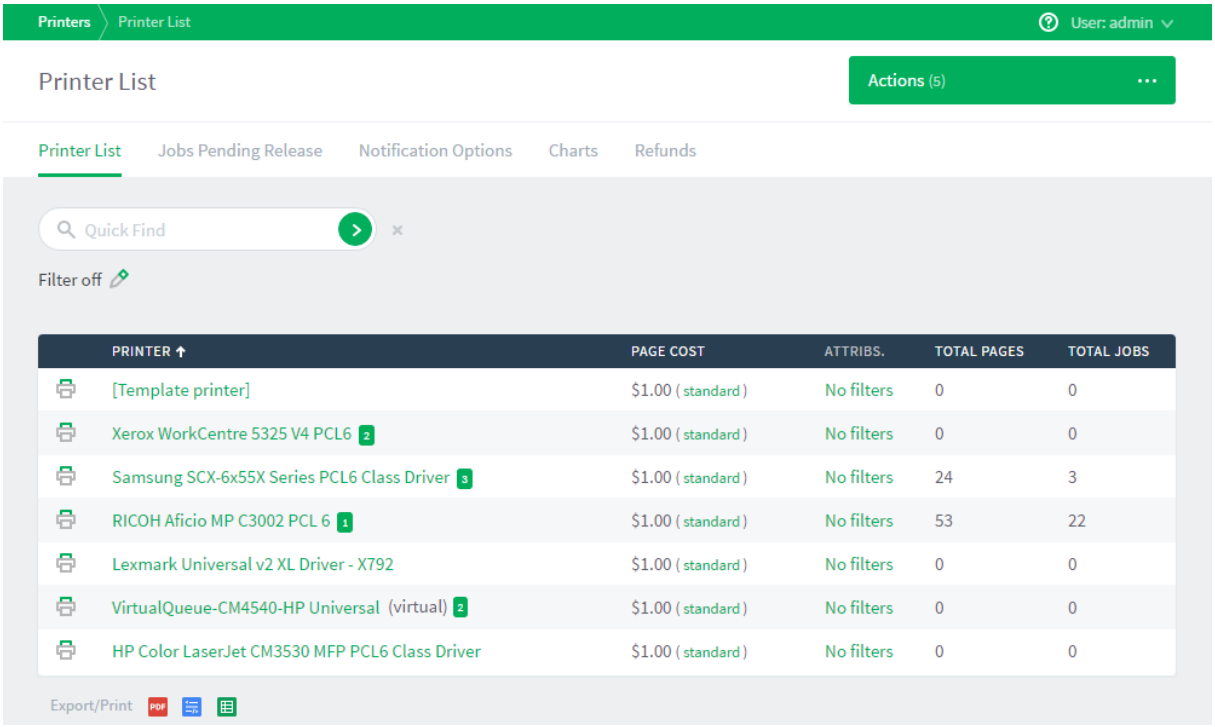
This list includes all printers and unlinked print queues.



Printers that are configured for Direct Printing can be either:

- **printer with linked print queues**—printers with linked print queues are indicated by an icon containing a number greater than one after the printer name (
  HP Color LaserJet CM3530 MFP PCL6 Class Driver 3)
- **print queues that are not linked to a printer**—print queues that are not linked to a printer are indicated by an icon containing **1** after the printer name (
  Samsung SCX-6x55X Series PCL6 Class Driver 1)

2. Click the printer for which you want to view the linked print queues.

   The **Printer Details: Summary** page is displayed.

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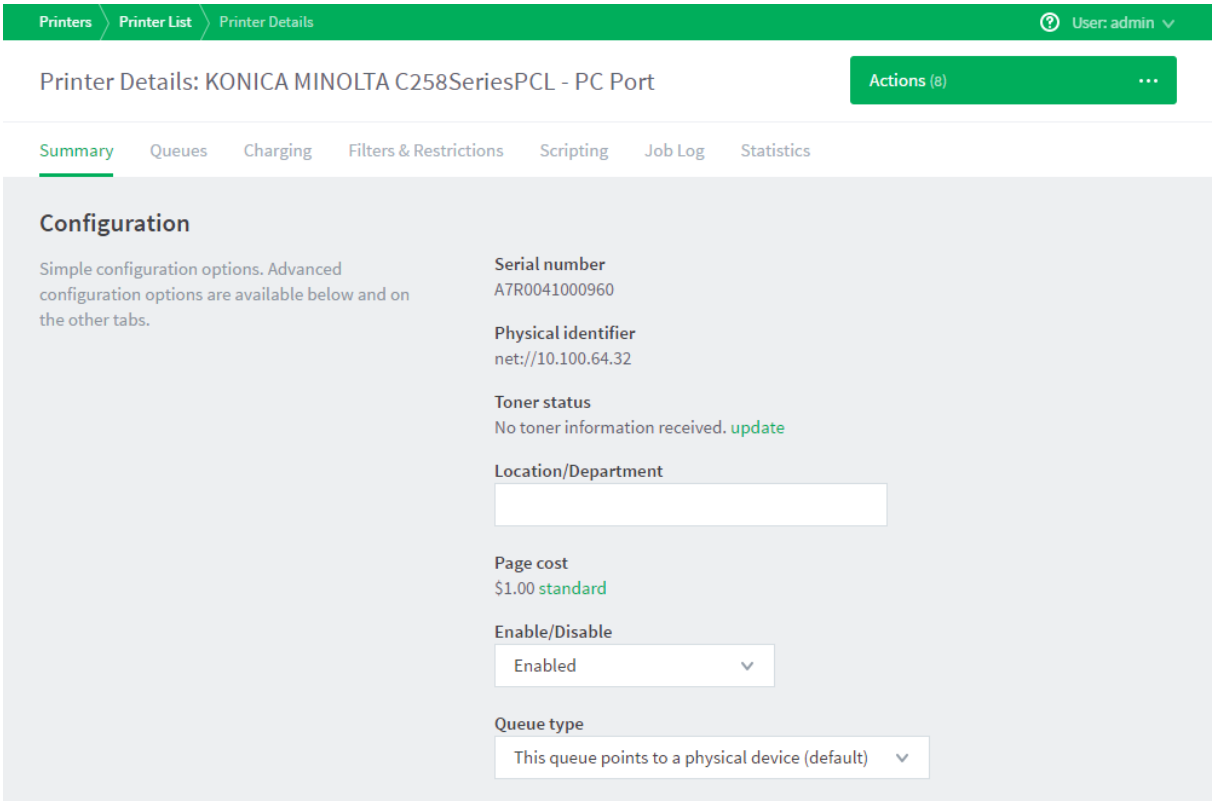
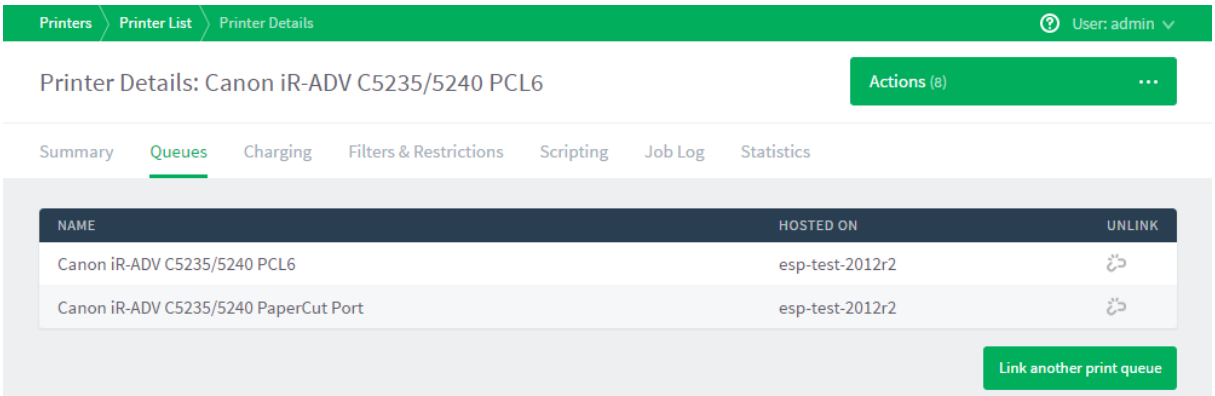


3. Click the **Queues** tab.



This page displays the following information for each linked print queue:

- **Name**—the name of the printer
- **Hosted on**—the name of the computer

You can do the following on this page:

- Link a print queue to a printer
- Unlink a print queue from a printer

Link a print queue to a printer

1. Click the **Printers** tab.

   The **Printer List** page is displayed.

   This list includes all printers and unlinked print queues.

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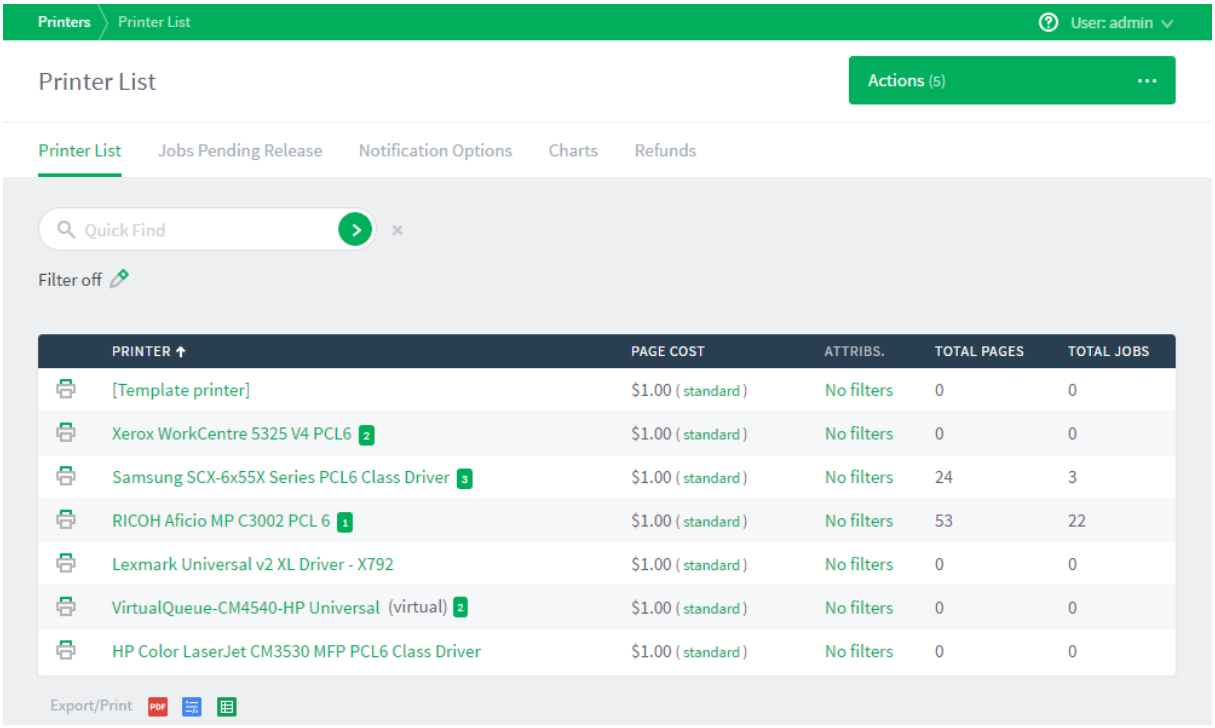

Printers that are configured for Direct Printing can be either:

- **printer with linked print queues**—printers with linked print queues are indicated by an icon containing a number greater than one after the printer name (HP Color LaserJet CM3530 MFP PCL6 Class Driver 3)
- **print queues that are not linked to a printer**—print queues that are not linked to a printer are indicated by an icon containing **1** after the printer name (Samsung SCX-6x55X Series PCL6 Class Driver 1)

> **Note:**
> To view the queues linked to a printer, see View linked print queues.

2. Check the **Printer List** for any unlinked print queues.
3. If there is an unlinked print queue in this list, click the printer to which you want to link the print queue.

   The **Printer Details: Summary** page is displayed.

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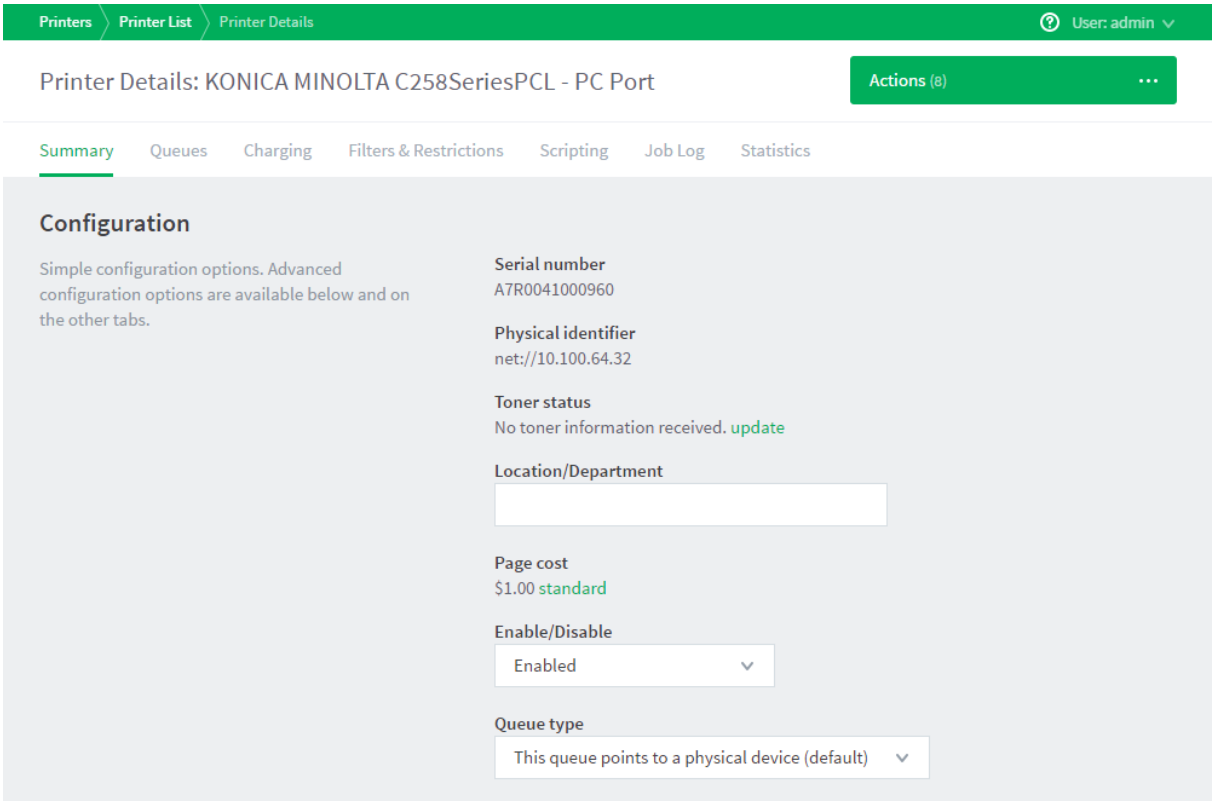
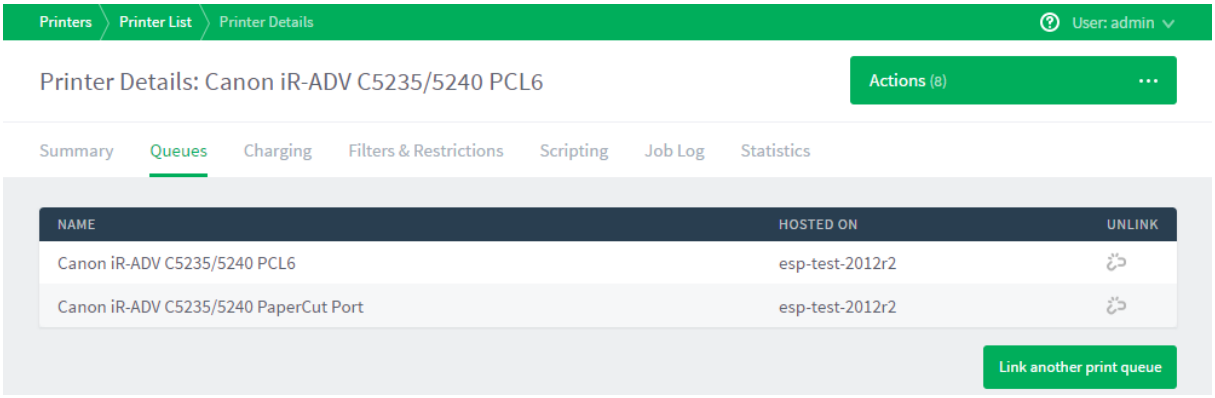


4. Click the **Queues** tab.

   This page displays a list of all print queues and the name of the computer on which the print queue is hosted.



5. In the **Actions** menu, click **Link another print queue**.

   The Link another print queue popup is displayed.

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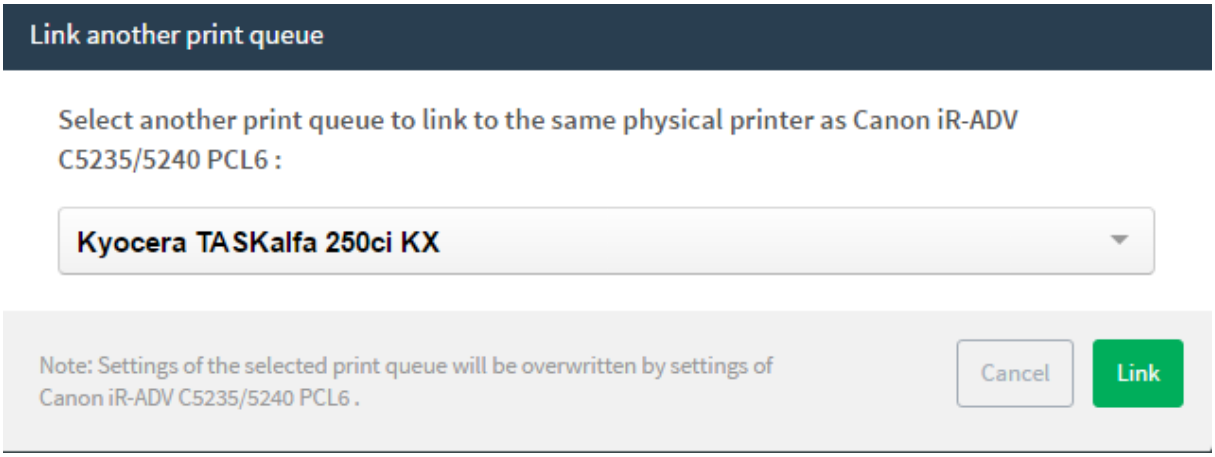


6. In the list, select one or more print queues that you want to link to the printer.
7. Click **Link**.

> **Important:**
> Any configuration for the linked print queue is overridden by the printer configuration.

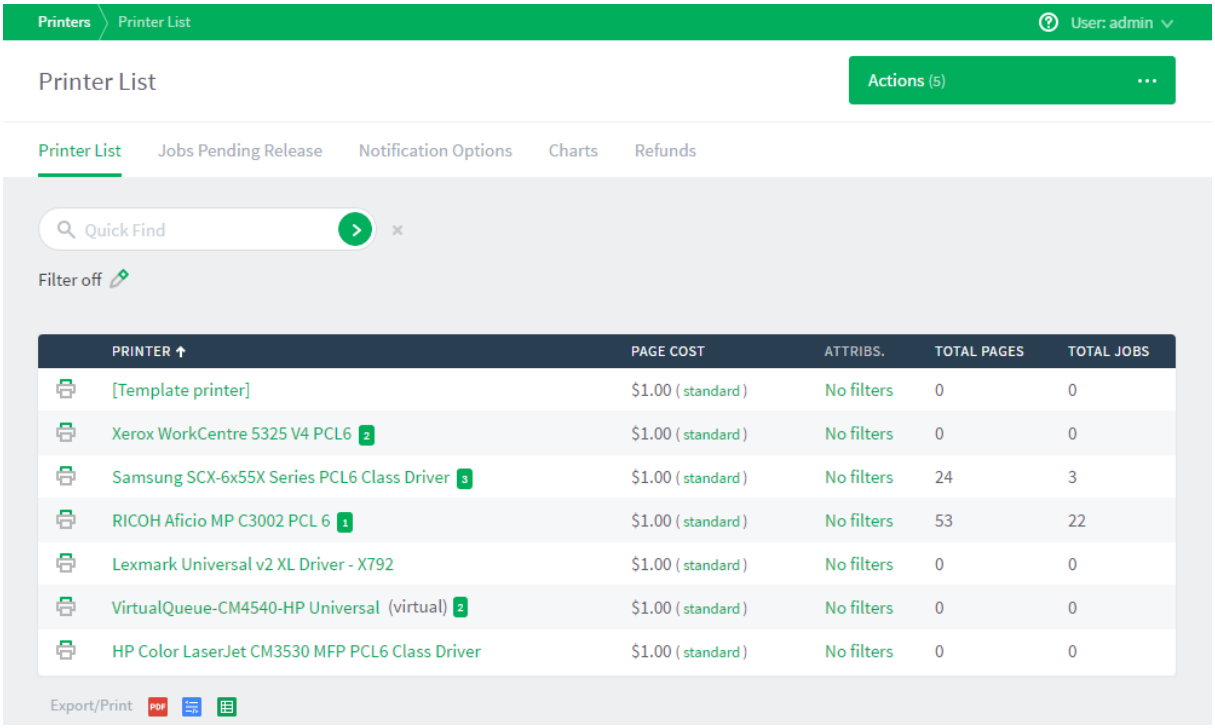
The following message is displayed on the **Application Log** page:

Linked print queue "tw7x64\Kyocery Copystar 500ci" with printer "Ricoh Aficio MP C3000 PCL6"

Unlink a print queue from a printer

1. Click the **Printers** tab.

   The **Printer List** page is displayed.



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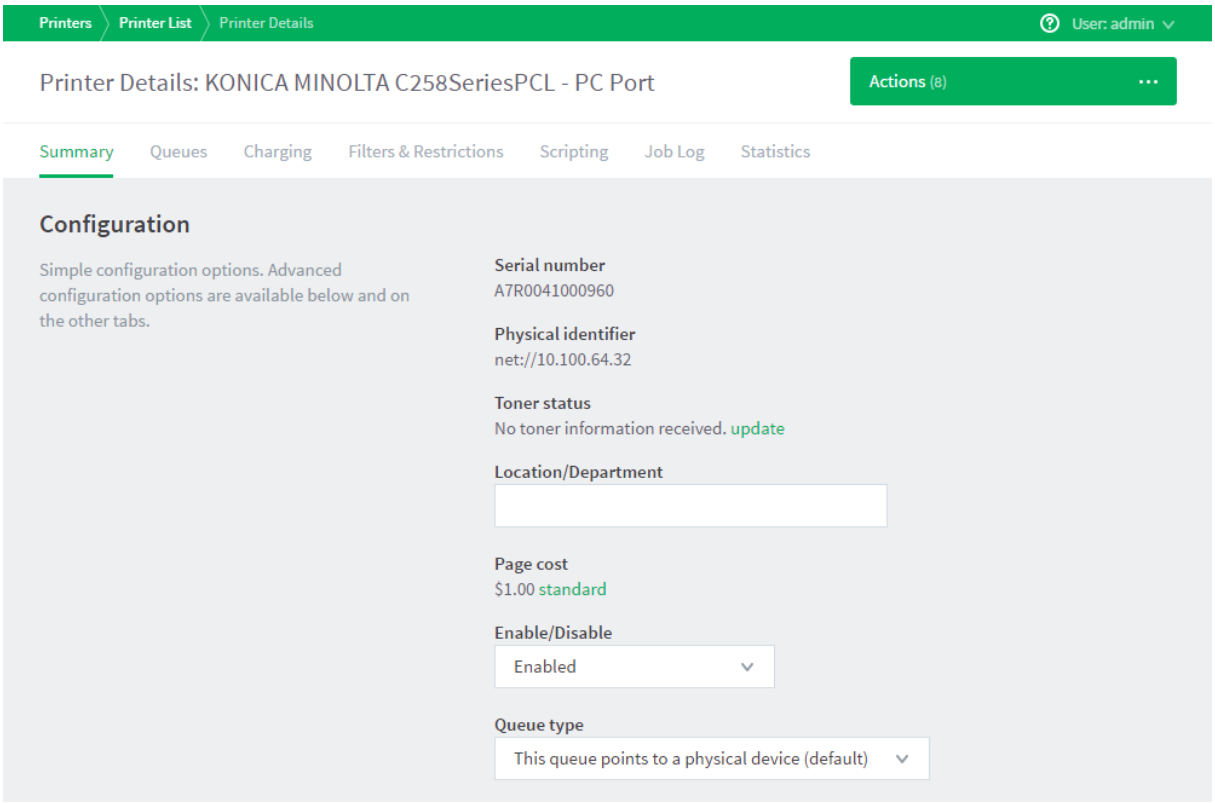
Printers that are configured for Direct Printing can be either a:

- **printer with linked print queues**—printers with linked print queues are indicated by an icon containing a number greater than one after the printer name (HP Color LaserJet CM3530 MFP PCL6 Class Driver 3)
- **print queues that are not linked to a printer**—print queues that are not linked to a printer are indicated by an icon containing **1** after the printer name (Samsung SCX-6x55X Series PCL6 Class Driver 1)

> **Note:**
> Linked print queues are not displayed on this page. For more information about viewing the print queues that are linked to a printer, see View linked print queues.

2. Click the printer from which you want to unlink a print queue.

   The **Printer Details: Summary** page is displayed.



3. Click the **Queues** tab.

   This page displays a list of all print queues and the name of the computer on which the print queue is hosted.

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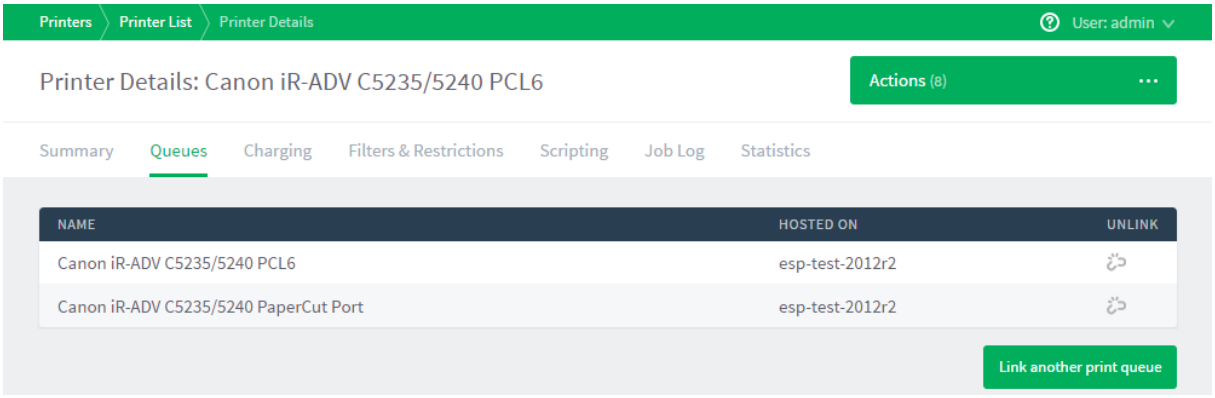

4. Find the print queue you want to unlink; then click in that row.

   The print queue is unlinked from the printer and is displayed as a unique printer on the **Printer List** page. The print queue retains the configuration of the printer from which you just unlinked.

   The following message is displayed on the **Application Log** page:

   Unlinked print queue "tw7x64\Kyocery Copystar 500ci" from printer "Ricoh Aficio MP C3000 PCL6"

> **Note:**
> Each printer using Direct Printing must have a minimum of one print queue. You cannot unlink a print queue if there is only one.

2.8.4.3. Configure a directly connected printer

With Direct Printing, you need to configure only the physical printer (in the Printer List) and then all linked printer queues automatically use the physical printer configuration.

1. Click the **Printers** tab.

   The **Printer List** page is displayed.

   Printers that are configured for Direct Printing indicated by an icon containing a number after the printer name (HP Color LaserJet CM3530 MFP PCL6 Class Driver 3)

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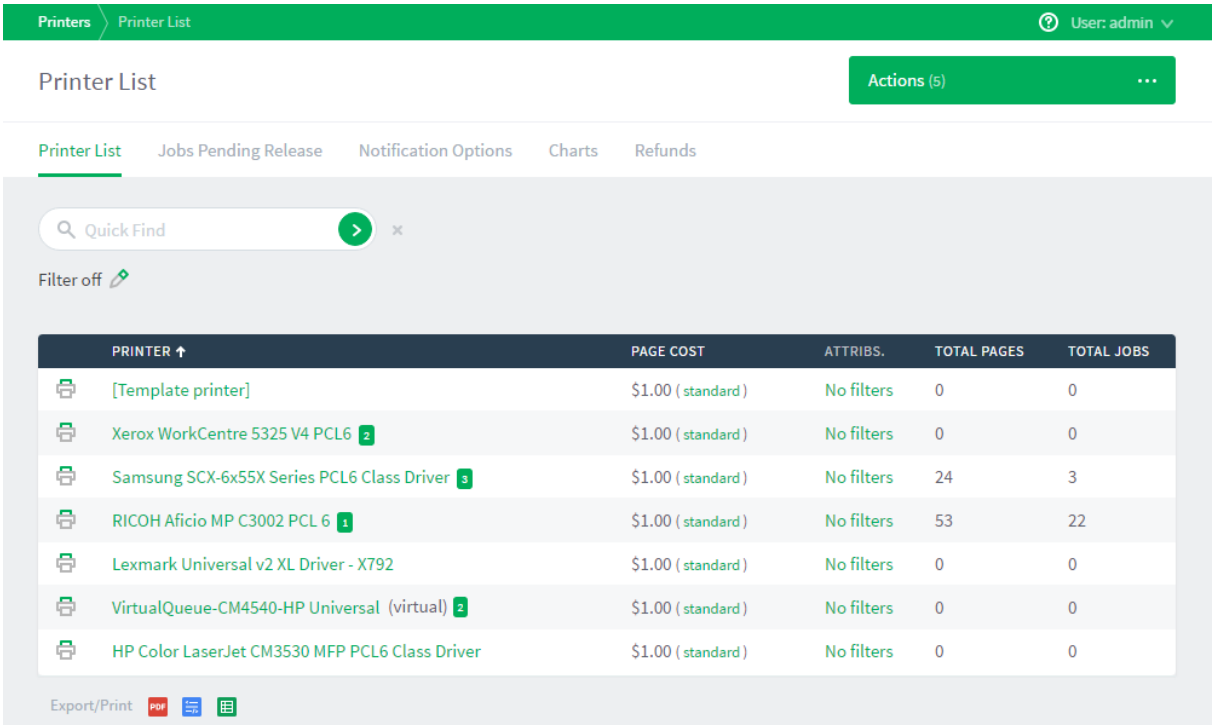
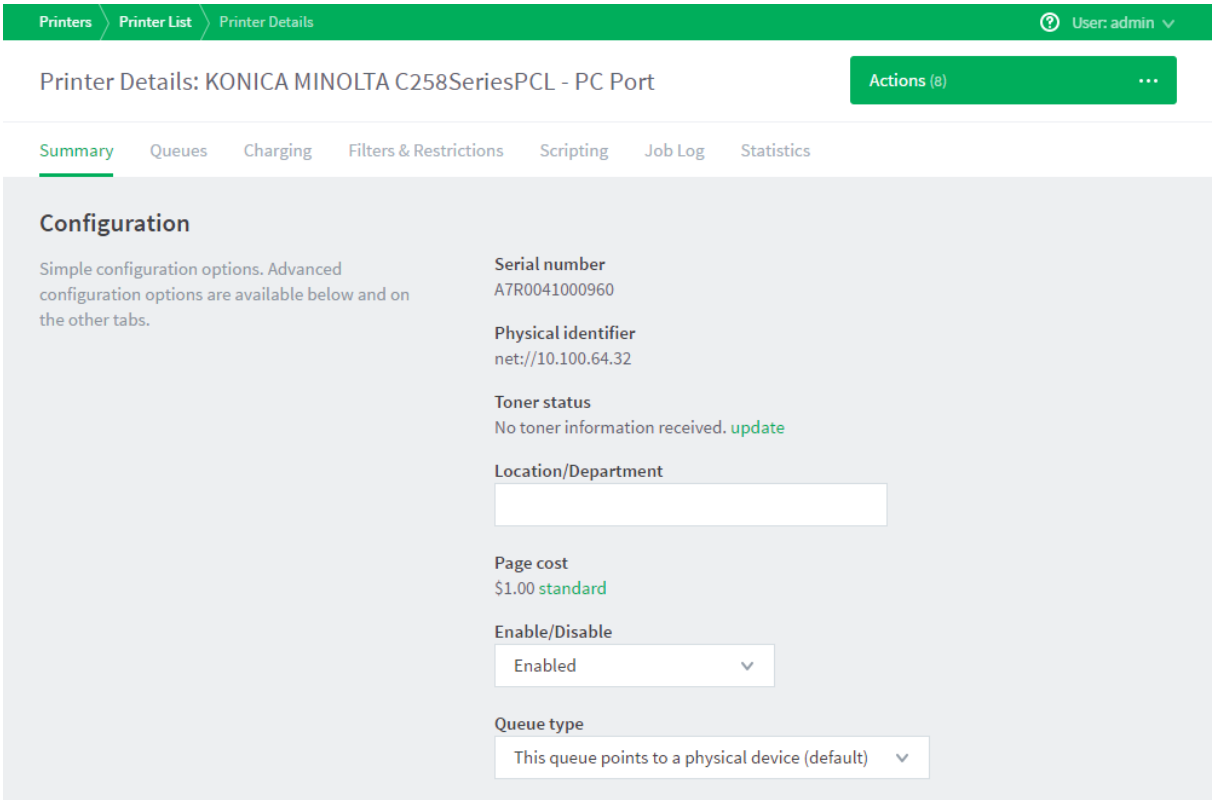


2. Select the printer you want to configure.

   The **Printer Details: Summary** page is displayed.



3. Configure the printer. For more information, see Printer management.

> **Note:**
> The following options are not available on a direct print queue:

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- Google Cloud Print
- Email to Print
- Web Print (users may upload documents to print)
- Print Archiving

To offer these services to your users, set up a server queue for this device/printer.

2.8.4.4. Configure Find-Me Printing for directly connected printers

Find-Me Printing is available for direct print queues. To implement Find-Me Printing for direct print queues, you need to do the following for each printer to be serviced:

- On each computer, create a virtual print queue. The virtual print queue must have the same name on each computer.

Note:
If you use the word virtual in the virtual print queue name, PaperCut NG/MF will treat the queue as a virtual queue.

- On the Application Server, create a virtual printer queue with the same name as the computer virtual print queues. PaperCut NG/MF automatically links all virtual print queues with the same name as the virtual printer on the Application Server.
- Configure Find-Me Printing and Release Station on the virtual printer. For more information, see Find-Me printing.

Important:
You cannot set up Find-Me printing between a direct printing queue and a print server queue.

2.8.5. Clustering and high availability

PaperCut NG/MF is designed to scale to networks over 50,000 users (largest deployments are running over 300,000 users). To ensure reliability on networks of this size, network architects can adopt strategies including:

- Load balancing - spreading tasks across multiple servers.
- Clustering - building in redundancy by implementing a failover strategy.

PaperCut NG/MF is a cluster compatible application. It supports clustering at all levels of the application, including

- Clustering at the print spooler service layer by integrating with clustering services.
- Failover based clustering at the Application Server layer using clustering services. (PaperCut's Application Server is web and web services based, which means it can support other failover

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methods such as heartbeat driven DNS).

- At the database layer by utilizing cluster aware databases such as Microsoft SQL Server or Oracle.

Setting up PaperCut in a cluster environment is an advanced operation. This section assumes a high level of expertise in system and cluster configuration. Make sure the cluster environment is operational *before* undertaking the PaperCut installation. Readers should also have a good understanding of PaperCut's Service Oriented Architecture - specifically its two main components, the *Application Server* and the *Print Provider* and how they work together (see Print monitoring architecture).

In a cluster environment, you can set up PaperCut in one of two possible configurations.

Mode 1 is the simplest configuration and is suitable for most organizations. It implements clustering in the front line, that is, the printers and print monitoring layer. The cluster print server is configured as a secondary print server reporting back to a primary PaperCut server hosted on another system outside the cluster.

Mode 2 implements clustering on all levels of the application for maximum fault tolerance - In addition to the print queues, the PaperCut Application Server is also hosted in the cluster. *Mode 2* is somewhat more demanding to configure and should only be attempted by organizations with staff experienced with advanced cluster and database management.

Refer to the subsequent sections for an explanation on how to set up *Mode 1* or *Mode 2* in your environment.

This section assumes that you have an already installed and working clustered printing environment.

2.8.5.1. Microsoft Failover Cluster Manager (MSFCM) on Windows server 2012/2016

Since Microsoft Windows 2012, Microsoft have reconfigured the way in which you can manage High Availability with print services. They introduced the ability to use Hyper-V and failover clustering to make your print server a highly available virtual machine. This solution provides full server failover options and can be implemented with the PaperCut NG/MF Application Server, Secondary Server, and/or Site Server.

There are several steps involved in the setup of this failover solution:

- Before you Begin
- Step 1: Configure roles / features on nodes for high availability
- Step 2: Connecting to iSCI network drives
- Step 3: Create the failover cluster
- Step 4: Create a high availability virtual machine
- Step 5: Set up your print server

Before you Begin

Systems Requirements:

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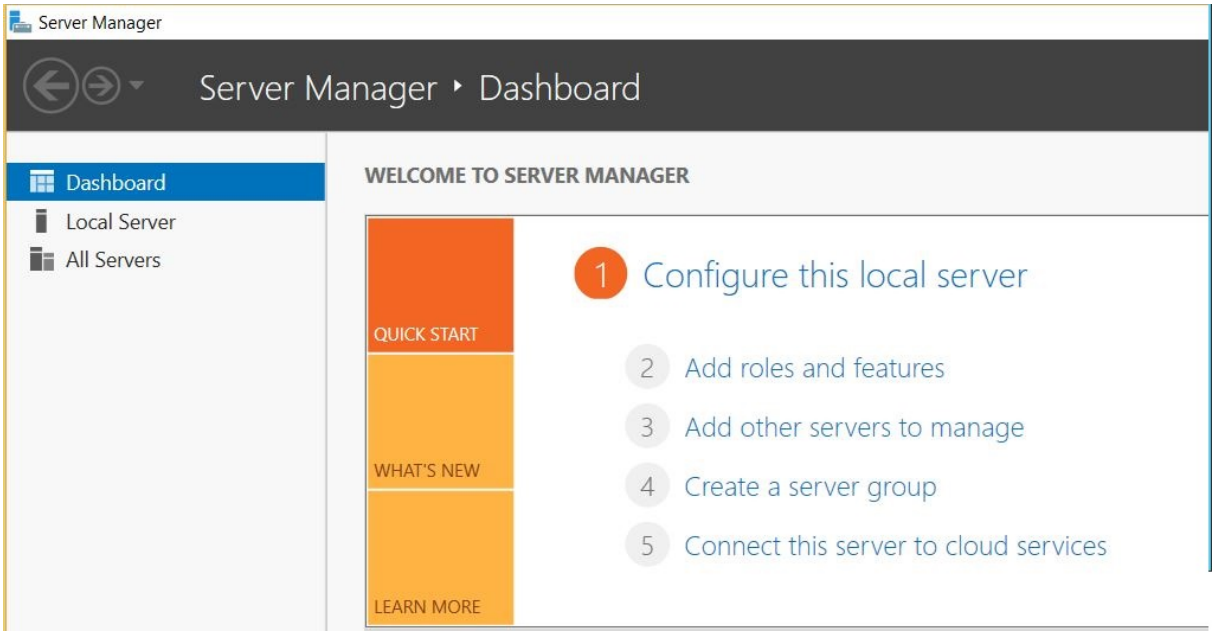
- 2+ physical servers
- MS Server 2012/2016 with Hyper-V capabilities
- iSCI SAN with 2 drives configured
- Drive 1: 5GB (to be used for the Quorum if using only 2 nodes)
- Drive 2: VM server storage

You will also require the following:

- Administrative rights to be able to join machines to the domain
- IP address to connect to your SAN
- IP Addresses for the following:
  - 2 x IP addresses for the Physical Servers
  - 1 x IP address for the Cluster
  - 1 x IP address for the VM

Step 1: Configure roles / features on nodes for high availability

1. Install MS Windows Server 2012 or MS Server 2016 onto your two server nodes.
2. In the **Server Manager > Dashboard**, click **Add roles and features**.



The **Before you begin** window is displayed.

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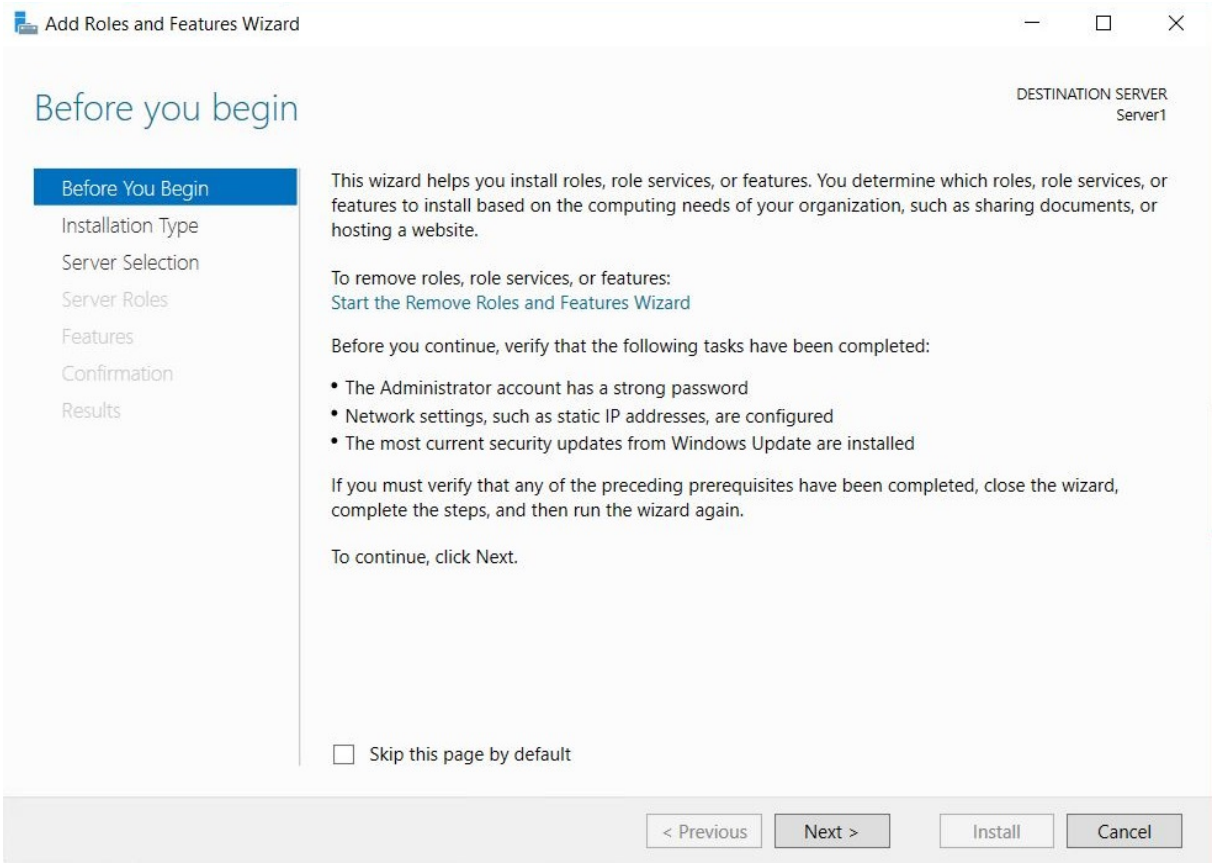
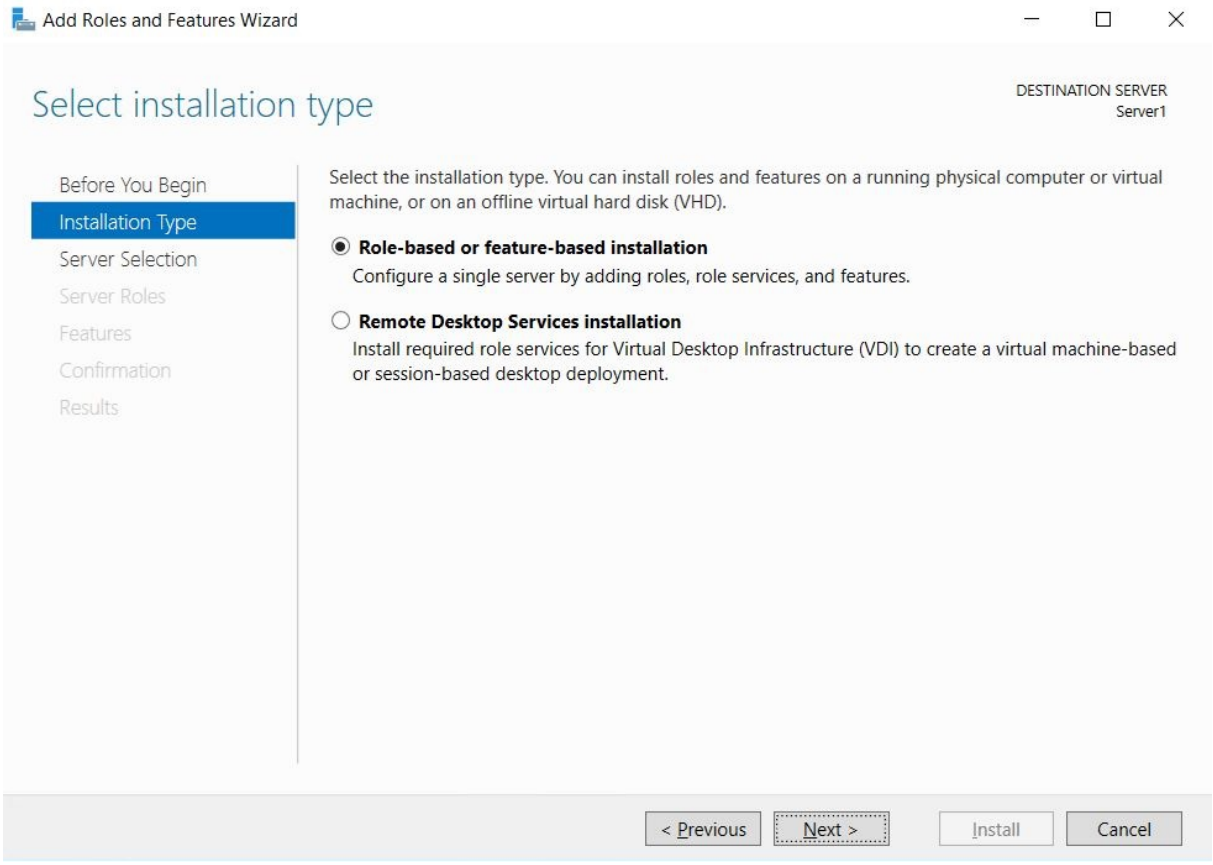


3. Click **Next**.

   The **Select installation type** window is displayed.



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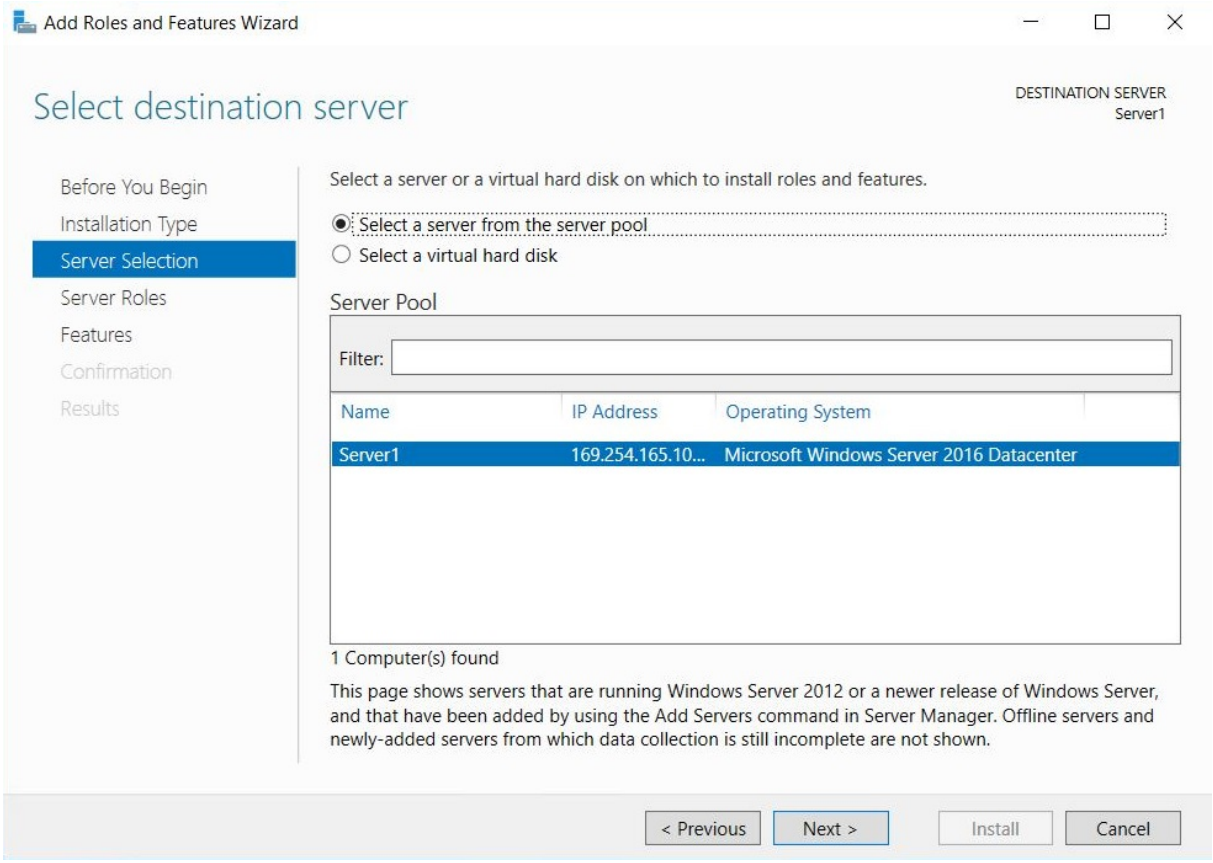
4. Select **Role-based or feature-based installation**.
5. Click **Next**.

   The **Select destination server** window is displayed.



6. Select the server that you are logged in on.
7. Click **Next**.

   The **Select server roles** window is displayed.

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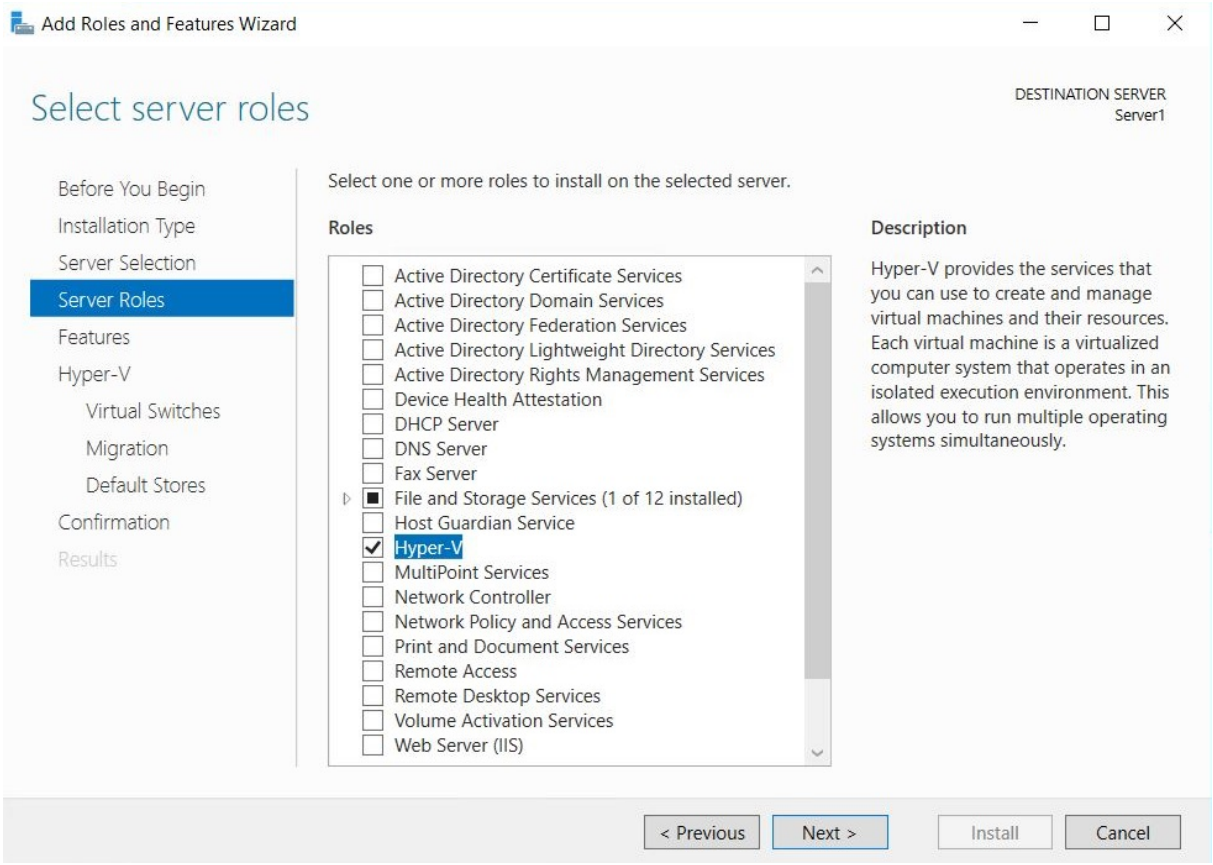

8. In the **Roles** list, select **Hyper-V**.

   The **Add feature that are required for Hyper-V** window is displayed. This window shows the dependencies that will be installed.

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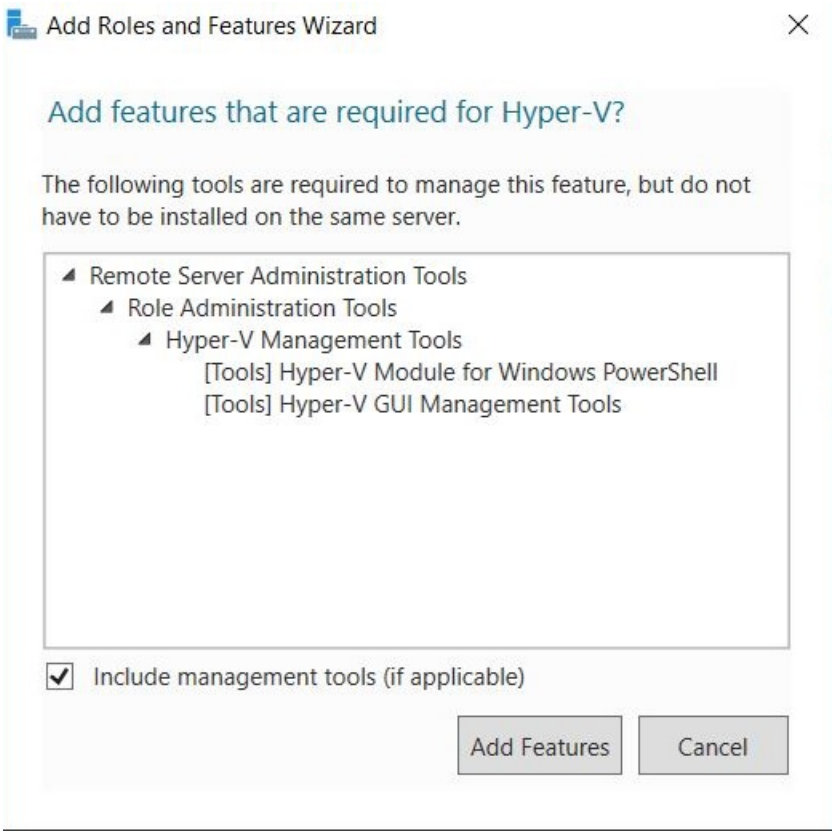

9. Click **Add Features**.
10. Click **Next**.

    The Select features window is displayed.

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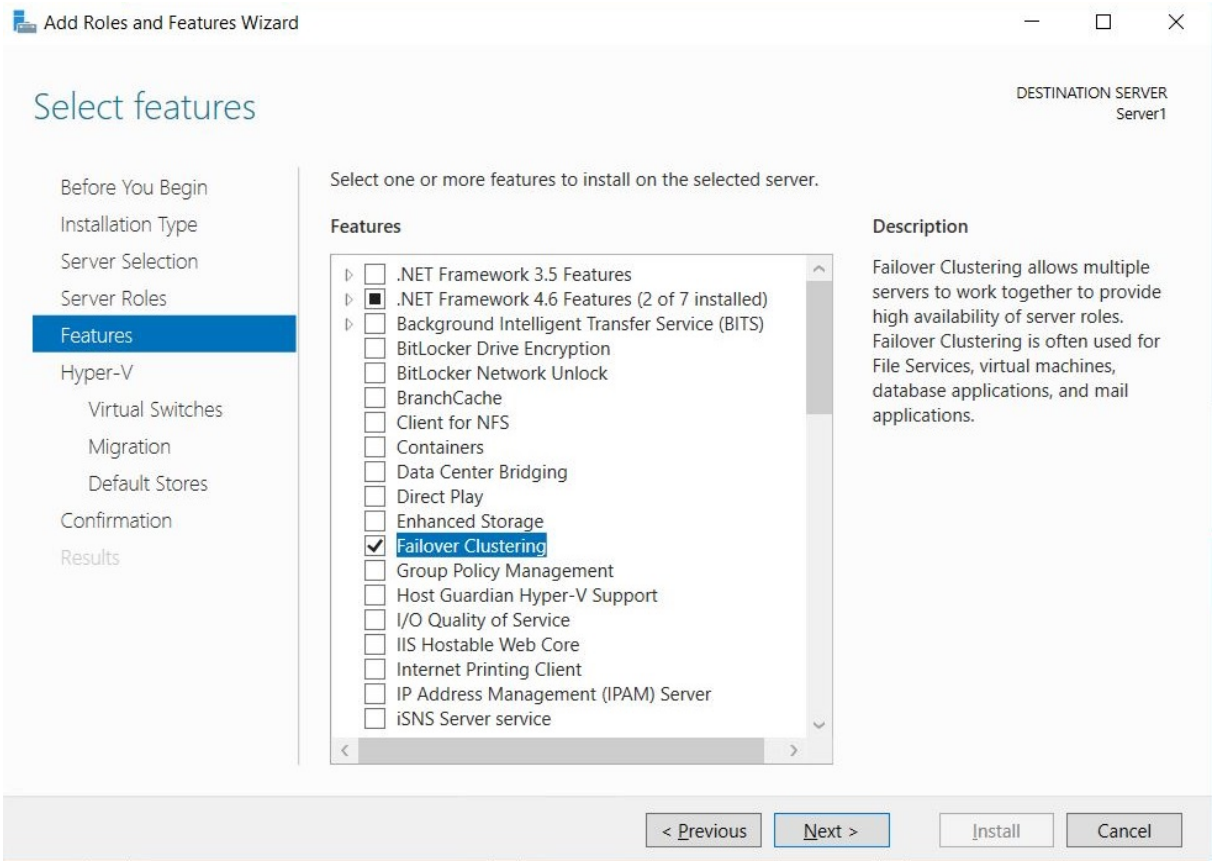
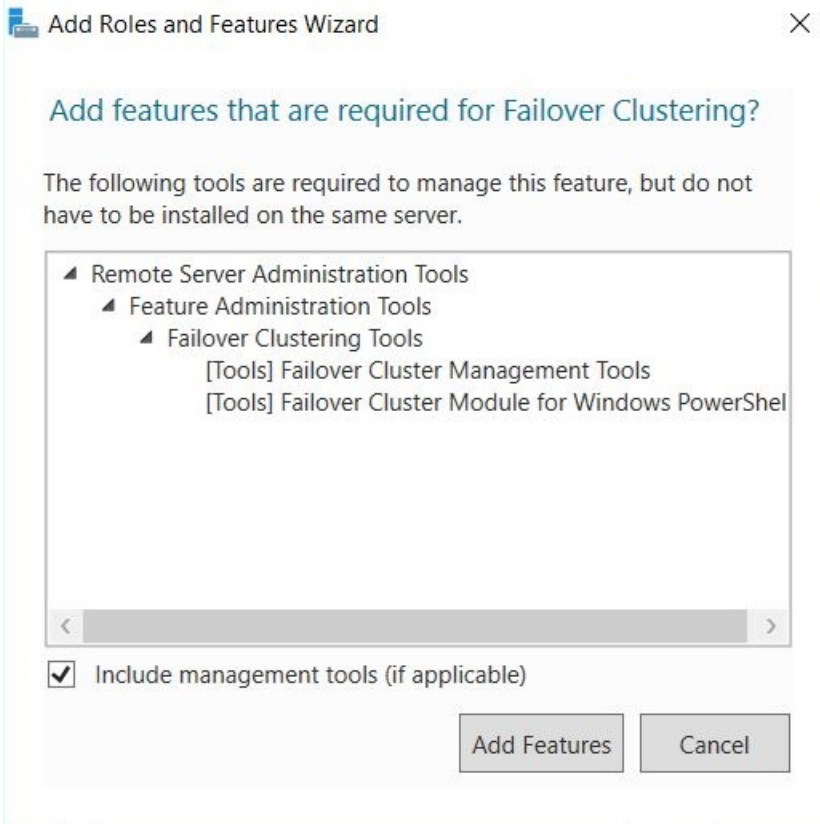


11. In the **Features** list, select **Failover Clustering**.

    The **Add features that are required for Failover Clustering** window will pop up and now be displayed. This window shows the dependencies that will be installed with this feature.



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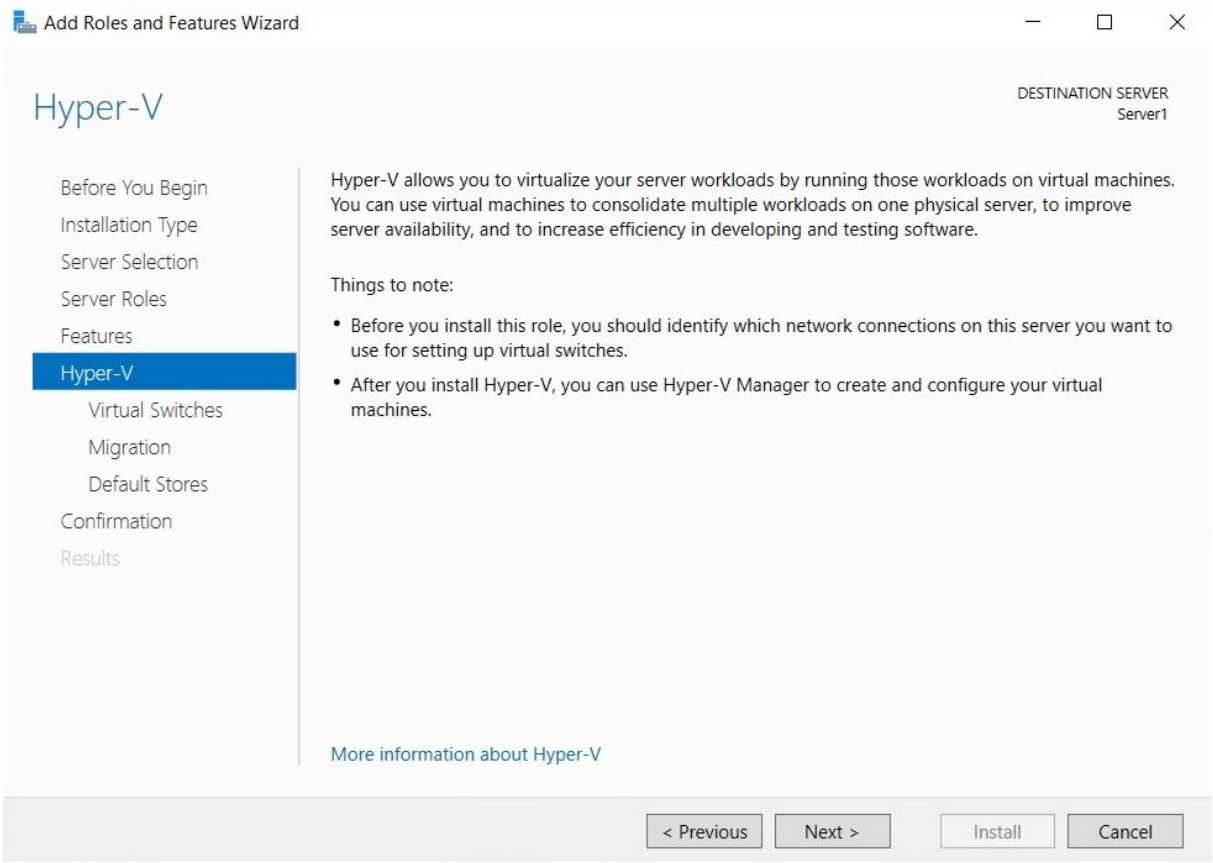
12. Click **Add Features**.

    The **Hyper-V** window is displayed.



13. Click **Next**.

    The **Create Virtual Switches** window is displayed.

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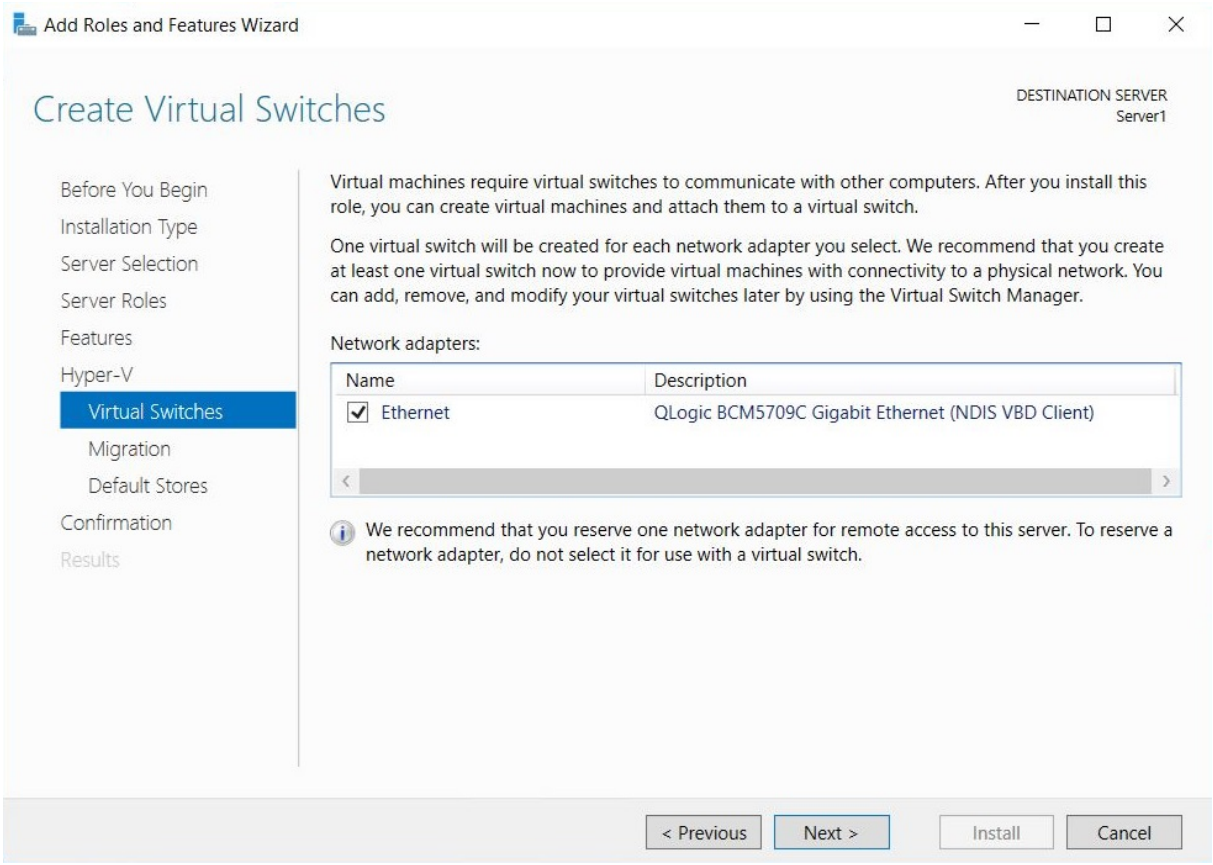

14. In **Network adapters**, select the network that you want your virtual machine to use for the cluster. If you have multiple NIC's listed here, choose the appropriate one/s.
15. Click **Next**.

    The **Virtual Machine Migration** window is displayed.

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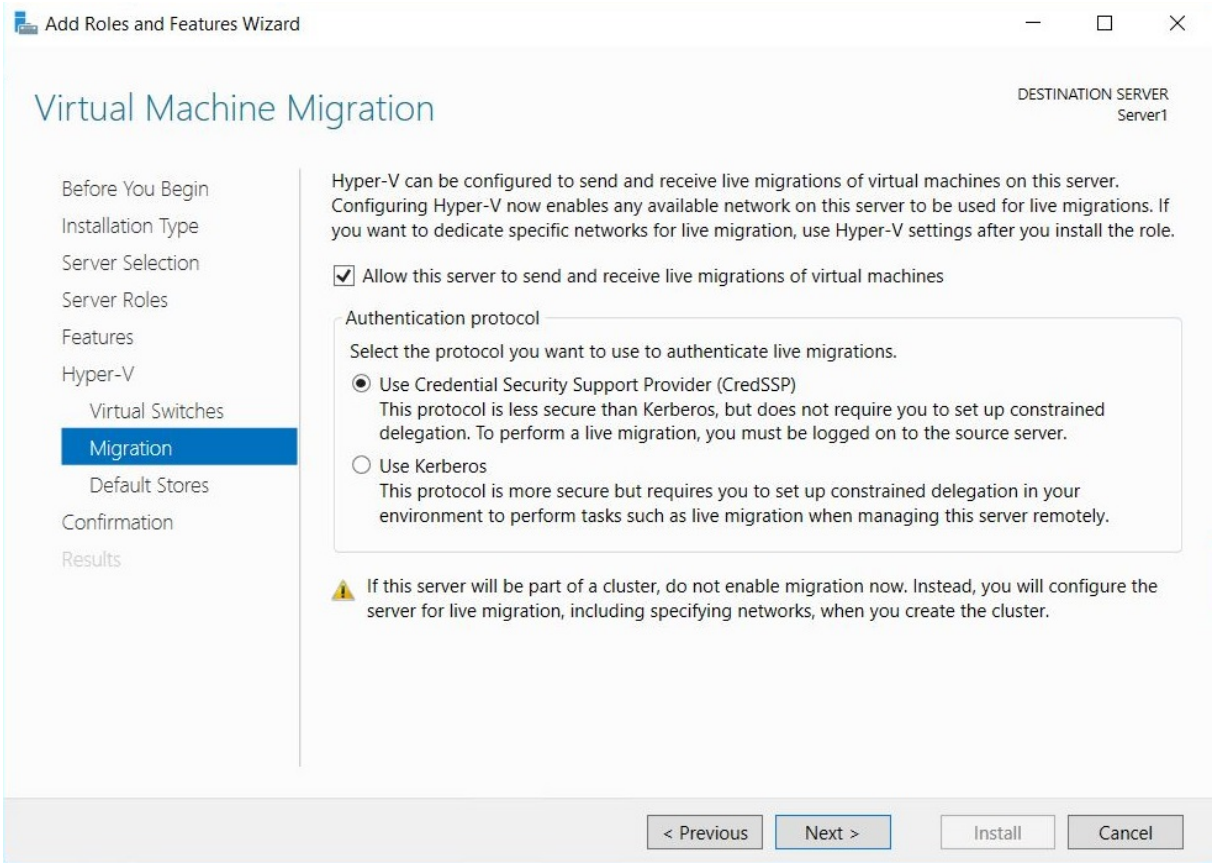

16. Select the **Allow this server to send and receive live migrations of virtual machines** checkbox. This allows the VM to transfer between your nodes where required.
17. Click **Next**.

    The **Default Stores** window is displayed. Do not change the default stores.

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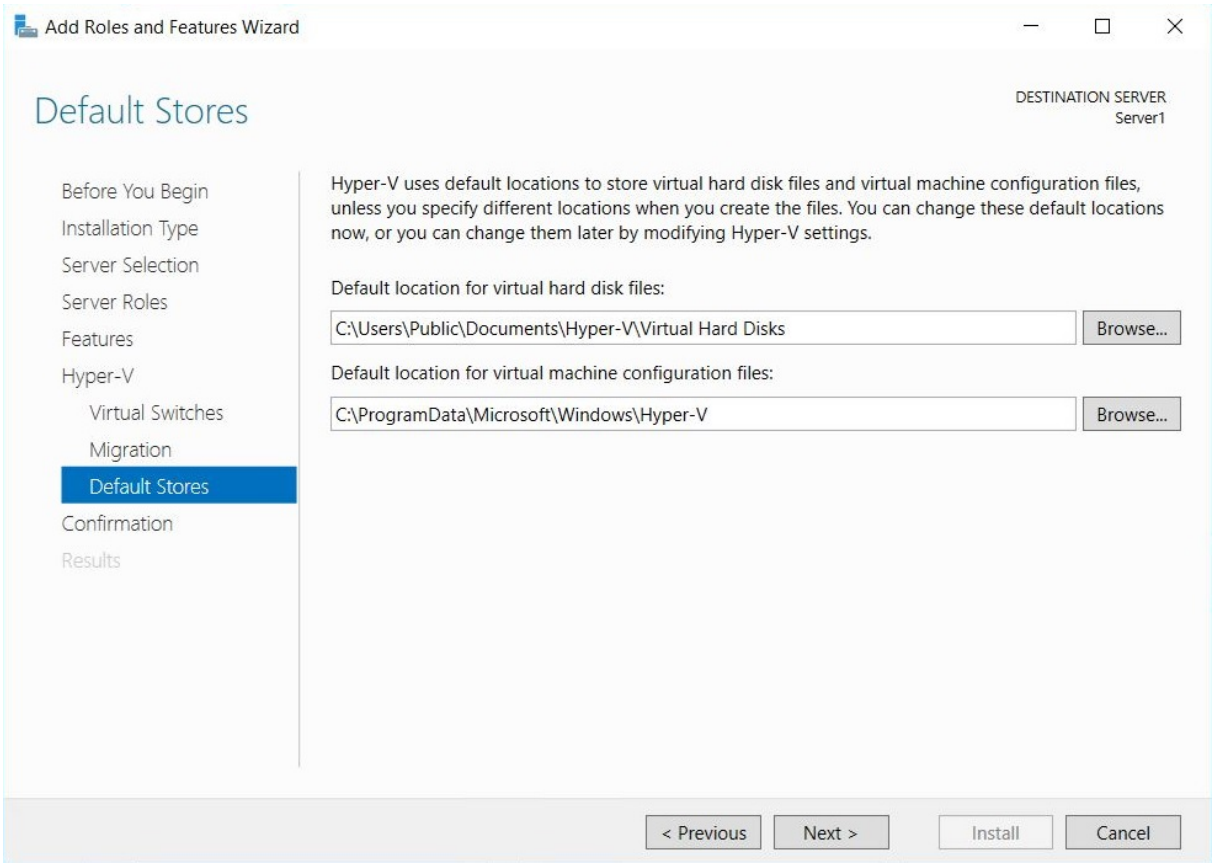
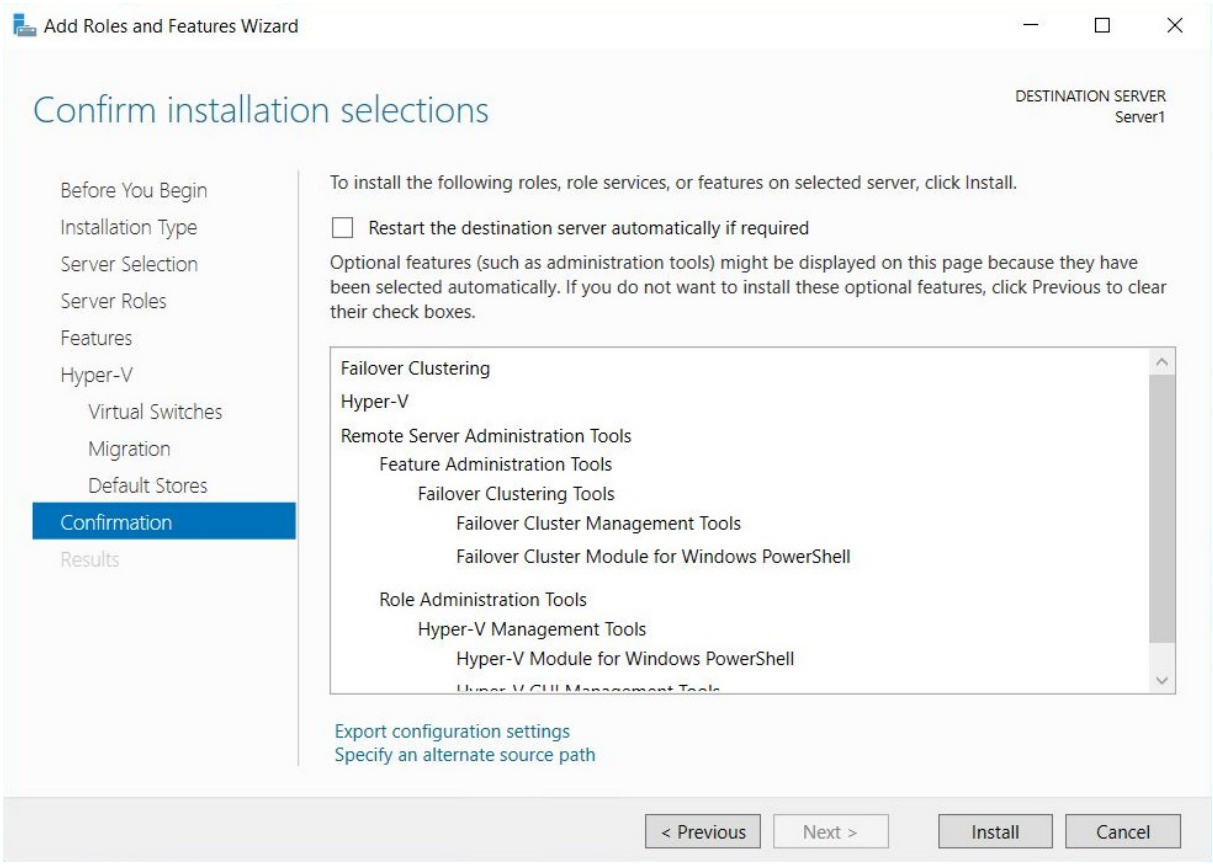


18. Click **Next**.

    The **Confirm installation selections** window is displayed.



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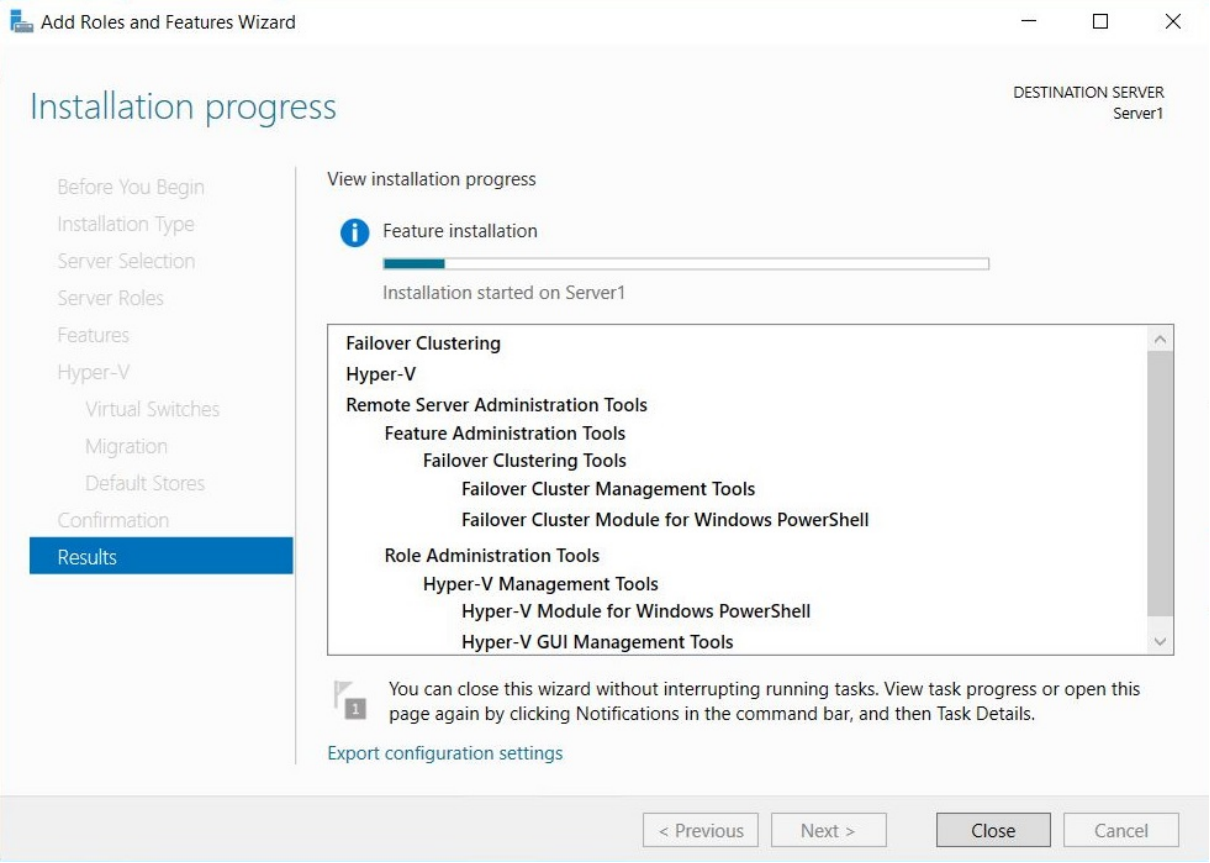
19. Check the setting to ensure you are happy with the selected items to be installed.
20. Click **Install**.

    The chosen Role and Feature will be installed on your machine.



21. When the installation is complete, restart the machine to finalize the installation.
22. Repeat the above steps on any additional nodes you want to include in the failover cluster.

Step 2: Connecting to iSCI network drives

1. Start the iSCI initiator then connect to your two SAN drives:
    a. Click **Start > Windows Administrative Tools > iSCI Initiator**.

> **Note:**
> One of the drives is configured for your Quorum and the other is configured for the virtual machines. 5GB is required for the Quorum and the second drive will be used to store your Virtual machines. Therefore, ensure you have provided enough disk space on this drive to handle the virtual machine storage.

    b. Ensure the drives are set to allow simultaneous connections. This is configured on your SAN. Make sure you have granted access to your two cluster servers.
2. Connect to the SAN drives:
    a. Open **iSCSI initiator**.
    b. Click the **Targets** tab.

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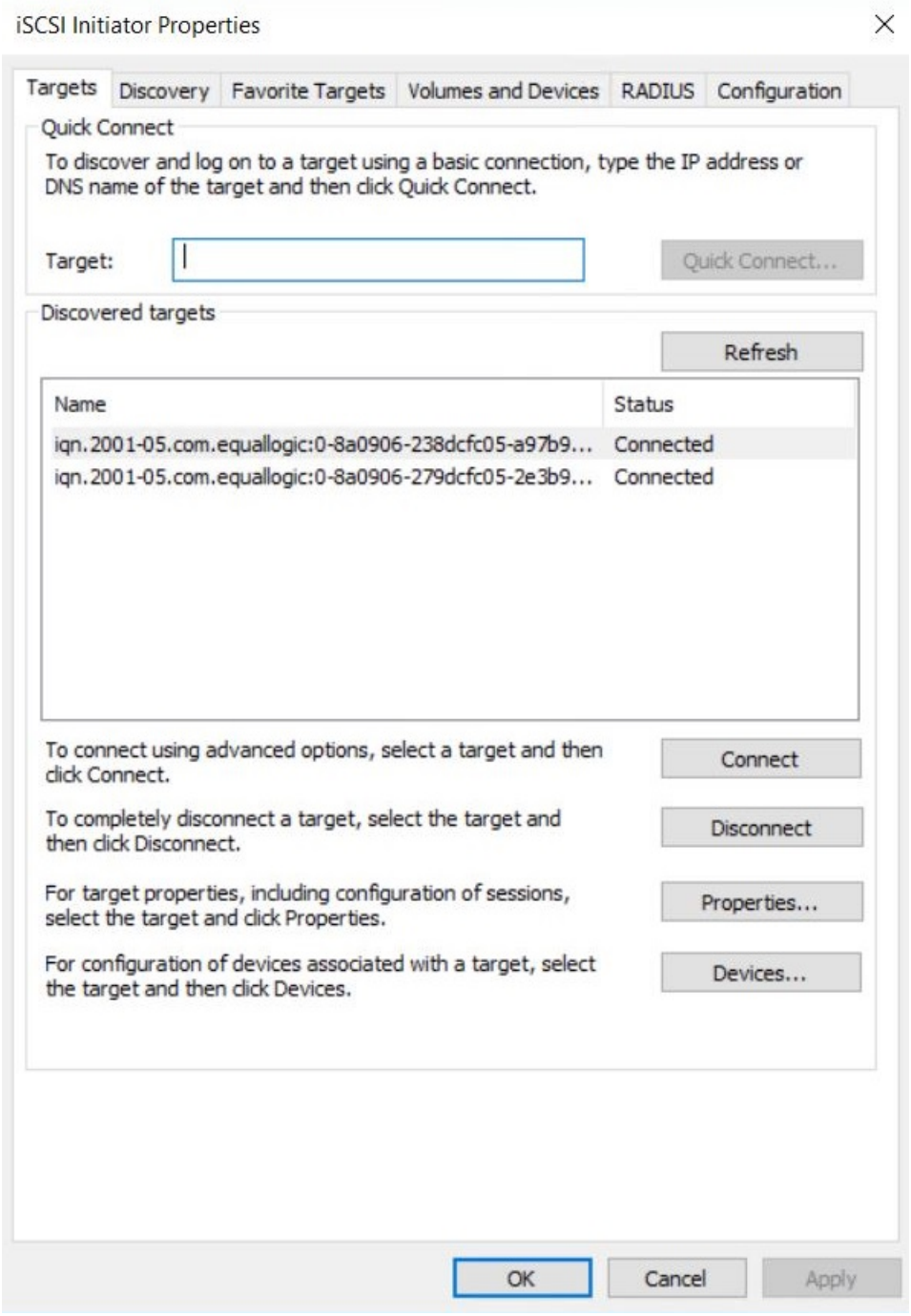

c. In **Target**, enter the IP address for the SAN.

d. Click **Quick Connect**.

   Your advertised drives are displayed.

e. Highlight a drive; then click connect to connect to each drive.

f. When a drive is connected, click **Done**.

g. Click the **Volumes and Devices** tab.

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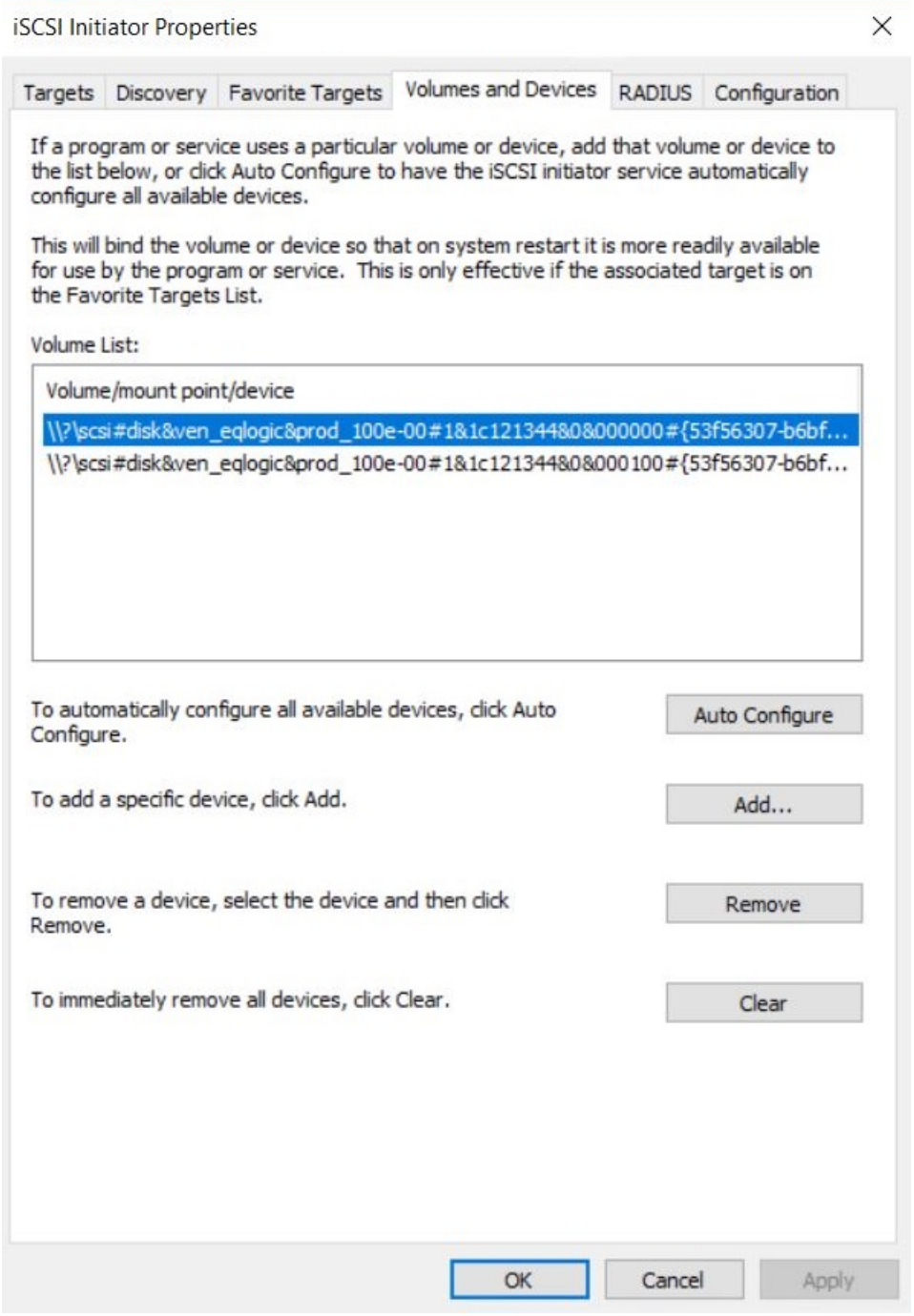

h. Click **Auto Configure**.

i. Click **OK**.

j. When you are connected on the first machine, click **Start > WIndows Administrative tools > Computer Management > Disk Management**.

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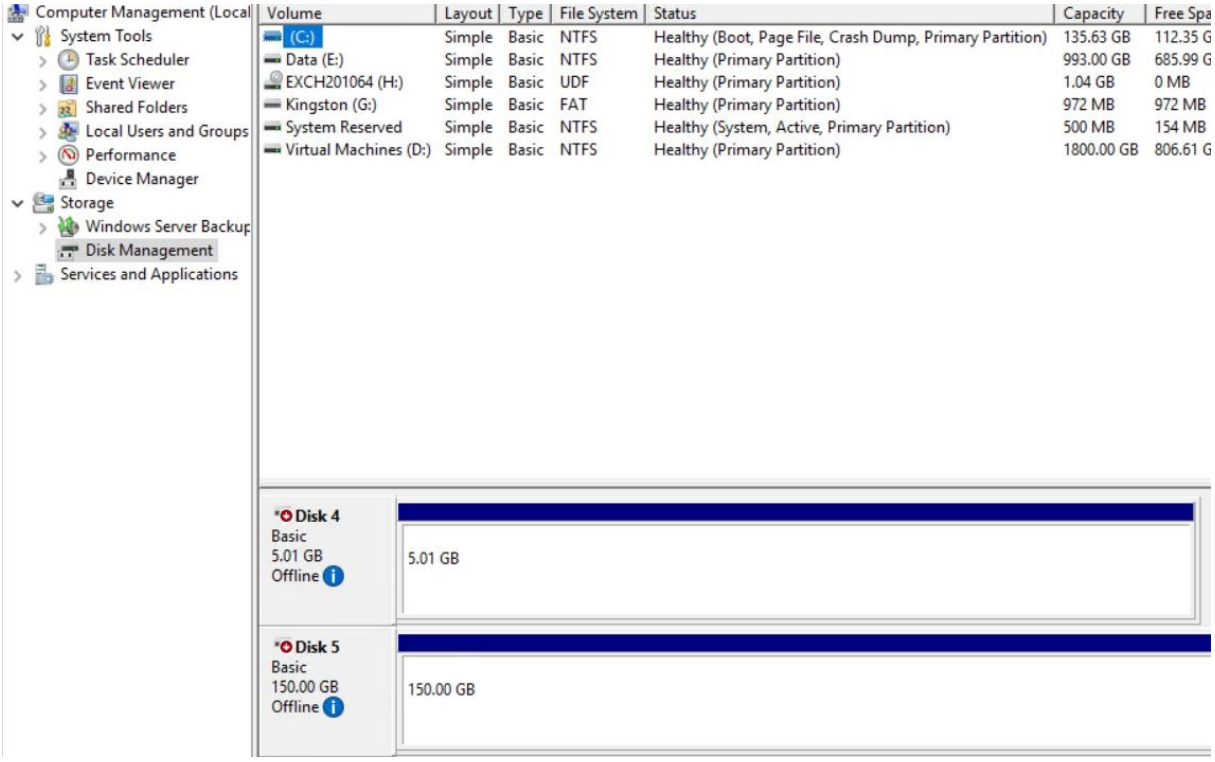

Your two disks appear as **Unknown** and **Offline**. They also display the size you configured on the SAN (eg: 5GB and 150GB).

3. Bring the disks online:
    a. Right-click the disk number.
    b. Select **Online**.
4. Repeat the above step for the second drive.
5. Initialize the disks:
    a. Right-click the disk number next to one of the new drives.
    b. select **Initialize disk**.
    c. In the box that appears, ensure that both your new disks have a tick mark next to them.
    d. Set as **MBR**.
    e. Click **OK**.
6. Configure the new drive:

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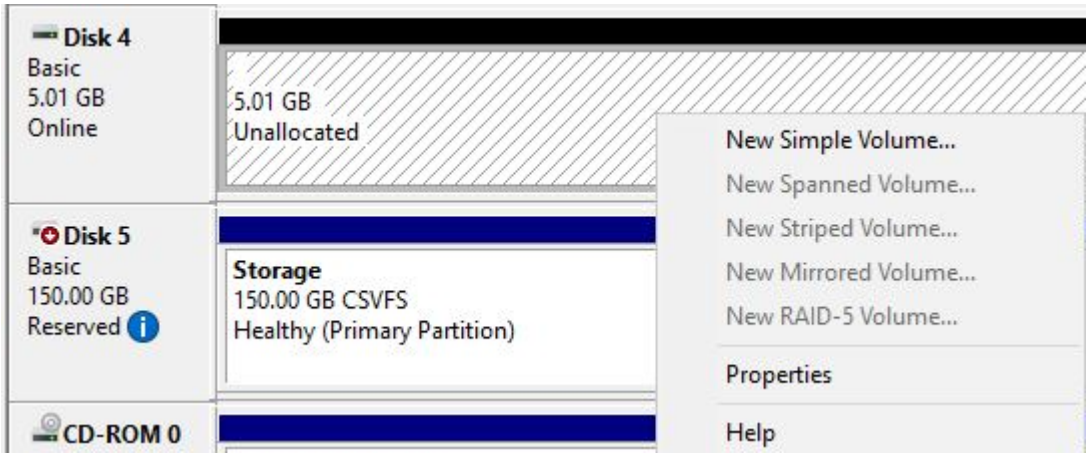
a. Right-click the first drive.



b. Select **Create New Simple Volume**.

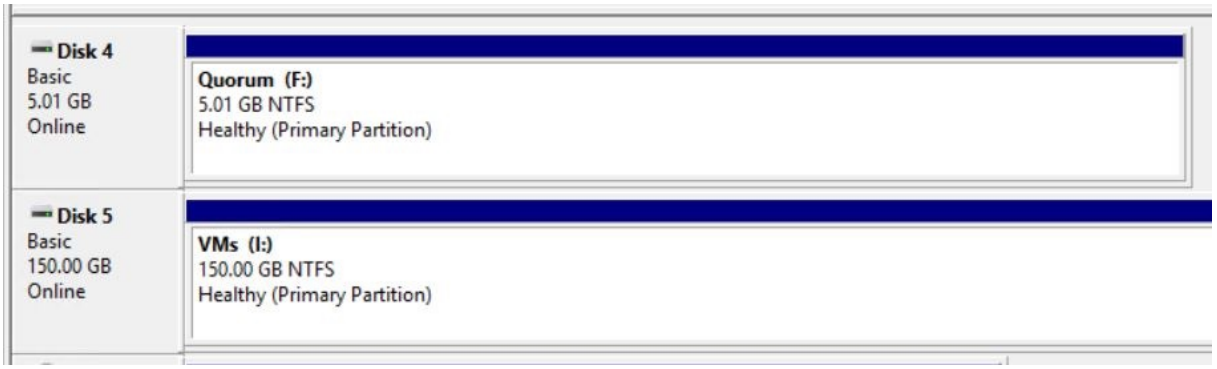
c. Leave the defaults in place.

d. Choose a drive letter to assign.

e. Label your drives:

- 5GB drive—label the drive as **Quorum**
- 150GB (larger drive)—label it as **ClusterStorage**

7. Repeat the above steps for the second drive.



Once this is done for your first node (Server), repeat these steps on your additional nodes (Servers). For example, from the two listed servers above (Server1 and Server2), you must connect the iSCSI drives on both systems before they will be available for your cluster.

Note:
As the simple volume is now configured, you only need to initialise the disks on the other Nodes, not recreate the Volume.

Step 3: Create the failover cluster

From the OS of any of the nodes:

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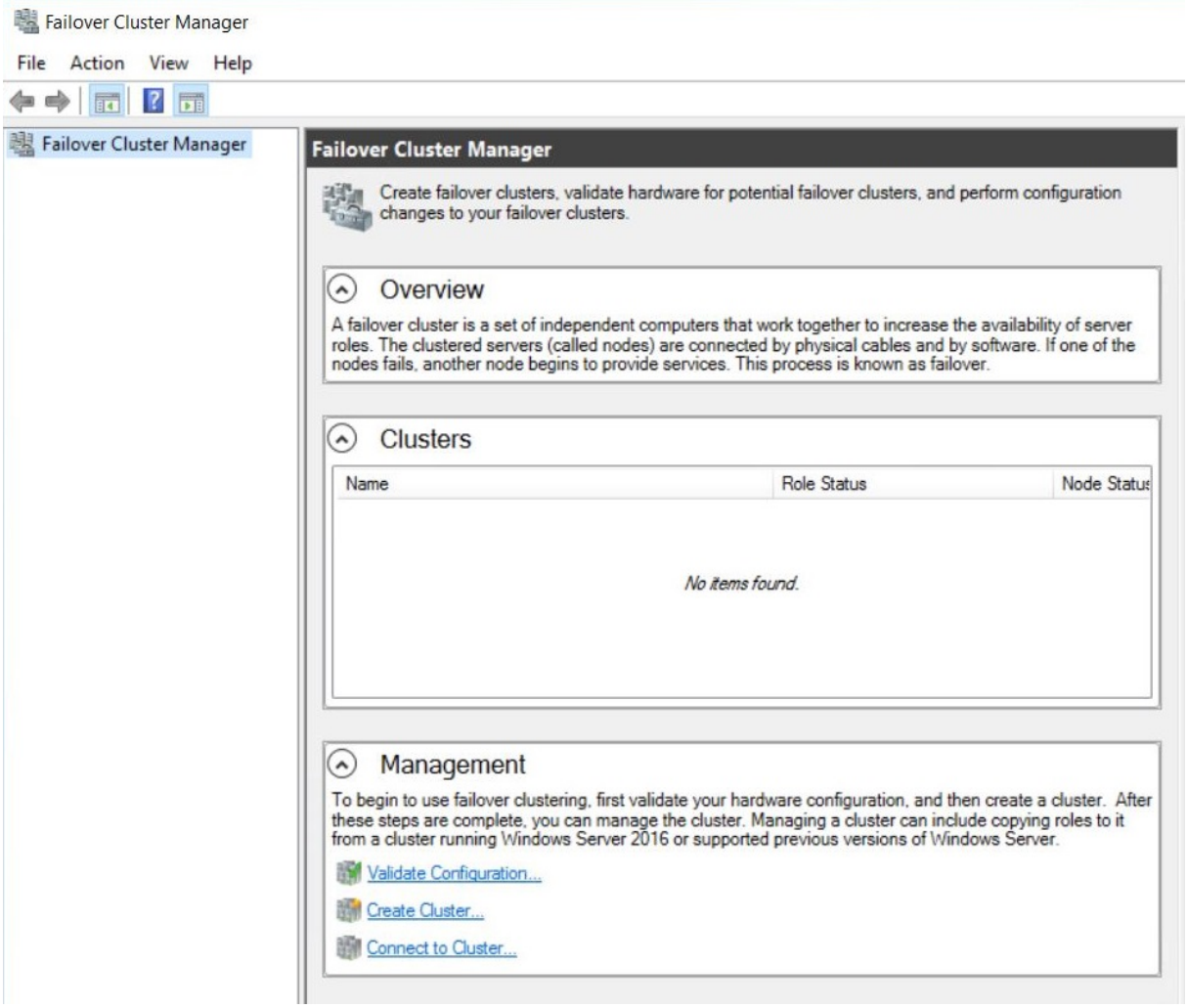
1. Click **Start > Windows Administrative tools > Failover Cluster Manager to launch the Failover Cluster Manager**.



2. Click **Create Cluster**.

   The **Before you Begin** window is displayed.

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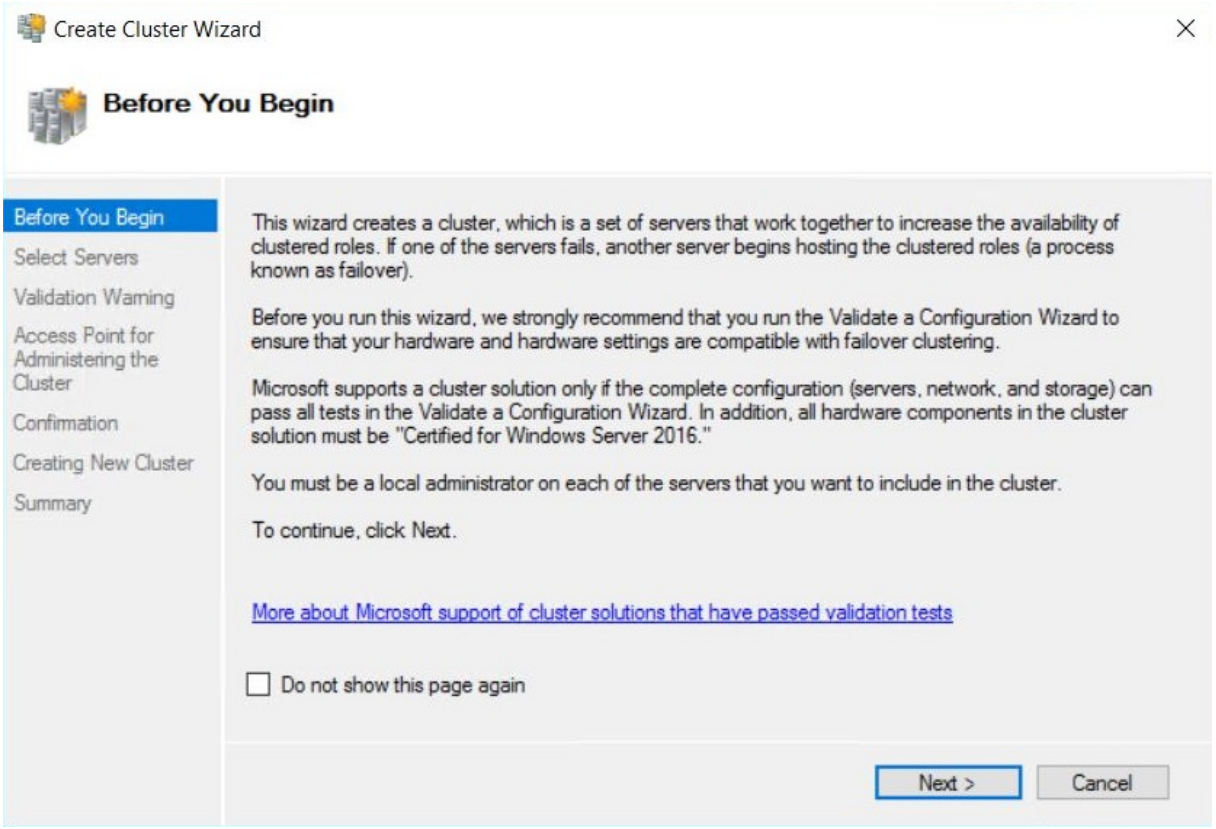
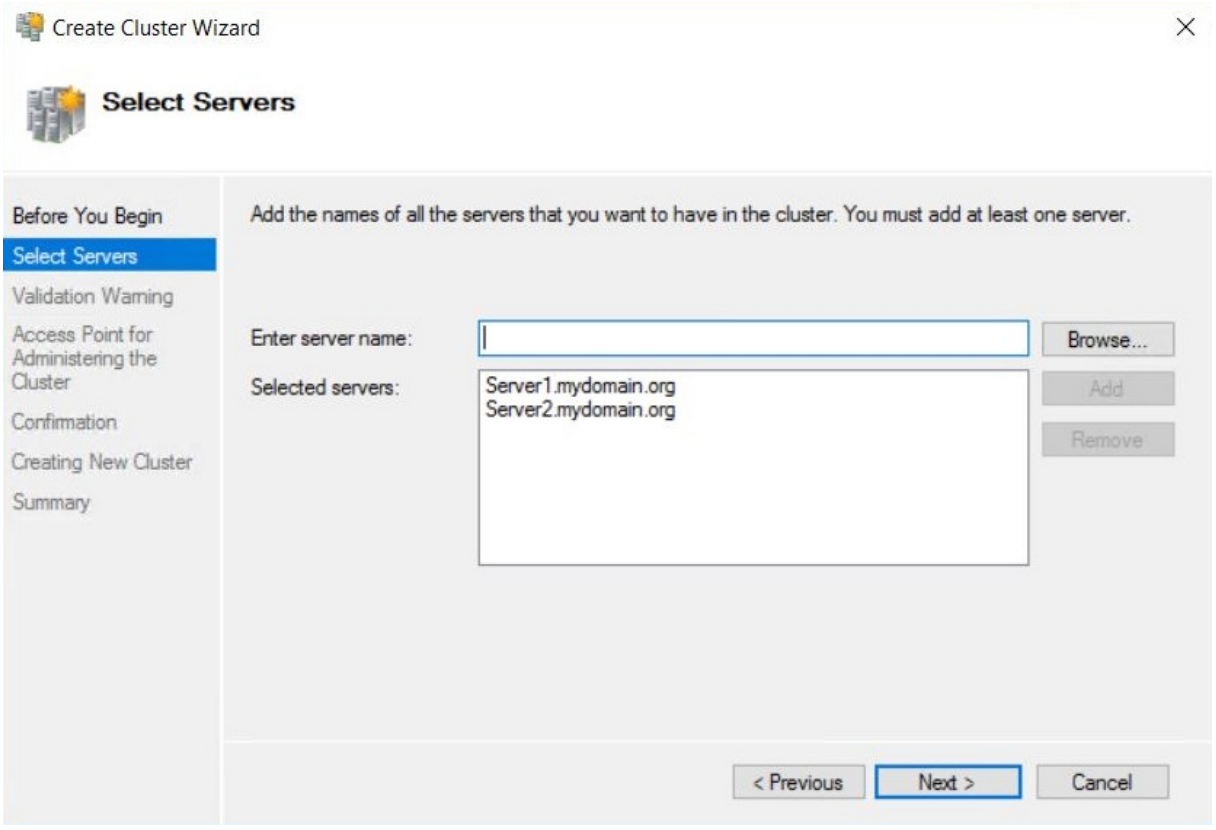


3. Click **Next**.

   The **Select Servers** window is displayed.



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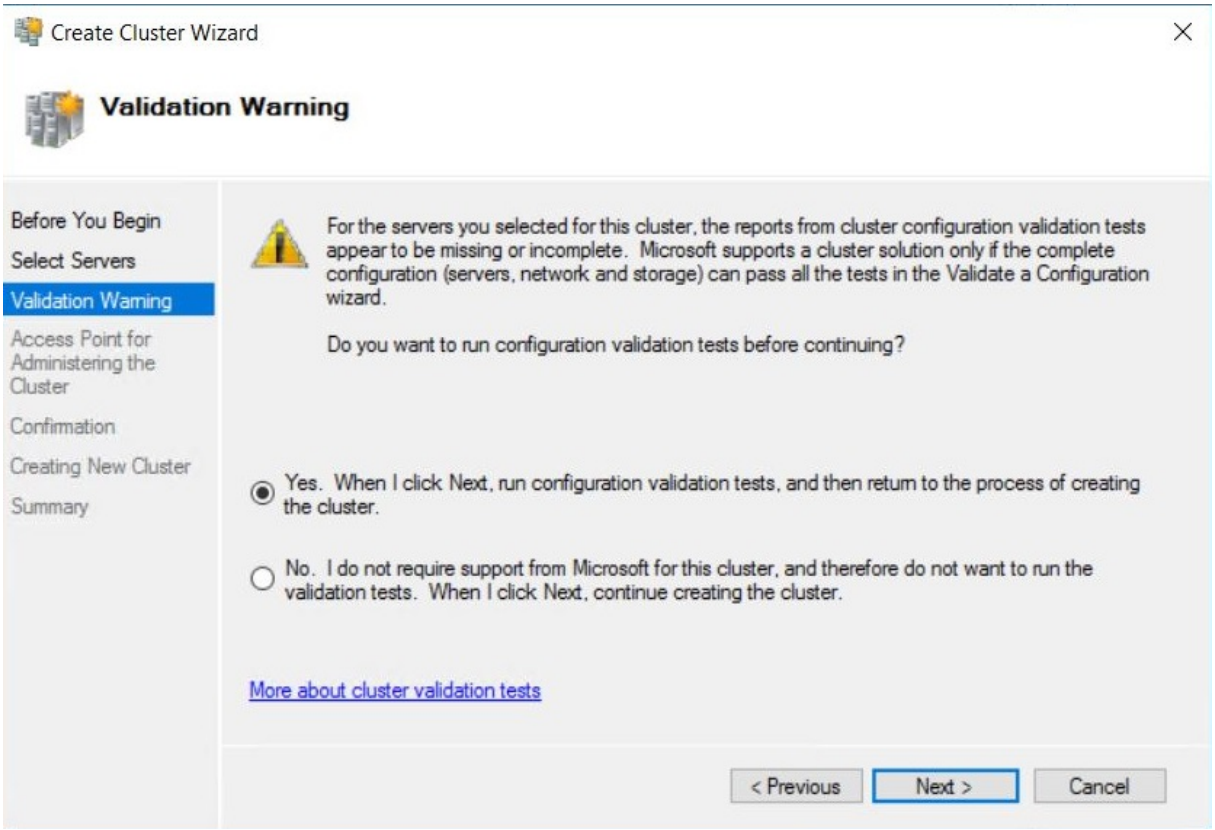
4. Enter the server names that you want to add to the cluster. Alternatively, you can locate them via **Browse**.
5. Click **Add**.
6. Click **Next**.

   The **Validation Warning** window is displayed.



7. Select **Yes** to allow verification of the cluster services.
8. Click **Next**.

   The **Validate a Configuration Wizard** is displayed. This wizard validates the server configuration.

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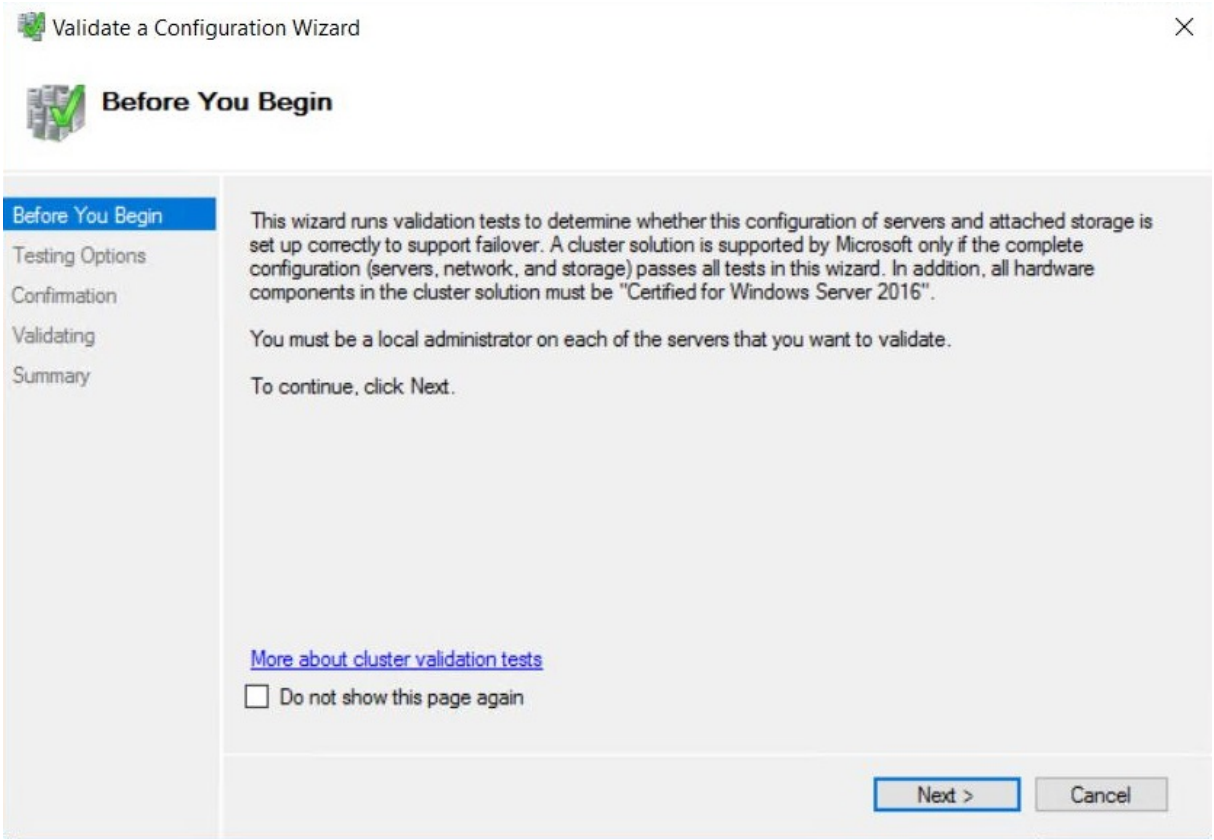
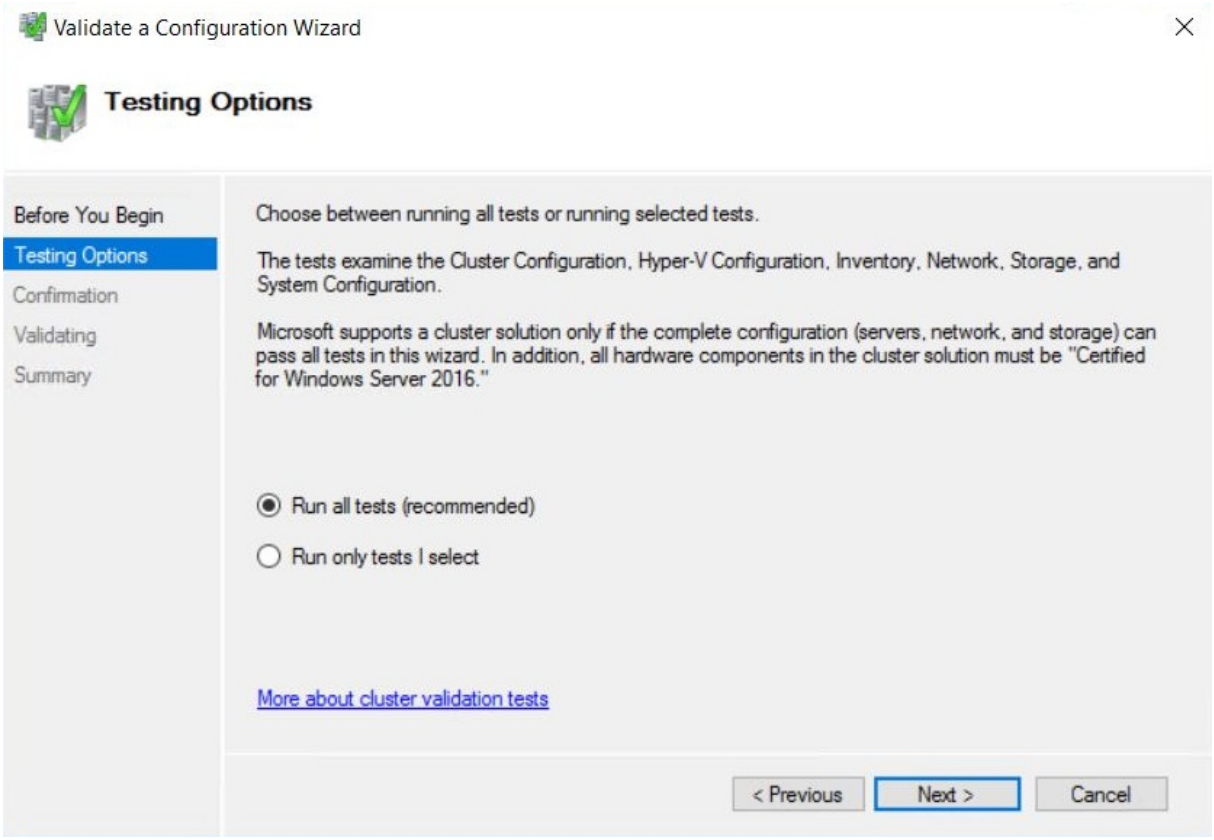


9. Click **Next**.

   The **Testing Options** window is displayed.



10. Select **Run all tests (recommended)**.

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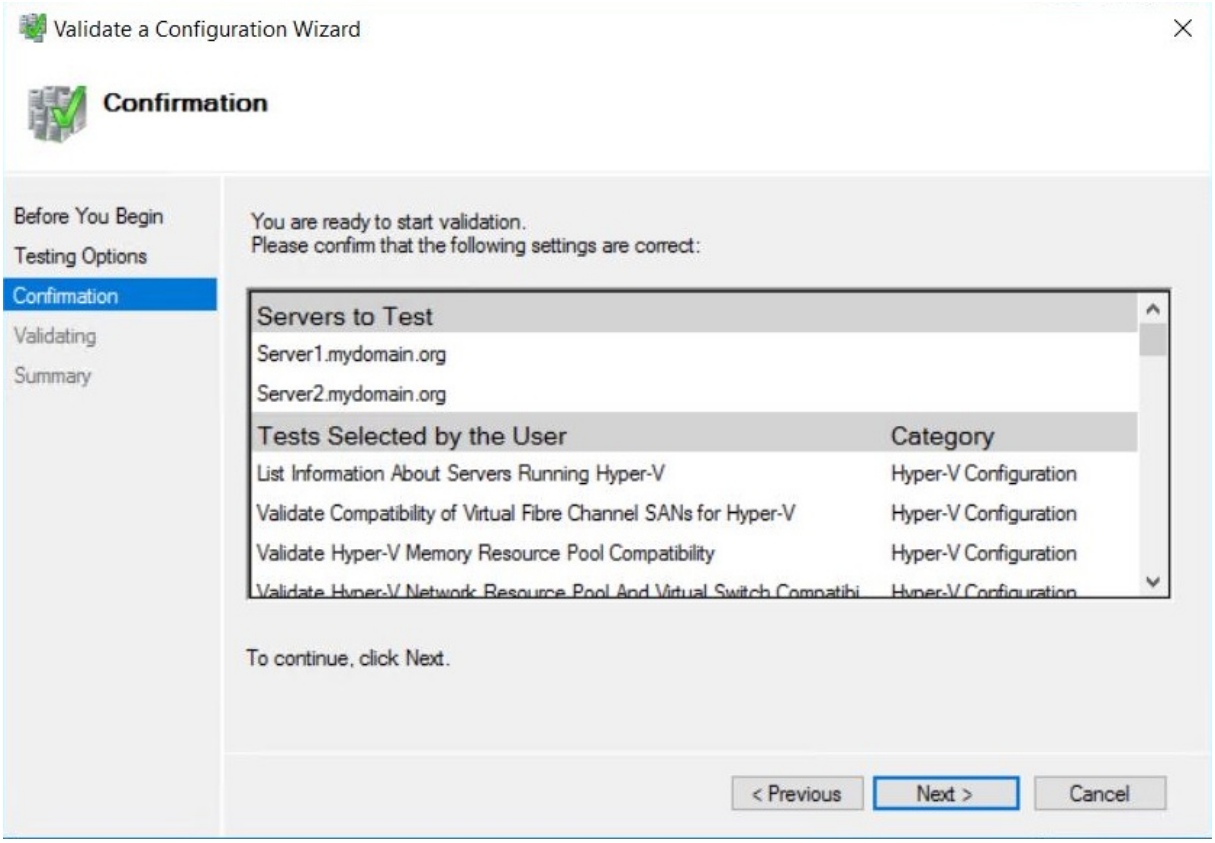
11. Click **Next**.

    The **Confirmation** window is displayed. This window lists all of the tests that will be run.



12. Click **Next**.

    The **Validating** window is displayed while all of the clustering tests are being run. This process may take several minutes depending on your network infrastructure and the number of nodes you have chosen to add to your cluster.

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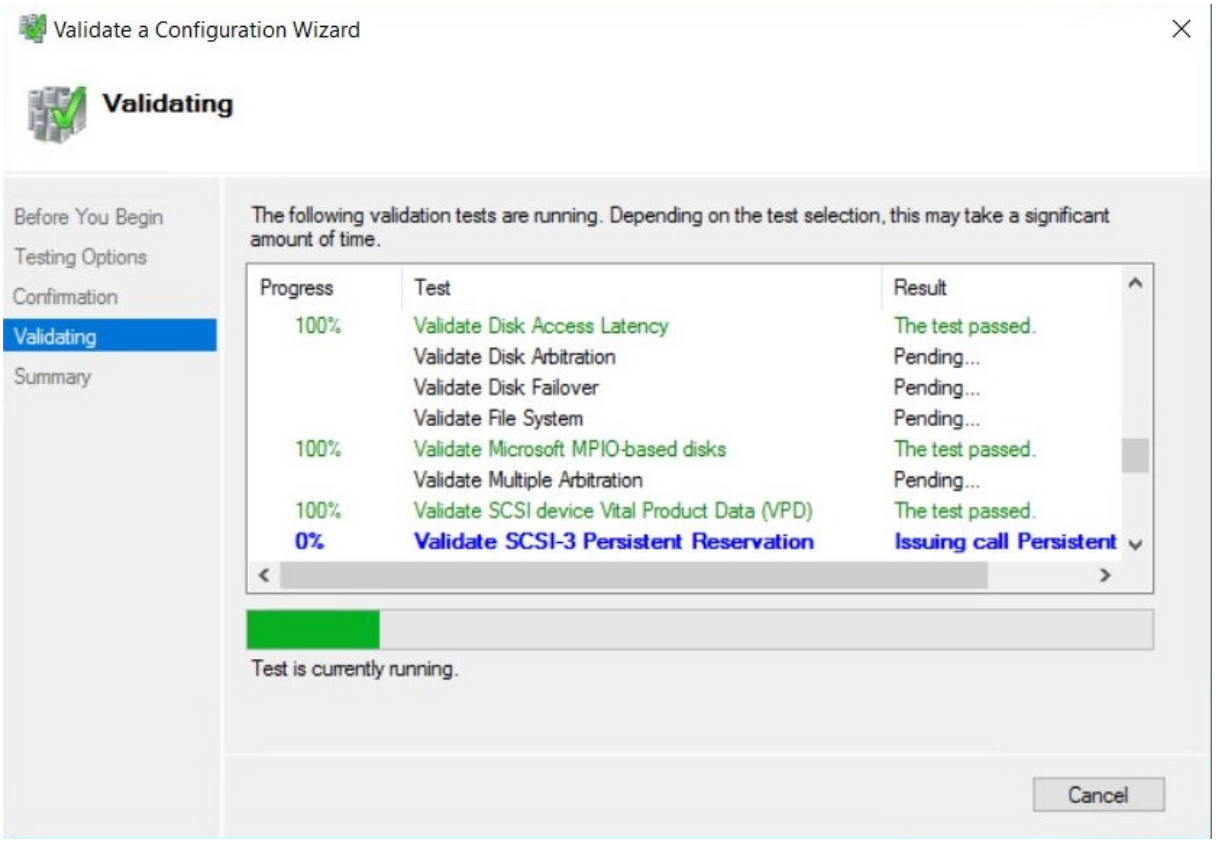

13. When the tests have completed, check the report then fix any configuration errors. The cluster setup will fail if any errors exist.

> **Note:**
> A common error is the NIC/s used on the two nodes. The NIC/s must have the same name on both servers for the cluster to use the NIC in the configuration.

The **Access Point for Administering the Cluster** window in the Create Cluster wizard is displayed.

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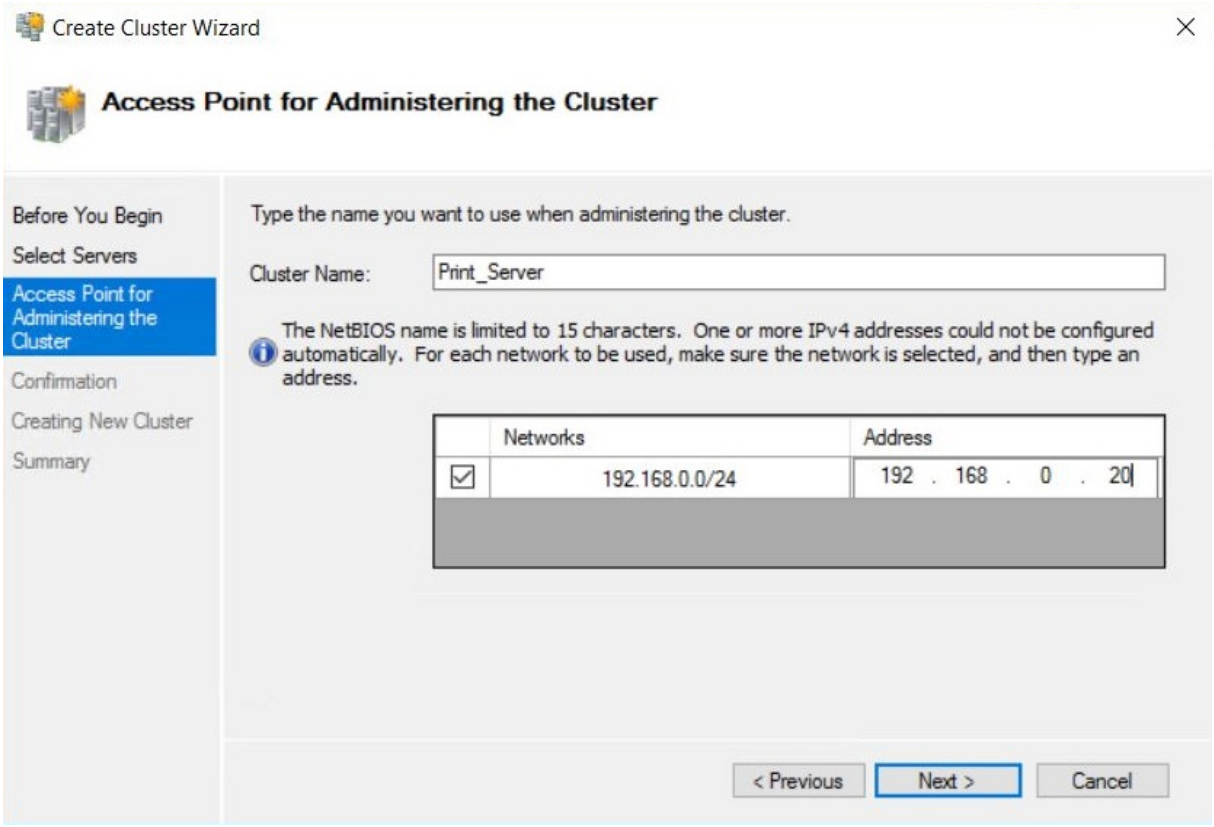

14. In **Cluster Name**, enter a name for your cluster.
15. In the available network provide an IP address for the cluster.

> **Note:**
> This name and IP address will be registered in your DNS

16. Click **Next**.

    The **Confirmation** window is displayed. This window lists the settings to be applied to your new cluster.

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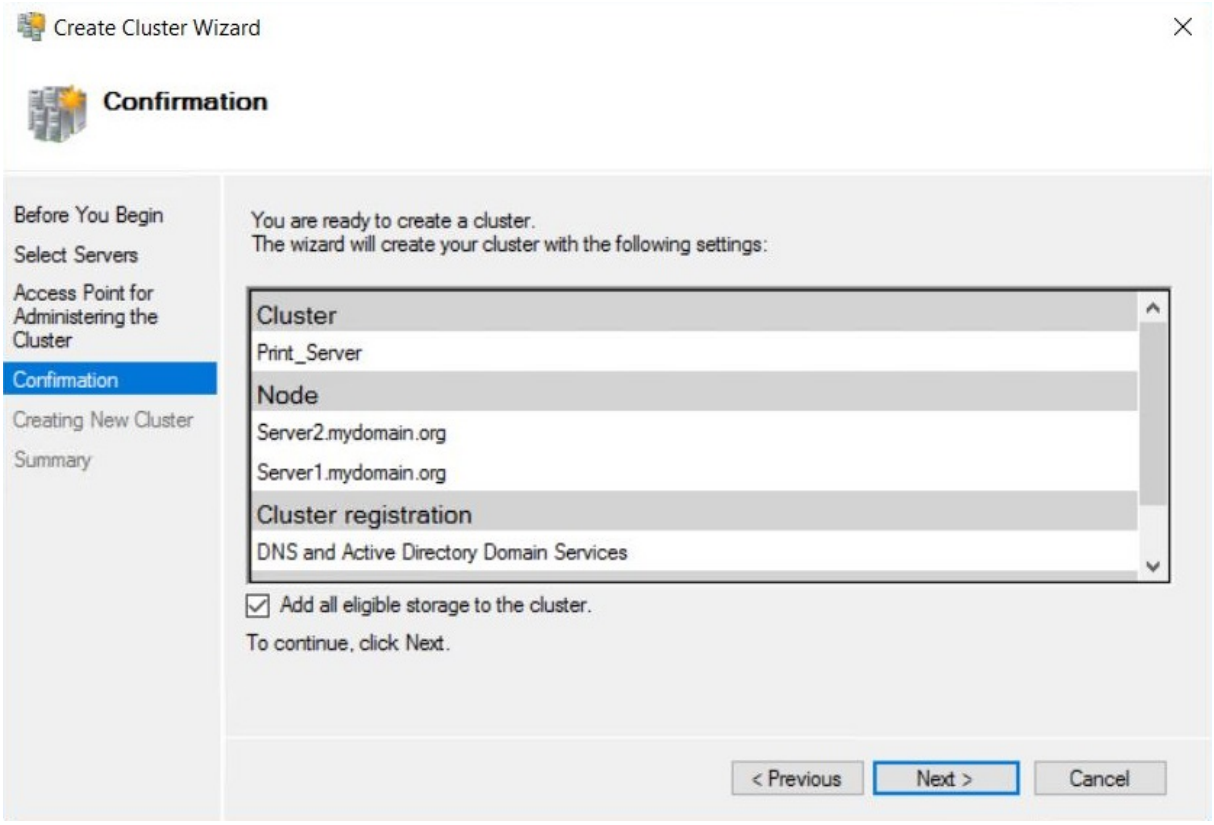

17. Select the **Add all eligible storage to the cluster** check box.
    The system will now try to assign any storage it can find.
18. Click **Next**.

    The system attempts to create the new cluster in your domain. This may take a while as there are several checks that must take place and tests that are conducted while the system is configured.

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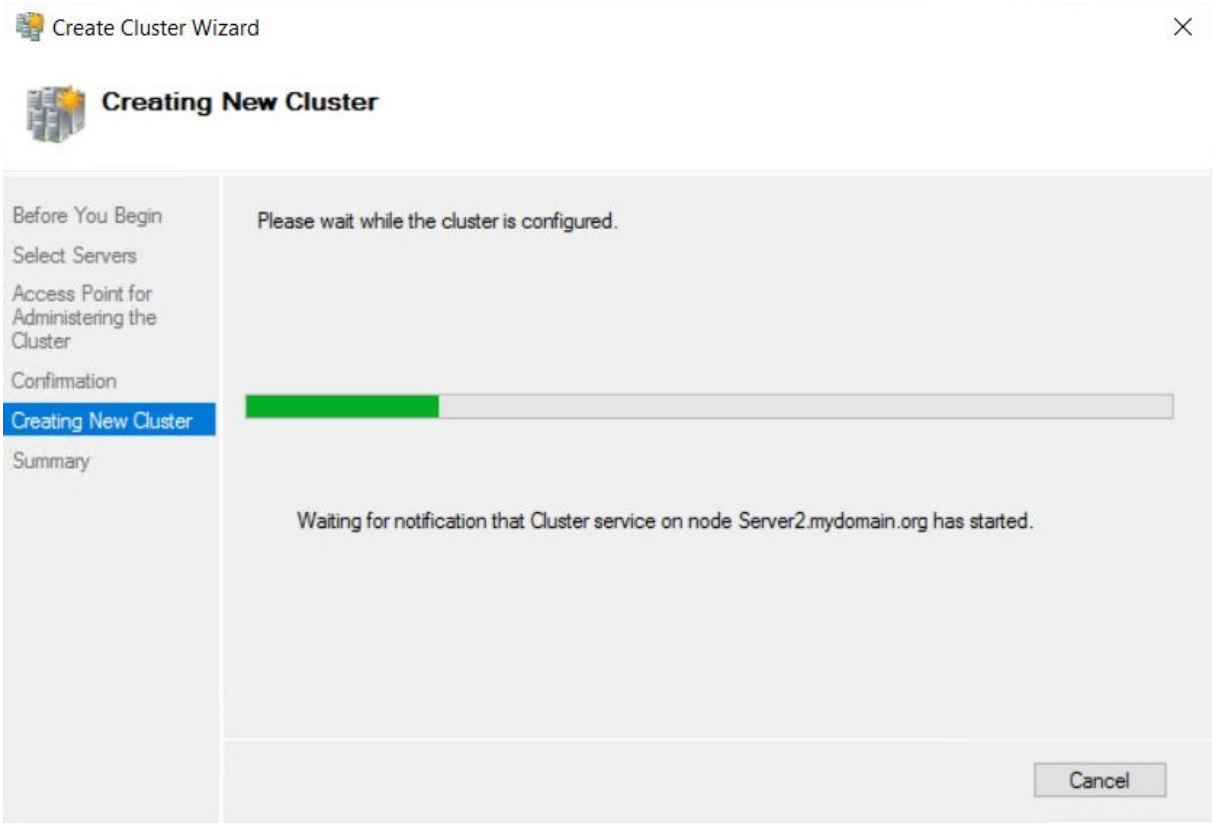
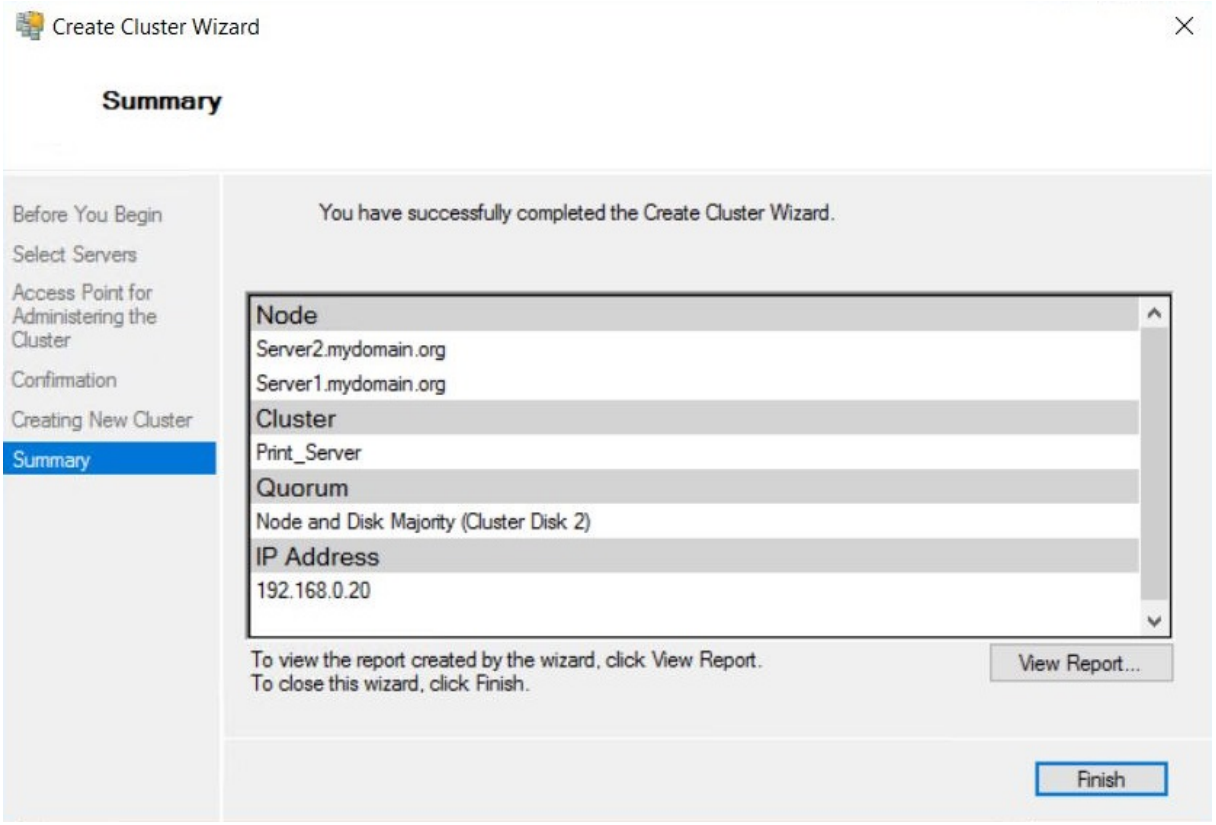


When the process is complete, the **Summary** window is displayed stating that the cluster wizard completed successfully.



19. Click **Finish**.
20. Check to confirm that the cluster is configured correctly:

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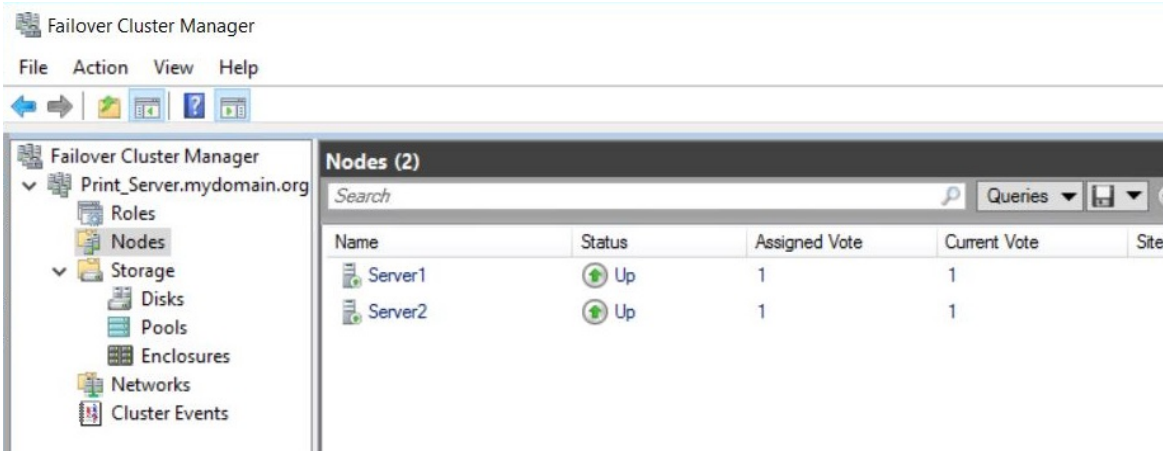
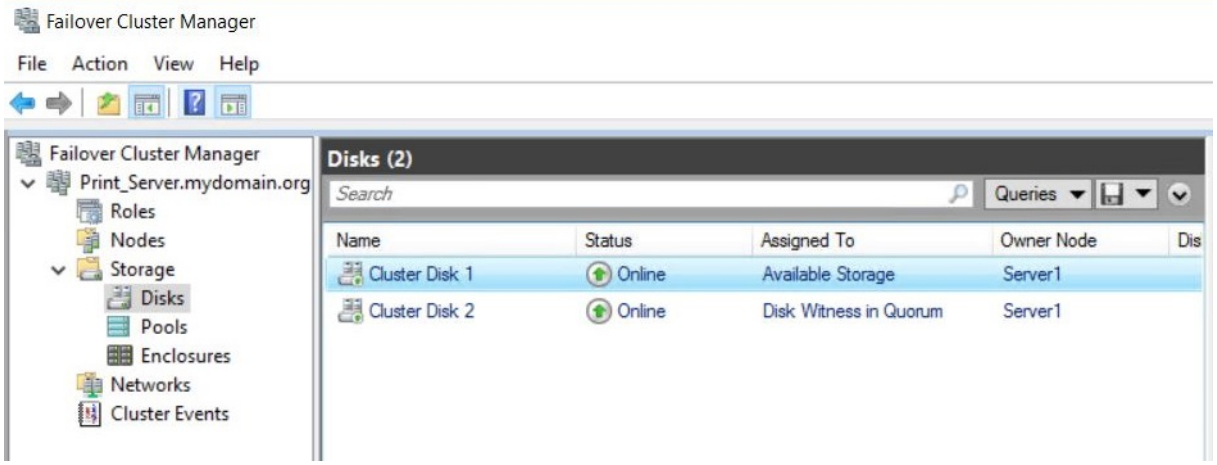
a. In the **Failover Cluster Manager**, navigate to **Nodes**.



b. Check that all nodes in the cluster are online. If they are not, go to the server that is offline and bring the system online to join the cluster.

21. Navigate to **Storage > Disks**.



The system detects the SCSI drives and displays them here. If you were setting this up with only two nodes, then the 5GB Quorum cluster would have been assigned as **Disk Witness in Quorum**.

> **Note:**
> If no disks are displayed, check that you have correctly completed the steps on all nodes detailed in Connecting to ISCSI network drives.

The configured storage space is assigned to Available Storage.

22. Configure this storage to be part of the cluster:

a. Right-click the disk assigned to available storage; then select **Add to Cluster Shared Volumes**.

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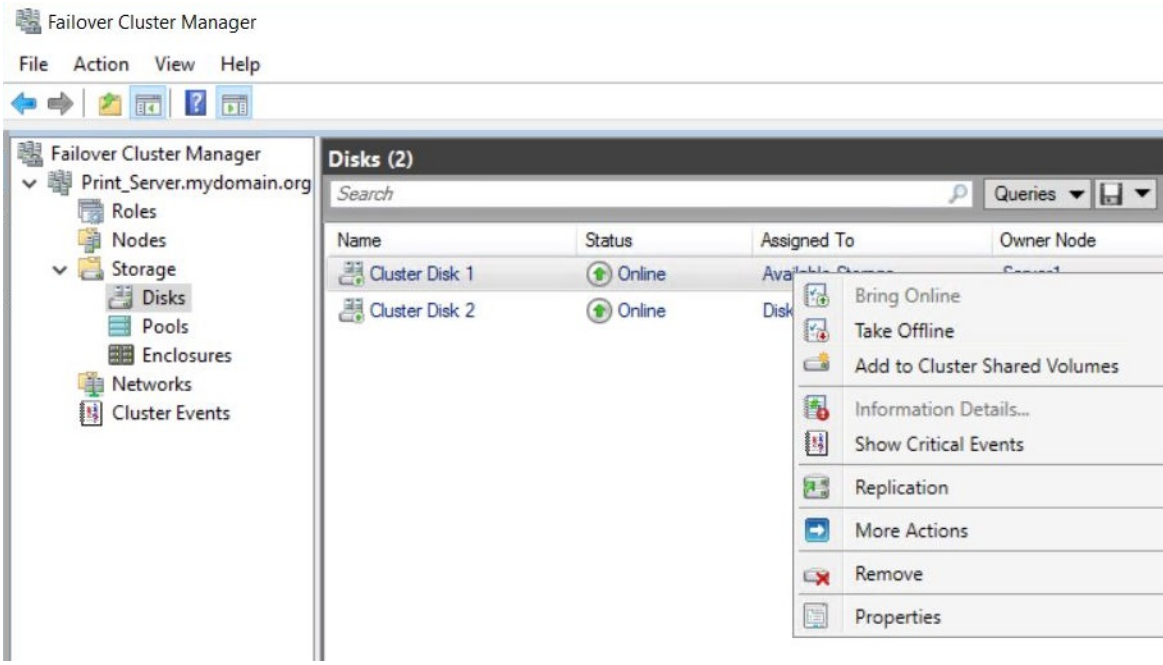
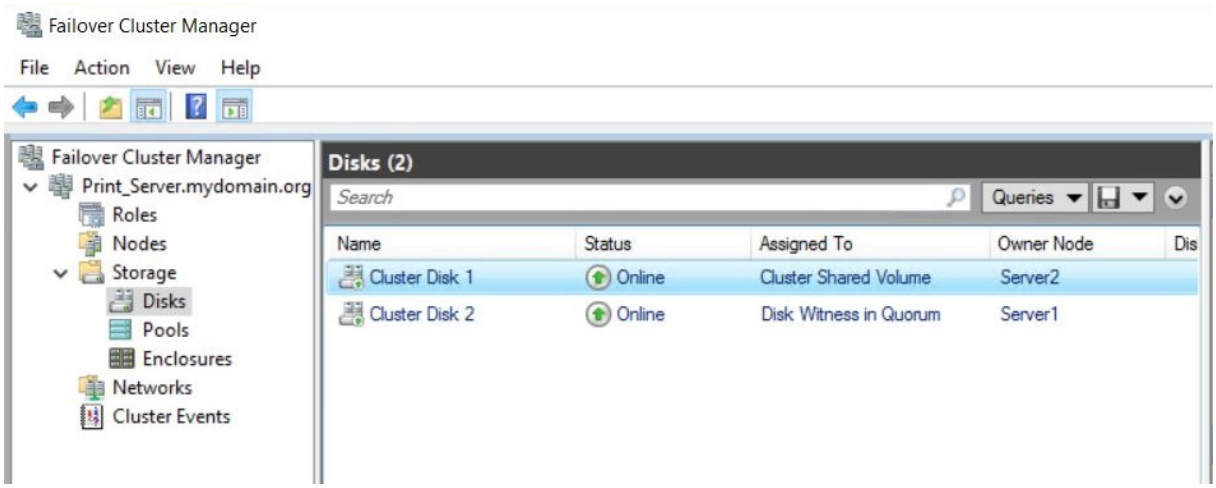


The cluster is now assigned to **Cluster Shared Volume**.



23. Check the **Cluster Events** folder for any reported issues with the cluster. If there are no issues, you can configure your virtual machine in the cluster environment.

Step 4: Create a high availability virtual machine

1. In the Failover Cluster Manager, expand the cluster created in the previous steps.
2. Right-click **Roles**; then select **Virtual Machines > New Virtual Machine**.

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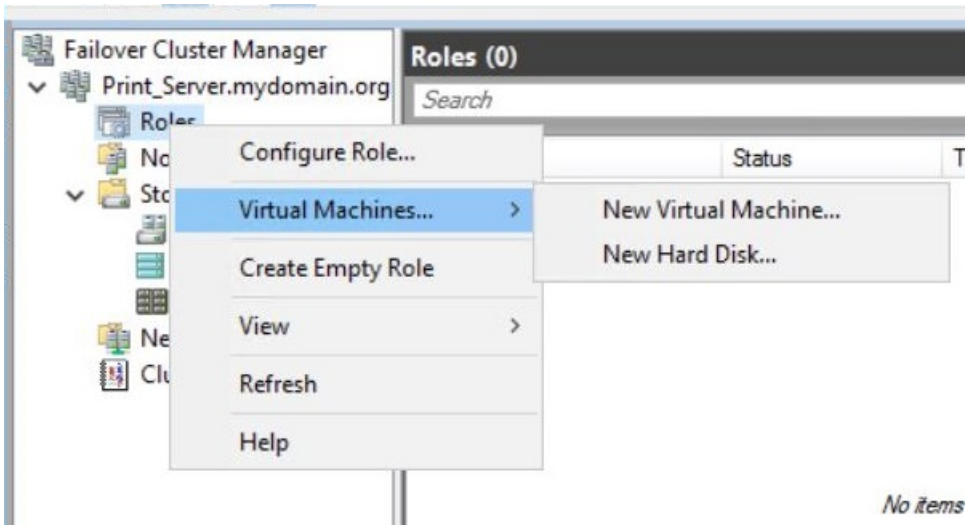
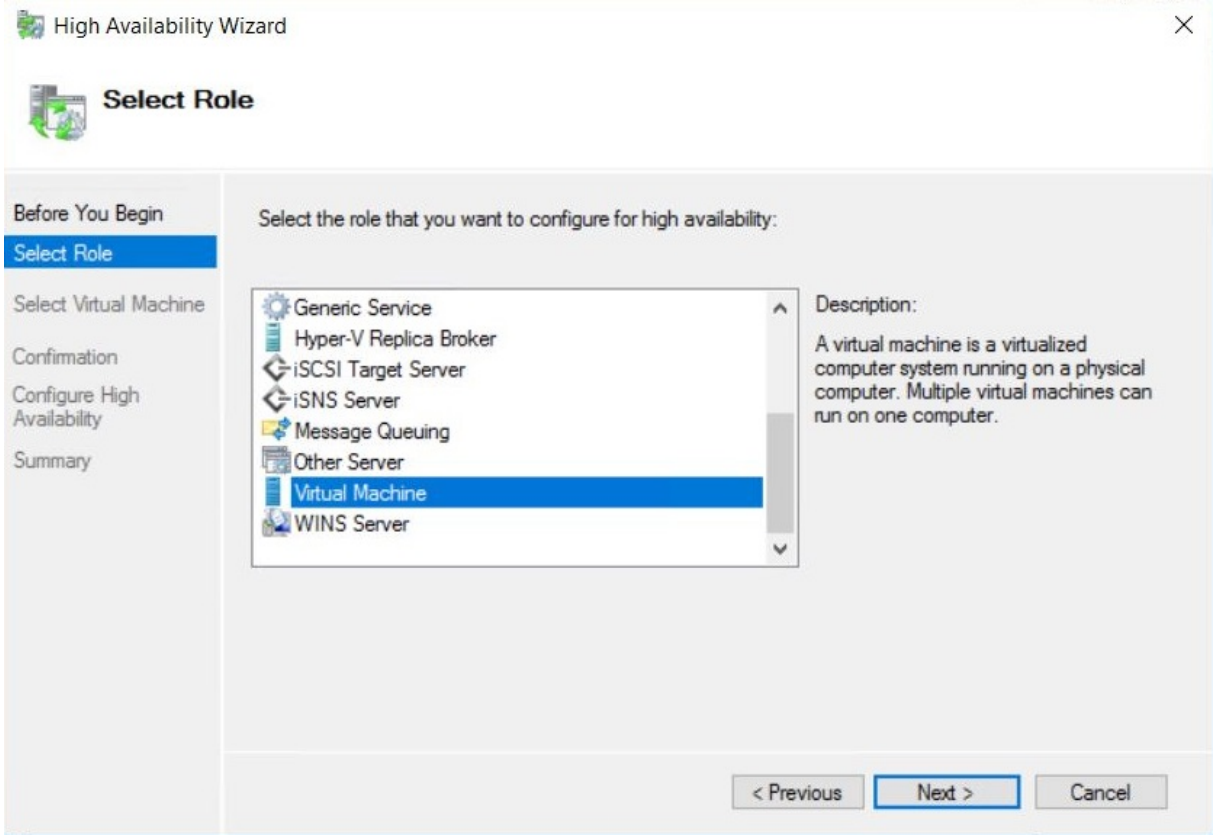


The **New Virtual Machine** window is displayed.



3. Select the node you want to set the virtual machine up on. It doesn't matter which node you choose, but we recommend you choose the node that you are currently working on.
4. Click **OK**.

   The **New Virtual Machine Wizard** is displayed. This window explains the steps involved in setting up a virtual machine.

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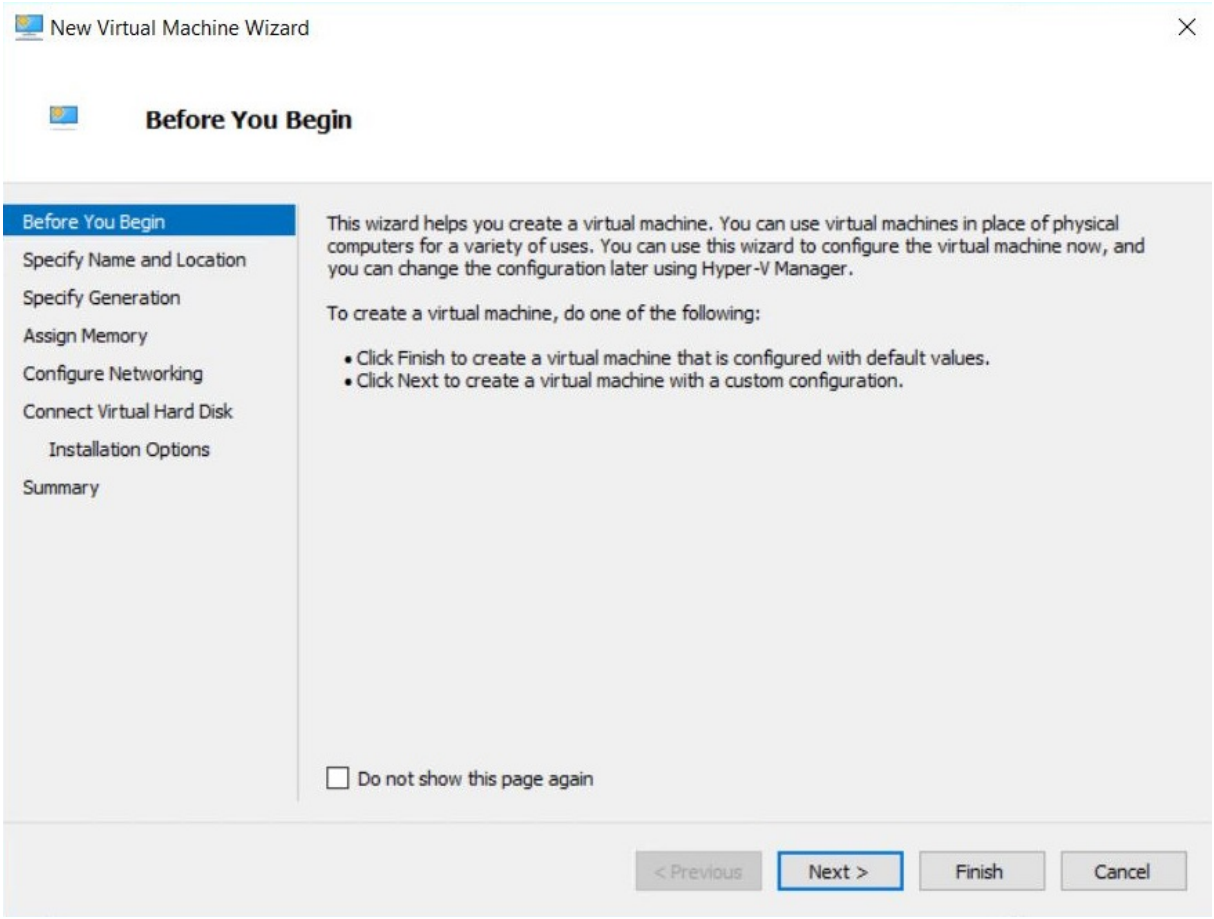

5. Click **Next**.

   The **Specify Name and Location** window is displayed.

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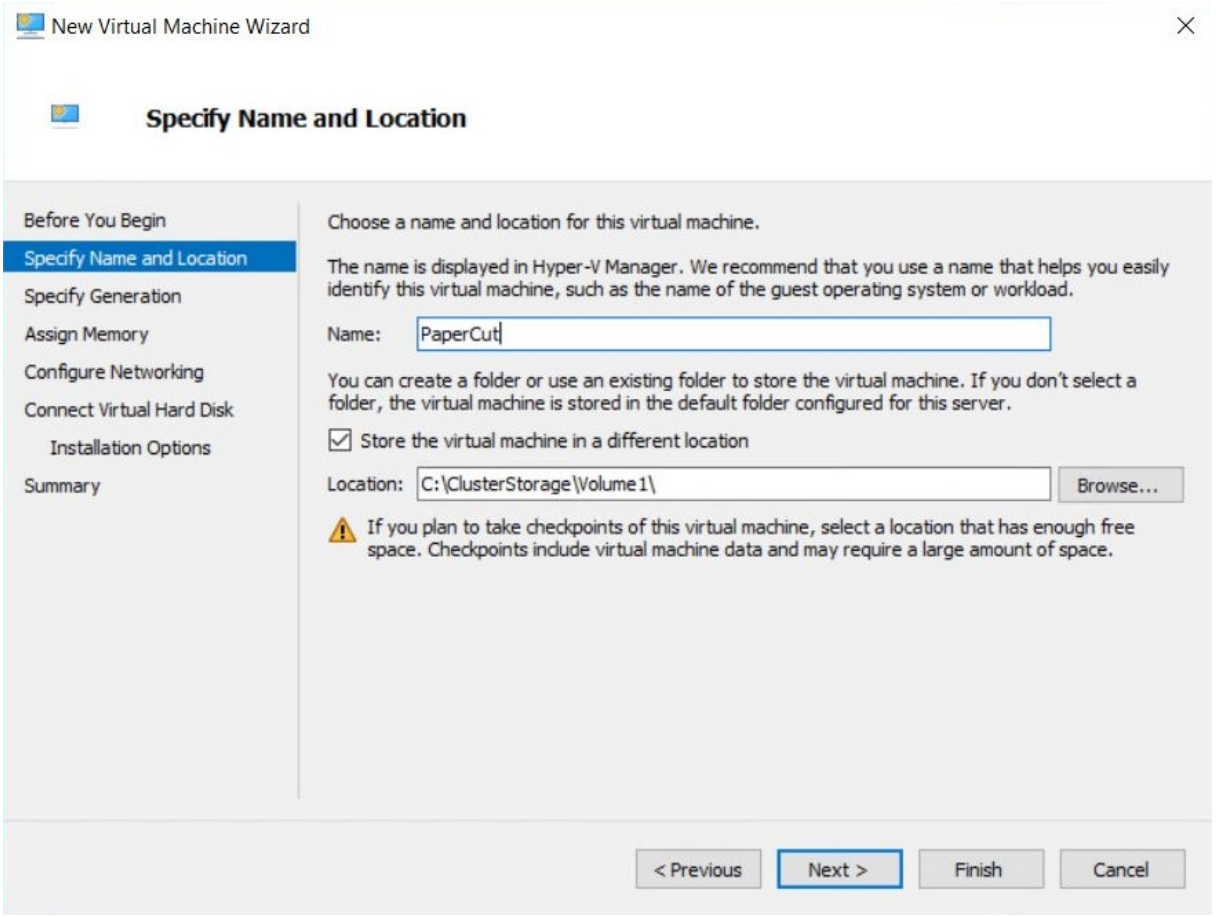

6. In **Name**, enter a name for your virtual machine.
7. In **Location**, enter the drive where the VM will be stored on the server. For this VM to be able to move between the nodes, choose the `ClusterStorage\Volume` drive. This is usually located on `C:\ClusterStorage\Volume1\` or similar.
8. Click **Next**.

   The **Specify Generation** window is displayed.

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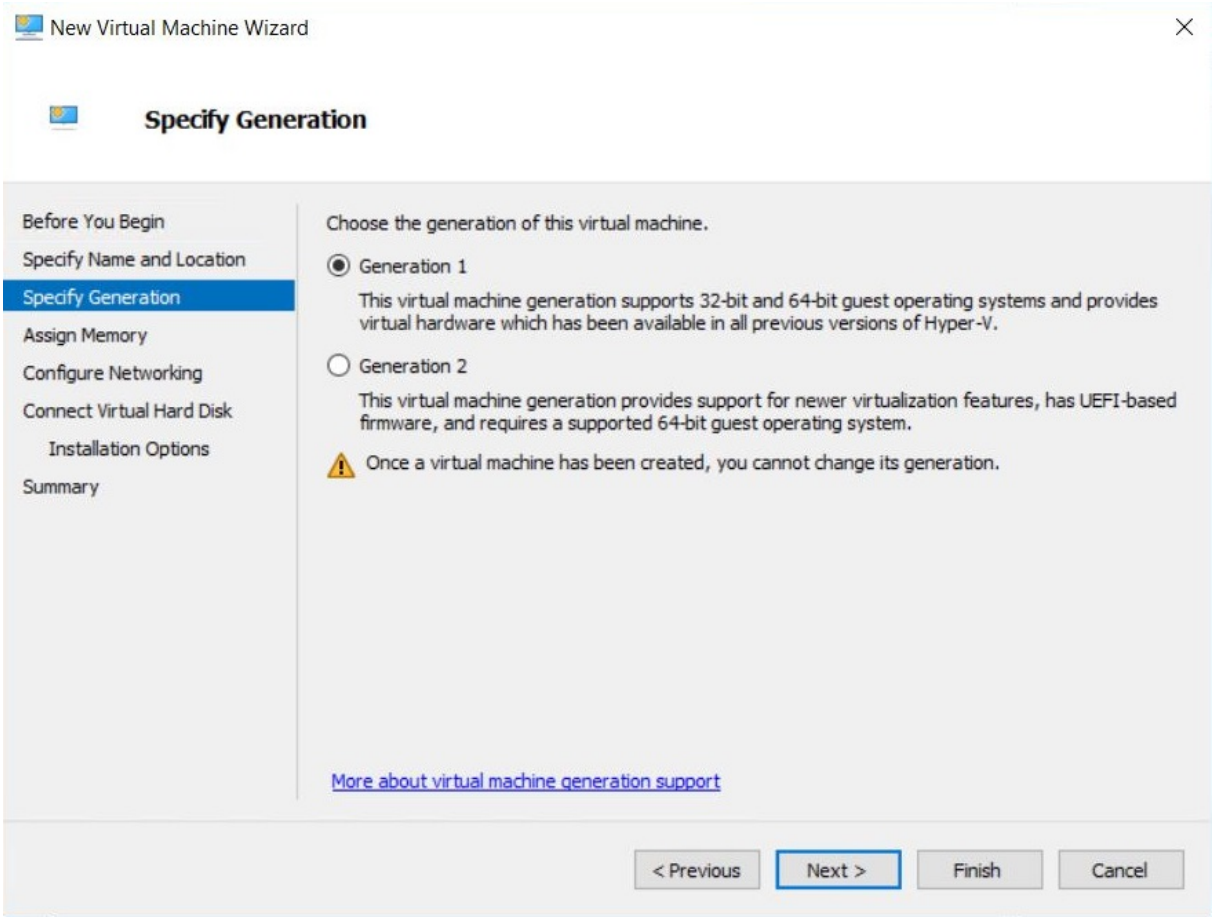

9. Select the generation of virtual machine you want to use:
   - **Generation 1**—offers the best cross compatibility with versions. Generation 2 offers greater security, better performance, and supports the UEFI disk partitioning.
   - **Generation 2**—supported on the current releases, but not the older versions of Hyper-V. Also Generation 2 virtual machines are not supported by Azure.

   Important:
   Once this selection is made, it most likely will not be able to be changed. There are some tools that allow you to switch generation (for example, Azure DR allows you to to convert to Gen1 or Gen2 based on failover location), but it is best to assume that it cannot be changed.

10. Click **Next**.

    The **Assign Memory** window is displayed.

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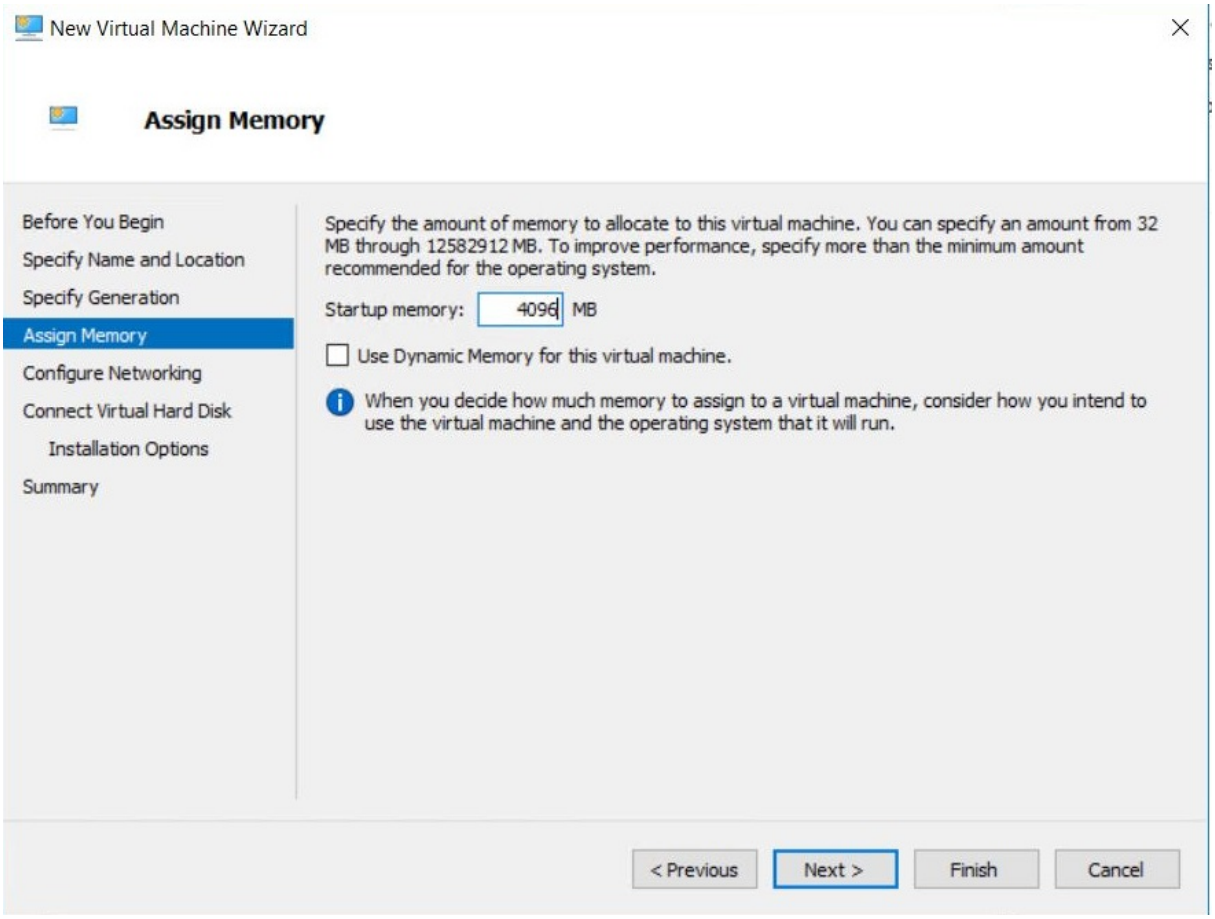

11. In **Startup memory**, enter the relevant amount of memory that you want for this virtual machine.
12. If you want the memory to be dynamic, select the **Use Dynamic Memory for this virtual machine** check box.
13. Click **Next**.

    The **Configure Networking** window is displayed.

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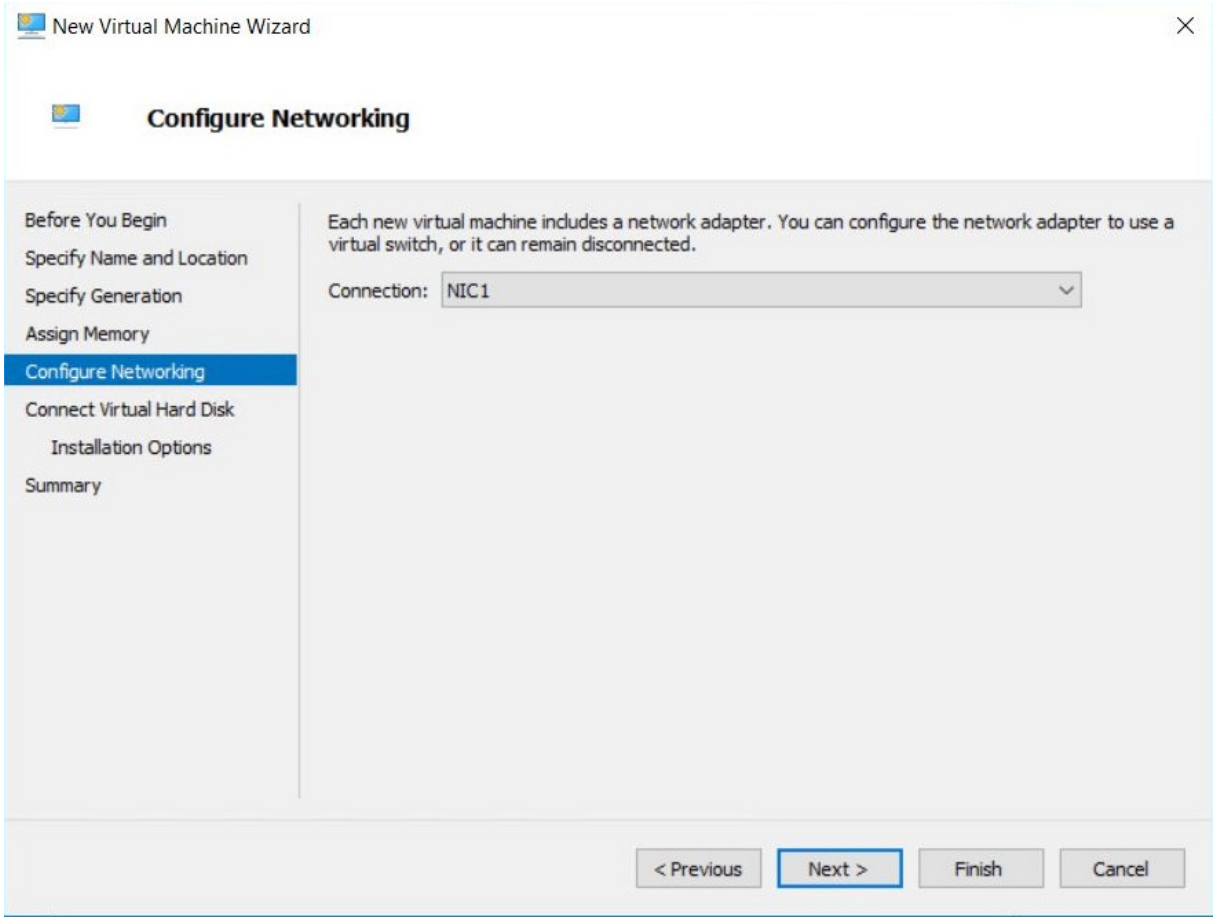

14. In **Connection**, select the NIC you want to assign to this virtual machine.
15. Click **Next**.
    The **Connect Virtual Hard Disk** window is displayed.

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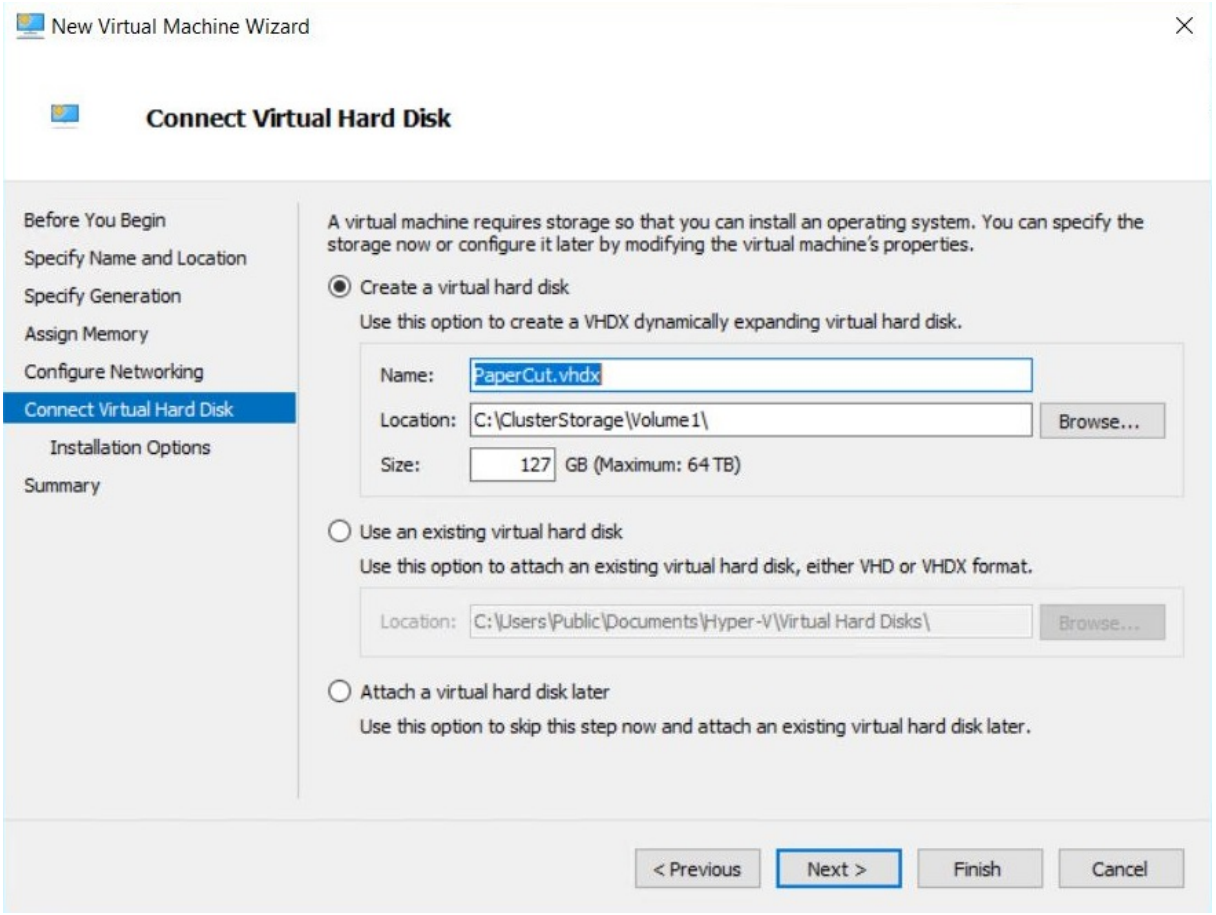

16. In **Name**, enter a name for your virtual machine. This is the name that will be displayed in Hyper-V.
17. In **Location**, enter a location on the cluster drive for the hard drive. By default, this is usually created on your system under `C:\ClusterStorage\Volume1\`.
18. Set the hard drive size.
19. Click **Next**.

    The **Installation Options** window is displayed.

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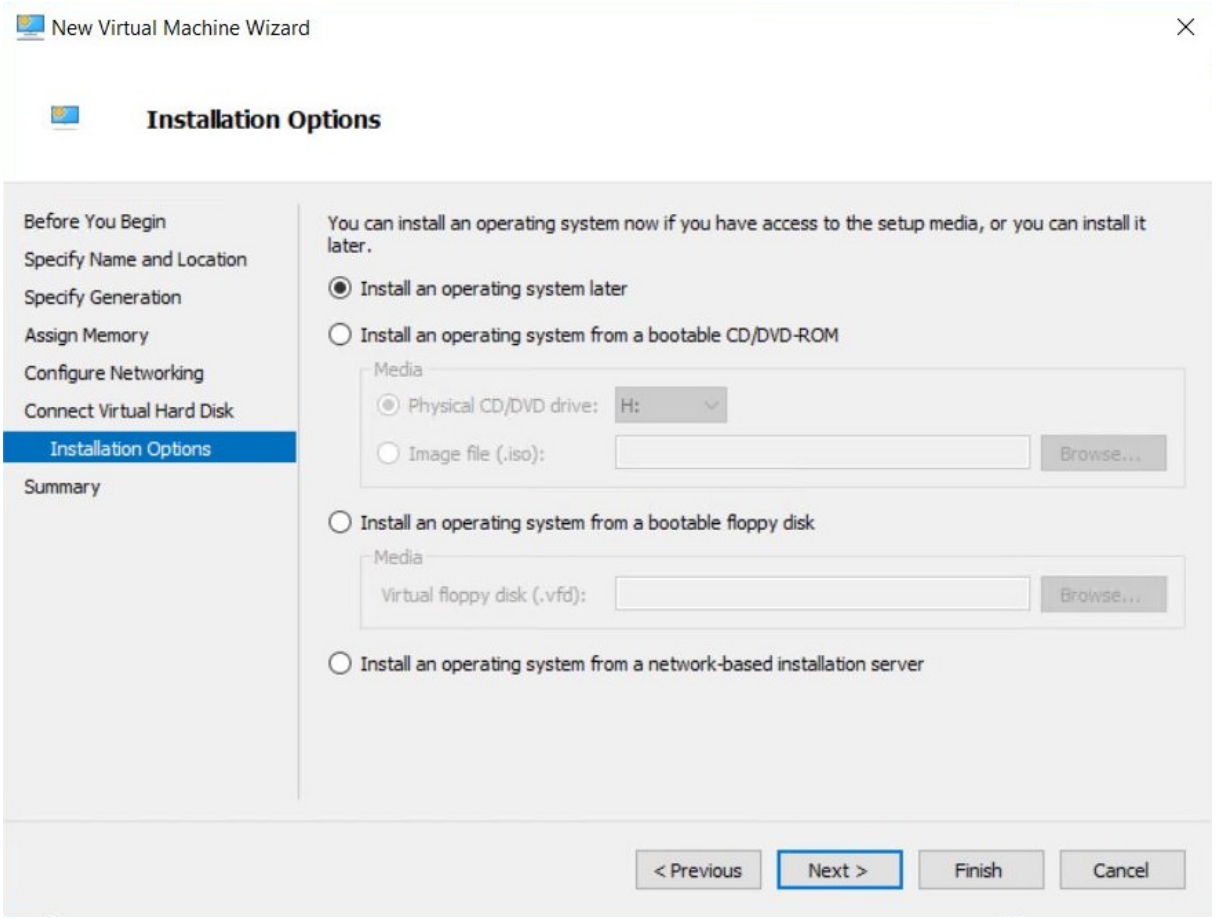

20. Select the install location for your operating system. If you intend to perform this installation at a later time, select **Install an Operating System Later**.
21. Click **Next**.

    The **Completing the New Virtual Machine Wizard** window is displayed. This window displays the options that you have selected for the configuration of this Hyper-V machine.

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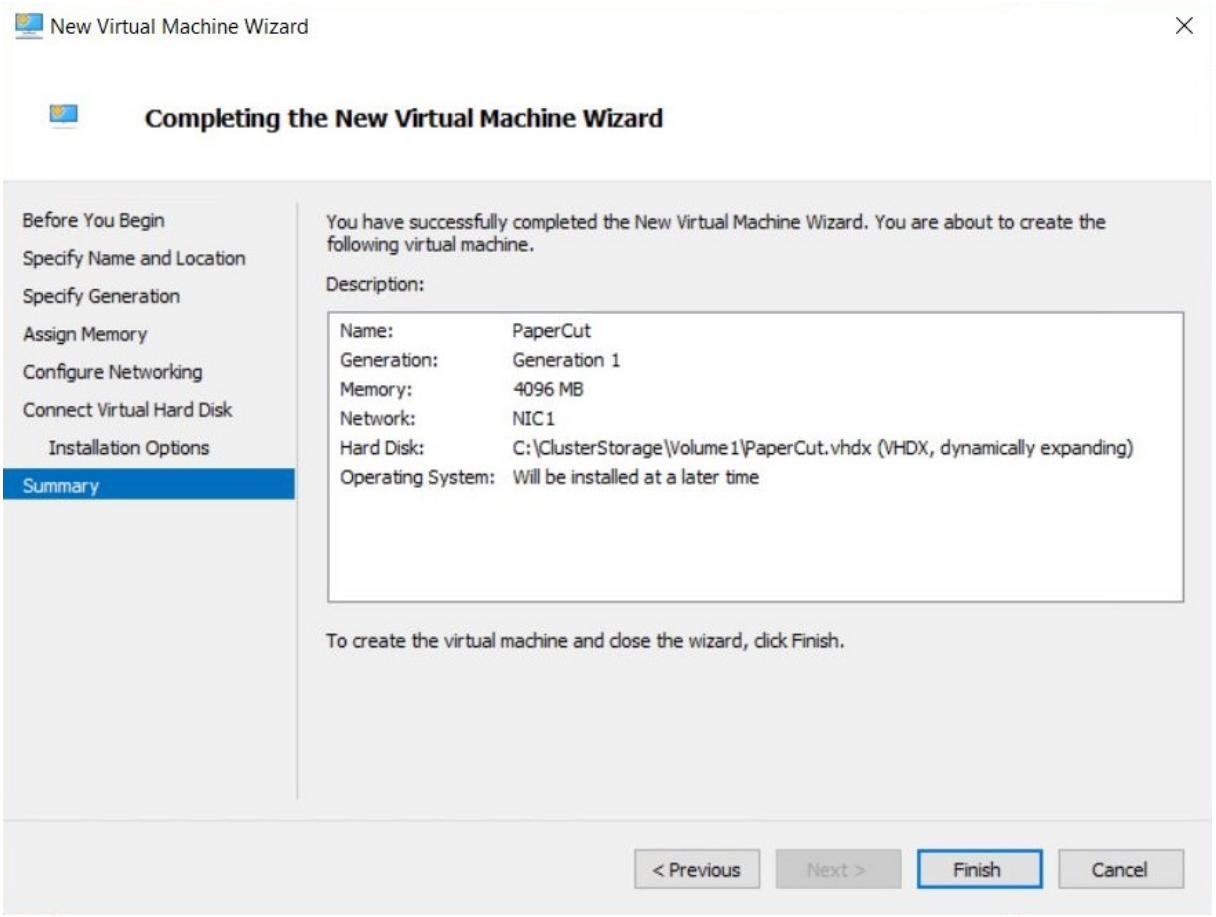

22. Review your selections and if you are happy with them, click **Finish**.

    When the Hyper-V machine has been configured, the **Summary** window displays a Success message.

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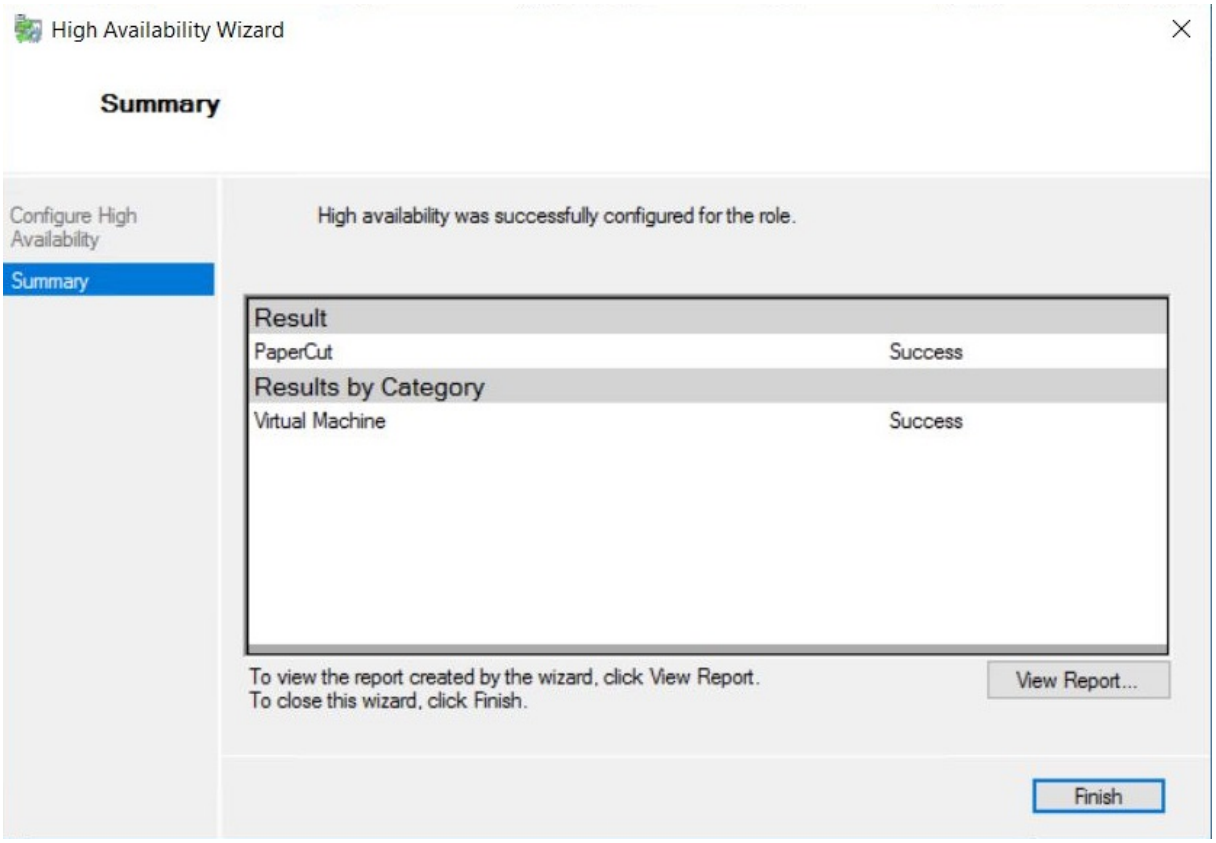
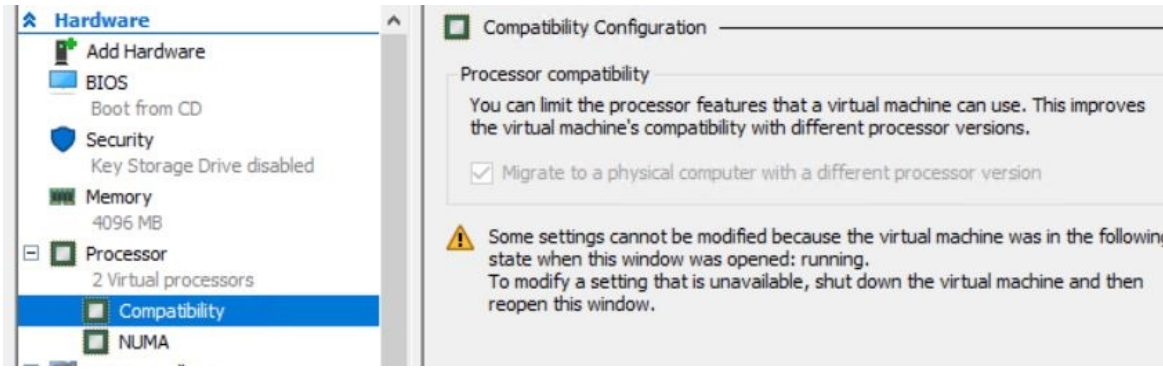


23. Click **Finish**.
24. If your two node machines are running different CPU models, enable processor compatibility:
    a. With the virtual machine turned off, in **Hyper-V Manager**, highlight the machine.
    b. From the **Action** pane select **Settings > Processor**.
    c. Expand **Processor**; then click **Compatibility**.



    d. Select the **Migrate to a physical computer with a different processor** check box.
    e. Click **OK**.
25. Ensure that the new nodes are configured to accept the virtual machine in the event of a failover:

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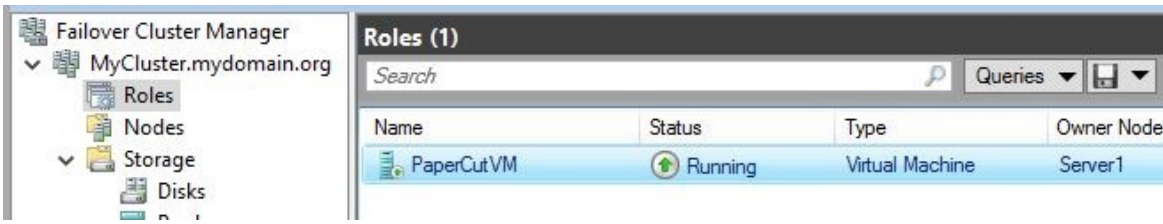
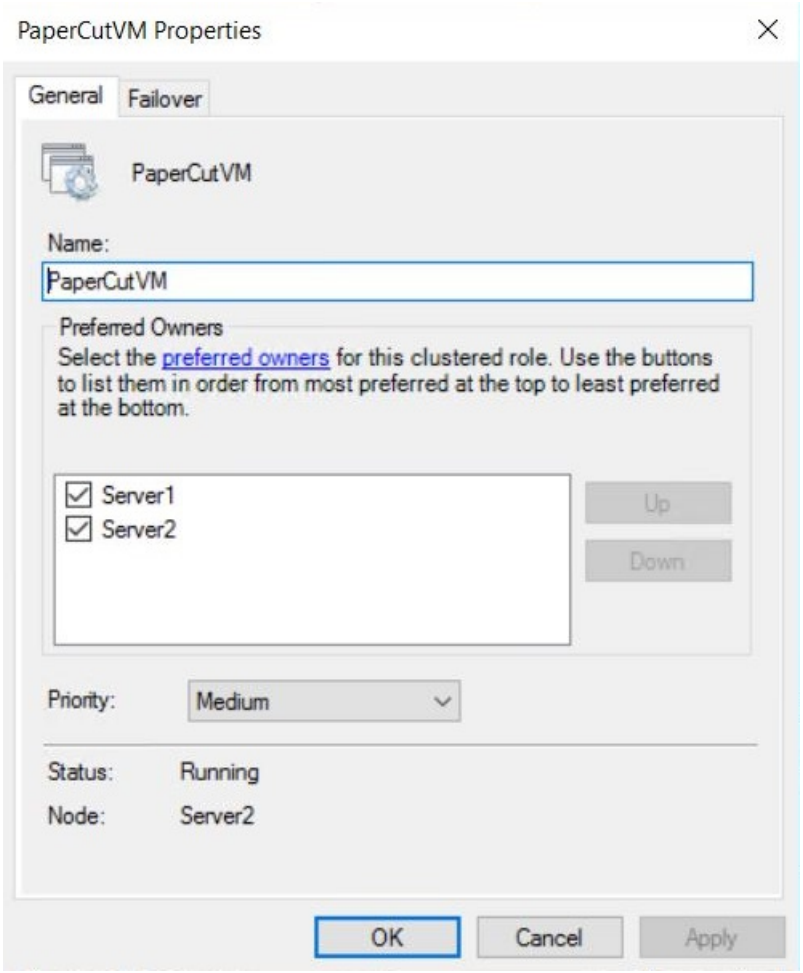
a. In the **Failover Cluster Manager**, select **Roles**.



b. Double-click your virtual machine.



c. On the **General** tab, under **Preferred owners**, select the nodes that you want to manage your virtual machine in the event of a failure.

d. Click **OK**.

Step 5: Set up your print server

1. From the Cluster Manager window start your VM and install Windows.
2. Configure the machine on your network.
3. For testing purposes, turn off Windows Firewall so you can RDP and Ping this machine.
4. Configure your print queues.

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5. Test that printing works successfully:
    a. Check printing on the server.
    b. Map the print queue from a client machine on the network and test printing.
6. When printing is working successfully, test the failover.
    a. In **Failover Cluster Manager**, right-click the VM you have created.
    b. Click **Move**.
    c. Select **Quick Migration > Select Node**.
    d. Select a node that the VM is not currently residing on.

    The VM will now start up on the other node.
7. When the virtual machine status shows that it is running, remote desktop into this machine to ensure it is still operational. Any windows you had open previously should still be running.
8. Install PaperCut NG/MF onto this machine.
9. Send several test print jobs to ensure that PaperCut NG/MF is operating correctly.
10. Install your shared print queues to a client machine.
11. Print a document.
12. Log in to the server node that the PaperCut NG/MF VM is running on; then restart the server.
13. While the server is restarting, from the client machine, send several test print documents to the shared printer.
14. The print jobs are processed and the VM fails over successfully to one of your other nodes.

    HA achieved!

Note:
Don't forget to reapply your firewall services on your machine before deploying into production.

2.8.5.2. Microsoft Failover Cluster Manager (MSFCM) on Windows 2008 R2

Microsoft Windows 2008 R2 offers clustering capabilities through its *Microsoft Failover Cluster Manager (MSFCM)*.

This section documents the setup for Microsoft Failover Cluster Manager. Sites using Veritas Cluster Server (VCS) on Windows or Novell Cluster Services (NCS) on Novell OES Linux should jump to their respective sections.

This section assumes that you have an already installed and working clustered server environment.

Mode 1 is the simplest configuration and is suitable for most organizations. It implements clustering in the front line, that is, the printer and print monitoring layer. The cluster print server is configured as a secondary print server reporting back to a primary PaperCut NG/MF server hosted on another system outside the cluster.

Mode 2 implements clustering on all levels of the application for maximum fault tolerance - In addition to the print queues, the PaperCut NG/MF Application Server is also hosted in the cluster.

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Mode 2 is somewhat more demanding to configure and should only be attempted by organizations with staff experienced with advanced cluster and database management.

Refer to the subsequent sections for an explanation on how to set up *Mode 1* or *Mode 2* in your environment.

Important:
Windows Server 2008 R2 installations might experience a Windows bug where print jobs are not removed from the print queue when completed. For more information, see Windows Server 2008 R2 only. Perform this work around on the clustered print server, not the nodes.

Mode 1 - Clustering at the print layer

Note:
Windows 2012 no longer support high-availability of printing servers using Failover Cluster Manager. Microsoft now only supports printing high availability through the use of highly available VM clusters. This is described in detail in the Microsoft document High Availablity Printing Overview. You should also review Virtual Machine clustering for more information on VM clustering. To set up Mode 1 clustering on Windows 2012 the printer server must be installed on a highly available VM cluster. The remainder of this section described setting up Mode 1 on Windows 2008.

Step 1 - Application Server (primary server) setup

Install the *Application Server* component (**Standard Install** option) on your nominated system. This system is responsible for providing PaperCut NG/MF's web based interface and storing data. In most cases this system will not host any printers and is dedicated to the roll of hosting the PaperCut Application Server. It might be one of the nodes in the cluster; however, a separate system outside the cluster is generally recommended. An existing domain controller, member server or file server will suffice.

Step 2 - Installing the Print Provider components on each node

The *Print Provider* component needs to be separately installed on each node involved in the print spooler cluster. This is done by selecting the **Secondary Print Server** option in the installer. Follow the secondary server set up notes as detailed in Configuring secondary print servers and locally attached printers . Take care to define the correct name or IP address of the nominated Application Server set up in step 1.

Step 3 - Decouple service management from nodes

By default the *Print Provider* component is installed under the management of the node. To hand over management to the cluster, the service start-up type needs to be set to manual. On each node navigate to **Control Panel > Administrative Tools > Services**, locate the `PaperCut Print Provider` service. *Stop* the service and set the start-up type to **Manual**. Repeat for each node in the cluster.

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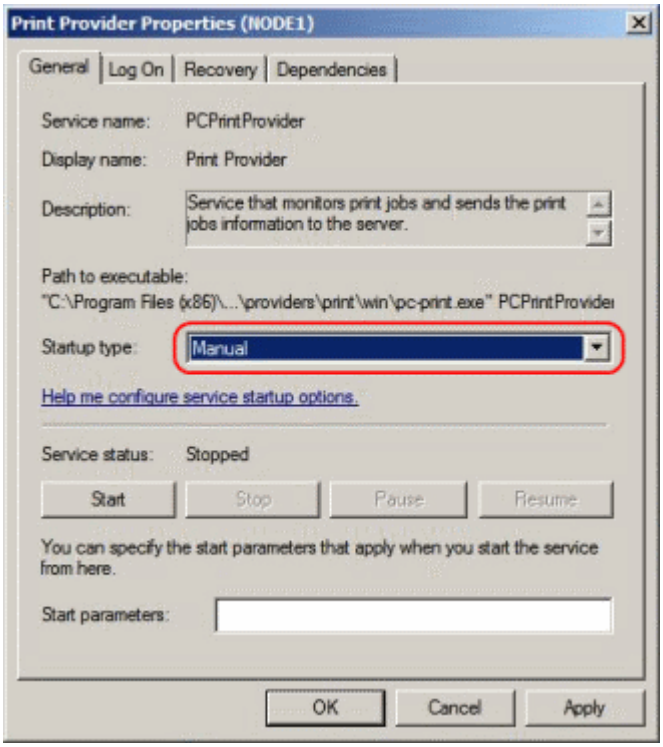
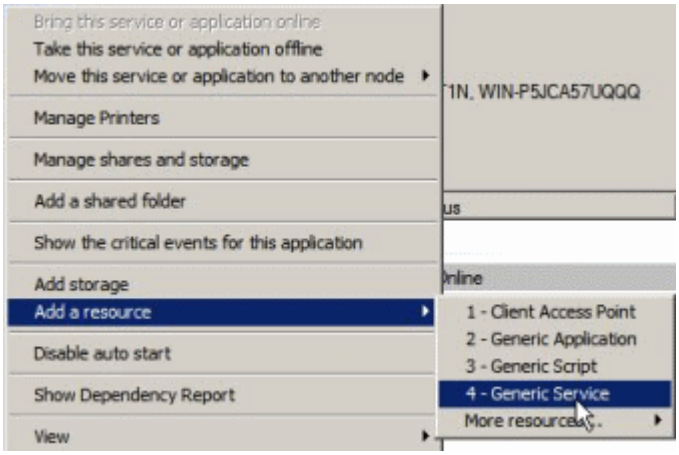


Step 4 - Adding the Print Provider service as a resource under the print spooler's cluster group

1. Open the **Failover Cluster Manager**.
2. Right-click the cluster group hosting the spooler service; then select **Add a resource > 4 - Generic Service**.



3. In the new resource wizard, select the name `PaperCut Print Provider`; then click **Next**.
4. Click **Next** at **Confirmation**.
5. Click **Finish** at **Summary**.
6. Right-click the `PaperCut Print Provider`; then click **Properties**. On the **PaperCut Print Provider Properties** page ensure the **Use Network Name for computer name** option is selected.

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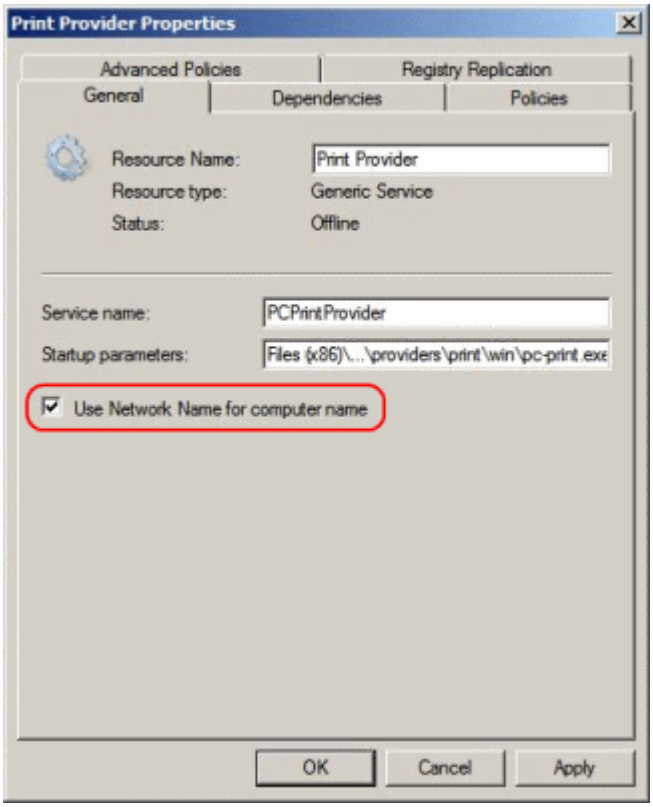

7. Next, click the **Dependencies** tab and ensure the **Print Spooler** is added as a resource.
8. Click **OK**.
9. Right-click the `PaperCut Print Provider`; then click **Bring this resource online**.

Step 5 - Shared active job spool

To ensure the state of jobs currently active (e.g. held in a hold/release queue) are not lost during a failover event, PaperCut NG/MF is able to save job state in a shared drive/directory. If a shared disk resource is available and can be added to the cluster resource, PaperCut can use this to host a shared spool directory to ensure no active job state is lost.

1. Add a shared drive to the cluster resource. e.g. (Q: drive). It is advisable to use the same drive as used for the shared print spool directory.
2. Create a directory in this drive called `PaperCut\Spool`
3. On *each* node, edit the file: `[app-path]/providers/print/win/print-provider.conf` and add a line pointing to the shared active job spool directory:

   ```
   SpoolDir=Q:\\PaperCut\\Spool
   ```

   Change the drive letter as appropriate.

> **Important:**
> If running an "Active-Active" print cluster you must use a separate active job spool directory for each node. To configure this use the `%service-name%` value in the `SpoolDir` setting. The `%service-name%` value is replaced by the service

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name of the running **PaperCut Print Provider** instance. e.g.

```
SpoolDir=Q:\\PaperCut\\Spool\\%service-name%
```

See below for details on "Active-Active".

4. Restart the cluster resource to ensure the change is picked up.

Step 6 - Test

Perform operations to verify that:

1. Print jobs are logged as expected.
2. There is no error message in the Print Providers text log located at: `C:\Program Files\PaperCut NG/MF\providers\print\win\print-provider.log` on each node.

Active/Active clustering - multiple virtual servers

On large networks it is common to distribute load by hosting print spooler services under two or more virtual servers. For example, two virtual servers might each host half of the organization's printers and share the load. This is sometimes referred to as Active/Active clustering - albeit not an entirely correct term, as the print spooler is still running in Active/Passive.

Virtual servers cannot share the same service on any given node. For this reason if the virtual servers share nodes, you need to manually install the `PaperCut Print Provider` service a second time under a different name. You can do this with the following command line:

```
cd \Program Files\PaperCut NG/MF\providers\print\win pc-print.exe
PCPrintProvider2 /install
```

The argument preceding `/install` is the unique name to assign to the service. The recommended procedure is to suffix the standard service name with a sequential number. Repeat this on each physical node. Use a unique service name for each "active" virtual server hosted in the cluster group.

Make sure that you have unique `SpoolDir` settings for each node of your cluster. Ensure that the `SpoolDir` setting in the `print-provider.conf` file has a `%service-name%` expansion variable as explained above. This ensures that each service has it's own spool directory.

Mode 2 - Clustering at all application layers

Mode 2 implements failover clustering at all of PaperCut NG/MF's Service Oriented Architecture software layers, including:

- Clustering at the Print monitoring layer
- Clustering at the Application Server layer
- Optional clustering at the database layer

Mode 2 builds upon *Mode 1* by introducing failover (Active/Passive) clustering in the *Application Server* layer. This involves having an instance of the Application Server on each of the cluster nodes. When one node fails, the other automatically takes over the operation. Both instances use a share

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data source in the form of an external database (see Deployment on an external database (RDBMS)). Large sites should consider using a clustered database such as Microsoft SQL Server.

This section assumes that you have an already installed and working Service and Application group hosting a clustered printing environment.

Step 1 - Application Server installation

On one of the cluster's nodes, install the PaperCut Application Server component by selecting the **Standard Install** option in the installer. Follow the setup wizard and complete the process of importing all users into the system.

Step 2 - Convert the system over to an external database

The system needs to be configured to use an external database as this database is shared between both instances of the Application Server. Convert the system over to the required external database by following the procedure detailed in Deployment on an external database (RDBMS). The database can be hosted on another system, or inside a cluster. As per the external database set up notes, reference the database server by IP address by entering the appropriate connection string in the `server.properties` file.

Step 3 - Setup of 2nd node

Repeat steps 1 and 2 on the second and any subsequent cluster nodes.

Step 4 - Distributing application license

Install your license on your 2nd node and any subsequent cluster nodes. To do this:

1. Log in to the Admin web interface by browsing to `http://[IP-Address-Of-Your-Node]:9191/admin`.
2. Click the **About** tab.
3. In the **Register** area, click **Browse**.
4. Locate the license file.
5. Click **Install license**.
6. Verify that the license information is correctly listed on the **About** page.

Step 5 - Decouple service management from the nodes

By default the `PaperCut Application Server` component is installed under the management of the node. It needs to be managed inside the cluster, so set the service's start-up type to manual. On each node navigate to **Control Panel > Administrative Tools > Services** locate the **PaperCut Application Server**. Stop the service and set its start-up type to **Manual**. Repeat this on all nodes.

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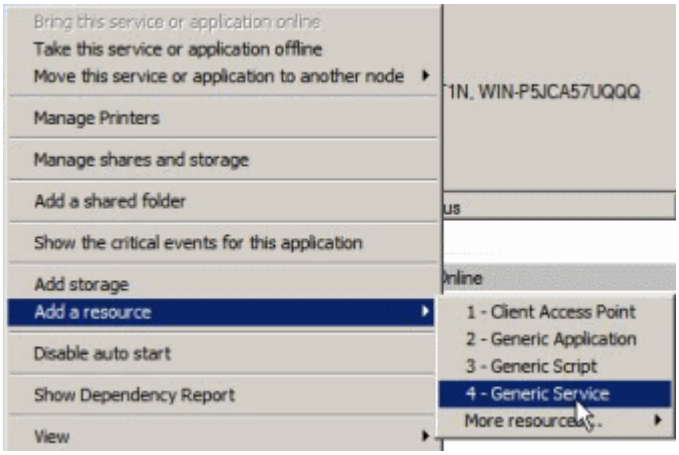
Step 6 - Create a new Services and Applications group

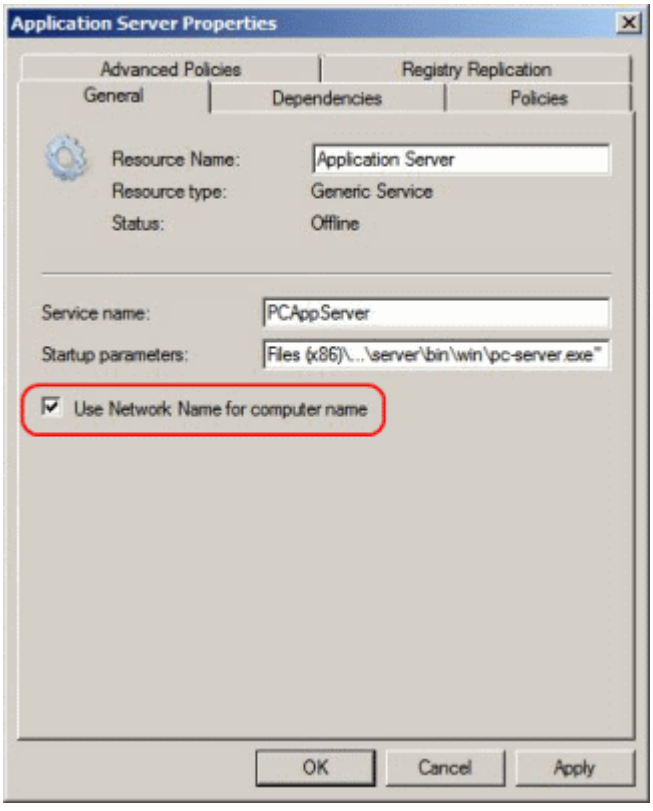
Create a new Services and Applications group containing the two nodes. Make note of the **IP Address** that you assign as you will use it later. Add the Generic Service **PaperCut Application Server**. Give the Client Access Point an appropriate title such as `PaperCutAppCluster`.



This Services and Applications group is separate to the existing clustered printing environment. It is recommended to set up two Services and Application groups where you can later set the node affinity to better distribute the application load across nodes.

Step 7 - Configure PaperCut Application Server

1. Right-click the `PaperCut Application Server`; then click **Properties**.
2. On the **PaperCut Application Server Properties** page, select the **Use Network Name for computer name**.



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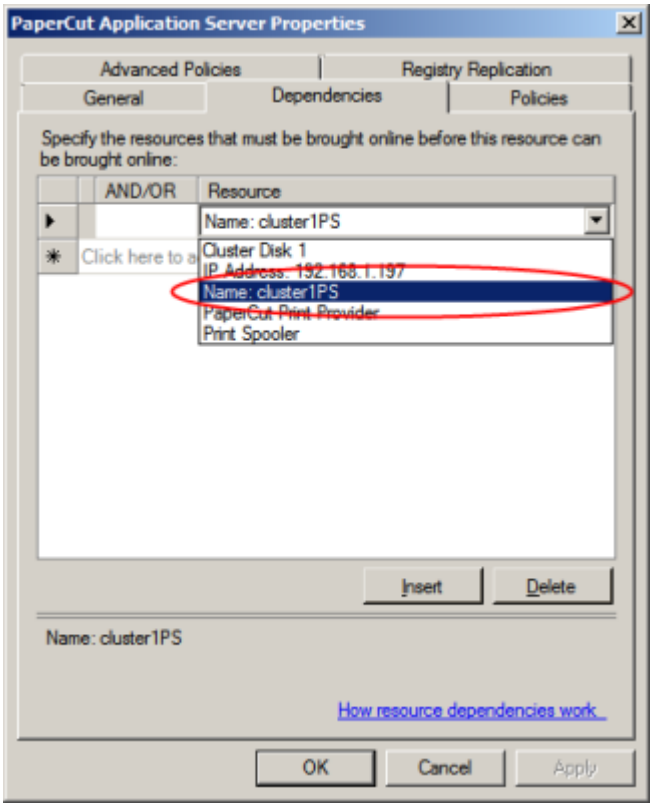
3. On the **Dependencies** tab make sure the Service and Application group is added as a *Resource*.



4. Click **OK**.

Step 8 - Confirm PaperCut Application Server active

Right-click the Service and Applications group; then select Bring online. Wait until the Application Server has started, then verify that you can access the system by pointing a web browser to:

```
http://[Virtual Server Name]:9191/admin
```

Log in, and perform some tasks such as basic user management and User/Group Synchronization to verify the system works as expected.

Step 9 - Set up the Print Provider layer

Set up the Print Provider as described in Mode 1 - Clustering at the print layer. The exception being that the IP address of the Application Server is the IP address assigned to the Virtual Server.

Step 10 - Client configuration

The client and Release Station programs are located in the directories:

- `[app-path]/client/`
- `[app-path]/release/`

These directories contain configuration files that instruct the client to the whereabouts of the server. Update the IP address and the server name in the following set of files to the Virtual Server's details (Name and IP address):

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- `[app-path]/client/win/config.properties`
- `[app-path]/client/linux/config.properties`
- `[app-path]/client/mac/PCClient.app/Contents/Resources/config.properties`
- `[app-path]/release/connection.properties`

Edit the files using Notepad or equivalent and repeat this for each node. Also see Client/workstation configuration.

Step 11 - Test

Mode 2 setup is about as complex as it gets! Take some time to verify all is working and that PaperCut NG/MF is tracking printing on all printers and all virtual servers.

Advanced: Load distribution and independent groups

Separating these resources into to groups, running on different IP addresses allows you to set up different node affinities so the two groups usually run on separate physical nodes during normal operation. This ensures the load is spread across multiple nodes.

To make this change after setting up the single group Mode 2 configuration:

1. Set the **Preferred owners** of each Services and Applications group to different physical nodes.
2. Restart or bring on line each group, and independently test operation and operation after fail-over.

Clustering tips

1. Take some time to simulate node failure. Monitoring can stop for a few seconds while the passive server takes over the role. Simulating node failure is the best way to ensure both sides of the Active/Passive setup is configured correctly.
2. It is important that the version of PaperCut running on each node is identical. Ensure that any version updates are applied to all nodes so versions are kept in sync.
3. The PaperCut installation sets up a read-only share exposing client software to network users. If your organization is using the zero-install deployment method, the files in this share are accessed each time a user logs onto the network. Your network might benefit from exposing the contents of this share via a clustered file share resource.
4. PaperCut regularly saves transient state information (such as print job account selections) to disk so that this state can be recovered on server restart. If failing over to a new cluster server, you should ensure this state information is saved to a location available to the new server.

   By default the state information is located in `[app-path]/server/data/internal/state/systemstate`. You can change this

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location if required by setting the property `server.internal-state-path` in your server.properties file.

Additional configuration to support Web Print

By default the Application Server looks in `[app-path]\server\data\web-print-hot-folder` for Web Print files. This location is generally available only on one node in the cluster. To support Web Print in a cluster, add a **Shared Folder** on the **Shared Storage** in your cluster. This can be done on the same disk that the spool files reside and the Print Provider point to.

To change this location, use the **Config editor** and modify the `web-print.hot-folder` key.

1. Add a **Shared Folder** on the **Shared Storage**, an example would be `E:\web-print-hot-folder` and share it as `\\clustername\web-print-hot-folder\`.
2. In the Admin web interface, click the **Options** tab.
3. In the **Actions** menu, select **Config editor**.
4. Modify `web-print.hot-folder` to `E:\web-print-hot-folder`
5. Map your selected network drive on the Web Print Sandbox machine to `\\clustername\web-print-hot-folder\`
6. Add all relevant printer queues from `\\clustername\web-print-hot-folder\` to the Web Print Sandbox server.

Additional configuration to support Print Archiving

If you have enabled Print Archiving (viewing and content capture), the Applications Server stores archived print jobs in `[app-path]\server\data\archive`. This location is generally only available on one node in the cluster. To support Print Archiving in a cluster, add a **Shared Folder** on the **Shared Storage** in your cluster. This location must be accessible to all cluster nodes and also any print servers that are collecting print archives.

For instructions for moving the archive location see Phase 1: Moving the central archive:. This describes how to configure both the Application Server and your print servers to use the same shared storage location.

2.8.5.3. Microsoft Cluster Server (MSCS) on Windows

Microsoft Windows 2003/2008 offers clustering capabilities through its *Microsoft Cluster Server (MSCS)*

This section discusses both Clustering and high availability and Clustering and high availability configuration in Microsoft Cluster Server. For sites using Microsoft Failover Cluster Manager (MSFCM) on Windows 2008 R2, Veritas Cluster Server (VCS) on Windows or Novell Cluster Services (NCS) on Novell OES Linux, see the following sections.

This section assumes that you have an already installed and working clustered printing environment.

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Mode 1 - Clustering at the Print Provider layer

The *PaperCut Print Provider* is the component that integrates with the print spooler service and provides information about the print events to the *PaperCut Application Server*. At a minimum, in a cluster environment, the *Print Provider* component needs to be included and managed within the cluster group. The *Application Server* component (The **Standard Install** option in the installer) is set up on an external server outside the cluster. Each node in the cluster is configured to report back to the single Application Server using XML web services over TCP/IP.

Step 1 - Application Server (primary server) setup

Install the *Application Server* component (**Standard Install** option) on your nominated system. This system is responsible for providing PaperCut NG/MF's web based interface and storing data. In most cases, this system will not host any printers and is dedicated to the roll of hosting the PaperCut Application Server. It can be one of the nodes in the cluster; however, a separate system outside the cluster is generally recommended. An existing domain controller, member server or file server will suffice.

Step 2 - Installing the Print Provider components on each node

The *Print Provider* component needs to be separately installed on each node involved in the print spooler cluster. This is done by selecting the **Secondary Print Server** option in the installer. Follow the secondary server set up notes as detailed in Configuring secondary print servers and locally attached printers . Take care to define the correct name or IP address of the nominated Application Server set up in step 1.

Step 3 - Decouple service management from nodes

By default the *Print Provider* component is installed under the management of the node. To hand over management to the cluster, the service start-up type needs to be set to manual. On each node navigate to **Control Panel > Administrative Tools > Services**, locate the `PaperCut Print Provider` service. *Stop* the service and set the start-up type to **Manual**. Repeat for each node in the cluster.

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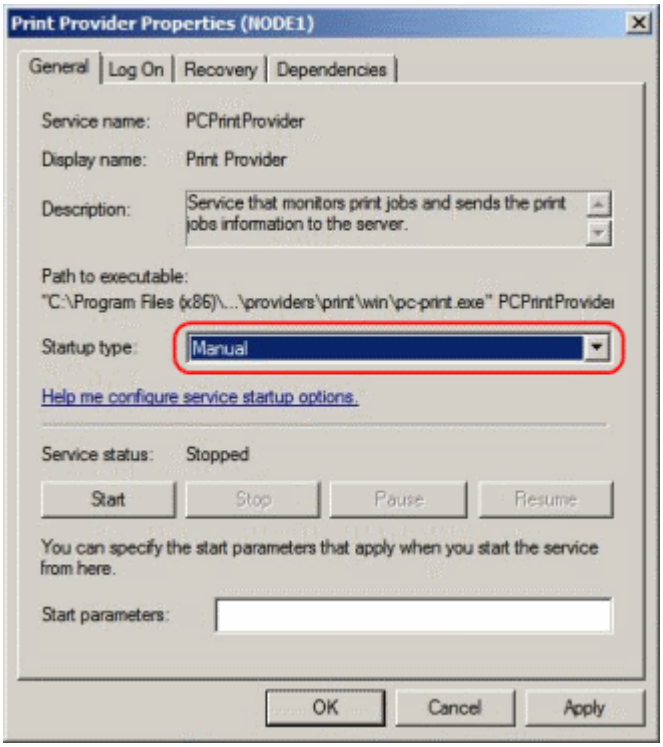
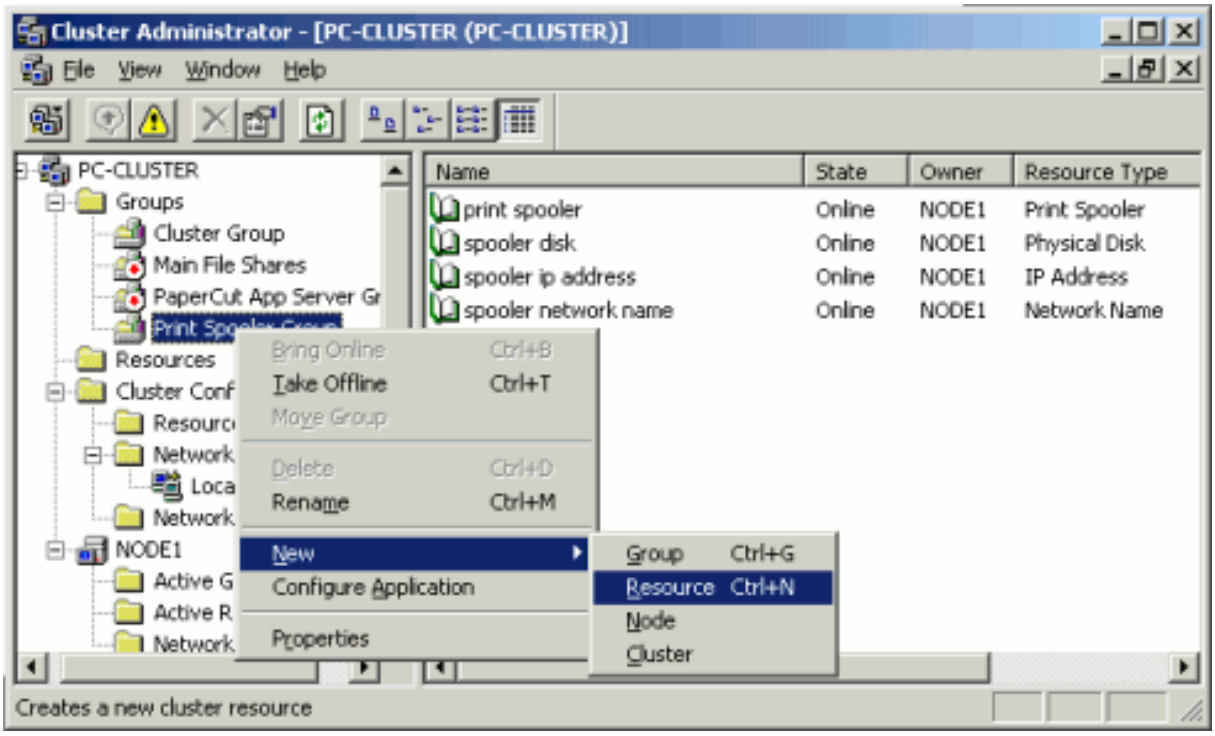


Step 4 - Adding the Print Provider service as a resource under the print spooler's cluster group

1. Open the **Cluster Administrator**.
2. Right-click the cluster group hosting the spooler service; then select **New > Resource**.



3. In the new resource wizard, enter a name of `PaperCut Print Provider`, select a resource type of **Generic Service**; then click **Next**.

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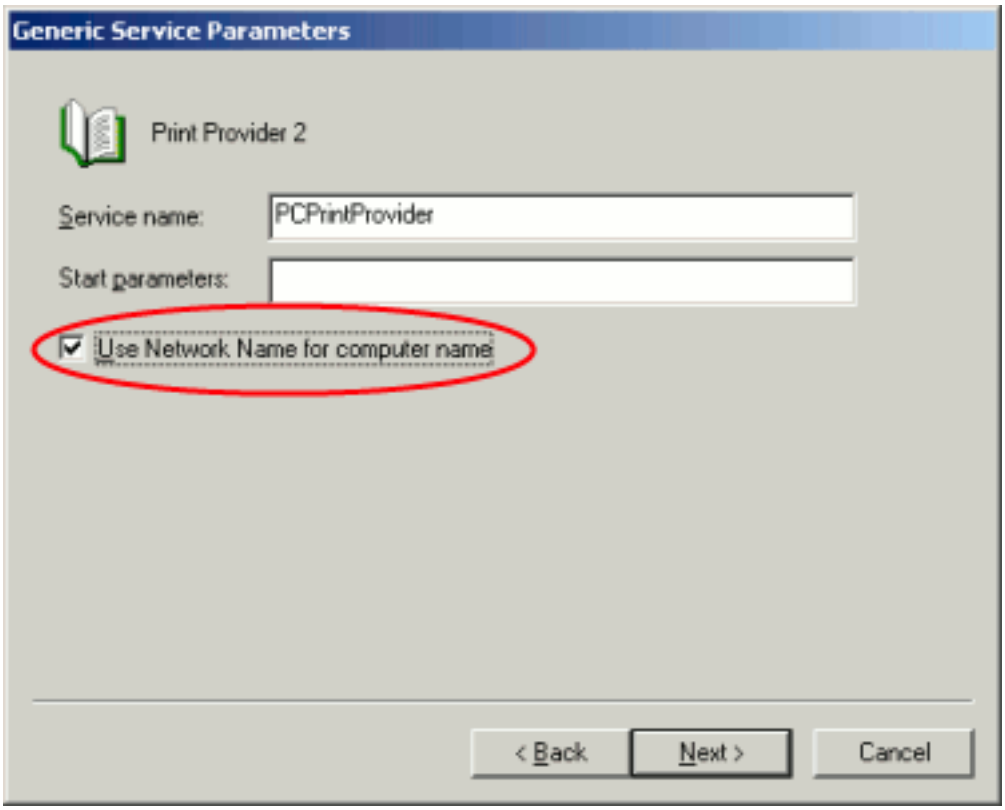
4. Click **Next** at **Possible Owners**.
5. Ensure that the `Print Spooler Service` resource is set as a required dependency, then click **Next**.
6. On the **Generic Service Parameters** page, enter a service name of `PCPrintProvider` and ensure the **Use Network Name for computer name** check box is selected. Click **Next**.



7. Click **Finish** at the **Registry Replication** page.

Step 5 - Shared active job spool

To ensure the state of jobs currently active (e.g. held in a hold/release queue) are not lost during a failover event, PaperCut NG/MF is able to save job state in a shared drive/directory. If a shared disk resource is available and can be added to the cluster resource, PaperCut can use this to host a shared spool directory to ensure no active job state is lost.

1. Add a shared drive to the cluster resource. e.g. (Q: drive). It is advisable to use the same drive as used for the shared print spool directory.
2. Create a directory in this drive called `PaperCut\\Spool`.
3. On *each* node, edit the file: `[app-path]/providers/print/win/print-provider.conf` and add a line pointing to the shared active job spool directory:
   `SpoolDir=Q:\\PaperCut\\Spool`
   Change the drive letter as appropriate.

> **Important:**
> If running an "Active-Active" print cluster you must use a separate active job spool

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directory for each node. To configure this use the `%service-name%` value in the `SpoolDir` setting. The `%service-name%` value is replaced by the service name of the running **PaperCut Print Provider** instance. e.g.

```
SpoolDir=Q:\\PaperCut\\Spool\\%service-name%
```

See below for details on "Active-Active"

Step 6 - Bring up all cluster resources and test

Perform operations to verify that:

1. Print jobs log as expected.
2. There is no error message in the Print Providers text log located at: `C:\Program Files\PaperCut NG/MF\providers\print\win\print-provider.log` on each node.

Active/Active clustering - multiple virtual servers

On large networks it is common to distribute load by hosting print spooler services under two or more virtual servers. For example, two virtual servers can each host half of the organization's printers and share the load. This is sometimes referred to as Active/Active clustering - albeit not an entirely correct term, as the print spooler is still running in Active/Passive.

Virtual servers cannot share the same service on any given node. For this reason if the virtual servers share nodes, manually install the `PaperCut Print Provider` service a second time under a different name. This can be done with the following command line:

```
cd \Program Files\PaperCut NG/MF\providers\print\win
pc-print.exe PCPrintProvider2 /install
```

The argument preceding `/install` is the unique name to assign to the service. The recommended procedure is to suffix the standard service name with a sequential number. Repeat this on each physical node. Use a unique service name for each "active" virtual server hosted in the cluster group.

Make sure that you have unique `SpoolDir` settings for each node of your cluster. Ensure that the `SpoolDir` setting in the `print-provider.conf` file has a `%service-name%` expansion variable as explained above. This ensures that each service has it's own spool directory.

Mode 2 - Clustering at all application layers

Mode 2 implements failover clustering at all of PaperCut NG/MF's Service Oriented Architecture software layers, including:

- Clustering at the Print monitoring layer
- Clustering at the Application Server layer
- Optional clustering at the database layer

Mode 2 builds upon *Mode 1* by introducing failover (Active/Passive) clustering in the *Application Server* layer. This involves having an instance of the Application Server on each of the cluster nodes.

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When one node fails, the other automatically takes over the operation. Both instances use a shared data source in the form of an external database (see Deployment on an external database (RDBMS)). Large sites should consider using a clustered database such as Microsoft SQL Server.

This section assumes that you have an already installed and working clustered printing environment.

Step 1 - Application Server installation

On one of the cluster's nodes, install the PaperCut Application Server component by selecting the **Standard Install** option in the installer. Follow the set up wizard and complete the process of importing all users into the system.

Step 2 - Convert the system over to an external database

The system needs to be configured to use an external database as this database is shared between both instances of the Application Server. Convert the system over to the required external database by following the procedure detailed in Deployment on an external database (RDBMS). The database can be hosted on another system, or inside a cluster. As per the external database setup notes, reference the database server by IP address by entering the appropriate connection string in the `server.properties` file.

Step 3 - Setup of 2nd node

Repeat steps 1 and 2 on the second cluster node.

Step 4 - Distribute application license

Install your license on each node in your cluster.

1. In the Admin web interface, click the **About** tab.
2. In the **Register** area, click **Browse**.
3. Locate the license file.
4. Click **Install License.**
5. Verify that the license information is correctly listed in the **About** page.

Step 5 - Decouple service management from the nodes

By default the `PaperCut Application Server` component is installed under the management of the node. It needs to be managed inside the cluster, so set the service's start-up type to manual. On each node navigate to **Control Panel > Administrative Tools > Services** locate the **PaperCut Application Server**. *Stop* the service and set its start-up type to **Manual**. Repeat this on each node.

Step 6 - Create a new cluster group

Designate the `PaperCut Application Server` to run inside its own cluster group. Create a new cluster group containing the each of the nodes. Add an **IP Resource** and a **Network Name**

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resource. Give the network name resource an appropriate title such as `PCAppSrv`.

The need for a new cluster group is not required. It is, however, recommended as it gives the most flexibility in terms of load balancing and minimizes the potential for conflicts.

Step 7 - Adding the PaperCut Application Service as a resource managed under the new cluster group.

1. Open the **Cluster Administrator**.
2. Right-click the cluster group hosting the spooler service; then select **New > Resource**.
3. In the new resource wizard, enter a name of `PaperCut Application Server`, select a resource type of **Generic Service**, then click **Next**.
4. Click **Next** at **Possible Owners** page.
5. Click **Next** at **Dependency** page.
6. On the **Generic Service Parameters** page, enter a service name of `PCAppServer`, ensure the **Use Network Name for computer name** option is *checked*; then click **Next**.
7. Click **Finish** at the **Registry Replication** page.

Step 8 - Bring the cluster group online

Right-click the cluster group; then select **Bring online**. Wait until the Application Server has started, then verify that you can access the system by pointing a web browser to :

```
http://[Virtual Server Name]:9191/admin
```

Log in, and perform some tasks such as basic user management and User/Group Synchronization to verify the system works as expected.

Step 9 - Set up the Print Provider layer

Interface the *PaperCut Print Provider* layer with the clustered spooler service by following the same setup notes as described for *Mode 1*. The exception being that the IP address of the Application Server is the IP address assigned to the Virtual Server assigned in step 6.

Step 10 - Client configuration

The client and Release Station programs are located in the directories:

- `[app-path]/client/`
- `[app-path]/release/`

These directories contain configuration files that instruct the client to the whereabouts of the server. Update the IP address and the server name in the following set of files to the Virtual Server's details (Name and IP address):

- `[app-path]/client/win/config.properties`
- `[app-path]/client/linux/config.properties`

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- `[app-path]/client/mac/PCClient.app/Contents/Resources/config.properties`
- `[app-path]/release/connection.properties`

Edit the files using Notepad or equivalent and repeat this for each node. Also see Client/workstation configuration.

Step 11 - Test

Mode 2 setup is about as complex as it gets! Take some time to verify all is working and that PaperCut NG/MF is tracking printing on all printers and all virtual servers.

Advanced: Load distribution and independent groups

You can split the two application layers (Resources) into two separate Cluster Groups:

- Group 1: Containing only the `PaperCut Application Server` service.
- Group 2: Containing the `PaperCut Print Provider` and `Print Spooler` services. These services are dependent and must be hosted in the same group.

Separating these resources into to groups allows you to set up different node affinities so the two groups usually run on separate physical nodes during normal operation. The advantage is that the load is spread further across the systems and a failure in one group will not necessarily fail-over the other.

To make this change after setting up the single group Mode 2 configuration:

1. Change the `ApplicationServer=` option in `[app-path]/providers/print/win/print-provider.conf` on each physical node to the IP or DNS name of the virtual server.
2. Create a new group called `PaperCut Application Server Group`.
3. Set the **Preferred owners** of each group to different physical nodes.
4. Restart or bring on line each group, and independently test operation and operation after fail-over.

Clustering tips

1. Take some time to simulate node failure. Monitoring can stop for a few seconds while the passive server takes over the role. Simulating node failure is the best way to ensure both sides of the Active/Passive setup is configured correctly.
2. It is important that the version of PaperCut running on each node is identical. Ensure that any version updates are applied to all nodes so versions are kept in sync.
3. The PaperCut installation sets up a read-only share exposing client software to network users. If your organization is using the zero-install deployment method, the files in this share are accessed each time a user logs onto the network. Your network might benefit from exposing the contents of this share via a clustered file share resource.

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4. PaperCut regularly saves transient state information (such as print job account selections) to disk so that this state can be recovered on server restart. If failing over to a new cluster server, you should ensure this state information is saved to a location available to the new server.

   By default the state information is located in `[app-path]/server/data/internal/state/systemstate`. You can change this location if required by setting the property `server.internal-state-path` in your server.properties file.

Additional configuration to support Web Print

By default the Application Server looks in `[app-path]\server\data\web-print-hot-folder` for Web Print files. This location is generally only available on one node in the cluster. To support Web Print in a cluster, add a **Shared Folder** on the **Shared Storage** in your cluster. This can be done on the same disk that the spool files reside and the Print Provider points to.

To change this location, use the **Config Editor** and modify the `web-print.hot-folder` key.

1. Add a **Shared Folder** on the **Shared Storage**, an example would be `E:\web-print-hot-folder` and share it as `\\clustername\web-print-hot-folder\`.
2. Click the **Options** tab.

   The **General** page is displayed.
3. In the **Actions** menu, click **Config editor (advanced)**.

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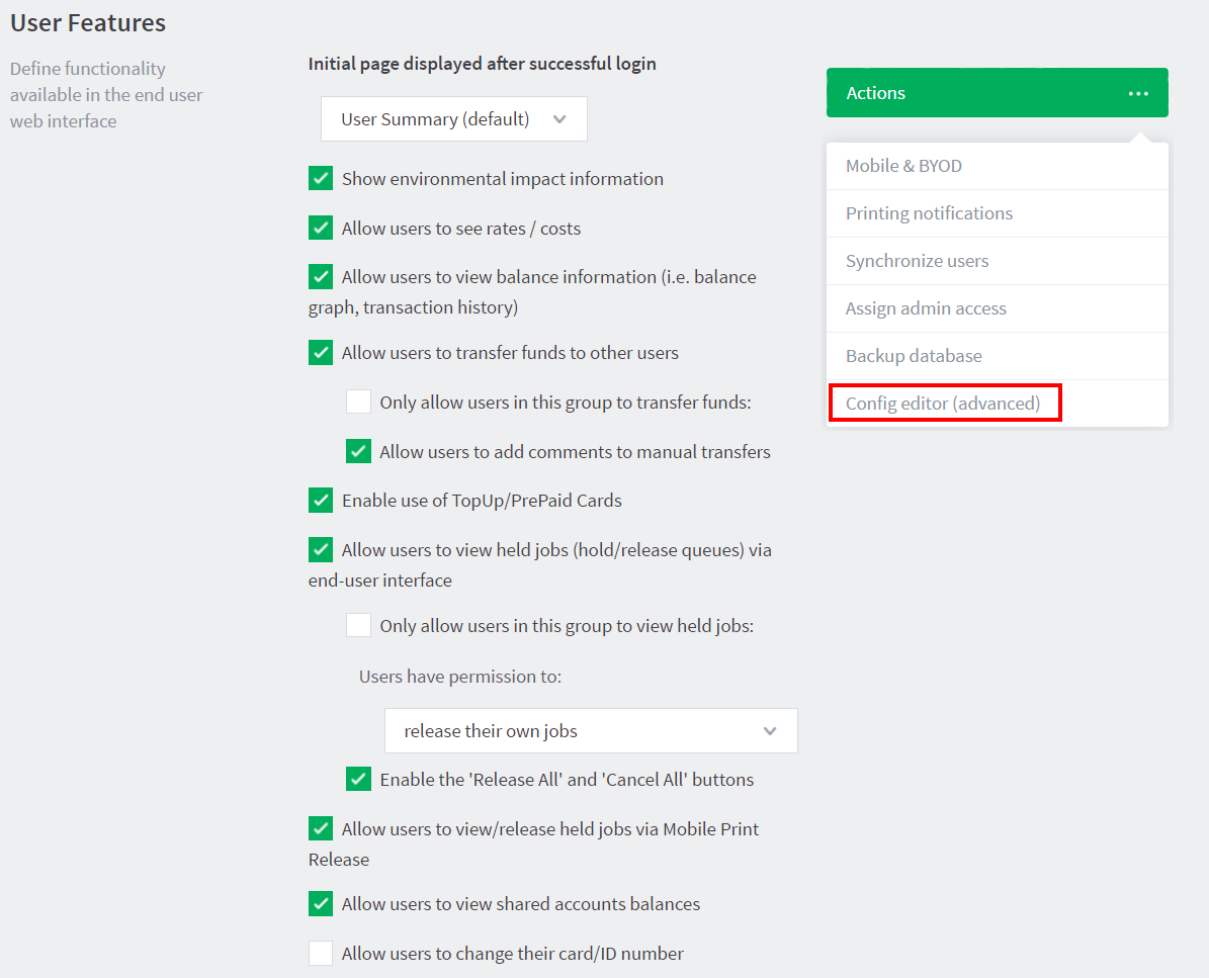

The **Config Editor** page is displayed.

4. Modify `web-print.hot-folder` to `E:\web-print-hot-folder`
5. Map your selected network drive on the Web Print Sandbox machine to `\\clustername\web-print-hot-folder\`
6. Add all relevant printer queues from `\\clustername` to the Web Print Sandbox server.

Additional configuration to support Print Archiving

If you have enabled Print Archiving (viewing and content capture), the Applications Server stores archived print jobs in `[app-path]\server\data\archive`. This location is generally available only on one node in the cluster. To support Print Archiving in a cluster, add a **Shared Folder** on the **Shared Storage** in your cluster. This location must be accessible to all cluster nodes and also any print servers that are collecting print archives.

For instructions for moving the archive location see Phase 1: Moving the central archive:. This describes how to configure both the Application Server and your print servers to use the same shared storage location.

2.8.5.4. Virtual Machine clustering

Virtual Machine (VM) technologies, such as VMWare, Microsoft Hyper-V are becoming increasingly popular. They provide great flexibility in deploying servers within an organization. VM implementations can also provide high-availability through the use of VM clusters. When a VM is

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running in a highly available VM cluster, any failure of the physical hardware does not affect the running VM as it is seemlessly transferred to another node in the cluster.

Implementing high-availability using VM infrastructure is much simpler to install and manage than using the built-in operating system and application clustering support. You set up your VM instances and the VM infrastructure ensures they continue to run uninterrupted.

This allows you to set up PaperCut NG/MF in the same way as on a physical server, but allow the VM infrastructure to provide the high availability.

This section discusses a generic clustered Virtual Machine setup.

PaperCut NG/MF offers great flexibility and allows you to easily structure your installation into physical multi-tiered clustered components.

Clustering at Virtual Machine level offers these advantages over other traditional clustering setups:

- Your software, drivers, settings, etc. are installed and configured once, in a single VM
- Depending on your VM infrastructure, when a physical node fails the VM can be shifted to another node with marginal or no downtime
- Dramatically simplified backup processes
- Disaster recovery capabilities are inherently available

Virtual Machine hosts can automatically detect when a VM crashes or becomes unresponsive. You should consider whether you will augment this with application level monitoring. Although the VM might be running normally, the underlying application can have problems and application level monitoring can detect this. Ways to perform application level monitoring include (but not limited to):

- Loading an Application Server URL to test server is running
- IP pings
- Checking that PaperCut NG/MF services are running

Define your VM clustering environment

Define your Virtual Machine Vendor/Product and how you want configure the VM cluster for high availability.

There are many VM deployment strategies you can leverage depending on the VM platform you are utilizing, including VMs that might be hosted in different physical boxes, or even in different sites, which might configure a typical Disaster Recover (DR) scenario.

When selecting a VM product, it's particularly important to consider the following product features:

- Fault Tolerance (FT): FT provides continuous availability for virtual machines by automatically creating and maintaining a secondary virtual machine that is identical to the primary virtual machine.
- High Availability (HA): Should a VM fail, you can make a new VM available minimizing down time. Generally, FT is a functionality added on top of HA that provides seamless switch over if no loss of state.
- Application High Availability (App HA): It's important that your VM vendor product offers

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Application Level monitoring. If the application fails, you can make a new VM available minimizing down time.

- Data Replication and Backup: Consider features on how the application data can be backup and restored. Generally tape based backups are slow and can very often get corrupted. Replication of in memory data in case of FT or Disaster Recovery (DR) features might also play an important role. Specific proprietary algorithms for memory segments replication usually reduce the bandwidth needs and are very efficient.

VM clustering setup

There are many ways in which you can deploy PaperCut on VM infrastructure. Consider the following for implementing a VM-based clustered PaperCut installation.

Mode 1 - Clustering at the print layer

Set up and configure print servers as required in your VM environment, and configure them for VM high availability. You then just need to install the PaperCut secondary server components to monitor printing on the print servers. See Configuring secondary print servers and locally attached printers.

Tip:
Microsoft have a guide to high availability printing that discusses the set up of printing in highly available VM enironments (in particular Hyper-V). See the Microsoft High Availablity Printing Overview.

Mode 2 - Clustering at the Application Server layer

Setup and configure a new server in your VM infrastructure to host the Application Server component. Configure this VM with high-availability. Then install the PaperCut Application Server as per the normal setup process.

You can then choose to set up your print servers for high availablity as described in Mode 1 - Clustering at the Print Layer.

2.8.5.5. Veritas Cluster Server (VCS) on Windows

This section discusses configuring PaperCut NG/MF on a Veritas Cluster Server (VCS). The section provides a brief overview and is designed to supplement guidance from the PaperCut NG/MF development team. If you are about to commence a production deployment on VCS, please feel free to get in touch with the development team for further assistance if required.

Note that Clustering and high availability only is supported for deploying on VCS.

This section assumes that you have an already installed and working clustered printing environment.

Mode 1 - Clustering at the print layer

The `PaperCut Print Provider` is the component that integrates with the `Print Spooler` service and provides information about the print events to the *PaperCut Application Server*. At a minimum, in a cluster environment, the *PaperCut Print Provider* component needs to be

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included and managed within the cluster group. The *PaperCut Application Server* component (The **Standard installation (primary server)** option in the installer) is set up on an external server outside the cluster. Each node in the cluster is configured to report back to the single Application Server using XML web services over TCP/IP.

Single virtual server (Active/Passive)

PaperCut NG/MF supports both Active/Passive and virtual Active/Active in VCS. This section discusses configurating PaperCut NG/MF on a single virtual server running Active/Passive. If your organization hosts mutliple virtual servers, see the following section covering Active/Active.

Step 1 - Set up the cluster, print spooler and printers

First, set up and verify that the cluster and print server is working as expected. Fully configure and test the system s before proceeding to the next step and installing PaperCut NG/MF.

Step 2 - Set up the PaperCut Application Server (primary server) on a system outside the cluster

Install the `PaperCut Application Server` component (**Standard installation** option) on your nominated system. This system is responsible for providing PaperCut NG/MF's web based interface and storing data. In most cases, this system does not host any printers and is dedicated to the role of hosting the *PaperCut Application Server*. It can be one of the nodes in the cluster; however, a separate system outside the cluster is generally recommended. An existing domain controller, member server or file server will suffice.

Step 3 - Install PaperCut Print Provider on both nodes

The *Print Provider* component needs to be installed separately on each node involved in the print spooler cluster. This is done by selecting the **Secondary Print Server** option in the installer. Follow the secondary server set up notes as detailed in Configuring secondary print servers and locally attached printers. Take care to define the correct name or IP address of the nominated Application Server set up in step 1.

Step 4 - Configure the PaperCut Print Provider service to bind to the virtual server

By default the PaperCut Print Provider component associates itself with the physical node. A configuration change is required to force it to bind to the virtual server. Add the following lines (or uncomment the example lines) to the file: `C:\Program Files\PaperCut NG/MF\providers\print\win\print-provider.conf`

```
ServerName=[VIRTUAL SERVER NAME]
PrintServerName=\\[VIRTUAL SERVER NAME]
```

Where `[VIRTUAL SERVER NAME]` is the network name associated with your virtual server. Note that the `PrintServerName` must be prefixed with two back-slashes (`\\`). The first setting is used to override the name reported to the *PaperCut NG/MF Application Server*. The

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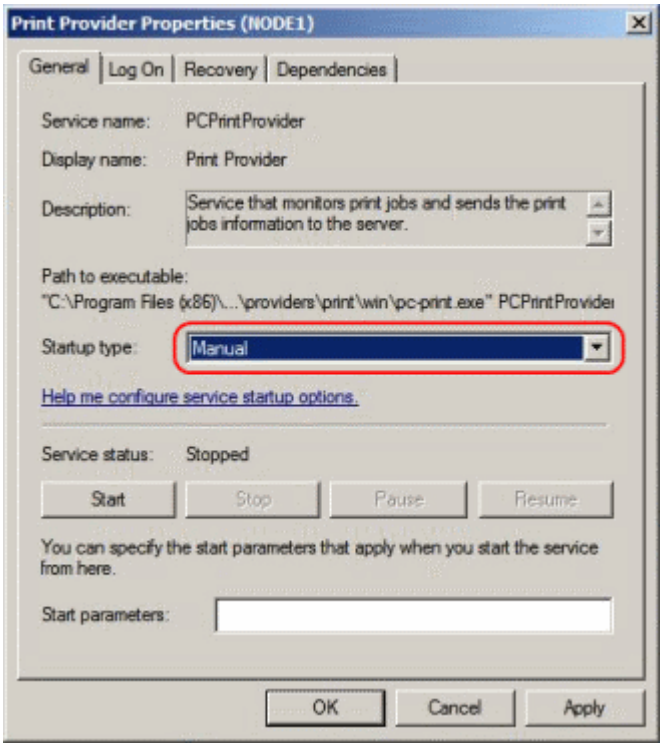
`PrintServerName` setting instructs the Print Provider to search for printers on the virtual server rather than on the physical server.

Step 5 - Decouple service management from nodes

By default the *Print Provider* component is installed under the management of the node. To hand over management to the cluster, the service start-up type needs to be set to manual. On each node navigate to **Control Panel > Administrative Tools > Services** and locate the `PaperCut Print Provider` service. *Stop* the service and set the start-up type to **Manual**. Repeat for each node in the cluster.



Step 6 - Add the PaperCut Print Provider service as a generic service

The *PaperCut Print Provider* service needs to be added to the Veritas Cluster group associated with the virtual server. This is to ensure that the service is managed within the same group as the print server and will fail-over as part of the group. Create a new **GenericServer** resource called `PaperCutPrintProvider01`. Set the service name to `PCPrintProvider`. You can leave the account, password and domain as defaults.

Step 7 - Set up dependencies

The `PCPrintProvider` service must start after the print spool resource. Create a dependency link between `PaperCutPrintProvider01` and the `PrintSpooler` using the tools on the Veritas Cluster Resources tab associated with this virtual server.

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Step 8 - Test

Take some time to test and ensure printing is monitored as expected. Use the Veritas Cluster administration console to simulate node failure and ensure monitoring continues after failure.

Multiple virtual servers (Active/Active)

On large networks it is common to distribute load by hosting print spooler services under two or more virtual servers. For example, two virtual servers can each host half of the organization's printers and share the load. This is sometimes referred to as Active/Active clustering - albeit not an entirely correct term, as the print spooler is still running in Active/Passive.

Virtual servers cannot share the same service on any given node. For this reason if the virtual servers share nodes, manually install the `PaperCut Print Provider` service a second time under a different name. Use the following procedure.

Step 1 - Set up one virtual server

Set up one virtual server using all steps in the preceding section. After this virtual server is tested, perform the steps below to set up the 2nd virtual server.

Step 2 - Create a 2nd instance of the PaperCut Print Provider on each physical node

A 2nd copy of the *PaperCut Print Provider* needs to be created on each physical node. This is required so that a separate service can be installed and configured to bind to the 2nd virtual server. Copy the following directory, and all its contents: `C:\Program Files\PaperCut NG/MF\providers\print` to `C:\Program Files\PaperCut NG/MF\providers\print2`. Repeat this step on both physical nodes.

Step 3 - Configure the copied instance to bind to the 2nd virtual server

Add the following lines (or uncomment the example lines) to the file at `C:\Program Files\PaperCut NG/MF\providers\print\win\print-provider.conf`:

```
ServerName=[VIRTUAL SERVER NAME 2]
PrintServerName=\\[VIRTUAL SERVER NAME 2]
```

Where `[VIRTUAL SERVER NAME 2]` is the network name associated with your *2nd* virtual server. Note that the `PrintServerName` must be prefixed with two back-slashes (`\\`).

Repeat this step on both physical nodes.

Step 4 - Manually install the a 2nd instance of the PCPrintProvider service

Services need a unique name. We'll install a 2nd instance of the service under the name `PCPrintProvider2`. This is done by typing the following commands at the command prompt.

```
cd C:\Program Files\PaperCut NG/MF\providers\print2\win
pc-print.exe PCPrintProvider2 /install
```

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The argument preceding `/install` is the unique name to assign to the service. The recommended procedure is to suffix the standard service name with a sequential number. Repeat this on each physical node. Use a unique service name for each "active" virtual server hosted in the cluster group.

Step 5 - Add this service to the resource group associated with the 2nd virtual server

Repeat steps 5 through 8 in the preceding section, this time using the service name `PCPrintProvider2` rather than `PCPrintProvider`. The recommend unique name for the cluster resource in step 6 is `PaperCutPrintProvider01`.

2.8.5.6. Novell Cluster Services (NCS) on Novell OES Linux

This section assumes that you have an already installed and working clustered printing environment.

Mode 1 - Clustering at the print layer

Step 1 - Application Server (primary server) setup

Before installing a secondary server/clustered Print Provider you should take some time to ensure the primary PaperCut server (central Application Server) is set up and running correctly. The primary server is responsible for providing PaperCut NG/MF's web based interface and storing data. In most cases where a cluster is involved, the primary server does not host any printers and is dedicated to the role of hosting the PaperCut Application Server. If it is not running fine now, adding an extra server only "adds an extra variable to the equation" and complicate troubleshooting. Take some time now to verify that the primary server is functioning correctly. For example, verify that:

- Install and configuration is completed
- Administrators can access the system via a web browser for administration.
- Users can log in to the user web interface from their workstations.

Step 2 - Ensure firewall allows access to port 9191

Cluster nodes needs to communicate (initiate a TCP connection) with the primary PaperCut server on port 9191. Administrators should ensure that any firewall software on the primary Application Server set to block any incoming local network traffic on this port. A good way to test is to open a browser on the planned cluster nodes and confirm you can access the administration web interface on port 9191.

Step 3 - Create eDirectory user account

The `papercut` user's home directory denotes the application install location. For the fact that it is the default for LUM enabled users, `/home/papercut` is recommended, and assumed through the rest of this guide.

1. In iManager open **Users > Create User**.
2. For **username**, enter `papercut`.

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3. For **Last name** enter `PaperCut LUM user`.
4. For **context** select the same eDirectory context as your the iPrint user and iprintgrp group created during your clustered iPrint installation.
5. Assign the user a secret password during creation, and ensure the user's password is set to not expire. If you are using eDirectory password policies, associate the user with an appropriate password policy after creation .
6. Select the **Create home directory** check box.
7. In **Volume** select the volume that is holding your clustered iPrint resource.
8. In **Path** ensure that it reads `papercut`.
9. Click **OK**.

You now need to LUM enable this PaperCut eDirectory user and add it to the already LUM enabled `iprintgrp` used by the clustered iPrint resource.

1. In iManager, open **Linux User Management > Enable Users for Linux**.
2. Select your papercut eDirectory user and continue.
3. Select **An Existing Linux-Enabled Group**; then select the `iprintgrp` created during your clustered iPrint installation; then click **Next**.
4. Confirm that **Workstation list** includes all of the servers in your cluster; then click **Next**.
5. On your clustered iPrint volume, navigate to the `papercut` user's NSS home folder (`/media/nss/[volume]/papercut`) using, for example, Windows Explorer or ConsoleOne and add `RWECMF` file rights for the eDirectory group `iprintgrp` created during your clustered iPrint installation. This ensures the iPrint services have access to the installed files.
6. As `root`, on *each* node that will run the iPrint resource, run the following command, replacing `[volume]` with the volume name of your iPrint resource.

   ```
   shell> ln -s /media/nss/[volume]/papercut /home/papercut
   ```

   Note:
   The symlink target exists only on the active node and *dangles* on the other nodes ready for when it becomes the active node.

7. To confirm all the above stages are working, using any method you want (such as the traditional Novell client for Windows, logged in as an admin user), create a folder or test files inside the papercut folder on your iPrint cluster volume, then on the server holding that resource run:

   ```
   shell> su - papercut
   shell> ls
   ```

   You can see the files created on the NSS volume. You can also view them via `/home/papercut` on the *active* node.

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Step 4 - Install the Print Provider

Important:
The instructions below assume x64 architecture.

Install the Print Provider software onto the secondary server by copying all files and directories from the primary Application Server's directory:

```
[app-path]/providers/print/linux-x64/*
```

to the equivalent location on the node currently holding the iPrint resource:

```
/home/papercut/providers/print/linux-x64/
```

Perform the copy operation as the `papercut` user so that files are owned by the `papercut` user. You can use any method to copy the files, including over the network or via a USB key. If the primary server is also Linux, the simplest way would be to use secure copy (`scp`) as follows:

```
shell> su - papercut
shell> mkdir -p providers/print
shell> cd providers/print
shell> scp -r
primary.server.name:/home/papercut/providers/print/* .
```

After the copy operation is performed, execute the `setperms` and `roottasks` scripts as *root*:

64bit

```
shell> su - root
shell> sh ~papercut/providers/print/linux-x64/setperms
shell> sh ~papercut/providers/print/linux-x64/roottasks
```

Step 5 - Configuration

The Print Provider on the cluster needs to know where the primary server is installed (i.e. its IP address). It also needs to correctly report the cluster name to the primary server.

1. Open the file `/home/papercut/providers/print/linux-x64/print-provider.conf` in a text editor.
2. Locate the line starting with `ApplicationServer=` and change `127.0.0.1` to the hostname or IP address of the primary server.
3. Locate the line starting with `ServerName=`, uncomment it and add the hostname of the cluster. This tells PaperCut NG/MF to report printers as being hosted on the cluster rather than on the node running the resource.

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Step 6 - Cluster configuration

1. **Configuring services**

   As the services are going to be managed by Novell clustering, the services on the physical nodes must be disabled so that they don't start. On the node used to install PaperCut in Step 4 - Install the Print Provider, in **YaST > System > System Services (Runlevel)** , disable `papercut-event-monitor`.

2. **Installing services and disabling them on all other nodes**

   On each other node in the cluster perform the following steps:

   a. As `root` run the following command ([resource-name] is the name for your iPrint resource, and [node-name] is the server name of the node you are now working on):

   ```
   shell> cluster migrate [resource-name] [node-name]
   ```

   b. Once the resource has successfully migrated run the following command (still as root):

   ```
   shell> /home/papercut/providers/print/linux-
   [arch]/roottasks
   shell> chown root:iprintgrp
   /opt/novell/iprint/bin/papercut
   ```

   c. In **YaST > System > System Services (Runlevel)** , disable `papercut-event-monitor`.

   d. Repeat steps 1-3 on the other nodes in the cluster.

Now you need to integrate the binaries copied in Step 4 - Install the Print Provider into Novell iPrint by adding papercut as the **Accounting Autoload Command** as discussed in Step 5 - Printer/iPrint Configuration under Installation on Novell OES Linux (iPrint). Follow that step only and return here once completed.

Step 7 - Test

Mode 1 clustering should now be configured. Perform some test printing on all of this secondary server's printers. Log in to the PaperCut Admin web interface as `admin` and verify that the printers are now listed under the **Printers** tab. Simulate a node failover and test again (wait a minute or two between failures for the new node to engage).

Mode 2 - Clustering at all application layers

This section assumes that you have an already installed and working clustered printing environment.

Step 1 - Prerequisites

This guide assumes you have iPrint up and working within an existing cluster. It is assumed the cluster is set up following Novell's documentation at http://www.novell.com/documentation/oes2/iprint_lx/?page=/documentation/oes2/iprint_lx/data/akujhhq.html.

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Ensure the size of the shared disk partition and NSS Pools are sufficient for your print manager, driver store, and PaperCut installation. This can mean making it larger than Novell's recommended 20GB if you are intending to use the internal database and store large amounts of data over time.

Step 2 - Create eDirectory user account

The `papercut` user's home directory denotes the application install location. For the fact that it is the default for LUM enabled users, `/home/papercut` is recommended, and assumed through the rest of this guide.

1. In iManager open **Users > Create User**.
2. In **username**, enter `papercut`.
3. In **Last name** enter `PaperCut LUM user`.
4. In **context** select the same eDirectory context as your the iPrint user and iprintgrp group created during your clustered iPrint installation.
5. Assign the user a secret password during creation, and ensure the user's password is set to not expire. If you are using eDirectory password policies, associate the user with an appropriate password policy after creation.
6. Select the **Create home directory** check box.
7. In **Volume**, select the volume that is holding your clustered iPrint resource.
8. In **Path**, ensure that it reads `papercut`.
9. Click **OK**.

You now need to LUM enable this PaperCut eDirectory user and add it to the already LUM enabled `iprintgrp` used by the clustered iPrint resource.

1. In iManager open **Linux User Management > Enable Users for Linux** .
2. Select your papercut eDirectory user and continue.
3. Select **An Existing Linux-Enabled Group**; then select the `iprintgrp` created during your clustered iPrint installation; then click **Next**.
4. Confirm that **Workstation list** includes all of the servers in your cluster; then click next.
5. On your clustered iPrint volume, navigate to the `papercut` user's NSS home folder (`/media/nss/[volume]/papercut`) using, for example, Windows Explorer or ConsoleOne and add `RWECMF` file rights for the eDirectory group `iprintgrp` created during your clustered iPrint installation. This ensures the iPrint services have access to the installed files.
6. As `root`, on *each* node that will run the iPrint resource, run the following command, replacing `[volume]` with the volume name of your iPrint resource.

```
shell> ln -s /media/nss/[volume]/papercut /home/papercut
```

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> **Note:**
> The symlink target only exists on the active node and *dangles* on the other nodes ready for when it becomes the active node.

7. To confirm all the above stages are working, using any method you want (such as the traditional Novell client for Windows, logged in as an admin user), create a folder or test files inside the papercut folder on your iPrint cluster volume, then on the server holding that resource run:

```
shell> su - papercut s
hell> ls
```

You can see the files created on the NSS volume.

Downloading and installing

On the node that is currently hosting the iPrint resource, perform a primary server PaperCut installation as per steps 3 and 4 in Installation on Novell OES Linux (iPrint).

> **Important:**
> Ensure this only done on the node that is currently holding the iPrint/PaperCut resource.

Step 4 - Installing services

1. As the services are going to be managed by Novell clustering, the services on the physical nodes must be disabled so that they don't start. On the node used to install PaperCut in Step 4 - Install the Print Provider, in **YaST > System > System Services (Runlevel)** , disable both `papercut` and `papercut-event-monitor`.
2. **Installing services and disabling them on all other nodes**

   On each other node in the cluster perform the following steps:

   a. As `root` run the following command ([resource-name] is the name for your iPrint resource, and [node-name] is the server name of the node you are now working on):

   ```
   shell> cluster migrate [resource-name] [node-name]
   ```

   b. Once the resource has successfully migrated run the following two commands (still as root):

   ```
   shell> /home/papercut/server/bin/linux-[arch]/roottasks
   shell> /home/papercut/providers/print/linux-
   [arch]/roottasks
   shell> chown root:iprintgrp
   /opt/novell/iprint/bin/papercut
   ```

   c. In **YaST > System > System Services (Runlevel)** , disable both `papercut` and `papercut-event-monitor`.

   d. Repeat steps 1-3 on the other nodes in the cluster.

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Step 5 - File permissions

On each node in the cluster, *including* the one used to install PaperCut in Downloading and installing, run the following command as `root`:

```
shell> chown root:iprintgrp /opt/novell/iprint/bin/papercut
```

Step 6 - Configure the nodes to report the virtual server host-name

Note:
This step only has to be completed on which ever node is currently holding the iPrint resource, as the Print Provider config file is on the portable volume and is automatically picked up when the resource moves.

1. Open the file `/home/papercut/providers/print/linux-x64/print-provider.conf` in a text editor.
2. Locate the line starting with `ServerName=`, uncomment it and add the hostname of the cluster. This tells PaperCut NG/MF to report printers as being hosted on the cluster rather than on the node running the resource.

Step 7 - Update iPrint cluster resource scripts to load/unload the PaperCut Application Server

1. In **iManager > Clusters > Cluster Options** open the cluster hosting your iPrint resource.
2. Click the iPrint resource; then click **Scripts**.

   This screen displays the load script, which is similar to the following:

```
#!/bin/bash
. /opt/novell/ncs/lib/ncsfuncs
exit_on_error nss /poolact=IPRINT
exit_on_error ncpcon mount IPRINT=250
exit_on_error add_secondary_ipaddress 10.10.55.7
exit_on_error ncpcon bind --ncpservername=FPCL_IPRINT_SERVER
--ipaddress=10.10.55.7
ignore_error mv
/media/nss/IPRINT/var/opt/novell/iprint/iprintgw.lpr
/media/nss/IPRINT/var/opt/novell/iprint/iprintgw.lpr.bak
exit_on_error rcnovell-idsd start
exit_on_error rcnovell-ipsmd start
exit 0
```

3. Add the following line between `exit_on_error rcnovell-ipsmd start` and `exit 0`:

```
exit_on_error /etc/init.d/papercut start
exit_on_error /etc/init.d/papercut-event-monitor start
```

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4. Click **Apply**.
5. Click **Unload Script**. The unload script looks similar to the following:

```
#!/bin/bash
. /opt/novell/ncs/lib/ncsfuncs
ignore_error rcnovell-ipsmd stop
ignore_error rcnovell-idsd stop
ignore_error ncpcon unbind --ncpservername=FPCL_IPRINT_
SERVER --ipaddress=10.10.55.
ignore_error del_secondary_ipaddress 10.10.55.7
ignore_error nss /pooldeact=IPRINT
exit 0
```

6. Insert the following two lines between `. /opt/novell/ncs/lib/ncsfuncs` and `ignore_error rcnovell-ipsmd stop`:

```
ignore_error /etc/init.d/papercut-event-monitor stop
ignore_error /etc/init.d/papercut stop
```

7. Click **Apply**.
8. Offline and online the iPrint resource to load it with these new scripts.

Step 8 - Config files

When installing PaperCut in step Downloading and installing the IP address of the physical node is automatically detected and stored in config files to simplify the deployment of remote components. These config files require modification so that the components connect to the cluster / virtual server resource instead.

Update the server IP address and hostname to the cluster / virtual server resource in the following configuration files:

- /home/papercut/client/win/client.properties
- /home/papercut/client/mac/PCClient.app/Contents/Resources/config
- /home/papercut/release/connection.properties
- client-config.js in each Gadget in /home/papercut/client/win/
- /home/papercut/client/mac/Widget/PCWidget/config
- /providers/net/connection.properties
- /providers/hardware/ricoh/*/connection.properties

As these config files are all on the shared resource, you need to change them only once on the node currently hosting the resource.

Step 9 - Printer / iPrint configuration

Each printer in the cluster that is managed/tracked by PaperCut needs further configuration via iManager.

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Follow Step 5 - Printer/iPrint Configuration under Installation on Novell OES Linux (iPrint) and return here once completed.

Step 10 - Test

Mode 2 clustering should now be configured. Perform some test printing on all of this secondary server's printers. Log in to the PaperCut Admin web interface as `admin` and verify that the printers are now listed under the **Printers** tab. Simulate a node failover and test again (wait a minute or two between failures for the new node to engage).

Step 11 - Sharing User Client software

As the clustered solution uses NSS, the client folder is already available as an NCP share at `\\[cluster-virtual-server]\[volume-name]\papercut\client`. Users should be able to access this folder once they are given file rights. Alternatively, consider making these files available via an alternate share/path/location.

2.8.5.7. Client/workstation configuration

In a clustered environment the behavior of PaperCut NG/MF on the workstations is identical to that of a non-clustered environment. The one exception, however, is in terms of configuration - configure the clients to connect to the *Virtual Server* rather than directly connecting to a node (i.e. make the network connections via virtual server's designated IP address). The changes necessary are:

1. Update User Client's configuration file `config.properties` with the Virtual Server's details as per Step 10 - Client Configuration.
2. Ensure that any URL's pointing to PaperCut NG/MF's web administration and user interfaces; `http://[server]:9192/admin` and `http://[server]:9192/user` user the virtual server's name. For example, any links on the organization's intranet site or links supplied to other SysAdmins.

2.8.6. Deployment on an external database (RDBMS)

This section describes the process of running PaperCut NG/MF on an external relational database, and describes why you would choose to do this. By default, PaperCut NG/MF uses an internal database product known as Apache Derby. This database engine was donated to Apache by IBM and was previously known as IBM Cloudscape.

The internal PaperCut NG/MF database is stable, scalable, self-maintaining, and provides very good performance. For this reason, most organizations do not need an external database system. However, you might consider running PaperCut NG/MF on an external RDBMS if:

- Your organization has existing database infrastructure and wants to consolidate all applications on the same database platform.
- Your organization has an existing database maintenance and backup procedure and wants PaperCut NG/MF to take advantage of this.
- People want to use 3rd party reporting and analysis tools (like Crystal Reports or Microsoft Access) to view and analyze the PaperCut NG/MF database.

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- Your organization is very large and requires the performance benefits of a dedicated RDBMS. This also allows the database to reside on a separate server to PaperCut NG/MF, which improves the system scalability.

PaperCut NG/MF supports the following external databases out-of-the-box:

- Microsoft SQL Server 2000/2005/2008/2012/2014/2016 (either 32-bit or 64-bit)
- Microsoft SQL Server Express 2005/2008/2012/2014/2016 (free from Microsoft)
- PostgreSQL 7.1+ (a free open source database)
- MySQL 5.5+ (a free open source database)
- Oracle 9.2+ (including the free Oracle Express Edition).

These databases were chosen to cater for the majority of customers.

2.8.6.1. Upsize to an external database (RDBMS)

By default, PaperCut NG/MF uses an internal database product known as Apache Derby. You might, however, consider running PaperCut NG/MF on an external RDBMS if your organization:

- has existing database infrastructure and wants to consolidate all applications on the same database platform.
- has an existing database maintenance and backup procedure and wants PaperCut NG/MF to take advantage of this
- uses 3rd party reporting and analysis tools (like Crystal Reports or Microsoft Access) to view and analyze the PaperCut NG/MF database
- is very large and requires the performance benefits of a dedicated RDBMS. This also allows the database to reside on a separate server to PaperCut NG/MF, which improves the system scalability.

The high-level steps to upsize the database are:

1. Stop the PaperCut NG/MF Application Server.
2. Perform a backup of the existing data.
3. Create a new database in the external RDBMS.
4. Configure the database.
5. Change the PaperCut NG/MF connection details.
6. Initialize the new database.
7. Load the data into the new database.
8. Restart the application.

Important:
Each Application Server requires exclusive access to an external database. i.e. A single database cannot be shared between more than one Application Server. If you are running multiple Application Servers (e.g. a test and production instance), then each must have a

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separate database.

Step 1: Stop the PaperCut NG/MF Application Server

Stop the Application Server. This allows you to back up the data, guaranteeing that all data is saved and ready to load into the new database.

For more information, see Stop and start the Application Server.

Step 2: Perform a backup of the existing data

Perform a backup of the database. This data is loaded into the application in a later step. For more information, see Manage system backups.

To back up the database:

1. On the Application Server, open a command prompt. (If you see 'Access Denied' errors, run the command prompt as an Administrator).
2. On Linux or Mac, use `su` or equivalent to become the identity of papercut. e.g.

   ```
   Mac: sudo su - papercut
   Linux: su - papercut
   ```

3. Change (`cd`) to the server binaries directory. e.g.

   ```
   Windows: cd "C:\Program Files\PaperCut NG/MF\server\bin\win"
   Mac: cd "/Applications/PaperCut NG/MF/server/bin/mac"
   Linux: cd ~papercut/server/bin/linux-*
   ```

4. Run the following command:

   ```
   db-tools export-db
   ```

   The output of the above command shows the name of the backup file.
5. Take note of the backup file name because it is required in a later step.

Step 3: Create a new database in the external RDBMS

This step differs depending on the external database you are using. It is assumed that the administrator knows how to create a new database. The following steps must be performed regardless of the chosen database:

1. Create a new empty database for dedicated use by PaperCut NG/MF. When creating the database, make sure you select the correct character encoding for your language.

   Important:
   Create the database with a character encoding suitable for your language. For SQL Server, the character encoding is set in **Collation** on the new database screen. For

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other databases, such as PostgreSQL or MySQL, select a unicode character set (UNICODE or UTF8) that allows all possible characters to be stored.

2. Create a new database user (and password) for PaperCut NG/MF to use to connect to the database.
3. Assign the appropriate permissions to the new user to give them full access to the new database (for example, permission to create/drop tables, and select/insert/update/delete in all tables).

Important:
Make sure you have enough disk space for the growth of your PaperCut NG/MF database. A full disk can corrupt the PaperCut NG/MF database. For more information, see Database sizing and growth

We also recommend you set up notifications for low disk space as described here: Alert Email Notification through SCOM 2012 R2.

Step 4: Configure the database

After you have created you database, you must configure it for PaperCut NG/MF. For more information, see:

- Configuring Microsoft SQL Server
- Configuring Microsoft SQL Server Express
- Configuring MySQL
- Configuring Oracle (and Oracle Express Edition)

Step 5: Change the PaperCut NG/MF connection details

1. On the Application Server, open the server config file in a text editor (e.g. Notepad):

   ```
   [app-path]/server/server.properties
   ```

2. (New installations only) Comment out the line:

   ```
   database.type=Internal
   ```

   by adding a # (hash) character to the beginning of the line.

3. (New installations only) Find the database connection details for SQL Server or PostgreSQL), and uncomment the lines by removing the # (hash) character.
4. (New installations only) Set the username and password to connect to the database:

   ```
   database.username=[your-db-user]
   database.password=[your-db-password]
   ```

5. Set the database connection URL, which describes the location and connection details of the external database.

   SQL Server database connection URL format

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The SQL Server URL format is:

```
jdbc:sqlserver://[server][:port];databaseName=
[database];socketTimeout=600000
```

The default port is 1433.

When using SQL Server instances, specify the instance name in the connection URL as follows:

```
jdbc:sqlserver://[server][\instanceName]
[:port];databaseName=[database];socketTimeout=600000
```

Where:

- `[server]` is the name of the server running the SQL Server database, and must be resolvable from the PaperCut NG/MF server. If the SQL Server instance is running on the same machine, then you can use `localhost`.
- `[port]` is the port the SQL Server Express edition is configured to listen on. For more information on configuring SQL Express, see Configuring Microsoft SQL Server Express.
- `[database]` is the name of the SQL Server database you created in the external RDBMS.

For more information see building the Connection URL.

Important:
See Configuring Microsoft SQL Server for specific instructions to configure SQL Server.

If you want to enable Windows authentication, add `;integratedSecurity=true` to the connection string:

```
jdbc:sqlserver://[server][:port];databaseName=
[database];socketTimeout=600000;integratedSecurity=true
```

SQL Server Express database connection URL format

The SQL Server Express format is:

```
jdbc:sqlserver://[server][:port];databaseName=[database]
```

Where:

- `[server]` is the name of the server running the SQL Server database, and must be resolvable from the PaperCut NG/MF server. If the SQL Server instance is running on the same machine, then you can use `localhost`.
- `[port]` is the port the SQL Server Express edition is configured to listen on. For more information on configuring SQL Express, see Configuring Microsoft SQL Server Express.

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- `[database]` is the name of the SQL Server database you created in the external RDBMS.

Important:
See Configuring Microsoft SQL Server Express for specific instructions to configure SQL Server Express.

If you want to enable Windows authentication, add `;integratedSecurity=true` to the connection string:

```
jdbc:sqlserver://[server][:port];databaseName=
[database];integratedSecurity=true
```

PostgreSQL database connection URL format

The Postgres URL format is:

```
jdbc:postgresql://[server]/[database]
```

Where:

- `[server]` is the name of the server running the PostgreSQL database, and must be resolvable from the PaperCut NG/MF server. If the PostgreSQL instance is running on the same machine, then you can use `localhost`.
- `[database]` is the name of the PostgreSQL database you created in Step 3 above.

MySQL database connection URL format

The MySQL URL format is:

```
jdbc:mysql://[server]/[database]
```

Where:

- `[server]` is the name of the server running the MySQL database, and must be resolvable from the PaperCut NG/MF server. If the MySQL instance is running on the same machine, then you can use `localhost`.
- `[database]` is the name of the MySQL database you created in Step 3 above.

Important:
See Configuring MySQL for specific instructions to configure MySQL.

Oracle database connection URL format

The Oracle URL format is:

```
jdbc:oracle:thin:@[server]:[port]/[ServiceName]
```

Where:

- `[server]` is the name of the server running the Oracle database, and must be resolvable from the PaperCut server. If the Oracle instance is running on the same

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machine, then you can use `localhost`.

- `[port]` specifies the port number that the Oracle services are listening on. By default this is 1521.
- `[ServiceName]` specifies the Oracle service name or identifier used to identify the database. For Oracle Express edition this is `XE`.

For example, for an Oracle Express Edition installation on the same server as PaperCut, running on the default port and SID, use:

```
jdbc:oracle:thin:@localhost:1521/XE
```

Important:
See Configuring Oracle (and Oracle Express Edition) for specific instructions to configure Oracle.

Step 6: Initialize the new database

The next step is to initialize the new database, creating the required database tables and initial data. To initialize the database:

1. On the server, open a command prompt. (If you see 'Access Denied' errors, run the command prompt as an Administrator).
2. On Linux or Mac, use `su` or equivalent to become the identity of papercut. e.g.

```
Mac: sudo su - papercut
Linux: su - papercut
```

3. Change (`cd`) to the server binaries directory. e.g.

```
Windows: cd "C:\Program Files\PaperCut NG/MF\server\bin\win"
Mac: cd "/Applications/PaperCut NG/MF/server/bin/mac"
Linux (64-bit): cd ~papercut/server/bin/linux-x64
```

4. Run the following command: `db-tools init-db`.

A message is displayed to indicate that the connection details are correct and the database was initialized correctly.

Step 7: Load the data into the new database

This step loads the data (that was exported in Step 2) into the database. To import the data:

1. On the server, open a command prompt. (If you see 'Access Denied' errors, run the command prompt as an Administrator).
2. On Linux or Mac, use `su` or equivalent to become the identity of papercut. e.g.

```
Mac: sudo su - papercut
Linux: su - papercut
```

3. Change (`cd`) to the server binaries directory. e.g.

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```
Windows: cd "C:\Program Files\PaperCut NG/MF\server\bin\win"
Mac: cd "/Applications/PaperCut NG/MF/server/bin/mac"
Linux (64-bit): cd ~papercut/server/bin/linux-x64
```

4. Run the following command: `db-tools import-db "backup file name"`.

   This command shows the data import progress.

If no errors occur, the application is ready to restart.

Step 8: Restart PaperCut NG/MF

The data is now in the new database and you can restart the server.

For more information, see Stop and start the Application Server.

Wait 30 seconds for the server to start, then log in to the Admin web interface. If you can log in successfully, then the upsizing process worked successfully.

Configuring Microsoft SQL Server Express

Microsoft SQL Server Express provides enterprise class database performance for free. However, it does have some limitations when compared to the full version of SQL Server. But these limitations are not likely to adversely affect most PaperCut NG/MF users. These limitations include

- 4GB limit on database sizes (10GB for SQL Server Express 2008/2012/2016)
- Limited to use only 1 CPU
- Limited to use only 1GB of RAM

This section described how to configure Microsoft SQL Server Express edition for use with PaperCut NG/MF. It is assumed that SQL Server Express is already installed with the default configuration.

Once this configuration is complete, you can use the database with PaperCut NG/MF by following the instructions in Upsize to an external database (RDBMS).

To configure Microsoft SQL Server Express, perform the following tasks on the machine with SQL Server installed.

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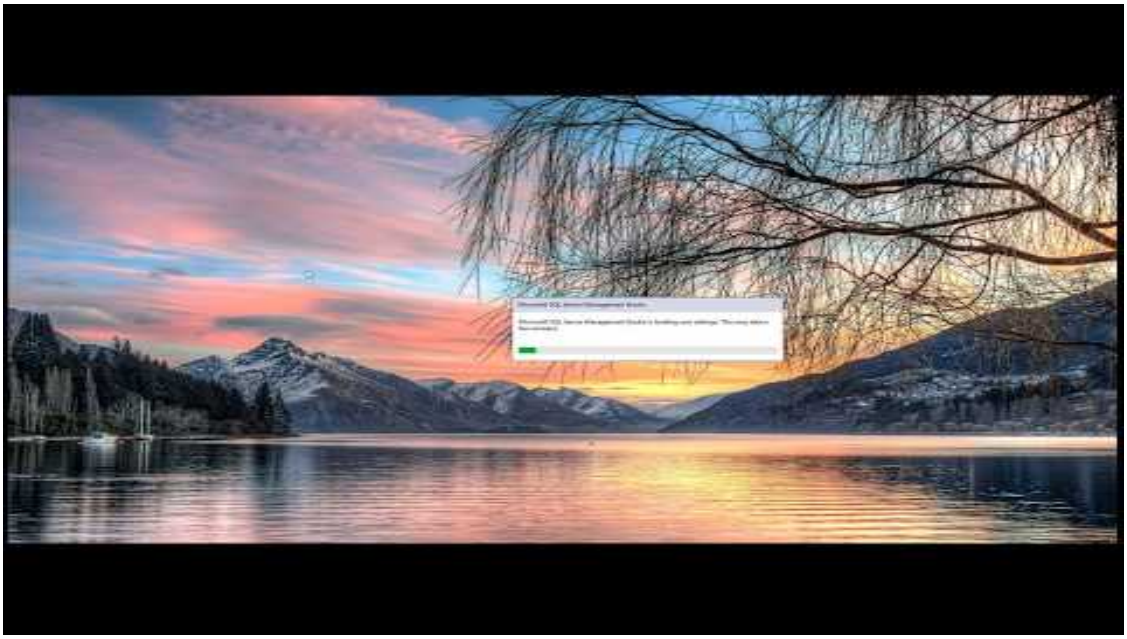

Step 1: Enable TCP/IP connections

PaperCut NG/MF uses TCP/IP to connect to the SQL Server database, but SQL Server Express does not enable TCP support by default. To enable TCP/IP:

1. In **SQL Server Configuration Manager**, expland the **SQL Server Network Configuration > Protocols for SQLEXPRESS** node.
2. Right-click the **TCP/IP** item on the right; then select **Properties**.
3. On the **General** tab, change **Enabled** to **Yes**.
4. On the **IP Addresses** tab, under the **IPAll** node, clear the **TCP Dynamic Ports** box.
5. In **TCP Port**, enter the port to listen on . For example, 1450. Remember this port, because it needs to be used in the PaperCut NG/MF connection string.
6. Click **OK**.
7. Restart the Microsoft SQL Server Express service using either the standard service control panel or the SQL Express tools.

Step 2: Enable SQL Server authentication

PaperCut NG/MF requires SQL Server authentication to be enabled on the instance of SQL Express. To do this:

1. In **SQL Server Management Studio Express** tool, right-click the instance of SQL Express to configure; then select **Properties**.
2. Select the **Security** section on the left.
3. Change the **Server Authentication** to **SQL Server and Windows Authentication mode**.
4. Restart the Microsoft SQL Server Express service using either the standard service control panel or the SQL Express tools.

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Step 3: Create a database user

PaperCut NG/MF requires a user to connect to the database. To create this user:

1. In **SQL Server Management Studio Express** tool, right-click the **Security > Logins** node; then select **New Login**.
2. Enter the username (e.g. papercut).
3. Change the **Server Authentication** to **SQL Server and Windows Authentication mode**.
4. Enter the user's password.
5. Disable password expiration.
6. Click **OK**.
7. After creating the PaperCut NG/MF database, assign this user `db_owner` permissions on the database, so that it can create the required database tables.
8. To initialize the database, follow the instruction in Upsize to an external database (RDBMS).

Set statistics to auto update

1. In **SQL Server Management Studio Express**, right-click the database; then select **Properties**.

   The **Database Properties** dialog is displayed.
2. Scroll to the top of the **Other options** list.
3. In **Auto Update Statistics**, select **True**.
4. Click **OK**.

Note:
Alternatively, you can set up this optimization as a scheduled task after hours to ensure you see no performance issues due to database indexing problems.

The optimization we recommend you run is:

- `exec sp_msForEachTable @COMMAND1= 'DBCC DBREINDEX ( "?")';`
- `exec sp_updatestats;`

Databases with large databases with millions of print jobs can complete this command in less than three minutes. The result was seen where reporting took 10-15 minutes before optimization, and now takes a matter of seconds.

Configuring Microsoft SQL Server

Microsoft SQL Server provides enterprise class database performance. With this type of database, you should put in place a database re-index every month. This database optimization helps with general performance, and more specifically, large queries performed on the SQL database. These queries include Reporting, as well as Bulk Actions performed on multiple data points.

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Important:

Ensure that SQL Server has the TCP protocol, and the server authentication option is set to **SQL Server and Windows Authentication**.

The database user created for PaperCut NG/MF should have only the minimum set of permissions required for the PaperCut application. The user should have full permissions to create/drop tables and have full access to any created tables. However, the user should not have permission to access other databases installed on the database server.

To configure Microsoft SQL Server, perform the following tasks on the machine with SQL Server installed:

Step 1: Get the driver for the SQL Server

Note:

If you have the latest version of PaperCut NG/MF it already includes the latest version of Microsoft's JDBC driver for SQL Server. Skip to Step 2.

1. Go to Download the latest version of Microsoft's JDBC driver for SQL Server from this link: https://docs.microsoft.com/en-us/sql/connect/jdbc/download-microsoft-jdbc-driver-for-sql-server?view=sql-server-2017
2. Run the downloaded file to extract the files.
3. Copy the file `mssql-jdbc-<version number>.jre11.jar` from the location the files were extracted to, to `<PaperCut MF or NG install directory>\server\lib-ext\`

Step 2: Enable SQL Server authentication

PaperCut NG/MF requires SQL Server authentication to be enabled on the instance of SQL Server. To do this:

1. In **SQL Server Management Studio**, right-click the instance of SQL Server to configure; then select **Properties**.
2. Select the **Security** section on the left.
3. Change the **Server Authentication** to **SQL Server and Windows Authentication mode**.
4. Restart the Microsoft SQL Server service using either the standard service control panel or the SQL Server tools.

Step 3: Create a database user

PaperCut NG/MF requires a user to connect to the database. To create this user:

1. In **SQL Server Management Studio**, right-click **Security > Logins**; then select **New Login**.
2. Enter the username (for example, papercut).

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3. Change the **Server Authentication** to **SQL Server and Windows Authentication mode**.
4. Enter the user's password.
5. Disable password expiration.
6. Click **OK**.
7. After creating the PaperCut NG/MF database, assign this user `db_owner` permissions on the database, so that it can create the required database tables.
8. Initialize the database.

Step 4: Set statistics to auto update

1. In **SQL Server Management Studio**, right-click the database; then select **Properties**.
   The **Database Properties** dialog is displayed.
2. Scroll to the top of the **Other options** list.
3. In **Auto Update Statistics**, select **True**.
4. Click **OK**.

> **Note:**
> Alternatively, you can set up this optimization as a scheduled task after hours to ensure you see no performance issues due to database indexing problems.
>
> The optimization we recommend you run is:
>
> - `exec sp_msForEachTable @COMMAND1= 'DBCC DBREINDEX ( "?")';`
> - `exec sp_updatestats;`
>
> Databases with large databases with millions of print jobs can complete this command in less than three minutes. The result was seen where reporting took 10-15 minutes before optimization, and now takes a matter of seconds.

Configuring MySQL

MySQL is a free/open-source database solution that provides robust, proven, and scalable storage at a great price. PaperCut NG/MF supports MySQL 5.5 and higher.

> **Important:**
> PaperCut NG/MF requires the use of the MySQL InnoDB table type, which provides full support for transactions. Ensure your MySQL database server is configured to support InnoDB (usually this is enabled by default).

Database driver

PaperCut NG/MF does not ship with a database driver for MySQL because the MySQL licensing does not allow redistribution of the driver. Download these drivers for free from the MySQL website as described below.

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To download the required version of the driver:

1. Visit the MySQL web site download page for the *MySQL Connector/J* product here: http://dev.mysql.com/downloads/connector/j/.
2. Select the appropriate driver version (the latest version is best).
3. Download the driver package and unzip the contents to a temporary directory.
4. Find the driver JAR file, which is typically named `mysql-connector-java-X.Y.Z-bin.jar`.
5. Copy the JAR file into the `[app-path]\server\lib-ext` directory. This allows PaperCut NG/MF to find and load the driver.

Once the driver is installed into PaperCut NG/MF, you can follow the standard upsizing procedure. For more information, see Upsize to an external database (RDBMS).

Configuring Oracle (and Oracle Express Edition)

Oracle is a high-end database solution that provides a very robust and scalable data storage solution. And with the release of Oracle Express Edition, it is available at no cost, but it does have some limitations that should not impact PaperCut NG/MF installations.

PaperCut NG/MF supports Oracle versions 9.2 and higher. Oracle 8 (and earlier) are not supported because they did not support the `TIMESTAMP` datatype required by PaperCut NG/MF.

Database driver

PaperCut NG/MF does not ship with a driver for Oracle because Oracle does not allow us to redistribute the driver. Also, the recommended driver depends on the version of Oracle used. You can obtain these drivers from the Oracle website as described below.

To download the required version of the driver:

1. Visit the Oracle web site here: http://www.oracle.com/technetwork/database/features/jdbc/index-091264.html
2. Select the appropriate Oracle version.

   The required file to download differs depending on the Oracle version.
3. Download the relevant `ojdbc.jar` for your Oracle Database version.
4. Copy the downloaded file into the `[app-path]\server\lib-ext` directory.
5. Restart the service **PaperCut Application Server**. This allows PaperCut to find and load the driver.

Once the driver is installed into PaperCut NG/MF, you can follow the standard upsizing procedure. For more information, see Upsize to an external database (RDBMS).

2.8.7. Web browser Single Sign-On (SSO)

Single Sign-On (SSO) lets users access PaperCut NG/MF's web interface without re-entering credentials. For example, you can give a user logged into Windows direct access to PaperCut NG/MF's web interface without needing to re-enter their username and password at the PaperCut

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NG/MF login screen. Sites with an intranet portal often find SSO particularly attractive, as it allows diverse IT systems to be seamlessly integrated into the portal without the need for separate logins.

Single Sign-On also goes hand in hand with technologies such as two-factor authentication used in high security environments. With two-factor authentication, sign-on can involve presentation of an ID card or reading a fingerprint. In some cases, user passwords are managed by the security system and not known to the user, making it impossible to login using a traditional login screen. PaperCut NG/MF's SSO support allows PaperCut NG/MF to leverage the two-factor security already in place.

Web single sign-on is an advanced topic. The standard web login that comes built-in with PaperCut NG/MF is most appropriate for many sites.

PaperCut NG/MF supports two different web SSO methods:

1. *Integrated Windows Authentication* For Windows domain environments where both the PaperCut NG/MF Application Server and the user computers share the same Windows domain and intranet zone. With Integrated Windows Authentication, PaperCut NG/MF uses existing Windows technologies to securely identify Windows domain users as PaperCut NG/MF users.
2. *WebAuth* A web authentication system developed and freely licensed by Stanford University. It is implemented as an Apache module and works by intercepting requests to the PaperCut NG/MF Application Server. WebAuth is operating system neutral, but requires specialist expertise to set up.

   PaperCut NG/MF's WebAuth integration is actually quite generic and is also used for Shibboleth SSO integration at several customer sites.

2.8.7.1. Planning for web SSO implementation

There are a number of considerations and preparation steps you must take prior to implementing SSO in PaperCut NG/MF.

Preparing for SSO

1. An effective security system offers multiple layers of defence against unwanted intrusion. For example, an organization's firewall can provide the first layer of defence, but if an intruder penetrates that, the Windows login presents a second barrier. Once logged into Windows, PaperCut's login screen represents a third layer of defence.

   SSO trades off the convenience of direct access with removing one layer of security. For example, with SSO a user can click a hyperlink in an email or instant message and be taken directly into PaperCut. Before implementing SSO, you must weigh up the risks and benefits for your organization.
2. PaperCut offers granularity of control over which parts of PaperCut will use SSO. For example, you might decide to use SSO for just the user web pages and mobile client, not the Admin web interface. Decide your policy up front before configuring SSO.
3. Decide whether you want PaperCut NG/MF SSO to directly log in users, or to first present a confirmation page. The confirmation page displays the user name and can also offer a **Switch User** link to allow users to use an alternate login. With direct login, one less click is required,

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but there is no opportunity to confirm the correct login or switch to an alternate user.

4. Decide if you want to redirect the user to your intranet portal after logout. A logout URL is required when direct access is configured.
5. Your PaperCut users must be sourced from a central directory server, such as Windows directory. Internal users (users managed by PaperCut NG/MF), and the built-in `admin` are internal to PaperCut so do not work with SSO. If you have internal users, show the confirmation page with the **Switch User** link to make the PaperCut login page accessible.
6. If using SSO to access the PaperCut Admin web interface, set up the necessary permissions (see Assign administrator level access) for all administrative users before enabling SSO. The same applies to other PaperCut interfaces, such as Release Station, Web Cashier, and Central Reports.
7. Select which SSO technology is right for you. While many PaperCut NG/MF sites choose Integrated Windows Authentication, it does have strict prerequisites. For example, if you have a significant number of non-Windows users, Windows based SSO might not be the best choice for you. More information about each SSO technology is provided below.

Planning for integrated Windows authentication

Integrated Windows Authentication (IWA) is designed for Microsoft Windows environments where both the PaperCut Application Server and client PCs reside on the same Windows domain and intranet zone. In summary the requirements are:

1. The PaperCut Application Server must run on the Windows operating system.
2. PaperCut web users are using PCs running Windows
3. All computers are on the same domain
4. Your site uses Active Directory for managing users, including PaperCut users. Windows Authentication works only with users who are managed by Windows.
5. The Application Server URL is on the same intranet zone as users' PCs. By default this means that the URL does not contain periods. You can configure user internet options to explicitly add the PaperCut Application Server to the intranet zone.
6. Your organization's recommended web browser supports IWA. Browsers that support IWA include Internet Explorer, Chrome, and Firefox. (Note that Firefox requires additional configuration to enable IWA support.)

Integrated Windows Authentication is part of Windows, so if your site meets the above criteria, no additional setup is needed prior to configuring SSO.

Planning for WebAuth

WebAuth uses a reverse proxy server to manage HTTP traffic between users and PaperCut. If you are considering WebAuth, you need the resources and skills to implement and configure an Apache web server and perform the installation instructions provided by WebAuth.

WebAuth takes care of authorizing the user and inserts a special HTTP header in all authorized requests sent to PaperCut. Specify the name of this header and also a list of whitelisted source IP addresses when integrating WebAuth with PaperCut

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Although WebAuth SSO is considerably more complex to implement than IWA, it does have the advantage of supporting a non-Windows environment.

2.8.7.2. Configure web SSO

Configuring SSO in PaperCut NG/MF is easy, but you must work through the preparation steps above, or you might not be able to log in to PaperCut NG/MF!

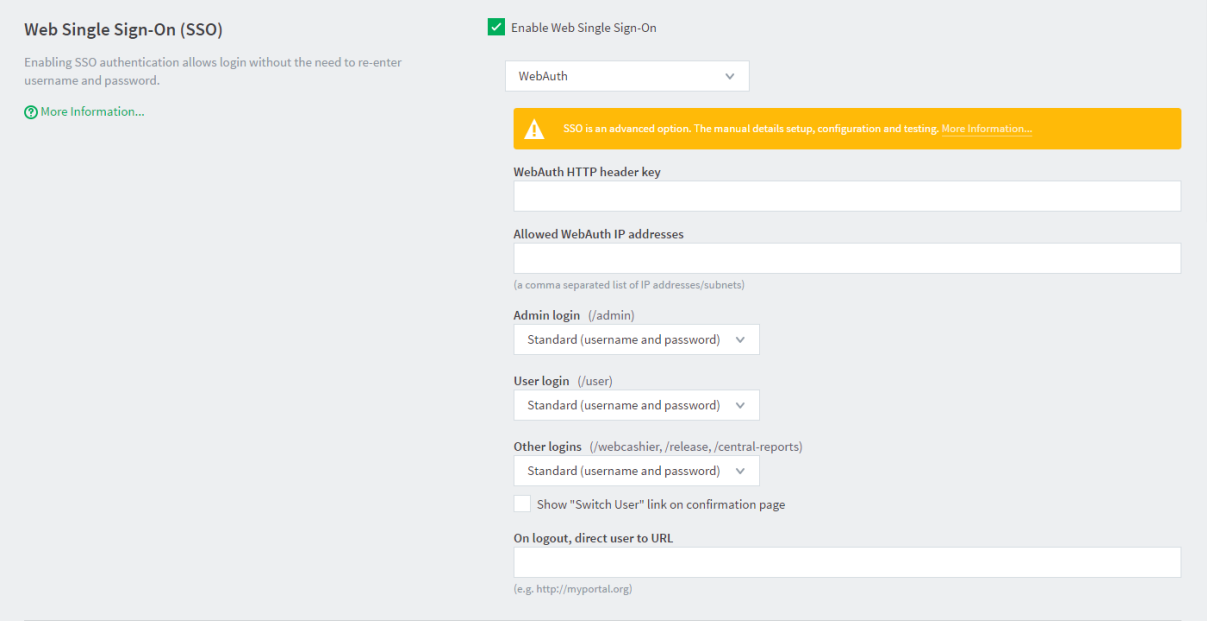
Tip:

After enabling SSO on the Admin web interface, it is not easy to use the built in `admin` user as the login page is no longer shown. Before configuring SSO, you must ensure your domain or corporate login has admin rights and you need to use this login. As a protection, the built-in `admin` user does not have the rights to enable SSO. If you lock yourself out after enabling SSO, you can bypass SSO by adding `/nosso` to the Application Server URL. For example: `http://[myserver]/admin/nosso`.

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.

2. In the **Web Single Sign-on (SSO)** area, select the **Enable Single sign-on** check box to enable SSO. Additional configuration items are displayed.



3. Select the SSO method:
   - **Integrated Windows Authentication**
   - **WebAuth**
4. If you select **WebAuth**, complete the following fields:
   - **WebAuth HTTP header key**—the WebAuth HTTP header name.
   - **Allowed WebAuth IP addresses**—a comma separated list of whitelisted IP addresses.
5. Specify the SSO behavior you want for the user web interface and mobile client, Admin web

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interface, and other interfaces:

a. **Standard (username and password)**—don't use SSO and show the PaperCut NG/MF login screen.
b. **SSO with confirmation page**—use SSO and present a confirmation page at login.
c. **SSO with direct access**—use SSO and directly log in the user with no confirmation page.

6. If you want to show a **Switch User** link on the confirmation page, select the **Show "Switch User" link on confirmation page** check box.
7. In **On logout, direct user to URL**, enter a URL to go to on logout. A typical example would be the URL for your intranet portal.

Advanced configuration

You can set advanced config keys to fine tune SSO behavior. For more information, see Using the Advanced Config Editor.

1. Some installations want to enable SSO for web users, but not for users of the mobile client and mobile release apps. To disable SSO for mobile users, set the advanced config key: `auth.web-login.sso-enable.mobile-user` to `N`.
2. By default, Windows SSO does not authenticate users belonging to the "Guest" group. You can change this behavior by setting the advanced config key `auth.web-login.sso-allow-guest` to `Y`.

Post installation testing

After enabling SSO, perform the following tests to ensure that users can successfully access the PaperCut interface.

1. Verify that you can still log in to the Admin web interface.
2. Verify that a user without admin rights can still access their user web pages.
3. If in use, verify that a user with the appropriate admin rights can still access other interfaces, such as Release Station or Web Cashier.
4. Try logging in from other computers in the domain.
5. Try logging in from different browsers supported in your organization.
6. If using IWA, try logging in from a non-windows client or a PC outside the domain. Verify you can still log in after providing your Windows credentials.

2.8.8. Advanced LDAP configuration

PaperCut NG/MF supports the following LDAP server types out-of-the-box:

- Novell eDirectory
- Microsoft Active Directory
- Unix/NIS/Posix

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For more information about basic configuration options for these platforms, seeSynchronize user and group details with LDAP

However, PaperCut NG/MF can support other server/schema types by defining the fields to query and the LDAP searches to perform. Configure these options in the **Advanced Config Editor** on the **Options** tab. The following config keys are available for the primary sync source:

Table 25: LDAP primary sync source config keys

Config name	Description
ldap.schema.user-name-field	The LDAP field that contains the user's username.
ldap.schema.user-full-name-field	The LDAP field that contains the user's full name.
ldap.schema.user-pin-field	The LDAP field that contains the user's PIN. This must be only digits.
ldap.schema.user-email-field	The LDAP field that contains the user's email address.
ldap.schema.other-emails-field	The LDAP field that contains the user's other email addresses. If the user has only one other email, then use a single value or a multi-value LDAP field. If the user has multiple other email addresses then use a multi-value LDAP field.
ldap.schema.user-second-card-id-field	The LDAP field that contains the user's second card id.
ldap.schema.user-department-field	The LDAP field that contains the user's department.
ldap.schema.user-office-field	The LDAP field that contains the user's office location.
ldap.schema.user-card-id-field	The LDAP field containing the user's primary card ID value.
ldap.schema.user-second-card-id-field	The LDAP field containing the user's secondary card ID value.
ldap.schema.user-name-search	The LDAP search to retrieve the user. The `{0}` in the search is replaced with `*` when listing all users, and `[username]` when searching for a specific user. If no search is defined, the default is `([userNameField]={0})`. IMPORTANT: The search must include the `{0}` value.
ldap.schema.group-name-field	The LDAP field that contains the group's name.
ldap.schema.group-member-field	The LDAP field that contains the group members.
ldap.schema.group-search	The LDAP search to retrieve the group. The `{0}` in the search is replaced with `*` for all group searches. If no search is defined, the default is `([groupMemberField]={0})`, which means get all entries with at least one member.

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Config name	Description
	IMPORTANT: The search must include the `{0}` value.
ldap.schema.posix-groups	If `Y`, then the group member field contains the user's username. If `N`, then the group member field contains the user's DN.
ldap.schema.home-directory-field	The LDAP field that contains the user's home folder path.

If you are using a secondary sync source, the following config keys are available:

Table 26: LDAP secondary sync source config keys

Config name	Description
ldap2.schema.user-name-field	The LDAP field that contains the user's username.
ldap2.schema.user-full-name-field	The LDAP field that contains the user's full name.
ldap.2.schema.user-pin-field	The LDAP field that contains the user's PIN. This must be only digits.
ldap2.schema.user-email-field	The LDAP field that contains the user's email address.
ldap.2.schema.other-emails-field	The LDAP field that contains the user's other email addresses. If the user has only one other email, then use a single value or a multi-value LDAP field. If the user has multiple other email addresses then use a multi-value LDAP field.
ldap.2.schema.user-second-card-id-field	The LDAP field that contains the user's second card id.
ldap2.schema.user-department-field	The LDAP field that contains the user's department.
ldap2.schema.user-office-field	The LDAP field that contains the user's office location.
ldap2.schema.user-card-id-field	The LDAP field containing the user's primary card ID value.
ldap2.schema.user-second-card-id-field	The LDAP field containing the user's secondary card ID value.
ldap2.schema.user-name-search	The LDAP search to retrieve the user. The `{0}` in the search is replaced with `*` when listing all users, and `[username]` when searching for a specific user. If no search is defined, the default is `([userNameField]={0})`. IMPORTANT: The search must include the `{0}` value.
ldap2.schema.group-name-field	The LDAP field that contains the group's name.
ldap2.schema.group-	The LDAP field that contains the group members.

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Config name	Description
member-field	
ldap2.schema.group-search	The LDAP search to retrieve the group. The `{0}` in the search is replaced with `*` for all group searches. If no search is defined, the default is `([groupMemberField]={0})`, which means get all entries with at least one member. IMPORTANT: The search must include the `{0}` value.
ldap2.schema.posix-groups	If `Y`, then the group member field contains the user's username. If `N`, then the group member field contains the user's DN.
ldap2.schema.home-directory-field	The LDAP field that contains the user's home folder path.

2.8.8.1. LDAP server default configuration

When a particular LDAP server type is selected (e.g. Novell eDirectory), PaperCut NG/MF uses the following defaults to query the LDAP server. Use these defaults as a starting point for customizing the LDAP searches or for supporting other server types.

Standard (Unix / Open Directory)

The following defaults are used if the LDAP server is configured to support Unix based authentication.

Table 27: Unix / Open Directory LDAP default settings

Config name	Default value
ldap.schema.user-name-field	`uid`
ldap.schema.user-full-name-field	`cn`
ldap.schema.user-email-field	`mail`
ldap.schema.user-department-field	`departmentNumber`
ldap.schema.user-office-field	*[not set]*
ldap.schema.user-name-search	`(uid={0})`
ldap.schema.group-name-field	`cn`
ldap.schema.group-member-field	`memberUid`
ldap.schema.group-search	`(memberUid={0})`
ldap.schema.posix-groups	`Y`
ldap.schema.home-directory-field	*[not set]*

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Novell eDirectory defaults

The following defaults are used if the LDAP server is a Novell eDirectory.

Table 28: Novell eDirectory LDAP default settings

Config name	Default value
ldap.schema.user-name-field	`cn`
ldap.schema.user-full-name-field	`fullName`
ldap.schema.user-email-field	`mail`
ldap.schema.user-department-field	`OU`
ldap.schema.user-office-field	`l`
ldap.schema.user-name-search	`(&(cn={0})(objectClass=person))`
ldap.schema.group-name-field	`cn`
ldap.schema.group-member-field	`member`
ldap.schema.group-search	`(&(member={0})(objectClass-s=groupOfNames))`
ldap.schema.posix-groups	`N`
ldap.schema.home-directory-field	*[not set]*

Microsoft Active Directory defaults

The following defaults are used if the LDAP server is a Microsoft Active Directory.

Table 29: Active Directory LDAP default settings

Config name	Default value
ldap.schema.user-name-field	`sAMAccountName`
ldap.schema.user-full-name-field	`displayName`
ldap.schema.user-email-field	`mail`
ldap.schema.user-department-field	`department`
ldap.schema.user-office-field	`physicalDeliveryOfficeName`
ldap.schema.user-name-search	`(&(sAMAccountName={0})(objectCategory=person)(objectClass=user)(sAMAccountType=805306368))`

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Config name	Default value
ldap.schema.group-name-field	`sAMAccountName`
ldap.schema.group-member-field	`member`
ldap.schema.group-search	`(&(member={0})(objectCategory=group))`
ldap.schema.posix-groups	`N`
ldap.schema.home-directory-field	`homeDirectory`

2.8.9. Print authentication

Modern large multi-user networks, like those typically seen in higher education, are made up of mix of operating systems, authentication methods, personal student laptops, print protocols and disparate networks. This heterogeneous mix poses problems for SysAdmins working towards a unified and centralized print management system. PaperCut NG/MF supports an array of tools to help administrators meet their unification goals. PaperCut NG/MF's flexibility is, however, a double-edged sword and the multitude of options also bring complexity. This section discusses cross-platform support in detail with solutions presented as "recipes".

The objective of a centralized and unified PaperCut NG/MF system is to offer all users, irrespective of their operating system or access method, access to the full array of features in a secured and authenticated way. PaperCut NG/MF offers cross-platform client software providing end user features on all major operating systems, however, the need for secured and authenticated access adds an extra, somewhat complex dimension.

2.8.9.1. About authentication and printing

What is authentication?

Authentication in a printing environment is the act of confirming the digital identity of the person who issued a print job. Knowledge of the user's identity allows PaperCut NG/MF to offer the user access to functions such as allocating the cost of a job to their account, or offering them access to shared accounts. In a Windows domain environment, authentication is handled at the point of login using a username and password. A web-of-trust is then established between servers and services.

Why does authentication pose a problem?

By default PaperCut NG/MF assumes the printer queues are authenticated and trusts the username that is associated with the print job. It is this user is charged for for the printing. On fully authenticated networks (like 100% Windows Active Directory networks), PaperCut NG/MF can trust the username associated with the job. There are a few common scenarios where authentication is not as simple:

1. Generic, common, or shared user accounts. (e.g. generic "student" login).
2. Systems that auto-login as a set user.

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3. Unauthenticated print queues or print protocols (e.g. LPR).
4. Users' personal laptops that are not authenticated on the network.

Generic or shared login accounts are seen in some computer lab and network environments. In these environments administrators ask users to log in to selected systems using standard user names such as "student" or "user". This practice is particularly common on the Apple Mac operating system as a single login helps streamline system and application management. The use of the Window auto-login feature also poses a similar problem - authentication is not enforced at the time of system startup. An extra layer of authentication is required on these systems to correctly identify the person that performs printing.

Unauthenticated print queues also pose problems in cross platform environments. In an ideal world, all computers would talk the same protocols and happily work together in a single centrally authenticated environment. You can come close to this goal in a 100% Microsoft Windows environment, however, if you mix in Unix, Linux and Mac, it's a different story. Although initiatives such as CUPS (Common Unix Printing System) and the Internet Printing Protocol (IPP) offer some hope, unification in the area of authenticated printing is still some way off. Unfortunately technical reasons often prevent networks from using CUPS authentication or exclusively using the authenticated Microsoft printing protocol.

The use of personal laptops or other unauthenticated workstations in an otherwise authenticated network is another cause of problems. These machines might not be able to authenticate to your network for a number of reasons:

- The operating system does not support authentication (like Windows Home editions).
- It is too complex to configure authentication on personal laptops.
- Users log in to their laptop with their personnally chosen username and password.
- You cannot force users to change the configuration of their personal laptops.

How does PaperCut NG/MF address authentication?

If technical reasons prevent authentication at the print queue level, PaperCut NG/MF provides a number of alternate authentication options. These options change PaperCut NG/MF's default behavior of trusting the username associated with a print jobs, and instead the user is required to re-authenticate before the job is printed. The two alternate authentication options are described below.

Popup authentication (IP session based authentication)

This method involves associating the workstation's IP address with a user for a specified period of time - a session. Any print jobs arriving from this IP address are deemed to be associated with this user. Authentication is provided by the PaperCut NG/MF client software in the form of a popup dialog requesting a username and password. Data is transmitted to the server via an SSL encrypted connection. To print with popup authentication the client software must be running on the workstations or laptops.

Use popup authentication to:

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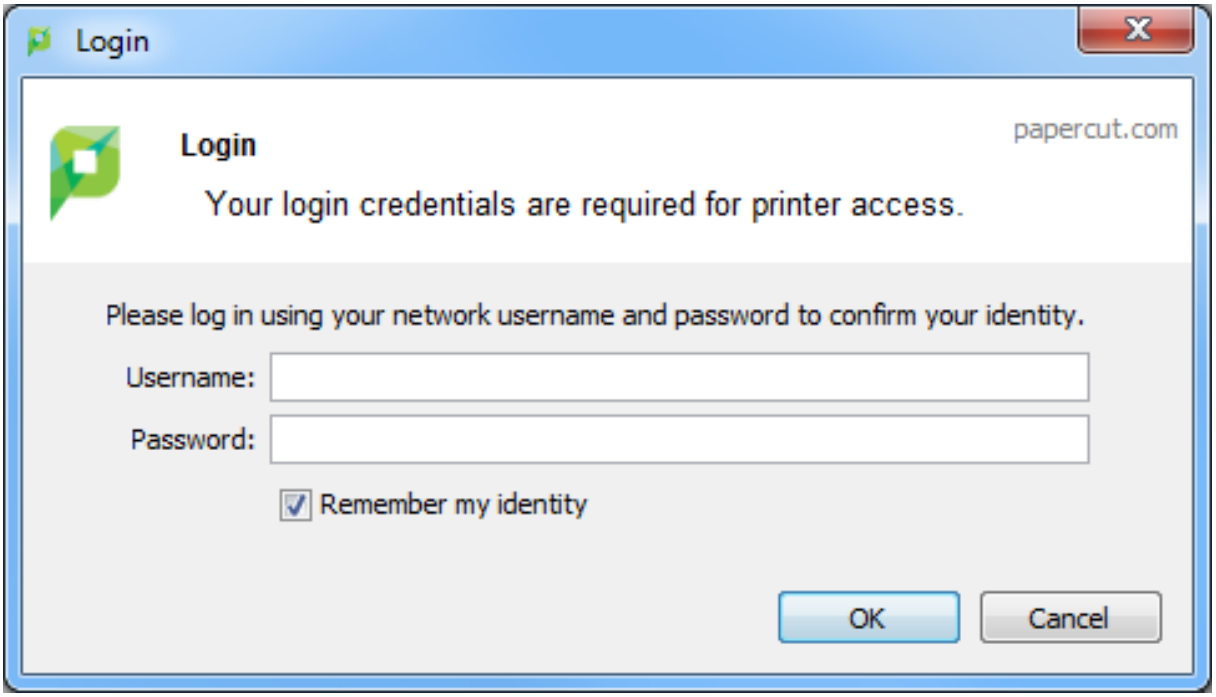
- Authenticate users who print from a generic login or auto-login account. This is done by flagging the generic account as unauthenticated in PaperCut NG/MF.
- Authenticate users not authenticated to the network (e.g. personal laptop users). This is done by marking the print queues as unauthenticated in PaperCut NG/MF.



For more information, see Popup authentication.

Web Print

Web Print is a service for printing documents that are uploaded via a web browser. This provides a simple way to enable printing for laptop, wireless, and anonymous users without installing print drivers.

With Web Print users are authenticated when they log in to the PaperCut NG/MF user web interface. Any documents they upload can then be tracked against their user name.

For more information, see Web Print (driver-less printing via a web browser).

Release Station authentication

Release Stations work by placing print jobs in a holding queue. Users must authenticate at a Release Station before being given access to release their job. A Release Station normally takes the form of a dedicated terminal located next to the printer(s), however, the holding queue can also be accessed via a web browser. The act of a user releasing a job causes it to be charged to their account. You can use Release Stations without installing the client software on user's workstations.

The hold/release queues are enabled on a printer queue level within PaperCut NG/MF

For more information on setting up and using Release Stations, see Secure print release. To achieve authentication, the Release Station is run in "release any" mode.

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Choosing the right authentication option for your network

The choice of the authentication approach depends on the constraints of your network and your requirements. Below are some points to consider when making this decision:

- Popup authentication: Usually the most user-friendly option, but it requires the client software to be installed and running on all workstations that print. In some environments it is not possible to mandate that software be installed on personal laptops.
- Release Station Authentication: Users do not need any additional software installed but the process of releasing a print job is more involved. You must install Standard Release Stations nearby all your printers, or make use of the User web interface Release Station. If you are already using hold/release queues, then it makes sense to also use them for authentication.

Handling partially authenticated networks

Many sites have a heterogenous network with a mix of both authenticated an unauthenticated printing. A common example, is a college where all lab computers are connected to the domain and users must log in to the workstations to print. The college also allows students to print using their personal laptops that are not authenticated on the network.

An administrator can enable PaperCut NG/MF authentication for all users. This is the simplest to set up but is inconvenient for users who are already fully authenticated. Why should an authenticated user have to re-authenticate with PaperCut NG/MF to print?

To overcome this it is recommended to set up two sets of print queues, one for the authenticated users and another for the unauthenticated users. These queues can point to the same physical printers, but are configured differently in both PaperCut NG/MF and the operating system. The authenticated print queues:

- Must only be accessible to authenticated users (i.e. through network security or operating system permissions).
- Should not have the authentication enabled within PaperCut NG/MF (i.e. do not enable the hold/release queue or unauthenticated printer options on the print queue).
- Should not be published to unauthenticated users.

The unauthenticated print queues:

- Must be configured to allow printing by unauthenticated users.
- Must have the authentication enabled within PaperCut NG/MF. i.e. Enable the hold/release queue or flag the printer as unauthenticated.
- Must be published to anonymous users so they know how to connect/user the printers.

If the decision as been made to split up printers into two separate queues (authenticated and unauthenticated), administrators can use tools such as IP address filtering, firewalls, or user/group access permissions to control who has access to which set of queues (i.e. deny "guest" account access on authenticated queues in Windows).

For a detailed explanation of setting up PaperCut NG/MF for unauthenticated laptop printing see Handling unauthenticated (non-domain) laptops

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For discussion of many other authentication scenarios see The authentication cookbook - recipes by example

2.8.9.2. Handling unauthenticated (non-domain) laptops

Schools and colleges commonly allow students to use their personal laptops for printing to campus printers. They also want to allocate/charge printing from these unauthenticated users to the correct person. However, if the systems haven't authenticated with the network, then user credentials are not provided with the print job (or worse, their personal laptop username is associated with the job). For example, on Windows networks, the jobs might list as `guest`. Mobility Print offers a solution for this problem by allowing users with unauthenticated laptops to print. For more details, see Mobility Print.

Alternatively, PaperCut NG/MF also addresses this problem by providing alternate print authentication options. This section provides a step-by-step guide to configuring these authentication options.

Before continuing it is highly recommended to read the introduction to print authentication (see Print authentication). It introduces the important concepts required to understanding print authentication.

Option 1: Popup authentication for unauthenticated laptops

Having chosen popup authentication to authenticate your laptop users, you should review Popup authentication for a detailed explanation of the feature.

Step 1: Decide whether to enable popup authentication on all printer queues

First decide whether to enable authentication for all queues, or only the queues accessed by unauthenticated laptop systems. For more information, read Handling partially authenticated networks.

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If you enable authentication only for your unauthenticated laptops, you must configure a second set of unauthenticated print queues. These queues can point to the same physical printers as your authenticated queues.

Often the simplest way to set up these unauthenticated queues is to configure a separate print server that allows anonymous printing. You can make use of a firewall or operating system permissions to ensure that the anonymous users cannot access the "authenticated queues". On Windows networks, you might need to enable the `guest` account on the domain/system so users running the "Home" editions of Windows can print to these queues.

Step 2: Install/run the User Client software on laptops

To use popup authentication, the client software must be installed and running on the unauthenticated laptops. You should make the client available for your users along with instructions of how to install the software on their laptops. You can easily install the software on all common operating systems (Windows, Mac and Linux).

For more information on installing and deploying the client software see User Client.

Step 3: Mark the printer queue as "Unauthenticated"

By default PaperCut NG/MF trusts the usernames that are associated with the print job. When printing from unauthenticated laptops this username cannot be trusted. By flagging the printer queue as "unauthenticated", PaperCut NG/MF no longer trusts the username and prompts the user to authenticate.

Advanced: An alternate approach on Windows networks is to enable the **unauthenticated** option at the user-level on `guest` only rather than at the queue level.

To flag the printer as Unauthenticated:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Configuration** area, select the **Unauthenticated printer** check box.
4. Click **OK**.
5. Repeat this process for each printer that requires popup authentication enabled.

Important:

Once the printer is flagged as *Unauthenticated*, no print jobs are printed until the user has authenticated using the client software. It is important that all workstations using these print queues are running the client software.

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Step 4: Test the popup authentication

It is important to test the popup authentication once enabled. To do this:

1. Start-up an unauthenticated laptop/workstation.
2. Ensure that the User Client software is installed and running.
3. Perform a test print job to the queue on the print server you flagged as Unauthenticated.
4. The client software should popup the authentication dialog box. The print job should not print until you successfully authenticate.
5. Once authenticated, verify that the print job completes and the job is logged against the correct username in **Printers >Print Jobs**.

Option 2: Release Station authentication for unauthenticated laptops

Having chosen Release Stations to authenticate your laptop users, you should review Secure print release for a detailed explanation of the feature.

Step 1: Decide whether to enable Release Station authentication on all print queues

First decide whether to enable the hold/release queue for all print queues, or only the queues accessed by unauthenticated laptop systems. For more information, read Handling partially authenticated networks.

If you enable the hold/release queue only for your unauthenticated laptops, you must configure a second set of unauthenticated print queues. These queues can point to the same physical printers as your authenticated queues.

Often the simplest way to set up these unauthenticated queues is to configure a separate print server that allows anonymous printing. You can make use of a firewall or operating system permissions to ensure that the anonymous users cannot access the "authenticated queues".

Step 2: Choose which Release Station interface to use

You can choose between the Standard Release Station interface and the User web interface. The standard Release Station:

- Requires a dedicated workstation nearby the printers that is configured to run the Release Station.
- Requires less user education because when they walk up to fetch their print jobs it is obvious they need to use the Release Station to user the job.

The User web interface Release Station:

- Requires no workstations configured near the printers. Users use a web browser to log in to the User web interface and release their jobs.
- Users must be provided with instructions on how to print and then log in to the web Release Station to release their print jobs.

After choosing the Release Station interface, proceed to the appropriate step below.

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Step 3a: Run and configure the Standard Release Station

If using the standard Release Station:

1. Deploy the standard Release Station to workstations located nearby your printers. See Configure a Release Station for information on deploying the Release Station.
2. Run the Release Station in "Release Any" mode, which allows users to log in and see all print jobs awaiting release. When they release a job it is charged to their user account. For more information see Release Station Modes.

Step 3b: Enable and configure the User web interface Release Station

If using the User web interface Release Station:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **User Features** area, select the **Allow users to view held jobs (hold/release queues)** check box.
3. In **Users have permission to**, select **Release any jobs (charge to their account)**.
4. Click **Apply**.

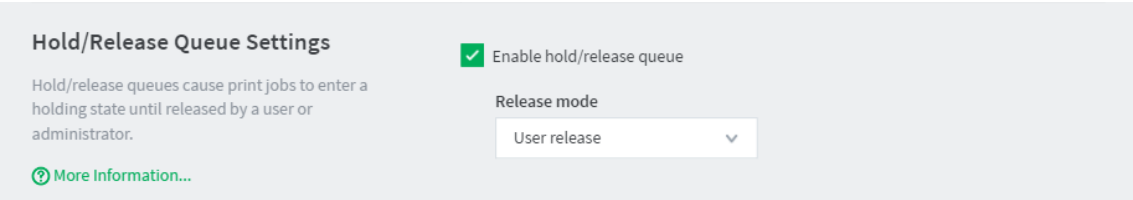
Step 4: Enable the hold/release queue for the print queues

By default, PaperCut NG/MF allows the jobs to be printed without any interaction from the user. The hold/release queue feature holds the print job until the user logs into a Release Station and releases the job. To enable the hold/release queue for a printer:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



4. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.

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- **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

> **Tip:**
> To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.

5. Click **OK**.
6. Repeat this process for each printer that requires the hold/release queue enabled.

> **Important:**
> Once the hold/release queue is enabled, no jobs print until released using a Release Station. It is important to instruct your users how to use the Release Station, otherwise they will not be able to print.

Step 5: Test the Release Station

It is important to test the Release Station once enabled. To do this:

1. Start-up an unauthenticated laptop/workstation.
2. Perform a test print to a print queue with the hold/release queue enabled.
3. For the standard Release Station, go to the print Release Station and log in as a user. Select the job you printed; then click the **Print** link to release the job.
4. For the User web interface Release Station, log in to the User web interface at `http://[yourserver]:9191/user`. Select the **Jobs pending release** link. Select the job you printed; then click the **[print]** link to release the job.
5. Log in to the PaperCut NG/MF Admin web interface and verify that the print job was allocated to the correct user in the **Printers > Print Jobs** area.

2.8.9.3. The authentication cookbook - recipes by example

This topic discusses various solutions to the "authentication problem". The aim is not to provide detailed step-by-step instructions, but rather guide you to the relevant procedures and sections in other parts of the manual. This topic includes the following recipes:

- Windows systems with generic logins
- Windows laptops that do not authenticate against a domain
- Windows print server using LDAP or eDirectory authentication
- Mac OS X systems with generic user accounts
- Mac OS X systems using domain authentication via Open Directory
- Mac OS X systems using domain authentication via Windows Active Directory
- Mac OS X laptops (or single user systems) printing to Windows print queues

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- Linux Workstations in a lab environment with printers hosted on a Windows server
- Linux Workstations in a lab environment with printers hosted on Linux CUPS server
- Linux laptops (or single user systems)
- Multiuser Unix terminal servers

Windows systems with generic logins

This scenario arises either when users log in to systems using a common username such as `user` or `student`, or if the workstations auto-login as a generic user. See introduction for details.

Preferred method:

- Ensure all users have an account (username and password) on the server (or domain) hosting the PaperCut NG/MF software.
- Install the User Client software on all systems. For more information, see User Client.
- Enable popup authentication by selecting the **Unauthenticated** option on the corresponding generic user account. For more information, see Popup authentication.

Other methods:

1. Use the Standard Release Station in "Release Any" mode, or the User web interface Release Station configured to allow users to release any jobs. For more information, see Secure print release.
2. Consider implementing domain level logins.

Windows laptops that do not authenticate against a domain

Portable systems can spend most of their time outside the organization's network so setting up domain authentication might not be required. The laptops/notebooks are often owned by a single individual and are not under the control of a central administrator.

Preferred method:

Use popup authentication or hold/release queues. For more information, see Handling unauthenticated (non-domain) laptops.

Alternate method 1:

If using a version of Windows that can authenticate with a domain (i.e. not the Windows Home editions), then you can configure the laptop to authenticate with the network as follows.

1. Teach the user how add their domain username and password to their **Stored usernames and passwords**:
    a. **Start > Control Panel > User Accounts**
    b. Select the user's laptop login account.

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c. Click **Manage my network passwords**.
d. Click **Add**.
e. Enter the name of the server and the user's network domain username and password

2. Teach the user how to add a network printer in the form `\\server\printer`.
3. *Optional:* Locally install client software using the `client-local-install.exe` install program. This is located on the `\\Server\PCClient\win` share. At the end of the install process, the client opens asking the user to confirm their network identity. For more information, see User Client.

Alternate method 2:

1. Add a generic "LaptopUser", or "guest" user account to the domain. Make the password known to all users (e.g. `password`).
2. Set the unauthenticated option on this user (enable popup authentication).
3. Locally install client software using the `client-local-install.exe` install program. This is located on the `\\Server\PCClient\win` share. At the end of the install process the client opens asking the user to confirm their network identity. See Configure the User Client using the command-line for details.
4. Teach the user how to add a network printer pointing to `\\server\printer`.
5. See the preceding scenario for more detail.

Windows print server using LDAP or eDirectory authentication

The Microsoft Windows operating system does not play well in non Active Directory domain environments such as LDAP or eDirectory. Although it is possible to configure a Windows print server on any network, Windows does not normally provide the ability to use LDAP as an authentication source. Jobs are listed under either a local Windows user identity or a guest account. Use PaperCut NG/MF's popup authentication, bound to LDAP, to work around this limitation.

Preferred method:

- Set up the Windows server and install and share printers.
- Set printer permission to allow printing from a general "guest" type account. This usually takes the form of the built-in guest account, or a local account with a known username and password (e.g. `printuser`).
- Configure printers on each workstation. Ensure all workstation users can print and jobs list in the print queue under the guest account configured in the previous step.
- Install the PaperCut NG/MF software. Select the LDAP server as your user/group source. PaperCut NG/MF then uses this source for the user list and authentication. See Synchronize user and group details with LDAP for more information about LDAP.
- Set the **Unauthenticated** option on each printer (print queue). This enables popup

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authentication. For more information, see Popup authentication.

- Install the User Client software. For more information, see User Client.

Other methods:

1. Use Release Station. See Secure print release.

Mac OS X systems with generic user accounts

Mac OS X workstations in a lab environment are often set up so users log in using a common, generic, or standard account. For example, "macuser" or "student".

Preferred method:

1. Install the User Client software. For more information, see User Client.
2. Add a domain/network user account that matches the generic login account (i.e. "macuser"). This ensures the account is available in PaperCut NG/MF.
3. Set the **Unauthenticated** option on the "macuser" account.
4. Add the printer(s) so jobs list under the "macuser" account. If the print queues are hosted on Windows, add the printer using Samba. (e.g. A `DeviceURI` such as `smb://macuser:password@servername/printer`). See Mac printing in detail for an explanation on how to add a printer using this method.

Important:
If you are running Mac OS 10.7, you might need to include the port in the DeviceURL:

```
smb://username:password@server_
name:139/printer_name
```

Other methods:

1. Use the Standard Release Station in "Release Any" mode, or the User web interface Release Station configured to allow users to release any jobs. For more information, see Secure print release.
2. Consider setting up domain-level authentication.

Mac OS X systems using domain authentication via Open Directory

You can configure Mac systems to authenticate users via a central Mac OS X server running Open Directory. Each user has their own login account.

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Preferred method:

- Set up print queues on the Mac OS X Server.
- Set up PaperCut NG/MF on the server either as a primary server, or as a secondary server reporting to another primary server (either Mac, Linux or a Windows system) (see Installation).
- Add printers to each Mac workstation. Ensure the local printers point to the shared print queue set up on the server.
- *Optional:* Install client software (User Client).

Other methods:

1. Use the Standard Release Station in "Release Any" mode, or the User web interface Release Station configured to allow users to release any jobs. For more information, see Secure print release.
2. Set up print queues on a Windows system and use popup authentication - see next recipe.

Mac OS X systems using domain authentication via Windows Active Directory

You can configure Mac systems so users log in using their Windows Active Directory domain username and password. The Mac Windows printer support using Samba/SMB, however, requires printers to be added using a single username and password and this is shared by all users. For this reason an extra layer of authentication is required.

Preferred method:

- Host printers and the PaperCut NG/MF system on the Windows server.
- Ensure the print server is running in **Mixed mode** or **Pre-Windows 2000 Compatibility Mode**. Macs currently have problems with `Native Mode` networks.
- Add a domain/network user account that matches the generic login account (i.e. "macuser"). This ensures that the `macuser` account is added to PaperCut NG/MF's user list.
- In PaperCut NG/MF, turn on the **Unauthenticated** option on the "macuser" account to enable popup authentication. Also ensure that the account has zero balance and is restricted.
- Add the printer(s) so jobs list under the "macuser" account. If the print queues are hosted on Windows, add the printer using Samba. (e.g. A `DeviceURI` such as `smb://macuser:password@servername/printer`). For more information about how to add a printer using this method, see Mac printing in detail.

Important:

If you are running Mac OS 10.7, you might need to include the port in the DeviceURL:

```
smb://username:password@server_name:139/printer_name
```

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- Install client software (see User Client).

Other methods:

1. Use LPR as a connection method. See Scenario Three: Multi-user Macs using LDAP or Active Directory authentication in detail.
2. Use the Standard Release Station in "Release Any" mode, or the User web interface Release Station configured to allow users to release any jobs. For more information, see Secure print release.
3. Host printers on a Mac Server (see the previous recipe).

Mac OS X laptops (or single user systems) printing to Windows print queues

Mac systems that are owned/used by a single user can benefit from having the printers added in such a way in that they automatically authenticate under their identity.

Preferred method:

- Teach users how to add printers using the method described in Scenario One: My Own Mac (Single User).
- Use popup authentication or hold/release queues. For more information, see Handling unauthenticated (non-domain) laptops.

Other methods:

1. Locally install client software using the `client-local-install` program located in the directory `[app-path]/client/mac`. The client displays a popup asking them to confirm their network identity (via username/password).

Linux Workstations in a lab environment with printers hosted on a Windows server

Linux workstations typically use the CUPS print system. CUPS, through the use of Samba, can print directly to Windows print queues.

Preferred method:

- Ensure the system is configured to deny remote shell access to standard users - that is, allow only direct screen/console access. This ensures the system's IP address can be associated with a single user providing a suitable environment for popup authentication.
- Ensure the print server is running in **Mixed mode** or **Pre-Windows 2000 Compatibility Mode**. Some Linux distributions currently have problems with `Native Mode` networks.
- Add a domain/network user account that matches the generic login account (i.e. "linuxuser"). This ensures the "linuxuser" account is added to PaperCut NG/MF's user list.

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- In PaperCut NG/MF, turn on the **Unauthenticated** option on the "linuxuser" account to enable popup authentication. Also ensure that the account has zero balance and is restricted.
- Add the printer(s) so jobs list under the "linuxuser" account. If the print queues are hosted on Windows, add the printer using Samba. (e.g. A `DeviceURI` such as `smb://linuxuser:password@servername/printer`). Refer to the CUPS or distribution documentation to read more how to add a CUPS printer using an `smb` backend.
- Install client software. For more information, see Install the User Client on Linux and Unix. If users log in to the workstations using a username that matches their Active Directory password, no additional client configuration is required. If users log in using a generic or non-matching account, use command-line options or the `config.properties` file to force the client to display under the user's domain identity. See Configure the User Client using the command-line for more information.

Other methods:

1. Use the Standard Release Station in "Release Any" mode, or the User web interface Release Station configured to allow users to release any jobs. For more information,see Secure print release.
2. Host printers on a CUPS server running on Linux.
3. Install PaperCut LPD Service and use a LPR rather than CUPS (or CUPS with an LPR backend).

Linux Workstations in a lab environment with printers hosted on Linux CUPS server

Network administrators running Linux labs might choose to host the printers on a Linux server running CUPS. For convenience, CUPS is set up without authentication.

Preferred method:

- Set up CUPS print queues on a Linux server.
- Ensure each user has an account on this system (or the domain depending on PaperCut NG/MF's selected user list source)
- Set up PaperCut NG/MF on the server either as a primary server, or as a secondary server reporting to another primary server (either Mac, Linux or a Windows system) (see Installation).
- Set the **Unauthenticated** option on each printer (print queue). This enables popup authentication (see Popup authentication).
- Ensure the system is configured to deny remote shell access to standard users, that is, allow only direct screen/console access. This ensures the system's IP address can be associated with a single user providing a suitable environment for popup authentication.
- Install client software (see User Client).

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Other methods:

1. Use the Standard Release Station in "Release Any" mode, or the User web interface Release Station configured to allow users to release any jobs. For more information, see Secure print release.
2. Use CUPS Authentication.

Linux laptops (or single user systems)

Modern Linux laptops make use of the CUPS print system. This environment is equivalent to the Mac laptop recipes described above.

Multiuser Unix terminal servers

Unix or Linux systems allowing remote SSH, Telnet, VNC, or X connections differ from the other scenarios discussed above. These systems cannot use the popup authentication as it is not possible to uniquely identify a user from the system's IP address. The only secure option is to use the Release Station.

Preferred method:

- Set up PaperCut NG/MF on your preferred server - this does not need to be the multi-user terminal system itself. It could be another Windows or Linux server.
- Ensure PaperCut NG/MF sources its user list from the same source as that used by the multi-user terminal server - most likely an LDAP server.
- Enable the Release Station option on all printers that are accessed via users of the multiuser terminal system.

> **Important:**
> Enabling the Release Station option might be incompatible with objectives of other operating systems so it might be appropriate to set up a separate set of print queues. See Further Recommendations below for more detail.

- Set up a Release Station. This commonly takes the form of a dedicated terminal located near the printers, however, other options worth considering using the PaperCut NG/MF User web interface to release jobs, or the Release Station command-line client. See Secure print release for details.
- Instruct users on how to use the Release Station.

Other methods:

1. No alternate methods.

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Further recommendations

1. Decide on an authentication method and use it consistently throughout the organization and network. For example, using popup authentication on some systems and Release Stations on others might be confusing for users. Try to offer a consistent user experience.
2. Where possible, configure workstations to communicate with the server using the server's native print protocol. For example, use SMB or standard Windows printing when printing to a Windows server, and Internet Printing Protocol (IPP) when printing to a CUPS server. Servers are most reliable when talking their own language!
3. Consider the scope of any configuration change. For example, enabling popup authentication or Release Station on a print queue affects ALL users of that printer. For example, you might want to ask Linux users to use the Release Station, however, this might be considered an inconvenience for Windows users. In these cases, you might set up two print queues for each physical printer - the first queue without Release Station enabled for Windows users and the other with the Release Station option enabled for Linux users.

2.8.10. PaperCut NG/MF LPD service

PaperCut NG/MF ships with its own LPD service that supports support cross platform printing. This service provides end-to-end support for customers who use PaperCut NG/MF and LPD.

The PaperCut LPD Service allows print administrators to connect disparate systems to a Windows print server, allowing the server to accept jobs from

- Mac Clients/Servers
- Linux Clients/Servers
- AS400 Servers
- Mainframes
- …any other client or server that supports LPR printing.

The PaperCut LPD Service also allows administrators to continue to support methods that bypass any authentication requirements to print to a Windows Server. Conversely, as a legacy protocol, LPR has limited security and administrators should make sure that LPD complies with their organization's security policies

2.8.10.1. Using the PaperCut NG/MF LPD service

Install the PaperCut NG/MF LPD service

After installing the Microsoft Windows version of PaperCut's Primary, Secondary, or Site Server software, the PaperCut LPD Service Setup Wizard style installer is available under **[appath]\providers\lpd\win\pc-lpd-installer.exe**

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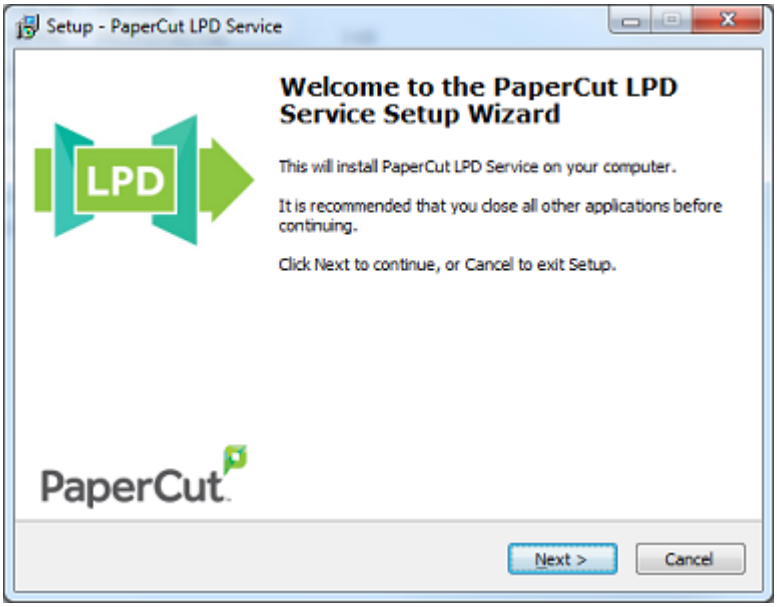

LPD Servers listen on port 515 by default, so Administrators must ensure that this port is open to requests from clients (check that the port is not blocked by your firewall). The installation wizard also checks for previous versions of the Windows LPD Server, and disables these to ensure there is no port conflict.

It's important at this point to consider how the print jobs are being tracked. The print jobs are sent with the username from the client system; e.g. the Unix, Linux, or Mac username associated with the print job. If the username is not consistent with the Windows username you want to associate with the job, consider additional PaperCut features like:

- Username aliasing
- Unauthenticated printing. See Handling unauthenticated (non-domain) laptops
- If this queue services a single account, enable the **Override user-level settings** at a given queue and charge all jobs to a given shared account.

Note:

- You must share the printer before being able to connect to it using LPR. This is different to Microsoft's implementation, but provides an extra level of control over which queues can be printed to using LPR.
- The PaperCut LPD Service accepts inbound print data over TCP/IPv4. The PaperCut LPD service does not support data over TCP/IPv6.
- The PaperCut LPD service records routed print jobs in the Windows Application Event log.
- PaperCut LPD responds to LPQ commands with "OK". No pending print job information is revealed.
- For customers currently using the Windows LPD Service, installations of the PaperCut LPD Service should not require any changes to the client.

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Connect to an LPD Service

Most operating systems, including Windows, support connecting to an LPD Service via the LPR printing protocol. You need the following information:

- The address of the server running the PaperCut LPD Service.
- The name of the queue: either share name or queue name.

> **Note:**
> Some print systems (e.g. CUPS) do not allow spaces in queue names, so a share or queue name that does not include spaces improves the likelihood of connection.

An example using Mac OS X System Preferences

1. Select **System Preferences**.
2. Select **Printers & Scanners**.
3. Click **+** to add a new printer.
4. Click the **IP** tab at the top toolbar.
5. From the **Protocol** list, select **Line Printer Daemon - LPD**.
6. In **Address**, enter the IP address of the server hosting the printers.
7. In **Queue**, enter the printer's share name.
8. In **Name**, define a user friendly name; then select the printer type.
9. Select the driver or printer model from the list; then click **Add**.

An example using the CUPS Admin web interface

This example assumes you are using the CUPS web based Admin web interface. Other methods are also available (e.g. GNOME printer manager in GNU/Linux)

1. Log in to the CUPS Administration UI.
2. Click **Administration > Add Printer**.
3. Scroll to **Other Network Printers**; then select **LPD/LPR Host or Printer**.

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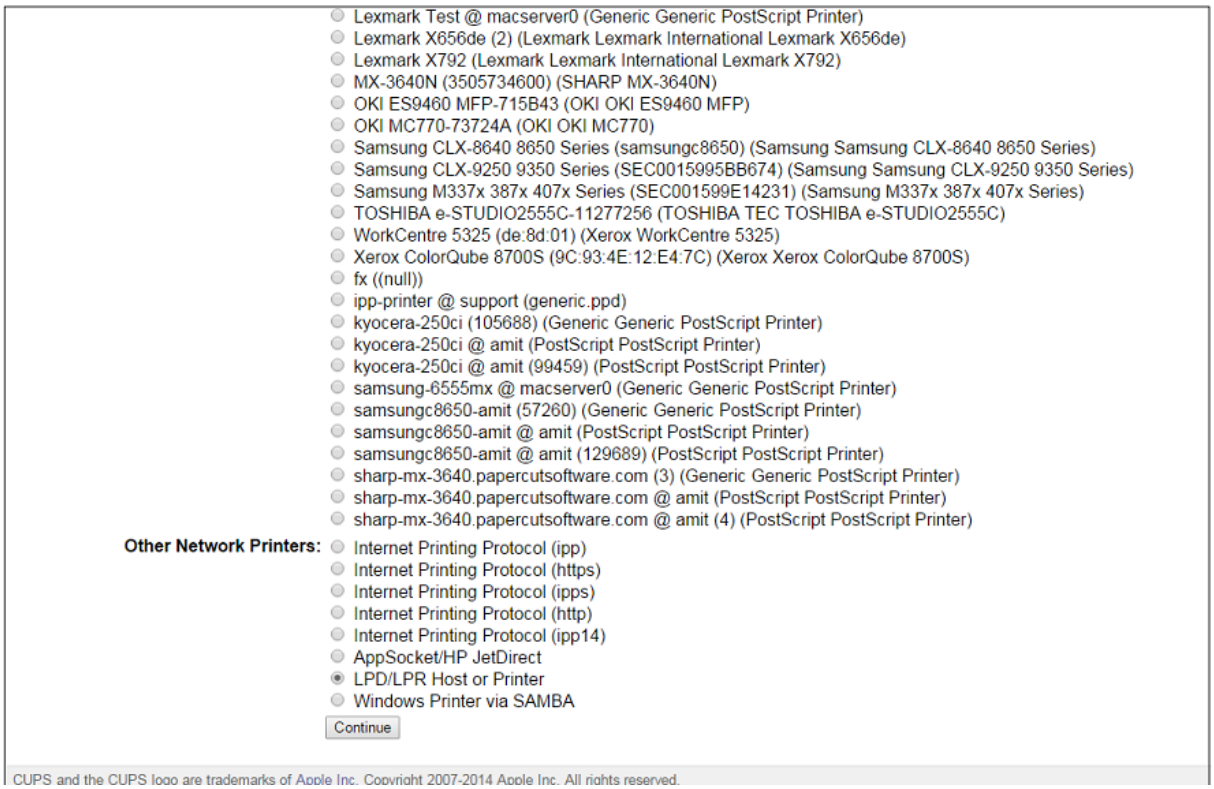

4. Enter in the **Connection** string using the example format on the page. i.e.
   - **lpd://hostname/queue**
   - **lpd://10.100.65.38/Global**
5. Queue **Name** — either the share name or print queue name on the print server. For CUPS the queue name cannot contain spaces.
6. Create the CUPS queue by entering in the rest of the required information, such as **Name**, **Description**, **Location** etc.
7. Choose the driver; then click **Add Printer**.

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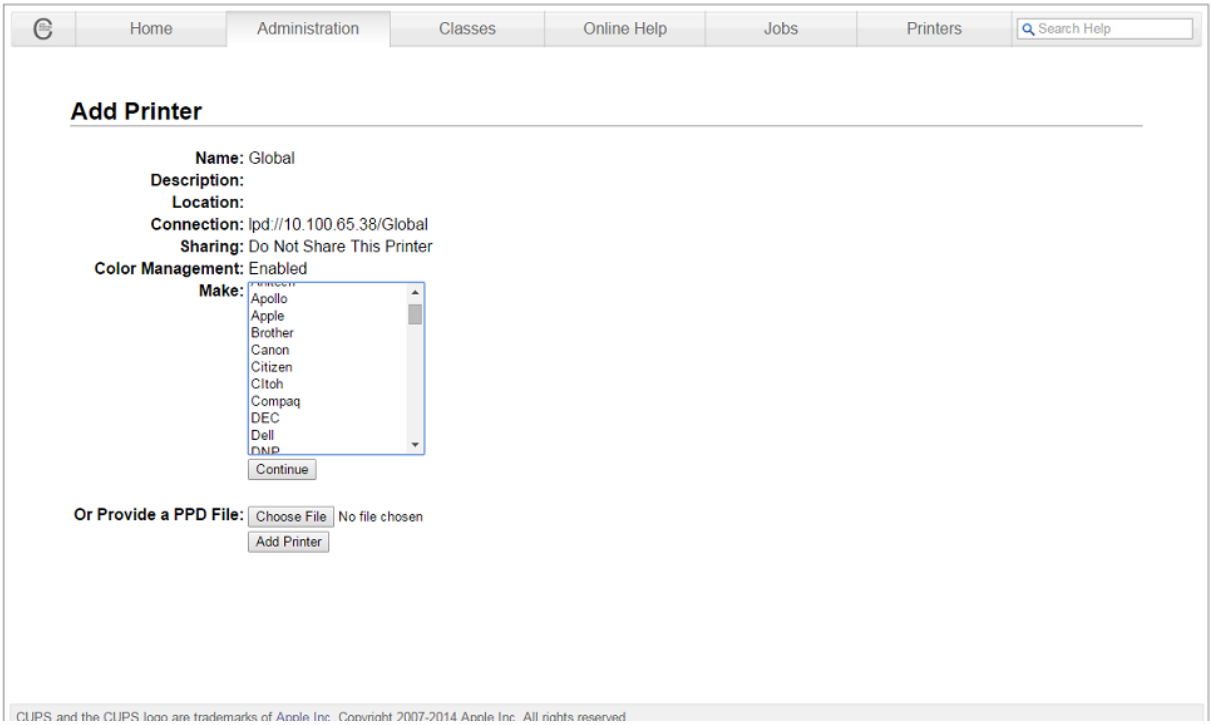


Print jobs are accepted by LPD into the Windows printing system.

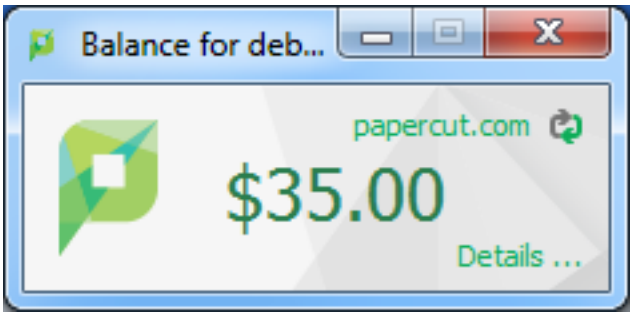
2.8.11. User Client

The PaperCut NG/MF activity tracking and charging is implemented using 100% server-side technology. The User Client software is not required as part of the activity monitoring process.

> **Note:**
> The use of client software for activity monitoring could open up security problems as client software is readily accessible to end users. By design PaperCut Software developers endeavor to implement all monitoring at the server level eliminating client-side loopholes. The client software supplied with PaperCut NG/MF is a presentation layer around server-side implementation.

The User Client facilitates four tasks:

- Allows users to view their current account balance via a popup window.



- Provides users with a "last chance" before printing, confirming what they are about to print.

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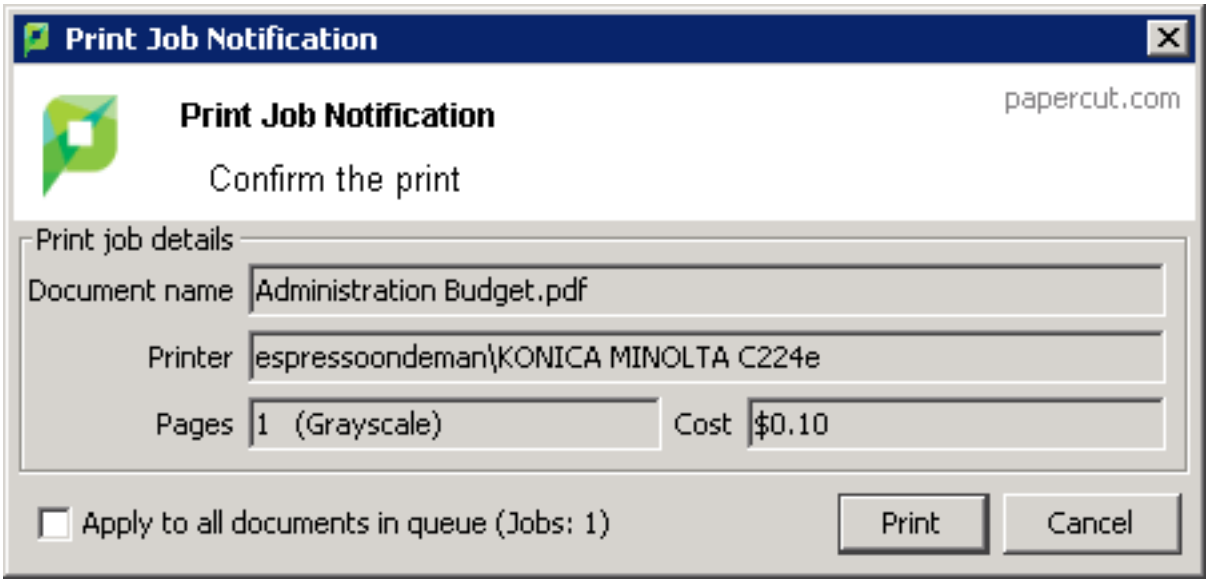
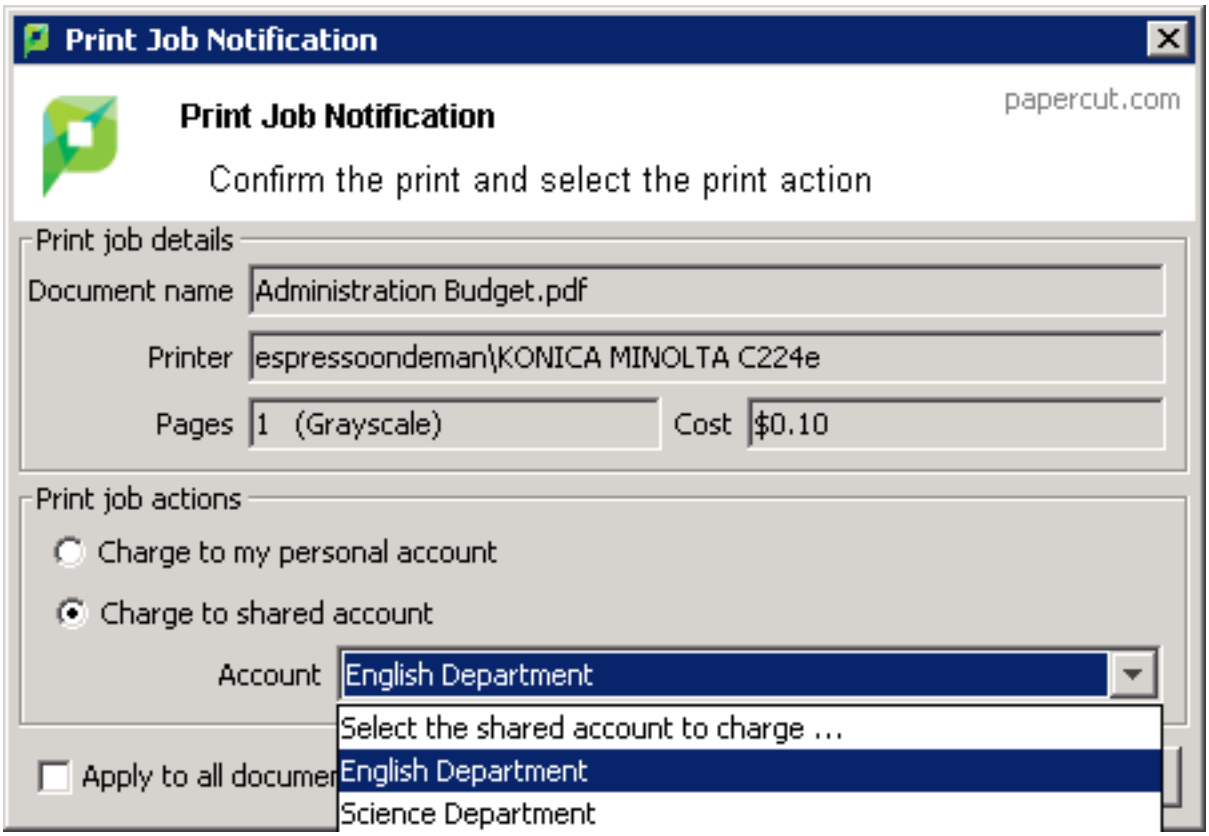


- Displays system messages such as the "low credit" warning message or print policy popups.
- Allows users configured with Account Selection options (or you have print scripts) that require user interaction that can ONLY be done via the User Client (and cannot be done at the printing device). In this case, if the User Client is not running, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused and does not appear on the printing device.



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> **Tip:**
> If users are configured with Account Selection options that require user interaction and this can be done BOTH via the User Client AND at the printing device (the ability to assign accounts at the printing device is available), then running the User Client is not mandatory. It may be required if it is also being used for other purposes, besides Account Selection (such as, viewing current account balance, cached user comments, "low credit" warning messages, notifications about print policies, etc). For more information, see Assigning accounts to print jobs at the device.

The User Client is available for most major platforms. For more information about installing the User Client, see:

- Install the User Client on Windows
- Install the User Client on Mac OS X
- Install the User Client on Linux and Unix

The User Client software is installed automatically on the server under the `[app-path]\client` directory. On a Windows based server this directory is automatically shared in read-only form providing network users with access to the client executables.

The following sections contain further information about the User Client:

- Configure the User Client using the command-line—command line and configuration options, such as where on the screen the User Client pops up or which option is selected by default.
- Customize the User Client—customization of the User Client.

2.8.11.1. User Client unavailability alert on Dashboard

You can configure PaperCut NG/MF to display an alert log in the Dashboard's **Real-time Activity** gadget, when the User Client is detected as being unavailable (either because users are not running it or it has not been deployed and installed). This is useful in environments where users are configured with Account Selection options that require user interaction that can ONLY be done via the User Client and not at the printing device (the ability to assign accounts at the printing device is available). This is because, in such environments, the unavailability of the User Client prevents users from being able to carry out the user interaction required for Account Selection via the User Client. As a result, their print jobs remain paused in the print queue and do not appear on the printing device. These jobs are eventually canceled after the User Client timeout or the Unreleased Held Jobs timeout.

To enable the Dashboard's **Real-time Activity** gadget to display an alert log when the User Client is unavailable:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Client Software** area, select the **Show a Dashboard log when the client is unavailable, preventing account selection** option.
3. Click **Apply**.

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2.8.11.2. User Client timeout

If users are configured with Account Selection options that require user interaction that can be done ONLY via the User Client (and not at the printing device), and users do not respond to the Account Selection's user interaction on the User Client, then after a defined time, their print jobs are automatically deleted. This is to prevent a buildup of old jobs in the print queue. The default timeout is `10` minutes.

Change the timeout as follows:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Client Software** area, in **Delete jobs awaiting popup response after**, enter the number of minutes to wait for a user to respond to the Account Selection user interaction on the User Client, after which the job is deleted.
3. Click **Apply**.

Note:

In environments where user interaction for Account Selection is required, and can be done BOTH via User Client AND at the printing device (the ability to assign accounts at the printing device is available), after the User Client timeout, any held print jobs without accounts:

- are not canceled
- are no longer available on the User Client
- are ONLY available at the printing device
- are canceled after the Unreleased Held Jobs timeout (instead of the User Client timeout).

For more information see Configure a Release Station and Assigning accounts to print jobs at the device.

2.8.11.3. Install the User Client on Windows

You can deploy the PaperCut NG/MF User Client to workstations using a variety of deployment methods. The deployment options are covered in detail in the `[app-path]\client\README.txt` file.

Options include:

- **Zero install**—Administrators looking for an automated install/deployment option should consider the "zero install" strategy. This is the recommended strategy for most Windows network environments as it's 100% self-maintaining.
- **Local installation**—If you're after a manual "setup wizard" style installer, run the program `client-local-install.exe` located in the network share `PCClient`. You can access this share by typing the following address into Windows Explorer. `\\<MyServer>\PCClient\win`, where `MyServer` is the name of the server where

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PaperCut NG/MF is installed.

- **MSI package**—Administrators can also deploy via MSI package, allowing the Client software to be remotely installed via Group Policy. This option is available for advanced sites that already leverage MSI packages for staged software deployment and want to continue with this procedure.

2.8.11.4. Zero install

The recommended approach with Windows networks is the "zero install" strategy. This involves configuring the workstations via group policy or otherwise, to run the client executable directly off the `PCClient` share - a share set up during installation. This avoids the need for a separate installation process on each workstation and ensures the client software is automatically updated in conjunction with server updates.

You can run the client directly from the `PCClient` share setup on the server. Two executables provide this launch functionality:

- pc-client.exe
- pc-client-local-cache.exe

`pc-client.exe` launches the client directly off the network share. The "local-cache" version (`pc-client-local-cache.exe`), is a smarter version that first copies itself and associated files to the local drive and launches itself from there. The local-cache version has the advantage that any future start ups use the local copy, which minimizes network traffic. The cache is self-managing and kept up-to-date ensuring that any new versions of the client are automatically and transparently copied down to the client.

Using `pc-client-local-cache.exe` is recommended on large networks. It does, however, require a globally writable cache directory. By default, the cache is created in a directory on the system drive (normally `C:\Cache`). You can specify an alternate cache with the `--cache` command-line switch. Administrators should ensure that standard users have write access to the system drive, or manually create the cache directory if required.

The recommended way to launch the `pc-client-local-cache.exe` on start up is to add a line to your domain login script:

```
cmd /c "start \\servername\PCClient\win\pc-client-local-cache.exe
--silent"
```

See below for other automatic start options.

2.8.11.5. Local installation

The zero-install deployment option is not appropriate for all situations. A local install is recommend on Windows laptop systems that are not permanently connected to the network or centrally managed by network administrators. The `client-local-install.exe` program can assist end users with a standard "setup wizard" install process. You can also streamline/automate this installer by using command-line options. For more information, see Automate installation on Windows.

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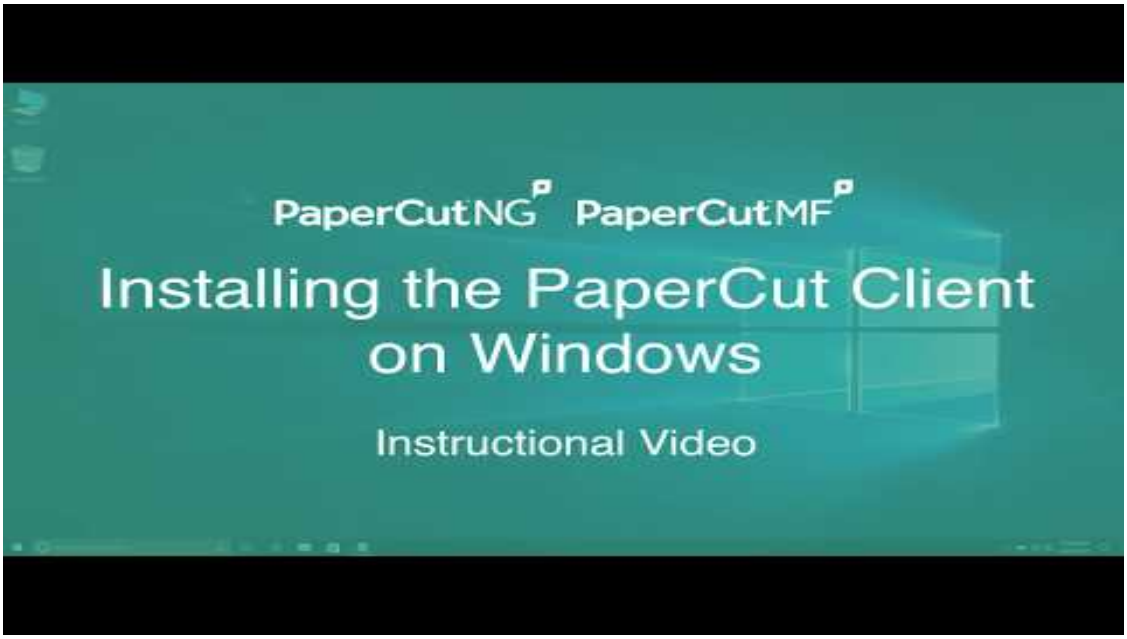

Deployment on Windows via silent installer MSI

The User Client software is available as a silent-install MSI (no clicks or wizards). This option is available for advanced sites that already leverage MSI packages for automated software deployment and upgrades using Active Directory Group Policy options. We recommend using the `pc-client-local-cache.exe` version of the User Client for most deployments, as all updates are automatically pushed to client machines. The MSI option discussed here must be manually updated.

The MSI package is a great option for organizations managing staged rollouts via Group Policy Filters. It is common in large organizations to progressively roll out new software as a series of small steps, for example, the IT department might get the software first, followed by a roll out across the organization.

Important:
Ensure these steps are conducted by an administrator experienced with Active Directory MSI software deployment.

Step 1 - Copy User Client files to deployment location

Copy all User Client files and subdirectories from

```
\\servername\PCClient\win\
```

into a versioned folder on your domain, alongside your other MSI-deployed software, e.g.

```
\\DeployedSoftware\papercut-client-19.0\
```

Do not deploy the MSI directly from the PaperCut install directory because the contents of this directory change when PaperCut is upgraded. This can result in problems in your MSI deployments.

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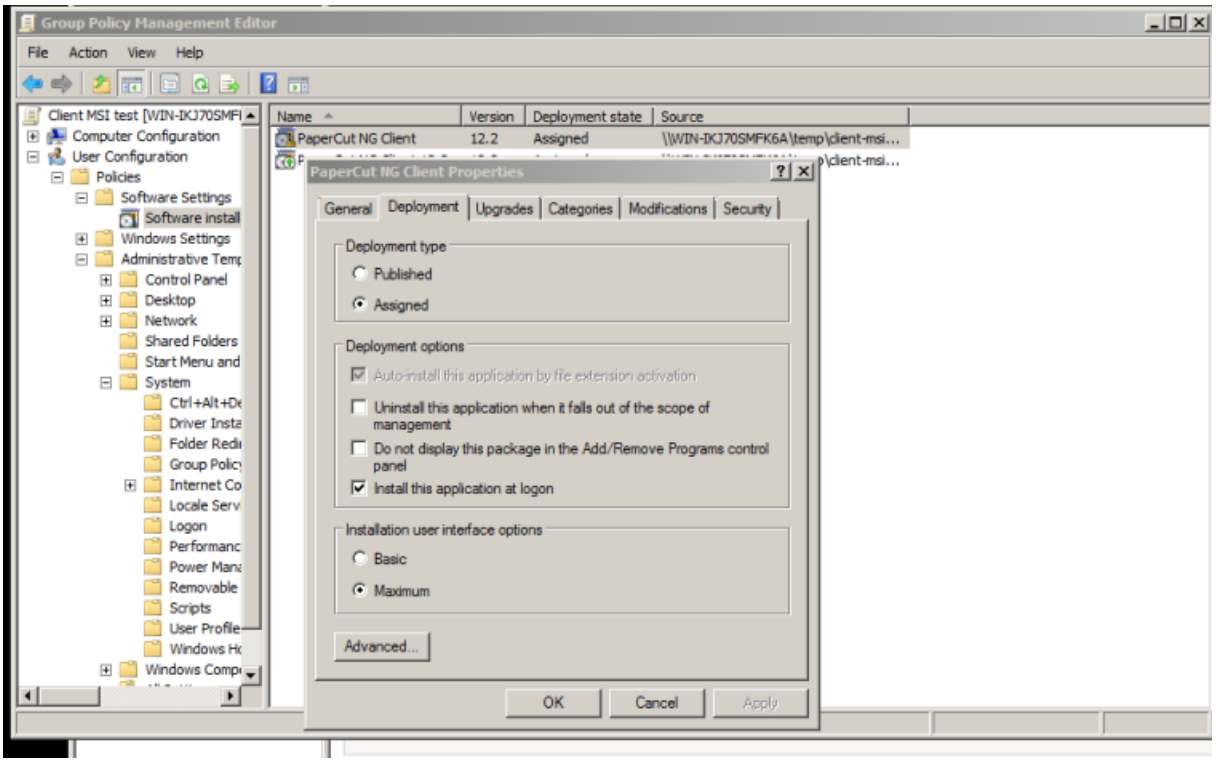
Note:
Unlike some other MSI packages, this file is not a self-contained archive - it must be copied along with the rest of the PaperCut client files when preparing your deployment.

Step 2 - Configure the User Client

If you need to make adjustments to the client (such as modifying `config.properties` or adding a custom logo), now's the time to do so. Changes made are distributed to your domain as the MSI deploys.

Step 3 - Deploy the MSI

Deploy the `pc-client-admin-deploy.msi` to your domain, as a Software Installation component to a Group Policy Object. The procedure for MSI deployment via Group Policy is explained in Microsoft's Knowledge Base: http://support.microsoft.com/kb/816102.



Step 4 - Configure for auto launch

Configure pc-client.exe to launch automatically at startup, as you would for any other program. One option is to add the User Client application to your GPO's "`Run these programs at user logon`" setting, found under **Computer/User Configuration > Policies > Administrative Templates > System > Logon**

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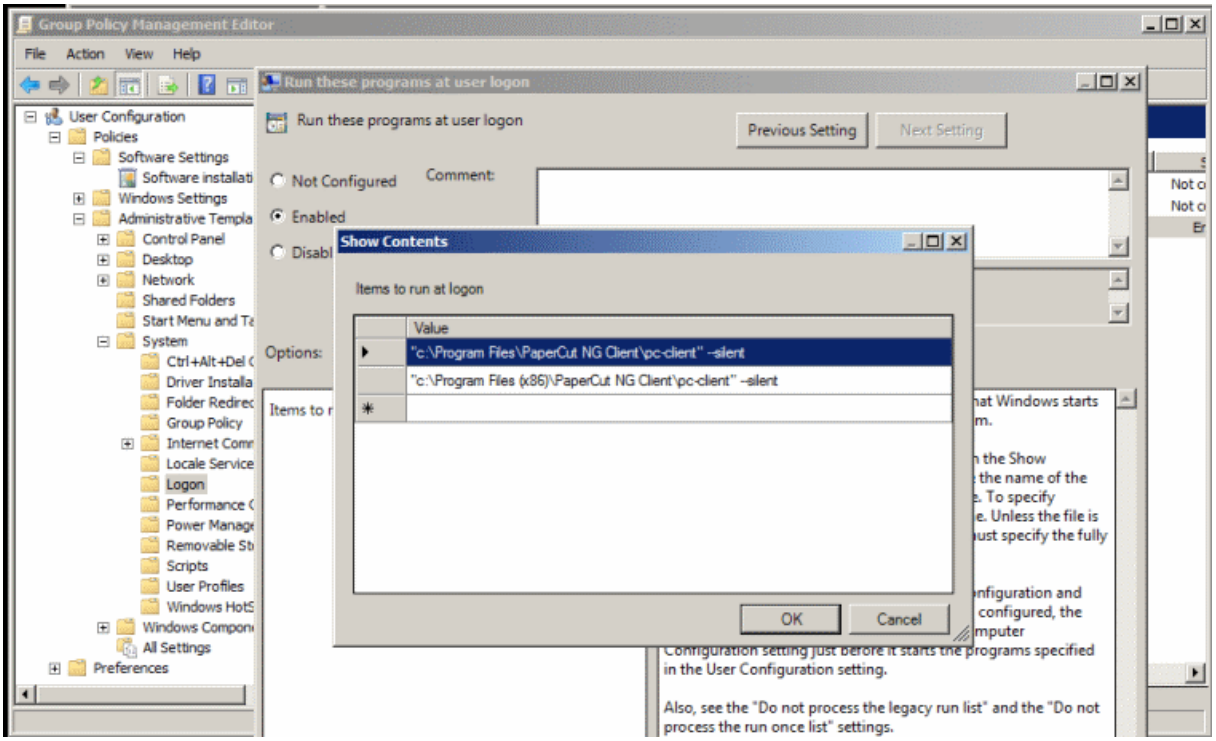

Tip:

To deploy to a heterogeneous environment of 32 and 64-bit systems, the default install paths are different for each architecture. A simple solution to this path problem is to launch the client from both `C:\Program Files` and `C:\Program Files (x86)` paths, as in the screenshot above. The non-matching path silently fails.

An alternate option is to start the client from an existing user logon script. An example of the line to add to the logon script is:

```
cmd /c "start "C:\Program Files\PaperCut NG/MF Client\pc-client.exe --silent"
```

Prerequisites/troubleshooting

Older machines might require an upgrade to the Windows Installer Service. If so, the following error message is displayed:

```
"This installation package cannot be installed by the Windows Installer Service. You must install a Windows service pack that contains a newer version of the Windows Installer Package"
```

To resolve this, download and install the Windows Installer 4.5 Redistributable, from: http://www.microsoft.com/en-us/download/details.aspx?id=8483

For more information on alternate deployment options see the `[app-path]\client\README.txt` file.

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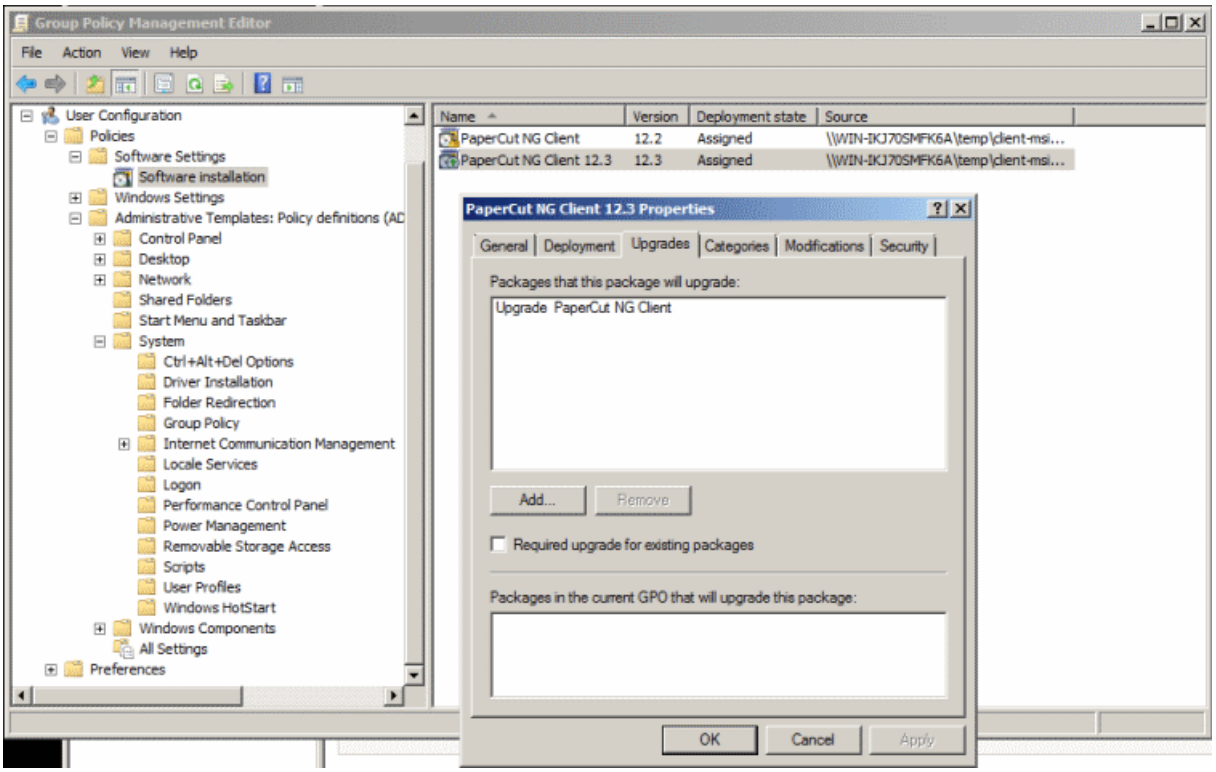
Upgrade an MSI installation

The procedure for upgrading an already deployed installation of the client (e.g. from 12.3 to 12.4) is slightly different to that of the initial deployment - add the updated MSI packages to your original GPO as an upgrade item. For step-by-step instructions on the procedure, see Microsoft's Upgrade Guide at: http://technet.microsoft.com/en-us/library/cc783421%28v=ws.10%29.aspx

Do not replace an old MSI with a newer version. If after following the instructions in the Microsoft article above you're still unsure how to proceed, please seek assistance, or contact technical support.



Windows 8 Metro requirements

Windows 8 introduced a new user interface called Metro. It has a tile based start screen or runs one application at a time. This user interface is also known as the "Windows 8-style UI".

When the Windows 8 user interface is in Metro mode, Windows desktop applications are not visible. This includes notifications, such as the PaperCut Client popup. Therefore, the Client popup could be missed.

PaperCut uses a Toast notification to notify users in Metro mode that a notification requires their attention in Metro mode.

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With the Toast notification, users working in Metro mode are notified of all PaperCut activities that require their attention in Desktop mode.

2.8.11.6. Install the User Client on Mac OS X

This section covers the installation of the PaperCut User Client on Apple Mac systems. Before installing the client software, review Mac printing in detail and first ensure printing is working as expected.

The PaperCut Mac User Client software is a supplied as a native Mac `.app` package. The User Client is delivered in two flavors:

1. The *current* client, which supports Mac OS X 10.7 (Mountain Lion) and above.
2. The *legacy* client, which supports Mac OS X versions from 10.4 to 10.6. It is a universal application that runs on both PowerPC and Intel hardware. The legacy client will not receive future feature enhancements.

Apple has switched to a yearly release cycle for Mac OS X, which means it is difficult to keep this documentation up to date. For the most recent and up-to-date information on current best practices, see the Knowledge Base.

For Mac OS X 10.7 and later

Utilizing LaunchAgent:

For Macs running 10.7, 10.8, 10.9, 10.10, 10.11, and later, the best way to establish set launch behavior patterns for the PCClient.app is to use LaunchAgents managed by LaunchD. For more information, see http://www.papercut.com/kb/Main/MacClientStartupWithLaunchd.

For legacy Mac OS X (10.6 and earlier) solutions:

For Macintosh computers running versions of Mac OS older than 10.7, the following three common installation methods cover most situations. The instructions for the "single user install" follow the standard Mac application installation process and can be conducted by any Mac end user. The other installation methods are more technically focused and aimed at Mac network administrators.

Special Notes for Mac OS X 10.6 and earlier

Note:
The current version of the PaperCut client does not work on Mac OS X 10.6 and earlier.

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For these systems the legacy client must be used. If the client fails to start, ensure you are using the correct client for your system.

The legacy client is found in `[app-path]/client/legacy`. Use this path to locate the client when referenced in the following sections.

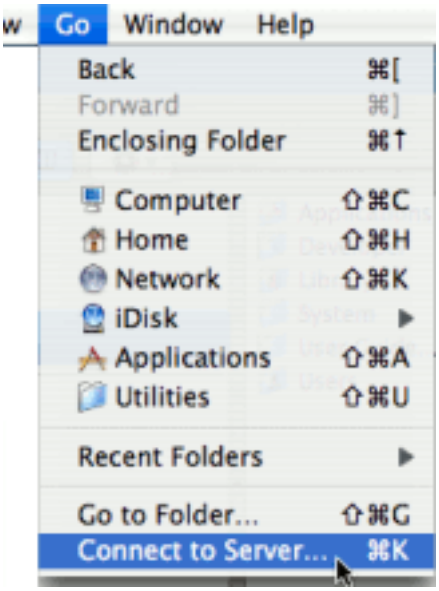
The legacy client software works best if Java 5 (or higher) is installed. Java 5 is available for OS X 10.4 or above. If Java is not already installed, the installer is available from the Apple website. This simplest way to install Java is to run **/Applications/Utilities/Java Preferences** from OS X Finder, and you are prompted to complete the installation.

Single user install

This method is suitable for a Mac computer used by a single user. For example, a personal Mac desktop or laptop. The installation process involves clicking the `client-local-install` program. This copies the `PCClient` application into the over to the system's `Applications` folder and starts the client in the "confirm network identity" mode. The simplest way to run the install process is to connect to a Windows server's `pcclient` share over the network, however, alternate methods such as copying the folder contents via a USB key or drive are also possible.

To install the Mac User Client from a server's share:

1. Start and Log in to the Mac computer. Ensure it's connected to the network.
2. Open the **Finder**.
3. In the **Go** menu, select **Connect to Server**.



4. Enter the pcclient share's connection details, such as: `smb://server_name/pcclient`.

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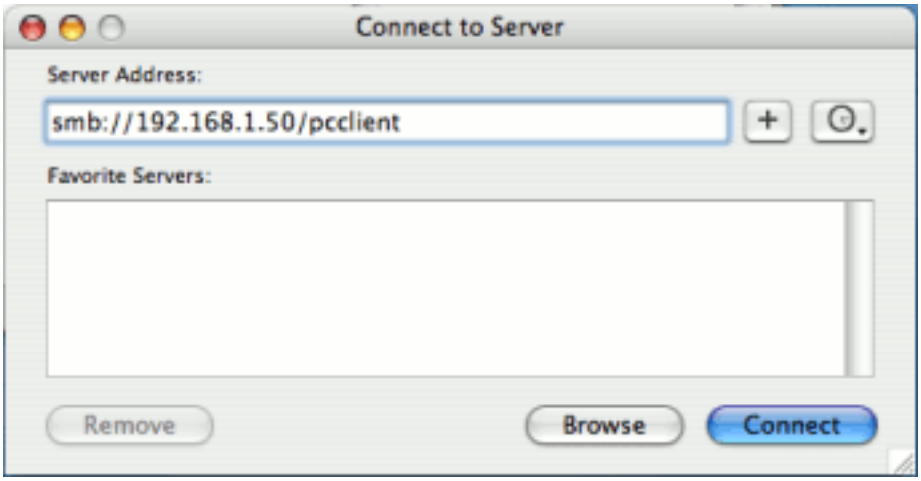

5. Enter password information if requested.
6. Double-click the `client-local-install` file. This executes a small AppleScript program that starts the install/copy process. (If installing on a legacy system (OS X 10.6 or earlier), you must install the legacy client located in the `legacy` folder.)
7. Test the application by double-clicking the `PCClient` application icon in the system's local `Applications` folder.

If the user needs the User Client for printing (for example, to use the shared account popup), configure the application to automatically open upon start up:

1. Open **System Preference** from the **Apple** menu.
2. Select **Accounts**.
3. Select your login account.
4. Click the **Login Items** tab.
5. Click + then browse and select the `PCClient` application.

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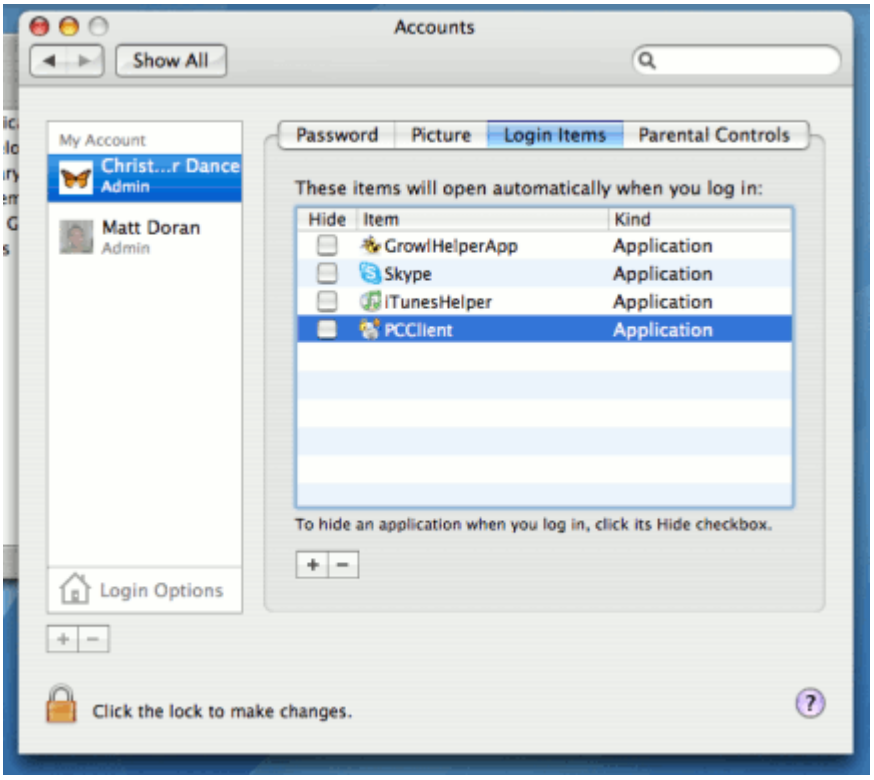

6. Test by restarting the computer. The client should start automatically after the reboot and log in procedure is complete.

Multi-user install

On a multi-user Mac system, setting up a **Login Item** for each user would be a tedious task. To streamline this process, you can configure the `PCClient` application to start on login via the login hook. A login hook is an advanced Mac feature that works by running a script when a user logs in. The `PCClient` package includes a command script resource that installs the login hook.

To install the User Client on a multi-user system:

1. Start and log in to the Mac computer.

   Ensure the Mac computer is connected to the network.
2. Open the **Finder**.
3. From the **Go** menu, select **Connect to Server**
4. Enter the pcclient share's connection details, for example, `smb://server_name/pcclient`
5. Enter password information if requested.
6. Drag the `PCClient` (or `legacy/PCClient` on OS X 10.6 or lower) package to the local hard disk's **Applications** folder. The copy process begins.
7. In the **Applications** directory, **Control+click** the newly copied `PCClient` application.
8. Select **Open Package Contents**.

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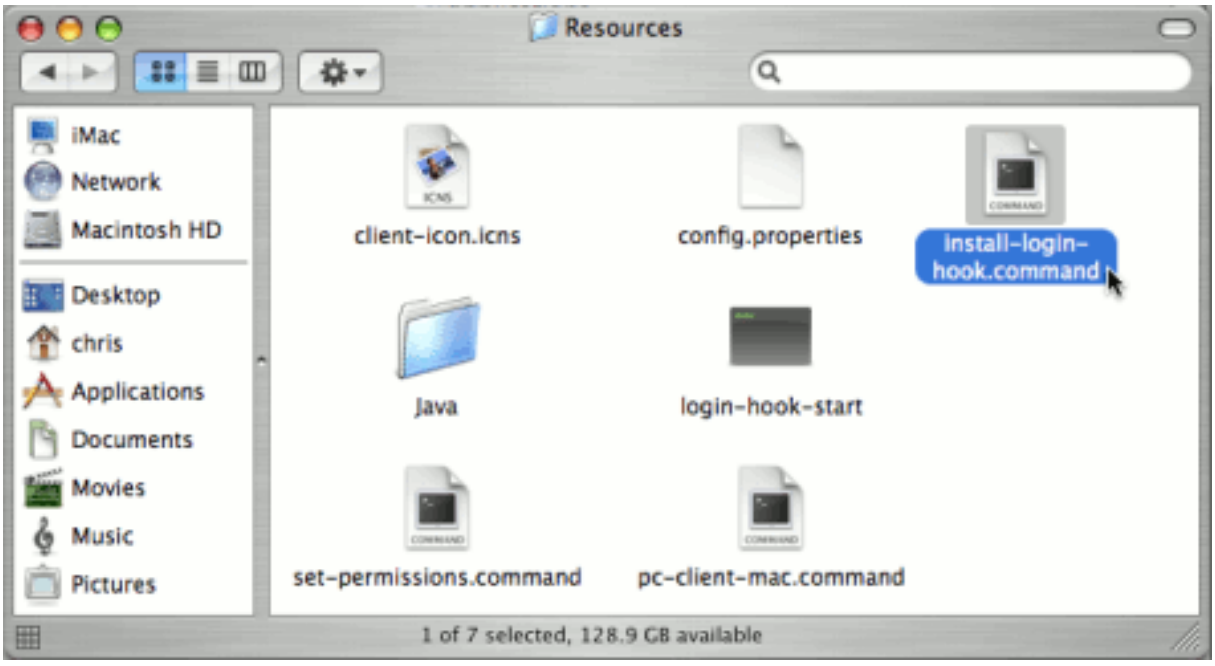
9. Navigate to `Contents/Resources/`.
10. Double-click the `install-login-hook.command` script.



11. Restart the system and verify the client starts on login.

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Important:

If you're already using a login hook for other script tasks, the setup process is different. Instead in step 10, double-click the `set-permissions.command` file. Then insert the following line at the end of your current login script (all on one line):

```
/Applications/PCClient.app/Contents/Resources/login-hook-start "$1"
```

The `set-permissions.command` script ensures the software is set up with the correct permissions, making it accessible to all users.

You can remove the login hook, once installed, with the terminal command:

```
sudo defaults delete com.apple.loginwindow LoginHook
```

Zero-install deployment

This deployment method is for advanced Mac network administrators and is suitable for medium to large Mac networks. Knowledge of the Mac's Unix underpinning and scripting is required.

A more flexible option over locally installing the `PCClient` package on each Mac system, is to directly launch the client from the `pcclient` share. The advantage of this deployment method is that any updates applied on the server (and updates to the client directory) are automatically propagated to all workstations.

The process of setting up zero-install deployment varies from network to network depending on the directory environment in use and administrator preferences. The process can, however, be summarized as:

1. Configure the Macs to mount the `pcclient` share as a volume on login or start-up.
2. Configure a login hook to start the client off the share. The `install-login-hook.command` resource script explained in the multi-user install above might help.

The typical way to mount the share is to use `mount_smbfs` in a boot script. See the Apple documentation on `mount_smbfs` at:
http://developer.apple.com/documentation/Darwin/Reference/ManPages/man8/mount_smbfs.8.html

Further information on Mac printing is available at Mac printing in detail.

2.8.11.7. Install the User Client on Linux and Unix

You can deploy the PaperCut NG/MF User Client software on Linux and other Unix based operating systems using the following installation procedure.

Step 1 - Install Java 11+

Linux and Unix workstations are supported via Java. Java version 11 or higher is required. Your Linux distribution might have Java pre-installed or have the option to install. If no Java option exists, you will need to install Java 11 for your distribution

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Step 2 - Copy (or mount) the PaperCut NG/MF User Client files

Similar to the Windows version of the client software, the Linux/Unix Java version is installed in the `~/client` directory on the server. Copy or make available to the Linux/Unix workstation, all files in this directory. Common methods include:

- Copying the files from the server using file transfer programs such as FTP or scp.
- If the server is Windows based, connecting using smbclient or the Gnome or KDE `smb://` file browsing tools. The client files are shared via a read-only share called `\\[server_name]\PCClient`.
- If the server is Linux based, consider exporting the `~papercut/client` directory via NFS and mounting on the workstations. The client can then be ran directly from the mount.

If the workstation is used by multiple users, copy the client directory to a common location such as `/usr/local/papercut/client`.

Step 3 - File permissions

Open a command prompt and set execute permissions on the `pc-client-linux.sh` file as follows:

```
cd /usr/local/papercut/client
chmod 755 ./pc-client-linux.sh
```

Step 4 - Testing

Log on as a user (a user listed in the PaperCut NG/MF system) in your preferred Linux desktop GUI environment. Locate and execute the file `/usr/local/papercut/client/pc-client-linux.sh`. The PaperCut NG/MF client should open displaying the user's account balance.

It is usual to configure the client as a "Startup Program" or "AutoStart Program" launched during login. See your desktop documentation to see how to define a startup program.

A number of command-line options are available to change the client's behavior. For more information, see Configure the User Client using the command-line.

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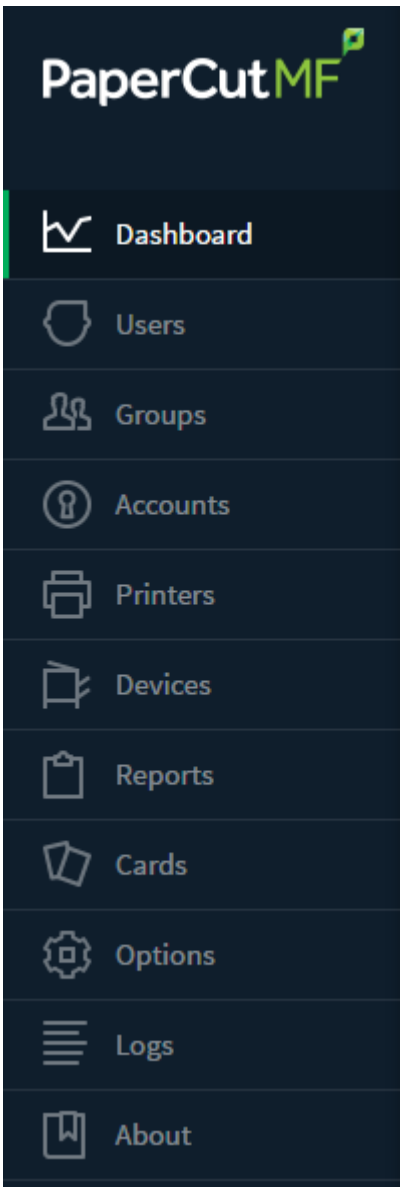
3. Tour

This section will guide you through the main areas of the application and cover some common management tasks.

3.1. Navigation

Before you jump in and start the tour of PaperCut NG/MF, it is important to take some time to understand the application's navigation tools. The subsequent sections detail the major user interface elements.

3.1.1. Tabs



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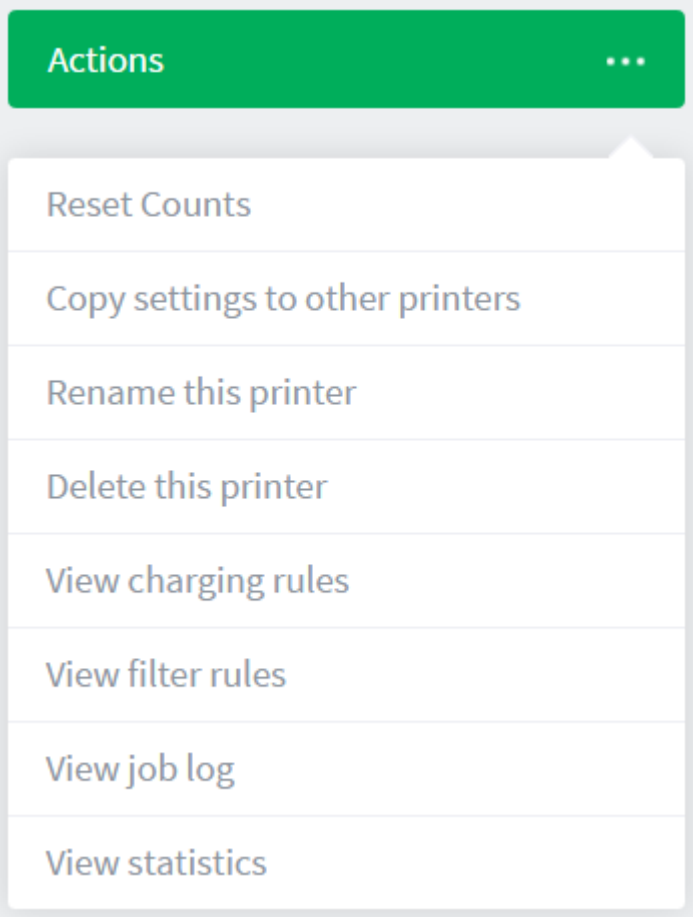
Application areas are grouped into tabs that logically separate parts of the system. Selecting a tab displays the controls and information related to that area. Users are familiar with the concept of tabs from many other applications.

3.1.2. Actions



Throughout the application, the *Actions* area lists a number of tasks or actions that can be performed. The Actions list is always located in the top right-hand corner of the page. Actions are adaptive and the list of actions changes depending on the area of the application being viewed.

3.1.3. Buttons

Changes made to options, user settings or configurations are only validated and applied after submitting the change. Screens that you can save in the application have the following buttons located at the bottom:

- **Cancel** - Don't save and changes.
- **OK** - Validate and save the changes and return to the data list ready to select and edit another object.
- **Apply** - Validate and save the changes and return to this location/object

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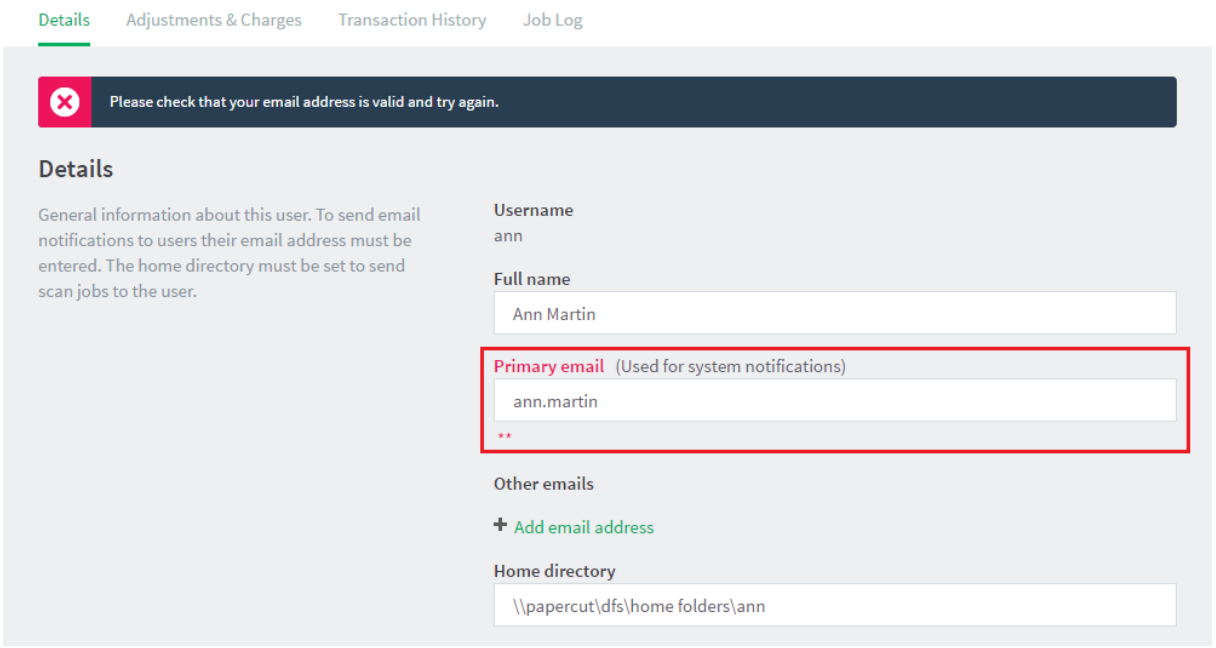
3.1.4. Crumb Trail

The crumb trail serves two purposes. It maps out the navigation path followed by the user and provides a way to navigate up (back) the navigation path. For example, while editing a user's account, the crumb trail provides a hyperlink up one level back to the **User List**.

3.1.5. Status Messages



Important status messages are displayed at the top of the page. Messages relating to an error or requiring user intervention are displayed in red. Standard messages are displayed in green and cautions in yellow.

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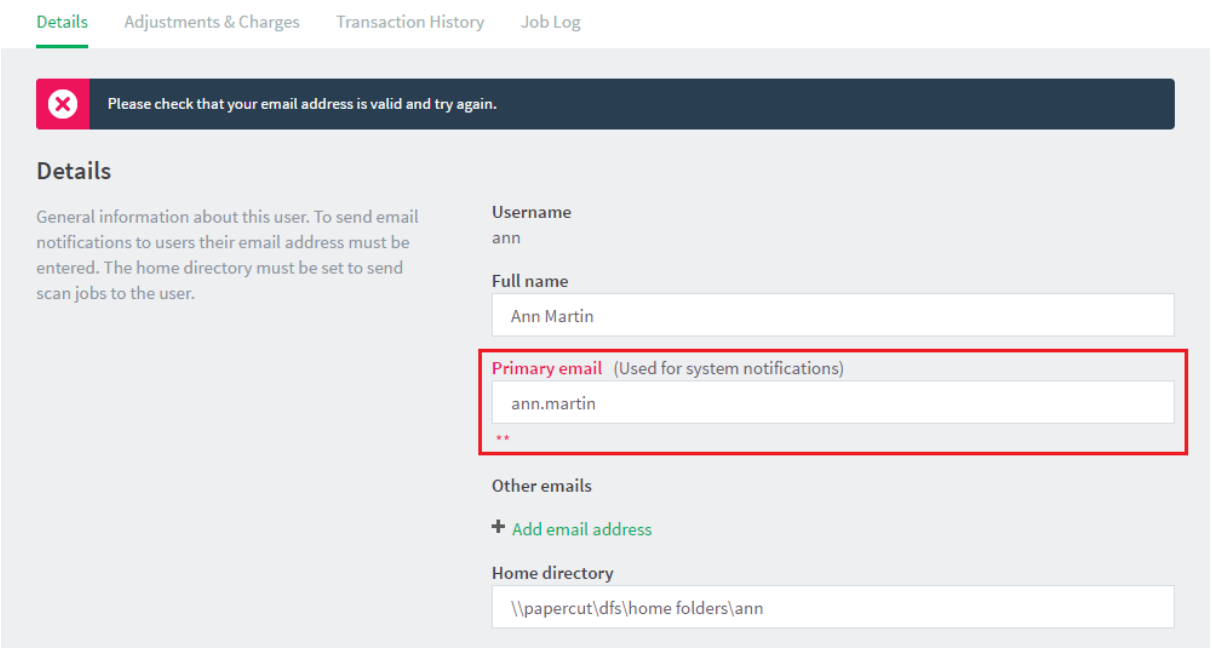
3.1.6. Fields



Configuring printers, users, or settings are often done via text fields. Changes made to fields are validated after you click **OK** or **Apply**. If the field fails validation, the offending data is marked with a red asterisk. Typical validation errors include invalid number or currency formats.

3.2. Menu

The PaperCut NG/MF Admin web interface is grouped into task oriented sections. These are listed in the left hand navigation menu. The tabs are:

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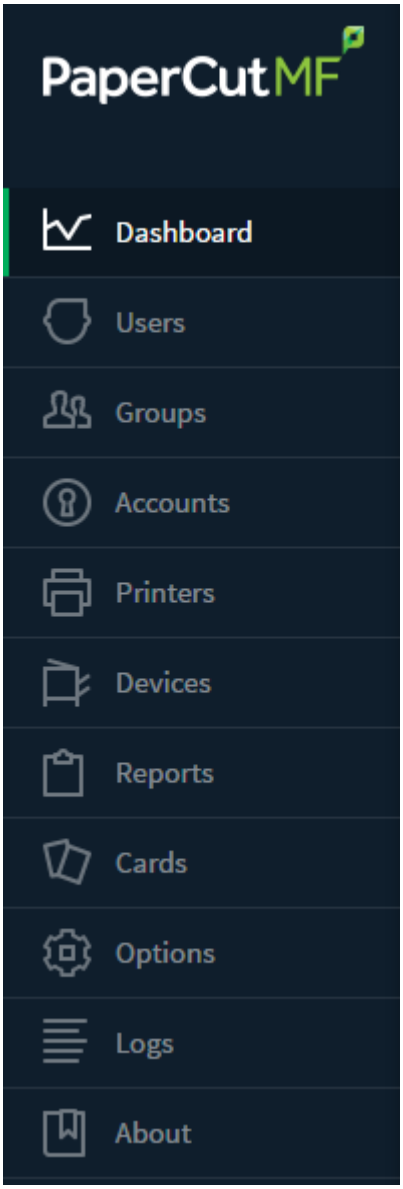

3.2.1. Dashboard

- The What's next? gadget provides tips for new users.
- The System Status gadget provides a list of system statistics.
- The Pages Printed graph shows a running history of the daily pages printed over the past 30 days.
- The Environmental Impact gadget provides environmental impact statistics.
- The Printer Status gadget displays daily pages printed and device status per printer.
- The News gadget has links to the latest information about release and development activity at PaperCut.
- The Real-time Activity gadget is a scrolling summary of PaperCut events with expandable details.
- Related sections:

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- The dashboard

3.2.2. Users

- View a list of all users
- View and change a user's credit balance
- View a user's statistics and charts
- List a user's printing activity
- Change user privileges and settings
- Related sections:
  - Basic user operations
  - User management

3.2.3. Groups

- Add/Remove domain or network groups required for user management
- Define rules controlling how new users are created
- Perform bulk user operations
- Control user quota allocations
- Related sections:
  - Groups in PaperCut NG/MF
  - User management

3.2.4. Accounts

- View, edit and create shared accounts
- View and change the shared accounts credit balance
- List all charges against shared accounts
- Set account access security
- Related sections:
  - Shared accounts
  - User Client
  - Assigning accounts to print jobs at the device

3.2.5. Printers

- View and edit printer costs and settings
- Define printer filter rules and restrictions
- View printer statistics and charts

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- Visually inspect the contents of print jobs (via Print Archiving)
- Related sections:
  - Basic printer operations
  - Printer management
  - Web Print (driver-less printing via a web browser)
  - Print Archiving (viewing and content capture)

3.2.6. Reports

- Access to standard reports for viewing, export and printing
- Run one click reports for quick overviews
- Run reports over Ad-hoc date ranges
- Related sections:
  - Charting, statistics, reports, and logs
  - Reports

3.2.7. Cards

- Managed TopUp/Pre-Paid Cards
- View card use and activity
- Download and install the card creation wizard
- Import new cards
- Related sections:
  - TopUp/Pre-Paid cards

3.2.8. Options

- Access general system settings
- Control administrator access and security
- Perform network user and group synchronization tasks
- Perform backup snapshots
- Related sections:
  - System management
  - Tools - database, server-command scripting, and APIs (Advanced)

3.2.9. Logs

- View all recent print jobs
- View system audit, security and application events in the application log

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- View administrative changes made to users in the audit log
- Related sections:
  - System management

3.2.10. About

- List version and build information
- Access update news
- Install and view license information
- Related sections:
  - Licensing and support

3.3. Basic user operations

The user section is dedicated to user management. Common user oriented tasks include assigning additional credit to users, viewing a user's activity, and controlling user privileges.

Users in PaperCut NG/MF can be assigned either:

- Restricted access where access to resources is denied once their credit drops to zero (or to the overdraft limit).
- Unrestricted access meaning the user is never denied access.

Change a user's restriction privileges

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. In the **Account Details** area, select the **Restricted** check box.
4. Click **Apply**.

Increase a user's account balance

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. Click **Adjustments & Charges**.
4. In **Adjustment**, enter **$10.00**.
5. Enter a comment to associate with the transaction.

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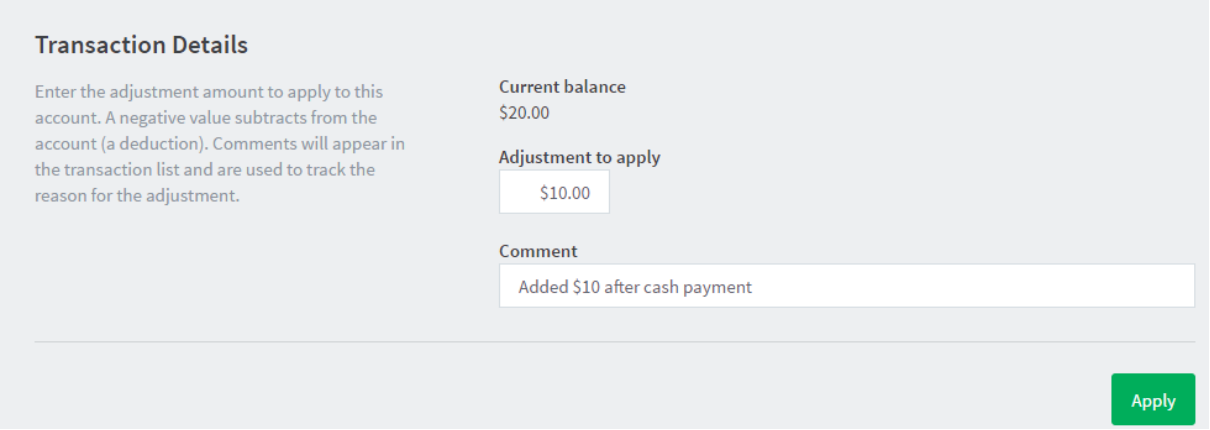

6. Click **Apply**.

View a user's transaction and print history

1. Select the user from the list (or enter the user name in the quick find).
2. Select the **Transaction History** tab to view the user's transaction.
3. Select the **Job Log** tab to view the user's recent print activity.

3.4. Basic printer operations

All printers managed by PaperCut NG/MF are configured on the **Printers** page. Printer configuration includes:

- Setting a cost-per-pages or defining more complex charging rules.
- Defining advanced filter and restriction rules. For example, configuring a printer to deny jobs of a selected size or automatically removing duplicate documents.
- Controlling the enabled/disabled status via time-latches.

Define a basic cost per page

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Click the **Charging** tab.
4. In **Charging type**, select **simple**.
5. In **Cost per page** , enter a page cost of **$0.10** .
6. Click **Apply**.

Define an advanced cost model

To define an advanced cost model offering a 40% discount for duplex (double sided) printing:

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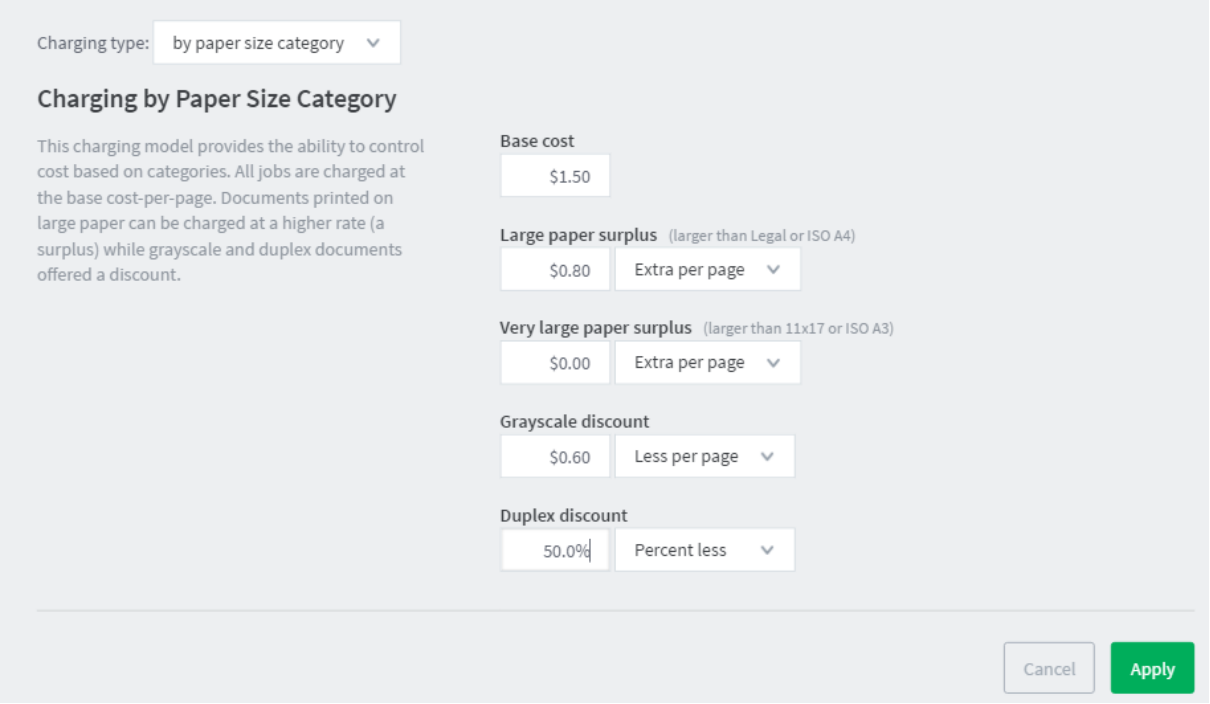
1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Click the **Charging** tab.
4. Select a charge type of **by paper size category**.
5. In **Duplex Discount**, enter **40%**; then select **Percent less** from the list.



6. Click **Apply**.

Apply filters

Filters provide administrators with access to a set of rules to control what type of documents are allowed access to the printer. You can use filter rules for a variety of tasks such as:

- Enforcing good printing practices
- Preventing queue jamming and hogging
- Ensure printers are used for the purpose they are designed for

Filter options include:

- Control by the jobs cost
- Control by a document's page count
- Denying jobs based on their color mode
- Filtering by document name
- Automatically denying and deleting duplicate documents

To apply a filter preventing jobs over 100 pages:

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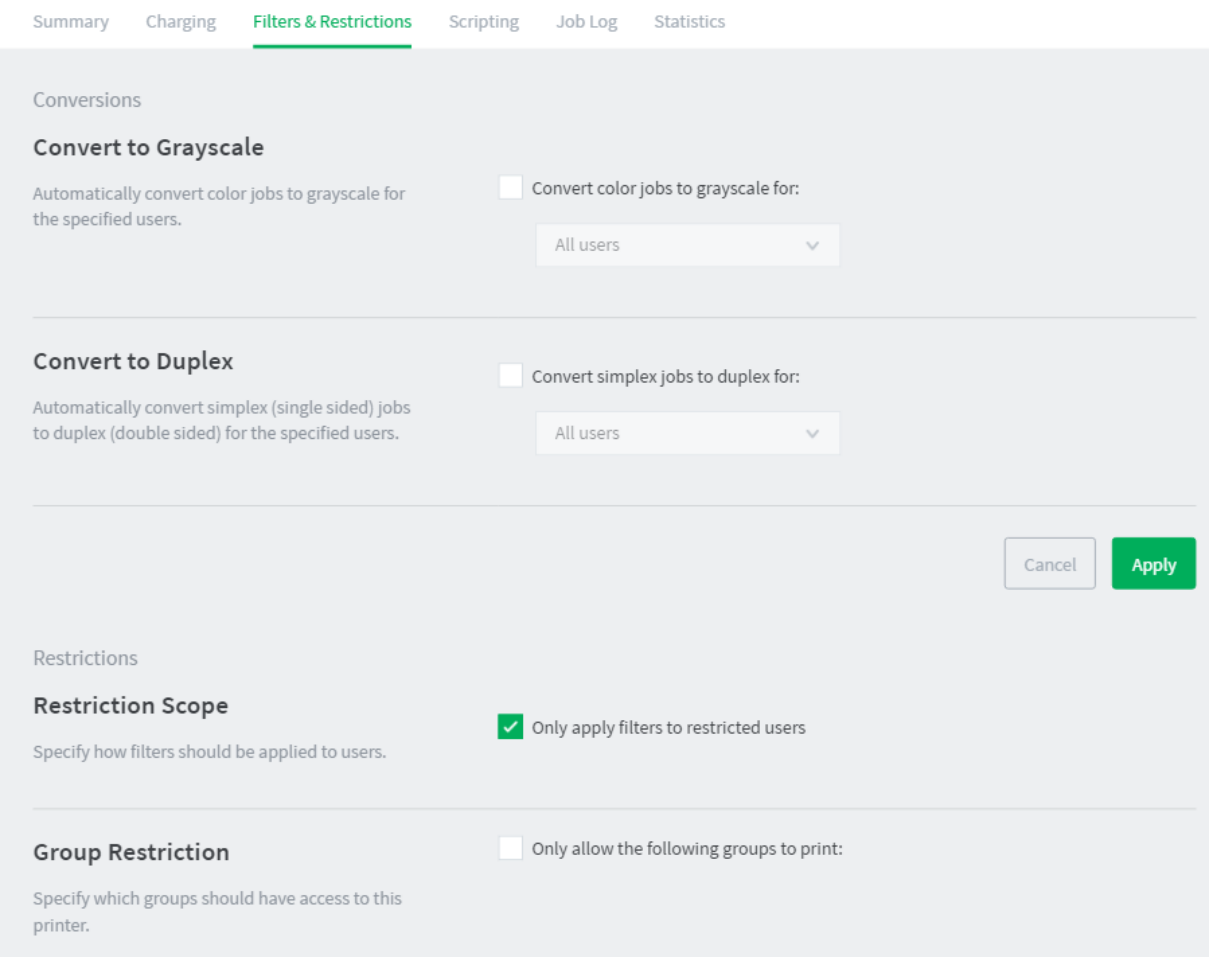
1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Click the **Filters & Restrictions** tab.
4. In the **Page Count** area, select the **Deny jobs based on number of pages** check box.
5. In **Maximum**, enter **100**.



6. Click **Apply**.

Temporarily disable a printer

To disable a printer for the next hour using a time latch:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Configuration** area, select **Disable for next hour** from the **Enable/Disable** list.

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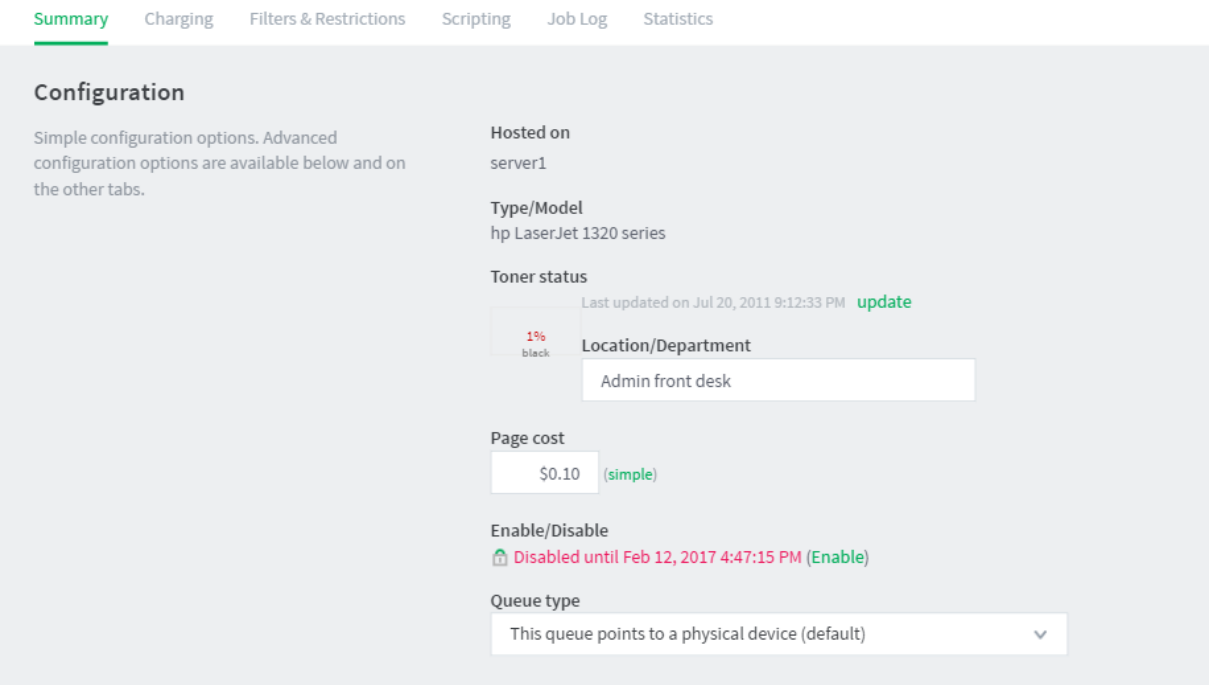

4. Click **Apply**.

3.5. Client software

The client software is optional and not required for basic logging, however, it does provide users with access to advanced features. These features include:

- Real-time feedback to the user including their account balances and event messages such as "print job denied" reasons.
- Access to the account selection popup so users can allocate print jobs to shared accounts - for example, accounts representing departments, projects, clients, etc. This is particularly important in a business environment.

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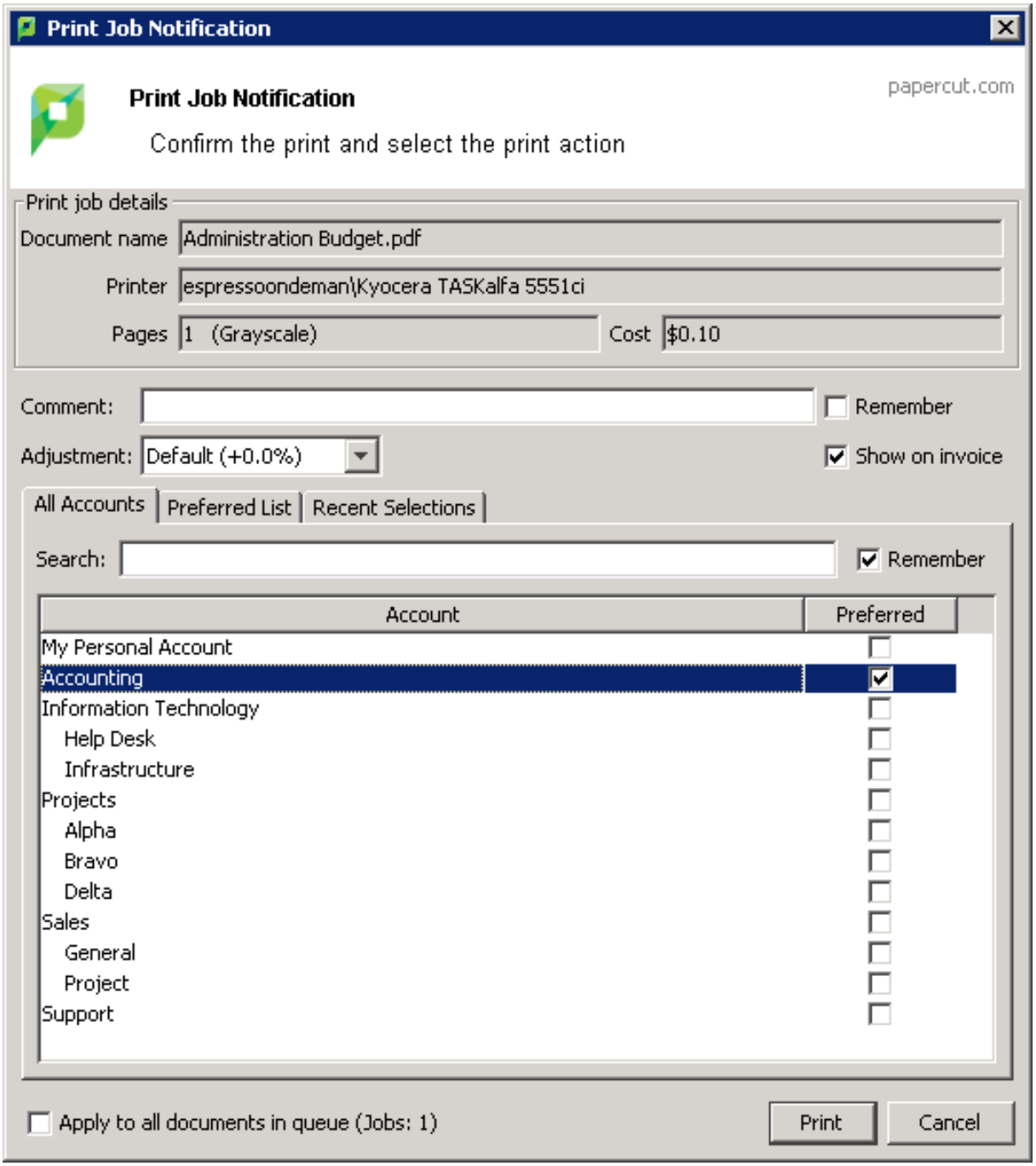

3.5.1. Demonstrating the client software and account selection process

Create a shared account

1. Click the **Accounts** tab.

   The **Shared Account List** page is displayed.

2. In the **Actions** menu, click **Create a new account**.

   The **Account Details** page is displayed.

3. Enter an appropriate name for the account. For example, "test account".

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4. Click **Apply**.
5. Select the security tab and ensure the `[All Users]` group has access to the account. If not, add the group by selecting it from the list; then clicking **Add**.
6. For more information about creating and managing shared accounts, see Shared accounts.

Grant account selection access to your account

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. In the **Account Selection** area, select the **Show advanced account selection** check box.
4. Click **OK**.

Launch the client software (Windows)

1. Log in to a workstation using your user account as modified above (note: The server itself can also be used for this testing if desired)
2. Open **Windows Explorer** (File Explorer).
3. In the address bar, enter `\\server_name\pcclient` where "`server_name`" is the name of the server hosting the PaperCut NG/MF software. This brings up files located on the `PCClient` share.
4. Launch the `pc-client.exe` program by double-clicking the file. An icon is displayed in the task tray.
5. Print a test page (for example, a web page). The advanced client popup is displayed allowing you to select the "test account" set up in the preceding section.

For more information about shared accounts, see Shared accounts. For more information about client software deployment, see User Client.

3.6. Interface levels

PaperCut NG/MF provides two layers of system access, Admin and User.

3.6.1. Admin access

Admin access provides access to the system for administration and management. This level is usually only granted to selected individuals in the organization, such as network administrators or management staff. To assign admin rights to an individual or group of users see Assigning administrator level access.

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3.6.2. User access

End users are granted access to a set of basic web pages providing them with access to:

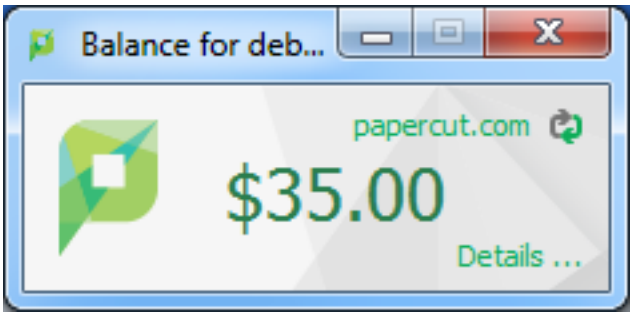
- View their account balance
- List recent account activity
- Use tools such as TopUp/Pre-Paid Cards and funds transfers to other users

The User Client (PaperCut NG/MF User Client software) complements the User interface by providing users with a quick view of their current account balance.

Important:
Access to the user area, such as the admin area, requires authentication - that is the user must enter their network username and password. Authentication is required because user information such as print history is confidential. Access to the user's funds transfer feature also needs to be protected. This is particularly important in schools. Students can rest assured that should they leave their workstation for a few minutes another student can't transfer their account balance to themselves!

To access the user pages via the User Client:

1. Start the client software if it is not already running. On the server, start the client software via the **Client** Start menu item. See the client software section for details on how to start this on a remote workstation or desktop.



2. Click the **Details** link. The web browser is opened.
3. Enter your username and password; then click **Login**.
4. The user page pages are displayed.

To access the user pages directly via a web browser:

1. Open a standard web browser.
2. Enter the URL `http://[servername]:9191/user` where `[server_name]` is the network name assigned to the system running PaperCut NG/MF. The login screen is displayed.
3. Enter your username and password.
4. Click **Login**.

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3.7. Assigning administrator level access

PaperCut NG/MF sets up one administrator account called admin. This is the master administrator account, with access to all features, whose password is assigned during the configuration wizard. In large organizations it is likely that administrator level access is granted to more than one person. One solution is to give all persons the master password; however, the recommended approach is to assign administrator rights to these individual's network user accounts. The advantages of this approach are:

- They can access the administration pages using their own username and password (they don't have to remember another password!).
- You can assign different levels of administrator access to different users. PaperCut NG/MF includes an advanced Access Control List (ACL) allowing different administrators access to different functions and areas of the application.
- Most activity is audited so changes can be sourced to an individual.

For more information see Assign administrator level access.

3.8. Charting, statistics, reports, and logs

One of the key features of PaperCut NG/MF is the advanced charting, statistics, reporting and logging. Use this information to:

- Determine which printers are most used
- Spot areas where printers are inappropriate for the task.
- View user and printer trends over time.

3.8.1. Charts

Charts are ideal for obtaining a quick visual overview. All users and printers have a line chart displaying activity over the last 30-days.

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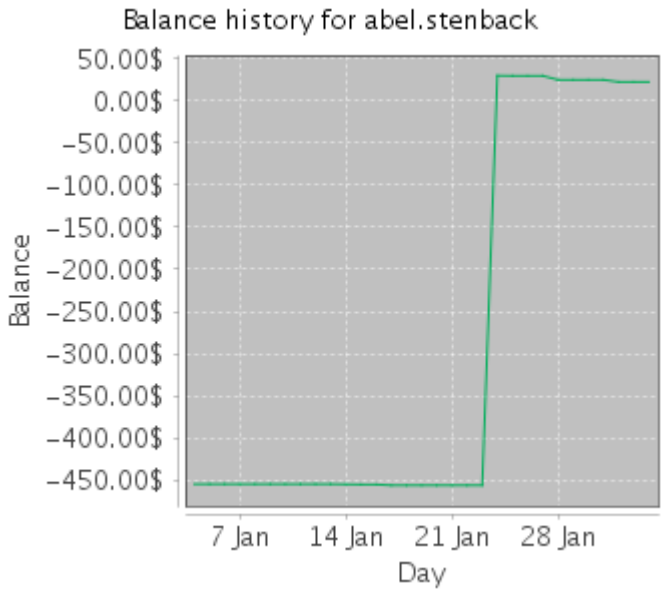

The Charts Tab under the Printers section hosts a set comparison charts allowing administrators to compare printers side by side.

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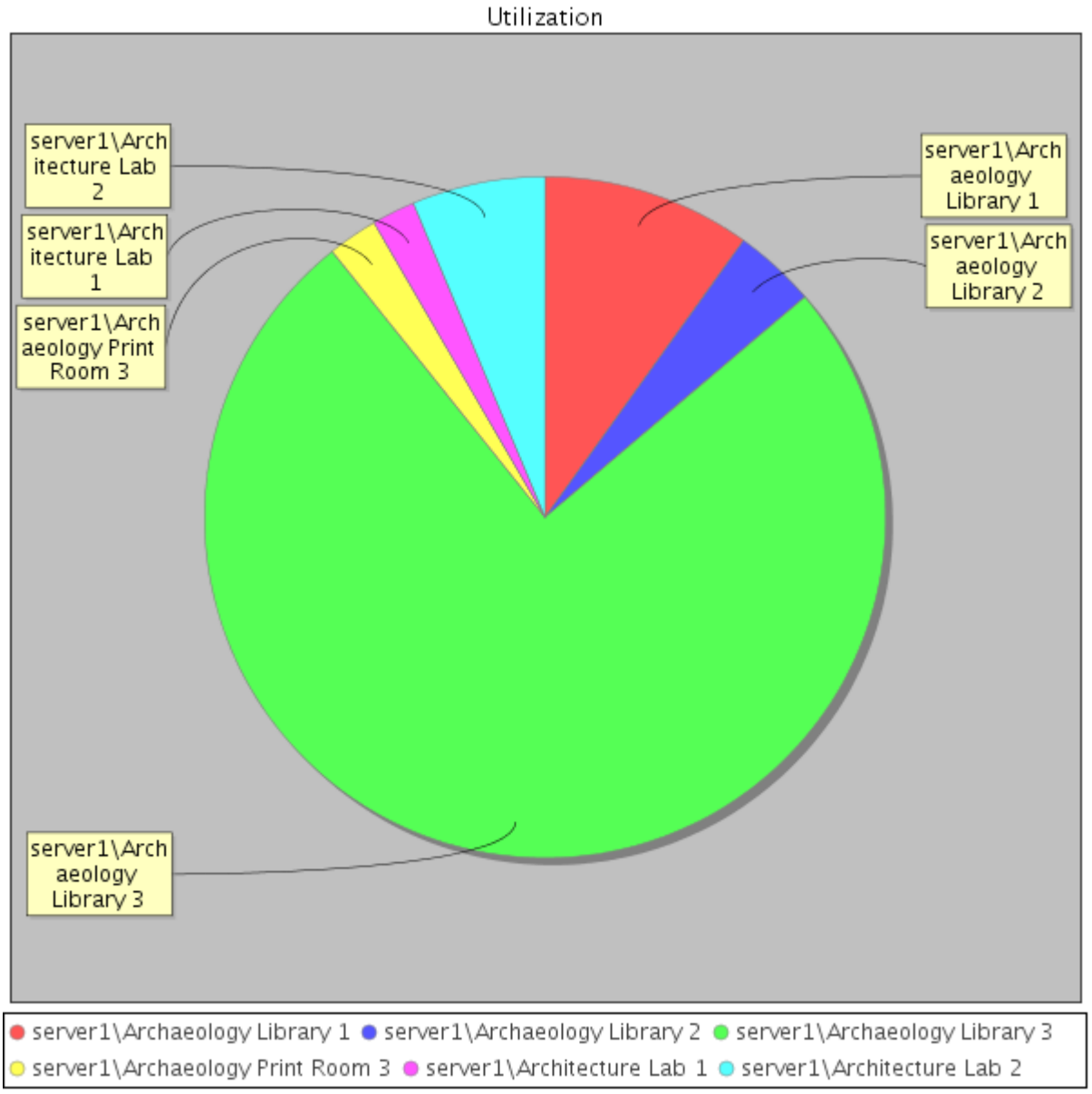

Under each individual printer the Statistics area provides information on all jobs printed on a given printer.

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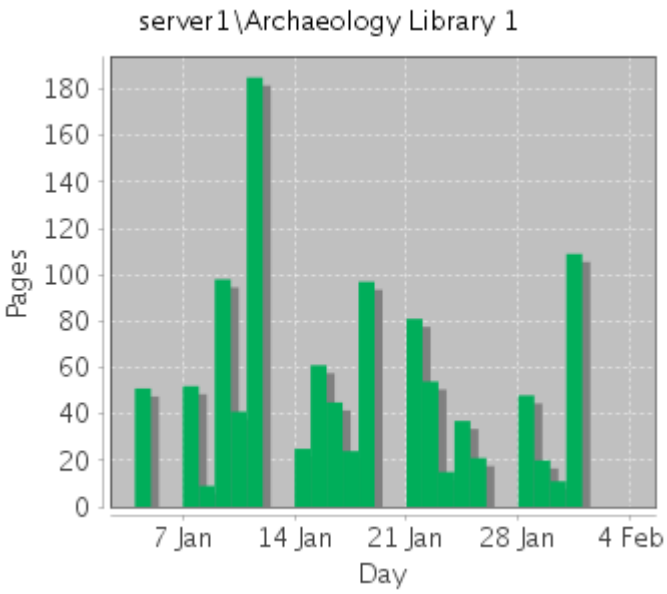

3.8.2. Reports

Reports provide a tabular data display, often in a printable format, of system information ranging from activity histories, summaries, transaction details, etc. Reports are typically run to print a summary of user activity, printer activity, or group or account activity. To streamline access to common reports, PaperCut NG/MF provides a series of predefined one-click report links on the **Reports** page. You can generate most reports over a variety of common date ranges or user-defined date ranges.

Standard reports include:

- User Reports
  - Print summary statistics grouped by user
  - Quick list of the most active print users
- Printer Reports
  - Summary of print activity grouped by printer
  - Quick lists of the most active/busiest printers
- Group Reports
  - Summary of print activity grouped by network group (Note: The group needs to be defined on the Groups tab.)
- Shared Account Reports
  - Summary of print activity grouped by shared account charged
- Print Log Reports
  - Detailed lists of all print jobs over a given period

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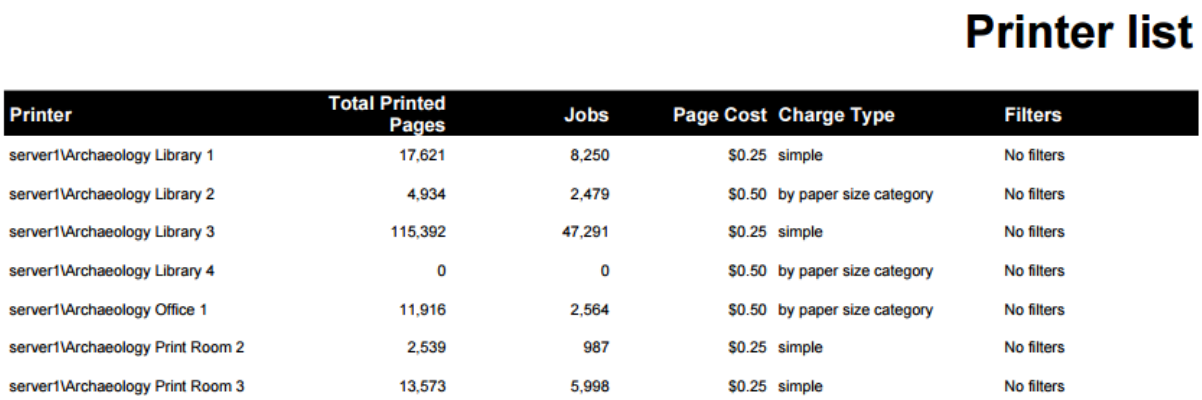
- Quick list of the largest print jobs



Printer list

Printer	Total Printed Pages	Jobs	Page Cost	Charge Type	Filters
server1\Archaeology Library 1	17,621	8,250	$0.25	simple	No filters
server1\Archaeology Library 2	4,934	2,479	$0.50	by paper size category	No filters
server1\Archaeology Library 3	115,392	47,291	$0.25	simple	No filters
server1\Archaeology Library 4	0	0	$0.50	by paper size category	No filters
server1\Archaeology Office 1	11,916	2,564	$0.50	by paper size category	No filters
server1\Archaeology Print Room 2	2,539	987	$0.25	simple	No filters
server1\Archaeology Print Room 3	13,573	5,998	$0.25	simple	No filters

Standard reports are provided in a variety of output formats including, HTML, PDF and MS Excel. PDF reports are ideal for printing. HTML versions of the reports are provided for systems without a PDF viewer.

Tip:
In addition to the standard reports, administrators can run other reports on ad-hoc data by using the **Export/Print** option available under most of the data lists. For more information, see Reports.

3.8.3. Logging

The following types of activity logging is performed by PaperCut NG/MF:

Usage logging

Usage logging records information about usage events such as printing. Information includes:

- The date of the use
- Who performed the use
- Details of the type of user including, cost and other attributes

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Transaction logging

All modifications or deductions to an account (user or shared) are recorded in the transaction log. Information recorded includes:

- The date of the transaction
- Who performed the transaction
- Any comment or note associated with the transaction (if performed by a user)

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Application activity logging

The Application Log records system events messages such as:

- User logins
- Security errors such as incorrect password attempts
- Backup times and scheduled tasks
- Any system errors or warning

It is similar to the operating system's event log. It is recommended that SysAdmins view this log on a daily basis for the first week and weekly thereafter.

User audit Logging

All administrative modifications to a user are recorded in the audit log. Information recorded includes:

- User properties such as emails and popup settings
- Account selection and popup settings
- Balance and overdraft
- Card Ids and pins

The audit log is enabled by default and the data is stored for 30 days.

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4. Configuration

This section provides information about how to configure PaperCut NG/MF. A technical background is not required to perform these tasks.

4.1. Services for users

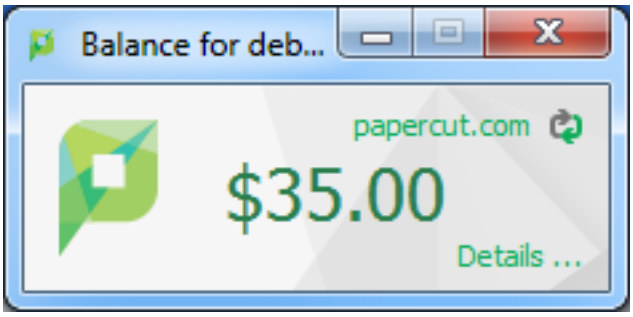
How a user experiences and interacts with PaperCut NG/MF varies depending on how it is implemented. When configured as a silent monitoring solution, users might not even know PaperCut NG/MF is in use. In other environments, users make extensive use of the various services that are available.

Services are provided to users through one of two interfaces:

4.1.1. The User Client

The User Client is an optional piece of software that provides additional functionality. The client software serves a number of purposes including to:

- Display the user's account balance (for print charging or quota environments)
- Display account selection or print conformation popups.
- Show system messages such as "low balance" notifications.
- Display popup warnings as configured by the administrator (e.g. Print policy discourage printing of emails).
- Provide popup authentication services in anonymous desktop environments.



You can customize the appearance of the User Client to fit in with your organization. For more information, see Customize the User Client. The features visible to the user (e.g. popup dialogs) are a function of server-side settings and are configured by the administrator.

4.1.2. The User web interface

The User web interface provide additional features for users. Functionality includes summaries and logs of usage, using TopUp/Pre-Paid Cards, transferring funds and displaying usage costs. The User Web Pages are accessed either via the **Details** link on the *User Client* window, or via the browser URL `http://[server_name]:9191/user`.

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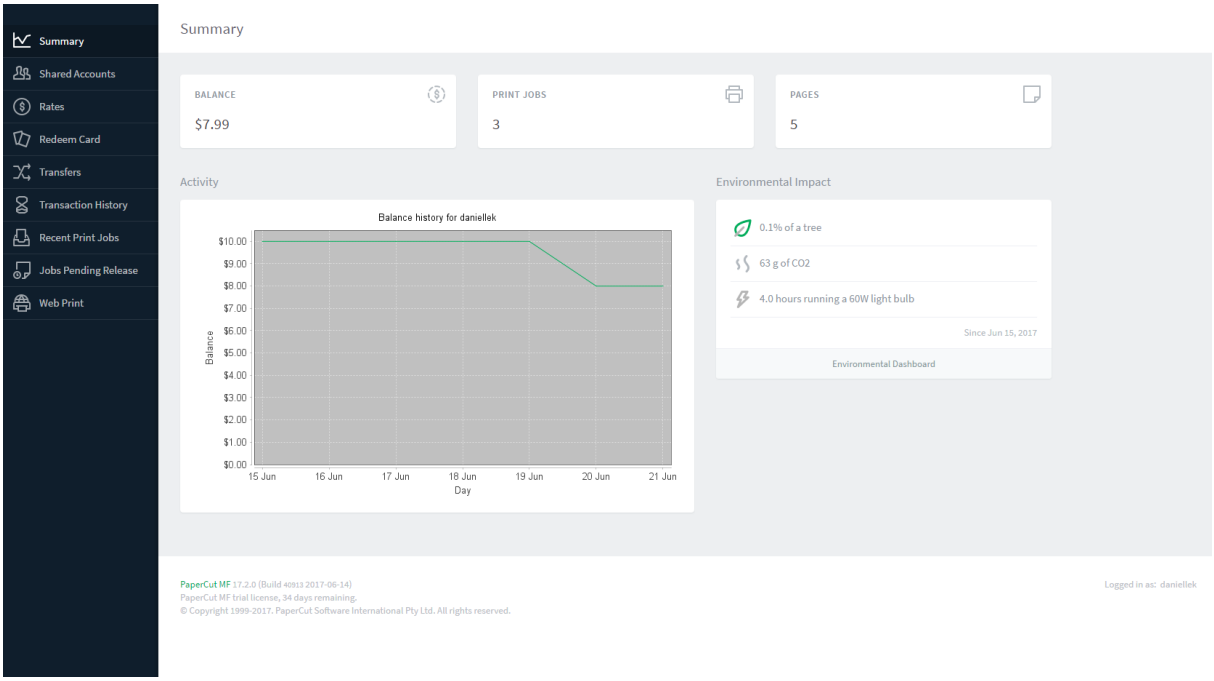
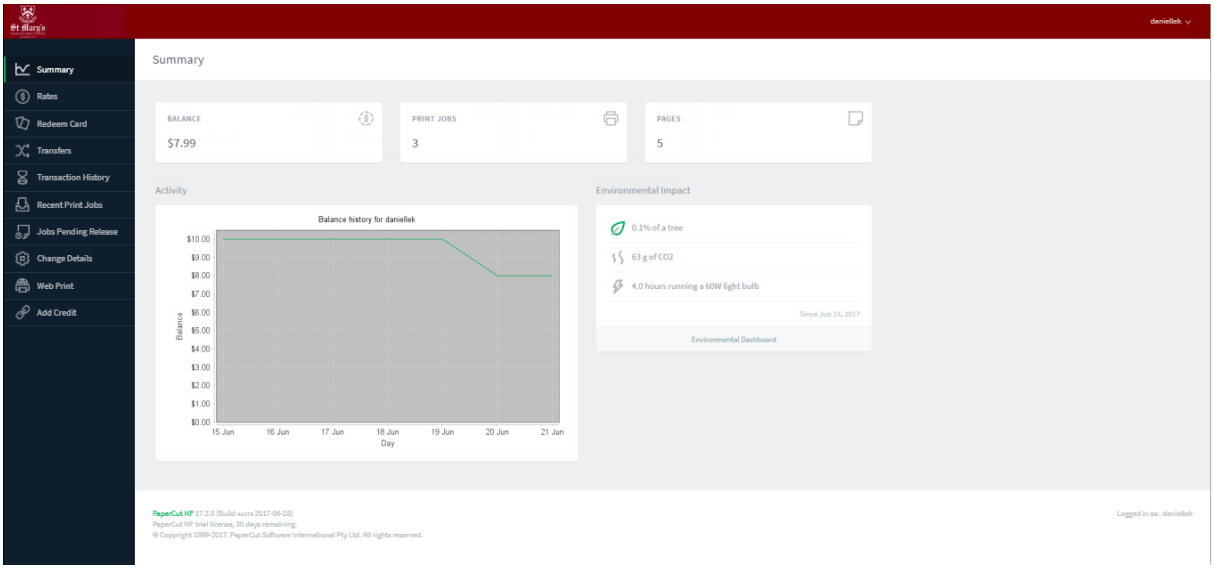


You can customize the appearance of the user web pages to fit in with your organization's existing intranet, web pages or color scheme. For more information, see Customize the User web interface.



4.1.3. The iPad / iOS app (for iPad printing)

The PaperCut iPad / iOS App for iPad/iOS Printing enables printing from your iPads enables printing to all your PaperCut managed printers across your enterprise. For more details see iOS printing (iPad & iPhone).

More information about each of these areas is available in the following sections.

4.1.4. User Client

The PaperCut NG/MF activity tracking and charging is implemented using 100% server-side technology. The User Client software is not required as part of the activity monitoring process.

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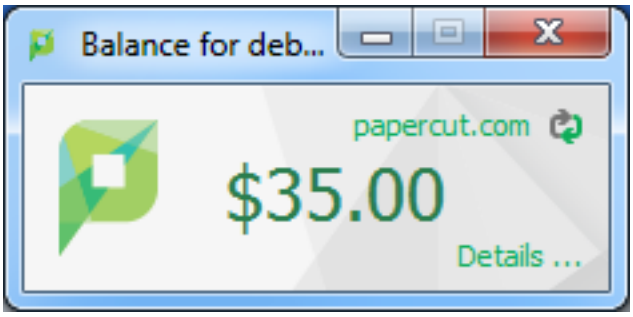
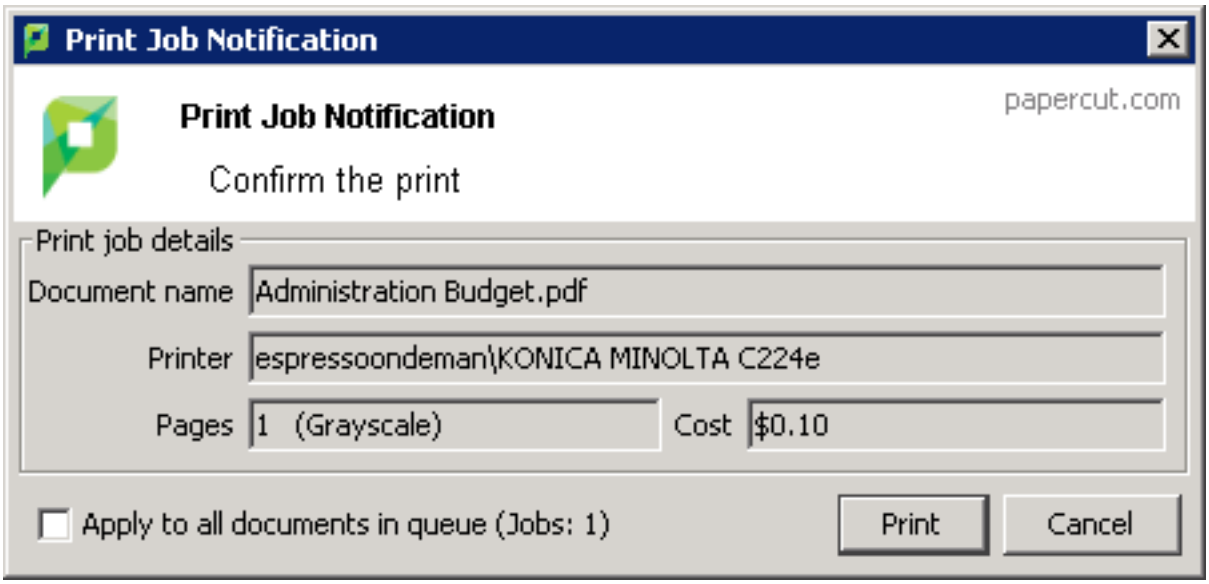
Note:
The use of client software for activity monitoring could open up security problems as client software is readily accessible to end users. By design PaperCut Software developers endeavor to implement all monitoring at the server level eliminating client-side loopholes. The client software supplied with PaperCut NG/MF is a presentation layer around server-side implementation.

The User Client facilitates four tasks:

- Allows users to view their current account balance via a popup window.



- Provides users with a "last chance" before printing, confirming what they are about to print.



- Displays system messages such as the "low credit" warning message or print policy popups.
- Allows users configured with Account Selection options (or you have print scripts) that require user interaction that can ONLY be done via the User Client (and cannot be done at the printing device). In this case, if the User Client is not running, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused and does not appear on the printing device.

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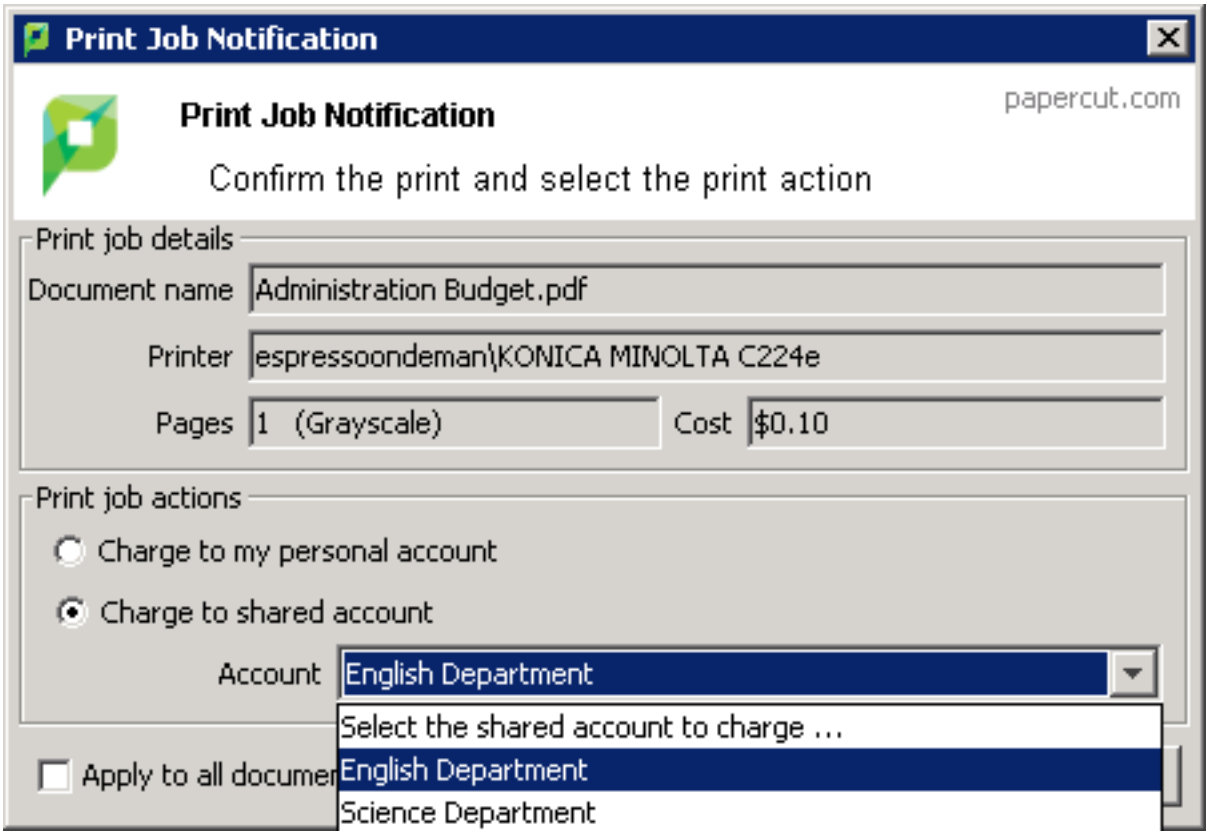

Tip:
If users are configured with Account Selection options that require user interaction and this can be done BOTH via the User Client AND at the printing device (the ability to assign accounts at the printing device is available), then running the User Client is not mandatory. It may be required if it is also being used for other purposes, besides Account Selection (such as, viewing current account balance, cached user comments, "low credit" warning messages, notifications about print policies, etc). For more information, see Assigning accounts to print jobs at the device.

The User Client is available for most major platforms. For more information about installing the User Client, see:

- Install the User Client on Windows
- Install the User Client on Mac OS X
- Install the User Client on Linux and Unix

The User Client software is installed automatically on the server under the `[app-path]\client` directory. On a Windows based server this directory is automatically shared in read-only form providing network users with access to the client executables.

The following sections contain further information about the User Client:

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- Configure the User Client using the command-line—command line and configuration options, such as where on the screen the User Client pops up or which option is selected by default.
- Customize the User Client—customization of the User Client.

4.1.4.1. User Client unavailability alert on Dashboard

You can configure PaperCut NG/MF to display an alert log in the Dashboard's **Real-time Activity** gadget, when the User Client is detected as being unavailable (either because users are not running it or it has not been deployed and installed). This is useful in environments where users are configured with Account Selection options that require user interaction that can ONLY be done via the User Client and not at the printing device (the ability to assign accounts at the printing device is available). This is because, in such environments, the unavailability of the User Client prevents users from being able to carry out the user interaction required for Account Selection via the User Client. As a result, their print jobs remain paused in the print queue and do not appear on the printing device. These jobs are eventually canceled after the User Client timeout or the Unreleased Held Jobs timeout.

To enable the Dashboard's **Real-time Activity** gadget to display an alert log when the User Client is unavailable:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Client Software** area, select the **Show a Dashboard log when the client is unavailable, preventing account selection** option.
3. Click **Apply**.

4.1.4.2. User Client timeout

If users are configured with Account Selection options that require user interaction that can be done ONLY via the User Client (and not at the printing device), and users do not respond to the Account Selection's user interaction on the User Client, then after a defined time, their print jobs are automatically deleted. This is to prevent a buildup of old jobs in the print queue. The default timeout is `10` minutes.

Change the timeout as follows:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Client Software** area, in **Delete jobs awaiting popup response after**, enter the number of minutes to wait for a user to respond to the Account Selection user interaction on the User Client, after which the job is deleted.
3. Click **Apply**.

Note:
In environments where user interaction for Account Selection is required, and can be done BOTH via User Client AND at the printing device (the ability to assign accounts at the

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printing device is available), after the User Client timeout, any held print jobs without accounts:

- are not canceled
- are no longer available on the User Client
- are ONLY available at the printing device
- are canceled after the Unreleased Held Jobs timeout (instead of the User Client timeout).

For more information see Configure a Release Station and Assigning accounts to print jobs at the device.

4.1.5. User web interface

The User web interface is accessed either via the **Details** link on the *User Client* window, or via the browser URL `http://[server_name]:9191/user`.

The User Web Pages provide a range of services for users, including:

- *Summary*: A summary of usage and balance history.
- *Shared Accounts*: Lists the shared accounts that the user can use for printing.
- *Rates*: The current costs for printing usage.
- *Use Card*: Add balance by using a TopUp/Pre-Paid Card.
- *Add Credit*: Add balance from an external payment system (when using the payment gateway module).
- *Transfers*: Transfer funds to other users.
- *Transaction History*: A history of balance transactions.
- *Recent Print Jobs*: A list of the user's recent printing.
- *Jobs Pending Release*: Print jobs pending release (when using a Release Station).

The services available provide a range of functionality that empowers users to make the most of PaperCut NG/MF without requiring intervention from administrators. The user web pages allows users to do what they need for themselves, and quickly get back to what they were doing.

You can switch many of the services on or off as required. This is useful for situations where a particular service is not suitable for exposing to the users. For example, you can disable the ability for users to transfer funds.

Each service is discussed in the following sections.

4.1.5.1. Summary

This page provides a summary of the information most important for a user, including their current balance, a summary of their printing usage, and a graph of their balance history.

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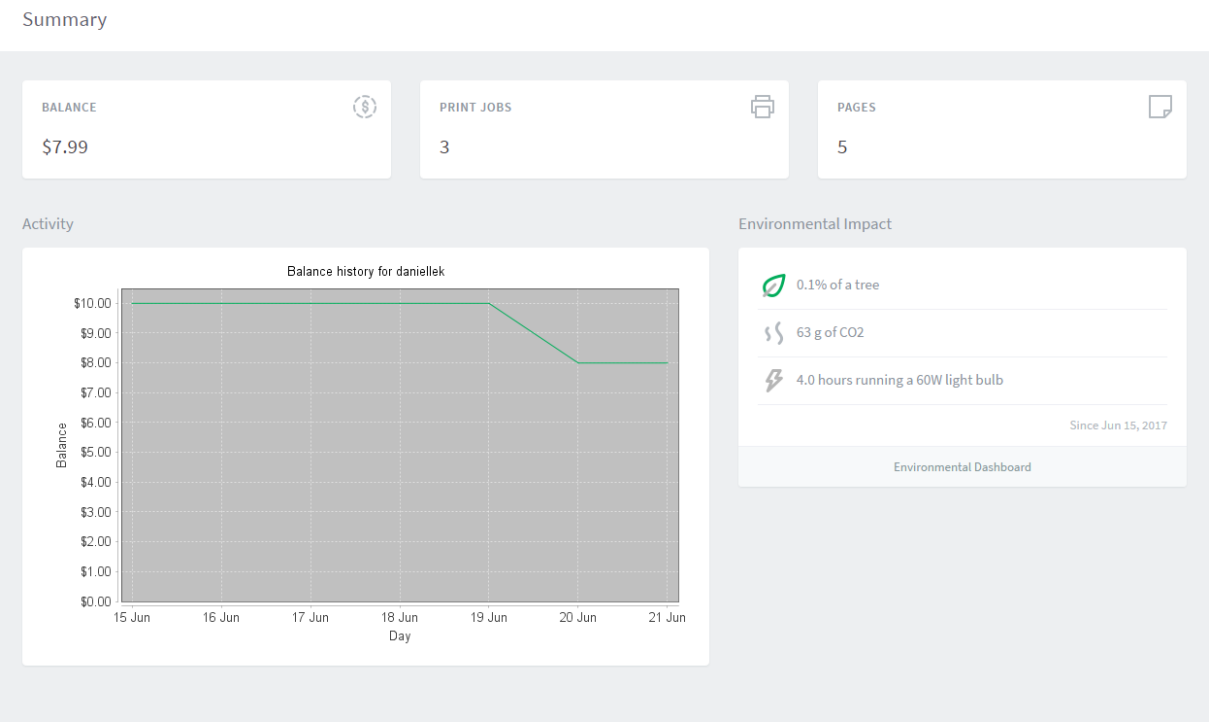
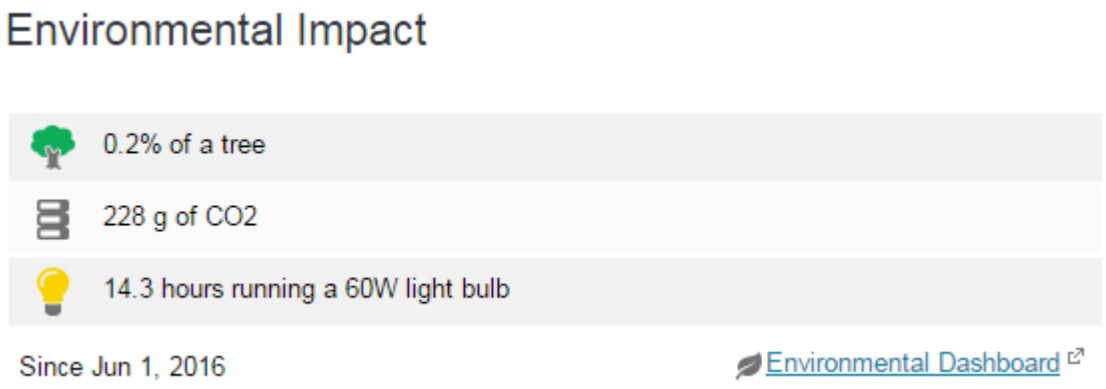


4.1.5.2. Environmental impact

One of the primary aims of PaperCut NG/MF is to reduce printing levels by changing a user's printing behavior. Implementing monitoring, quotas and charging are a good way of drawing a user's attention to their habits. The topic of the environment, global warming, and waste management is currently an area of debate and interest to many. Highlighting the environmental aspects of their activities is another good way of modifying a user's behavior.

The *Environmental Impact* area is displayed on the *Summary* page and provides the user with feedback on the environmental impact or footprint associated with their activities. Information presented includes an indication on how their printing equates to trees, CO_2 emissions and energy.

For more information about how these values are calculated, see Change the environmental impact reference values. If desired, you can disable this option using on the **Options** page.



4.1.5.3. Shared Accounts

Shared accounts page lists the balances of the shared accounts that a user can access.

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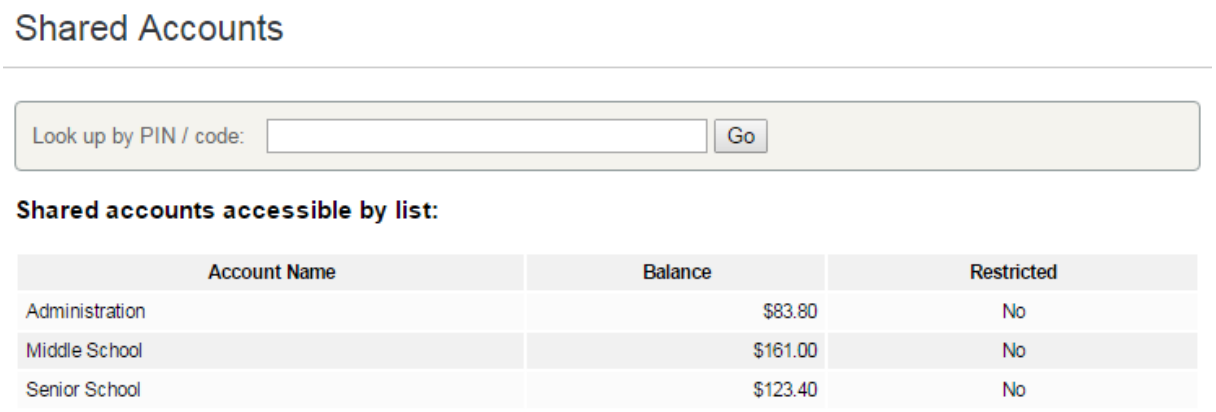
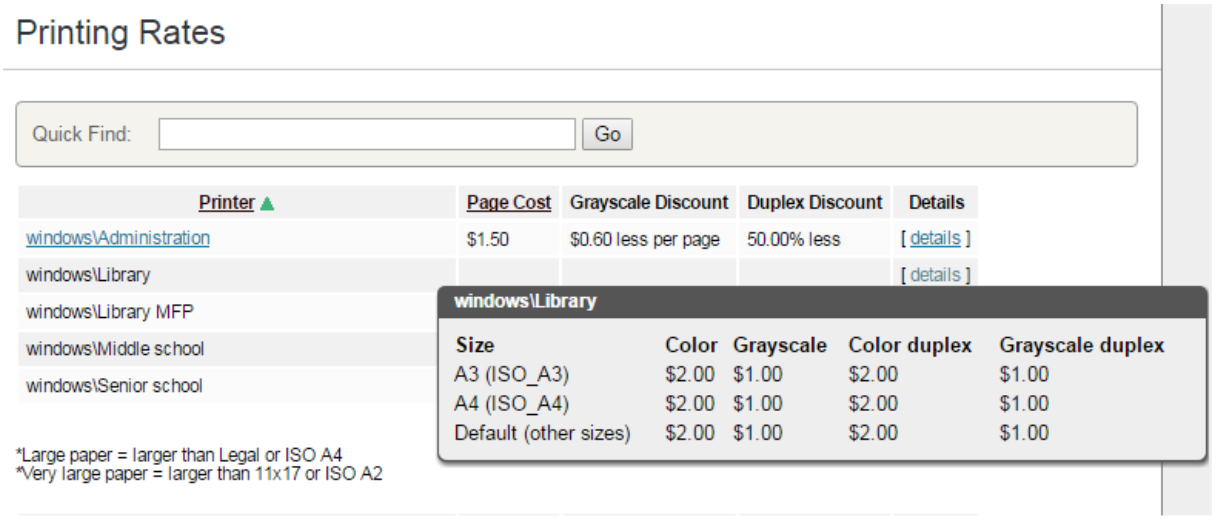


For more information, see Shared accounts.

4.1.5.4. Printing Rates

The rates page lets users know the printing costs associated with each printer. Displaying costs to users is a good way for them to see and understand the costs involved without having to spend time distributing the information to them.

Armed with this information, users can seek the most cost effective way to manage their printing. With discounts for grayscale and duplex printing clearly visible, ink and paper usage is reduced by the users own accord.



4.1.5.5. Redeem Card

From here users can use a TopUp/Pre-Paid Card. When a valid card number is entered, the value of the card is transferred to the user's balance. More information about cards is available in TopUp/Pre-Paid cards.

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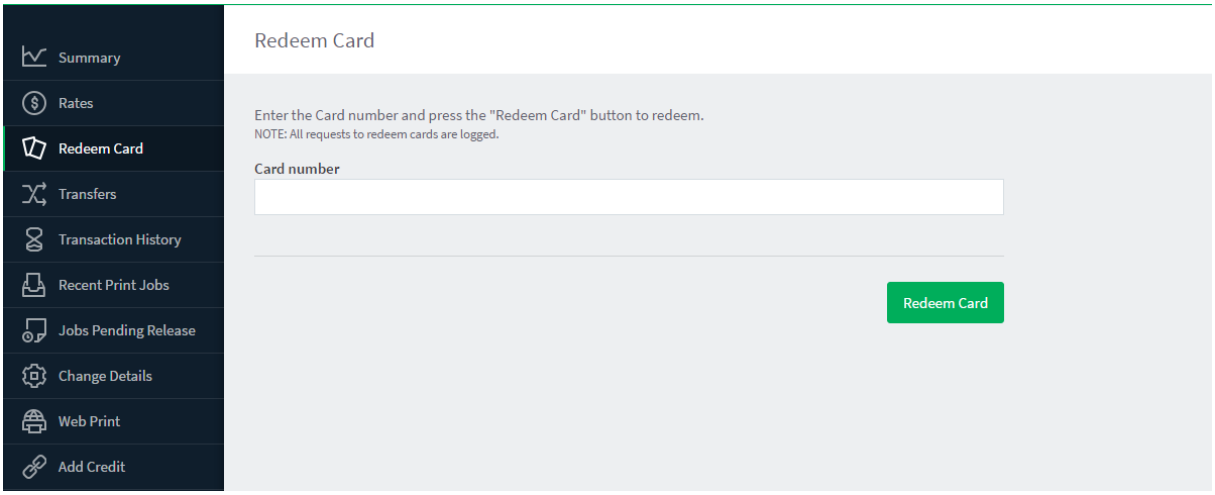
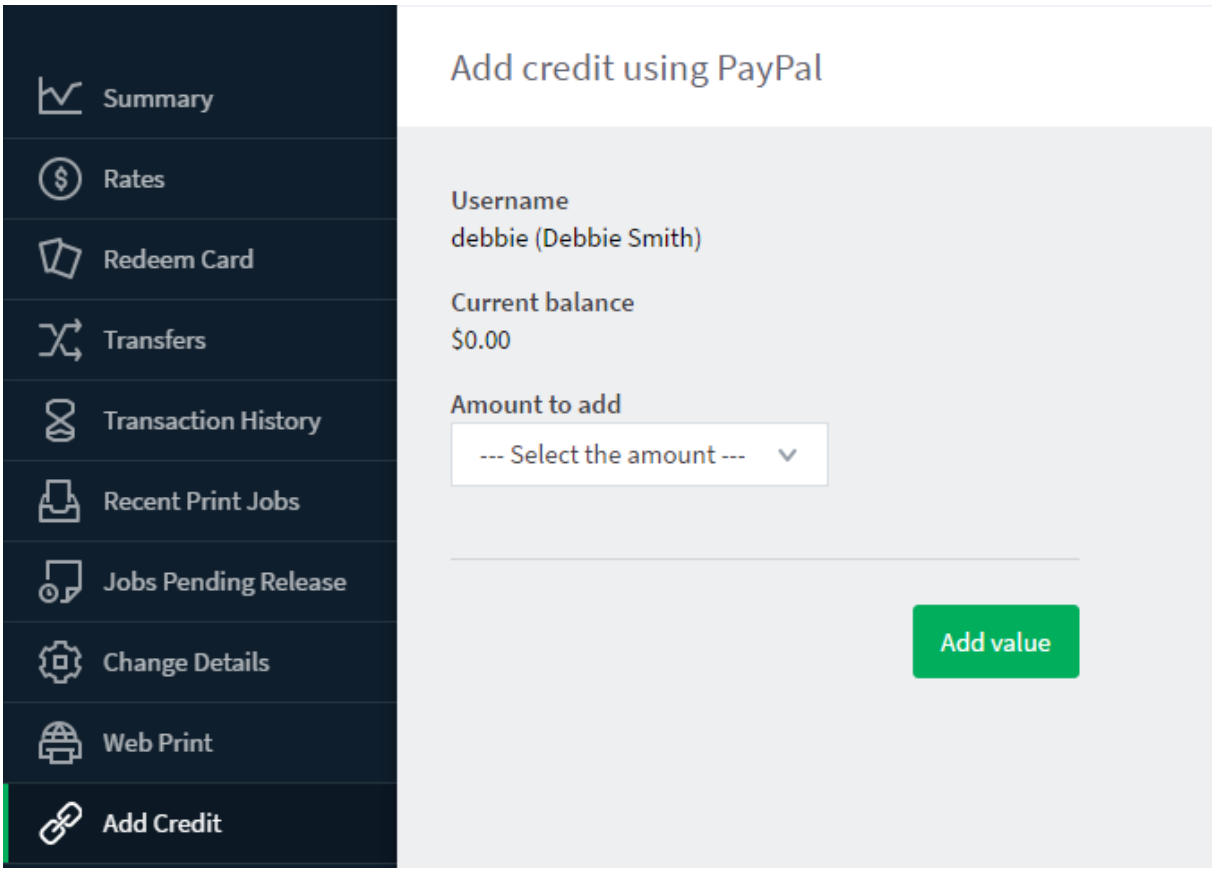


4.1.5.6. Add Credit

The Add Credit page is used to transfer funds into a user's account from an external source. This option is available when using the payment gateway module for integration with an external system.



4.1.5.7. Transfers

This page allows users to transfer credit to other users. Transferring balance is useful in situations such as:

- A student transferring credit to a fellow student for printing something for them
- A teacher transferring credit to a student for extra printing

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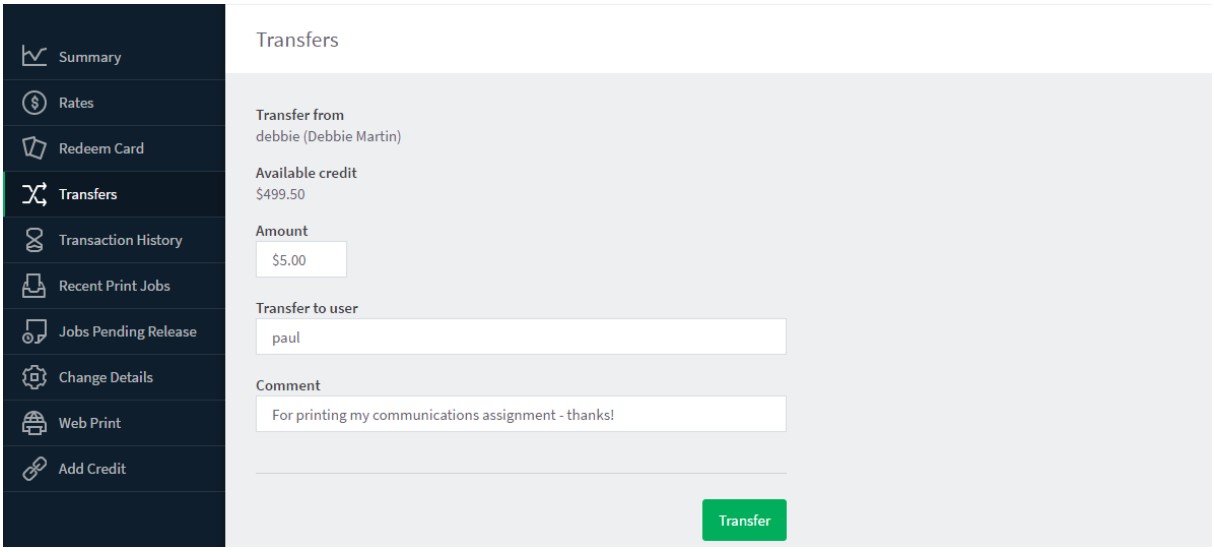
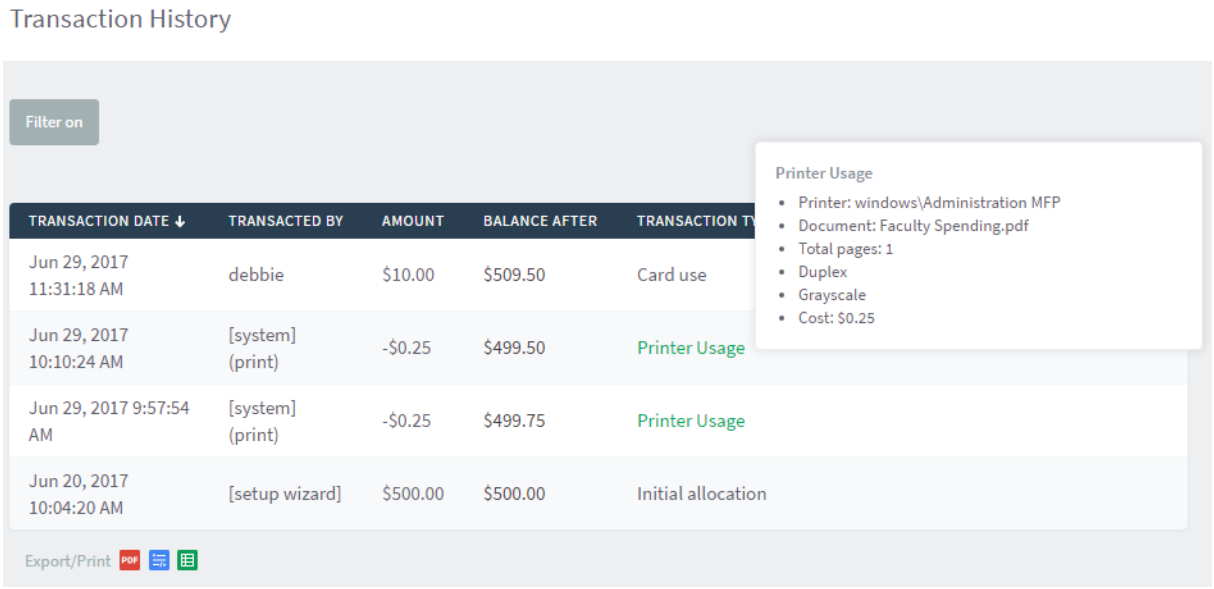
- Teachers trading printing credit between each other



4.1.5.8. Transaction History

The transaction history page displays a user's balance history in detail. Here a user can see how, when any why their balance was affected. If there is ever doubt about why a user's balance is at the current amount, or what they have been spending their credit on, the transaction history page has the answer.



4.1.5.9. Recent Print Jobs

This page displays the user's printing history. It allows a user to see the cost of their print jobs, or to find a particular print job. The filter criteria allows for many different views of printing, and can be used to easily drill-down to find the information required.

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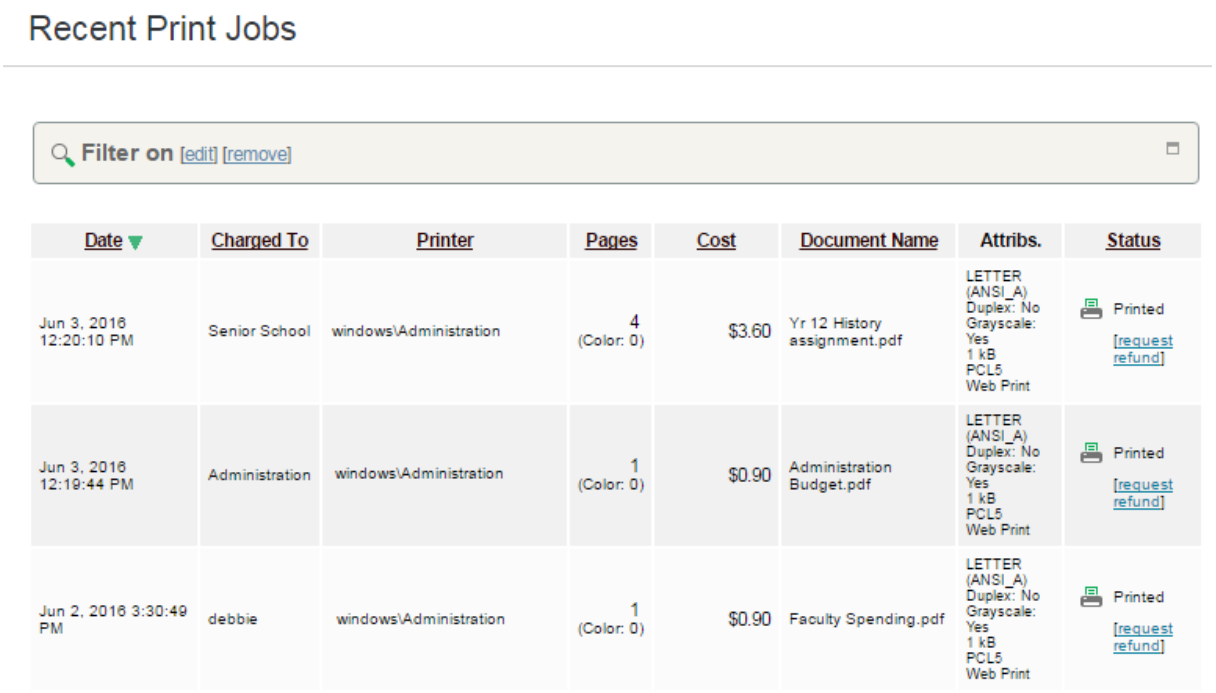
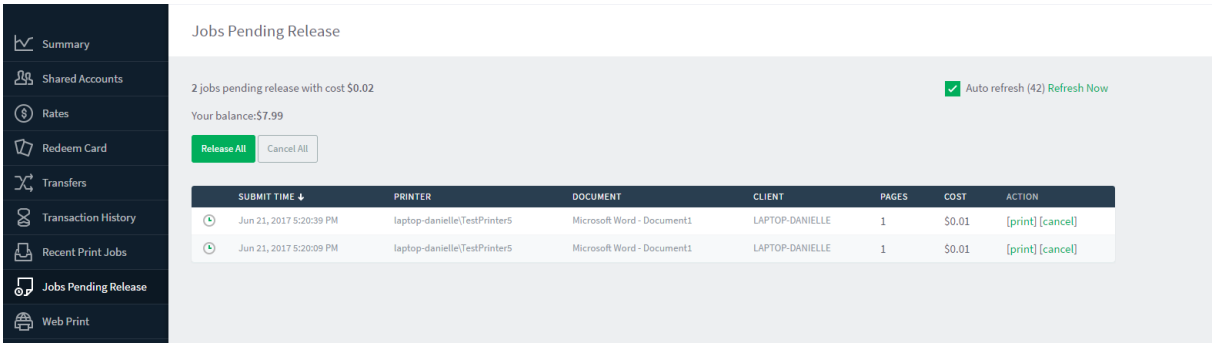


4.1.5.10. Jobs Pending Release

This page allows users to view and interact with jobs held in a hold/release queue. From here, users can release (print) the jobs that have been held in a managed queue. This allows for them to confirm the cost and details of the job before printing, and/or confirm their identity before the job is released.



More information about hold/release queues is covered in Secure print release.

4.1.5.11. Web Print

Web Print is a printing solution ideal for laptops and other non-domain connected systems. This page allows users to upload documents for printing, rather than requiring the print queues to be installed on their system.

The user is guided through a wizard where they can select a printer, select options, such, as number of copies; then select a document to upload. The document is then queued for printing and the user can track its status from this page.

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	Submit Time	Printer	Document Name	Pages	Cost	Status
	Jan 16, 2012 1:52:07 PM	desktop-tom2\TestPrinter	Poster.pdf			Rendering successful. Preparing job for processing.
	Jan 16, 2012 1:51:49 PM	desktop-tom2\TestPrinter	Biology Homework.docx	1	$0.10	Held in a queue

For more information, see Web Print (driver-less printing via a web browser).

4.1.6. Environmental Dashboard / Windows Live Tiles

One of the most powerful features in PaperCut is not actually a feature at all - it's the culture change that it brings about in an organization. Most of this change is encouraged by increasing the visibility of the impact printing has on the company and the environment. The *Environmental Dashboard* and the *Windows Live Tile* is an innovative way to raise awareness. It promotes paper saving in a positive and creative way. For example:

- See your environmental impact front and center
- Benchmark your usage against others in the organization
- Reward and promote good user behavior:
  - Award users for printing less
  - Encourage the user of duplex and grayscale
- It makes printing impact tangible and understandable:
  - Converting sheets into an "energy equivalent"
  - Emphasizing forest conservation
  - Highlighting CO_2 emissions

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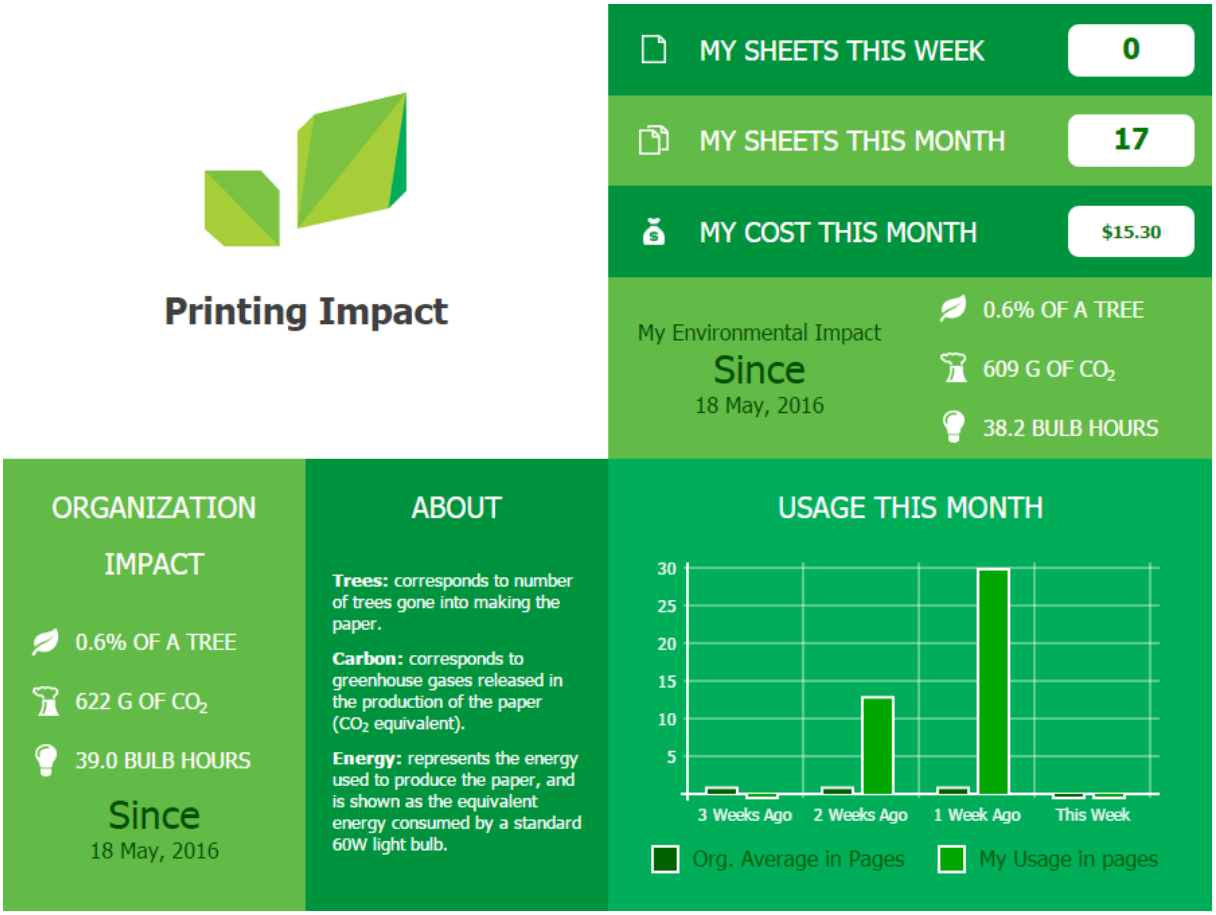

Windows Live Tile

The increasing use of devices running Windows with a tile based interface (featured in Windows 8 and above) has opened up a new avenue to communicate to users. You can pin the Environmental Dashboard page to the Windows Start Screen to create a dynamic Live Tile. This Live Tile communicates over 20 user-specific facts, awards and challenges all generated from real-time PaperCut data.

Sending a positive message with the Live Tile

All too often, the IT department is implementing back-end systems or invisible projects. The PaperCut Windows Live tile is a highly visible and positive story, and is a great complement to other changes planned in your print management program.

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Tip:

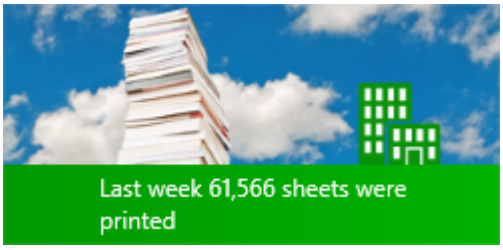
Recently PaperCut was working with a large national retail organization and they were in the middle of a project to implement PaperCut's secure print release. There was push-back from various department heads worried that any barriers to printing were going to reduce productivity. The environmental impact statistics helped turn this reluctance around. In the end, the savings were so compelling the project's success was promoted not only internally but externally as a strong corporate and social responsibility story. Oh, and for once the IT guy was the hero!

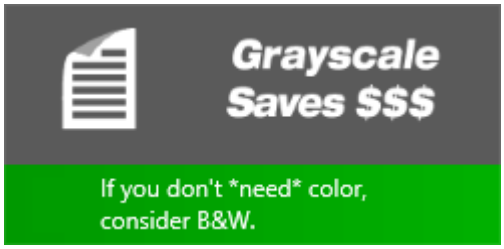
Some suggestions:

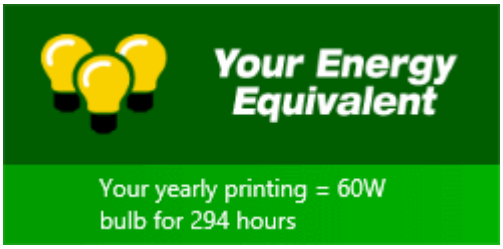
- Encourage your users to bookmark their dashboard
- Draw Windows users attention to the Live Tile and encourage them to Pin it to their start menu. See Windows Live Tile Installation.
- Link to the Environmental Dashboard on your intranet or monthly newsletter
- Share environmental impact information visually with management
- Challenge users to compare their live tile awards with their colleagues

Windows Live Tile examples

Below is a small sample of the 20+ tiles available:







4.1.6.1. Install Windows Live Tile

Windows Live Tile installation

To pin the environmental live tile on the Windows Start Menu:

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1. Go to the Start Menu (press the Windows key).
2. Open Internet Explorer or Edge in the Start Menu. (NOTE: The browser must be configured as the default browser to complete the pinning process).
3. Enter the URL below (where `[server-name]` is the hostname of yourApplication Server).

   `http://[server-name]:9191/environmentaldashboard/`
4. Enter your network username/password. After successful login, the **Environmental Dashboard** showing your usage statistics is displayed.
5. Click the favorites button.
6. For Internet Explorer, click the pin button.

   For Edge, click the menu button.
7. Click **Pin to Start** .
8. Press the Windows key to go back to the **Start** screen. The **Environmental Dashboard** is now pinned to the **Start** screen. Clicking the live tile opens the **Environmental Dashboard**.

   After a short period the live tiles start displaying. Five distinct live tiles rotate displaying your environmental usage statistics, ratings, tips, etc. A new set of five tiles are retrieved every 30 minutes.

> **Tip:**
> Although Windows usually starts displaying the live tiles after a short delay, sometimes it takes a few minutes for them to activate. If the live tiles are not displaying, changing the tile size can kick it into action. To do this, right-click the tile, select **Resize** from the bottom, then select a different size. Then change the size again back to the "Wide" tile format.

> **Important:**
> The Environmental Dashboard shows user level environmental information by default. If you do not want user level information to be available, you can turn it off by clearing the `Show environmental impact information` check box found in the Admin web interface under **Options > General > User Features** . When this option is off, only organization wide environmental stats are shown in the live tiles and dashboard.

Windows Tile deployment

Windows has very limited options to automatically deploy the live tile through the organization.

You should provide instructions to your users on how to access the **Environmental Dashboard** and install the live tiles on Windows 8.1 and above. These instructions could be provided in an email

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or on the organization's intranet. The instructions should include information from Windows Live Tile Installation and Using Environmental Dashboard on other browsers/platforms.

4.1.6.2. Using Environmental Dashboard on other browsers/platforms

The Environmental Dashboard displays interesting environmental impact and printing statistics for the user and organization. The Dashboard is useful to all users and can be accessed using any web browser running on any platform.

The simplest way to access the Environmental Dashboard is to open a web browser to:

1. Open a web browser to the following URL:

   `http://[server-name]:9191/environmentaldashboard`

2. Enter their network username/password. After successful login you are taken to the **Environmental Dashboard** showing your usage statistics.

> **Tip:**
> An alternate way to access the dashboard is to open a browser to the following URL (replacing `[username]` with their username): `http://[server-name]:9191/environment/dashboard/[username]` This URL could be linked from the organization's intranet site if the user's username is known.

4.1.7. Mobile User web interface

When the User web interface is accessed from a mobile browser (e.g. Mobile Safari from an iPhone), the user is presented with a lightweight interface that is optimized for smaller screen sizes.

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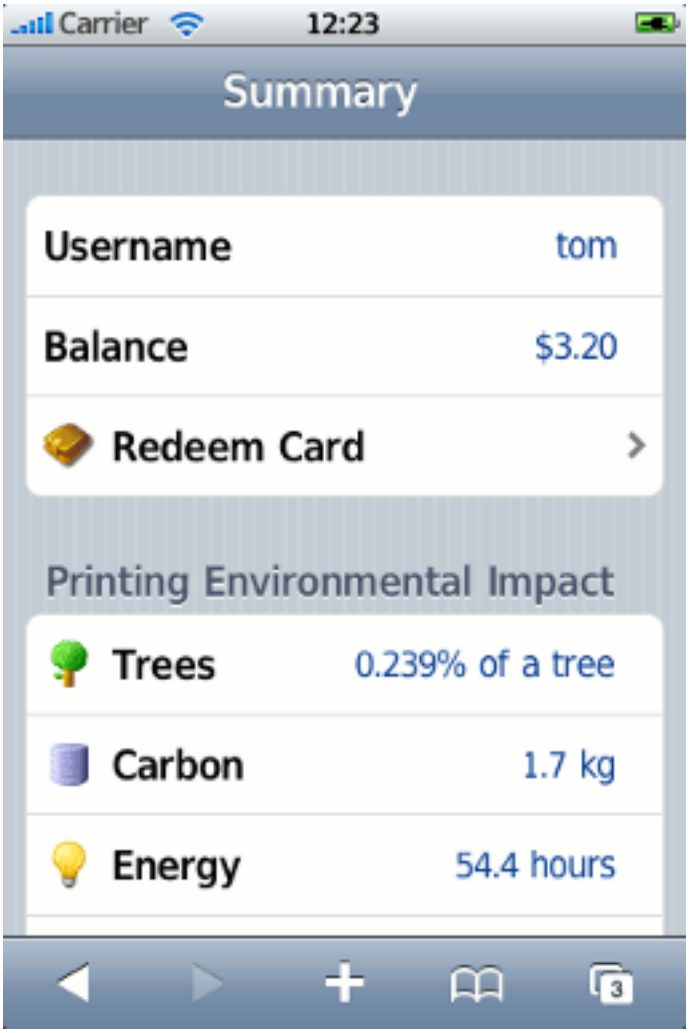
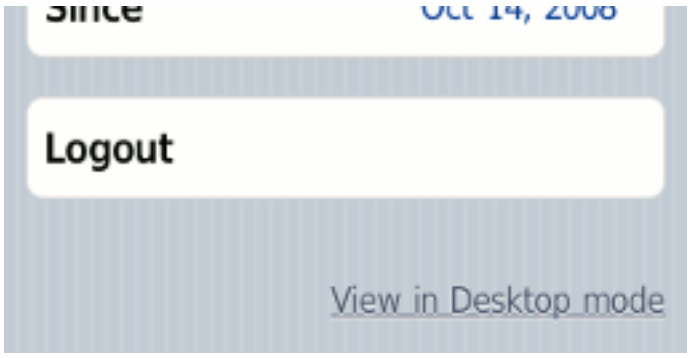


The user can view the user web pages in desktop mode instead by clicking **View in Desktop mode**



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Features available in the mobile user web pages include:

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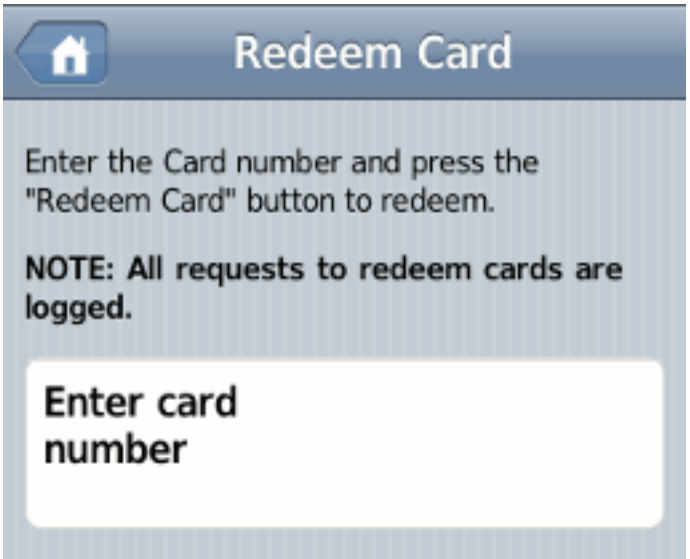
- Checking user balance

- Viewing environmental impact statistics

- Redeeming a TopUp/Pre-Paid Card



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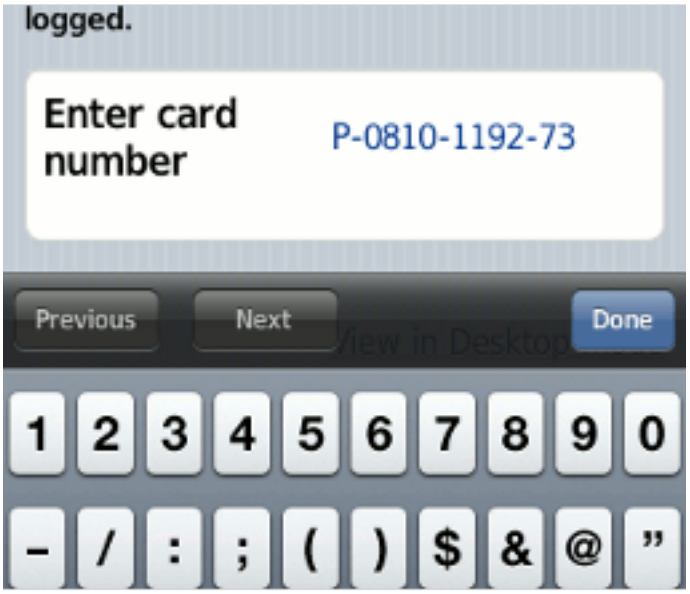

For more information about the full (desktop) User web interface, see User web interface.

4.1.8. Gadgets/Widgets and more

Gadgets/Widgets are a lightweight application that sits on a user's desktop. Some versions of Windows (for example, Windows Vista and Windows 7) have in-built support for sidebar gadgets. The equivalent on the Mac is the Widget. PaperCut NG/MF offers three useful Gadgets as well as a series of AJAX/JSON style embeddable components that can be leveraged by intranet developers.

4.1.8.1. Paper-Less Alliance Widget

PaperCut has teamed up with *Do Something*, the non-profit organization behind many environmental initiatives including *Save Paper* (http://savepaper.com.au/category/save-paper/what-software-to-get). The Desktop Widget, developed in Adobe Air works off the data in PaperCut. It is designed to help organizations reduce paper in a fun positive way. Highlights include:

- Draw user's attention to their environmental impact upon login
- Allow users to compare/benchmark their usage with the company/organization average
- Highlight facts fun about the environment and paper use
- Support a non-profit organization leading the paper reduction initiative

To download the widget, visit: https://www.papercut.com/products/save-paper-widget/

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Note:
Organizations deploying the widget are asked to make a small donation of less than $1.00 a user to the Paper-Less Alliance. All proceeds go to the non-profit supporting paper saving initiatives and awareness.

4.1.8.2. Windows Gadgets

Two small footprint Windows Gadgets are available:

- *The Print Balance Gadget:* Used to display user's personal balance on the desktop or sidebar. This is called `PCBalance.gadget`.
- *The Environmental Impact Gadget:* Used to provide the users with feedback on the environmental impact associated with their printing activities. Highlighting the environmental aspects is useful in modifying a user's behavior towards printing. For more information about how these values are calculated, see the section called Change the environmental impact reference values. This gadget is called `PCEnvironmentalImpact.gadget`.

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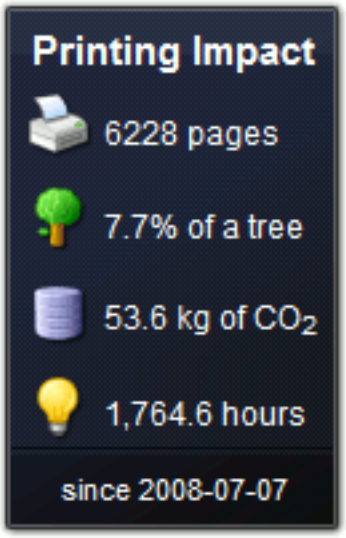

To install a Gadget:

1. Log in as administrator
2. Browse to the share on the PaperCut NG/MF server at `\\server\PCClient\win\Gadgets`
3. Copy all `*.gadget` folders to the local directory `C:\Program Files\Windows Sidebar\Gadgets`
4. Users should now see the PaperCut NG/MF Gadgets as available Gadgets on the system.

4.1.8.3. Web Widgets

PaperCut NG/MF also provides web widgets that you can easily embed within pages on your intranet site. These widgets work in a similarly to Google Web Gadgets or the Google Maps APIs. All that is required is to paste a few lines of HTML/JavaScript on your pages. There are two built-in web widgets that offer balance and environmental impact (and look identical to the Vista widgets above). However, if the built-in widgets do not suit your needs you can create your own that better suit your site.

There are only two requirements to running web widgets on your intranet site:

1. You require edit access to the intranet pages to add the required HTML/JavaScript.
2. The username of the logged in user is required so the web widget knows whose details to load. This usually requires that users log in to the intranet. When using a Microsoft Active Directory domain and Microsoft IIS web server the user can be automatically detected if using NTLM or Kerberos authentication, which provides a transparent login process via the Web Browser.

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The simplest way to get started with web widgets is to look at some examples. There are detailed and well commented examples available on the PaperCut NG/MF server in the directory `[app-path]/server/examples/webwidgets/examples.html`. Use these examples as a starting point to implement web widgets on your site.

The basic steps to adding a web widget to a page are:

1. Add a `<div>` element to your page. The widget is drawn within this tag. The div element must be given a unique `ID`.
2. Include scripts into your page to load the widget and user data from the PaperCut NG/MF.
3. Edit the included script to set `pcUsername` to the logged in user.
4. Edit the included script to set `pcServerURL` to base URL of the PaperCut NG/MF server.
5. Add some script to draw the built-in widgets to the page. You can use one of the built-in widgets, or create your own.

4.2. User management

This section covers some of the more advanced user management tasks. On large networks managing users on an individual basis is not practical. Management needs to be handled either via a level of automation, or manually at group level. Some common user management tasks that typically consume time on a large network include:

- Creating new user accounts
- Allocating user credit or quotas.
- Performing administration tasks such as allocating additional allowances or applying different privileges.
- Generating or allocating card/ID numbers for users

PaperCut NG/MF offers a number of features to help automate these tasks.

4.2.1. Groups in PaperCut NG/MF

Groups are collections of users. PaperCut NG/MF uses the network domain or computer's groups, meaning administrators can take advantage of the existing network structure. Groups in PaperCut are used in the following ways:

- To control how quota/credit is allocated to users on a regular basis.
- To automate the addition of new (future) user accounts.
- To assist with making modifications to user accounts by group.
- For group based reporting.

PaperCut NG/MF mirrors (caches) domain network group memberships for performance reasons. Therefore, changes in group membership made at the domain level might not be immediately reflected in PaperCut. You can refresh the group membership at any time.

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Refresh group membership

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.
2. Click **Synchonize now**.

   Groups are mirror/cached for two reasons:

   - For fast reporting and search performance.
   - To ensure PaperCut NG/MF is a good network application and does not overload domain controllers with group membership requests.

Many large networks can contain hundreds of groups and/or organizational units. In many cases only a small percentage of these groups are pertinent to PaperCut NG/MF management. To ensure administrators are not overwhelmed with all groups, PaperCut NG/MF only lists the groups selected as relevant by the administrator.

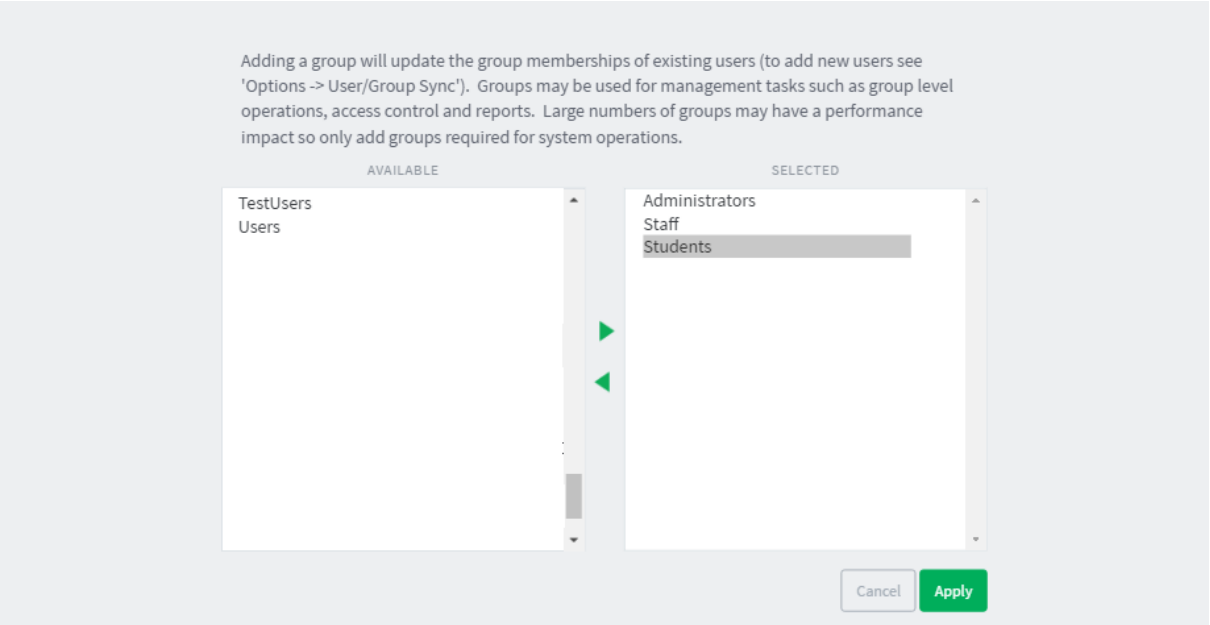
Add a group to PaperCut NG/MF

When you import users into PaperCut NG/MF from a user directory, the groups in that directory are also imported, however, they are not automatically displayed in the Group List. You need to add the required groups to the Group List.

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. In the **Actions** menu, click **Add/Remove groups**.

   The **Add/Remove Groups** page is displayed.
3. Select the group(s) required on the left-hand-side; then click the **Add** arrow.
4. Click **Apply**.



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PaperCut NG/MF includes one built-in group called the `[all users]` group. This group is not related to any existing network group and is a "catch all" group that represents the *all users* list in the PaperCut system. It is similar to the "Everyone" special group in Windows.

Note:
PaperCut NG/MF sources groups and group members from your selected directory/domain source. There are, however, some situations where maintaining groups within the network directory source is not possible. For example, you might only have read-access to the domain. If for technical reasons it's not possible to define the required groups in your network directory, groups can also be defined via a text file (e.g. a tab-delimited file). Simply place your group definition file at the location `[app-path]/server/data/conf/additional-groups.txt`. See the template file `additional-groups.txt.tmpl` in the same directory for an example and further information. The `additional-groups.txt` can also be used to manage an internal user's group memberships.

4.2.2. Set new user creation rules

It is inevitable that new users will be added to your network in the future. To streamline account setup, PaperCut NG/MF offers the option of having new users automatically assigned initial settings such as starting credit, privilege level, and other settings based on their group membership. Users are automatically added to PaperCut NG/MF when either:

- The user sends his or her first print job
- Overnight during user/group synchronization
- When a manual user/group synchronization is performed
- When a user logs in (i.e. authenticates) to the User Client, Release Station or User interface pages

When a new group is added, it does not provide any new user settings. Taking the time to configure initial settings rules means one less job for administrators to perform! The group based control offers maximum flexibility and ensures that it's possible to have a different set of initial settings rules for different types of users. This flexibility is particularly important in an academic environment where students of different year levels need different settings.

Example:
For example, an administrator might want to allocate new users belonging to the `Senior Students` group, a $10 starting credit and allow them `restricted` access, while all other students receive $5.00 starting credit.

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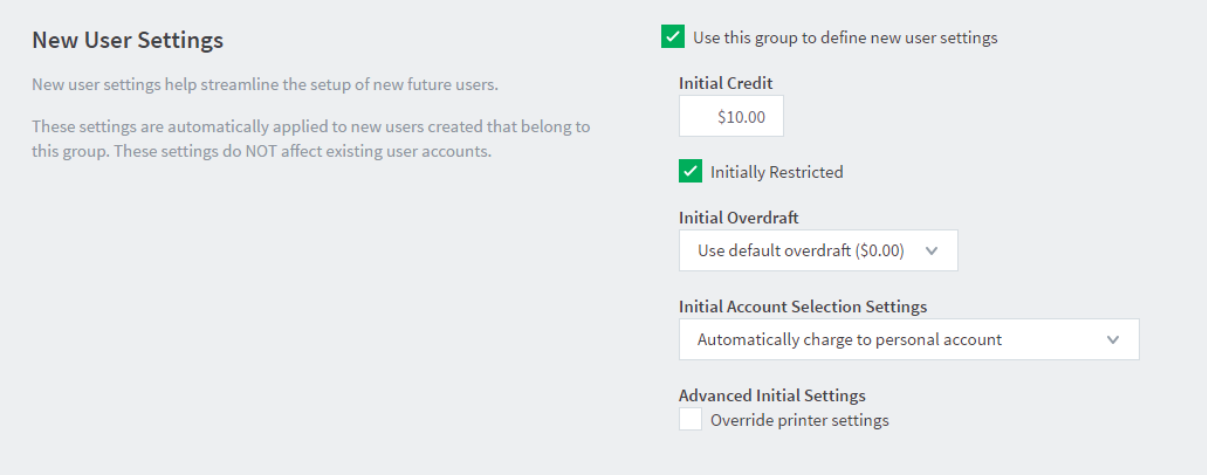
Set up new user creation rules

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. Select a group.

   The **Group Details** page is displayed.
3. In the **New User Settings** area, select the **Use this group to define new user settings** check box.

   The new user settings are displayed.



4. Complete the following as required:
   - **Initial Credit**—Enter the amount of credit to apply to each new user in this group.
   - **Initially Restricted**—Select this check box to set an overdraft limit on the account.
   - **Initial Overdraft**—(displayed only if the **Initially Restricted** check box is selected) Enter the amount of overdraft to allow for each user in this group.

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- **Initial Account Selection Settings**—Select the account selection option.
- **Override printer/device settings**—Select the printer/device settings that can be overridden for users in this group.

5. Click **OK**.

Important:
Changes made to the **New User Settings** affect only users *NOT* yet listed in the system. (i.e. future users). Any users *already* listed in the system are not affected. Initial user settings also do not apply when users change groups. To modify settings or credit on existing users, see Bulk user operations.

Tip:
Initial settings can become confusing when a user belongs to more than one group. PaperCut NG/MF uses the following logic to allocate initial settings:

- The user obtains a starting credit that is the sum of all the matching groups (the special `[all-users]` group is ignored).
- If any of the matching groups has `unrestricted` access, the user inherits unrestricted status.
- If any of the matching groups has account selection settings, the user inherits the ON settings.
- If the user does NOT belong to any group with new user settings defined, they inherit the settings applied to the special `[all-users]` group.
- The initial settings are applied from each group in alphabetical order. So for settings that cannot be merged (e.g. charge to single shared account), the last group alphabetically takes precedence.

Tip:
To control when users are automatically created, see On demand user creation.

4.2.3. Set up quota allocations

PaperCut NG/MF can be used to control and restrict users usage by allocating a quota or allowance (a budget). For example, a user might be allocated $10.00 a month. This type of control is particularly popular in schools and universities.

Allocate a quota to a group

Users receive quotas for all groups to which they belong. For example, if `Students` and `Student Newspaper` groups are defined in PaperCut NG/MF, with $20/month and $10/month quotas respectively. If a student belongs to both groups, they will receive a $30/month of quota. If they belong to only the `Students` group, they will receive only $20/month.

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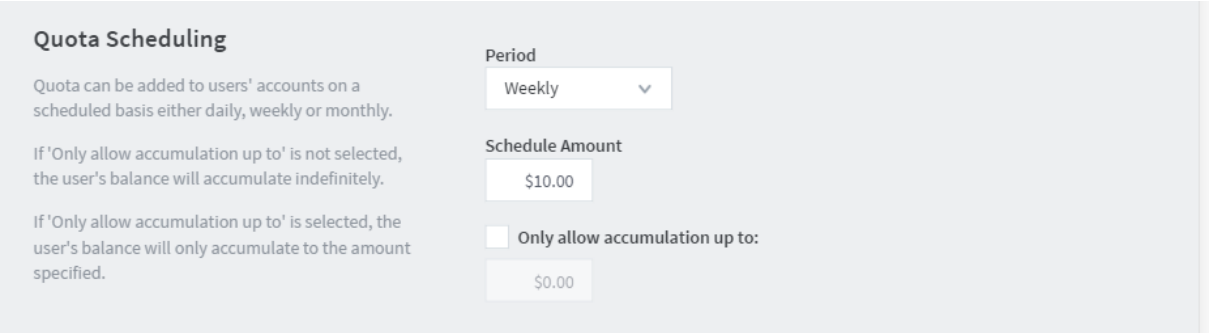
If you allocate a quota on the `[All Users]` group, then all users in the system receive this quota in addition to quotas defined on other groups.

To allocate a $10.00 a week to members of the Students group:

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. In the **Actions** menu, click **Add/Remove groups**.

   The **Add/Remove Groups** page is displayed.
3. Add the **Student** group if not already listed.
4. On the **Group List** page, select the **Student** group.
5. In the **Quota Scheduling** area, complete the following fields:
   - **Period**—select **Weekly**
   - **Schedule amount**—enter **10.00**.



6. If you do not want users to be able to "bank up" their quota allowance, select the **Only allow accumulation up to** check box; then enter a maximum amount that can be accumulated. Allowing accumulation can lead to excessive use at certain periods of the year, such as the end of semester
7. Click **OK**.

Credit is assigned to group members at just past 12:00am (midnight) on the day of the schedule. Administrators can verify that this has taken place by inspecting log entries in the Application Log and/or users' Transaction Log.

4.2.4. Set overdraft limits

The overdraft setting applies to restricted users (and restricted shared accounts). An overdraft allows a user to continue to use services even though their account has dropped below zero. In essence, the overdraft value moves the "zero-point" allowing users to overdraw the account to the agreed limit. An overdraft can also be referred to as a credit limit.

Reasons for using an overdraft include:

- Provide users with flexibility between budget, quote or allocation periods. For example, an overdraft allows a user to "draw on" a portion the next month's quota allocation.
- To Implement a credit system with credit limits rather than an up-front pay system.
- Grant trusted users a "loan" on a case-by-case basis.

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You can define an overdraft at two levels:

- Globally as a default affecting all users and shared accounts.
- On an individual user or account basis.

Change the overdraft limit for all users

The default overdraft is zero. You can change this limit.

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Account Options** area, in **Default overdraft limit for restricted users/accounts**, enter the overdraft limit.
3. Click **Apply**.

Change the overdraft limit for specific users

Optionally, you can apply a separate overdraft to an individual user (or shared account).

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. In the **General Quota (built-in account)** area, select the **Restricted** check box.

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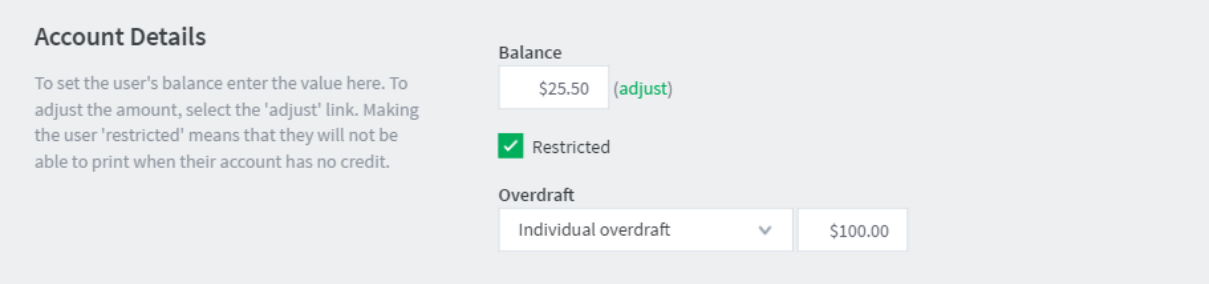

4. In **Overdraft**, select **Individual overdraft**.
5. Enter a positive value in the adjacent overdraft balance field.
6. Click **Apply**.

4.2.5. Enable username aliasing

In some scenarios, a particular user wants to print a job but his/her username has been changed for various reasons and it is reflected in PaperCut NG/MF now as a different username. Examples of why the username has changed include:

- Two networks/domains/servers have different naming conventions, e.g. for user John Smith, one network uses the convention "j.smith" while the other uses "jsmith".
- For some policy reasons, the format of usernames has changed and you want to allow forgetful users to log in with their previous username.
- Print jobs are coming from an ERP or mainframe system where usernames are different.
- In some organizations, users log in with employee numbers.
- Print jobs coming from some software packages might use the "application username" and not the user's network username used by PaperCut NG/MF. This can occur in some SAP configurations.
- Unix has strict requirements for usernames, (IEEE Std 1003.1–2001), where the only valid characters are letters, digits, underscores, full stops, at-signs, dashes (but not start with a dash) and having $ at the end. So when printing on a Unix server, it can sanitize the username, such as converting an apostrophe into an underscore, and then recording in PaperCut NG/MF as a different user when one really wants it to be the same user.

To work around this problem PaperCut NG/MF allows users to have an alias for their username. The username alias is applied at the following levels:

- User login to the web interface, client popup authentication, or Release Station login.
- Print jobs arriving in the print queues under the alias.

Enable username aliasing

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Username Aliasing** area, select the **Enable username aliasing** check box.

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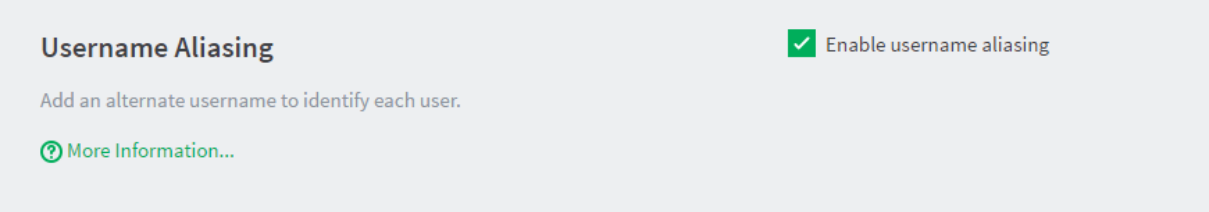
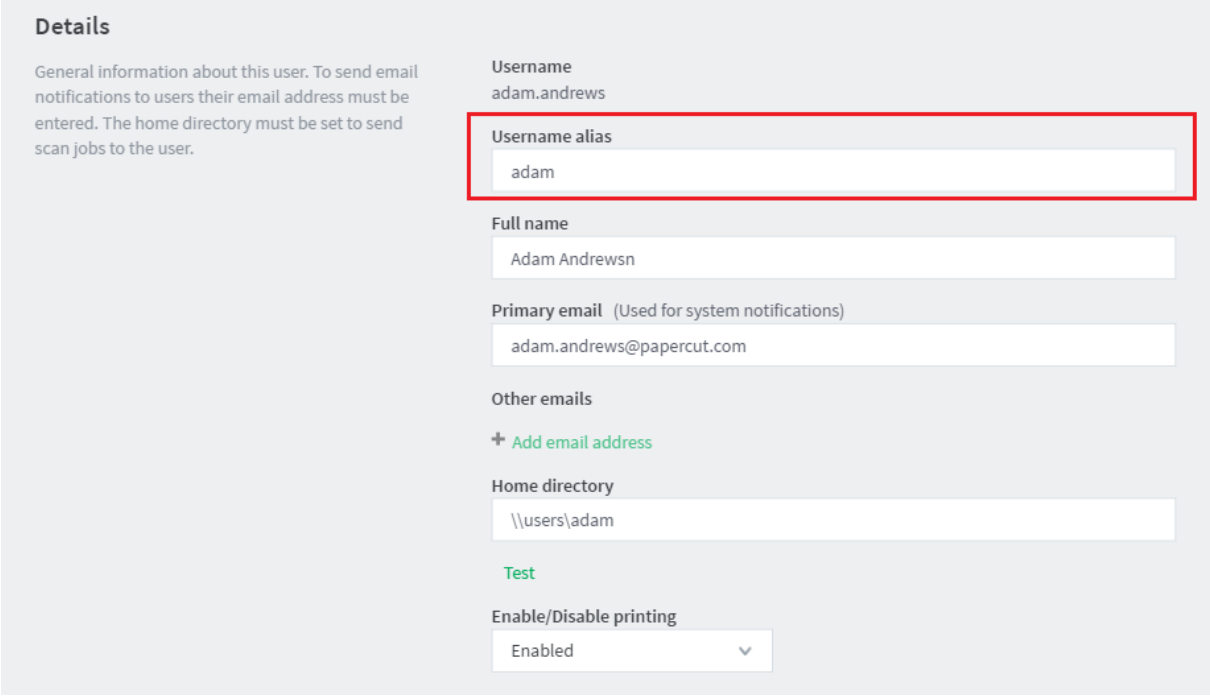


3. Click **Apply**.

Once username aliasing is enabled, **Username alias** is displayed on the **User Details** page.



You can import this information from Active Directory or LDAP during an overnight sync. Once username aliasing is enabled, an option to enter an **AD/LDAP field name** is displayed under **Options > User/Group sync**. You can choose any valid Active Directory user field to import this information. For example, employeeNumber, employeeID, otherLoginWorkstations.

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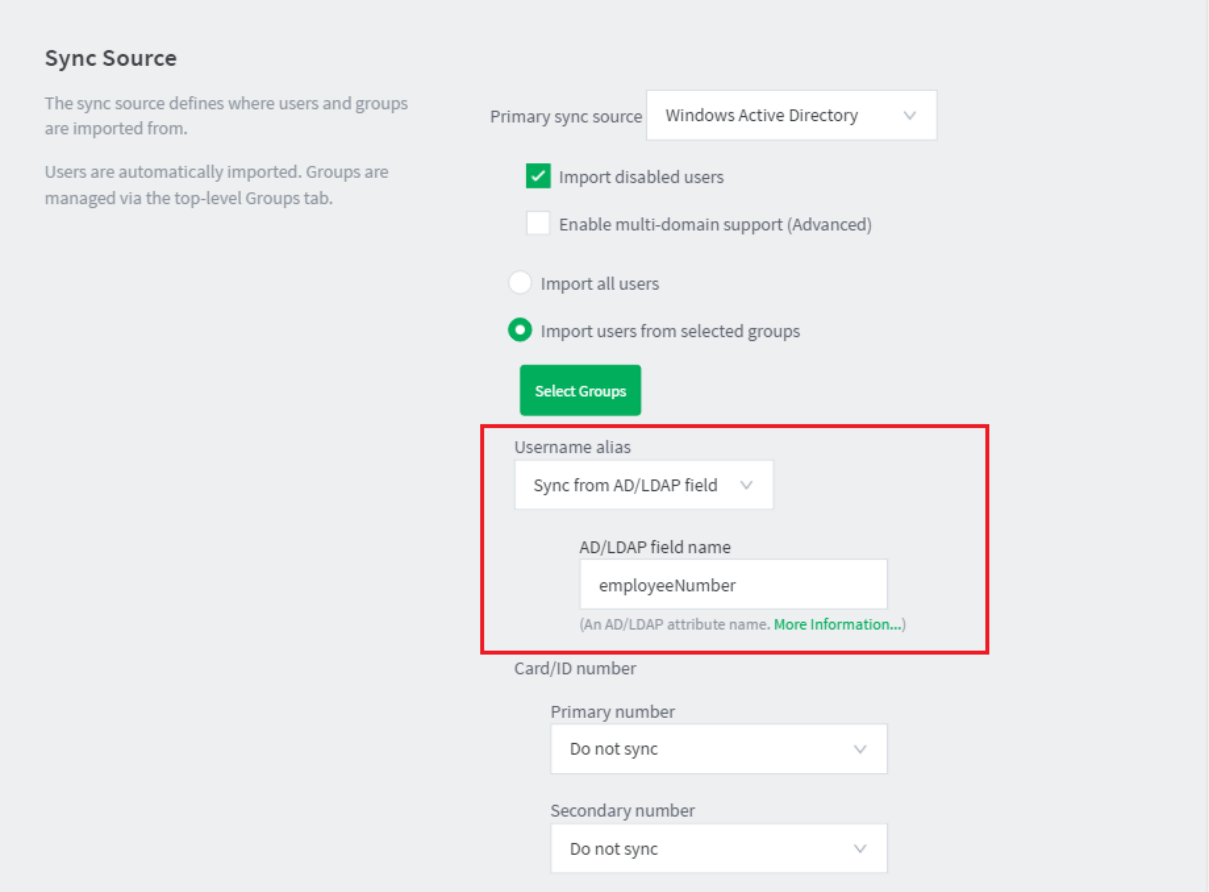

Once this is set, information from this Active Directory field is imported every night as username aliases. For more information on user group synchronization see Synchronize user and group details.

4.2.6. Maintain office/department history

PaperCut NG/MF maintains a historical record of changes to users' office and department fields. PaperCut NG/MF cross-references job logs against these histories so that it can report print usage by the office and department a user belonged to at the time they printed a job. Normally this happens in the background so you do not need to know that it is happening.

There are some cases where a user's office or department has been updated incorrectly in the user directory, e.g. updated too late, or changed to the wrong name. These changes reflect how user activity is reported by PaperCut NG/MF. To ensure that information is reported correctly, you can retrospectively alter changes that were made incorrectly. The most common cases where alteration might be required are described below.

Note:
A user's office and department history are synchronized from the user directory into PaperCut NG/MF, and not the other way around. Therefore it is important that the details in the user directory are updated before making historical changes in PaperCut NG/MF. PaperCut NG/MF automatically synchronizes these details overnight, however, a you can make a change in the same day by running a manual synchronization from **Options >**

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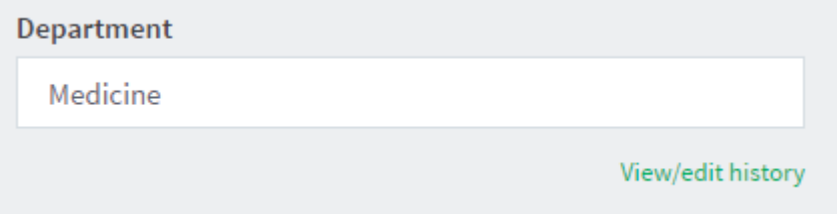
User/Group Sync > Synchronize Now .

4.2.6.1. Scenario 1: Correcting a late change to a user's office or department

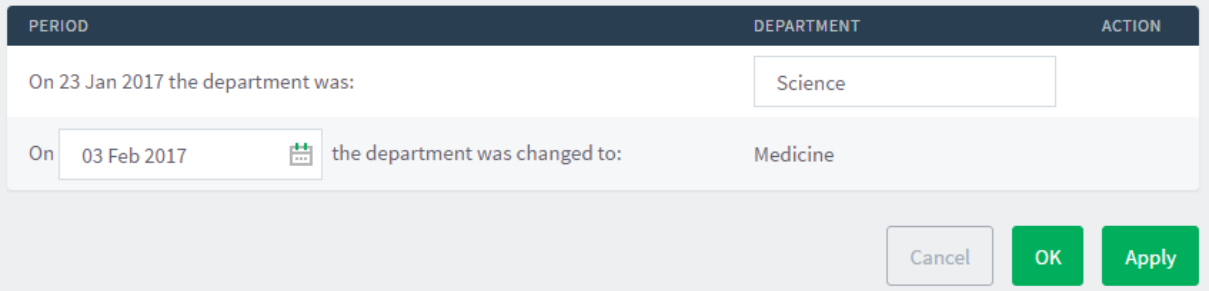
User `peter` moves from the Science department to the Medicine department on 14 May but the user directory is not updated with the change until 27 May. The PaperCut administrator Jane notices that Peter's activity between 14 and 27 May has been incorrectly allocated to his old department, Science. Luckily Jane can alter history, and she does so as follows:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select **peter**.
3. In the **Other Details** area, click **View/edit history** below **Department**.



   The **Department history** screen is displayed, including the department change on the incorrect date of May 27.



4. Jane finds the row where the department was changed to `Medicine` on the incorrect date (`On 27 May 2011` in the screenshot above), corrects the date; then clicks **Apply**.
5. Peter's department change has now been retrospectively updated to 14 May. Reports now show Peter's activity being allocated to the `Medicine` department after this date.

4.2.6.2. Scenario - Correcting an unintended office or department change

On April 9 Peter joins the Medicine department. At the time, his department's administrator entered the department name into the user directory as `Medical Department`, where the correct name should have been `Medicine`. The PaperCut administrator Jane realizes this mistake on April 28 and updates the user directory.

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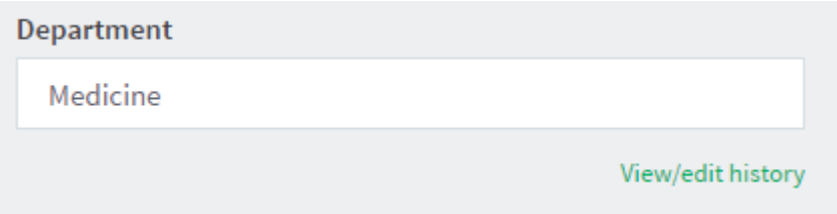
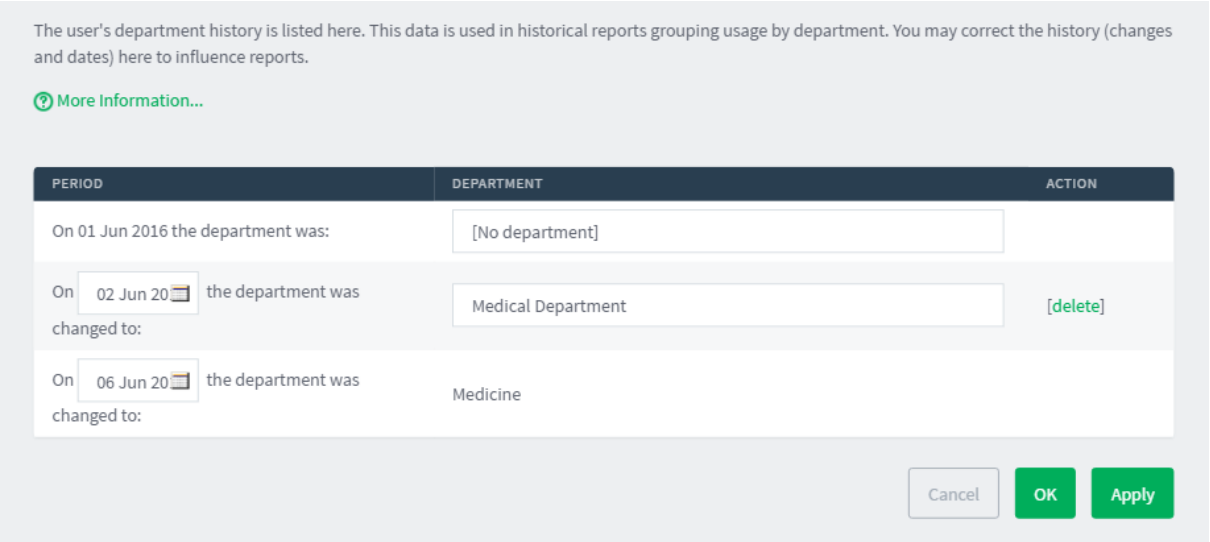
PaperCut now displays Peter's activity between April 9 and April 28 as being allocated to the incorrect department `Medical Department`. To correct this, Jane performs the following actions:

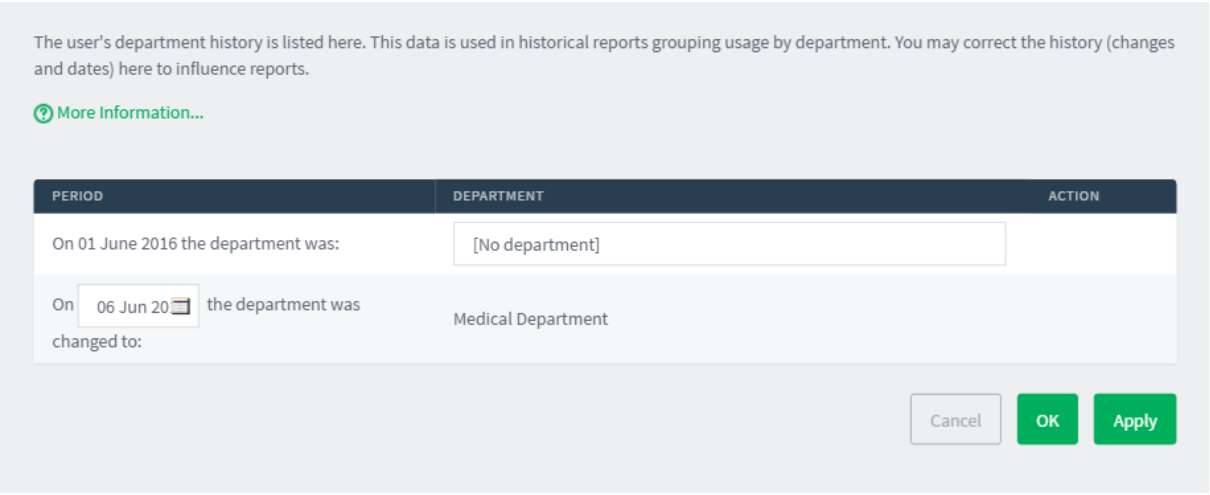
1. Navigates to **Users > peter**.
2. Clicks **View/edit history** below **Department**.



3. The department history screen is displayed, and shows the incorrect department change on April 9.
4. Jane clicks the **delete** link in the row of the incorrect department change `Medical Department`.



5. The incorrect department change has now been deleted, leaving the new department `Medicine` as active since April 28.



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6. Jane updates the change date of the `Medicine` department to April 9; then clicks **OK**.
7. Reports now consider `Medicine` as Peter's department since April 9, and the incorrect entry `Medical Department` has been deleted.

4.2.7. Disable printing for a user

PaperCut NG/MF allows printing to be disabled for particular users using time-based locks. These time latches allow a user's printing to be disabled for a predetermined amount of time. After this time has passed, the user's printing is re-enabled without the need for manual intervention. Some examples of where time latches are useful include:

- Student discipline—Under some circumstances it might be useful to disallow printing for a student who has misbehaved in class, abusing computer resources or for other disciplinary reasons. You can disable the user's printing for the duration of a class, or indefinitely. Once the time period has passed, printing is automatically enabled for this user.
- Classroom Management—Using the bulk user actions screen, you can disable printing for a group of users. This is useful to stop a classroom from printing for a period of time.
- User Management—If an employee or student is away for an extended period of time and will return, you can disable printing so that their details and balance is unchanged but no-one can use their account for printing.

Disable printing for a user

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. In the **Details** area, in **Enable/Disable**, select the period for which you want to disable printing.

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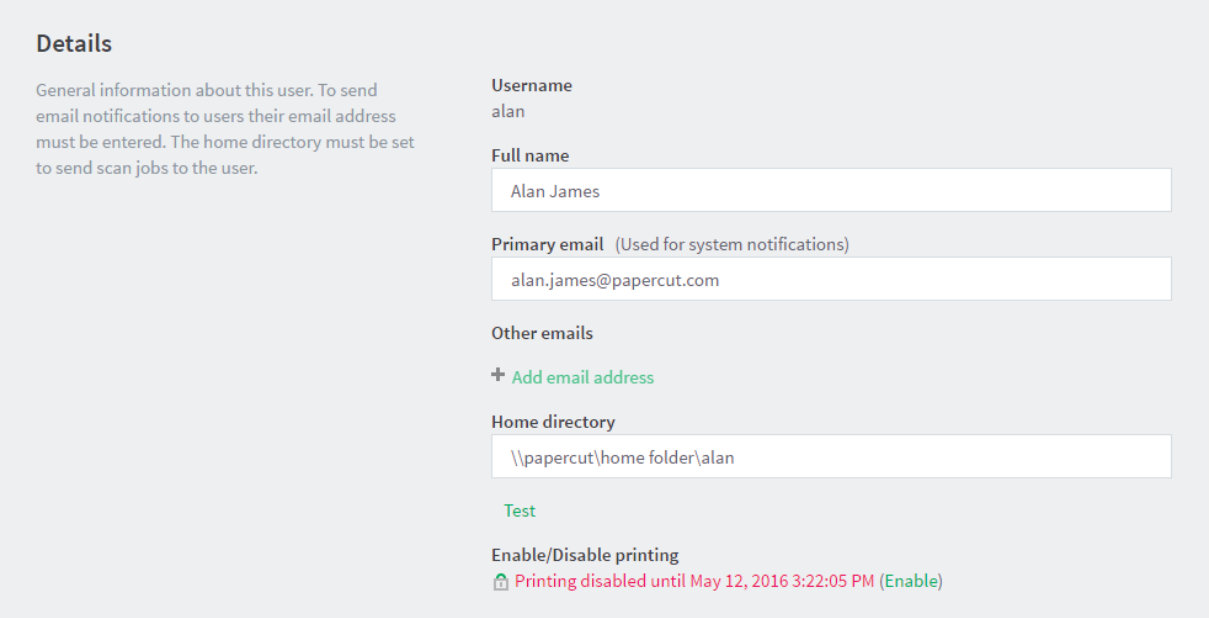

4. Click **OK**.

4.2.8. User card and ID numbers

PaperCut NG/MF supports two closely related features:

- **card number**—the number read from a swipe or proximity card assigned to a user. Swipe and proximity cards are often used for user authentication at hardware terminals, copiers and print Release Stations.
- **ID number**—a unique number allocated to a user. It can represent a student or employee number or can be a random number. It can be keyed in at a copier, hardware terminal or Release Station as an alternative to username/password authentication. As ID numbers can be guessed or learnt by others we recommend a secret PIN be used in conjunction with an ID number when used for user authentication.

As both card numbers and ID numbers function as a unique number identifying a user, they both share the same field in the User record of the database - the card/ID number. This means that all administrative functions related to card numbers and ID numbers are the same - because they operate on the same database field.

Note: Although we use the term "number", PaperCut NG/MF permits any string containing both letters and numbers in the card/ID field. If used as an ID number to be typed at a numeric keypad, a purely numeric number is best. ID numbers generated by PaperCut NG/MF are always purely numeric.

PaperCut NG/MF supports two different card/ID numbers for each user. These are called the primary and the secondary card/ID number. There are many reasons why having two numbers is useful. For example:

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- One number can be for a card, and the other for an ID number in case the user misplaces his or her card.
- Different card readers can sometimes read different numbers from the same card - so having two numbers allows both types of readers to be supported.
- You can issue new cards to users and phase out the old card with an overlap period in which they both work.

Use of either the primary or secondary card/ID number field is optional.

PaperCut NG/MF offers a range of tools for managing card/ID numbers allowing for either centrally managed or user managed card/ID numbers:

- Automatic generation of numbers within PaperCut NG/MF (See Automatic card/ID generation)
- Batch update from an external file (See Batch user card/identity update)
- Import from AD or LDAP (see Synchronize user and group details)
- Lookup via an external database (See Database lookup configuration)

4.2.8.1. Automatic card/ID generation

PaperCut can generate random card/ID numbers for your users. This might be the ideal solution if you don't already have ID numbers assigned for other purposes. PaperCut provides a number of options allowing you to choose whether to centrally administer the card/ID numbers or to allow users to generate and manage their own numbers. You can:

- Enable users to manage their own card/ID number and/or PIN. (See User management of card/ID number and PIN.)
- Generate card numbers during your nightly user/group sync operation (See Synchronize user and group details.)
- Generate numbers as a Bulk User Operation. (See Bulk user operations.)

When generating numbers on behalf of users, inform users what their number is. PaperCut can help with this task as well. You can:

- Send an email to each user with their new number. This is set up in **Options > Notifications > Card/ID Number Notification**. See Card/ID number notification for more information.
- Allow users to view their number in the user web portal. To enable this feature, select the **Allow users to view their card/ID numbers** check box in **Options > General > User Features** . Specify whether you want users to view their primary or secondary card/ID number.

Tip: When generating card/ID numbers, you are asked to specify the length or number of digits you require in the generated numbers. Short numbers are easier to remember and faster to key in, but it is also easier to guess someone else's number. If your number is too short, PaperCutcannot generate sufficient

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numbers to cover all your users. A good rule of thumb is to make the number 3 digits longer than the number of users in your organization. If you have 10-20 users, a 4 digit number is probably sufficient. However, if you have 1000 users, you probably need a 7 or 8 digit number.

User management of card/ID number and PIN

You can allow users to manage their own card/ID number or PIN or both. These options are controlled in **Options > General** and result in different functionality in the **Change Details** menu item of the User web interface.

Allow users to edit the card/ID PIN

When using card number and PIN authentication, you might want to allow users to change their PIN in a similar way to changing passwords.

To enable this feature:

1. Click the **Options** tab.

   The **General** page is displayed.
2. Select the **Allow users to change their card/ID PIN** check box.

When users log in to the User interface, the option **Change Card/ID PIN** is available under the **Change Details** menu item.

Allow users to generate a card/ID number

You can allow users to generate their own card/ID number from the **Change Details** page:

1. Click the **Options** tab.

   The **General** page is displayed.
2. Select the **Allow users to change their card/ID number** check box; then select which card number they can change. Users can edit the prinary number, or the secondary but not both.
3. Select the **Auto-generate random number (users cannot manually enter a number)** check box. This option gives users the ability to generate a new random number, but not to create a number of their own choosing.

   If this check box is cleared, users can select any number they want. **Please note that this may be a potential security risk as it may allow users to confirm the existence of a valid card number used by someone else.** We recommend that sites enable two-factor authentication by also requiring users to have a secret PIN number.

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> **Note:** To change the number of digits used when users auto-generate their own card/ID number, change the **user.auto-generate-card-id.length** value by using the **Config Editor**. In version 14.3 or later, you can also set this in the Admin web interface under the **Auto-generate random number** option, by setting the 'Length' value.

Users can then log in into the User interface and under the **Change Details** menu, the **Change Card/ID** option is available.

4.2.8.2. Batch user card/identity update

The batch user card/ID update feature allows the administrator to update user card/ID numbers and optionally import or update PINs by reading data from a simple text file. User card/ID numbers can also be imported using the batch user import/update feature (see Batch import and update user data).

Example: To update/import the card/ID numbers or PINs of all the users in the import.txt file on a windows system.

```
C:\> cd C:\Program Files\PaperCut NG/MF\server\bin\win
server-command batch-import-user-card-id-numbers "C:\card
numbers\import.txt"
```

Note: Quote the import path if it contains spaces.

> **Important:**
> The card/ID number must uniquely identify a user, so take care to ensure that no two users have the same card/ID number. Make sure the card/ID numbers defined in the import file are unique. If PaperCut NG/MF encounters a non-unique card/ID number, that user is not updated.

Perform a batch user card/ID update by calling the `batch-import-user-card-id-numbers` server-command. Use of server-command is detailed in Server commands (server-command). The import file format is detailed in Batch User Card/Identity Update File Format.

> **Caution:**
> Batch updates are a major operation modifying data en masse. Best practise suggests:
>
> - Always run a backup *before* proceeding with the import.
> - First experiment/test the update process with a small batch of users before moving onto the full batch.

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Batch user card/identity update file format

The import file is in tab delimited format and contains the following fields in the given order.

Table 30: User Card/Identity Update File Format

No.	Field	Description	Optional?	Limitations
1.	Username	The user's username.	Mandatory	Max. 50 characters
2.	Primary User Card/ID Number	A unique primary card/ID number for this user.	Optional (card/ID number not set if blank)	Max. 100 characters. To specify that the number is blank, enter a hyphen (–).
3.	User Card/ID PIN	The user's card/ID PIN.	Optional (card/ID PIN not set if blank)	To specify that the PIN is blank, enter a hyphen (–).
4.	Secondary User Card/ID Number	A unique secondary card/ID number for this user.	Optional (card/ID number not set if blank)	Max. 100 characters. To specify that the number is blank, enter a hyphen (–).

Other limitations: Although any actual limit to the size of an update file should be large enough for any purpose, we recommend keeping the file size below 10MB.

If your card/ID numbers are stored in an external database, see Looking up card numbers in an external database.

Tip:
A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, then save it in the `Text (Tab delimited)` format.

4.2.8.3. Looking up card numbers in an external database

PaperCut NG/MF can import user card/ID numbers from Active Directory and LDAP. This is the recommended approach because it allows the card/ID numbers to be associated with users in a centralized location. For more information see Synchronize user and group details.

Card numbers can also be imported using the import file described in Batch user card/identity update.

In some circumstances the mapping between card numbers and users is stored in another external database (e.g. a database used for secure door access). In this case, it might be more convenient to look up the card numbers in this database in real-time.

Tip:
This also allows users to be associated with more than two card/ID numbers. This is useful where users are allocated different types of authentication cards, or there are alternate card systems used throughout the organization. To allocate multiple card numbers to a

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user, populate the mapping table with multiple entries per user where different card numbers map to the same username.

Once external user lookups are enabled, PaperCut NG/MF does the following when looking up a user by card number:

1. Find a user with the matching card number in the PaperCut NG/MF database.
2. If not found, the card number is looked up in the external database.
3. If a match is found the information returned is used to find the matching user in the PaperCut NG/MF database. If a user is found the lookup is successful.

Configure database lookup

To enable external card number lookups:

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **External User Lookup** area, select **Use external database for card number lookup** check box.
3. Select the database type. If using Oracle or MySQL you must install the database driver as described in the Configuring a database , and the Application Server must be restarted.
4. Enter the database connection URL. For examples see Step 4 - Change the PaperCut NG/MF connection details of Upsize to an external database (RDBMS).
5. Enter the database connection username and password.
6. **SQL to map card number in external database to** allows you to choose what the card number in your external database maps to. The options include:
   - **username**, used if your external database contains a mapping between card numbers and usernames, and
   - **user's identity number**, used if your external database contains a mapping between card numbers and user ids (and the user ids have been imported and stored on users in PaperCut).

   Select the option that matches the mapping in your external database.
7. Enter an SQL select query that looks up the card number in your external database and returns either a username or user id as selected above. The query must return a single row with the first field being the username or user id (as found in PaperCut NG/MF). The SQL statement must contain `{cardnumber}`, which is replaced with the card number to find.

   An example select query that looks up a card number and returns a username is:

   ```
   select user_name from users_table where card_number =
   {cardnumber}
   ```

   An example select query that looks up a card number and returns an indentity number is:

   ```
   select user_id from users_table where card_number =
   {cardnumber}
   ```

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> **Note:**
> The `{cardnumber}` replacement does not require quotations (it is sent as a parameter). This also serves to prevent SQL injection attacks sent via card numbers.

Testing database lookup

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Pick a card number from your external database that maps to a user in PaperCut NG/MF.
3. In **Quick Find**, enter this card number; then click **Go**.
4. Verify that the matching user is displayed. If the expected user is not displayed check the **App Log** tab for errors.

4.2.9. Bulk user operations

A bulk user operation refers to an operation that is applied to more than one user. This operation was referred to in previous PaperCut NG/MF releases as "Group level functions". You can perform bulk operations on a user group or a comma separated list of users. Bulk user operations are best described by example.

4.2.9.1. Example 1: Bulk operation on a user group

John is a network administrator at a local high school. A number of students from each year level have been placed on the school newspaper committee. The head teacher has requested that John allocated an extra $10.00 of printing credit to these students. The students are all in a network group called "NewspaperCommittee". John performs this operation as follows:

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1. Click the **Users** tab.

   The **User List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.
3. In the **User Selection** area, in **Perform operations on users**, select **NewspaperCommittee**.
4. In the **Edit credit balance** area, select the **Adjust credit by** option; then enter **$10.00**.
5. In **Transaction comment**, enter extra allowance for newspaper committee role.
6. Click **OK**.

4.2.9.2. Example 2: Bulk operation on an ad-hoc list of users

Now, John wants to add $10.00 credit to a list of users he has saved in an Excel spread sheet. John needs to perform this operation as follows:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.
3. In the **User Selection** area, change **Perform operations on users** to **in the list**.
4. Cut and paste the list of names from the spread sheet. This would generate a comma separated list of usernames.
5. Select the **Adjust credit by** check box; then enter **$10.00**.
6. Click **OK**.

4.2.9.3. Additional information

Bulk user operations apply changes to all users matching the selected group and other criteria. Settings under the **Groups** section or shared accounts are not affected.

Caution:
Group level operations are one-way and cannot be undone. Always carefully consider the operation before proceeding. If you are unsure of the function or behavior, performing a backup prior to undertaking the operation is advised.

Other bulk user operations available under **Bulk user actions** include:

- Adjust or set the users' credit (perform a transaction).
- Change the users' restriction status
- Modify account selection popup options
- Reset the users' count statistics
- Apply user level overrides, such as print cost adjustments, and disabling printer filters for a user

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- Disable printing for a specified period of time
- Generate new card/ID numbers for users who don't have one

4.2.10. Batch import and update user data

The user data batch import and update feature allows the administrator to import users, user information and optionally update existing users details by reading data from a simple text file. It enables administrators to update the following user data:

- Credit balance
- Restriction status
- Full name
- Email address
- Department
- Office
- Primary Card/ID Number
- Card/ID PIN
- Notes
- Secondary Card/ID Number
- Other email addresses
- Username alias
- Home folder

Examples of where the batch user details import feature is useful include:

- To set the user email addresses that are stored in another system (like a student management system).
- When importing user and balance data from another external or legacy system.
- When moving user balances from previous PaperCut NG/MF editions to PaperCut NG/MF.

For more information on using the batch import to import data from previous PaperCut NG/MF editions, see Upgrade from PaperCut NG/MF Quota.

Tip:

PaperCut NG/MF is designed to import user information from the underlying system or network domain. The batch user data import feature is not designed to replace this but rather complement it by allowing importing of user data from other systems or sources. For more information about managing a set of users in addition to those in a user directory, see Internal users (users managed by PaperCut NG/MF).

To perform a batch import:

1. Manually inspect your file in a text editor and ensure it's in the prescribed tab-delimited format as detailed at Batch User Import File Format.

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2. Click the **Users** tab.

   The **User List** page is displayed.

3. In the **Actions** menu, click **Batch import**.

   The **Batch User Import and Update** page is displayed.

4. Click **Browse** to select the file to import. (The format of the file is described in Batch User Import File Format).

5. Choose whether you want the import to create new users if they do not already exist. If you clear this check box, lines that contain users who do not exist are ignored and only existing users are updated.

6. Click **Import**.

   A message is displayed informing you of how many users were updated and how many users were created.

Caution:

Batch imports are a major operation modifying data en masse. Best practise suggests:

- Always run a backup *before* proceeding with the import.
- First experiment/test the import process with a small batch of users before moving onto the full batch.

Important:

Usernames are stored in PaperCut NG/MF as all lower case, regardless of the capitalization when the username is created. Entry of a username by an end user, however, is not case sensitive as it is converted to lowercase before the account is validated.

4.2.10.1. Batch user import file format

The import file is in tab delimited format and contains the following fields in the given order.

Table 31: User Import File Format

No.	Field	Description	Optional?	Limitations
1.	Username	The user's username	Mandatory	Max. 50 characters
2.	Credit Balance	The user's credit balance	Optional - balance not set if blank	A number with no currency symbol or separators, using a full stop for the decimal separator. Correct: `1.23` Incorrect: `$1.23` or `1,23` or `1,023.00`
3.	Restricted Status	The user's restricted status. (Y/N)	Optional - restricted status not set if blank	

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No.	Field	Description	Optional?	Limitations
4.	Full Name	The user's full name	Optional - full name not set if blank	Max. 255 characters
5.	Email	The user's email address	Optional - email not set if blank	Max. 255 characters
6.	Department	The user's department or faculty	Optional - department not set if blank	Max. 200 characters
7.	Office	The user's office or location	Optional - office not set if blank	Max. 200 characters
8.	Card/ID Number	The user's primary identity/card number	Optional - card/id number not set if blank	Max. 100 characters, case insensitive
9.	Card/ID PIN	The user's card PIN number	Optional - card/id PIN not set if blank. If the field is '-' then the PIN is set to zero.	Max. 20 digits
10.	Notes	Notes about the user.	Optional - notes not set if blank	Max. 2000 characters
11.	Secondary Card/ID Number	The user's secondary identity/card number	Optional - secondary card/id number not set if blank	Max. 100 characters, case insensitive
12.	Other email addresses	The user's other email addresses	Optional - other email addresses not set if blank	Email addresses must be separated by commas
13.	Username alias	The user's alias. Only useful if username aliasing is enabled	Optional - alias not set if blank	Max. 100 characters, case insensitive
14.	Home folder	The user's home folder	Optional - required for scanning to a user's home folder.	Max. 256 characters

Other limitations: Although any actual limit to the size of an import file should be large enough for any purpose, we recommend keeping the file size below 10MB.

Tip:
A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, and

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then save it in the `Text (Tab delimited)` format.

Import file format examples

The following lines shows importing all the above fields. (The fields are separated by tabs).

```
matt   20.00  Y     Matt John- mattj@email.com Science Dept   Head  \
                    son                                      office
103251 912254 NoteA

john   25.00  N     John Jack- jj@domain.com   Administration Other \
                    son                                      office
963254 123254 NoteB
```

Note: backslash indicates text should be displayed on the same line.

The following lines shows importing user email addresses only. NOTE: That the tabs still exist for balance, restriction, full name fields, but each entry is blank.

```
matt mattj@email.com john jj@domain.com
```

The following lines shows importing the credit balance and full name for the first user and the credit balance and email address for the second user. NOTE: That the tabs characters still exist for blank fields.

```
matt 10.00 Matt Johnson john 15.00 jj@domain.com
```

For more examples, refer to the following files in the install directory:

```
[server install]/server/examples/import/user/external/batch-user-example.tsv
[server install]/server/examples/import/user/batch-internal-user-example.tsv
```

4.2.11. User management FAQs

How do I add credit to a user?

Select the user from the groups list; then click the **adjust** link next to the credit or select the **Adjustment & Charges** tab.

How do I add a new user to the system?

PaperCut NG/MF automatically adds users to the system the first time they print. If your new user initial settings rules are defined correctly on the Groups tab, the user is automatically created with the designated starting credit and settings.

If you have added a large batch of new users, you can force the addition of these users immediately via the **User/group synchronization** option on the **Options** page. For more information, see Synchronize user and group details.

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How should I make a change to more than one user?

If you need to make a change to more than one user, consider using the **Bulk user actions** link located in the **Actions** menu on either the **User List** or **Group List** page. This allows bulk modification of user settings based on their network group membership. See Bulk user operations.

How do I grant administrator access to a trusted person to manage a group of users?

You can grant administrator level access to trusted individuals. See Assigning administrator level access. By using advanced access control rights, you can limit administrators to a subset of users (a group) via the option **Limit access to users only in group**.

How can I prevent new users from being added automatically?

See On demand user creation.

Due to technical reasons I'm unable to create new groups in my domain. Can I create groups in PaperCut NG/MF?

Yes. You can also define groups via a text file (e.g. a tab-delimited file). Simply place your group definition file at the location

```
[app-path]/server/data/conf/additional-groups.txt
```

See the template file `additional-groups.txt.tmpl` in the same directory for an example and further information.

I have two different networks with different username naming conventions (e.g. j.smith and jsmith). Is this supported?

Yes. You can enable **Username aliasing** under **Options > Advanced**

Another option to set up username aliasing is described in the file below:

```
[app-path]/server/data/conf/username-aliases.txt.tmpl
```

See the comments in this file for more information.

Can I manage my own set of users inside PaperCut NG/MF (as well as / instead of importing users from a user directory)?

Yes. PaperCut NG/MF is designed to keep user management simple and automated, but you can manage users inside PaperCut NG/MF as well as or instead of using users from a user directory. Users managed by PaperCut NG/MF are termed *internal users*. For more information, see Internal users (users managed by PaperCut NG/MF).

4.3. Guest and anonymous user management

PaperCut NG/MF tracks print activity against individual users. In most cases, these users belong to your organization, and user information is synchronized against an external user directory source

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such as Active Directory, Open Directory, eDirectory or LDAP. If you are able to synchronize your users against an external directory source - this should be your first choice.

There are a number of scenarios where it is not practical to synchronize all users from an external directory. They typically involve visitors and guest users printing from BYOD mobile devices who might not even have access to the corporate wired or wireless networks.

Guest Printing for Business

- *Requirement:* Need a printing solution for visitors and casual guests - often using BYOD devices with no network access.
- *Considerations:* Tracking of individual guest users is not important.
- *Recommend:* Anonymous guest printing (direct print or managed release)

Guest Printing for K-12 Schools

- *Requirement:* Need a printing solution for visitors and casual guests.
- *Considerations:* Tracking of individual guest users is not important, but need controls in place to prevent student use.
- *Recommend:* Anonymous guest printing with hold/release queue managed by front desk.

Guest Printing for Higher Education / Library Pay-for-Print

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- *Requirement:* Need a pay-for-print solution for students and guest users.
- *Considerations:* Each user has their own account and account balance.
- *Recommend:* Internal users (users managed by PaperCut NG/MF) with self-registration.

To address these varied requirements, PaperCut NG/MF offers multiple solutions for guest and anonymous printing:

- Internal users (users managed by PaperCut NG/MF): Internal users are added directly to PaperCut NG/MF and are not synced with an external user directory. Internal users can be added by a PaperCut NG/MF administrator or self-registered.
- **Shared or generic users**: A shared username and password is provided to guests to allow them to log in and print using company equipment. All guest jobs are logged in against this generic user.
- Anonymous guest printing: Guests not registered in PaperCut NG/MF are permitted to send jobs to a special email address for printing. Jobs are logged against a single internal guest user.

4.3.1. Internal users (users managed by PaperCut NG/MF)

Internal users are user accounts that exist only inside PaperCut NG/MF and are independent of the domain, network or operating system. Internal users are managed inside PaperCut NG/MF, which means you do not need to create or manage them in an external user directory.

There are several ways you can use this feature:

- You can give selected staff the ability to create internal user accounts. This gives staff control over who can receive a new account, preventing the creation of unwanted accounts (e.g. with offensive usernames).
- You can give users the ability to create their own internal accounts via a web based registration form. This is useful for providing guests the ability to register their own accounts and begin printing immediately, removing the need for staff intervention.
- Administrators can create a new batch of internal users via a text based file import. You can use this file to import or update a set of users who are managed separately to the regular domain users. For more information about the internal users batch import and update feature, see Batch internal user import and update.

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The following sections present several different environments and how you can use the internal users feature to accommodate them. For information about specific configuration, Internal users options provides full details about each available option.

Important:
Usernames are stored in PaperCut NG/MF as all lower case, regardless of the capitalization when the username is created. Entry of a username by an end user, however, is not case sensitive as it is converted to lowercase before the account is validated.

4.3.1.1. Implementation by example

Several examples are provided below demonstrating how the internal user feature can be applied.

Important:
In PaperCut NG/MF all internal usernames must only contain characters that can be printed (e.g. *not* `newline`) and must not contain `/`, `\` or `@`.

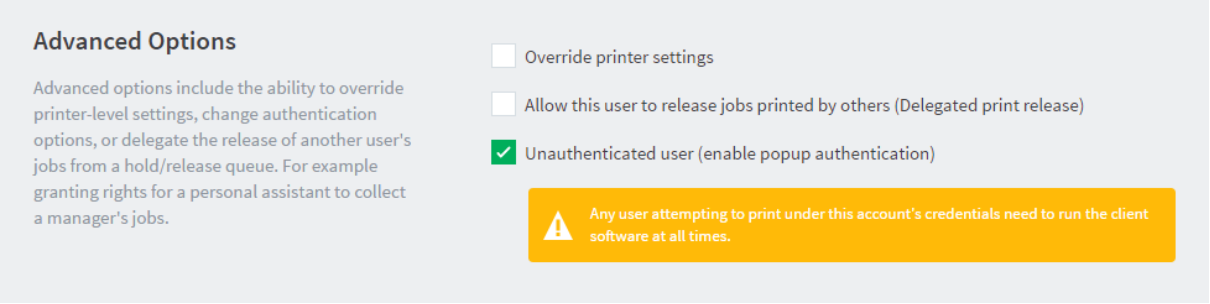
Scenario One: Manually managed guest accounts

North Shore University has a campus that occasionally hosts students from other universities. These guest students do not have a login in the universities domain, and it is considered too much effort to go through "official channels" to create one for them.

The administrator wants to provide selected staff the ability to create PaperCut NG/MF accounts for these guest students as needed. To go about this, the administrator performs the following:

1. The guest students are first provided with access to computers or network resources using the generic login `guest`, password `guest`.
2. Click the **Users** tab.

   The **User List** page is displayed.
3. Select the **guest** user.
4. In the **Advanced Options** area, select the **Unauthenticated user (enable popup authentication)** check box.



5. Click **OK**.
6. Select **Options > User/Group Sync**.

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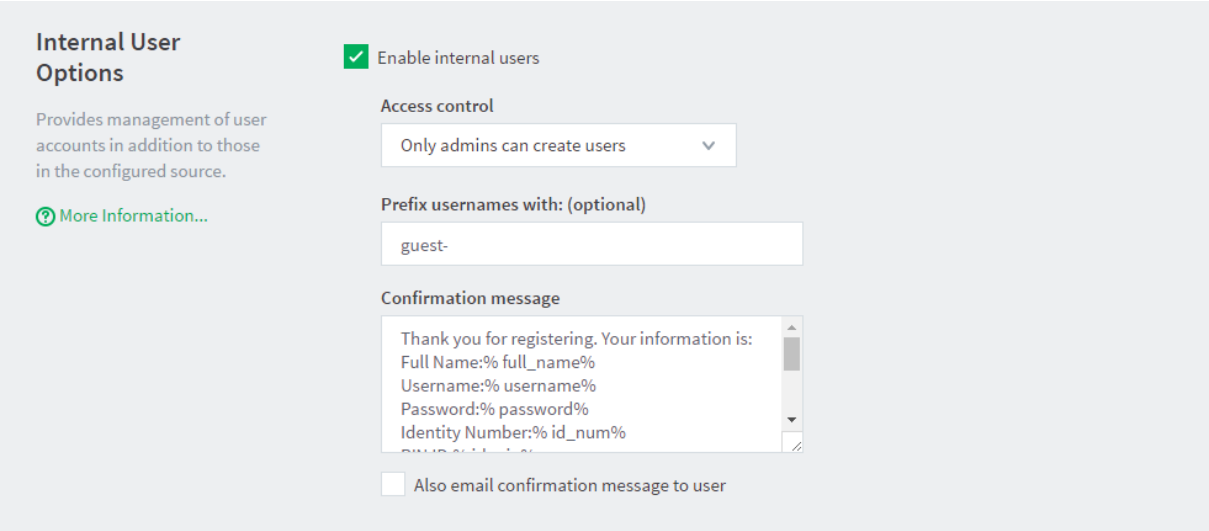
The **User/Group Sync** page is displayed.

7. In the **Internal User Options** area, select the **Enable internal users** check box.



8. In **Access control**, select **Only admins can create users**.
9. In **Confirmation message**, enter a tailored conformation message to provide relevant information, such as how to log in.
10. Click **Apply**.
11. PaperCut NG/MF administrator access is assigned to the staff who are responsible for creating the new student guest accounts. The administrator right **Create internal users** is required for this purpose. For more information about assigning administrator rights see Assign administrator level access.
12. Ensures that the PaperCut NG/MF client software is running on workstations where guest printing is allowed.

The system is now configured to allow selected staff the ability to create internal accounts for the guest students. When a guest student prints from the generic `guest` login, the PaperCut NG/MF User Client displays the *authentication popup*. This allows them to enter their personal username and password, assigned by the administrator when registering their internal user account.

Staff can create an internal user account for a guest student as follows:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. In the **Actions** menu, click **Create internal user**.

   The **Create Internal User** page is displayed.

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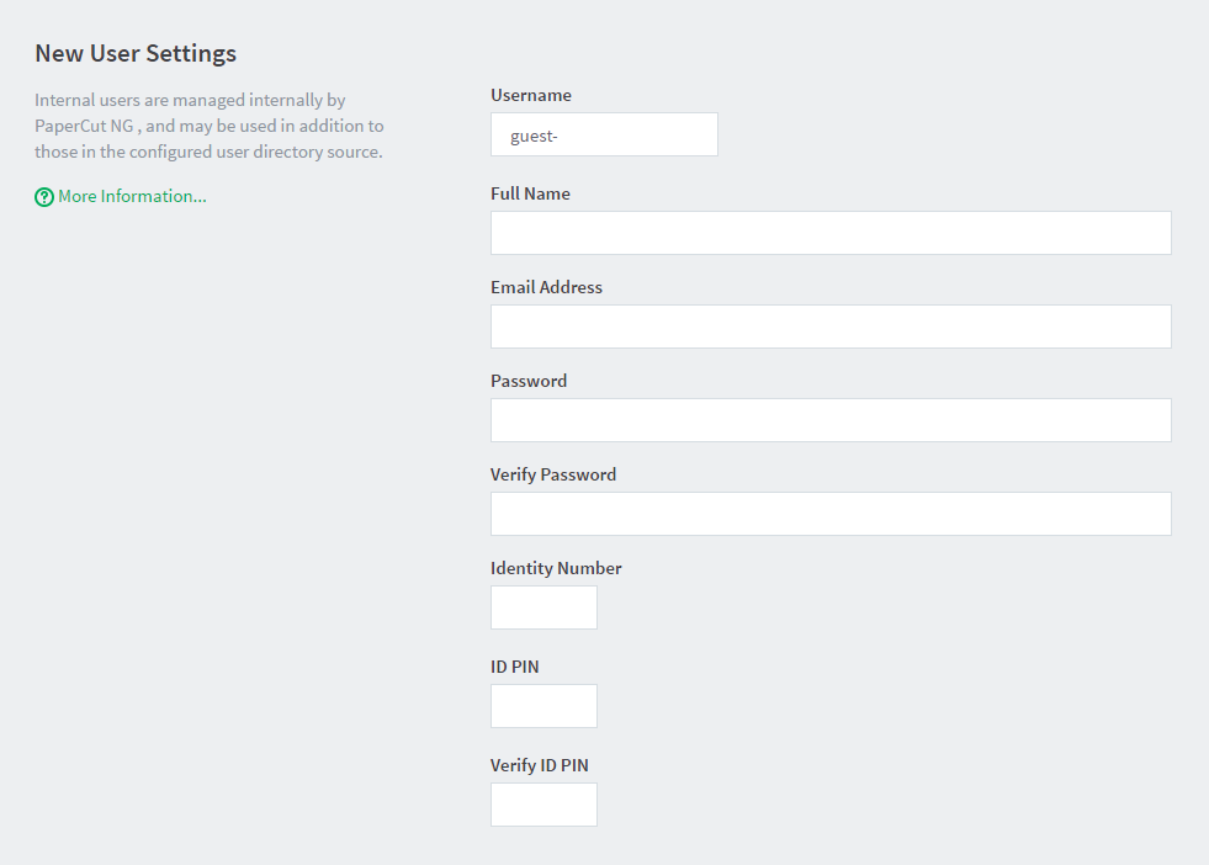

3. Complete the details; then click **Register**.

Scenario Two: Automated guest management (self-registration)

West Face College is a large community college that regularly has members of the public visiting to use the library resources.

It is not feasible to create a domain login for every visitor, and manually creating an internal user account for each guest would require too much time of the administrators or staff, so the decision is made to automate the process and allow guests to register their own internal user accounts.

To set up the internal users feature and allow guest self-registration, the administrator performs the following:

1. The guests are first provided with access to computers or network resources using the generic login `guest`, password `guest`.
2. Click the **Users** tab.

   The **User List** page is displayed.
3. Select the **guest** user.
4. In the **Advanced Options** area, select the **Unauthenticated user (enable popup authentication)** check box.

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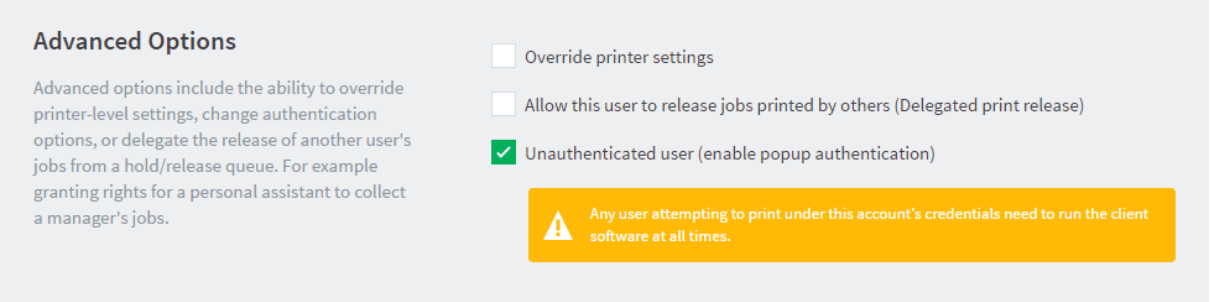
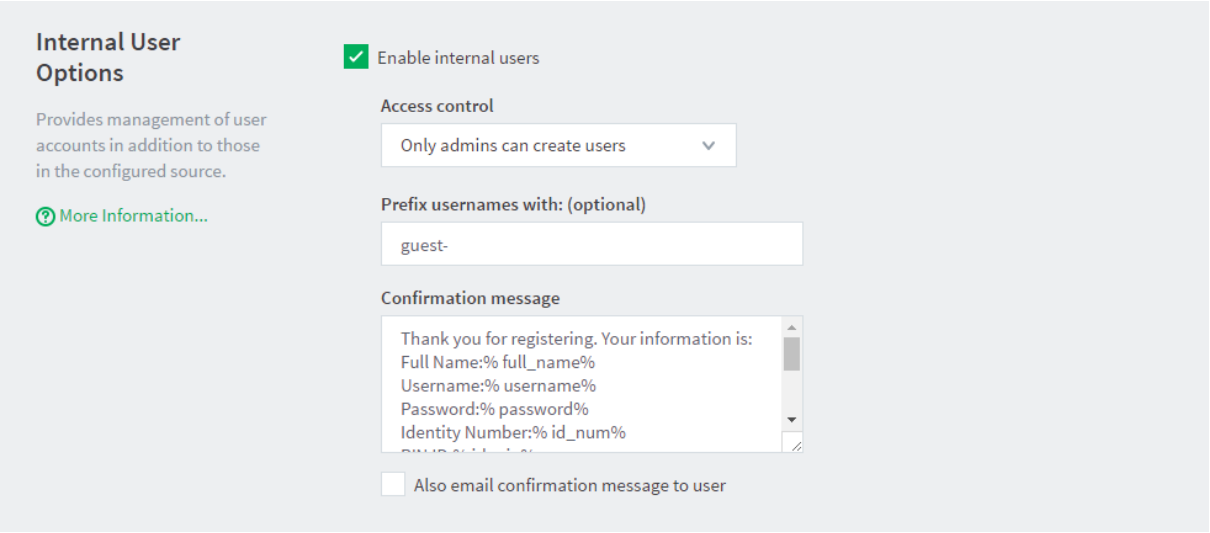


5. Click **OK**.
6. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.
7. In the **Internal User Options** area, select the **Enable internal users** check box.



8. In **Access control**, select **Users can register their own account**.

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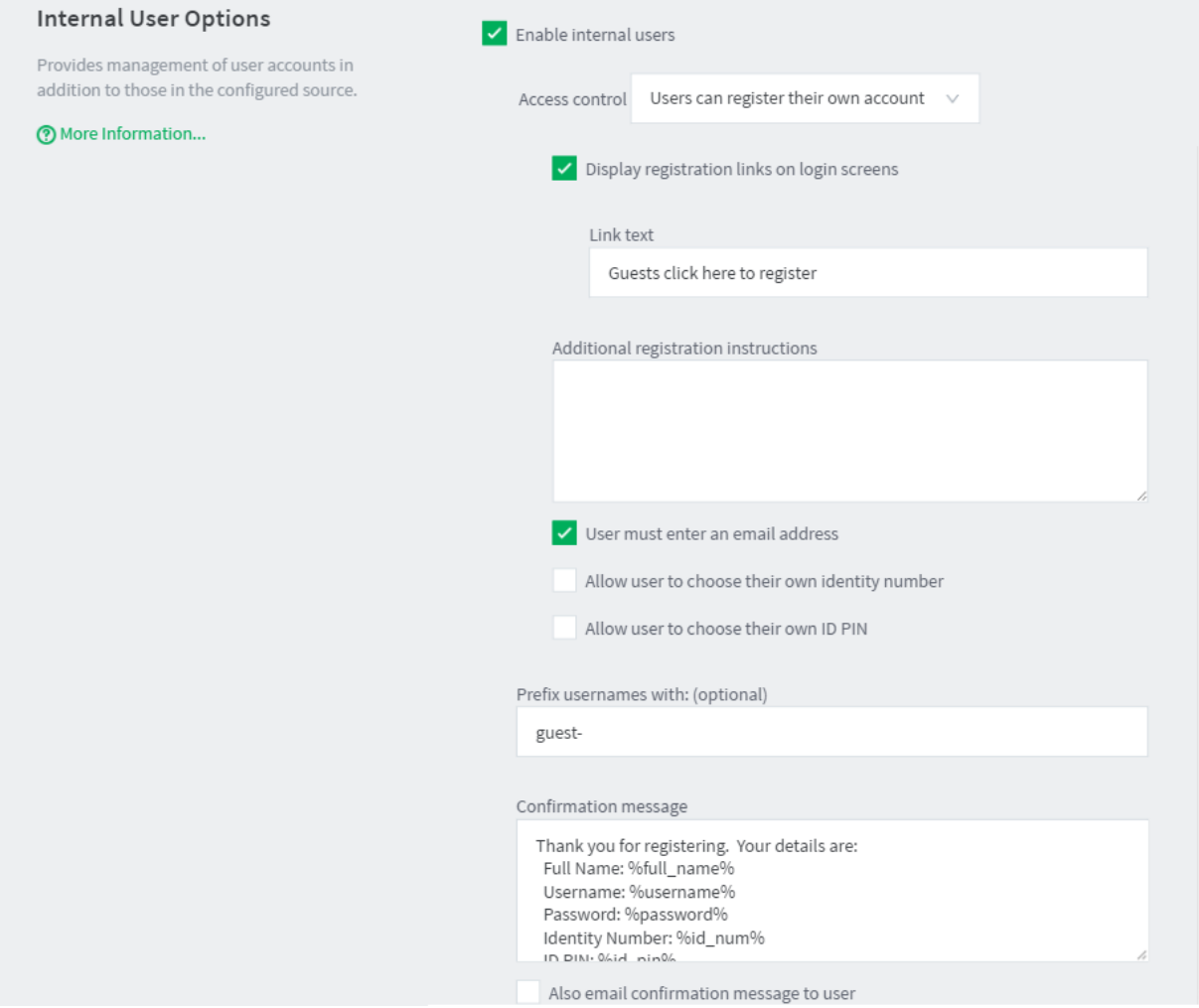

9. Select the **Display registration links on login screens** check box so that users have easy access to the registration interface.
10. In **Link text**, enter **Guests click here to register**, to provide a better clue for guests.
11. In **Additional registration instructions**, add more information about the organization's printing policy, how to access printing resources, etc. Also add a note to specify that only guests need to register to access printing resources - students or users with existing accounts do not need to register.
12. Click **Apply**.
13. Ensure that the PaperCut NG/MF client software is running on workstations where guest printing is allowed.
14. Creates an information sheet for guests, providing instructions about how to register, how to print, and where to find additional help. Most people do not need this type of information to work out how to use the system for themselves, but some people appreciate step-by-step instructions.

The system is now configured to allow guests to register their own internal user accounts. When a guest user prints from the generic `guest` login, the PaperCut NG/MF User Client displays the *authentication popup*. This allows them to enter their personal username and password, chosen when registering their internal user account.

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For a guest to create an internal user account, they must:

1. Click the **Register as a New User** link on a login screen (the web interface login screen, or on the authentication popup), or access the registration web interface directly at `http://[server-name]:9191/register`.
2. Complete the from; then click **Register**.

Scenario Three: Managing users in a non-domain environment

Southmark Inc. is a medium sized ten person real estate office service the local area. Their network consists of a mix of Windows 7 and 8.1 workstations connected to a workgroup based network. No user directory / domain exists, and setting one up is not a current priority. They want to take control of their printing costs and volumes, and use PaperCut NG/MF to identify the amount of printing performed by each staff member.

Because no user directory exists, PaperCut NG/MF is used to maintain user accounts, details and passwords for all staff. To set this up, the administrator performs the following:

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.
2. In the **Internal User Options** area, select the **Enable internal users** check box.
3. In **Prefix usernames with**, delete the value. There is no need for an internal username prefix, because all users are internal!
4. Collect a chosen username and password from each staff member. This is used to construct a batch import file, using the format specified in Batch internal user import file format.
5. Import the batch file into PaperCut NG/MF using server-command to create a new internal user account for each staff member, following the directions in Batch internal user import and update.
6. Follow the directions in User Client to deploy the client software to each workstation in the office.
7. When staff send print jobs from their workstations, they arrive at the print server under the generic `guest` username. The administrator marks this generic account as **Unauthenticated** using the PaperCut NG/MF Admin web interface. This option is available on the User Details page.

The batch of internal user accounts has now been imported, ready for the staff to use them. When a staff member next sends a print job, the PaperCut NG/MF User Client displays the *authentication popup*. This allows them to enter their personal username and password, provided to them on arrival, having been assigned by the administrator in the batch import file.

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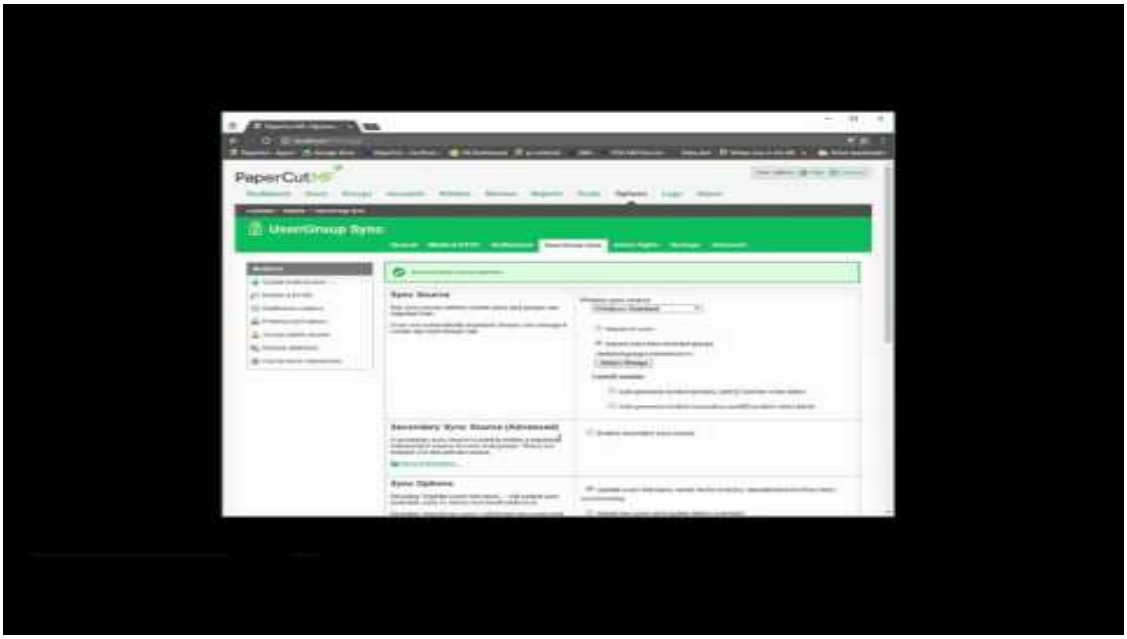

4.3.1.2. Internal user options

To configure internal users:

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.
2. In the **Internal User Options** area, click the **Enable internal users** check box.

   The internal user options are displayed.

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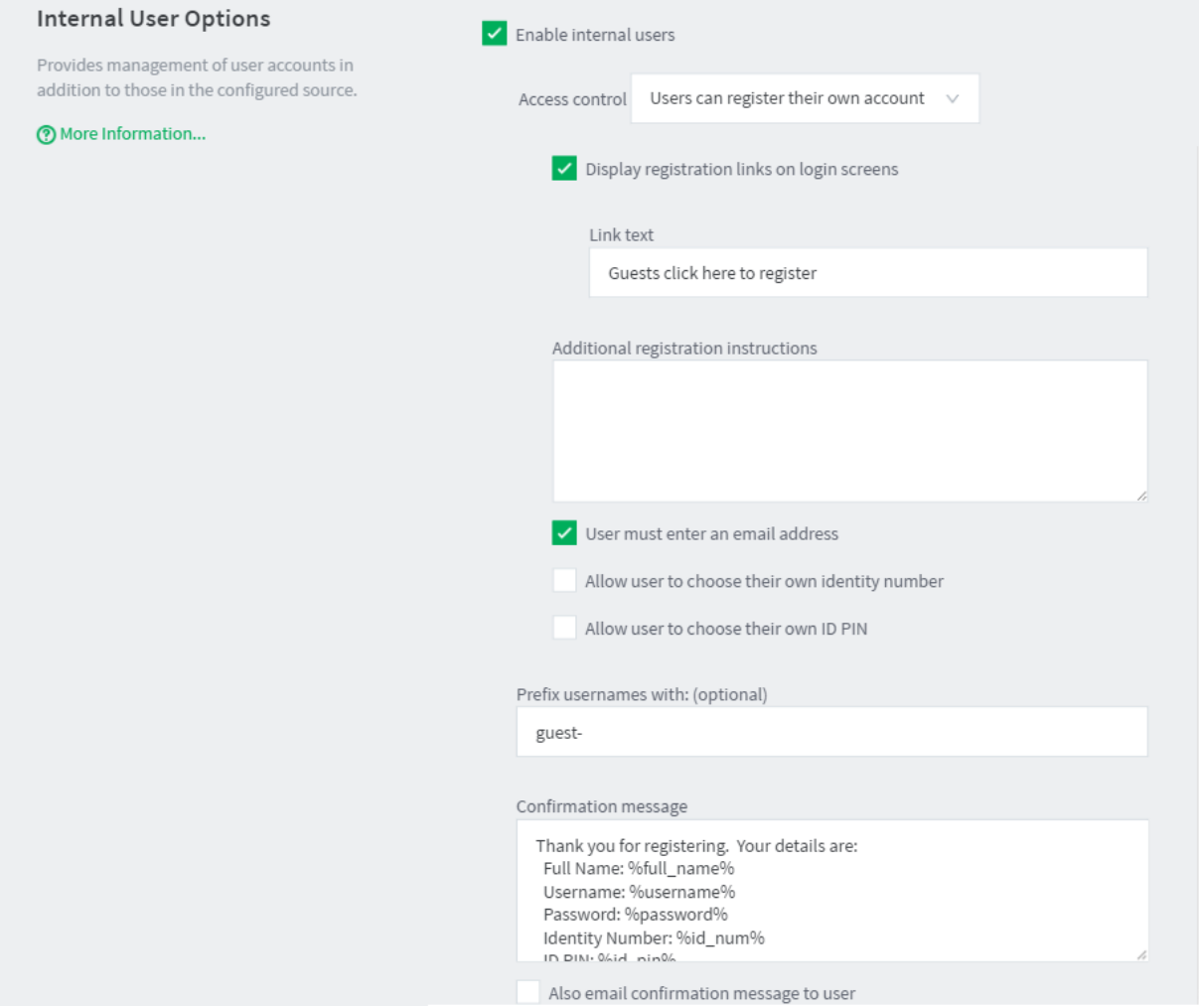
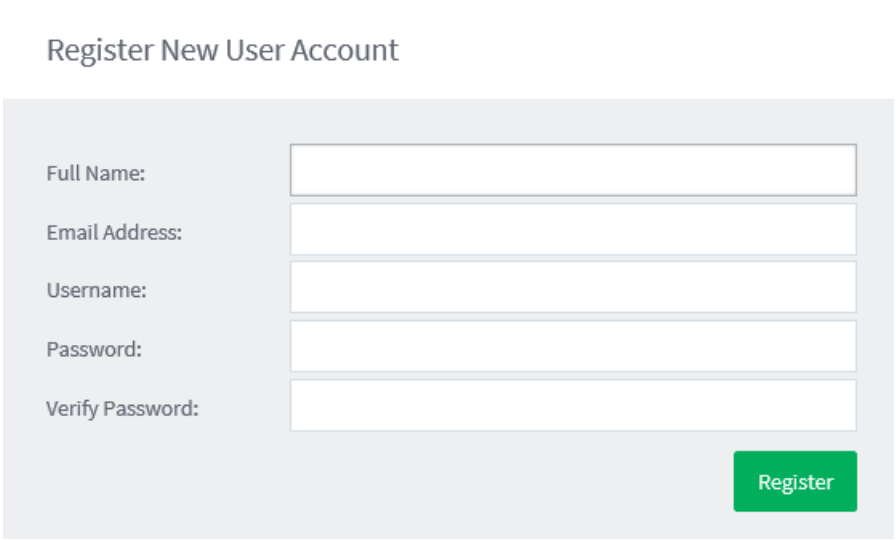


3. Complete the following fields as appropriate:
   - **Access control**—determines who can create internal users. The available options are:
     - **Users can register their own account**—a web based interface is available for users to register their own account. This allows users to register their own accounts without intervention from staff or administrators.



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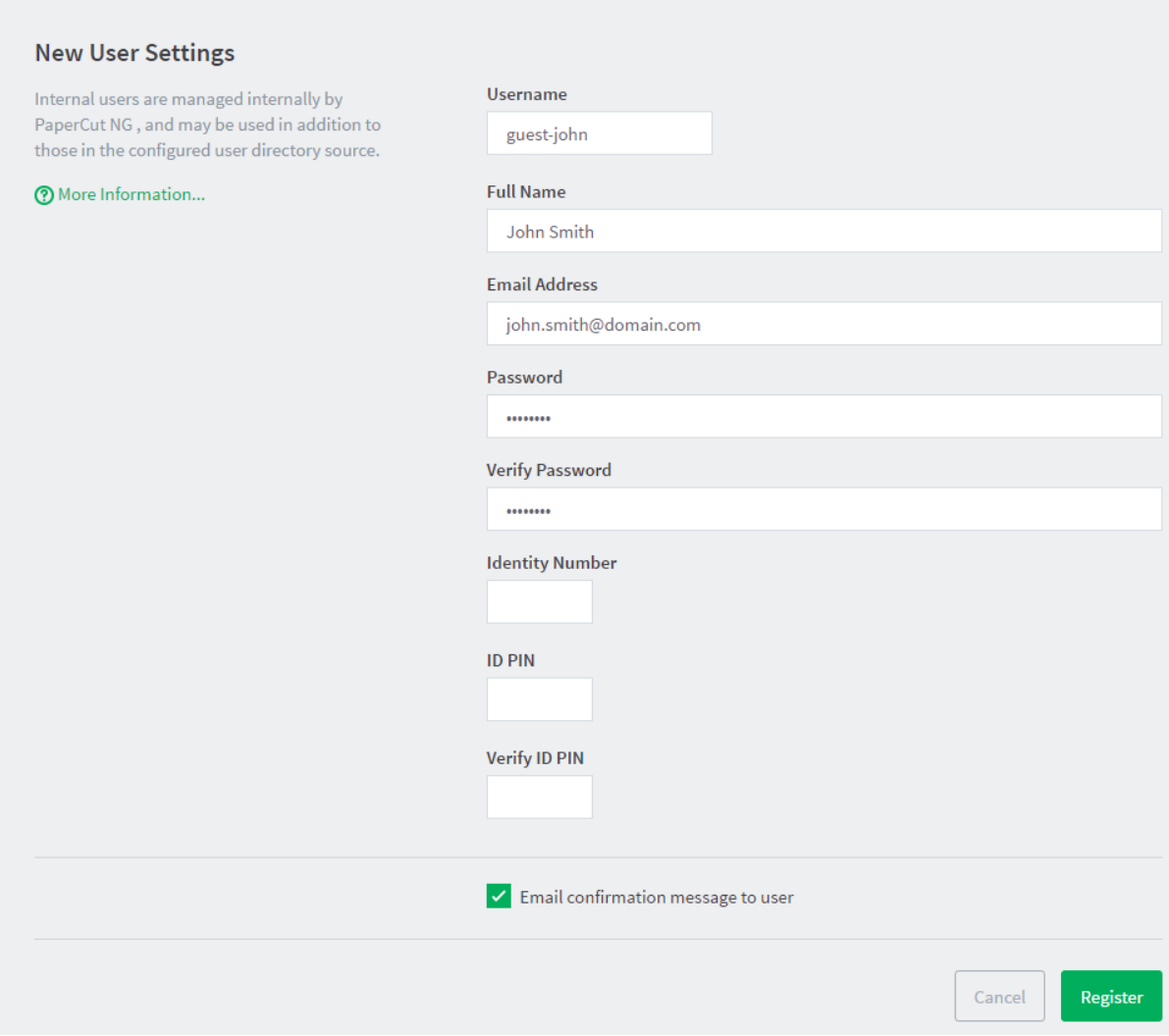
- **Only admins can create users**—only administrators can create users. Internal users are created in the Admin web interface under Users > Create Internal User. For information about delegating this access to additional users see Assign administrator level access.



- **Display registration links on login screens** - When enabled, PaperCut NG/MF login screens display a **Register as a New User** link. Clicking this link takes the user to the web based registration interface, allowing the user to create their own internal user account. If disabled, registration links are not displayed, and users can access the web based registration interface only by navigating to the URL at `http://[server-name]:9191/register`.

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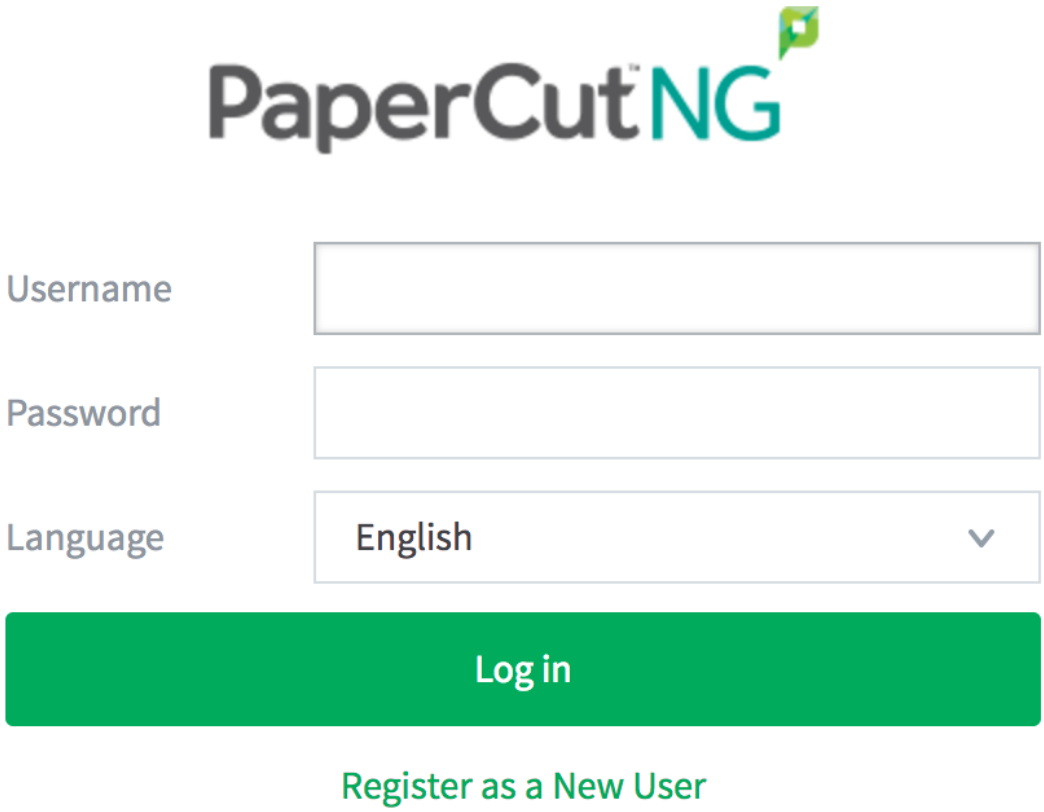

- **Link text**—The text used for registration links on login screens. The default link text is `Register as a New User`. An example of alternate link text might be `Guests click here to register`.
- **Additional registration instructions**—Allows providing additional instructions to users when registering, and are displayed above the web based registration form. Specific instructions will vary from site to site, but could include information such as how to log in and print, how to add credit to their account, or where to find additional help.
- **User must enter an email address**—Requires the user to enter an email address. If disabled, entering an email address is optional.
- **Allow user to choose their own identity number**—The user can enter/choose their own identity number. The chosen identity number must be at least 6 digits, and must be unique. If disabled, a unique identity number is automatically generated for the user. Use identity numbers for logging into some devices where only a numeric keypad is available.
- **Allow user to choose their own ID PIN**— The user can enter/choose their own ID PIN. The chosen PIN must be at least 4 digits. If disabled, a random PIN is automatically generated for the user.
- **Prefix usernames with: (optional)**—This prefix is applied to the username of all users registering via the web based interface. E.g. if a user chooses the name `john`, and the username prefix is `guest-`, their allocated username is `guest-john`. This prevents

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name clashes with existing or future users from the configured user/group sync source, and immediately identifies the user as being internal.

- **Confirmation message**—This message is displayed to the user after they have completed registration. It can also be emailed to the user (see next option).
- **Also email confirmation message to user**—The confirmation message is emailed to the user after registration (if an email address was provided).

4. Click **OK**.

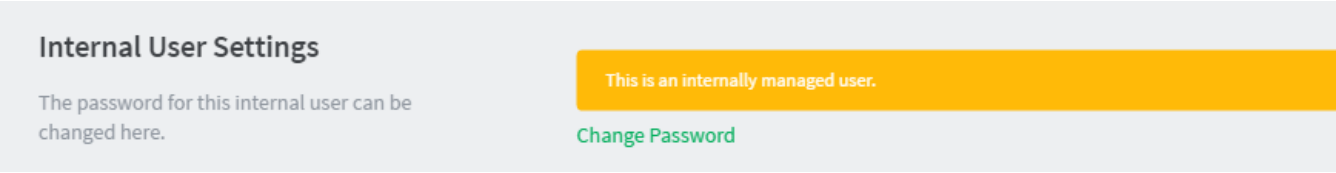
Note:

- An alternative to the PaperCut NG/MF User Client's authentication popup is to use a print Release Station in `Release Any` mode. After ensuring that guest users have their own internal account, this allows users to submit a print job under a guest/generic login, then authenticate at the Release Station and choose which job(s) they want to release. For more information about setting up a Release Station see Secure print release.
- To delete an internal user, navigate to their **User Details** page in the Admin web interface by clicking the user in the **User List**, then select the **Delete user** item from the **Actions** list. The domain/network-level Synchronize user and group details settings and operations do not affect and do not delete internal users.
- The special `[Internal Users]` group contains all internal users. You can use it to produce reports showing information about internal users, or to apply a *bulk user operation* on all internal users.

4.3.1.3. Changing internal user passwords

Both internal users and administrators can change their own password.

- Administrators can reset the password on the **User Details** page in the Admin web interface. In the **Internal User Settings** area, click the **Change Password** link.



- The internal user can reset their password on the **User Web** pages by clicking **Change Details**.

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Tip:
Administrators can turn on or off the ability for internal users to change their password by using the Config Editor and modifying the key: `internal-users.user-can-change-password`

4.3.1.4. Batch internal user import and update

Tip:
This section covers the batch importing and updating of *internal users*. Internal users are managed internally by PaperCut NG/MF. For more information about internal users, see Internal users (users managed by PaperCut NG/MF).

For information about importing and updating regular users, see Batch import and update user data.

The batch internal user import and update feature allows the administrator to import users, user information and optionally update existing internal user details by reading data from a simple text file. In addition to being able to create internal users, it enables administrators to update the following user data:

- Password
- Credit balance
- Restriction status
- Full name
- Email address
- Department
- Office
- Card/ID Number
- Card/ID PIN
- Notes
- Secondary Card/ID Number
- Home folder

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Important:
You can delete an internal user by selecting the **Delete user** action while viewing the user. You can delete multiple users selecting **Bulk user actions**; then selecting all internal users.

Examples of where the batch user import feature is useful include:

- Several guests to the organization are arriving at the same time and require their own accounts in PaperCut NG/MF.
- A set of users needs to be managed separately / externally to the existing user directory source. For example, the users of a certain computer lab require their own accounts in PaperCut NG/MF, but it is not possible to create accounts for them in the existing user directory.
- Details for existing internal users needs to be updated.

To perform a batch internal user import:

1. Manually inspect your file in a text editor and ensure it's in the prescribed tab-delimited format as detailed at Batch internal user import file format.
2. Follow the directions in Server commands (server-command) to run the server-command `batch-import-internal-users`.

   For example, to import/update internal users from a file `import.tsv` on a Windows system:

   ```
   C:\> cd "C:\Program Files\PaperCut NG/MF\server\bin\win"
   server-command batch-import-internal-users "C:\extra
   users\import.tsv"
   ```

   Note: Quote the import path if it contains spaces.

   On a Mac OS X system:

   ```
   mac-server:~ jason$ cd "/Applications/PaperCut
   NG/MF/server/bin/mac/"
   mac-server:mac jason$ ./server-command batch-import-
   internal-users /path/to/the/file/import.tsv
   ```

   If your import path has spaces, remember to escape them if you don't use quotes:

   ```
   /path/to\ the\ file/import.tsv
   ```

3. The import process will start running in the background. See the **App. Log** tab in the Admin web interface to check the status of the import or if any errors were encountered.

Caution:
Batch imports are a major operation, modifying data en masse. Best practice suggests:

- Always run a backup *before* proceeding with the import.
- First experiment/test the import process with a small batch of users before moving

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onto the full batch.

Batch internal user import file format

The import file is in tab delimited format and contains the following fields in the given order:

Table 32: Internal User Import File Format

No.	Field	Description	Optional?	Limitations
1.	Username	The internal user's username. If the policy is to use a username prefix for internal users, include the prefix here (e.g. `guest-user123`).	Mandatory	Max. 50 characters
2.	Password	The user's password	Optional - although internal users cannot log in without a password	
3.	Credit Balance	The user's credit balance	Optional - balance not set if blank	A number with no currency symbol or separators, using a full stop for the decimal separator. Correct: `1.23` Incorrect: `$1.23` or `1,23` or `1,023.00`
4.	Restricted Status	The user's restricted status. (Y/N)	Optional - restricted status not set if blank	
5.	Full Name	The user's full name	Optional - full name not set if blank	Max. 255 characters
6.	Email	The user's email address	Optional - email not set if blank	Max. 255 characters
7.	Department	The user's department or faculty	Optional - department not set if blank	Max. 200 characters
8.	Office	The user's office or location	Optional - office not set if blank	Max. 200 characters
9.	Primary Card/ID Number	The user's primary identity/card number	Optional - card/id number not set if blank	Max. 200 characters, case insensitive
10.	Card/ID PIN	The user's card PIN number	Optional - card/id PIN not set if	Max. 20 digits

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No.	Field	Description	Optional?	Limitations
			blank. If the field is '-' then the PIN is set to zero.	
11.	Notes	Notes about the user.	Optional - notes not set if blank	Max. 2000 characters
12.	Secondary Card/ID Number	The user's secondary identity/card number	Optional - card/id number not set if blank	Max. 100 characters, case insensitive
13.	Home folder	The user's home folder	Optional - required for scanning to a user's home folder.	Max. 256 characters

Other limitations: Although any actual limit to the size of an import file should be large enough for any purpose, we recommend keeping the file size below 10MB.

Tip:

- If an optional field is not specified in the import file then it is not updated. To remove or "blank out" an existing value, use a single "-" (hyphen / dash).
- A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, then save it in the `Text (Tab delimited)` format.

For some examples of using tab-delimited files, see Import File Format Examples.

4.3.2. Anonymous guest printing

In the normal case, PaperCut NG/MF must identify the user responsible for each print job so that jobs are correctly tracked and charged. However, for ad-hoc guest printing by visitors, it is often more important to provide a convenient printing solution than to provide individual print tracking per visitor.

In addition, visitors and guests often want to print from their BYO mobile devices so a generic, widely available printing solution is required.

For these scenario's, PaperCut NG/MF provides the ability for guest users to print anonymously using Email to Print. This solution provides a simple and convenient printing experience from any device, imposing minimal or no administrative inconvenience on the guest user as there is no need to set up accounts or network access for the guest.

You can implement anonymous email printing in three ways:

- **Direct Print**

  Guests can send their job directly to the anonymous email defined for a physical printer. This is the most convenient way to provide printing access for guests or visitors.

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- **Managed release**

  Guest users send their job to the printer's anonymous email address where they are held in a hold/release queue. Jobs are released by the receptionist or a trusted person in the organization. Jobs sent by different guests are identified by the guest's email address, which is appended to the document name.

- **Guest self-release**

  Guest users send their job to the printer's anonymous email address where they are held in a hold/release queue. Guests are provided with a common username and password by which they can log in to the MFD to release their job. Jobs are identified by their email address appended to the document name.

Each of these options has advantages:

Table 33: Guest Email to Print modes

	Suitable For	Benefits	Trade-Off	Document Privacy
Direct Print	Business	Very convenient - no staff envolvement	Low security. Printing is uncontrolled with potential for paper wastage. Separate email aliases are required for each printer (no virtual queue).	Low
Managed Release	Business and Education	Convenient for guest. Printing is supervised and managed by staff.	Staff must be available and interrupted to release jobs for guests.	Good
Guest Self-Release	Business	Convenient for site staff.	Moderate. Printing is uncontrolled with potential for paper wastage. Guests can see and release	Low-Moderate

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	Suitable For	Benefits	Trade-Off	Document Privacy
			each others jobs.	

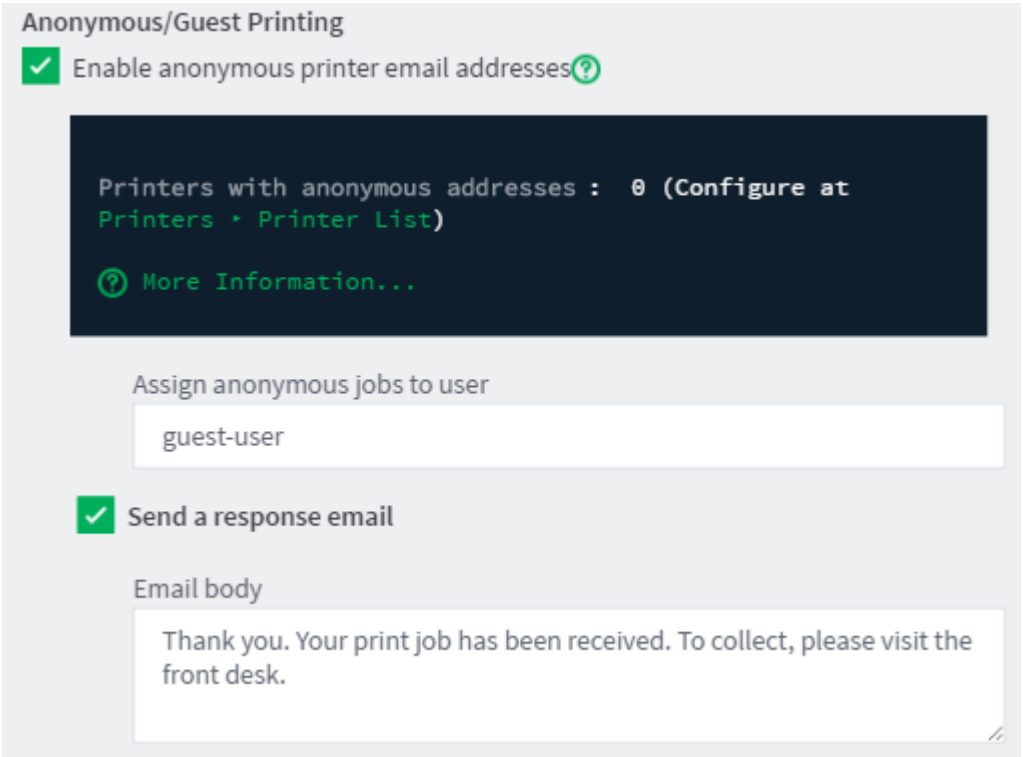
4.3.2.1. Anonymous setup

The starting point for all three anonymous printing modes is the **Options > Mobile & BYOD** page. Email to Print must be enabled and configured. If you have not yet set up Email to Print, do that first (see Email to Print), then return to this section.

- **Step 1**

1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.
2. In the **Email to Print** area, select the **Enable anonymous printer email addresses** check box.
3. Optionally change the user to which anonymous jobs will be logged. The default user is `guest-user`.
4. If you want guests to receive a reply email in response to sending a print job, select the **Send a response email** check box. You can customize the email body as required.



Important:
If the guest user (default `guest-user`) does not already exist, it is created for you,

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as an internal user. If you want to be able to log in as this guest user, either:

- Create the user beforehand in AD/LDAP as a regular user and sync it with PaperCut. user in the same way as any other user. Ensure the user is configured as `unrestricted`.
- *or* Enable internal users in **Options > User/Group Sync**. If internal users are not enabled, you can still use the internal guest user to log jobs, but you cannot log in to this user.

Step 2

Enable a printer for anonymous printing by configuring an anonymous printing email alias.

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Email to Print** area, add a valid email address or alias in the `Anonymous email address` text box.
4. Click **Apply**.

The remaining steps are specific to your selected anonymous printing mode:

Direct Print setup

Step 3:

Ensure your printer does not have `Enable hold/release queue` checked in the Printer Details page.

You are now ready to test. Email to Print jobs sent to the printer's guest email alias print without intervention.

Tip:
When using direct print, consider implementing a print script to force printing policy. For example, converting jobs to duplex, or redirecting large jobs to a high volume printer.

Managed release setup

Step 3

Configure your printer to use a hold/release queue.

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

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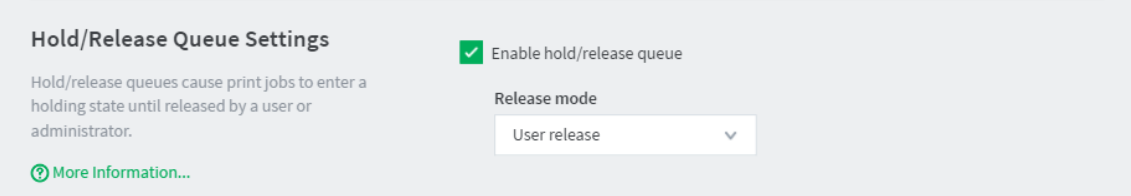
The **Printer Details** page is displayed showing the **Summary** tab contents.

3. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



4. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
   - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

> **Tip:**
> To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.

5. Click **OK**.

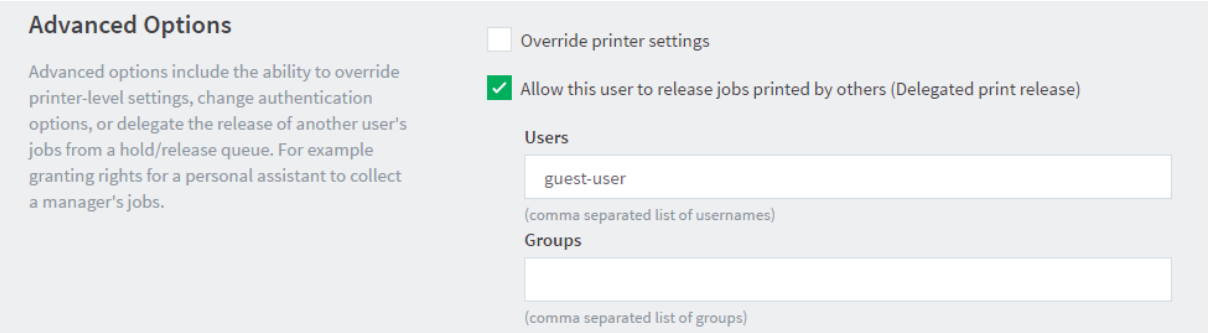
- **Step 4**

Make the receptionist or person responsible for releasing guest jobs a delegated release manager for the guest user.

1. Click the **Users** tab.

   The **User List** page is displayed.

2. Select your receptionist user.
3. In the **Advanced Options** area, select the: **Allow this user to release jobs printed by others (Delegated print release)** check box.
4. Add your configured guest user (default `guest-user`) to the list of Users; then click **Apply**.



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The receptionist can now log in to a Release Station or MFD and see the guest print jobs. Anonymous Email to Print jobs are identified by the source email address appended to the document name.

Tip:
If using swipe cards, reception can swipe their card to log in and release jobs.

Guest self-release setup

- **Step 3**

  Configure your printer to use a hold/release queue.

  - Check `Enable hold/release queue` in the Printer Details page.
  - `User Release` is the correct option for most scenarios.

- **Step 4**

  Set a password for the configured guest user (default `guest-user`). Change this password regularly - e.g. daily or weekly.

Tip:

- You can edit the response email to include the guest username and password - or you can direct the user to ask reception for this information.
- Keep the guest password secure to avoid abuse of the guest printing facility.
- Run regular reports of printing by your guest user to audit usage of guest printing.
- Change the guest user password regularly. You can automate this using `server-command`.

Known users and anonymous printing

The anonymous printing feature is designed for ad-hoc use by guests and visitors. It should not be used by people within your organization, as printing is not tracked by user and many important features such as account selection, script popups etc are not supported.

If an Email to Print job is sent to an anonymous printer email address by a known user (i.e. the source email matches a user in the PaperCut database), the job is *not* logged to the guest-user account. Instead, the normal print workflow for the known user is performed and the job logged against that user.

4.4. Multiple personal accounts

Users in PaperCut NG/MF have a personal balance used to fund their personal printing. This balance can be treated as a bank account used for printing. When the account is out of credit the user can no longer print until more funds are added to the account. By default, users have a *single*

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account to store their balance, but this can be too restrictive in some situations. For example, it's often useful to have separate accounts for "free" print quotas and cash payments.

The *multiple personal accounts* feature is an advanced feature that has been carefully architected with the assistance and feedback from leading Universities and Colleges from around the globe.

When *multiple personal accounts* are enabled, a user has multiple accounts with credit available for printing. Each account is a separate pool of credit that adheres to the following rules:

- Credit is deducted from the available funds in the order configured by the administrator.
- If the designated account does not have enough credit, the next account in sequence is used until all of the credit is used.
- If a print job costs more than the total credit in all accounts, the job is disallowed.

From the perspective of the end user little changes when multiple accounts are enabled:

- The total balance of all accounts is displayed in the User Client, Release Station, and User web interface.
- Printing, quotas, TopUp/Pre-Paid cards and all other PaperCut NG/MF features work the same with multiple accounts as they do with a single account.
- The fact that there are multiple balances can optionally be effectively hidden from the user.

Important:
Although the concept of multiple personal accounts is quite simple, the management can be complex depending on implementation. Readers are advised to read this section in full and conduct some planning before full deployment. Good print management in large organizations is hard enough, and multiple accounts if not implemented right could make it just that little bit harder!

4.4.1. Why use multiple personal accounts?

There are a number of reasons why a site might use multiple personal accounts, but the most common is the need to separate "free" print quotas from cash payments. Common reasons for considering multiple accounts are:

4.4.1.1. Separating quota and cash

Many sites such as colleges, schools, and universities allow users to pay for printing using TopUp/Pre-Paid cards or credit card using a payment gateway, such as PayPal or Authorize.Net. When cash payments and "free" quota are combined into a single account balance it is not possible to give cash refunds without potentially refunding quota amounts.

Using multiple accounts to separate "quotas" and "cash" has a number of benefits:

1. Simplified auditing and tracking of cash payments and refunds.
2. Allows for refunding of unused cash payments at the end of year or enrollment.
3. Making cash payments does not interfere with "not to exceed" quota thresholds.

For more information about this configuration, see Example 1: Separate Cash/Quota Accounts.

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4.4.1.2. Independently managed work areas

In some more large and complex environments each department or faculty independently manage and control their own printer fleet. In these situations the departments might want to assign a "free" quota to their members/students that should only be used on their own printers. Any "free" quotas allocated from other departments must not be used on this department's printers. If the user adds cash to their account, it can be used in any department.

In most environments this configuration is not required because the print policy is managed centrally. This is useful when implementing a centralized PaperCut installation in an environment where the departments historically had independent control of print policy. Using this configuration is the first phase in a transition to a fully centralized system.

This is an advanced configuration. For more information, see Example 2: Department/Faculty Quotas (Advanced).

4.4.2. Configure multiple personal accounts

Enabling and configuring multiple personal accounts is quite simple. However, before enabling this feature it is recommended that you read this section and understand the concepts involved.

4.4.2.1. Enable multiple personal accounts

To enable multiple personal accounts:

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Multiple Personal Accounts** area, click the **Go to multiple personal account setup** link.
3. Enable the **Enable multiple personal accounts option**.
4. The built-in default account is where initial credit is assigned and quota allocated.

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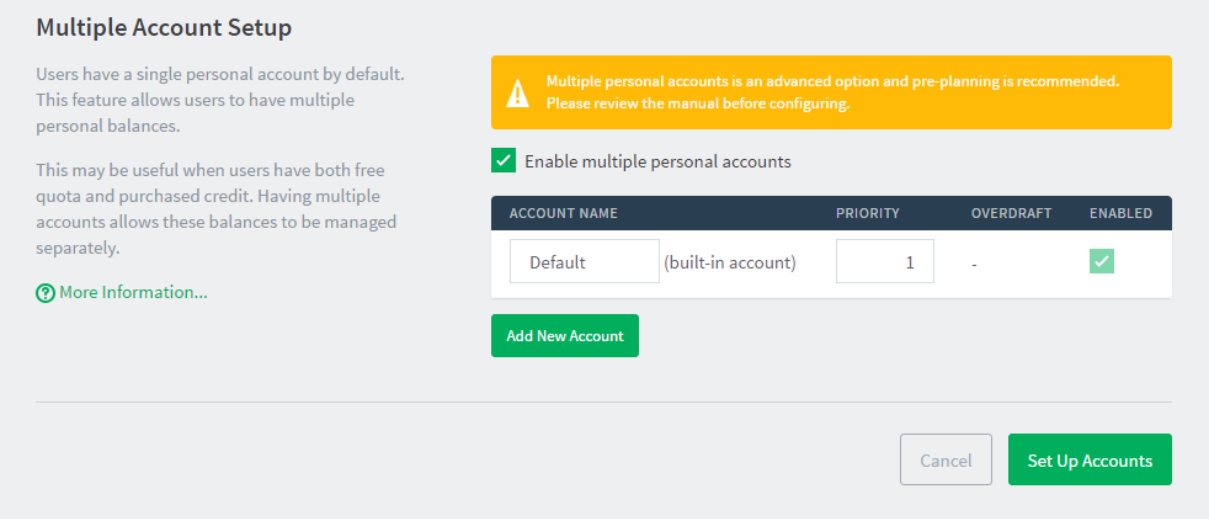

5. Click **Add Account** to add a new account. A new account is added to the list with a blank description, and default options for priority and overdraft.
6. Enter a descriptive name for the account. You can change this at any time.
7. Edit the account priority to change the order in which the account balances are used. Accounts at the top of the list (i.e. the lowest priority number) are used first. You can change the priority at any time. For more information on priorities see How account priorities work.
8. (Optional) Edit the overdraft value. This allows this account to go into negative. e.g. If the overdraft is set to $5.00, then the account is allowed to go to $5.00 into negative.
9. Repeat these steps adding accounts as necessary. Take care to add only the accounts you require (See Why can't I delete accounts?).
10. When the accounts are configured as required, click the **Set Up Accounts**. This starts the process of creating the new accounts for all of your users.

4.4.2.2. How account priorities work

When a user has multiple accounts it's important to have a well-defined order for how the balances are used. If one account is used for cash and the other for quotas, the quota credit should be used first before cash. The account priority defines this order. This is best explained with some examples.

The account priorities are configured with the "Default" account first and the "Cash" account second (as shown in the screenshot below).

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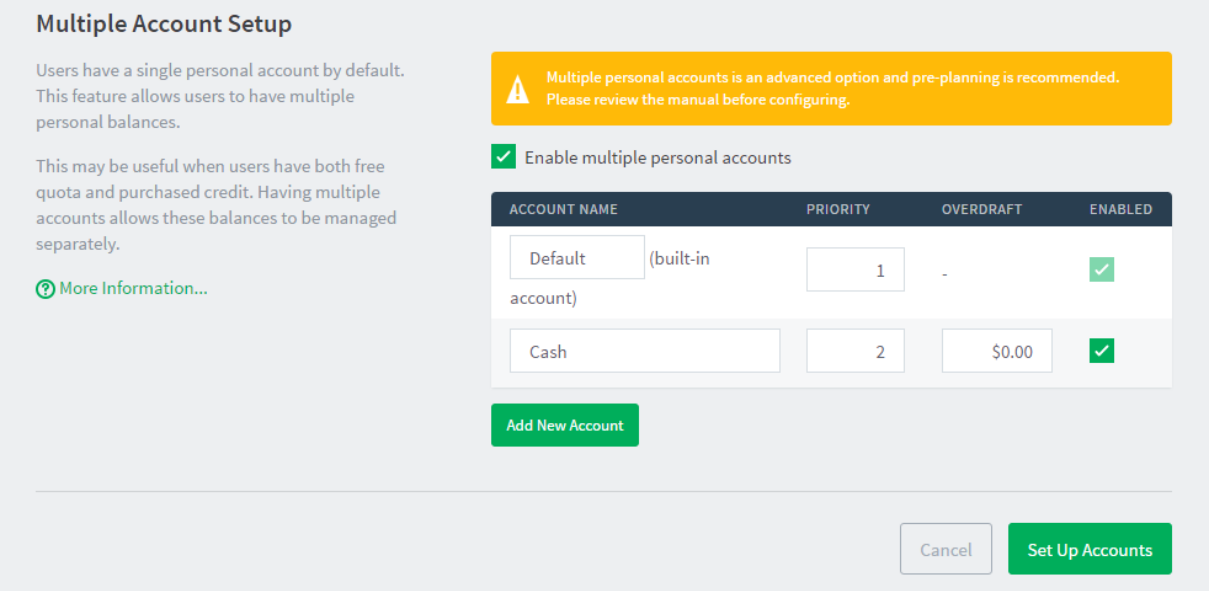

- **Example 1:**

  If a user has $1.00 in each of the "Default" and "Cash" accounts, and a $0.25 job is printed the cost of the job is deducted from the "Default" account, leaving a balance of $0.75.

- **Example 2:**

  If a user has $1.00 in each of the "Default" and "Cash" accounts, and a $1.30 job is printed the cost of the job split between both accounts. First, the $1.00 available in the "Default" account is used, then the remaining $0.30 is deducted from the "Cash" account. The user is then left with $0.00 in the "Default" account and $0.70 in the "Cash" account.

Whenever a print job is refunded, the credit is refunded to the accounts in the reverse order.

4.4.2.3. Configure payment accounts

When a user has multiple personal accounts, you can configure user payments to credit different accounts for different payment sources:

- TopUp/Pre-Paid cards,
- Payment gateways (such as PayPal or Authorize.Net),
- User transfers
- Other payments, including web cashier, value loaders, etc.

To configure the "Cash/Payment" account:

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Multiple Personal Accounts** area, click the **Go to multiple personal account setup** link.
3. In the **Multiple Account Settings** area, select the accounts you want to use for each of the payment types using the **User payment accounts**.

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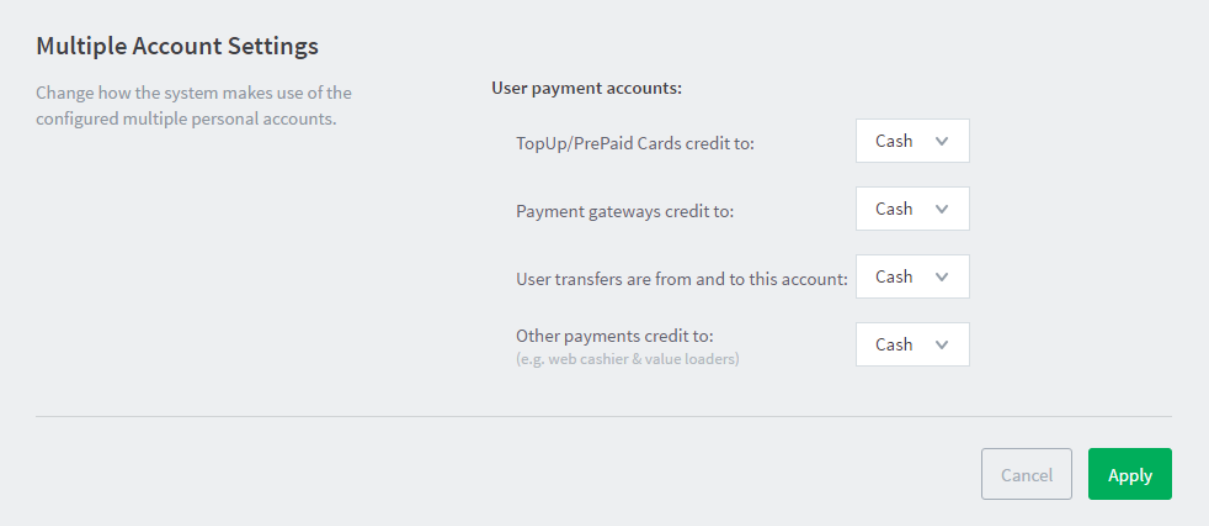

4. Click **Apply**.

4.4.2.4. Why can't I delete accounts?

Once an account is configured and created it cannot be deleted. Once an account is created it can be used immediately by users for their printing activity. If you could delete an account, you would also need to delete any transaction associated with that account, resulting in a confusing transaction history for the user.

Although you cannot delete an account, you can disabled an account. Disabling the account means that it is no longer available to the user, nor displayed in their account details. From the perspective of the user the account no longer exists, and any associated balance is also no longer available. If the account is later re-enabled any previous balances are made available to the user again.

Caution:
Because accounts can't be deleted it's prudent to carefully plan accounts and their use before deployment.

4.4.2.5. Other options

By default the User web interface displays just the total of all of the user accounts. To display an itemized list of each of the account balances:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **User Features** area, select the **Itemize multiple personal accounts** check box.
3. Click **Apply**.

To change the available personal accounts or the order that they are used, use the Advanced Printer Scripting feature. For more information, see Example 2: Department/faculty quotas (advanced).

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4.4.3. Configuration examples

This section describes in detail how to set up PaperCut NG/MF for the most common uses for multiple personal accounts:

- Example 1: Separate cash/quota accounts
- Example 2: Department/faculty quotas (advanced)

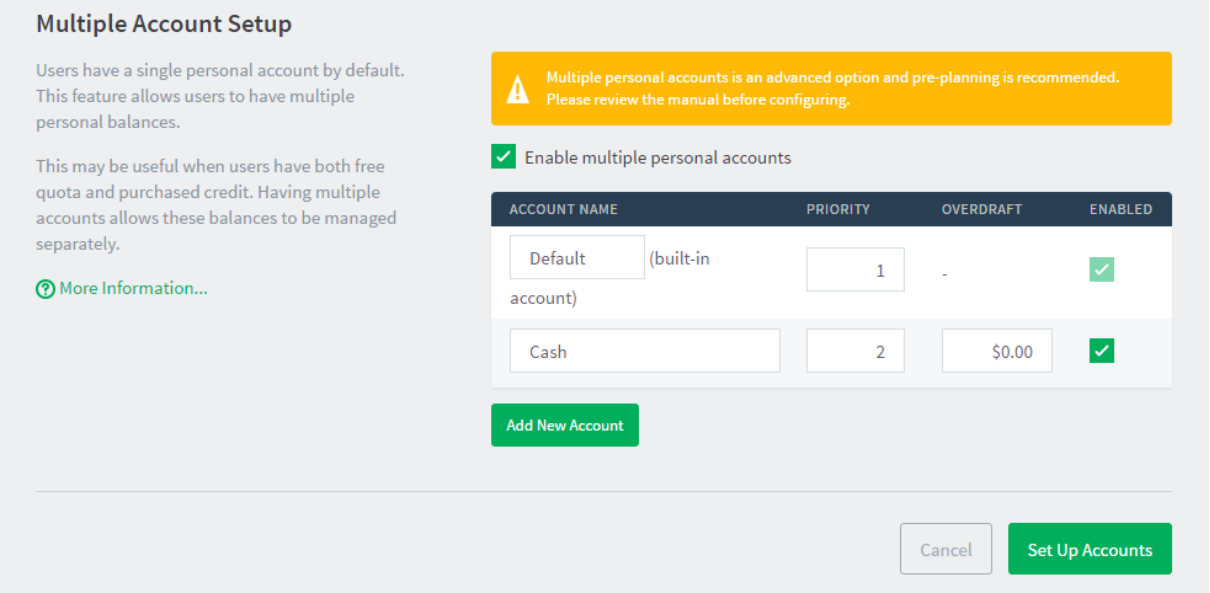
4.4.3.1. Example 1: Separate cash/quota accounts

In environments where users have both freely allocated quotas and the option for users to pay for printing it's useful to separate quotas from cash. For a description of this scenario see Separating Quota and Cash.

To configure multiple accounts for this situation:

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Multiple Personal Accounts** area, click the **Go to multiple personal account setup** link.
3. Enable the **Enable multiple personal accounts option**.
4. The "Default" (built-in) account is used for quotas. Rename it to something appropriates (e.g. "Quotas").
5. Click **Add Account** to add a new account. This account are used for user payments. Name it appropriately, and set the priority to a value higher than the default/built-in account.



   It is important that the accounts are given this priority order. This way any freely allocated quotas are used before using the cash payments. This allows a user to add credit to their account and know that it will be used only when they run out of allocated quota.
6. Click **Set Up Accounts** to start applying the change.
7. When the account setup is complete, select the **Cash** account as the account for user

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payments. To do this, select this account under the **User payment accounts** option.

8. Click **Apply**.

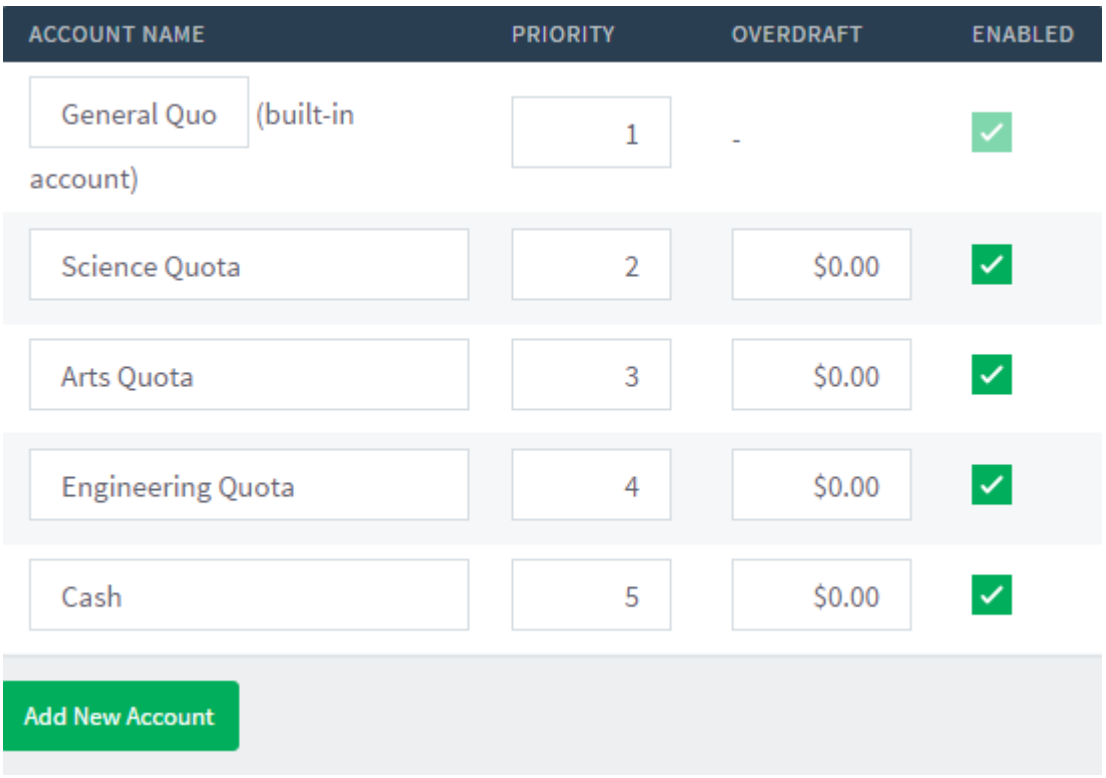
At this point the system is ready to use. Any cash payments from TopUp/Pre-Paid Cards or Payment Gateways are added to the selected cash account. The quotas are added to the default/built-in account. (*Note:* Sites running a Payment Gateway module released prior to version 10.5 might need to upgrade the gateway to leverage this setting.)

4.4.3.2. Example 2: Department/faculty quotas (advanced)

A much more advanced configuration is required when different departments/faculties/areas want to each have their own quotas that are only available for use by their users on their printers. Department quotas are also often combined with user cash payments, which can be used anywhere on site. For a description of this scenario see Independently Managed Work Areas.

This configuration requires the use of many advanced PaperCut features. This section gives a brief outline of how this is configured.

- Enable multiple personal accounts and create the accounts for each of the work-areas or departments required. If users can also pay for printing, also create a cash account. The priority/order of the quota accounts is not important, as long as the "Cash" account is displayed last. The screenshot below shows a possible configuration.



  Click **Set Up Accounts** to apply the change.

- When the account setup is complete, select the "Cash" account as the account for user payments. To do this select this account under the **User payment accounts** option; then click **Apply**.
- At this point all the accounts are enabled and can be used on any printers. The Advanced

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Printer Scripting feature is used to restrict the accounts that can be used on different printers. For more information, see Advanced scripting (print scripting). The advanced scripting provides a method (`actions.job.changePersonalAccountChargePriority`) that allows for changing both the accounts available and their order/priority. The method is documented in detail in Script Actions.

For example, the following script snippet, shows how to limit the available accounts to only "Science Quotas" and "Cash" (in that order).

```
actions.job.changePersonalAccountChargePriority(["Science
Quotas", "Cash"]);
```

- Departments can allocate initial quotas at enrollment or periodically throughout the year using the web-service APIs or `server-command` to adjust user balances. All the balances affecting APIs/commands have a parameter to specify which of the accounts to adjust/set. For example, to use `server-command` to set the balance of the "Science Quotas" account to $10.00 for all members of the "Science Students" group:

  ```
  server-command set-user-account-balance-by-group "Science
  Students" 10.0 \ "Enrollment quota" "Science Quotas"
  ```

  You can integrate this technique with existing student management systems to automate the allocation of free print quota at the time of enrollment.

  For more information on web-service APIs or `server-command` see The XML Web Services API and Server commands (server-command).

You can achieve a lot with the power of Advanced Print Scripting and Multiple Personal Accounts. Large universities and colleges needing this level of flexibility also tend to have very competent IT staff. Take some time to bounce around some ideas. Here are a few:

- Use advanced print scripting to tune on/off access to accounts based on conditions such as group membership, time of day, device, etc.
- Automate account management tasks such as free quota assignment on course enrollment using scripts.
- Clearly explain to users any complex rules on which accounts are used and under which conditions. Take some time to document this and communicate policy with staff/students/members.

4.5. Shared accounts

PaperCut NG/MF has two types of accounts - personal accounts and shared accounts. Each user has a personal account. This is the default account charged under normal operation. In some organizations and businesses you might want to provide users, or selected users, with the option to charge printing to a shared account. Some uses of shared accounts include:

In business:

- Allocate and budget printing by business areas (e.g. cost center)
- Track printing by project, phase, client or account

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- Track printing by client/matter - popular in legal and accounting firms

In a school or university:

- Budget staff use via shared faculty or department accounts
- Provide share accounts for classes or subjects
- Track printing costs by subject areas

Tip:

Do you have many client matter accounts? Organizations such as legal firms, engineering firms, or accounting offices often have long lists of accounts, projects, clients, or matters. It is not uncommon to see more than 10,000 accounts, and some organizations run in excess of 300,000 accounts. Here are some tips to help improve performance when you have a large number of shared accounts:

- If you have 2,000 or more accounts, make sure you use an Deployment on an external database (RDBMS)
- If you have 50,000 or more accounts, consider using the methods outlined in the Knowledge Base article "Managing Large Client Matter Databases and Manage large client billing databases.

These recommendations improve:

- account selection lookup and search speed on the popup client software
- client popup speed after print
- account selection speed on the copier/MFD embedded software
- server load (using a scalable database)

Shared account scenario

East Beach High School has implemented PaperCut NG/MF to control their printing. Students are allocated a $5.00 a month budget. Pre-paid cards are sold at the library for students who need extra credit above this allowance.

Teachers and staff are given a small personal budget to cover casual printing with curriculum material to be allocated to share accounts. Shared accounts exist for each faculty. The network administrator has granted staff members access to the share account popup. Access to faculty accounts is controlled via Active Directory group membership.

Sarah is a Science and English teacher at the school. When she prints she is able to allocate the print job to either her personal account or either the Science or English shared account via a drop down list. She can also view the shared accounts balances from the User web pages.

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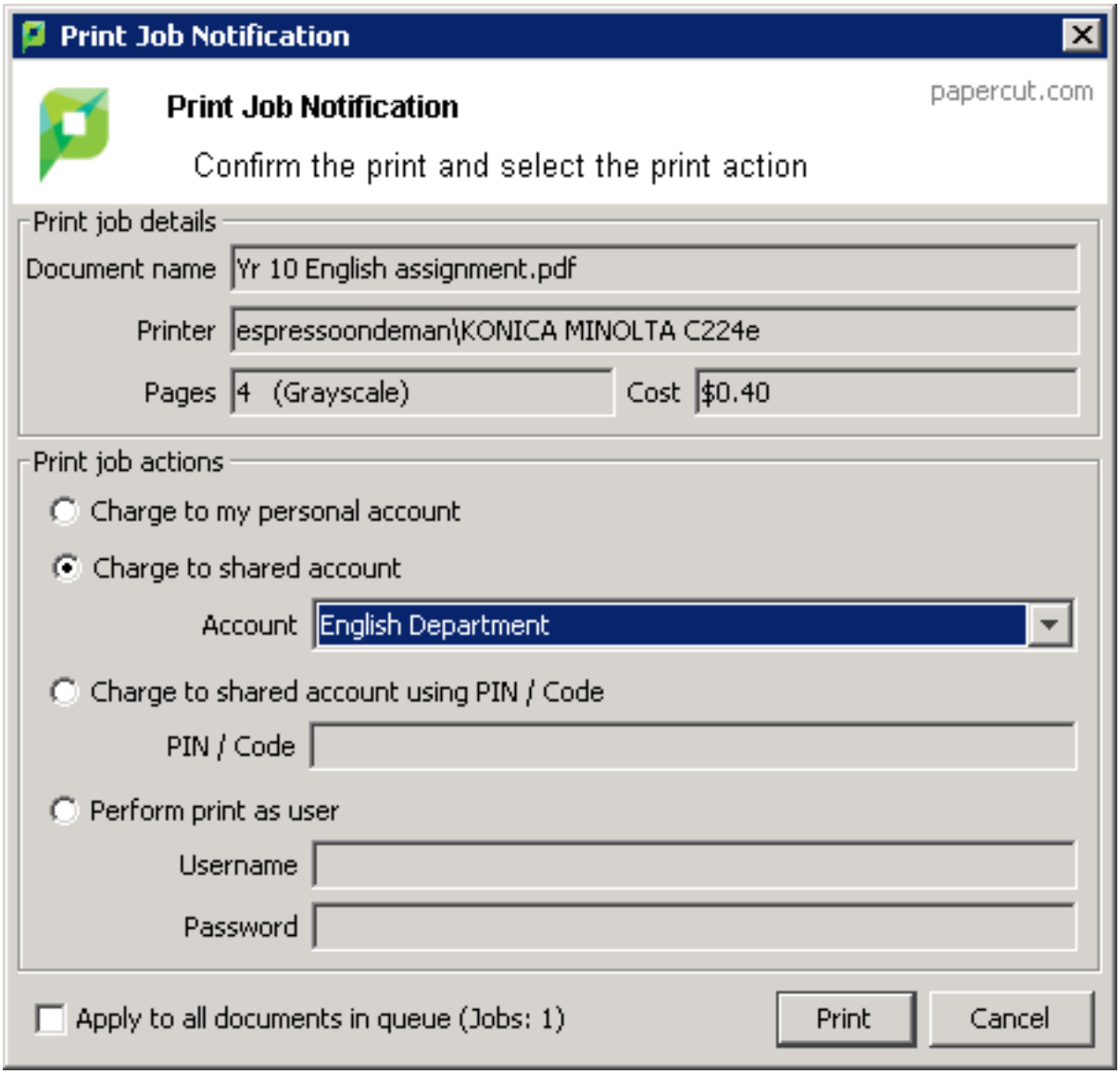

Tip:
To educate the users about shared accounts, administrators might find the Example 2: Printing with shared accounts (for staff) helpful.

4.5.1. Create a shared account

Personal user accounts are automatically created when users are first imported into the system. Shared accounts are created manually on an as-needed basis. Normally shared accounts are created manually in the Admin web interface, however, organizations with many accounts can automate the account creation process by importing accounts. Import options include via a file (for example, Excel, or an export from a 3rd party system) or by scanning an existing directory structure. For more information on automatic importing, see Batch import and update shared accounts .

Note:
You cannot create a shared account unless you have admin access to all shared accounts.

To create a shared account:

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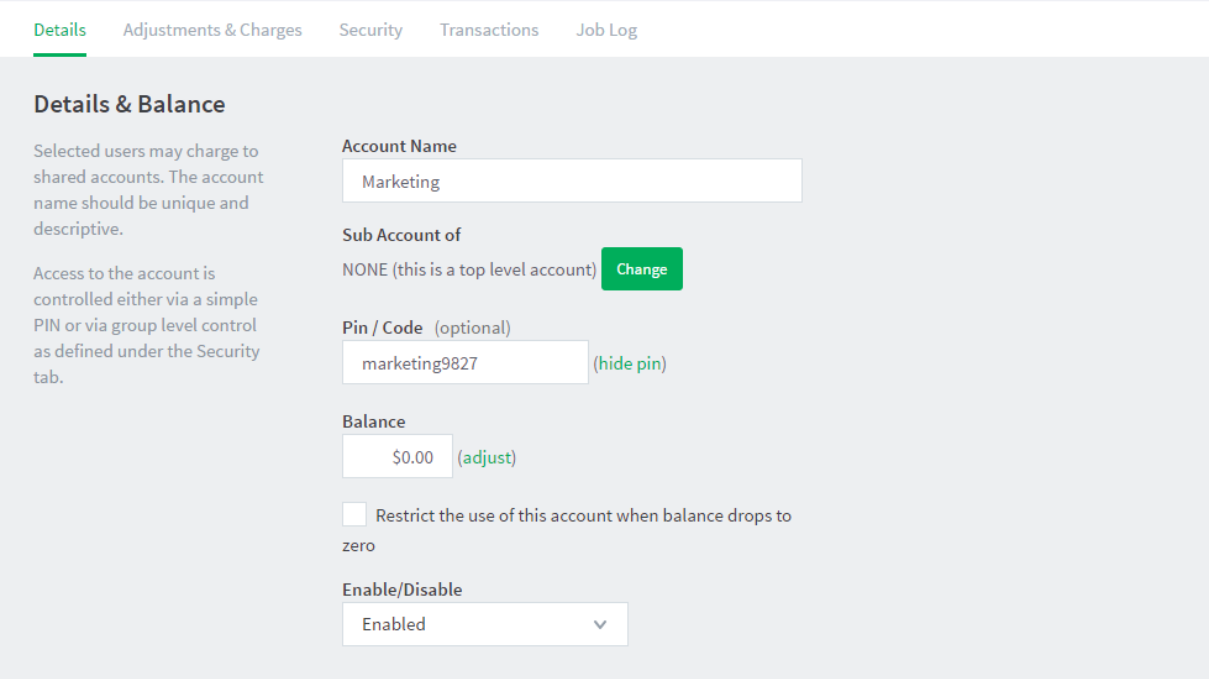
1. Click the **Accounts** tab.

   The **Shared Account List** page is displayed.
2. In the **Actions** menu, click **Create a new account**.

   The **Account Details** page is displayed.
3. Enter an appropriate name for the account. Make the account names as descriptive as possible.
4. Complete other details such as starting balance, restrictions status and notes as appropriate.
5. Click **OK**.



Restricted/Unrestricted status

By default, shared accounts have an unrestricted status. This means that the account's balance is allowed to drop below zero. Many organizations use shared accounts to track their printing expense. A common strategy is to start the account off at a zero balance and let it count down into the negative. By setting the account to restricted and allocating an initial starting balance, you can use shared accounts as a budget control system as printing to the account is denied once credit is exhausted.

Parent/child account structures

PaperCut NG/MF has support for advanced parent/child account structures. The subsequent account naming conventions section covers many of the common practices. See Shared account naming guidelines for more details.

PIN/Codes

Each account can also be assigned a PIN/Code that helps uniquely identify an account. Many users use the codes to represent cost-centers, clients, projects, etc. These codes are often also used in other systems (like the accounting system) to identify these accounts consistently across the

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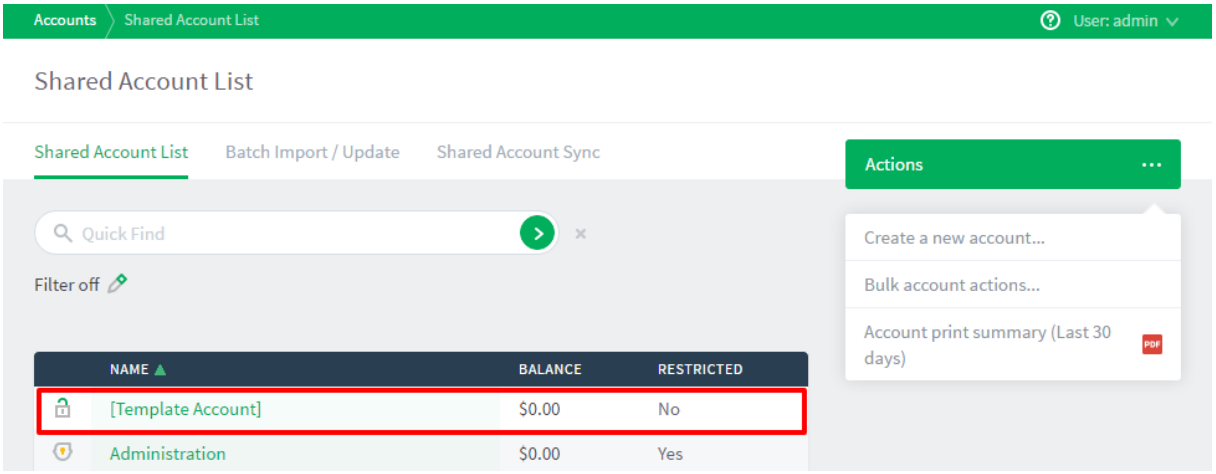
organization. Once defined, you can use these codes in the User Client software to quickly search for accounts, and can also displayed in account-based reports.

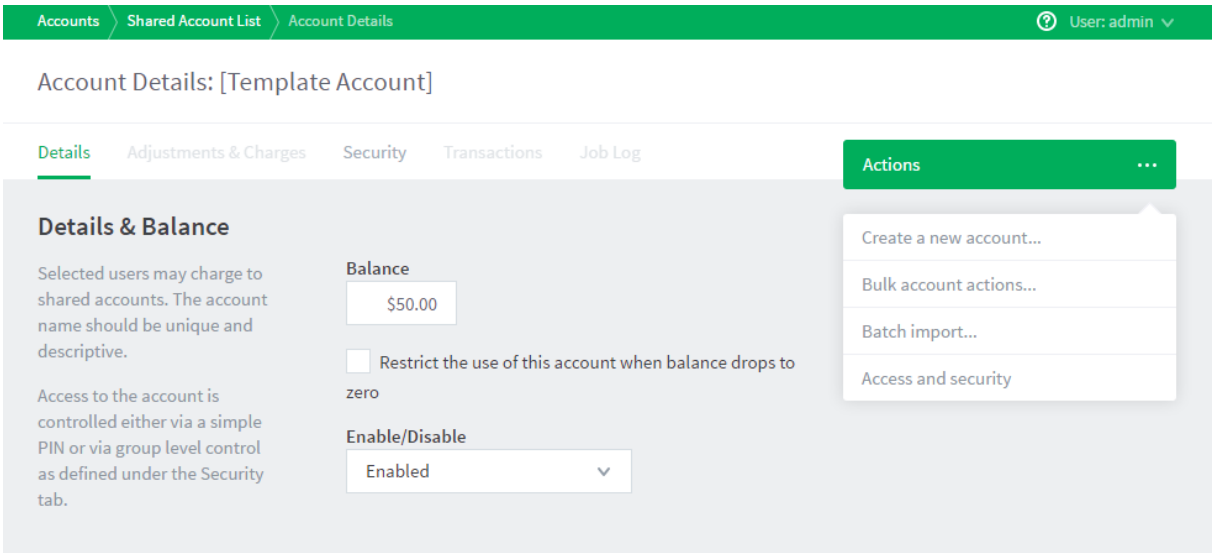
The account PIN/code can be entered on both parent and sub-accounts. For example, it is common to use parent accounts to represent clients and sub-accounts to represent projects for those clients. In this scenario, the parent account code would represent a client code, and the sub-account code would represent the project code.

4.5.1.1. The template account

The `[Template Account]` is designed to save time by applying the most common settings to all newly created accounts. The `[Template Account]` is on the **Shared Account List** page of the **Accounts** tab.



Any settings applied to the template account are applied to new accounts when they are created.



Some examples of where the template account might prove useful include:

- Applying common security settings. For example, if the `Staff` group should have access to all accounts, adding the group to the template account ensures group members can also charge to future accounts.

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- Applying a starting balance. The starting balance might represent the standard department print quota or the amount of 'free printing' a customer has before they are billed for the excess.

4.5.1.2. Shared account naming guidelines

Administrators are encouraged to create accounts as logically related groups. Doing so makes for easier searching and charging, and better integration with existing accounting systems.

Different account models can be adopted by organizations depending on their requirements. Common models are:

- *Faculty or Department* - a simple flat list familiar to schools, colleges and Universities.
- *Client / Matter model* - familiar to legal and accounting firms
- *Project / Phase model* - familiar to engineering and technology firms
- *Customer / Job model* - familiar to other customer based firms and common in accounting software

The following sections describe how to configure PaperCut NG/MF to best match the three advanced models.

Client / matter naming model

The client / matter model is one with which legal and accounting firms are familiar. In this model:

- Top level accounts are created for each client
- Sub-accounts are created for each matter under the relevant client

Usually, charging directly to a client (without a matter) is not allowed in this model. Instead users should charge to the relevant matter. SysAdmins should set each top level account to be inactive (disabled), and all sub-accounts to active, as shown in the following image. This enforces use of sub-accounts only.

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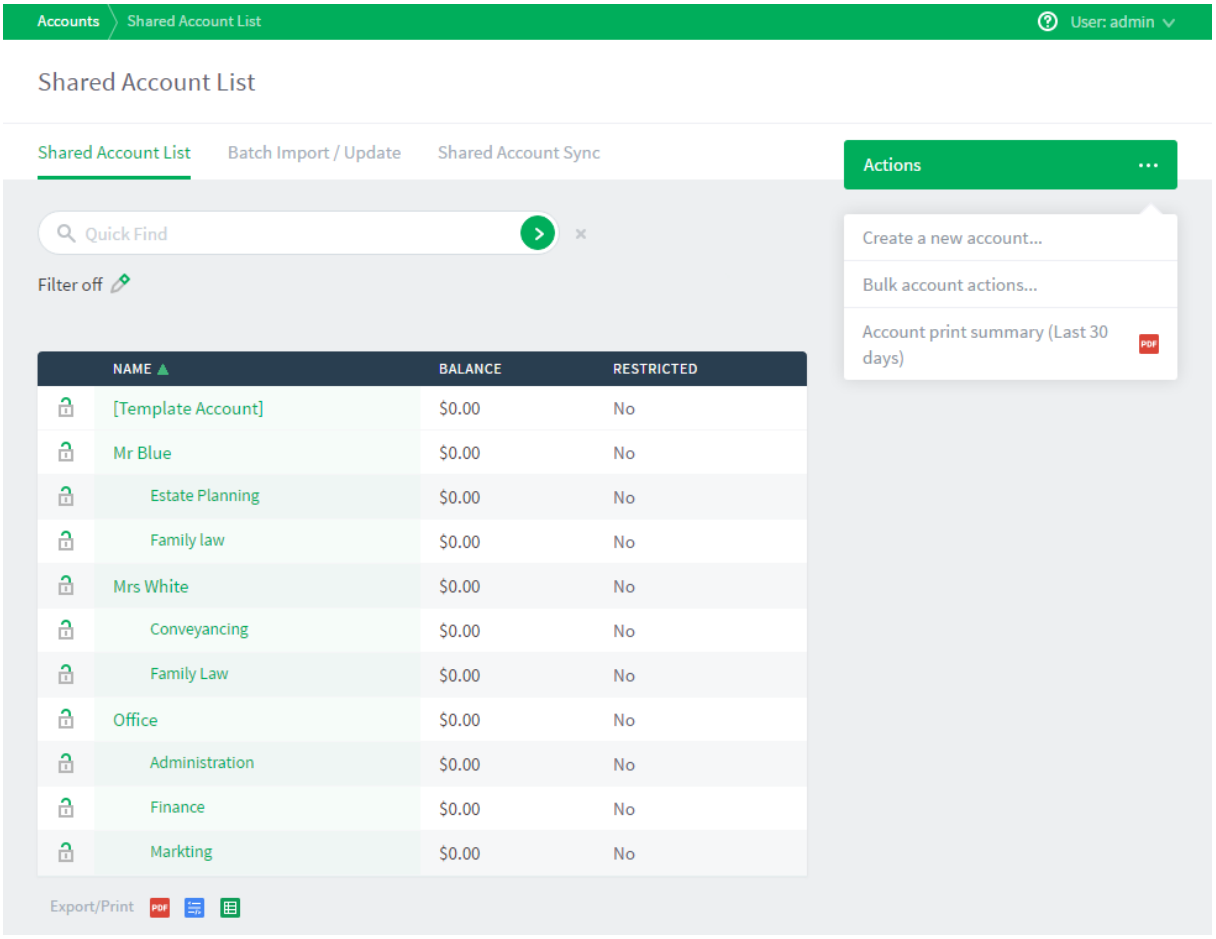

As shown in the example, the shared account *code* is used as the client code for the top level client accounts, and the matter code for the matter sub-accounts. In the account list, the sub-account codes are displayed as `[parentCode]-[subCode]`. For the shared account code to be visible, select the **Make shared account PIN / code visible** check box. For more information see Customize shared accounts.

By including both the client/matter code and name, users are able to search for a particular account by either client code, matter code, client name or matter name. The following examples demonstrate this:

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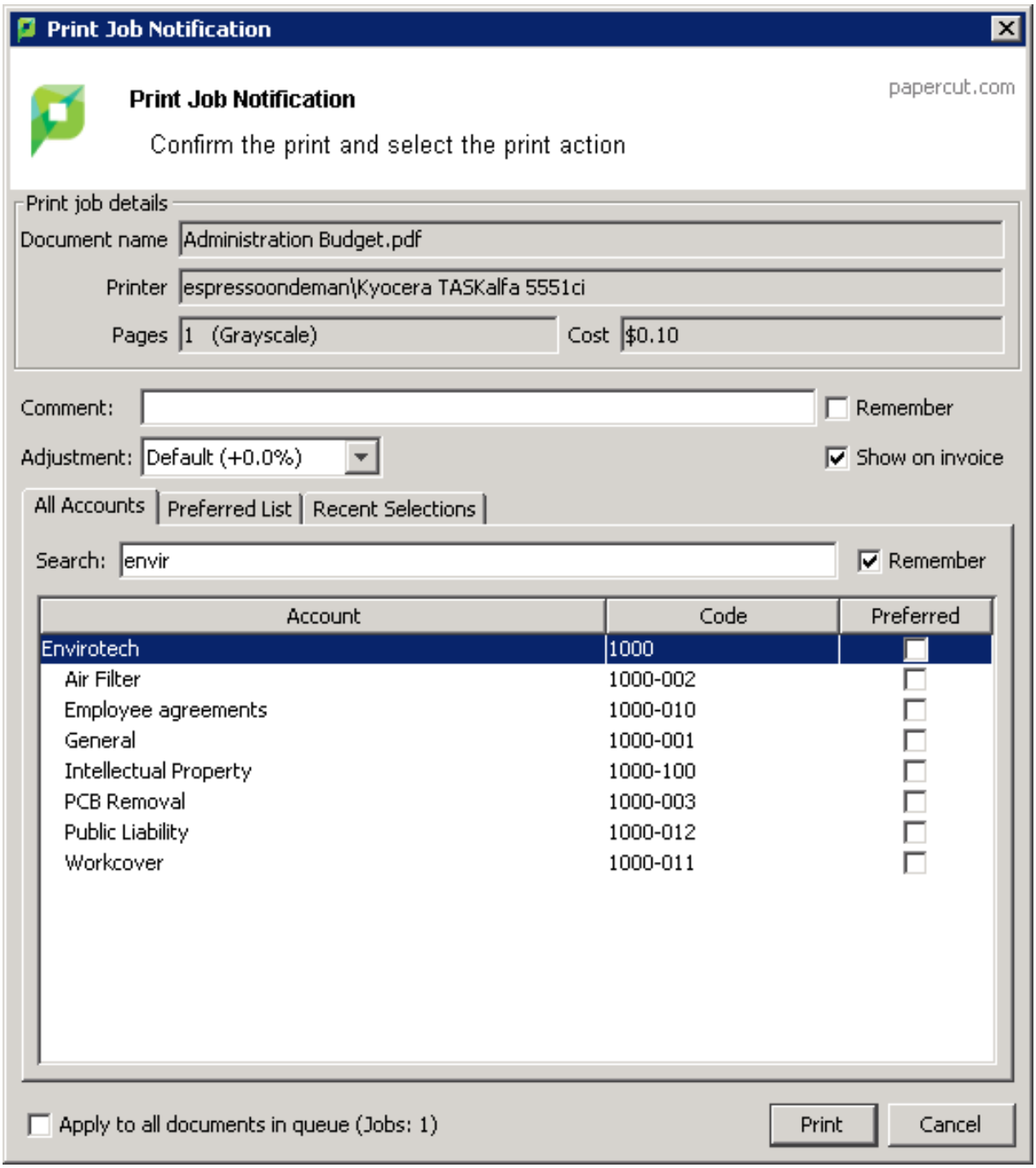
1. Searching by client name displays the client plus all matter codes for the client.



2. Searching by client code displays the client plus all matter codes for the client.

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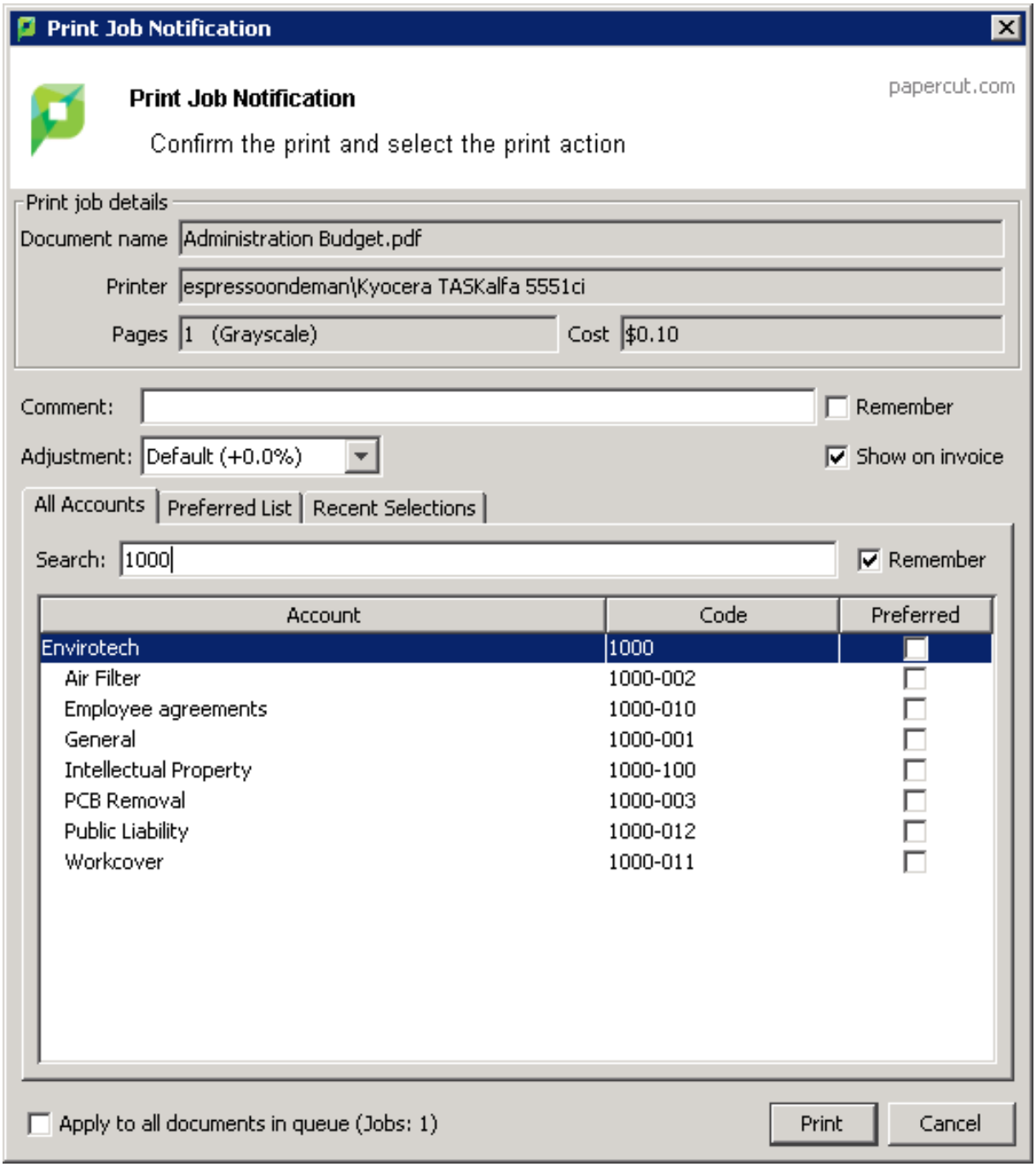

3. Searching by matter name displays the matching matters plus the client for each matching matter.

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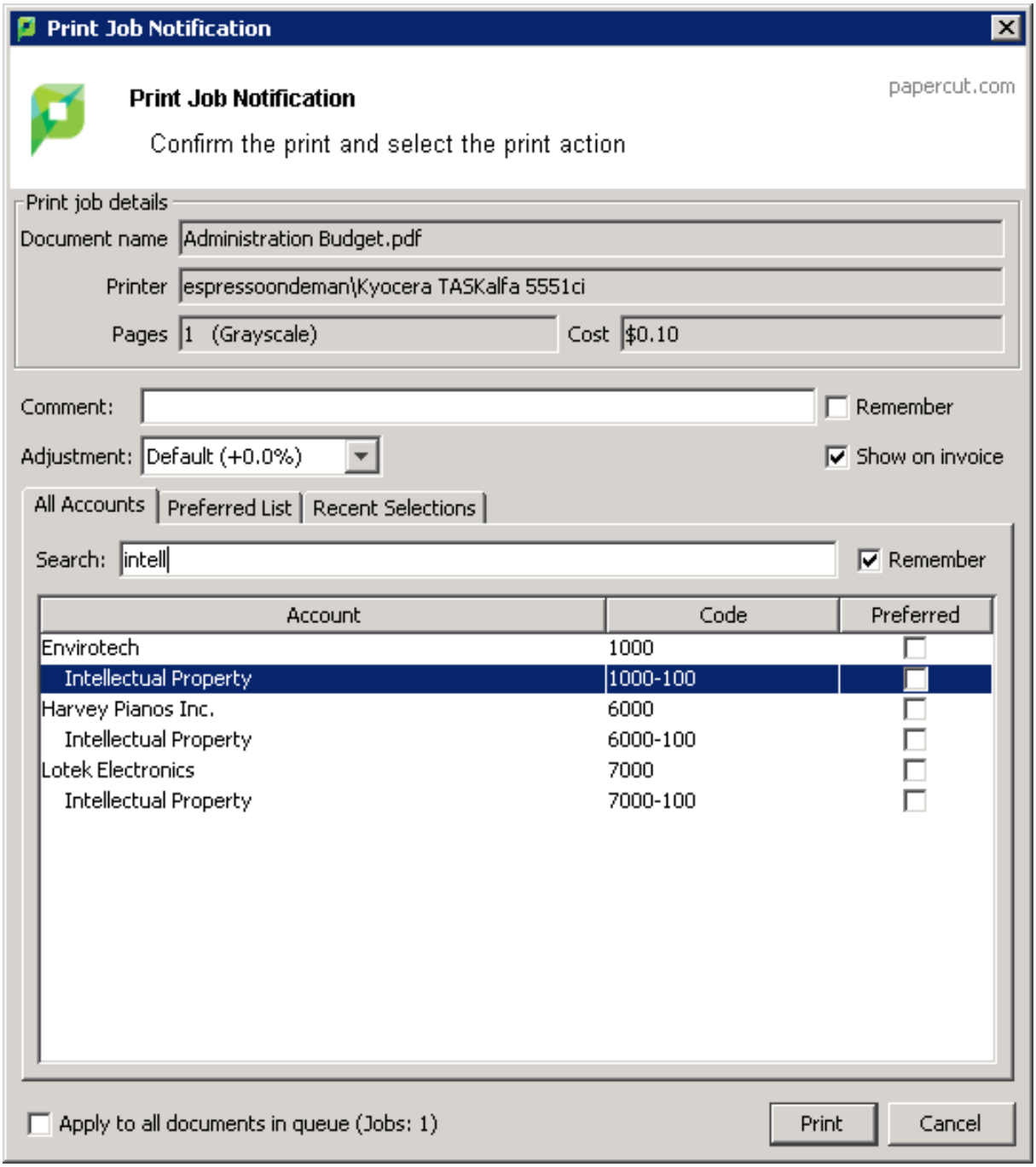

4. Searching by matter code displays the matching matters plus the client for each matching matter.

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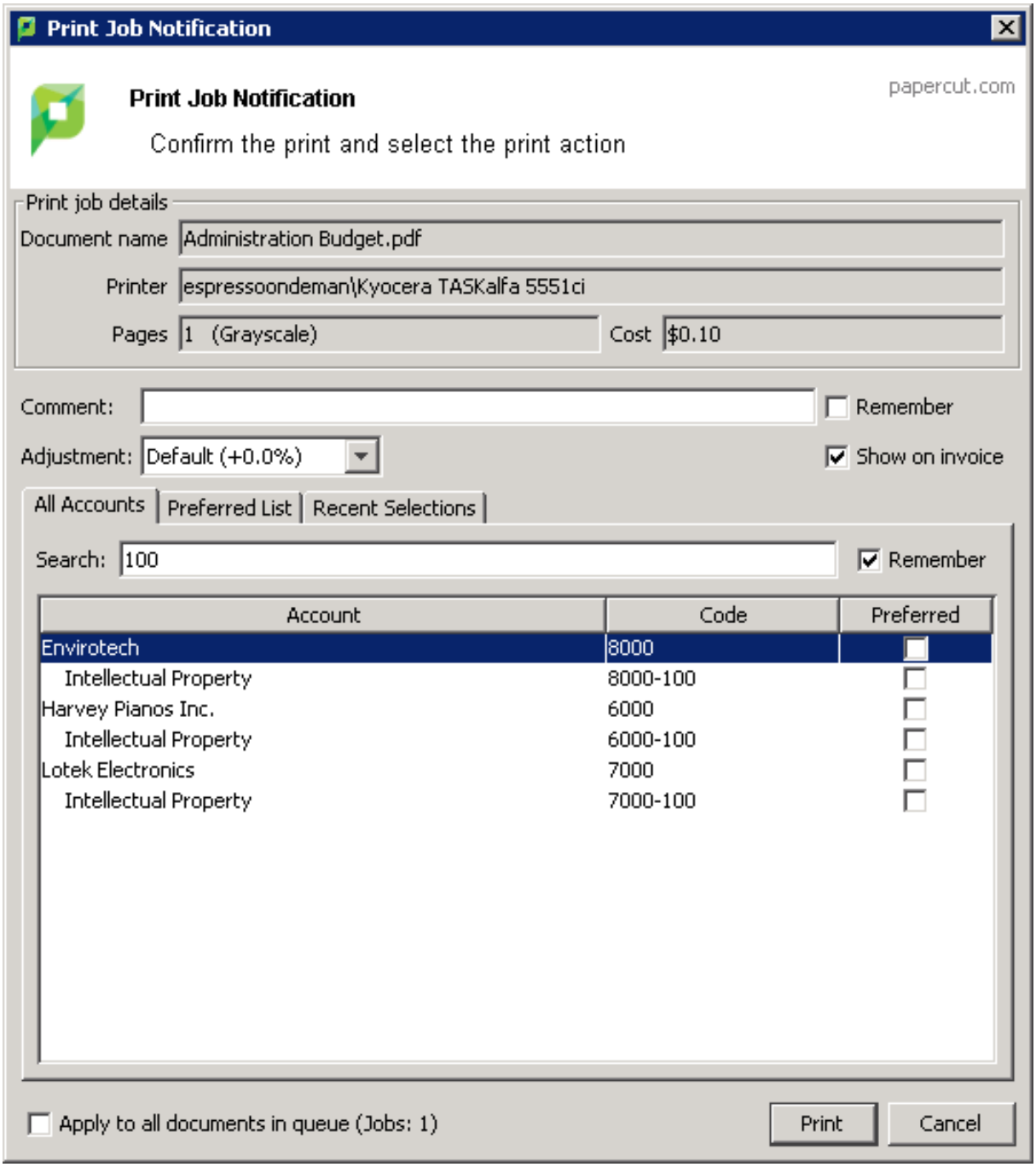

Project / phase naming model

Engineering and IT firms are familiar with the project / phase model:

- Parent accounts are created for each project
- Sub-accounts are created for each project phase or stage

Usually, charging directly to a project is not allowed in this model - instead users should charge to the relevant project phase. SysAdmins should set each parent account to be inactive (disabled), and all the sub-accounts to be active, as shown in the following image.

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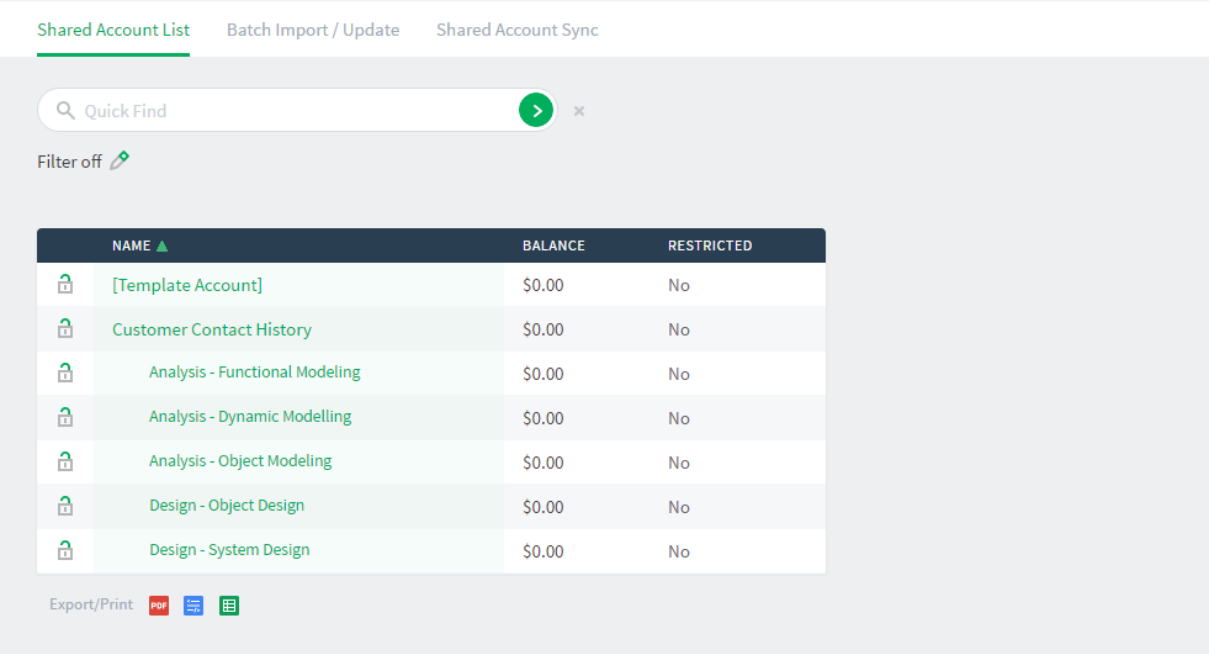

When projects have a job or project number, it is recommended that it be included as the shared account *code*. For the shared account code to be visible, select the **Make shared account PIN / code visible** check box. For more information see Customize shared accounts.

By including the project name, project number and phase name, users can search for a particular account using any of these fields. The following examples demonstrate this:

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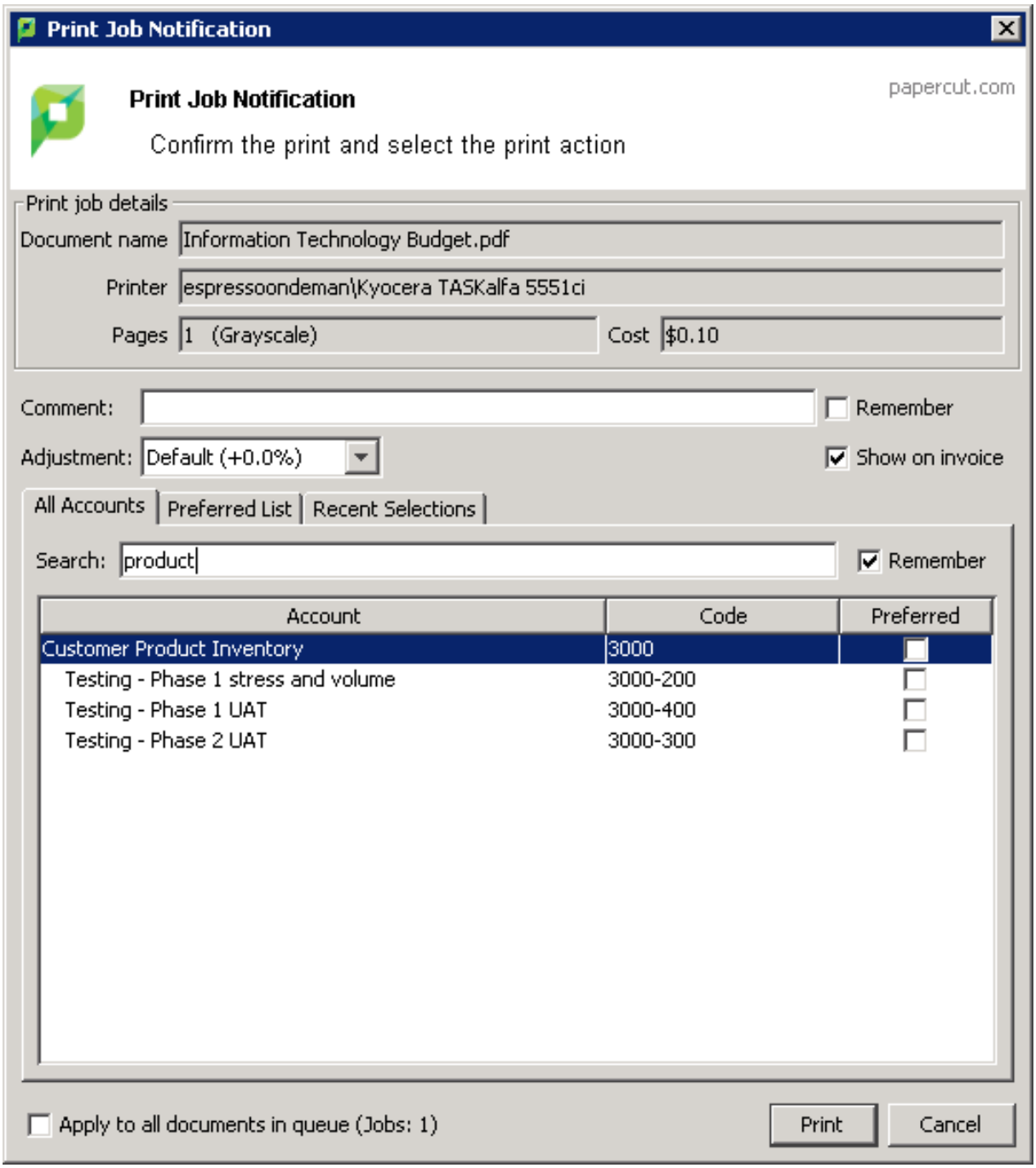
1. Searching by project name or number displays the project plus all phases for that project.



2. Searching by phase displays all matching project phases, plus the project name for each phase.

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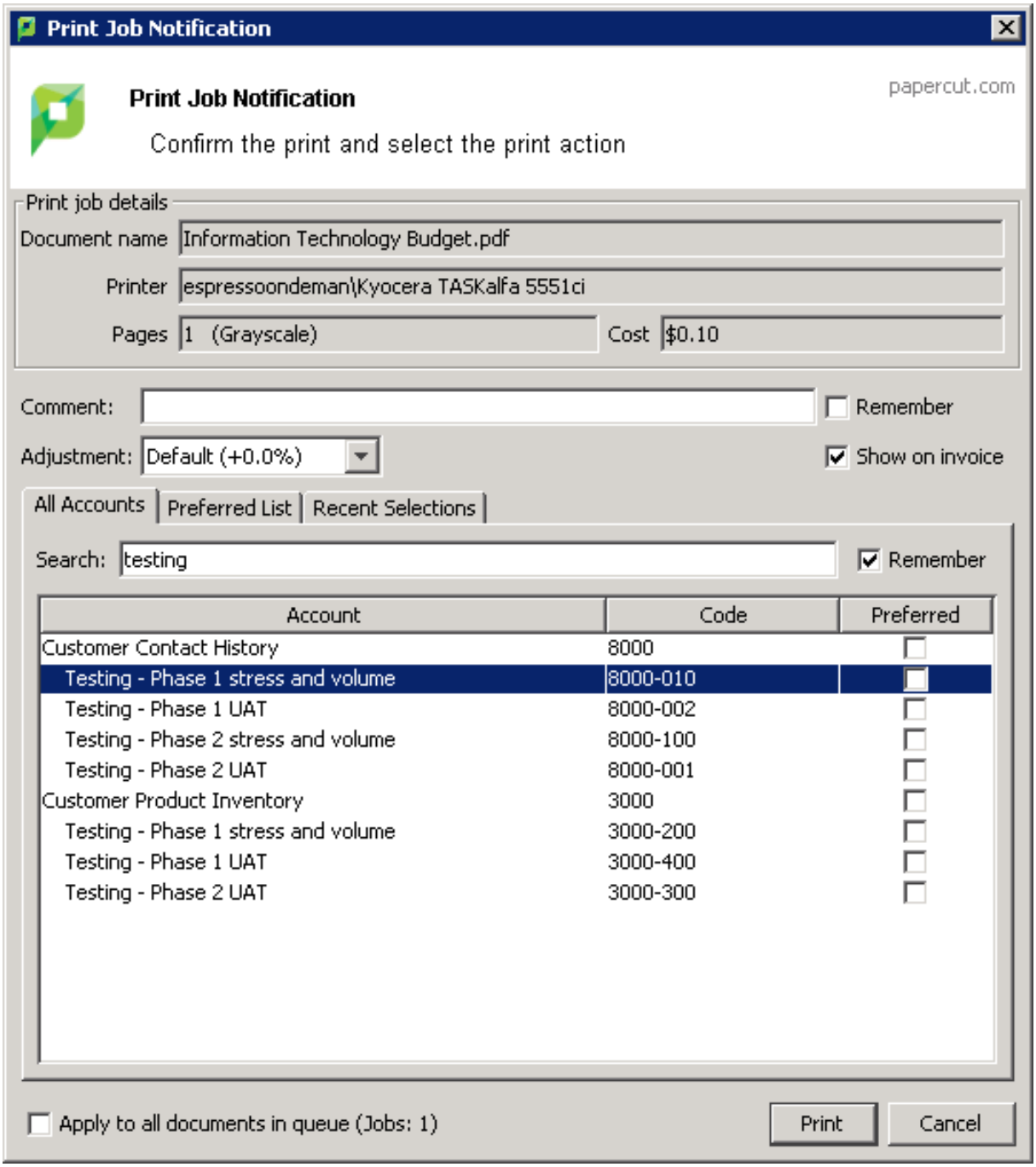

Customer / job naming model

Organizations that deal with customers on a per-job basis are familiar with the customer / job model, as are those who use common accounting software packages. In this model:

- Parent accounts are created for each customer
- Sub-accounts are created for each job

The basic principals of the customer / job naming model are the same as the project / phase naming model. See Project / Phase Naming Model, substituting *project* for *customer* and *phase* for *job*.

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4.5.2. Search for a shared account

If you have many shared accounts, scrolling through a list of accounts to find what you want is not practical. For example, some professional organizations, such as legal firms, can have thousands of accounts. PaperCut NG/MF offers a couple of ways to quickly find the accounts you need on the Shared Account List page:

- Quick find
- Filter

To display the Shared Account List page:

1. Click the **Accounts** tab.

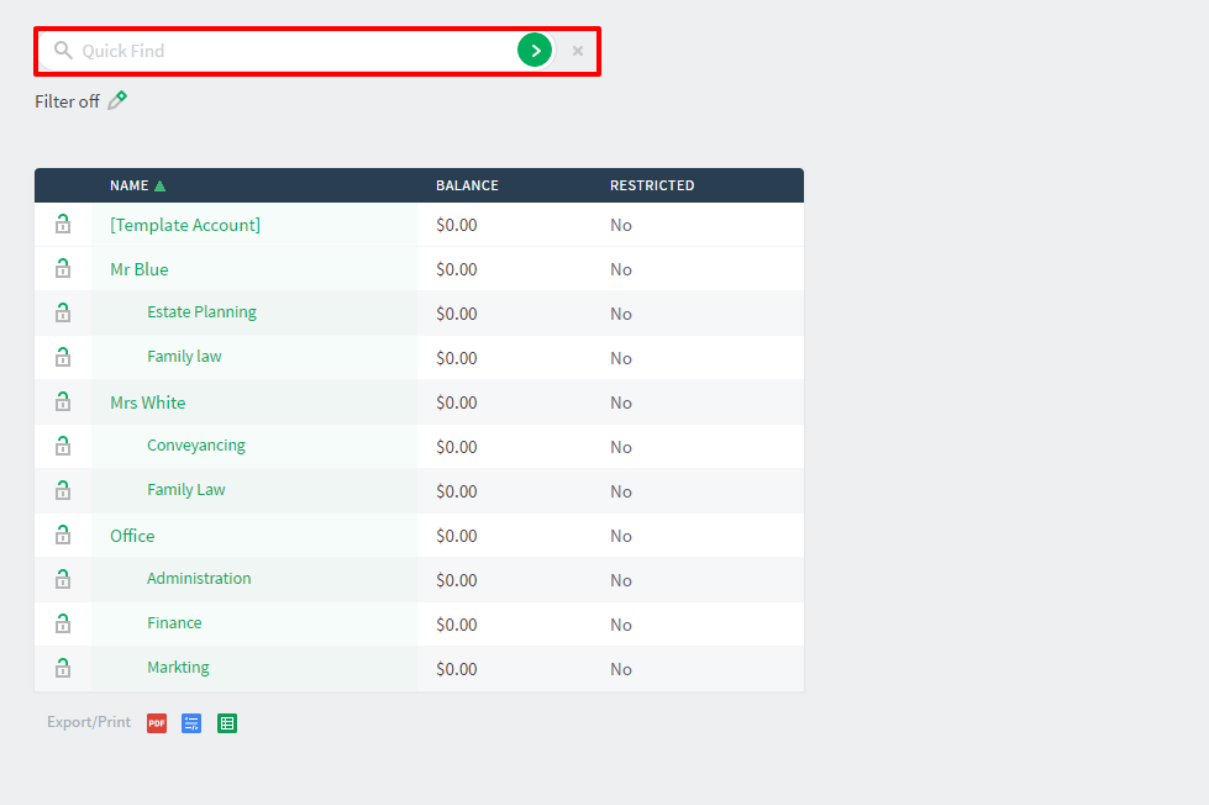
   The **Shared Account List** page is displayed.

> **Note:**
> Only the shared accounts for which you have admin rights are displayed.

Quick Find

The **Quick Find** field allows you to search for an account by name or partial name.

1. In **Quick Find**, enter a string of characters from the account name.



   A list of accounts with names containing the characters you have entered is displayed.

2. Select the account you are looking for.

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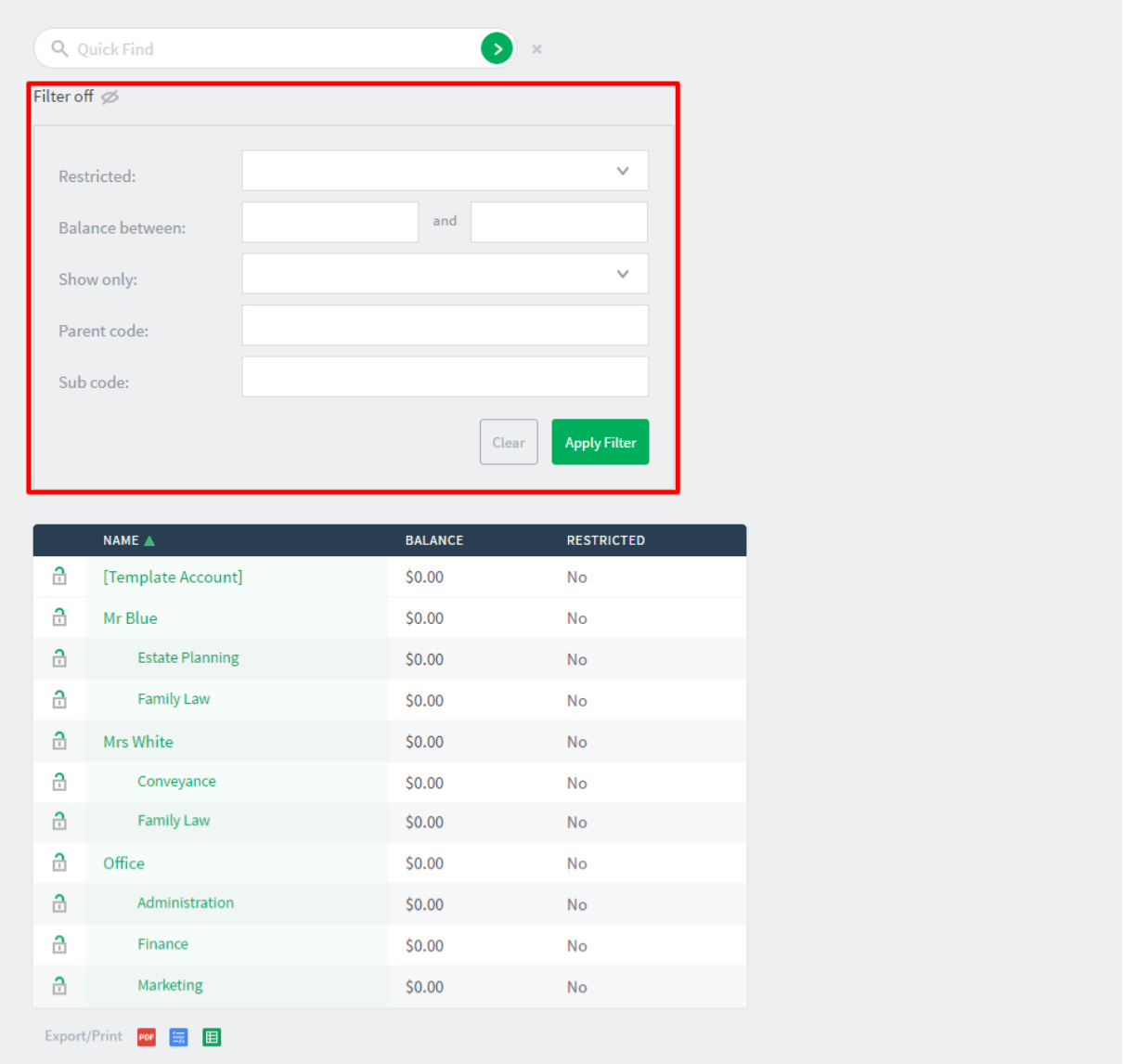
3. Click **Go**.

   Only accounts that match the entered name are displayed.

Filter

The **Filter** area allows you to search for accounts that match selected criteria.To filter accounts:

1. Click the edit link next to **Filter off**.



   The filter criteria are displayed.

2. Select the relevant criteria; then click **Apply Filter**.

   Only accounts that match the selected criteria are displayed.

4.5.3. Batch import and update shared accounts

The batch import and update feature allows the administrator to import accounts, and optionally update existing account details by reading data from a simple text file or directory structure. In addition to being able to create accounts, it enables administrators to update the following account data:

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- Enabled / disabled status
- Account PIN / Code
- Credit balance
- Restriction status
- Users allowed to use the account
- Groups allowed to use the account
- Invoicing options
- Comment options
- Notes

Examples of where the batch import feature is useful include:

- When importing account and balance data from another external system (e.g. a project management or accounting system).
- To reset the account balances at the end of a billing period (year/term/semester).
- To bulk update the users and groups who are allowed to use/access the accounts (security).

Tip:

To update shared accounts from a tab delimited file on a regular basis, see Synchronize shared accounts with external source instead. You can also synchronize shared accounts against the directory structure of a file system, for example, when there is a separate folder for each department or customer.

Note:

You cannot perform batch imports or updates unless you have admin access to all shared accounts.

To perform a batch import:

1. Manually inspect your file in a text editor and ensure it's in the prescribed tab-delimited format as detailed at Batch account import file format.
2. Select **Accounts > Batch Import / Update**.

   The **Batch Import/ Update** page is displayed.
3. Click **Choose File** to select the file to import. (The format of the file is described in Batch Account Import File Format).

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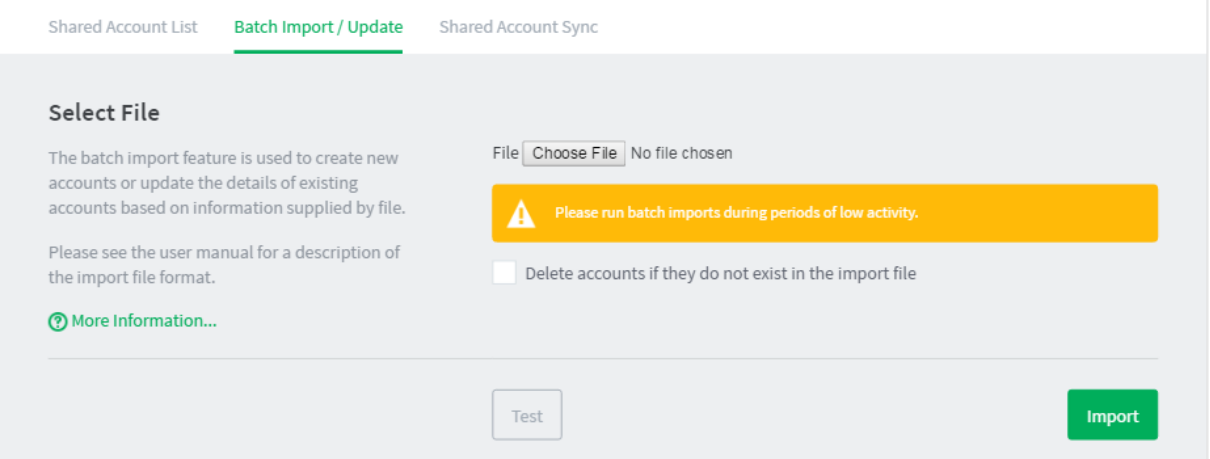

4. If you want to delete accounts that exist in PaperCut NG/MF but not in the import file, select the **Delete accounts if they do not exist in the import file** check box.
5. Click **Test**.
6. The window displayed indicates how many lines were processed, and how many shared accounts will be imported, updated, or deleted when you click **Import**.
7. If you are happy with the results of the test, click **Import**.

Tip:
Consider testing your import file format with a small sample first (e.g. maybe a copy of the file containing only the first five lines). This way any formatting mistake only propagates to a few accounts rather than all!

Some example shared account import files are located at `[app-path]/server/examples/import/shared-accounts/` in both Excel and TSV (tab separated values) formats. Use the Excel format to produce the TSV format by saving as `Text (Tab delimited)`. Examples include a flat list of accounts using the example of departments in a school (`school-departments.tsv`) and another with subaccounts using the example of a client-matter layout for a business' clients (`client-matter.tsv`).

4.5.3.1. Batch account import file format

The import file is in tab delimited format and contains the following fields in the given order.

Table 34: Shared account import file format

Column	Field	Description	Optional?	Limitations
A.	Parent Account Name	The name of this account's parent. When creating a top level account, leave the sub-account name blank (this is the account's name).	Mandatory	Max. 255 characters
B.	Sub-account Name	When creating a sub-account (1 level deep only), enter its name here.	Optional - account is top level if blank	Max. 255 characters
C.	Enabled	Whether or not this account is enabled.	Optional -	

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Column	Field	Description	Optional?	Limitations
		(Y/N where Y = YES, and N = No).	account is enabled if blank	
D.	Account PIN/Code	The account PIN/Code. For parent accounts, the code must be unique for all parent accounts. For sub-accounts, the code must unique amongst accounts with the same parent account.	Optional - PIN not set if blank	Max. 50 characters
E.	Credit Balance	The account balance. • When updating an existing user, a blank balance indicates that the existing balance is maintained without modification.	Optional - Balance not updated if blank	A number with no currency symbol or separators, using a full stop for the decimal separator. Correct: `1.23` Incorrect: `$1.23` or `1,23` or `1,023.00`
F.	Restricted Status	The account's restricted status. (Y/N where Y = YES, and N = No).	Optional - if blank, set to a configurable default	
G.	Users	Modifies the users who are allowed to select this account from the list (no CODE/PIN required). You can modify the access list as follows: • To replace the previously defined access list, use a pipe (|) delimited list of usernames. e.g. `user1|user2|user3` sets the list to these three users (removing any previously defined). • To add users to the existing access list, prefix the pipe delimited user list with a plus sign (+). e.g. `+user1|user2|user3` adds these three users to the access list. • To remove users from the existing user list, prefix the pipe delimited user list with a hyphen (−). e.g. `-user1|user2|user3` removes these three users from the access list.	Optional - users are not updated if blank	No real limit, but if there are many users consider using an access group instead

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Column	Field	Description	Optional?	Limitations
		• To remove all users from the access list, enter a hyphen (-).		
H.	Groups	Modifies the groups that are allowed to select this account from the list (no CODE/PIN required). To reference the special 'All Users' group, use the syntax `[All Users]`. You can modify the access list as follows: • To replace the previously defined access list, use a pipe (|) delimited list of groups. e.g. `group1|group2|group3` sets the list to these three groups (removing any previously defined). • To add groups to the existing access list, prefix the pipe delimited group list with a plus sign (+). e.g. `+group1|group2|group3` adds these three groups to the access list. • To remove groups from the existing group list, prefix the pipe delimited group list with a hyphen (-). e.g. `-group1|group2|group3` removes these three groups from the access list. • To remove all groups from the access list, enter a hyphen (-).	Optional - groups are not updated if blank	
I.	Invoice Option	The invoicing option defines how prints allocated to this account are invoiced. Available values are: `ALWAYS_INVOICE` - prints allocated to this account are always invoiced `NEVER_INVOICE` - prints allocated to this account are never invoiced `USER_CHOICE_ON` - it is up to the user whether or not to invoice prints allocated to this account. The default is yes. `USER_CHOICE_OFF` - it is up to the user whether or not to invoice prints allocated to this account. The default is no.	Optional - set to USER_CHOICE_ON if blank	
J.	Comment Option	The comments option defines whether or not comments are added to prints	Optional - set to COMMENT_	

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Column	Field	Description	Optional?	Limitations
		allocated to this account. Available values are: `NO_COMMENT` - comments cannot be added `COMMENT_REQUIRED` - comments must be added `COMMENT_OPTIONAL` - it is up to the user whether or not to add a comment	OPTIONAL if blank	
K.	Notes	Notes about the shared account (placed in the Notes field).	Optional - notes not set if blank	Max. 2000 characters

Other limitations: Although any actual limit to the size of an import file should be large enough for any purpose, we recommend keeping the file size below 10MB.

Tip:
A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, and then save it in the `Text (Tab delimited)` format.

Import file format examples

The following lines shows importing all the above fields. (The fields are separated by tabs).

```
Maths Y 12 5 N user1|user2 group1|group2 ALWAYS_INVOICE COMMENT_
REQUIRED Science Physics Y 1620 100 Y user3 NO_COMMENT A Note
Science Biology N 16 12.50 N group3 USER_CHOICE_OFF
```

The following lines show updating only the groups that can access the account. NOTE: The tabs still exist for the enabled status, pin, balance, restriction and users fields, but each entry is blank.

```
Maths group1|group2|group3 Science Physics group1 Science Biology
group3
```

Tip:
The shared account import process is triggered by the command-line scripting tool *server-command*. See Server commands (server-command).

4.5.4. Synchronize shared accounts with external source

The shared account synchronization feature allows the administrator to define an external source for shared accounts. This is useful for situations where shared accounts are managed by an external system, and allows PaperCut NG/MF to mirror the accounts without any additional administration.

Note:
You cannot perform shared account synchronization unless you have admin access to all

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shared accounts.

To enable shared account synchronization:

1. Select **Accounts > Shared Account Sync**.

   The **Shared Account Sync** page is displayed.
2. In **Source**, select the type of file containing the accounts you want to sync:
   - **Text file**—Synchronize shared accounts against a text file. For more information about the format of this text file, see Batch account import file format.
   - **File System Directory Scan**—Synchronize shared accounts against a directory structure. Many organizations have a 'Customers' folder or similar in their file system that contains one folder per customer. For example, given `Customers/Client 1` and `Customers/Client 2`, synchronizing against the `Customers` directory imports `Client 1` and `Client 2` as shared accounts.

   Tip:
   The location of the text file or directory (the sync source) is relative to the system where PaperCut NG/MF is installed, not the system being used to access the Admin web interface. The sync source should either be physically on that system, or accessible via a mapped / mounted drive. Additionally, the source should have permissions to be readable by the `Local System` account on Windows, or the `papercut` account on Mac or Linux.
3. Complete the following fields:
   - **File location / Directory location**—The location of the file or directory to sync against. The location is relative to the server.
   - **Perform**—How often the account sync should take place. The available options are **Hourly** and **Overnight**. If new accounts are added regularly throughout the day, **Hourly** is probably the best choice. The **Overnight** sync occurs nightly at approximately 12:55am.
   - **Treat subdirectories as sub-accounts**—(available only when the **Source** is **File System Directory Scan**). Select this check box to treat sub-directories as sub-accounts. For example, a directory structure of `Customers/Client 1/Project 1` produces a top level account called `Client 1` and a sub-account of `Client 1` called `Project 1`.
   - **Delete accounts that do not exist in the selected source**— delete accounts that exist in PaperCut NG/MF but not in the sync source. Use this option to clean out 'old' accounts. This option is not 'remembered' for the automatic synchronization, so accounts can be deleted only by selecting this check box; then clicking **Synchronize Now**. Deleting is a destructive operation. Don't forget to perform a test first and a backup is also advised!

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4. Click **Test**.

   The window displayed indicates how shared accounts were processed, and how many shared accounts will be imported, updated, or deleted when you click **Synchronize Now**.

5. If you are happy with the results of the test, click **Synchronize Now**. This triggers a shared account synchronization, and synchronization continues at the chosen interval.

4.5.5. Bulk shared account operations

A bulk shared account operation refers to an operation that is applied to more than one shared account. There are occasions where the same task needs to be performed on multiple accounts. With a large number of shared accounts, it can take too long to perform the task manually on each one; this is where bulk account operations are useful.

Bulk account actions are in the **Actions** list on the **Accounts** tab.

> **Note:**
> You cannot perform bulk account operations unless you have admin access to all shared accounts.

Some examples of where bulk account operations might come in useful include:

- Resetting shared account balances at the start of a new billing period.
- Introducing a new printing policy or account model that needs to be rolled out across all shared accounts.
- Temporarily disabling shared accounts. For example, over the holiday period when there should be no shared account based printing.
- Giving to a particular group access to all shared accounts.

> **Caution:**
> The bulk account operations are one-way and cannot be undone. Always carefully consider the operation before proceeding. If you are unsure of the function or behavior, performing a backup prior to undertaking the operation is advised.

You can perform the following tasks through bulk account operations:

- Adjust of set the accounts' credit (perform a transaction)
- Change the accounts' restriction status
- Disable the accounts for a specified period of time
- Change the invoicing option
- Change the comments option
- Change the cost multiplier
- Change the security settings
- Change quota scheduling settings

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4.5.6. Allocate a shared account quota

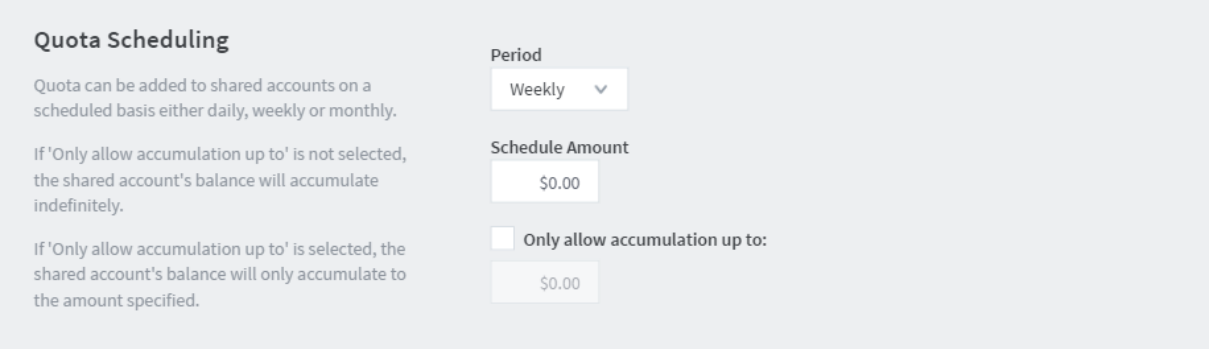
Sometimes organizations want to control printing to shared accounts. You can do this by allocating quotas on a periodic basis.

To allocate a $100.00 weekly quota to `Science` account:

1. Click the **Accounts** tab.

   The **Shared Account List** page is displayed.
2. Select **an** account.

   The **Account Details** page is displayed.
3. In the **Quota Scheduling** area, in Period, select **Weekly**.



4. In **Schedule Amount**, enter **100.00** .
5. If you want to limit the amount by which the shared account can accumulate, select the **Only allow accumulation up to** check box; then enter the amount.
6. Click **OK**.

Quota for shared accounts is allocated very similarly to group quota. See Set up quota allocations for more details about quota scheduling.

For details about scheduling times, refer to Set up quota allocations.

4.5.7. Apply a cost multiplier to a shared account

Sometimes organizations want to charge different amounts to different shared accounts. You can set a cost adjustment multiplier on a shared account. For example, by setting the **Multiply cost by** to 50%, then printing to the shared account costs 50% less. Setting the **Multiply cost by** to 125% costs 25% more.

To provide a discount to the example "Administration" shared account:

1. Click the **Accounts** tab.

   The **Shared Account List** page is displayed.
2. Select the **Administration** account.
3. In the **Advanced Options** area, select the **Multiple cost by** check box; then enter **50**.

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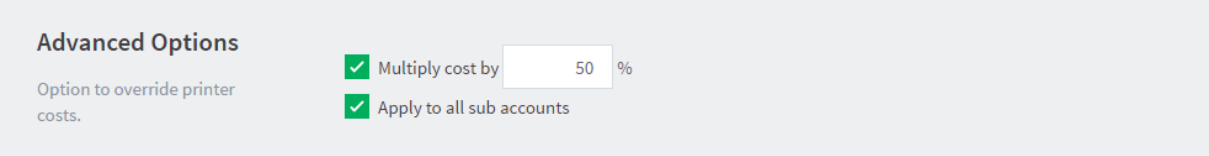

4. If you want to apply same cost adjustment to all it's sub accounts of **Administration**, select the **Apply to all sub accounts** check box.
5. Click **Apply**.

If you want to apply same settings to multiple accounts you can use **Bulk account actions**. For more information, see Bulk shared account operations.

4.5.8. Customize shared accounts

You can customize the functionality of shared accounts to suit a wide range of uses. There are several advanced options available throughout PaperCut NG/MF to control this customization:

- *Make shared account PIN/code visible*

  When this option is active, the purpose of the shared account PIN is changed. Usually the PIN is equivalent to a password, and can be required before a user is able to charge to a shared account. When this setting is active, the PIN is treated as a 'code' instead; that is, a unique identifier for a given shared account. For example, an organization dealing with projects might allocate a shared account the project code `123`.

  When this option is active it has several effects throughout PaperCut NG/MF, including:

  - The shared account list (on the **Accounts** tab) includes the shared account code.
  - Reports dealing with shared accounts display the code.
  - On the account selection popup dialogue of the User Client, the code is visible when entering (i.e. it is no longer hidden by stars). This allows charging to a shared account by code, rather than scrolling through the list to find the correct account by name.

  To activate this option:

  1. Click the **Options** tab.

     The **General** page is displayed.
  2. In the **Account Options** area, select the **Make shared account PIN/code visible** check box.

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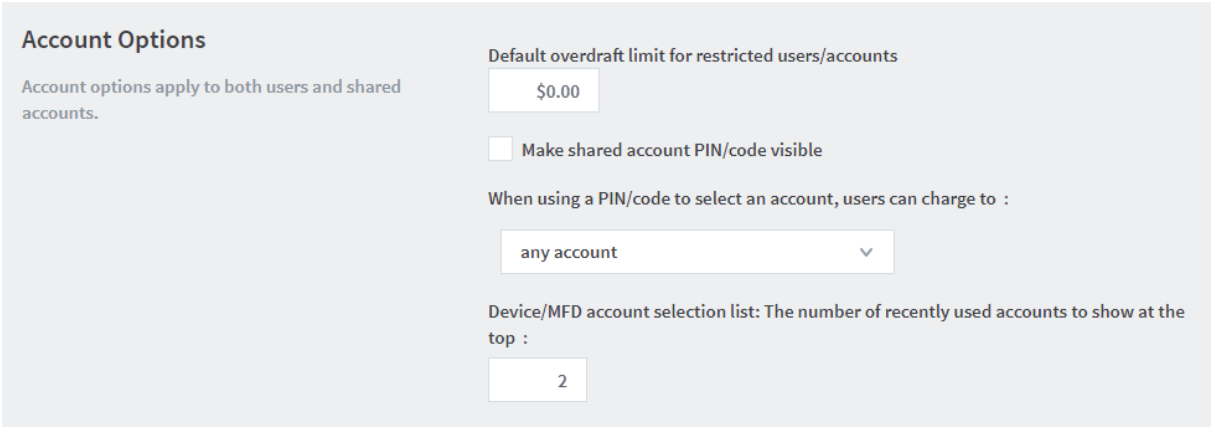

3. Click **Apply**.

4.5.9. Grant access to shared accounts

By default all printing is automatically charged to a user's personal account. However, for a user to be able to select a shared account to charge to, you must:

- enable them with the relevant Account Selection options (See Account selection), and
- grant them access to the required shared accounts.

You can control shared accounts access using two methods:

- PINs (also known as security codes or passwords)
- Network group membership

4.5.9.1. Account security using PIN/codes

If an account is allocated a PIN (an alpha-numeric access code) users with knowledge of the PIN can select the account. A PIN based system would be a sensible selection in an organization when PINs are already in use for other systems such as photocopiers or door access codes.

Tip:
PINs/codes can also be used when using parent and sub-accounts. To select a specific sub-account from the client software, both the parent and sub-account pins are required. Enter them in the format of: `[parentPIN]-[subPIN]` (i.e. they are separated by a hypen).

PIN/codes provide a convenient way to select shared accounts. However, this convenience can compromise security when short or guessable PINs are used. For this reason PaperCut NG/MF allows the user/group security to be also applied to PIN/code access. This allows sites to use convenient and short codes with confidence that only authorized users are granted access.

To enforce user/group security for PIN/code access:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Account Options** area, change **When using a PIN/code to select an account,**

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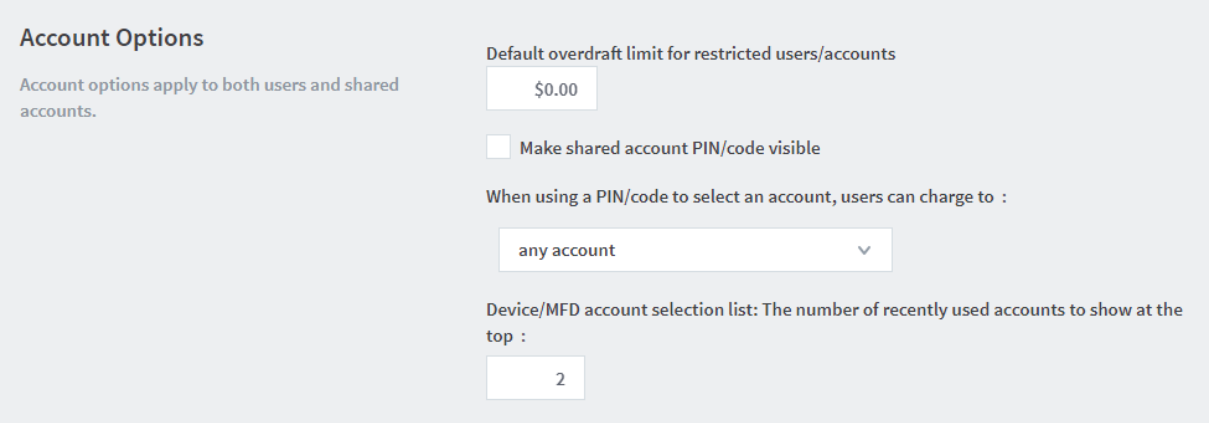
users can charge to to **only those accounts they have access to**.



3. Click **Apply**.

With this setting changed, users can select only an account using the PIN/code when they:

- know the PIN/code; and
- are in the shared account's user/group security

4.5.9.2. Account security using network group membership

An alternate method is to delegate access to the shared account via network group membership. One advantage of group based control is that users do not have to remember PINs. Most medium to large organizations already have their network structured into suitable groups representing their position, title, department or work area. Use these existing groups to control access. Access to shared accounts can also be granted on an individual user basis, however, best practice suggests group-based management for medium to large networks.

Tip:
In a Windows Active Directory environment, Organization Units are treated as special groups. This means you can also use them to control access to a shared account. Controlling access to shared accounts via group membership rather than individual user accounts is recommended. By using group based control, new users created on the network inherit the correct account access by virtue of their network group membership. This alleviates the need for additional user modification inside PaperCut NG/MF.

To grant access to a shared account for all members in a given network group:

1. Click the **Accounts** tab.

   The **Shared Account List** page is displayed.
2. Select **an** account.

   The **Account Details** page is displayed.
3. Click **Security**.
4. Select the appropriate group from the list.

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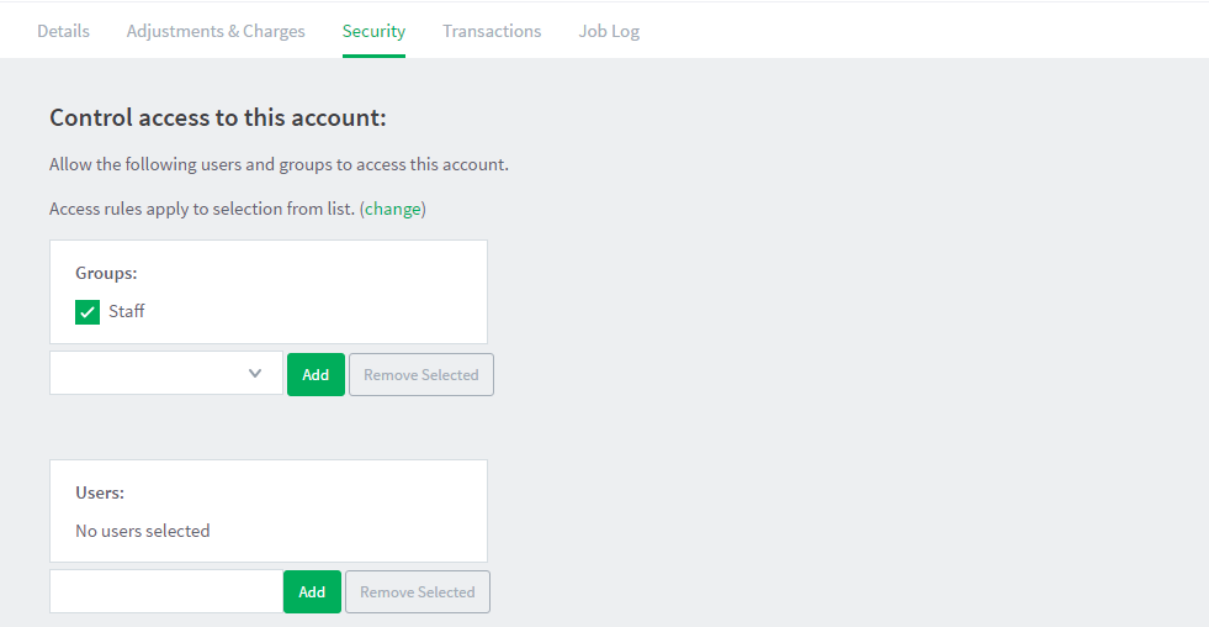
5. Click **Add**.



Tip:
To simultaneously change security settings of multiple shared accounts, click the **Bulk account actions** link on the **Accounts** tab. For more information, see Bulk user operations.

4.5.10. Account selection

Every print job must be charged or assigned to an account. This can be a personal or shared account. The account can be either automatically assigned, or selected by a user at the MFD or via the User Client. If required, you can make both of these options available to your users as each method is suitable for different printing scenarios, for example, printing from a computer versus printing from a mobile device. To enable your users to do this, you must configure them with the relevant Account Selection options. For more information, see Account selection configuration.

Account selection at the MFD

For PaperCut MF, the simplest method for account selection is for users to assign an account directly at the MFD. It doesn't matter if users are printing in the Mobility Print environment from a mobile device (such as a smart phone or a tablet) or from a computer; the experience is streamlined. It also eliminates the need for an additional tool like the User Client. All users, including Mobility Print users can select or change the account at the MFD.

For more information, see Assigning accounts to print jobs at the MFD.

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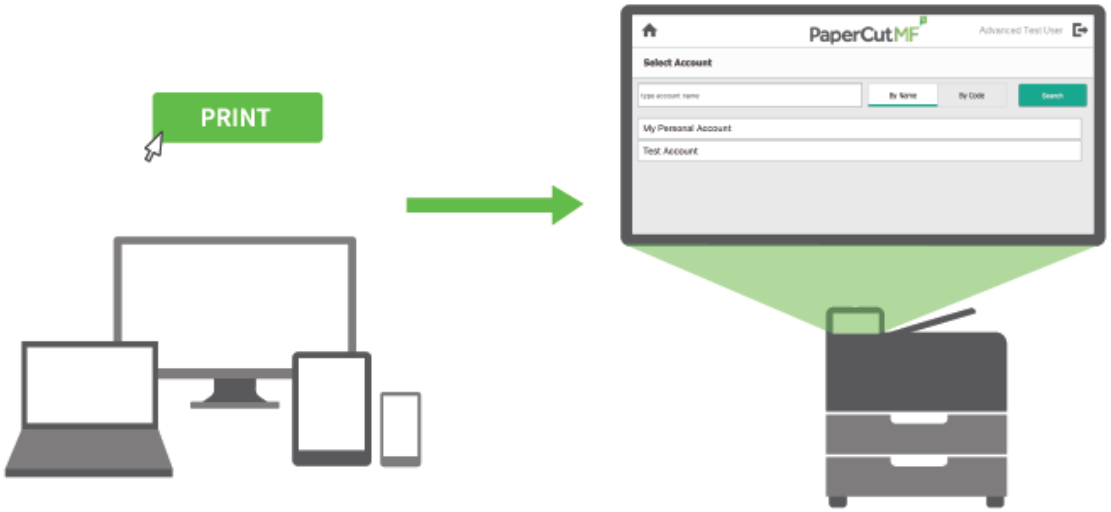

Important:

If you have one of the following configurations, your users must use the User Client for printing from a computer (or the Mobile web client when printing from a mobile device):

- MFDs that do not support assigning accounts at the MFD (see System requirements).
- users who have permission to release jobs printed by other users, or charge a job to another user (for example, delegated print release).
- unauthenticated printing.
- users who need to do more than just assigning accounts, for example, cost adjustments (available only in the User Client).
- overrides and print scripts that affect account selection, such as the printJobAfterAccountSelectionHook, Print Scripting with Mobility Print, etc (available only in the User Client).

Account selection via the User Client

The User Client is another great way to assign accounts to jobs sent from computers, particularly when there are a large number of accounts. Apart from offering the ability to assign accounts, the User Client also offers the following features:

- Cost adjustments
- Preferred Account List
- Recently Selected Account List

For more information, see the User Client.

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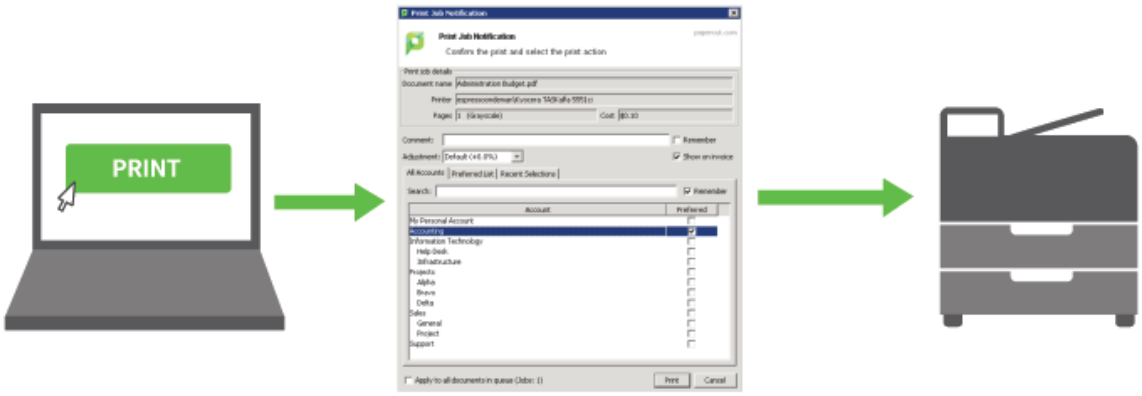
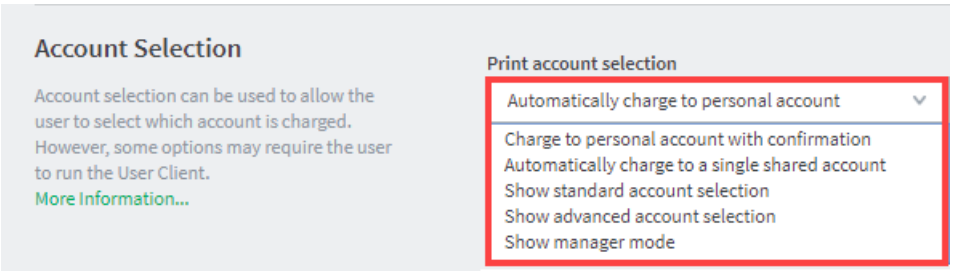


Important:
While the User Client is ideal for printing from a computer when these advanced account selection features are needed, it cannot be used when printing via Mobility Print. This is because it cannot be installed on mobile devices.

Account selection configuration

To enable users with the ability to assign an account (personal or shared) to a print job (at the MFD and/or via the User Client), you must configure them with the relevant Account Selection options:



- **Automatically charge to personal account**

  All printing is automatically charged to the user's personal account, without any user interaction.
- **Charge to personal account with confirmation**

  All printing is automatically charged to the user's personal account, with minimal user interaction.
- **Automatically charge to a single shared account**

  All printing is automatically charged to a selected account, without any user interaction.
- **Show standard account selection**

  Printing is charged to an account selected by the user, and is suitable to environments with few shared accounts. This requires user interaction.

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- **Show advanced account selection**

  Printing is charged to an account selected by the user, and is suitable to environments with many shared accounts that are used frequently. This requires user interaction.

- **Show manager mode**

  This is designed for authorized users in the role of "print managers" who perform printing on behalf of other users, providing them with several options, such as being able to charge printing to any user or account, apply adjustments to the job costs (e.g. for charge for special paper, binding, etc). This is suitable to print rooms where staff print on behalf of other users and email them to the users; these print jobs often involve complex instructions such as binding, color paper covers, etc. This requires user interaction.

4.5.10.1. Automatically charge to personal account

Important:
This does not require account selection by the user.

All printing is automatically charged to the user's personal account, without any user interaction. This mode is useful when a user only ever charges printing to a single personal account and does not require all the other Account Selection options that require additional user interaction.

You can select this option for:

- an individual user
- multiple users

For an individual user

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. In the **Account Selection** area, in **Print account selection**, select **Automatically charge to personal account**.
4. Click **OK**.

For multiple users

The **Bulk user actions** action is a convenient way to apply this change to many users.

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.
3. In the **Change settings** area, select the **Change account selection setting** check box;

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then select **Automatically charge to personal account**.

4. Click **OK**.

For all new users in a group

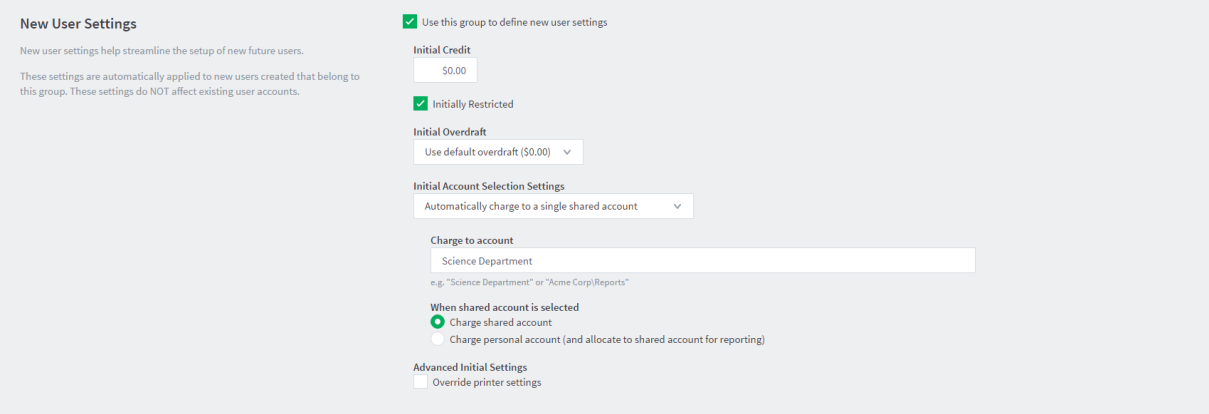
1. Click the **Groups** tab.

   The **Group List** page is displayed.

2. Select a group.

   The **Group Details** page is displayed.

3. In the **New user setting** area, select the **Use this group to define new user settings** check box.



4. In **Initial Account Selection Settings**, select **Automatically charge to personal account**.
5. Click **OK**.

4.5.10.2. Charge to personal account with confirmation

Important:
This requires the User Client. Users will not see their print job at the MFD unless they have confirmed the job via the User Client.

All printing is automatically charged to the user's personal account. But requires users to confirm this action, ONLY via the User Client (even if the ability to assign accounts at the printing device is available). This mode is useful when a user only ever charges printing to a single personal account and does not require all the other Account Selection options that require additional user interaction.

You can select this option for:

- an individual user
- multiple users

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For an individual user

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. In the **Account Selection** area, in **Print account selection**, select **Charge to personal account with confirmation**.
4. Click **OK**.

For multiple users

The **Bulk user actions** action is a convenient way to apply this change to many users.

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

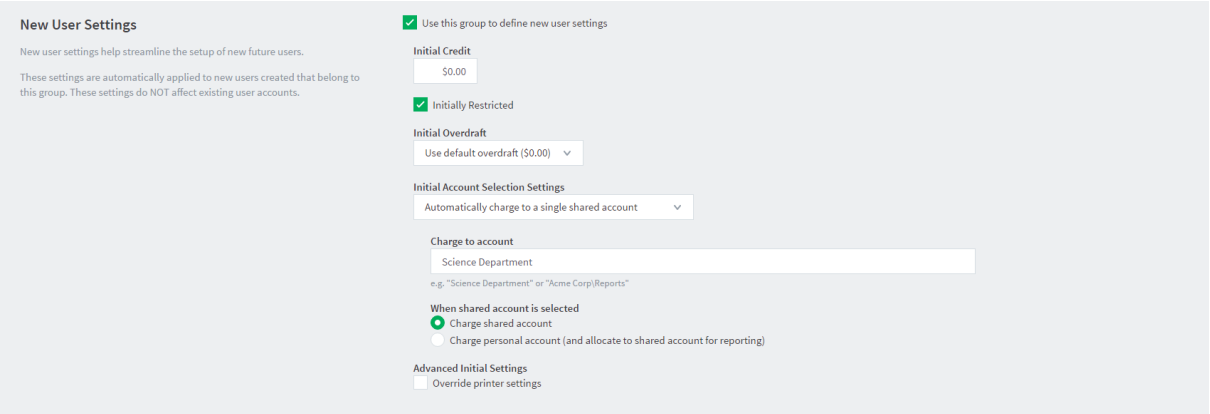
   The **Bulk User Operations** page is displayed.
3. In the **Change settings** area, select the **Change account selection setting** check box; then select **Charge to personal account with confirmation**.
4. Click **OK**.

For all new users in a group

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. Select a group.

   The **Group Details** page is displayed.
3. In the **New user setting** area, select the **Use this group to define new user settings** check box.



4. In **Initial Account Selection Settings**, select **Charge to personal account with confirmation**.
5. Click **OK**.

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4.5.10.3. Automatically charge to a single shared account

Important:
This does not require account selection by the user.

All printing is automatically charged to a selected account, without any user interaction. This mode is useful when a user only ever charges printing to a single account and does not require all the other Account Selection options that require additional user interaction.

An example of where this would be useful is in a school or business environment where shared accounts represent a department within the organization.

You can select this option for:

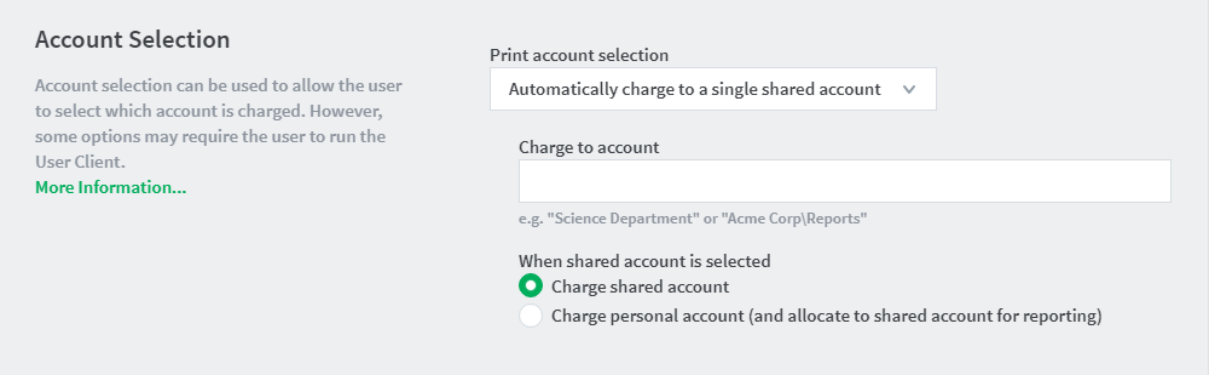
- an individual user
- multiple users
- initial user settings on the **Group List** page. Once the **Automatically charge to a single shared account** option is selected, then enter the account name to charge. To select a sub-account the account name must be entered in the parent\sub-account format.

For an individual user

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. In the **Account Selection** area, in **Print account selection**, select **Automatically charge to a single shared account**.
4. Complete the following fields:
   - **Charge to account**—enter the name of the shared account to which costs will be charged by default.
   - **When shared account is selected**—select whether you want to charge costs to the shared account or the user's personal account.



5. Click **OK**.

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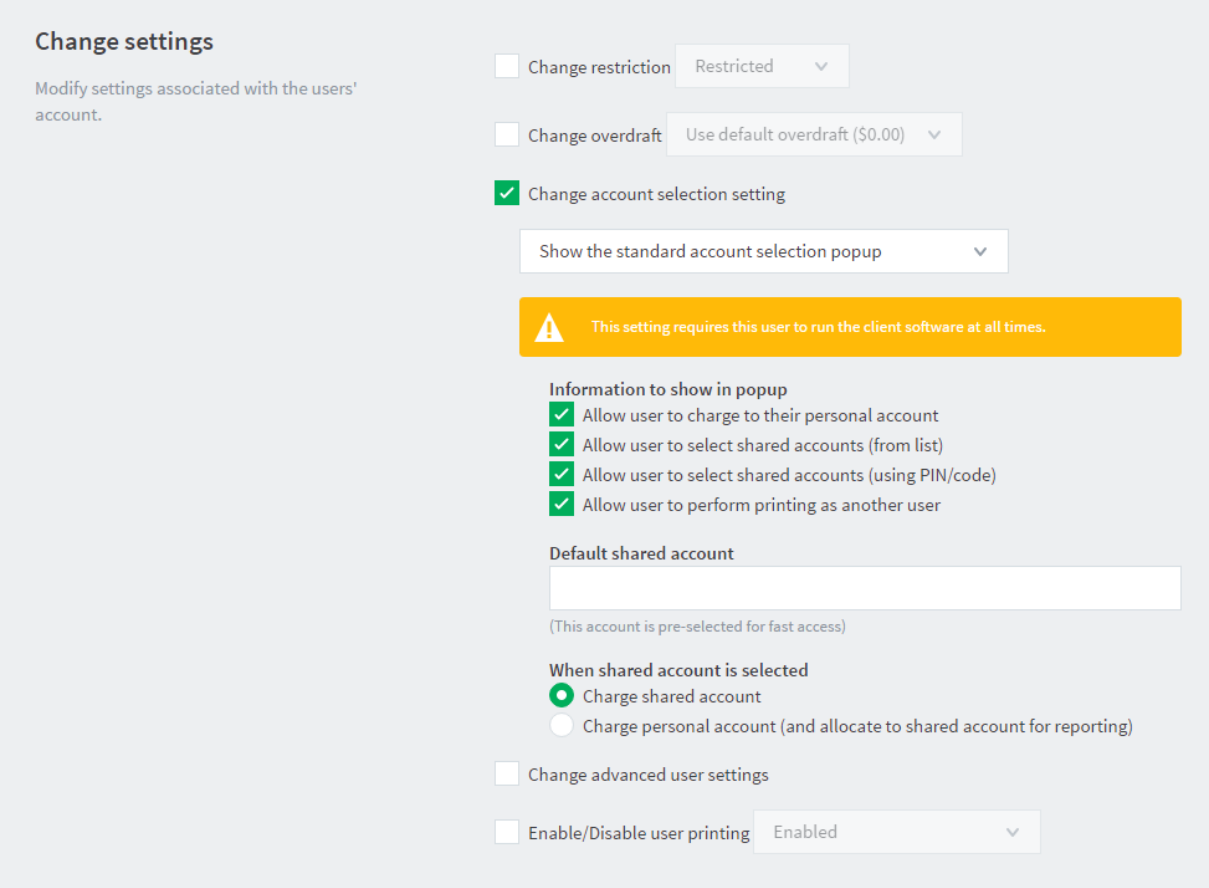
For multiple users

The **Bulk user actions** action is a convenient way to apply this change to many users.

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.
3. In the **Change settings** area, select the **Change account selection setting** check box; then select **Automatically charge to a single shared account**.



4. Complete the following fields:
   - **Charge to account**—enter the name of the shared account to which costs will be charged by default.
   - **When shared account is selected**—select whether you want to charge costs to the shared account or the user's personal account.
5. Click **OK**.

For all new users in a group

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. Select a group.

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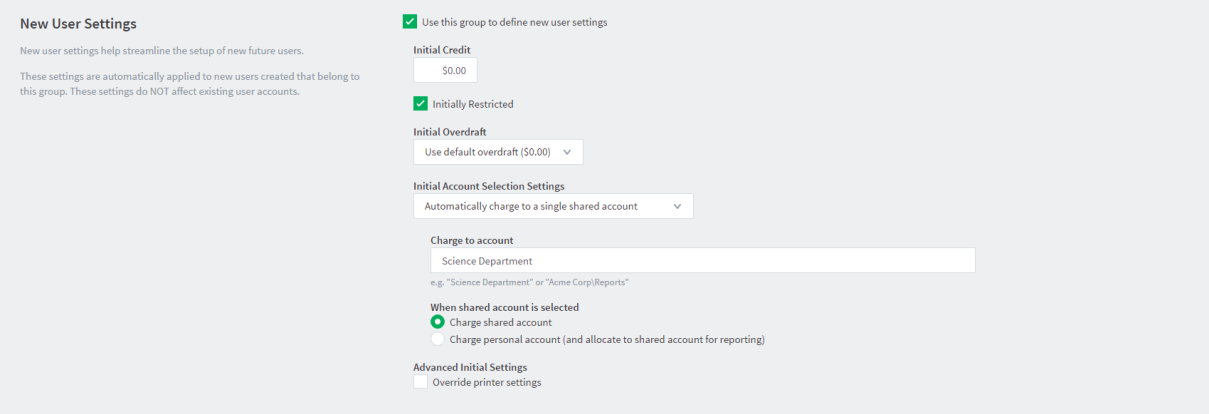
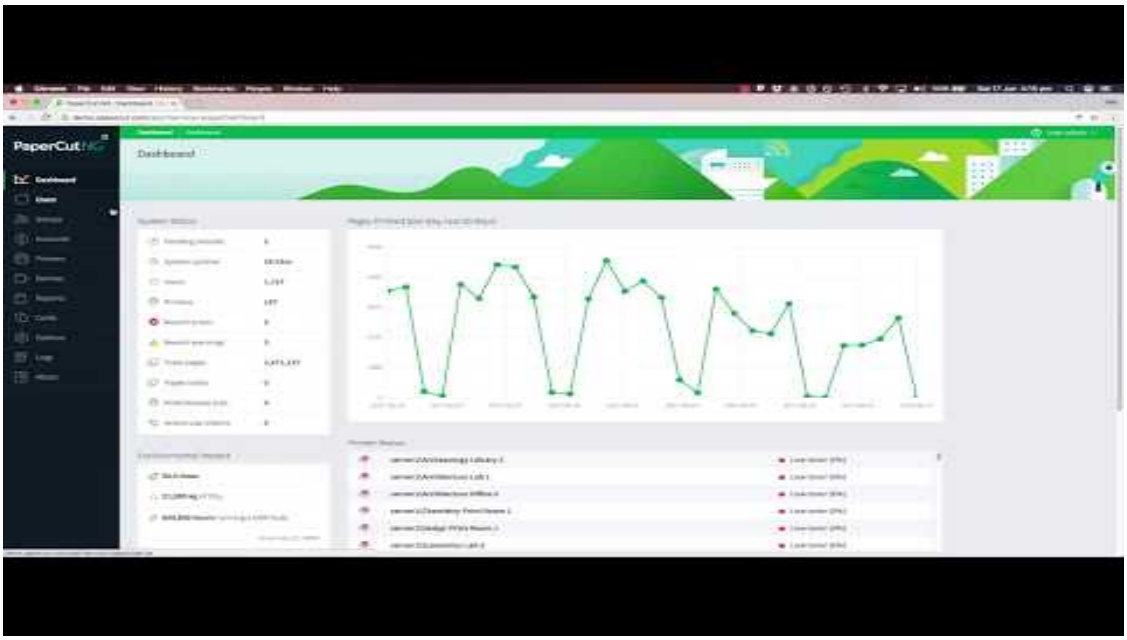
The **Group Details** page is displayed.

3. In the **New user setting** area, select the **Use this group to define new user settings** check box.



4. In **Initial Account Selection Settings**, select **Automatically charge to a single shared account**.
5. Complete the following fields:
   - **Charge to account**—enter the name of the shared account to which costs will be charged by default.
   - **When shared account is selected**—select whether you want to charge costs to the shared account or the user's personal account.
6. Click **OK**.

4.5.10.4. Show standard account selection



Printing is charged to an account selected by the user, and is suitable to environments with few shared accounts.

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Allow user to

This requires user interaction, and is based on the options you allow the user to have when assigning an account to a print job:

- **Charge to their personal account**

> **Important:**
> If the only option configured is to **Charge to their personal account**, then the User Client is required. For more information see User Client and Assigning accounts to print jobs at the device.

- **Select shared accounts from a list**—When a shared account is selected by a user, the **Default shared account** option allows you to specify a default shared account, which is pre-selected for the user, further accelerating the process of selecting a frequently used account.
- **Select shared accounts using a PIN/code**
- **Print as another user**

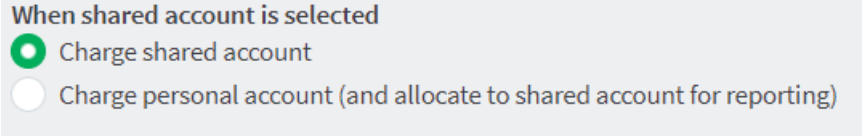
> **Note:**
> - The User Client is required for this option.
> - For more information about the **Print as another user** option, see Account selection in non-domain environments (workgroups).

When shared account is selected

When a shared account is selected by a user, the **When shared account is selected** option further allows you to configure whether the print job is then actually charged to:

- the selected shared account, or
- the user's personal account, but in reports the job is allocated to the selected shared account.

> **Note:**
> This allows printing to be tracked against shared accounts while allowing the use of user-based quotas. The cost of the print job is deducted from the user's personal account, but the job is allocated against the shared account, which allows for account based print reporting.



> **Note:**
> Changes made to any of these options for any user, take effect immediately and do not

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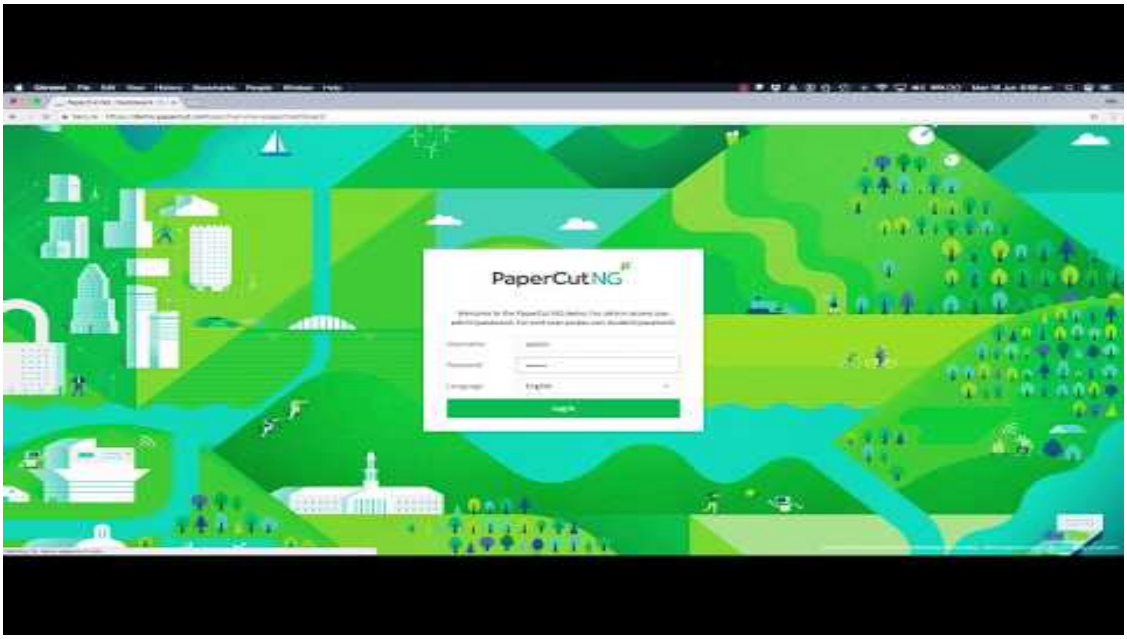
require the User Client to be restarted.

4.5.10.5. Show advanced account selection



Important:
This requires the User Client, if the ability to assign accounts at the printing device is unavailable. For more information see User Client and Assigning accounts to print jobs at the device.

Printing is charged to an account selected by the user, and is suitable to environments with many shared accounts that are used frequently.

This requires user interaction, and by default allows the user to have the following options when assigning an account to a print job:

- **Account search**

  Users can select the account to charge to by searching for it using the account's name or code, making it much easier to find an account when there are many in the list. The search can also be cached.

- **All Accounts list**

  Users can select the account to charge to from a hierarchical list (i.e. sub-accounts are indented from their parent accounts for clarity).

- **Preferred Accounts List**

  Users can select the account to charge to from a list of most commonly used, preferred accounts. This is a useful feature when many accounts exist, but each user mostly just uses a few of them.

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> **Note:**
> This is not available when selecting an account at the MFD.

- ### Recently Selected Accounts List

  Users can select the account to charge to from a list of recently used accounts. This is a useful feature when many accounts exist, but each user mostly just uses a few of them, almost all the time.

  > **Note:**
  > This is not available when selecting an account at the MFD.

- ### Comments

  Users can enter comments for a print job. For example, to explain the reason for the cost adjustments.

- ### Cost Adjustments

  Users can apply the available, pre-configured cost adjustments on a print job. For example, a 200% adjustment could be defined for manually loading photo paper (charge twice the standard cost). Other common examples of adjustments include Mylar Film, draft paper, draft printing mode, discounts for "special" customers/jobs, and extra for binding and manual handling.

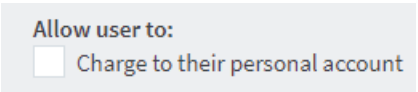
  For more information about configuring cost adjustments that are available to users (including percentage rate adjustment, per job adjustment, per page adjustment), at a global or printer level, see Define cost adjustments.

  > **Note:**
  > This is not available when selecting an account at the MFD.

- ### Show on invoice

  Users can toggle the inclusion of the print job cost on the invoice. For example, sometimes users may want to assign an account to a print job, but not have it included on any invoice reports.

In addition to the above options that are available by default, the **Charge to their personal account** allows you to give the user this additional option when assigning an account to charge the print job to.



When a shared account is selected by a user, the **Default shared account** option allows you to specify a default shared account, which is pre-selected for the user, further accelerating the process of selecting a frequently used account.

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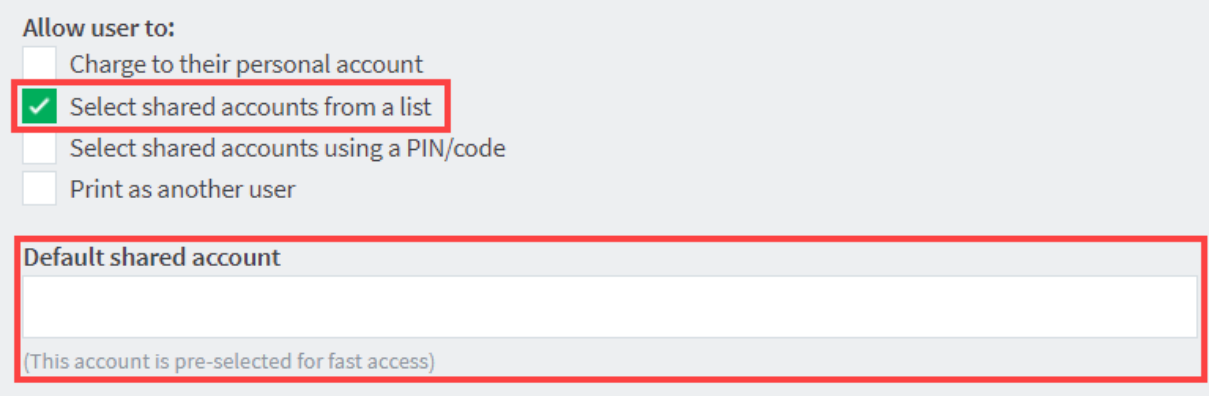
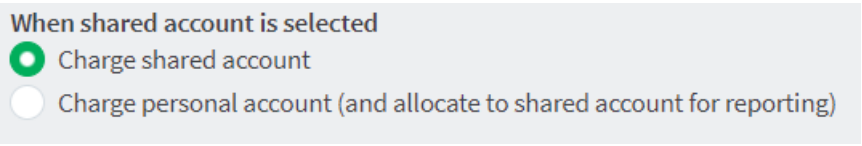


When a shared account is selected by a user, the **When the user selects a shared account** option further allows you to configure whether the print job is then actually charged to:

- the selected shared account, or
- the user's personal account, but in reports the job is appears as allocated to the selected shared account.

> **Note:**
> This allows printing to be tracked against shared accounts while allowing the use of user-based quotas. The cost of the print job is deducted from the user's personal account, but the job is allocated against the shared account, which allows for account based print reporting.



> **Note:**
> Changes made to any of these options for any user, take effect immediately and do not require the User Client to be restarted.

Enabling Advanced Account Selection for all users

In a Professional (Client Billing) installation, users who print jobs for clients are often enabled with the **Advanced Account Selection** option. After deploying the User Client on user workstations (if required), you can configure users with this option, either one user at a time or update for all users in bulk.

Use the **User Details** page to enable the **Advanced Account Selection** option for a single user.

To enable the the **Advanced Account Selection** option for all users in bulk:

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1. Click the **Users** tab.

   The **User List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.

   > **Tip:**
   > By default the action is applied to all users (the special `[All Users]` group). To apply the action to a subset of users (a user group), select that group from the list.
3. In the **Change settings** area, select the **Change account selection setting** check box; then select **Show advanced account selection** from the list.
4. If you do not want to allow users to charge printing to their personal account (i.e. they must select a shared account) then clear the **Allow user to charge to their personal account** check box.
5. Click **OK**.

   A confirmation window is displayed.
6. Click **OK**.
   Once completed, the **Advanced Account Selection** option is enabled for the selected users. It is recommended that you test this from the User Client on a desktop or on the printing device (if applicable). Ensure that user interaction provided is as per the configured **Advanced Account Selection** option. Once the interaction is completed, ensure that the job is printed, logged and appropriate account charged.

4.5.10.6. Show manager mode

> **Important:**
> This requires the User Client.

This is designed for authorized users in the role of "print managers" who perform printing on behalf of other users, providing them with several options, such as being able to charge printing to any user or account, apply adjustments to the job costs (e.g. for charge for special paper, binding, etc). This is suitable to print rooms where staff print on behalf of other users and email them to the users; these print jobs often involve complex instructions such as binding, color paper covers, etc.

This requires user interaction that can ONLY be done via the User Client (even if the ability to assign accounts at the printing device is available), and by default allows the user to have the following options when assigning an account to a print job:

- **Select user**

  Users can select any user to charge to by specifying the username or ID number. The print job is logged under this user's account.

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- ### Select Account

  Users can select the account to charge to from a list of most commonly used, preferred accounts. This is a useful feature when many accounts exist, but each user mostly just uses a few of them

  The print job can be charged to the user's personal printing account or any of the shared accounts in the system. Users can select the shared account from a list, or by using the account code/PIN

- ### Standard Cost Adjustments

  Users can apply the available, pre-configured standard cost adjustments on a print job. For example, a 200% adjustment could be defined for manually loading photo paper (charge twice the standard cost). Other common examples of adjustments include Mylar Film, draft paper, draft printing mode, discounts for "special" customers/jobs, and extra for binding and manual handling.

  For more information about configuring cost adjustments that are available to users (including percentage rate adjustment, per job adjustment, per page adjustment), at a global or printer level, see Define cost adjustments.

- ### Custom Cost Adjustments

  Users can apply customized cost adjustments (per page, per copy, per job) on a print job. For example, special binding, delivery, etc

- ### Comments

  Users can enter comments for a print job. For example, to explain the reason for the cost adjustments.

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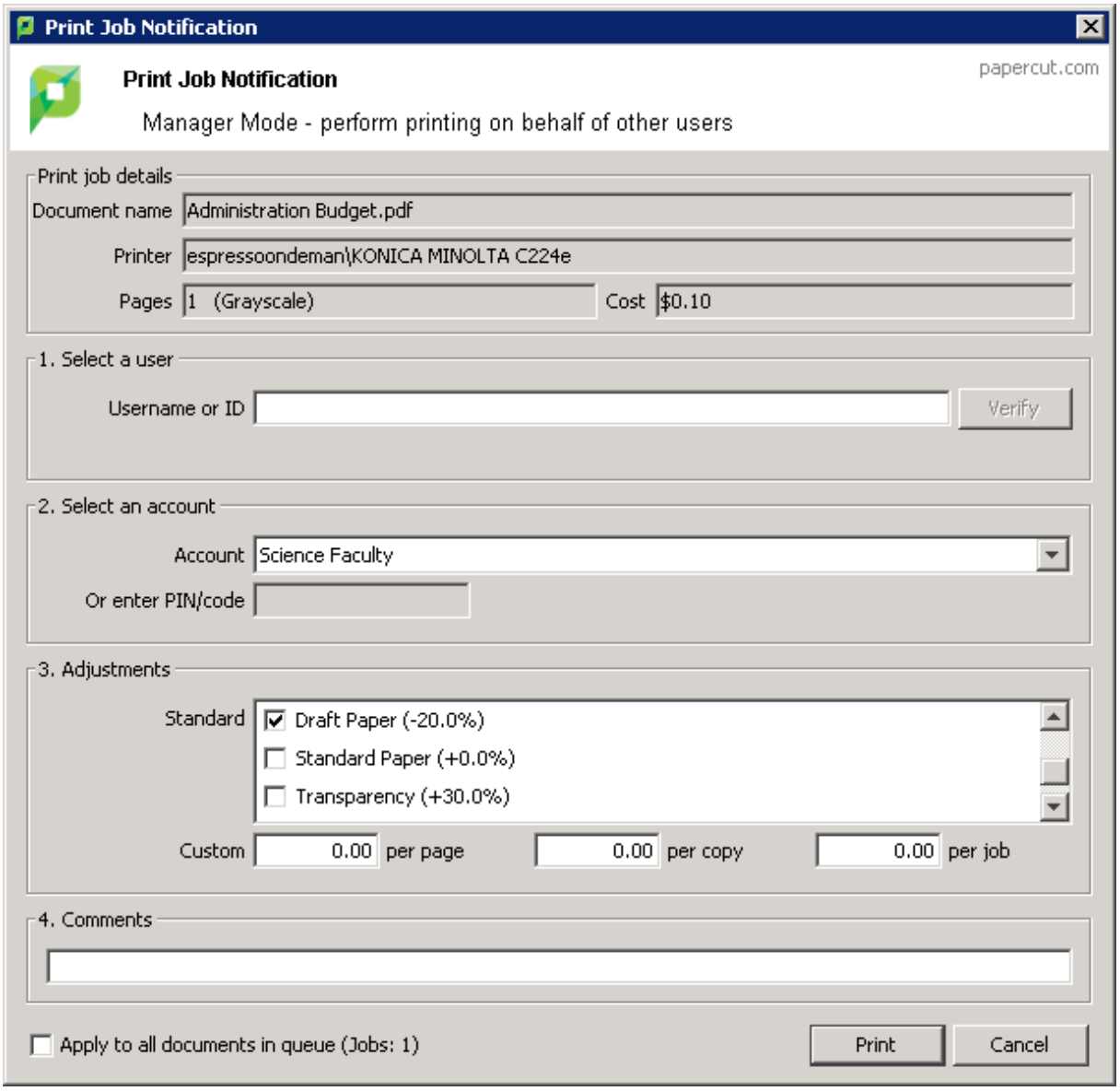

4.5.11. Account selection in non-domain environments (work-groups)

Important: This requires the User Client.

Many small networks are not controlled via a central domain server. These networks are sometimes referred to as workgroups or peer-to-peer networks. On these networks users cannot log on to their desktop, or computers might be shared by multiple users. In these non-domain/logon environments, user accounts need to be set up in the system hosting the printers (see Internal users (users managed by PaperCut NG/MF)).

After which, users can be configured with the **Show standard account selection** > **Allow user to: Print as another user** option:

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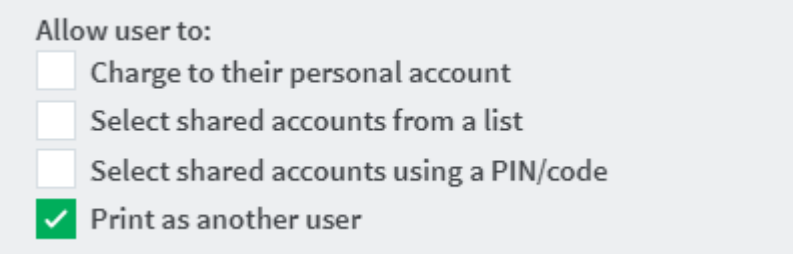
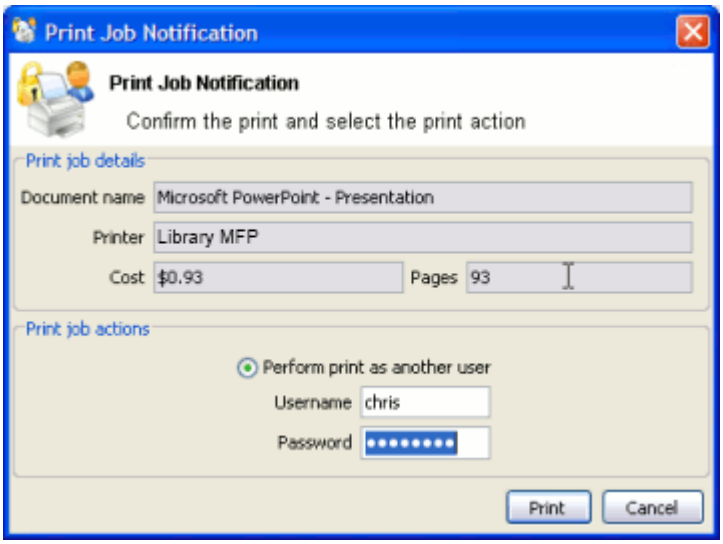


Users select their account using usernames and passwords for each print job, irrespective of which user account is currently logged onto the workstation. This user interaction that can ONLY be done via the User Client (even if the ability to assign accounts at the printing device is available):



4.6. Printer management

This section covers some of the more advanced printer management tasks. Advanced printer management has the following high-level concepts:

- Activity monitoring
- Encouraging appropriate use
- Managing the addition of new printers

This section addresses these management areas and covers tools available in PaperCut NG/MF to assist administrators.

4.6.1. Add and remove/delete/ignore printers

Note:
When a printer is deleted via the Admin web interface, PaperCut MF retains the associated data for reporting.

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4.6.1.1. On Windows

PaperCut NG/MF tracks all print queues *local* to the system by default. Local print queues are those that have been set up on the server running PaperCut NG/MF with a local port, such as: a TCP/IP connection to a network printer, an LPR connection, or a printer attached locally via USB or LPT. Standard Windows print queues that are hosted on a different system, or re-shared, are not tracked (you can track these queues by setting up a *secondary print server*, see Configuring secondary print servers and locally attached printers).

New print queues added to the system should show up automatically in PaperCut NG/MF, however, in some rare situations the printer shows up only after the first print job is sent.

Under some situations you might not want to track all printers. Some examples of why an administrator might not want to monitor a printer include:

- The printer is a virtual printer such as a PDF generator, FAX, or document management program.
- The administrator might want to offer free printing on a selected printer and is not concerned with monitoring (silent monitoring with a zero page cost also achieves this).
- The printer might not be supported by PaperCut NG/MF and needs to be ignored.

The *Print Provider* component is responsible for locating and tracking the printers. To instruct it to ignore a printer:

1. On the computer system hosting the queue to be added/removed/ignored, open the file `[app_dir]\providers\print\win\print-provider.conf` in a text editor such as Notepad.
2. Locate the line `IgnorePrinters=` and enter the full name of the printer on the right-hand-side of the equals line. For example:
   ```
   IgnorePrinters=Office Printer
   ```
   > **Note:**
   > This is the printer's locally assigned name and not the name of its network share.

   If you have multiple printers to ignore, then separate the each printer name with a comma. For example:
   ```
   IgnorePrinters=Office Printer,Copy Room Printer
   ```
   Wildcard expressions can also be used. Use '*' to ignore any span of characters, and '?' to ignore a single character. For example, to ignore any printers that start with the phrase *Copy Room*:
   ```
   IgnorePrinters=Copy Room*
   ```
3. Restart (stop then start) the `PaperCut Print Provider` component under **Start > Control Panel > Administrative Tools > Services**
4. In the Admin interface, delete the printer from PaperCut NG/MF:

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a. Click **Printers**; then click the name of the device you want to delete.
b. In the **Actions** menu, click **Delete this device**.
c. Click **OK**.

5. Test the changes by printing to the deleted printer and ensuring the printer does not re-register itself in the system. It if does, verify the name assigned under the `IgnorePrinters=` setting is correct.

4.6.1.2. On Mac

When you first install PaperCut NG/MF, all printers are automatically added. If you add any printers to your print server after installation, they are also automatically added to PaperCut NG/MF. The monitored printers are listed on the **Printer List** page. If the printers are not displayed, try printing a document. The first job triggers registration.

You can, however, change the configuration so that new printers are not automatically added. You might want to do this if you do not want all printers monitored. If that is the case, you need to manually add the required printer. For more details, see To manually add a printer.

To manually add a printer

Important:
You cannot use the automatic addition of printers functionality if one or more printers in your network are not tracked.

1. Ensure the **Print Setup Utility** is closed.
2. Stop new printers from being automatically added to PaperCut NG/MF:
   a. On the computer system hosting the queue to be added/removed/ignored, In a text editor such as Notepad, open the file: `[app_dir]\providers\print\mac\print-provider.conf`.
   b. Locate the line `EnablePrinterAutoImport=on`.
   c. Change `on` to `off`.
   d. Save the file.
   e. Restart the secondary server.
   The service is called `papercut-event-monitor` on both Mac and Linux machines. For more information, see How to Enable Debug in the Print Provider.
3. On the print server, open a terminal.
4. Navigate to:
   ```
   cd [app_directory]/providers/print/mac-*
   ```
5. Type the following command:
   ```
   sudo ./configure-cups --list
   ```
   A list of all printers connected to the server is displayed.
6. To add a printer, type the following command:

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```
sudo ./configure-cups --add <printer name>
```

The printer is now added to the server.

7. Type the following commands:

```
cd ~/providers/print/mac
sudo ./configure-cups --help
```

The options available in this tool are displayed.

8. Test the changes by printing to the printer.

Note:

PaperCut NG/MF also has an interactive script that allows you to enable or disable monitoring of each individual printer. This tool has the advantage of being easy to use, however, you need to re-enable or re-disable every printer each time you make a change to a single printer.

1. Double-click the `Control Printer Monitoring.command` script.

   `/Applications/PaperCut NG/MF/Control Printer Monitoring.command`.

   Each printer on your server is displayed one at a time.
2. For each printer, select to either enable or disable monitoring:
   - to enable monitoring of a printer, type **e**
   - to disable monitoring of a printer, type **d**

Note:

At the technical level, macOS systems use the Common UNIX Printing System (CUPS). PaperCut NG/MF tracks printing by integrating with CUPS. (For SysAdmins familiar with CUPS, PaperCut NG/MF integrates by wrapping or proxying the CUPS backend). The `Control Printer Monitoring.command` script and the `configure-cups` command edit the file `/etc/cups/printers.conf` and prefixes the `DeviceURI` with `papercut:`, enabling monitoring on the selected printer. SysAdmins experienced with the terminal might prefer to edit the `printers.conf` file directly with a text editor. See On Linux for more details.

Delete a printer

You might want to delete a printer for the following reasons:

- the printer is decommissioned
- you no longer want to track the printer

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To remove a decommissioned printer

1. Remove the print queue off your print server
2. In the PaperCut NG/MF Admin interface:
    a. Click the **Printers** tab.

    The **Printer List** page is displayed.

    b. Select a printer.

    The **Printer Details** page is displayed showing the **Summary** tab contents.

    c. In the **Actions** menu, click **Delete this printer**.

To stop monitoring a printer

Important:
You cannot use the automatic addition of printers functionality if one or more printers in your network are not tracked.

1. Stop new printers from being automatically added to PaperCut NG/MF:
    a. On the computer system hosting the queue to be added/removed/ignored, In a text editor such as Notepad, open the file:
    `[app_dir]\providers\print\mac\print-provider.conf`.
    b. Locate the line `EnablePrinterAutoImport=on`.
    c. Change `on` to `off`.
    d. Save the file.
    e. Restart the secondary server.

    The service is called `papercut-event-monitor` on both Mac and Linux machines. For more information, see How to Enable Debug in the Print Provider.
2. On the print server, open a terminal.
3. Navigate to:

    ```
    cd [app_directory]/providers/print/mac-*
    ```
4. Type the following command:

    ```
    sudo ./configure-cups --list
    ```

    A list of all printers connected to the server is displayed.
5. To delete a printer, type the following command:

    ```
    sudo ./configure-cups --remove <printer name>
    ```

    The printer is now removed from the server.
6. In the Admin interface, delete the printer from PaperCut NG/MF:
    1. Click the **Printers** tab.

    The **Printer List** page is displayed.

    2. Select a printer.

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The **Printer Details** page is displayed showing the **Summary** tab contents.

3. In the **Actions** menu, click **Delete this printer**.

7. Test the changes by printing to the deleted printer and ensuring the printer does not re-register itself in the system. It if does, verify that it is not being monitored using `configure-cups`.

4.6.1.3. On Linux

PaperCut NG/MF tracks printing by integrating with the Common UNIX Printing System (CUPS), the printing system on Linux. For a printer to be tracked, CUPS needs to be told to route print jobs through PaperCut NG/MF before printing.

To do this, the `printers.conf` file must be edited. This can either be done manually, or assisted via the `configure-cups` script.

Set up printers using a script

1. On the print server, open a terminal.
2. Type the following commands:

```
cd ~/providers/print/linux-*
sudo ./configure-cups --help
```

   The options available in this tool are displayed.

3. To monitor all printers on your network, type:

```
--add-all
```

4. To monitor a subset of printers in your network:
   a. Type `--list-all`

      A list of all printers on your network is displayed.

   b. For each printer you want to add, type `--add <printer name>`

To use the script, run the script file at `[app-path]/providers/print/linux-*/configure-cups`. Read the script's instructions carefully to enable monitoring on the desired printers.

Set up printers manually

1. Open your `printers.conf` in a text editor such as `vim`. On most Linux distributions `printers.conf` is located at `/etc/cups/printers.conf`.
2. Prepend `papercut:` to the `DeviceURI` of the printers you want to track. After the modification a `DeviceURI` line might look like:

```
DeviceURI papercut:ipp://1.2.3.4/printers/My_Printer
```

3. Restart CUPS in the way appropriate to your distribution. E.g.:

```
/etc/init.d/cupsys restart
```

4. Perform a test print on each printer. This causes the printers to be registered. This step is not required with the `configure-cups` script, because the script registers the printers

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automatically.

5. The printers should now be registered. Log in to PaperCut NG/MF as `admin` and verify that the printers are now listed on the **Printer List** page. Verify that the test prints sent previously were tracked correctly.

Delete a printer

Important:
You cannot use the automatic addition of printers functionality if one or more printers in your network are not tracked.

1. Stop new printers from being automatically added to PaperCut NG/MF:
   a. On the computer system hosting the queue to be added/removed/ignored, In a text editor such as Notepad, open the file: `[app_dir]\providers\print\mac\print-provider.conf`.
   b. Locate the line `EnablePrinterAutoImport=on`.
   c. Change `on` to `off`.
   d. Save the file.
   e. Restart the secondary server.
      The service is called `papercut-event-monitor` on both Mac and Linux machines. For more information, see How to Enable Debug in the Print Provider.
2. On the print server, open a **Linux Shell Command Terminal**.
3. Navigate to:
   ```
   cd [app_directory]/providers/print/linux-*
   ```
4. Type the following command:
   ```
   sudo ./configure-cups --list
   ```
   A list of all printers connected to the server is displayed.
5. To delete a printer, type the following command:
   ```
   sudo ./configure-cups --remove <printer name>
   ```
   The printer is now removed from the server.
6. In the Admin interface, delete the printer from PaperCut NG/MF:
   a. Click the **Printers** tab. The **Printer List** page is displayed.
   b. Select a printer. The **Printer Details - Summary** page is displayed.
   c. In the **Actions** menu, click **Delete this printer**.
7. Test the changes by printing to the deleted printer and ensuring the printer does not re-register itself in the system. It if does, verify that it is not being monitored using `configure-cups`.

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View all the other command line options available

1. Open a **Linux Shell Command Terminal**.
2. Navigate to:

   ```
   cd [app_directory]/providers/print/linux-*
   ```

3. Run the following command:

   ```
   ./configure-cups --help
   ```

4. All the other command line options available are listed.

```
$ ./configure-cups --help
Usage:
      --add-all         Add all printers for monitoring
      --remove-all      Remove all printers for monitoring
      --list-all        List all printers (monitored and not monitored)
      --expert          Expert mode
      --list            List all monitored printers
      --add printer     Add a printer to be monitored
      --remove printer  Remove a printer from being monitored
      --help            Print this help text
```

4.6.2. The template printer

The Information Technology field is a rapidly moving environment. Change is driven by two main forces:

- Business and end user requirements
- Technology advances

It is change that often consumes a network administrator's time. PaperCut NG/MF endeavors to alleviate some of the more mundane tasks via automation. The **New User Settings** area on the **Group Details** page assists with the creation of new user accounts. The addition of new printers, although less common, is also inevitable. PaperCut NG/MF helps administrators streamline new print setup using a concept of a template. A template is a pattern or initial condition used as a starting point. PaperCut NG/MF has a special virtual printer called the `[template printer]`. This is not a real printer, but a special printer used as a template for printers added in the future.

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The `[template printer]` is best described by an example:

1. Jane is a network administrator at a local business. She has implemented a print policy across all printers as follows:
    a. The page cost for a standard page is $0.10.
    b. Double sided printing is encouraged with a 40% discount.
    c. A filter exists on all printers to prevent jobs of over 100 pages. This prevents users from holding up the queues with large single jobs.
2. Jane has set up her policy on all existing printers and then adjusted settings on a printer-by-printer basis depending on the type and functions.
3. She has also set up this policy on the `[template printer]`.
4. Two months later Jane adds 4 new printers. No change in PaperCut NG/MF needs to take place as the printers automatically set themselves up based on the settings in the `[template printer]`.
5. When Jane has spare time later in the month she fine tunes printer configuration as required.

As the example shows, the template printer not only helps alleviate future configuration work, but also ensures a consistent policy is applied on printers by default. It brings PaperCut NG/MF one step closer to the "zero-administration" goal.

It is recommended the administrators take a few minutes to configure the template printer on any network of more than 100 users.

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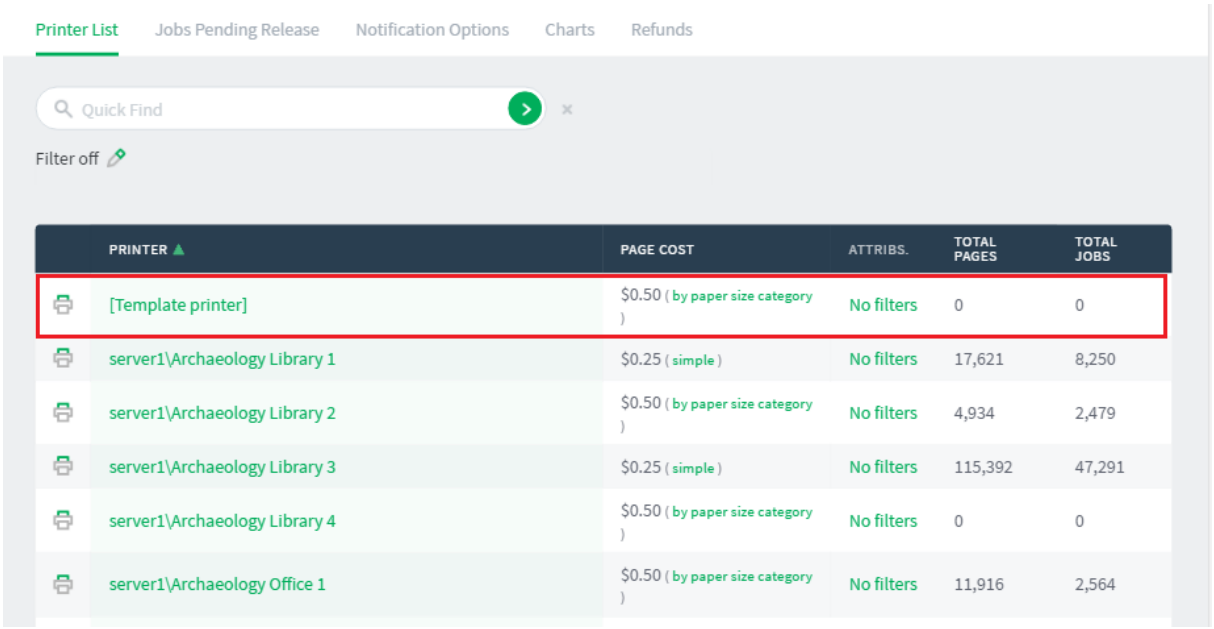

4.6.3. Copy printer settings

Another way to quickly configure printers and have a consistent charging policy is to copy printer settings (costs, filters, etc.) from one printer to another.

Caution:
Copying settings to printers is a one-way operation and cannot be undone. Always carefully consider the operation before proceeding. If you are unsure of the function or behavior, performing a backup prior to undertaking the operation is advised.

To copy printer settings from one printer to another:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Actions** menu, click **Copy settings to other printers**.
4. Choose which settings to copy. There is a choice of the cost and the filter settings.
5. Select the printers / printer groups to copy the settings to.

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6. Click **Copy** to perform the copy.

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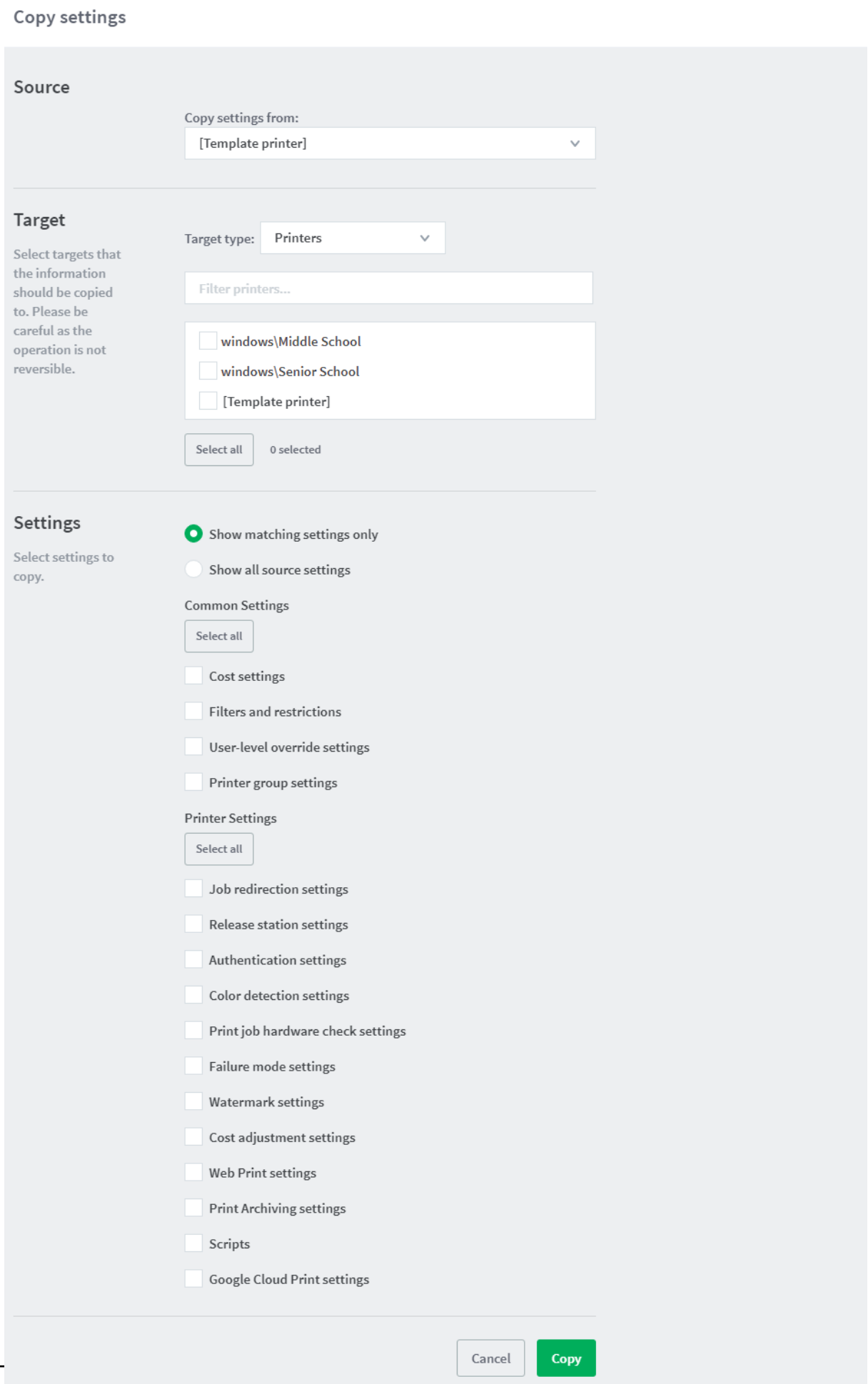

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4.6.4. Rename a printer

To uniquely identify a print queue PaperCut NG/MF uses a combination of the hostname the print queue is hosted on and the printer's queue name. If either of these change, for example, because if the print queue is renamed, or because the print queue was migrated to a new print server, then a new entry is created for the **Printer List**. Future print logs are tracked against the new printer name, and the old printer name is still available along with all its logs.

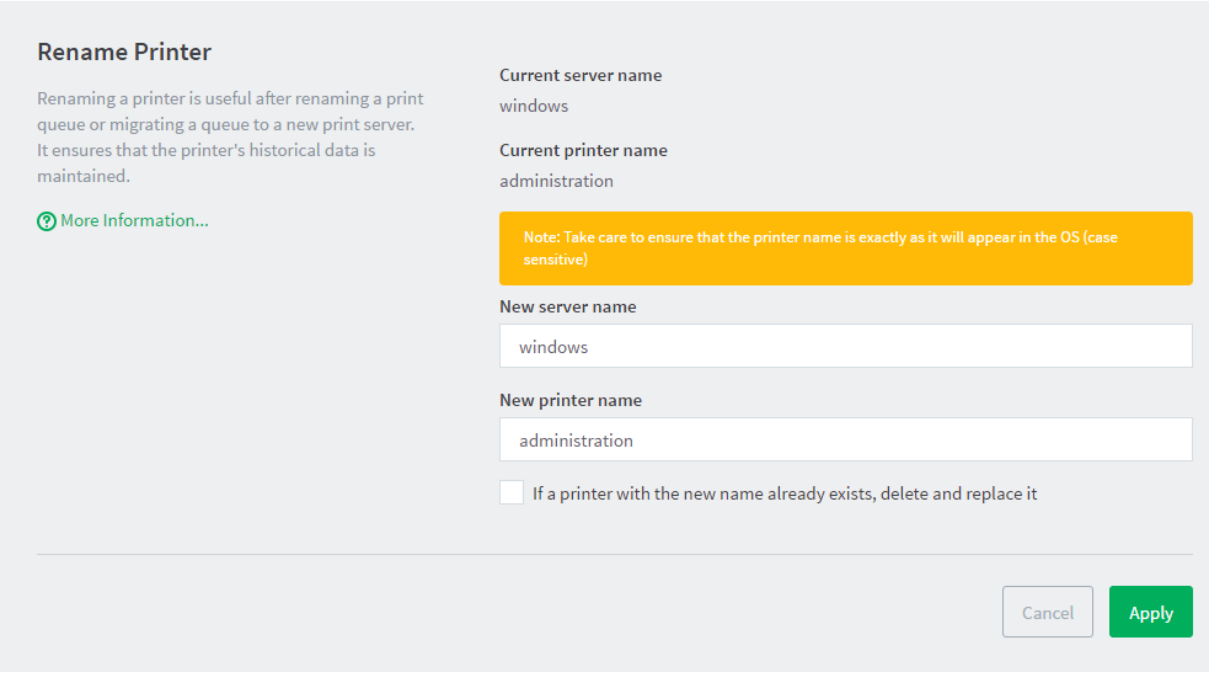
In some cases this is the desired behavior. In other cases, you might prefer to rename the "old" printer to its new name so that logs and settings are maintained.

To rename a printer, log in to the Admin web interface and:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Actions** menu, click **Rename this printer**.
4. Enter the new server and print queue name.



> **Important:**
> The print queue name might not be the same as the print queue's share name. On Windows the print queue name is displayed in **Control Panel > Printers** . On Mac the print queue name is displayed on the printer's **Printer Info** sheet under **Name & Location > Queue Name** . Take care to enter the name exactly as it is displayed in the OS, as case is important.

5. If there is already a printer with the chosen name, for example, because the print queue has

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already been renamed in the OS and was automatically added to PaperCut NG/MF, select the **If a printer with the new name already exists, delete and replace it** check box.

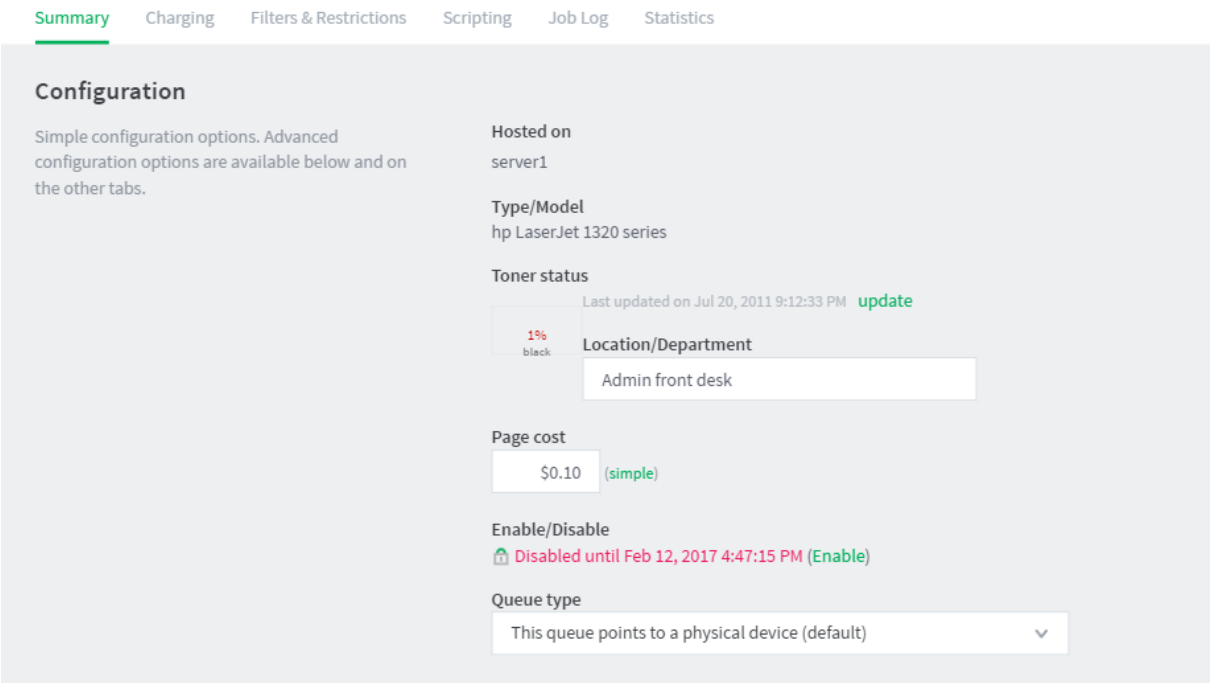
6. Click **Apply**.
7. Perform a test print to ensure that printing is logged under the new name.

4.6.5. Disable printers with time latches

Time latches allow a printer to be disabled for a predetermined amount of time. After the disable time has expired, the printer is re-enabled without the need for manual intervention. Some examples of where time latches are useful include:

- Printer maintenance - A printer might be consistently jamming and require maintenance. The administrator can lock the printer for 24 hours until the maintenance is performed. Users receive a notification message if they try to use the locked printer.
- Classroom management in schools - A teacher might want to disable printer use to force students to focus on their work for the duration of the class. The printer can be locked for the duration of the class. After the class has finished the printer is re-enabled automatically ready for the next class.

The disable option is located on the **Printer Details** page in the **Configuration** area.



4.6.6. Set up differential charging

In a quota-based or charged environment, one of the most important tools at the administrator's disposal is the ability to charge different amounts for different types of documents or on different types of printers. Printers are designed for a particular task and a particular work rate. For example, an inkjet color printer is ideal for photos or the occasional color page but should not be used print 1000-page black and white documents when the heavy duty laser printer is located just down the corridor.

PaperCut NG/MF allows administrators to:

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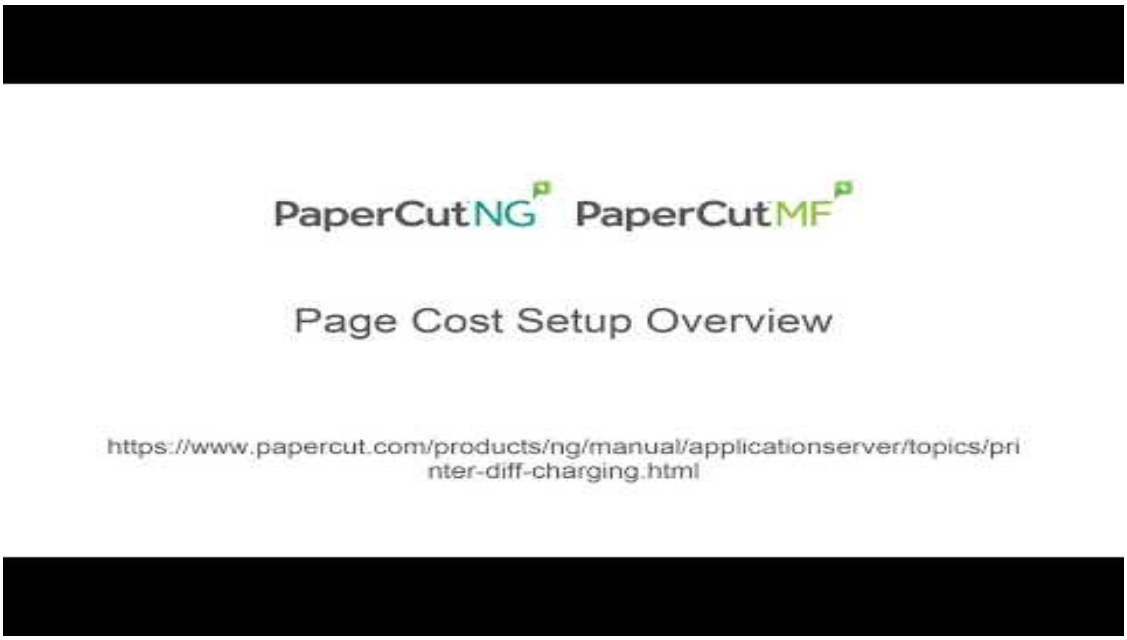
- Charge different cost-per-page amounts for each printer
- Charge different amounts based on the type of document including:
  - Charge more for color printing vs. black and white or grayscale
  - Charge more for single-sided printing vs. double-sided or duplex
  - Charge more for larger or non-standard paper sizes

Administrators can use differential charging to encourage users to use the correct printer and printer settings for the task at hand. This ensures maximum utilization of the resources available.

Example: David is a network administrator at a local university. The printer comparison charts in PaperCut NG/MF suggest that one of the printers on the 4th floor in the computer science wing is only used half as much as other printers. Upon investigation he finds that students prefer to use the closer printer located in the corridor outside the lab. David decides to relocate the printer at the end of semester. In the meantime he encourages its use by reducing the price thereby taking load off the other printers.



4.6.6.1. Charging types available

PaperCut NG/MF offers a range of charging types to cover the needs of most organizations. Most people find that either Simple or Standard Charging meets their needs best.

Simple charging

Simple charging is appropriate to all types of printers. It allows administrators to define a simple cost-per-page setting only. For example, if the cost per page was defined at $0.10, 50 pages would cost $5.00.

Standard charging

Standard charging is the default and is ideal for printers that support advanced print attributes including:

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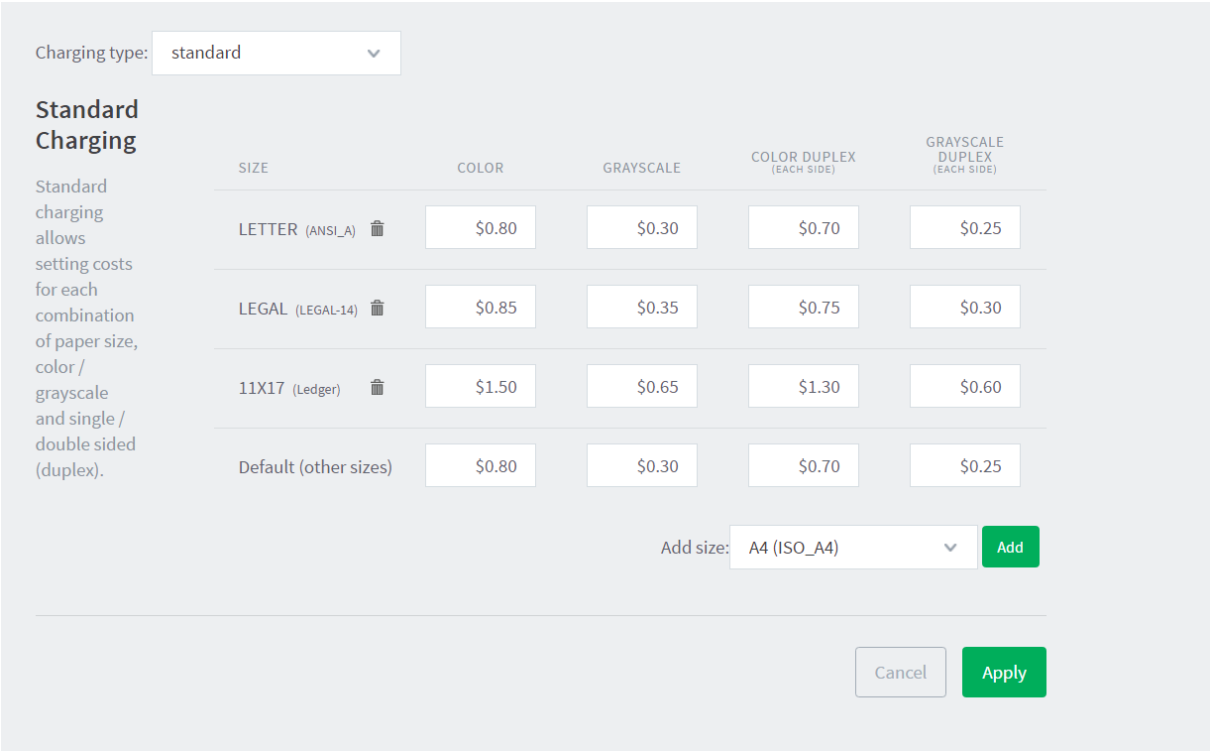
- Duplex or double-sided printing
- Color or Black & White (grayscale) printing modes
- Multiple paper trays offering standard and large sizes

Standard charging allows administrators to define the exact charges per page for each printing category and paper size in a spreadsheet-like table. Each row in the table specifies the charges for a specified paper size. Rows for common paper sizes are added by default and you can add or delete rows as required.

- To add a row, select the desired paper size; then click **Add**.
- To delete a row, click the trash can icon

The columns in the table represent the different printing modes for each paper size.

- Color: specify the cost per sheet for printing color single sided. This is normally the most expensive option.
- Grayscale: specify the cost per sheet for printing grayscale (black and white) single sided. This is normally less than Color.
- Color duplex: specify the cost per side for printing color double sided.
- Grayscale duplex: specify the cost per side for printing grayscale double sided. This is normally the lowest cost option.



Click **Apply** after making any changes to save your changes to the database.

Charging by category

Category based charging is an alternative to Standard charging for printers that support advanced print attributes.

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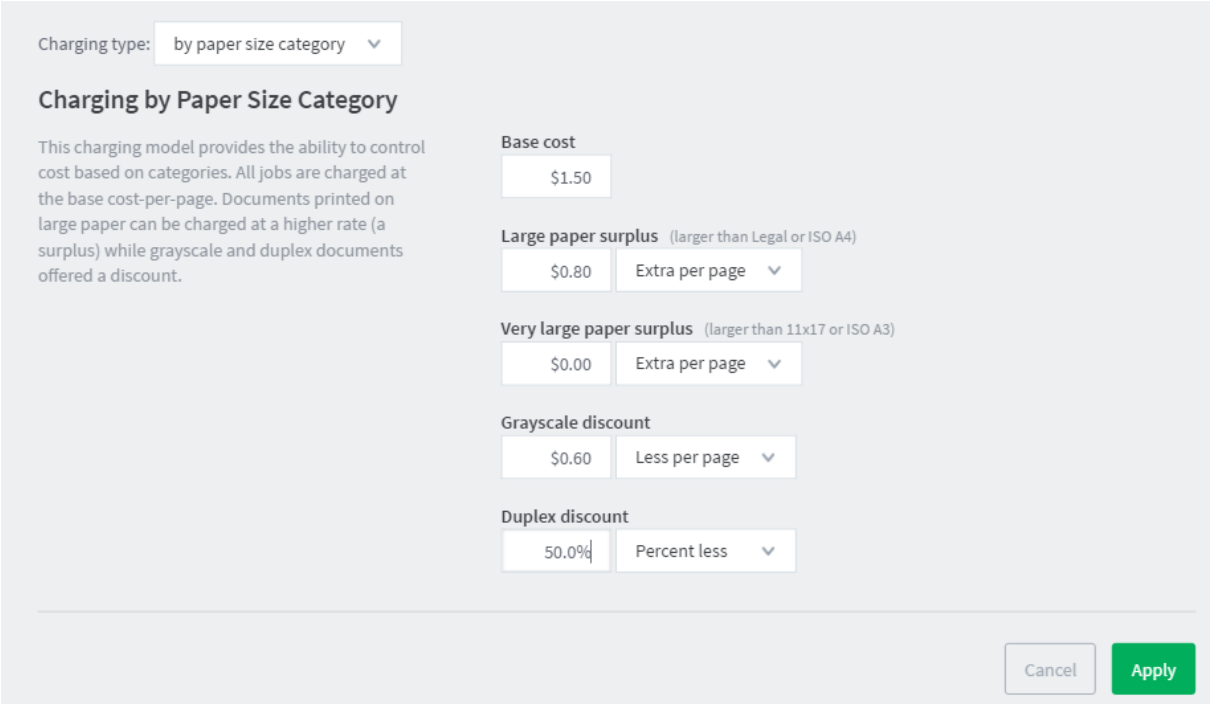
The difference with Category charging over Standard charging is that a base charge and discounts are specified, rather than an exact charge per category. For example, you can grant Black and White (grayscale) documents a discount over full color. An option also exists to discount and encourage double-sided printing. You can apply discounts as either fixed amounts or as a percentage of document cost.

A practical example, Mary has a color printer that supports letter and legal paper and duplex. She wants to define rules to:

- Charge $1.00 per page for letter (standard size) color printing.
- Charge $0.40 per page if the users select grayscale (black & white) - a $0.60 discount for grayscale
- Charge an extra $0.80 if they use large legal size paper
- Offer a 50% discount for duplex to encourage double sided printing.

To accomplish this complex set of charging rules, Mary should set up the Advanced charging options for the particular printer as defined in the screenshot below.



Charging by paper sizes

The charging by paper size mode is designed for printers with multiple trays and a variety of available paper sizes. Administrators have full flexibility to define cost for each of the paper sizes support by the printer. For example, printing a letter size page would cost less than printing a legal size page. This mode includes options to enable discounts for grayscale and/or duplex jobs. You can apply discounts as either fixed amounts or as a percentage of document cost.

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Charging by paper area

This mode is designed for plan printers, plotters or printers that support a variety of paper sizes. For example, many engineering firms use these types of printers for plotting CAD design diagrams. Charging by area allows the cost of the print job to be a function of the paper area.

Charging by paper length

This mode is designed for plotters or printers that use a paper roll or fixed width media. Charging by length allows the cost of the job to be a function of the paper/plot length.

4.6.6.2. How duplex discounts are calculated

Several of the supported cost modes allow a discount to be applied to printing duplex documents. The discount is entered as either a percentage or a constant amount per page. It is important to understand that PaperCut NG/MF counts a single *side* of printing as a one page. For example, if you have a 50 page Word document, PaperCut NG/MF counts this as a 50 page document, whether it is printed single-sided or duplex.

When calculating the cost of a job, the duplex discount is only applied to pages when there is printing on both sides of a sheet paper. If a document contains an odd number of pages, the duplex discount is not applied to the last page. For example, if a 11 page document is printed as duplex, the duplex discount is applied to the first 10 pages, but not the last page.

Some printers allow multiple copies of a document to be printed as a single job. PaperCut NG/MF calculates the cost using the above rules. i.e. If a copy contains an odd number of pages, it does not apply the discount to the last page of each copy.

4.6.7. Using Print filters: conversions and restrictions

PaperCut NG/MF offers two categories of print filters:

- **conversions**—change something about the print job, e.g. from color to grayscale.
- **restrictions**—are used to ensure jobs meet certain criteria (denying those that don't).

Each printer has its own set of filters.

Conversion filters include:

- Convert to grayscale (for all users, or for users in specified groups)
- Convert to duplex (for all users, or for users in specified groups)

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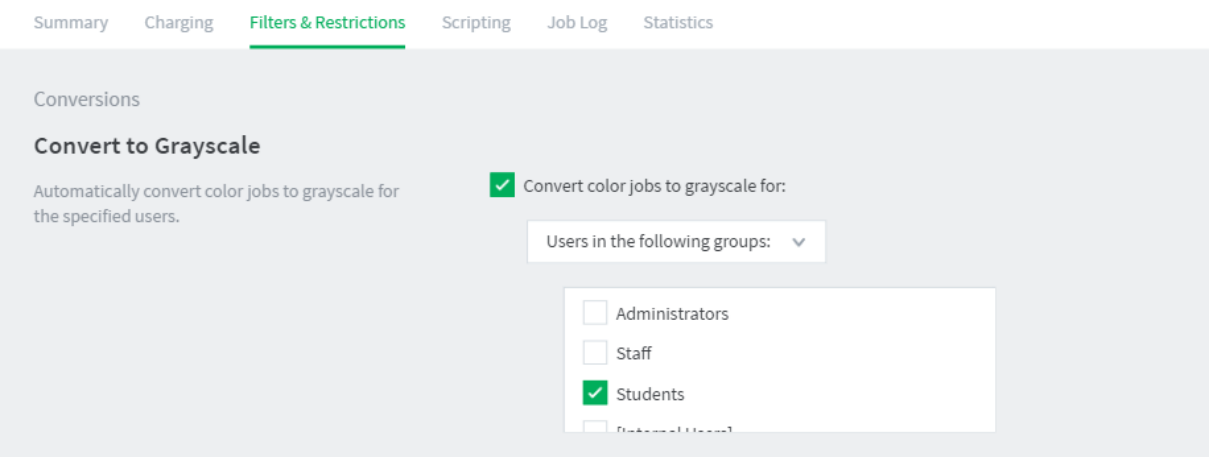

More details about conversion filters are available in Print conversion filters in detail.

Restriction filters include:

- Restrict printer access to one or more user groups
- Restrict color printing access to one or more user groups
- Define the maximum cost of a single print job
- Define the maximum number of pages allowed in a single print job
- Define the maximum number of copies allowed in a single print job
- Allow only simplex or duplex jobs
- Allow only color or grayscale jobs
- Filter documents based on the file extension or name
- Allow only selected paper sizes
- Define the maximum spool size of a print job (to prevent large jobs blocking the printer)
- Detect and delete duplicate print jobs

By default, restrictions apply only to **restricted** users. You can apply restrictions to all users by clearing the **Restriction Scope** check box.

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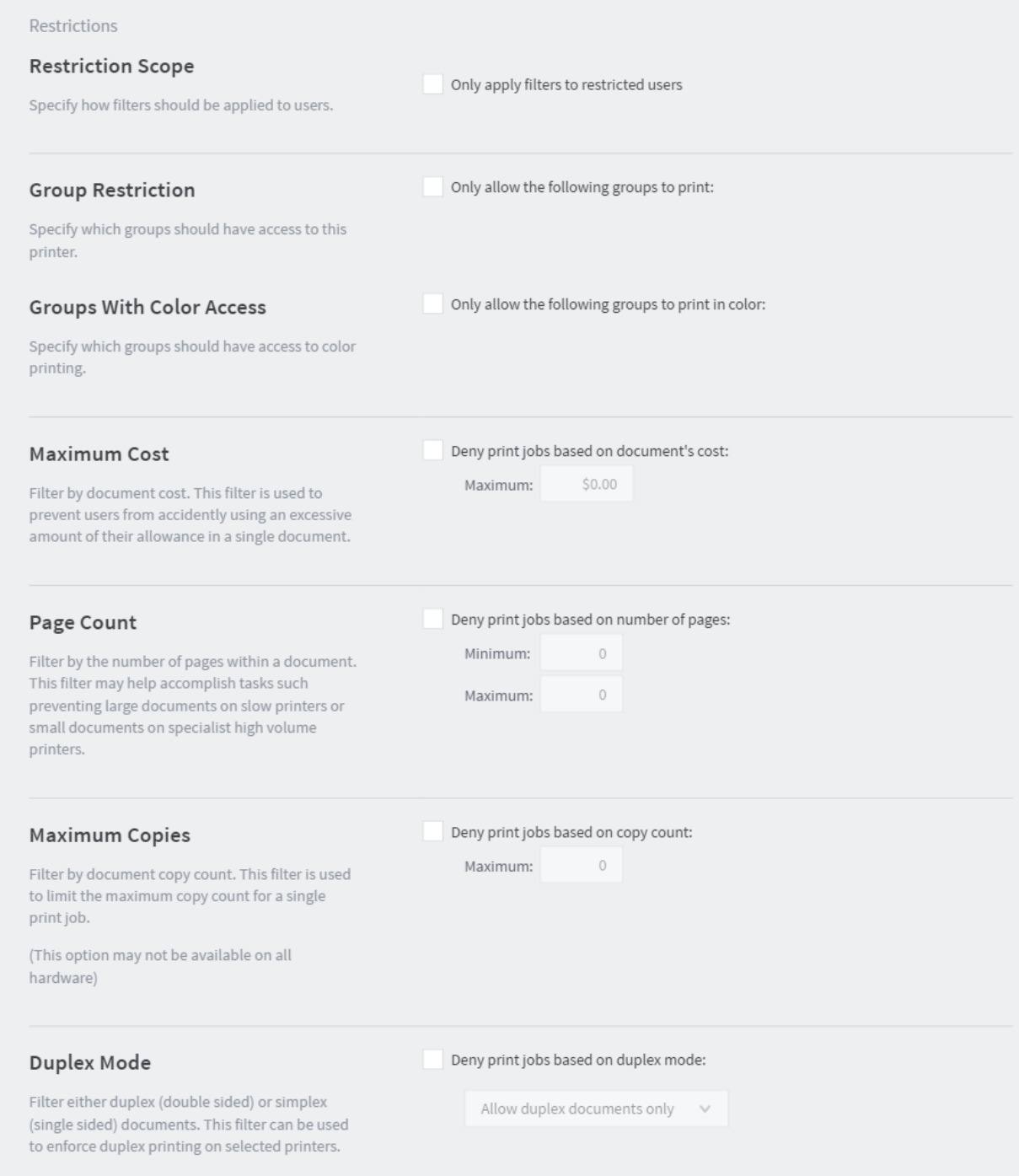

More details about restriction filters are available in Print restriction filters in detail.

Important: PaperCut MF 18.2.0 or above allows users to change the settings of held print jobs at the device. However, printers with Filters and Restrictions, limit and control a user's ability to change the settings of held print jobs on such printers. If changes made to the settings of held print jobs contradict the printer's Filters and Restrictions, then the device displays an

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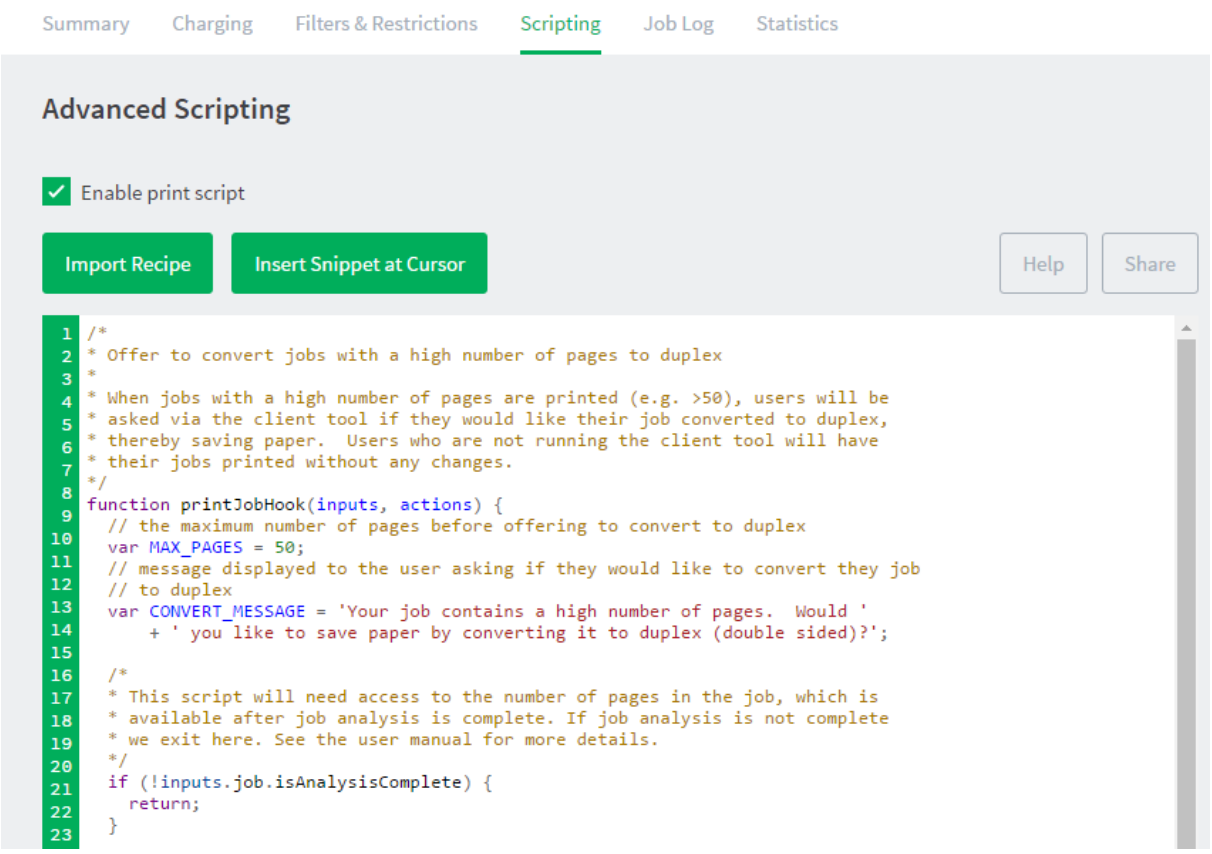
error, preventing the job from being released. The held print job is released only when its settings comply with the printer's Filters and Restrictions. For more information, see Allow users to change print settings at the device.

For more advanced functionality there is print scripting. While the options available on the **Filters & Restrictions** tab are useful for rules that apply to all users or to some user groups, scripting can take into account multiple factors. Examples include:

- automatically convert all printed emails to grayscale (i.e. do a conversion based on the application type)
- automatically convert large documents to duplex
- suggest or require that users print in grayscale if their job contains a large number of color pages



For more detail see Advanced scripting (print scripting).

4.6.7.1. Examples

Filters and scripts are applied at the printer level (i.e. on a per-printer basis). The following examples cover how to apply a filter/script to a single printer. Once a filter or script is applied to one printer, you can copy it to other printers (see Copy printer settings).

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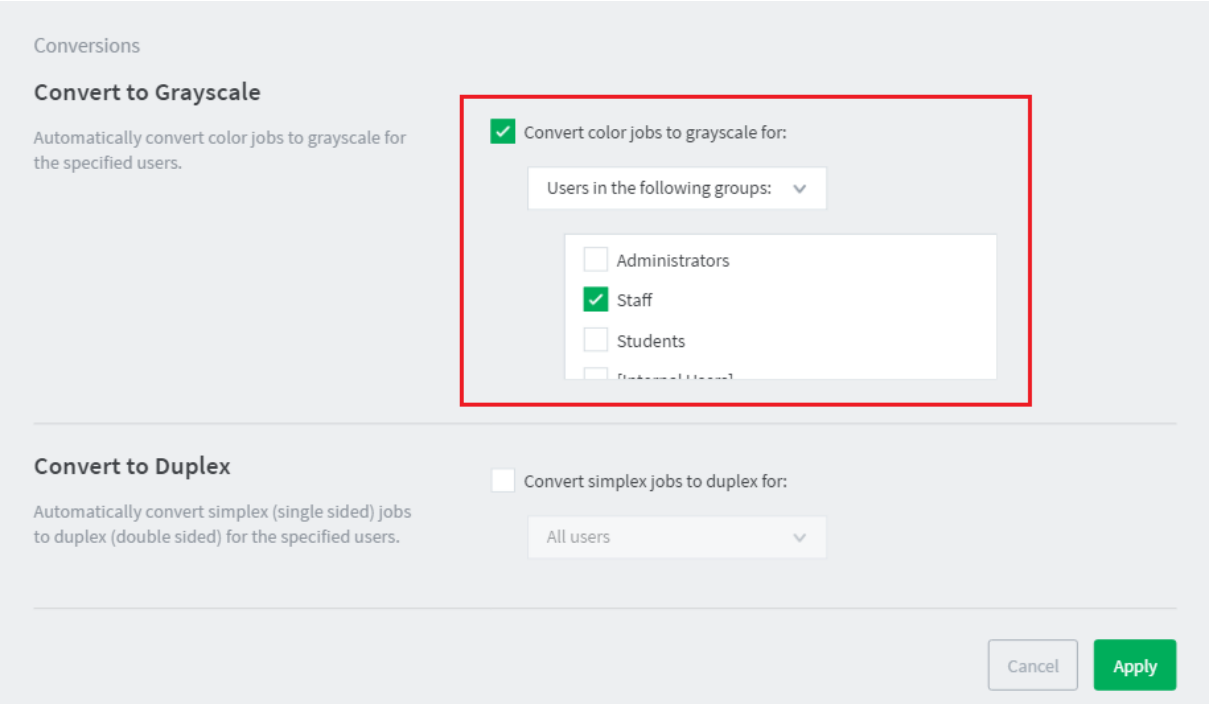
Converting student print jobs to grayscale

You can convert all jobs that were sent by a student to grayscale from the **Filters & Restrictions** tab as follows:

1. Ensure you have a `Students` group in your domain (or equivalent) that contains all students.
2. Ensure the `Students` group has been added to PaperCut so that it is displayed on the **Groups** tab. For more information about adding and removing groups see Groups in PaperCut NG/MF.
3. Click the **Printers** tab.

   The **Printer List** page is displayed.
4. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
5. Click the **Filters & Restrictions** tab.
6. Select the **Convert color jobs to grayscale for** check box; then select **Users in the following groups** from the list.



7. Select the **Students** group in the list of groups for selection.
8. Click **Apply**.
9. Test by printing a color job as a user in the `Students` group.

Converting printed emails to grayscale

Printing of emails is a prime candidate for reduction of paper and printing costs. Printing of emails in color (when the colour is being used for blue links and email footers) is doubly so. Having PaperCut automatically convert emails to grayscale requires a printer script as multiple factors are taken into

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account. The logic would read: when a user prints and the print is an email, convert the print to grayscale.

There is a built-in recipe script to achieve this:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Click the **Scripting** tab.
4. Click **Import Recipe**.
5. Find the recipe called **Convert all email printing to grayscale**; then click **import** next to it. Note the message at the top of the script about the method it uses to detect when an email is printed.
6. Click **Apply**.
7. Test by printing an email in color.

More examples

More examples are available in the application by clicking **Import Recipe** on the **Scripting** tab.

4.6.7.2. Print conversion filters in detail

Conversion filters work by modifying print jobs on the fly. For example, rather than denying color printing access and asking the user to print again (as is done using a restriction filter), a conversion filter can convert the job to grayscale automatically.

Possible uses include:

- converting color jobs to grayscale to prevent accidental color printing
- converting jobs on high volume printers to duplex to save paper
- having student jobs automatically converted to duplex

Use print scripts for more advanced conversion functionality. For more information, see Advanced scripting (print scripting).

Important:
After enabling a conversion filter on a new printer model it is always a good idea to perform a test to ensure it is working as expected.

Using the PaperCut printer port for conversion filters on Windows (advanced)

Conversion filters work by modifying print jobs on the fly. On Windows (when using standard printer ports) this is performed by modifying a print job and submitting it as a new job. An alternative is to

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configure the printers to use a PaperCut printer port. When using a PaperCut port, print jobs are modified in-place rather than copied. This has several advantages:

- Processing is faster as there is no need to take a copy of the job.
- When jobs are re-submitted the new job might look unusual (the owner is `SYSTEM`, the document name has a special code in it). Using the PaperCut port avoids this and any potential confusion from administrators about what those jobs are.
- There is no need to disable the **advanced printing features** option on the print queues. Without the PaperCut port this option can cause problems with watermarking and other advanced features. When the PaperCut port is used it can cater for this option being enabled.
- Processing is more robust. Without the re-submission there are less steps, so less things to go wrong!
- Re-submitting can alter job ordering and priority (a feature of Windows print queues). Using the PaperCut port avoids this.

For information about setting up a new or existing printer to use the PaperCut port, see Windows printer queue configuration.

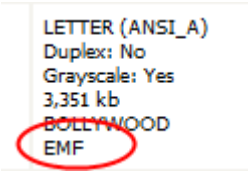
Changing the printer port is not required on other platforms such as Mac, Linux or Novell as the same limitations do not apply.

Troubleshooting

Disabling EMF printing (Windows print servers only)

> **Important:**
> This section is not applicable if your print queue is using a PaperCut port (see Using the PaperCut printer port for conversion filters on Windows (Advanced) for details).

Print conversion filters work best with open standard languages such as PostScript and PCL. Other manufacturer specific and GDI based languages might be supported, but most of all it's important that print jobs spool in the printer's native language, and not the "EMF" format. If your print server is running Windows and documents are printing using the EMF language (the default), then conversions will not take place.



To disable EMF printing on a Windows print server:

1. On the **print server**, select **Start > Control Panel > Printers > [right-click printer] > Properties > Advanced**
2. Turn **off** (disable) the option **Enable advanced printing features**.

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3. Test printing and check the printer language to ensure that it is now something other than EMF.

You can read more about this setting on the Microsoft website at: http://support.microsoft.com/?kbid=268093.

Updating printer drivers

When experiencing problems with print conversion filters and there are new driver versions available for your printer, updating might resolve issues with the driver that caused conversions to not work.

When updating printer drivers, it is important to update the printer drivers on **both the client and the server**.

Contacting support

If the other troubleshooting steps do not assist with a print conversion filter related problem, feel free to contact the PaperCut support team. Please include information about the make, model and driver for the printer you are using.

4.6.7.3. Print restriction filters in detail

Print restrictions provide network administrators with advanced control over printer usage. Some common examples include:

Reduce printer jams

Many printers expect print jobs to be on a single size of paper, or maybe two sizes if the printer has multiple paper trays. A non-standard size causes the printer to enter a *manual load* state causing the queue to halt. PaperCut NG/MF**Filters & Restrictions** tab allows SysAdmins to select the allowed sizes. Non-standard sizes are automatically deleted before they're sent to the printer. It's an effective way of reducing one of the most common causes of queue jams.

Controlling documents on slow inkjets

Many inkjet printers have very low throughput rates. A large color document can hold up a queue preventing other users from getting their "fair share" of print time. By setting an upper page count via the printer's **Filters & Restrictions** tab, network administrators can prevent large print jobs. The page count forces users to split up large documents and allows other users access to the printer.

Automatically deleting duplicate jobs

PaperCut NG/MF can also monitor the print queues and automatically delete duplicate print jobs. This option is useful on networks with novice users. New users often "double click" an application's printer icon causing two identical print jobs to be sent to the queue. This wastes paper and users' print quota. Network administrators can enable duplicate job detection via the **Filters & Restrictions** tab. A popup message warns the user and the duplicate job is removed from the queue.

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Important:
This option can affect multiple prints from Microsoft Excel and some other applications. Users wanting to print multiple prints from Excel might need to reprint the document 30 seconds apart. When printing to a hold/release queue, the filter does not apply until the jobs are released, not at the time of submitting the print job. Consider whether this Filter and hold/release queues are the workflow you require for your organization.

Force sensible use

You can set restrictions to define a maximum cost per job. This prevents users from accidentally spending all their credit/quota in one print job.

Automatically deny documents based on file extension or name

There are many reasons why users should not print certain files. For example, maybe a report from the accounting application consists of 400 pages. Users might not be aware of this and "accidentally" print the report expecting only a few pages. You can configure PaperCut NG/MF to match this document via its name and automatically delete it from the queue. Use the **Filters & Restrictions** keyword filter to implement this functionality.

Additionally it's also possible to filter documents based on file extension by entering a keyword, such as `.htm` or `.pdf`.

To filter a document name based on a regex (regular expression), enclose the keyword in forward slashes. Note that the regex matches the entire document name. For example:

- To disallow printing of any documents ending in `.htm`:
  `/.*\.htm/`
- To disallow printing documents of the form `account-12345.pdf`:
  `/account-\d*\.pdf/`

Important:
This is *not* a security option. It is easy to circumvent the filter by renaming the document. Some systems might not even report type information!

Control who can print in color (advanced)

To control which group of users have access to color printing to a particular printer use one of the following methods:

Method 1

1. On the print server, create a print queue.
2. Share the print queue as normal.

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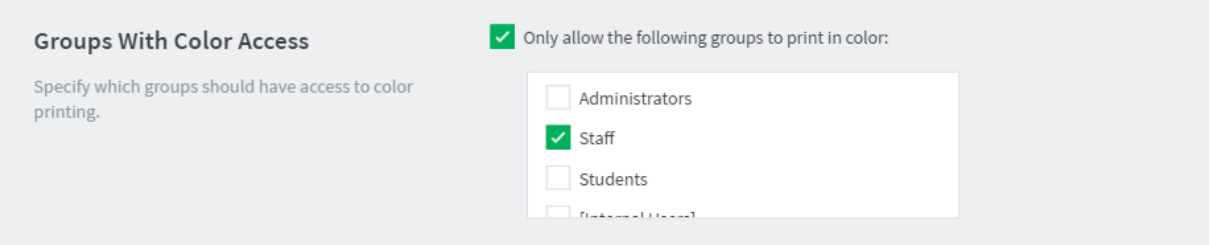
3. Add the printers to PaperCut NG/MF and define appropriate costs.
4. Click the **Filters & Restrictions** tab.
5. In the **Groups With Color Access** area, select the groups that should have access to color printing via restriction. For example, you might want to allow only staff to print in color.

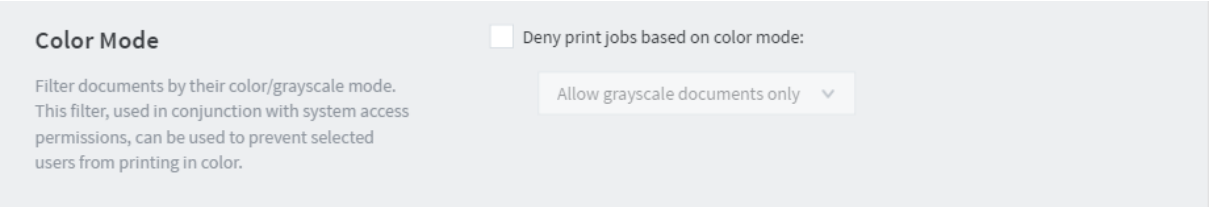


6. Click **Apply**.

Method 2

This method uses two print queues, each with different driver defaults. One queue is set to grayscale only and the other have full color access. Group access is used to control who has access to the color queue.

1. On the print server, set up two print queues that point to the same physical printer. Call one queue *Grayscale Only* and the other *Color*. You now have two printer icons (logical printers) each connected to the same physical printer.
2. Share the printers as normal.
3. Set Windows access permissions on each queue as required. Ensure Users who require color access can print to the color printer and other users can access to the "black and white" only printer.
4. Add the printers to PaperCut NG/MF and define appropriate costs.
5. Click the **Filters & Restrictions** tab.
6. In the **Color Mode** area:
   - select the **Deny print jobs based on color mode** check box.
   - select **Allow grayscale documents only** from the drop-down list.



7. Click **Apply**.

This method although being more complex to manage, sometimes offer better user experience as users do not need to select driver color and black and white options for each print.

Advanced setups

PaperCut NG/MF provides printer management features that you can easily extend to more advanced network setups including:

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- Environments with multiple print servers
- Monitoring of locally attached network printers.
- Central monitoring over Wide Area Networks (WAN) or VPN.

These topics are an advanced subject and covered in subsequent sections.

Tip:

For more flexibility in filtering print jobs, one should consider the Advanced Scripting capability. Advanced scripting allows filtering on more more attributes of a print job or combinations of attributes. See Advanced scripting (print scripting) for more details.

4.6.8. Manage printer groups

Administrators use groups to manage large number of users. Groups are used for many purposes, such as reporting, access control, notifications, and management. Printer groups are most useful for organizations with a medium to large number of devices.

Printer groups allow administrators to tag or group printers by attributes. Group names are user definable and can represent any attribute appropriate for printer management. Examples include printer type, location, make, function, owner, age, etc. PaperCut NG/MF's grouping is implemented using text based "tags" offering similar flexibility to that seen in many modern online systems.

Some examples of where printer groups are useful include:

- Grouping by printer type allowing an organization to compare volume on inkjets vs. laser printers.
- Grouping by floor, departments, or work areas providing comparison reports to identify areas that might need additional printers.
- Quickly locate printers by attributes or tags defined by administrators.
- Implement fine grained access control by ensuring administrators can only apply adjustments to devices under their ownership/responsibility.
- Facilitate group-level management of devices settings, such as copying new rules, costs and policies between similar devices.

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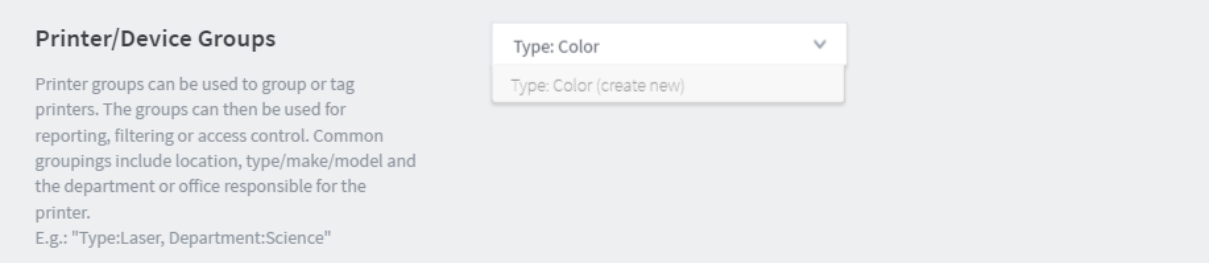
To group printers:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Printer/Device Groups** area, enter an appropriate group name, such as **Type:Color**; then click **Enter** to add. Read best practices in Suggested best practices for naming printer groups

4. Click **OK**.
5. On the **Printer List** page, select another color printer.
6. In the **Printer/Device Groups** area, click the drop-down arrow in the text box.

   A list of all available printer/device groups is displayed.
7. Select the printer group, such as **Type:Color**.

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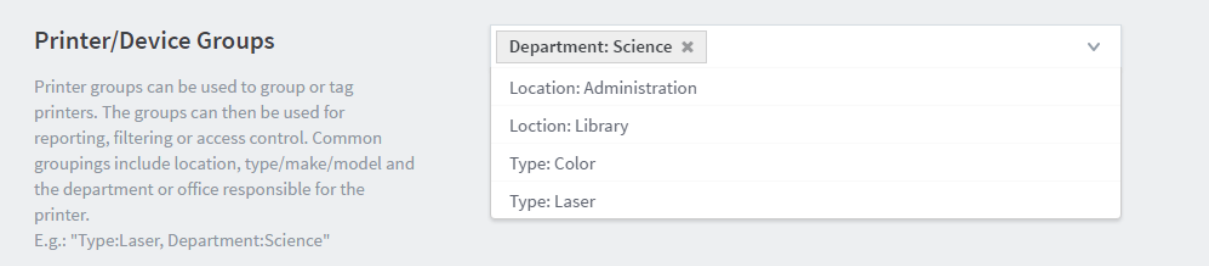

8. Repeat steps 5-7 for all printers/devices to be included in the group.

Tip:
An alternate method to apply a set of printer groups to multiple printers is to use **Copy settings from printer to printer** action.

Important:
Printer/device groups are automatically deleted in the nightly maintenance if they:

- do not contain any printers or devices
- are not associated with a notification

You cannot run reports on a deleted printer/device groups.

4.6.8.1. Suggested best practices for naming printer groups

An important requirement of group management is to have clear and consistent naming conventions for your groups. This convention needs to be followed by all involved in group management. Being able to see a list of printer/device groups is a good way to ensure consistency. A group name can contain any character except for `","`. Administrators are encouraged to use a key-colon-value format such as:

- Type:Laser
- Location:Floor1
- Department:Science
- Subnet:192.168.4.*
- Office:NewYork

Prefixing the value with a type makes it easier to compare and locate groups of interest.

Similar to user groups, it's important to keep printer groups up-to-date. Ensure someone is tasked with assigning printer groups when new devices are added to your network.

4.6.9. Define cost adjustments

Cost Adjustments are used in conjunction with the User Client's Advanced Popup (see Advanced account selection popup) or Manager Popup (see Manager mode popup). They allow an administrator to define a user selectable list of adjustments to apply to the current print job. These adjustments can be in the form a percentage adjustment, a per job fixed adjustment or a per page

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adjustment. Charge Rates are commonly used in the Engineering and Architectural Drafting fields. Examples include:

- Charging different rates for premium print material. For example, 150% for use of Mylar drafting film.
- Offering a discount of selected situations. A second copy of an architectural plan printed on draft quality paper can be charged at 50% normal rate.
- Charging a fixed cost for services such as document binding. For example, binding might cost an additional $5.00.
- Increasing the per-page cost of a job for color paper (e.g. an additional $0.20 per page).

Cost adjustments are defined at both a global and printer level - allowing common adjustments to be applied globally to all printers, with the flexibility to also define printer specific adjustments. The adjustments are defined in the format:

```
adjust1:100%, adjust2:150%, adjust3:3.0pj, adjust4:0.10pp,
adjust5:1.0pc
```

(A comma separated list of rates in the format of "Name" and "Amount" separated by a colon). The first rate listed is the default rate and is automatically selected in the Advanced Client Popup. The format of the "Amount" depends on the type of adjustment. Each of the formats is defined below:

Table 35: Cost adjustment types

Type	Description	Format	Examples
Percentage	Applies a percentage adjustment to the job cost. Rates above 100% increase the cost, while those below 100% discount the job. (NOTE: When multiple adjustments are applied with the manager popup, the percentage adjustments are applied last)	`0.00%`	`120%` - increases cost by 20% `75%` - discounts the cost by 25% `0%` - sets the cost to zero
Per Page	Adds/subtracts a fixed amount to each page in the job.	`0.00pp`	`0.10pp` - increases cost by $0.10 per page – `0.05pp` - reduces cost by $0.05 per page
Per Job	Adds/subtracts a fixed amount to the total job cost.	`0.00pj`	`3.00pj` - increases total cost by $3.00 – `1.00pj` - reduces total cost by $1.00
Per Copy	Adds/subtracts a fixed amount to each copy in the job.	`0.00pc`	`3.00pc` - increases total cost by $3.00 per copy – `1.00pc` - reduces

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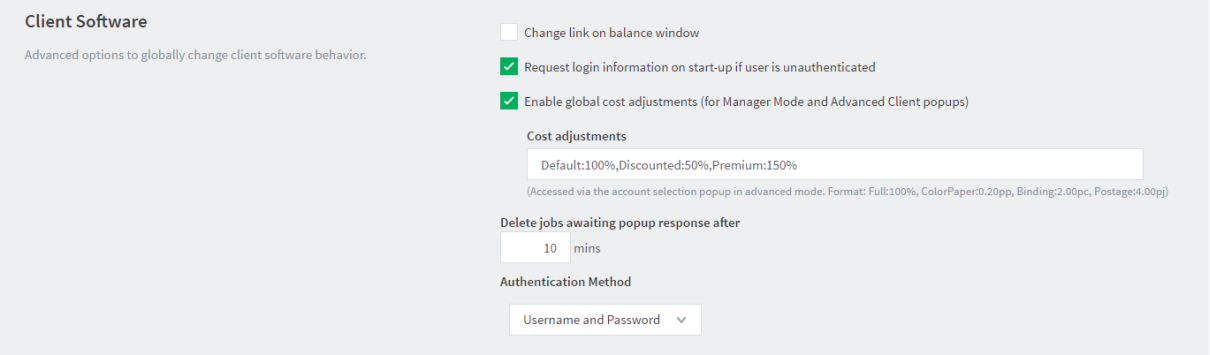
Type	Description	Format	Examples
			total cost by $1.00 per copy

Define global cost adjustments

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Client Software** area, select **Enable global cost adjustments (for Manager Mode and Advanced Client popups)** check box.



3. In **Cost adjustments**, enter the charging rates separated by a comma in one of the following formats:
   - percentage markup or markdown—**<name>:XX%** (for example, **Discounted:50%**)
   - per page markup or markdown—**<name>:XXpp** (for example, **Discounted:-0.10pp**)
   - per job markup or markdown—**<name>:XXpj** (for example, **Markup:0.50pj**)
   - per copy markup or markdown—**<name>:XXpc** (for example, **Markup:0.10pc**)
4. Click **Apply**.

Define printer level cost adjustments

Any adjustments defined at the printer level are in addition to the global adjustments.

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Advanced Configuration** area, select the **Define cost adjustments** check box.

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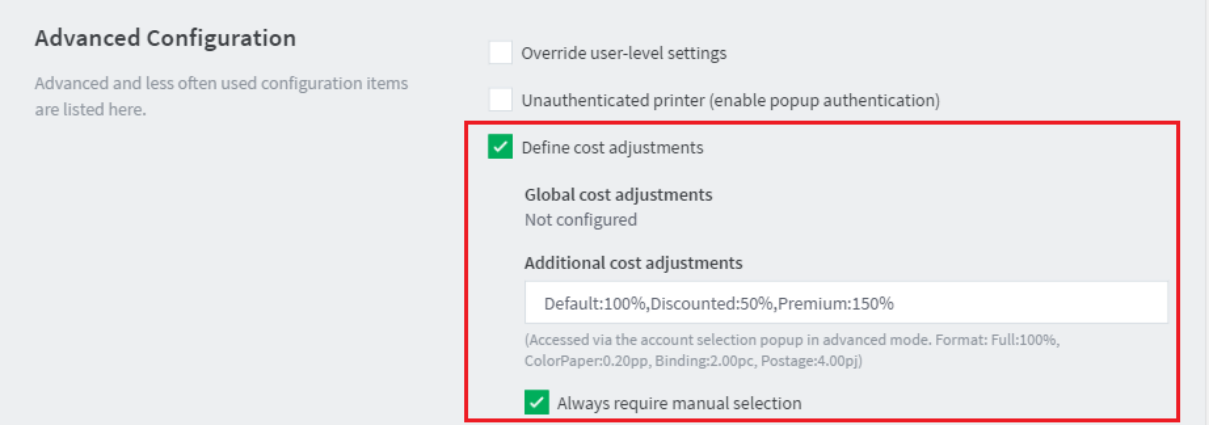

4. In **Additional cost adjustments**, enter the charging rates separated by a comma in the following format:

   <name>:XX% (for example, **Discounted:50%**)

> **Note:**
> If an adjustment with the same name is defined at both the global and printer level, the printer adjustment takes preference.

5. If you want users to manually select a charge rate every time they print, select the **Always require manual selection** check box.
6. Click **OK**.

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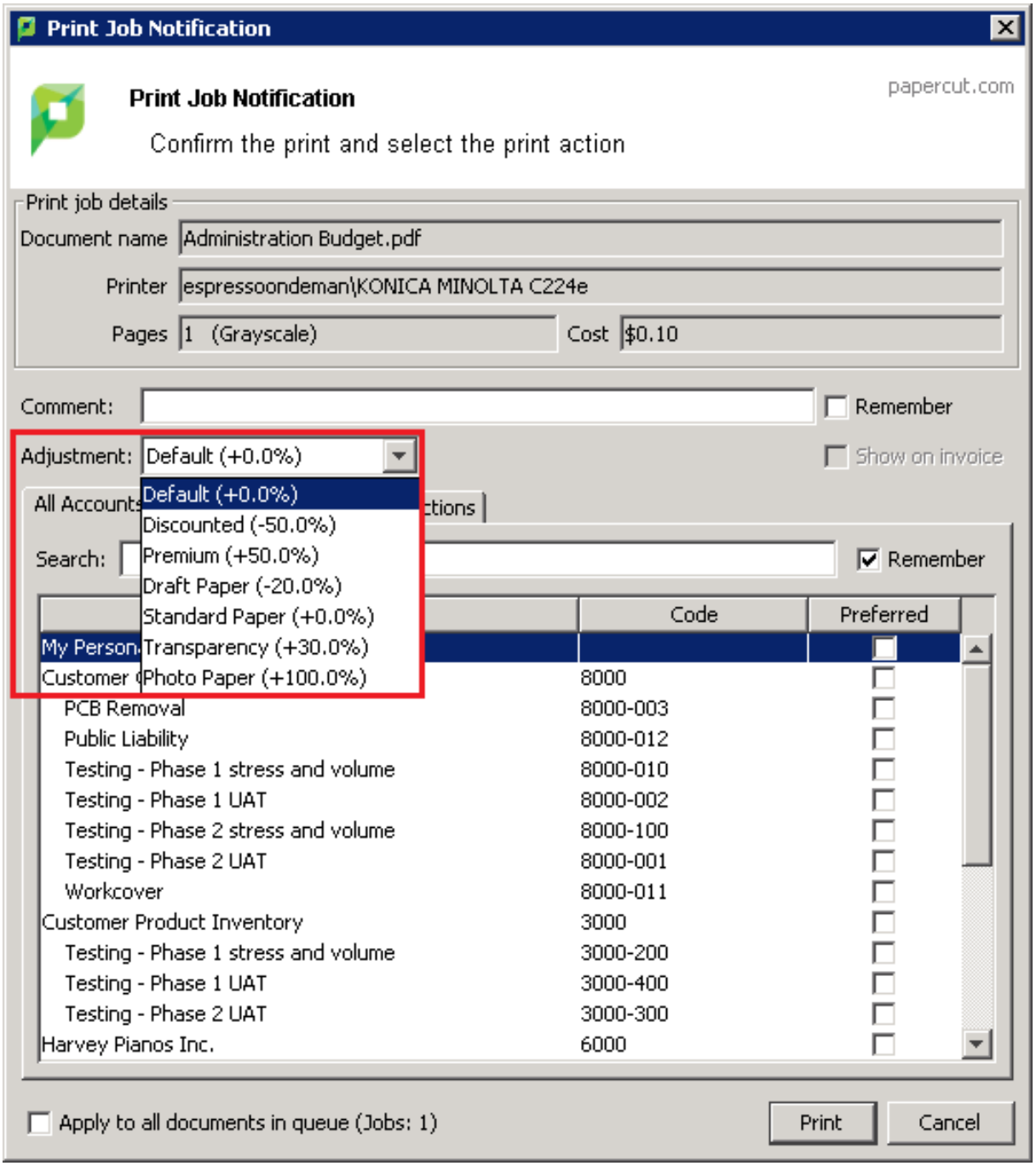

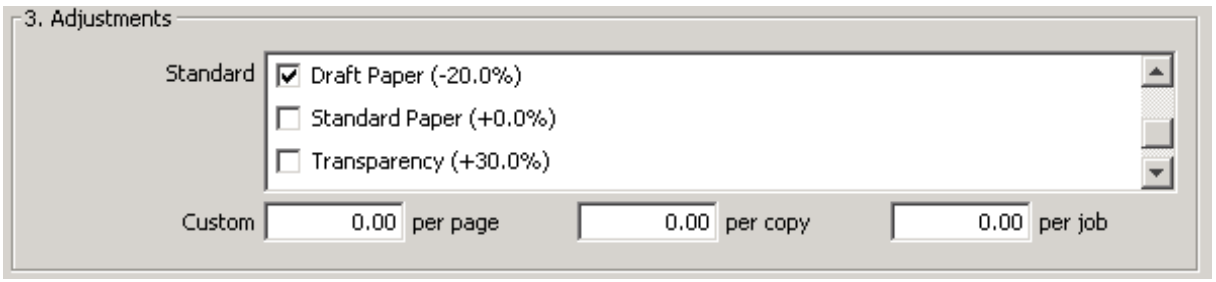

4.6.10. Popup authentication

PaperCut NG/MF normally relies on the underlying operating system and the associated print queues to perform authentication. For example, in normal operation, a user logs into a workstation using a domain/network level authentication method such as a username and password. The print

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queues also use this authentication and PaperCut NG/MF can trust the supplied identity. However, in some network environments, relying on network level authentication is either not possible, or not reliable. Common examples include:

- All users log in with a common generic username and password meaning that it's not possible to distinguish between users.
- A print queue that does not enforce authentication.

For a detailed explanation of print authentication, see Print authentication.

4.6.10.1. How does popup authentication work?

Popup authentication matches the source IP address of the print job with the user confirmed to be operating from the popup client IP address. The workflow is as follows:

- The user initiates a print job to a server-hosted, PaperCut NG/MF-managed, queue (printer) via unauthenticated print protocol.
- The print job arrives in the print queue and because of the unauthenticated protocol, the username cannot be trusted.
- PaperCut NG/MF uses the job's source IP address to determine the PaperCut NG/MF popup client it should contact for authentication.
- The user is prompted to enter their username and password, which are then verified against PaperCut NG/MF's configured directory source. If the credentials are correct, the user is considered authenticated at that client.
- The print job is attributed to the authenticated user.
- Depending on configuration, the server might remember the association between the IP address and the authenticated user for a period of time.

4.6.10.2. Where and when should popup authentication be used?

Some real life examples include:

The Student Lab

Some student labs are set up so everyone logs in using a generic username and password. For example, username: student, password: student. This is common in Apple Mac labs, where enabling multi-user authentication is complex and can often prevent selected applications from running correctly.

LPR/LPD or CUPS

The Line Printer Daemon print protocol, often used in UNIX environments, is a non-authenticated system. The username associated with the print jobs is passed through to the print queue, however, the name is not verified and can easily be forged. An extra level of authentication is required.

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CUPS, the modern print system often used on Linux, Apple Mac and some Unix systems, is often implemented in a non-authenticated fashion. Although CUPS can support authentication, technical considerations such as the inability to interface with Active Directory domain authentication often prevent its use.

Mac print queues

Mac OS X server use the CUPS print system. Current Apple implementations prevent administrators from enabling CUPS authentication. This is not usually a problem in an environment where you can control logins at individual workstation level. It does, however, pose a problem if users have local admin access - for example, individual owned laptops. PaperCut NG/MF popup authentication provides a way to work around the non-authentication issue.

For more information, including a discussion of platform specific issues, see Print authentication.

Macs and popup authentication

Popup authentication is often required on Mac networks supporting a mix of lab systems authenticated via a directory service and unauthenticated laptop systems. Advanced administrators might review Eliminating popup authentication via Mac Login Hook to streamline login on the secured lab systems.

iPad / iOS Printing and popup authentication

PaperCut comes with an iPad / iOS app that provides popup authentication and other functionality. For more information see iOS printing (iPad & iPhone).

4.6.10.3. What technical considerations do I need to review before implementing popup authentication?

As a general rule, popup authentication should only be used in low-volume, low-complexity scenarios when Protocol-Level Authentication is ruled out. By its design, Protocol-Level Authentication is always the most secure which is why it is used in Windows and authenticated protocols such as HTTP, SSH or Novell's iPrint protocol.

A good example of a situation where Protocol-Level Authentication is not ideal would be a public-access PC in a library set to auto-logon as the insecure, generic account "public". In this case the Protocol-Level Authentication is passing through the insecure user of "public". PaperCut NG/MF's client software and IP address authentication can overlay these insecure user credentials and request authentication from the user at the time of print via a popup.

The following is a general guide to factors your System, Network and Security teams should consider when implementing popup authentication:

- Minimize IP address changes. If you are using DHCP, consider the lease time as well as the re-use rate of IP address and DNS scavenging timeouts.
- Do not use any form of NAT between the clients and print server. NAT obscures the IP address seen by the server.

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- Consider the authentication session time (TTL - Time To Live) options offered to your users. This is detailed further in the popup authentication configuration page of the manual. TTL settings are a trade-off; the shorter the time, the smaller the window of mismatch, but the greater the inconvenience to the user. There is no one-size-fits-all answer, this must be taken on a site-by-site basis.
- Ensure that hostnames are resolved to IP addresses, both from the client and server. In some situations, hostnames might be reported instead of IP addresses, and resolution results are key to correct behaviour.
- Any machine relying on popup authentication must have the PaperCut NG/MF client running at all times for printing from that workstation to function.
- Awareness of IP address spoofing. Large sites often actively monitor this and/or endeavour to prevent it, as IP address spoofing is something that affects network application security in general.
- Always reconsider your choice of popup authentication. Protocol-Level Authentication can become viable with changes in technology, infrastructure or internal procedure.
- Popup authentication is not a viable solution for simultaneous multi-user systems, such as Terminal Server or Citrix, as multiple users are reported from a single IP address.

A real-life an example of the practical difficulties associated with popup authentication

In 2012 one major university user of PaperCut NG/MF in the USA were using popup authentication to support authentication on print jobs issued via the LPR protocol (for Unix desktop systems). This setup had been in place successfully for 5 years with no reported problems. The site's networking team (independent of the server team responsible for PaperCut NG/MF's management) decided to make a few network infrastructure changes and enabled NAT for some subnets. This caused a subtle set of authentication issues that took a number of days to detect and diagnose. During this time some jobs were incorrectly attributed.

4.6.10.4. Configuration

The following sections cover how to enable popup authentication on either the user account level or the print queue level.

Popup authentication and generic user accounts

The following notes explain how to enable popup authentication when a user logs in under a generic user account - for example, `student`.

1. Add the account to the domain called `student`. You might already have this account set up.
2. Perform a **User/Group Sync** or print a job from this account so the username is listed in PaperCut NG/MF.
3. Select the generic user and set the account to a *zero balance* and a *restricted* status. This ensures that users can't charge against this account.

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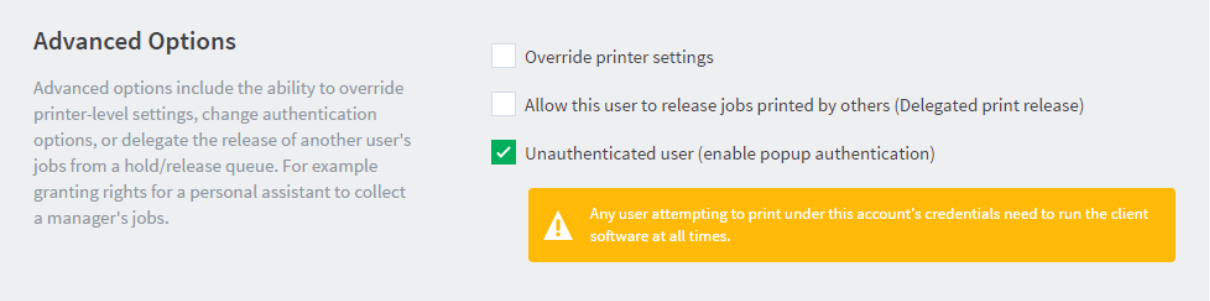
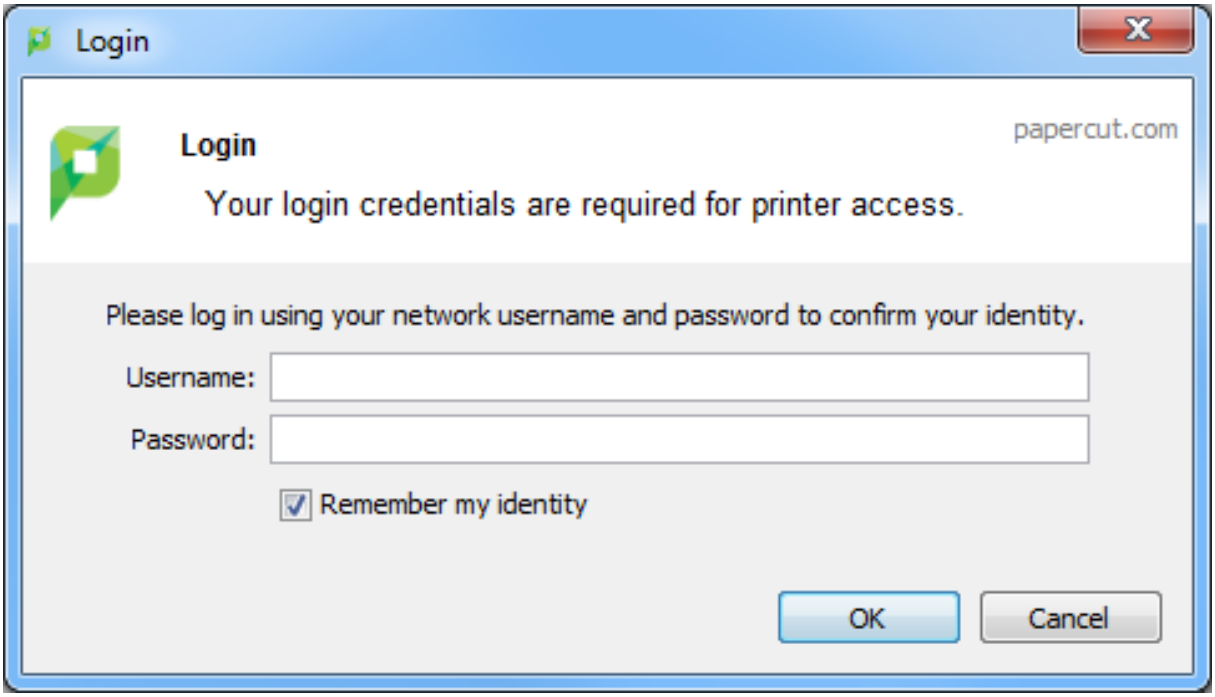
4. Select the **Unauthenticated** check box; then click **Apply** to save the changes.



5. Install client software on workstations. See User Client for details.
6. When a user logs in as the generic `student`, they are prompted for their domain level username and password.



Popup authentication on a print queue

The following notes explain how to enable popup authentication when a user attempts to print to a non-authenticated printer such as one hosted via an LPR/LPD queue or a CUPS print queue:

1. Add the printer to the system as normal. Perform a few test prints to ensure the printer is functioning and tracking as expected.
2. Log in to PaperCut NG/MF and check the **Unauthenticated** option under the relevant print to enable the popup authentication.
3. Install the client software on any workstation that will print to this printer. See User Client for details.
4. When a user attempts to *print* to this printer, they are prompted for their username and password.

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User interaction

When running in popup authentication mode, the client offers the following options:

- Log out
- Log in as another user

The **Logout** option is available on Windows via either the right-click option on the task try icon, or when running on Mac or Linux, via a right-click popup menu (Option Click) access via the icon on the balance window.

The **Login as** option is made available if the client starts as an unauthenticated user. This option allows users to authenticate or quickly switch user identity.

Advanced Popup Configuration

The login box displayed to the user offers the choice of how long their authentication details should remain active. An administrator can control the options presented to the user by modifying the following system configuration keys. These configuration keys are edited under **Options > Actions > Config editor (Advanced)**

Table 36: User Client Popup Config Keys

Config name	Description
client.config.auth.ttl-values	A comma separated list of values to display in the popup authentication login box. Positive numbers represent the number of minutes to remember the authentication for. The value of `0` indicates that the authentication is remembered for "this print job only". The value of `-1` indicates that the authentication is remembered until the user logs out or exits the client. The value of `-2` indicates that the authentication is remembered indefinitely, even after restarting the client. For security reasons, you need to make this change in the Config Editor, not the client's `config.properties` and the client does not save the password. Instead a server generated *cookie* is placed in a file in the user's home directory. The default is: `1,5,15,30,60,-1`
client.config.auth.ttl-default-minutes	The default time-to-live value automatically selected when the login authentication window is displayed.
client.config.auth.popup-on-startup-if-unauthenticated	Determine if the client should request authentication when the client starts if the operating system user is unauthenticated. Set to `Y` (yes = enabled) or `N` (no = off).

Important:
User Clients that are already running will pick up changes made via the Config Editor the next time they are restarted.

See Using the Advanced Config Editor to find out how to change config keys.

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4.6.11. Set the color detection method

The color detection setting determines the method used by PaperCut NG/MF to analyze documents for the presence of color. Changing the detection method might require some additional printer configuration.

The standard way used by PaperCut NG/MF to handle color in documents is to see if the printer's driver has set the `grayscale` flag. When this flag is set on a document sent to a color printer, the grayscale discount is applied. Otherwise, the document is charged at the printer's standard rate. This might be an inconvenience for users when a large document is printed with just a few color pages.

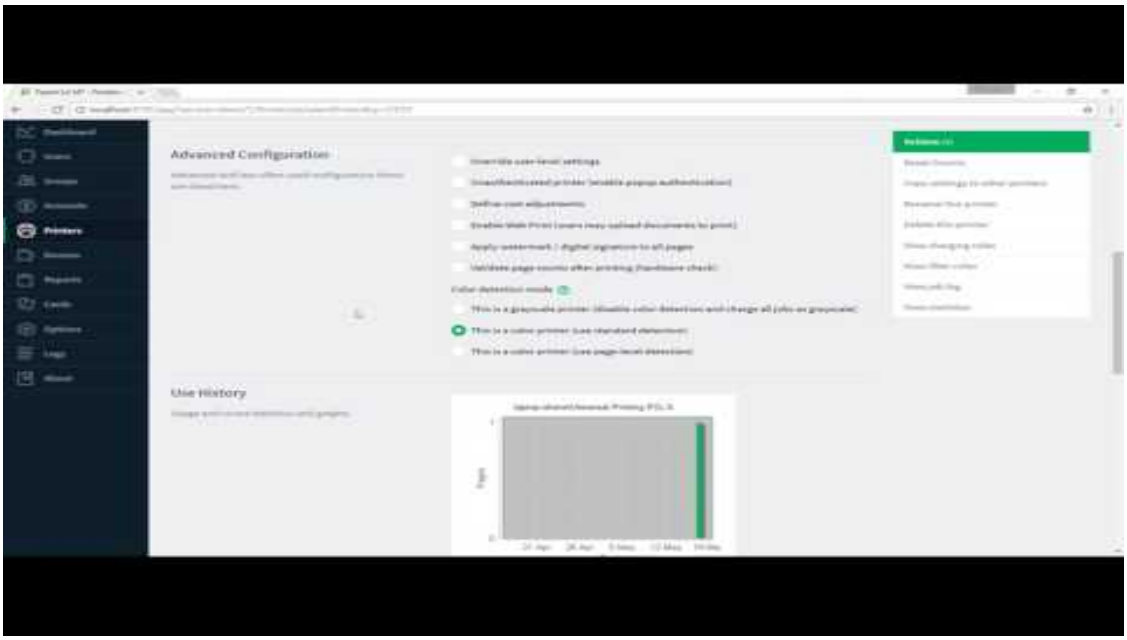
For example, a user prints a 21 page document to a color printer. The document is all grayscale except for a color header on the first page. When using *standard color detection*, the user is charged for 21 pages at the color printer's standard rate. As a workaround, the user could send the document as two print jobs (one with just the first page containing color, and another with the rest of the document), but this is an inconvenience. An enhanced alternative is to use *page-level color detection*. When this option is selected, the user would be charged for one page at the color printer's standard rate, and receive the grayscale discount for the other 20 pages.

PaperCut NG/MF has three options for document color detection:

- Grayscale only (for grayscale printers)
- Standard color detection (also referred to as document-level detection)
- Page-level color detection

The color detection setting is available for each printer controlled by PaperCut NG/MF. PaperCut NG/MF can perform page-level color detection with most modern color printers.

To use page-level color detection



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1. Click the **Printers** tab.

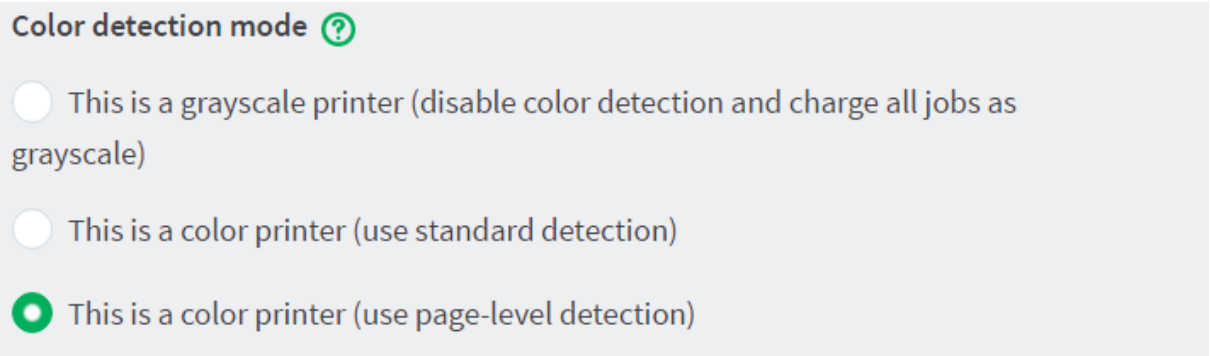
   The **Printer List** page is displayed.

2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.

2. In the **Advanced Configuration** area, select the **Color detection mode** :

   - **This is a grayscale printer**—The printer is not capable of printing color documents, so color detection is bypassed. This ensures that the color page count for this printer is always zero.
   - **This is a color printer (use standard detection)**—Documents are treated as being either grayscale (where a printer's driver has set the grayscale flag) or color. This mode is available on almost all color printers. Where users print documents containing both grayscale and color pages, this option encourages users to use color printers only for their color printing.
   - **This is a color printer (use page-level detection)**— Page-level color detection scans each page of a document for traces of color. The grayscale discount is applied to any grayscale pages and other pages are charged at the printer's standard rate.

   Linux and Mac systems pick up the change immediately.

   On Windows based servers, the change takes up to 2 minutes to propagate to the `Print Provider`. You can speed up this process by manually restarting (stop and starting) the `PaperCut NG/MF Print Provider` service via **Control Panel > Administrative Tools > Services** .

3. For Windows print servers:

   On the printer's Windows Properties page, on the **Advanced** tab, set **Enable advanced printing features** according to the type of printer:

   - for *PostScript*, *PCL*, *HPGL* or *XPS* printers, disable the setting. (With these printers, Page level detection works regardless of the advanced printing features setting, but you must disable the setting if you want to use advanced PaperCut NG/MF features such as Grayscale/Duplex Conversion Filters and Watermarking.)
   - for other printer types, enable the setting. On most printers, this setting causes print files to be spooled using Window's EMF format. PaperCut NG/MF supports for page level color detection for EMF. See below for limitations.

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For non-Windows print servers, page-level color detection is available only for *PostScript*, *PCL*, *HPGL* and *XPS* printers.

4. Print a few test documents with both grayscale and color pages and ensure PaperCut NG/MF is correctly charging the document. The **Print Log** under the **Printers** tab is a good place to monitor the detection in real-time.

4.6.11.1. Printer color mode auto-detection

From version 14.1 onwards, when a printer is first added, PaperCut NG/MF detects if it is grayscale or color and sets its color detection mode accordingly. Color mode auto-detection is performed only once and can be overridden manually.

Color mode auto-detection works well but you might have a reason for not using it. You can turn it off by setting the configuration key `printer.detect.grayscale.printers` to `N`. See Using the Advanced Config Editor to find out how to change config keys.

4.6.11.2. Limitations of page-level color detection

Page level detection works by inspecting the contents of the document looking for color use. The aim is to track down simple black and white only pages so it can offer the user the grayscale discount on these pages. There are a few situations that can cause a seemingly grayscale page to list as color - referred to as a 'false positive'. These situations are rare and are discussed below:

- The use of some image formats, even if they look grayscale, can detect as color. For example, JPEG is a lossy format and artifacts as a result of compression can cause speckles of color. PaperCut NG/MF handles most of these situations but grayscale JPEG images in PDF files can cause false positives.
- The use of 'color' white-space in Microsoft Word can cause a false positive with some print drivers. For example, the user selects a color font, enters a single space or new-line, and then changes back to black. PaperCut NG/MF in most cases, correctly filters out the 'color space' but might experience problems with some drivers leading to a false positive.
- The Windows **Enable advanced printing features** setting allows page level color detection to work for many color printers by spooling print files in EMF format. The accuracy of color detection is dependent on the particular printer driver in use. Our testing has demonstrated excellent accuracy with newer printers and drivers, but poorer results with some older drivers. If using an older printer, run a representative set of print jobs to verify that the color page counts meet your requirement. Where possible, select a PCL or PostScript driver if available for your printer.

4.6.12. Switch to using SNMPv3

PaperCut NG/MF uses SNMP to perform:

- page count validation using hardware checks
- toner levels and notifications
- printer status, for example, to block jobs in error being released.

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By default PaperCut NG/MF uses SNMPv1/v2c, which usually requires no configuration. If your organization has a policy in place that does not allow SNMPv1/v2c traffic on the network, then you can configure PaperCut to use SNMPv3 instead.

Note:

- **SNMPv1/v2c**—When a printer is in error, PaperCut NG/MF provides the ability to block the release of print jobs from:
  - standard release stations
  - web-based release stations
  - embedded application at an MFD.

  This minimizes the chance of someone releasing a print job, only for the document to print later when the user is no longer at the printer.
- **SNMPv3**—When a printer is in error, PaperCut NG/MF provides the ability to block the release of print jobs from the embedded application at the MFD. It doesn't support the other release methods.
- When SNMPv3 is enabled, PaperCut NG/MF can't perform Hardware Page Count validation.

For a full description of how both versions work with PaperCut NG/MF, take a look at the knowledge base article: Is PaperCut compatible with SNMPv3?

4.6.12.1. Switch to SNMPv3

Tip:

- SNMPv3 must be enabled and set up in both the printer/MFD *and* the Admin web interface.
- Perform the printer/MFD setup first. That way, when you when you set up SNMPv3 in the Admin web interface you will know any specific details and exactly which fields to complete.

1. Configure SNMPv3 at the printer/MFD according to printer/MFD documentation.
2. For **MFDs**, in the Admin web interface click **Devices**. The **External Device List** page is displayed. Configure PaperCut MF according to the MFD's Embedded Guide.
3. For **printers**, in the Admin web interface click **Printers**. The **Printer List** page is displayed.
4. Select a printer. The **Printer Details: [printer]** page is displayed showing the **Summary** tab.
5. In the **Advanced Configuration** area, select the **Use SNMPv3 for Printer Status such as Toner Levels** checkbox. A set of fields is displayed.
6. Complete the fields using exactly the same details as on the corresponding device.

   Note:
   If on the device there is no mention of a Context name, then leave the **Context**

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Name field blank.

7. Click **Apply**.

Note:
For bulk application of SNMPv3 across a large fleet, you can either use the six server commands for SNMPv3 to script the change, or configure one printer/MFD and bulk copy the settings across the others.

4.6.12.2. Revert to SNMPv1/v2c

1. In the **Admin** web interface, click **Printers**. The **Printer List** screen is displayed.
2. Select a printer. The **Printer Details: [printer]** page is displayed showing the **Summary** tab.
3. In the **Advanced Configuration** area, clear **Use SNMPv3 for Printer Status such as Toner Levels**.

4.6.13. Validate page counts using hardware checks

- Requirements
- Up-front page count and cost calculations
- Verification of the number of printed pages after the job is completed
- Causes for differences in page counts
- How hardware checks work
- Configuring hardware checks
- Reviewing hardware checks results
- Known limitations
- Troubleshooting

4.6.13.1. Requirements

Important:
This feature is available using SNMPv1/v2c only.

PaperCut NG/MF's hardware checks use the SNMP protocol to query the page counters of the printer. This is a network protocol supported by most network printers. To support hardware checks the following is required:

- A network printer that supports the SNMP protocol.
- SNMP enabled in the printer (also ensure the "public" SNMP community is enabled).
- The network/firewall allows SNMP UDP packets from the print server to the printers. SNMP uses UDP port 161.

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- Some additional configuration of the printer queues might be required. See the installation instructions in Configuring hardware checks.
- Only PaperCut NG/MF should send jobs to the printer. If a job from another print server is sent, the resulting statistics might be unreliable.

PaperCut NG/MF provides accurate tracking of printer usage with the combination of up-front spool file analysis and post-job hardware verification of the jobs. PaperCut NG/MF tracks printer usage by performing:

- up-front page count and cost calculations
- verification of the number of printed pages after the job is completed.

4.6.13.2. Up-front page count and cost calculations

Before the job is sent to the printer, PaperCut NG/MF analyzes the printer spool file on the server to determine the job attributes, including the page count, color/grayscale, duplex, paper-size, etc. This up-front analysis allows PaperCut NG/MF to:

- calculate the job cost and determine up-front whether the user has enough credit to print
- display the job details (for example, the cost and page count) to the user in the print confirmation screens and Release Stations
- apply filters and policy rules to print jobs (for example to disallow non-duplex jobs, or to enforce print policy using the advanced printer scripting).

After the job is queued for printing, PaperCut NG/MF logs the print job information and charges the usage to the user.

4.6.13.3. Verification of the number of printed pages after the job is completed

PaperCut NG/MF validates page counts using hardware checks after a print job has been processed. If the job is sent to the printer but it does not print completely (for example, if the user cancels the job at the printer), then print job hardware checks allow PaperCut NG/MF to determine the actual number of pages printed.

The hardware check counts the number of pages only and does not analyze the job attributes, such as the number of color/grayscale pages, or the actual page size. These checks are performed at the hardware-level by communicating with the printer via SNMP (Simple Network Management Protocol).

If there is a discrepancy between the up-front page count and the hardware count, you can choose whether you want to use the:

- up-front payment calculation
- hardware check page count.

For more information about these options, see Configuring hardware checks below.

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4.6.13.4. Causes for differences in page counts

The printer can report a difference to the PaperCut server's spool file analysis for a variety of reasons:

- The user cancels the job at the printer's panel, for example using the LCD screen or cancel button.
- The printer goes into an error state (for example, out of toner) after the job has partially printed. The administrator can then cancel the job at the printer.
- The print job might have become corrupted, causing the printer to print 100s of pages of junk (for example, PostScript code) instead of the user's document!
- Configuration "strangeness", such as the devices double-counting large pages or counting the blank page at the end of a duplex job. Most of these corner-cases have been worked around, however, like all things in Computing, some are bound to show up again!

4.6.13.5. How hardware checks work

The Printer SNMP standard allows querying of printer status and page count information over SNMP. PaperCut NG/MF makes use of this information to verify the number of pages printed for each print job. This works as follows:

1. Before the print job is sent to the printer PaperCut NG/MF confirms the printer is idle (that is, not printing).
2. A snapshot of the page counters is retrieved using SNMP.
3. PaperCut NG/MF waits for the job to complete by querying the printer status and page counts. If the printer is in error (for example, out of paper), then PaperCut NG/MF continues to wait until the printer error is resolved and the job completes printing.
4. After the job is completed and the printer is idle, another snapshot of the page counts is taken.
5. The total pages printed is calculated using the differences between the initial and the post-job snapshot.

4.6.13.6. Configuring hardware checks

Printer hardware checks are not enabled by default in PaperCut NG/MF. Enabling the checks requires some configuration within PaperCut NG/MF and also some additional configuration of the operating system's printer queues.

You can enable/disable hardware checks at the individual printer queue level, or alternatively you can apply the same settings to multiple printers using the Copy printer settings.

Enabling hardware checks

Important:
On Windows print servers, you must also configure the printer to use a **PaperCut TCP/IP Port**. For instructions see Windows printer queue configuration.

To enable the print job hardware checks:

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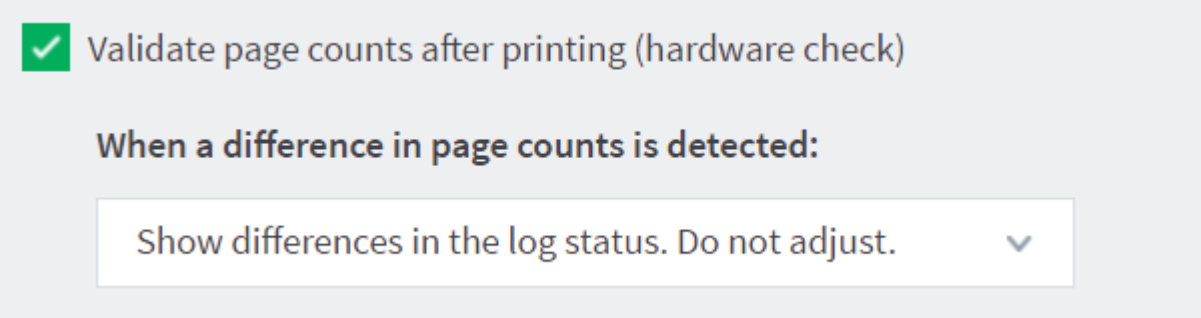
1. Click the **Printers** tab.

   The **Printer List** page is displayed.

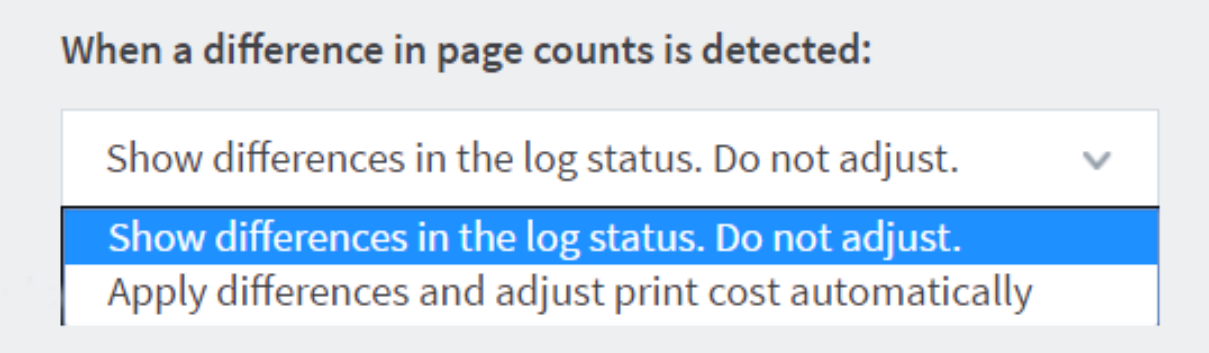
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.

3. In the **Advanced Configuration** area, select the **Validate page counts after printing (hardware check)** check box.



4. In **When a difference in page counts is detected**, select how to handle a difference in page counts between the printer and PaperCut NG/MF:



   - **Show differences in the log status. Do not adjust**

     The page count differences are recorded against the print job, but no adjustments are made to the page counts or job costs. This is the default option when hardware checks are enabled.

     This mode is useful when you want to use the hardware check information to validate refund requests by users. In this case the administrator can verify that a user's job did not complete printing and then refund the job.

     The hardware check information is displayed in the print log status and also in the refund screens.

   - **Apply differences and adjust the print cost automatically**

     In this mode, the hardware check information is also recorded on the print jobs as described above. However, any differences in page count and costs are automatically applied to the job.

     For example, if a user printed a 5 page document costing $0.50, and they canceled the job after only 3 pages were printed, the job cost would be reduced to $0.30 and the user would be refunded $0.20.

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In rare situations, the hardware check can report an increased number of pages. For example, this might happen when a print job is corrupted and prints out 100s of pages of "junk" instead of what the user printed. In this case, the hardware check reports an increased number of pages resulting in an increased cost. By default, PaperCut NG/MF does not apply the adjustments to the job if the cost would increase.

If you would prefer to apply the differences even if the cost is increased, select **Always apply cost adjustments**.

> **Tip:**
> To enable the hardware page counts quickly on multiple printers, use the **Copy settings to other printers** action available on the left of screen.

5. Click **OK**.

> **Tip:**
> On Windows print servers, this setting can take up to two minutes to take effect. You can speed this up by restarting the **PaperCut Print Provider service**.

> **Note:**
> If you have hardware page count validation enabled, you must ensure the list of printer errors specified for **release-station.block-release-on-printer-error.error-list** does NOT include any errors excluded for hardware page count validation. For more information, see Block release of print jobs to printers in error with hardware check.

Windows printer queue configuration

To perform printer hardware checks, configure the Windows printer queues to use the **PaperCut TCP/IP Port** type. This port works the same as the **Standard TCP/IP Port** that ships with Windows. The **PaperCut TCP/IP Port** allows PaperCut NG/MF to perform the page count checks before and after printing the job.

To configure an existing printer queue to use a **PaperCut TCP/IP Port**

1. Open the **Printers** list
2. Right-click the printer; then select **Printer Properties** or **Properties**
3. Select the **Ports** tab.
4. Click **Add Port**.

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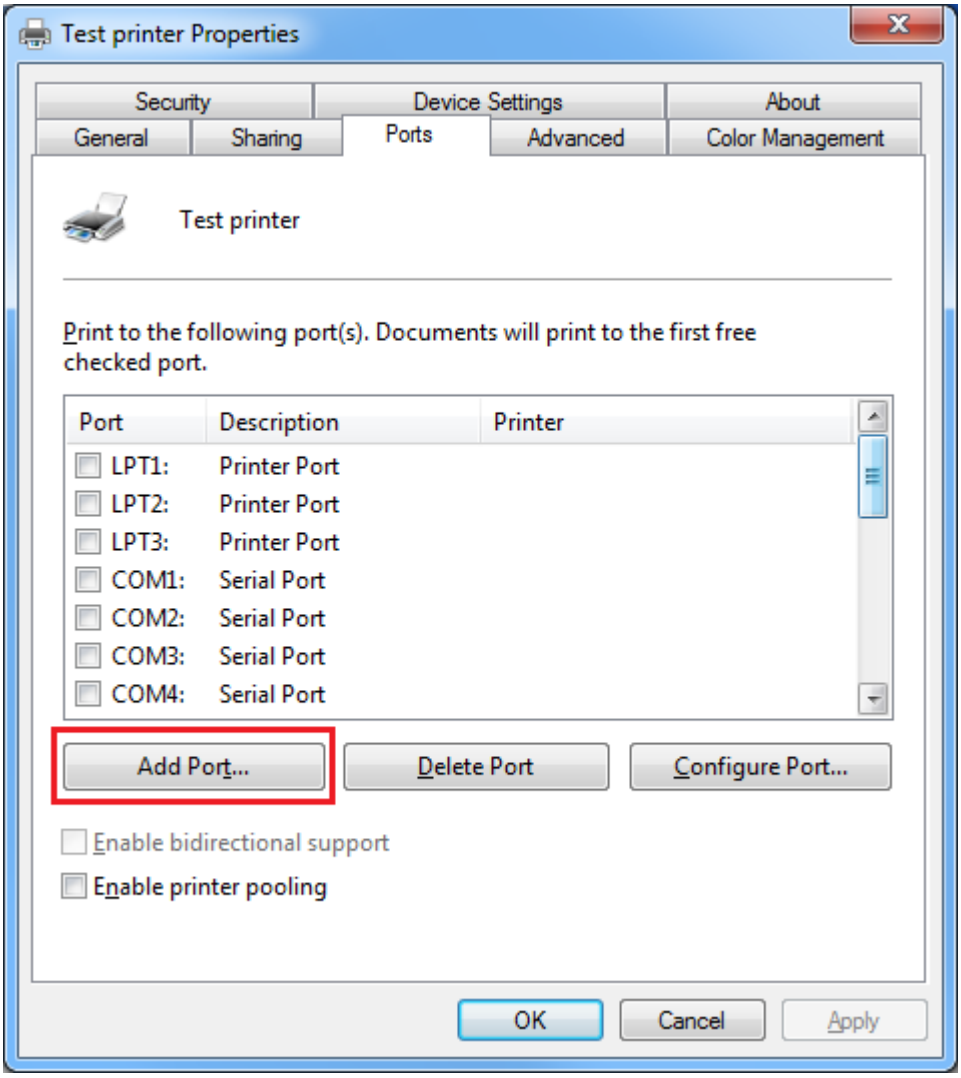
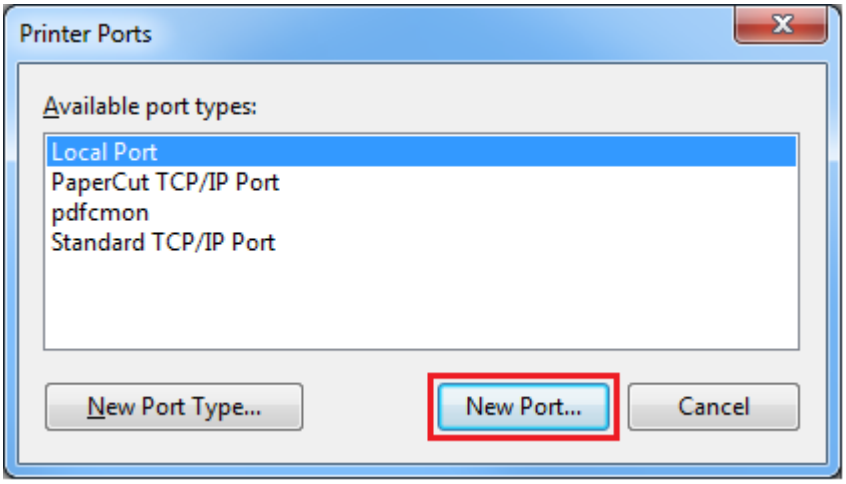


5. Select **PaperCut TCP/IP Port**. (Note: if this port is not displayed in the list of available port types, then see Why is the PaperCut TCP/IP Port not available to be chosen in port selection on Windows?.)
6. Click **New Port**.



7. Enter the printer IP address and port name.

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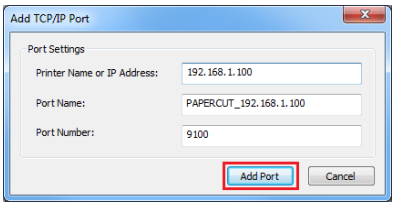
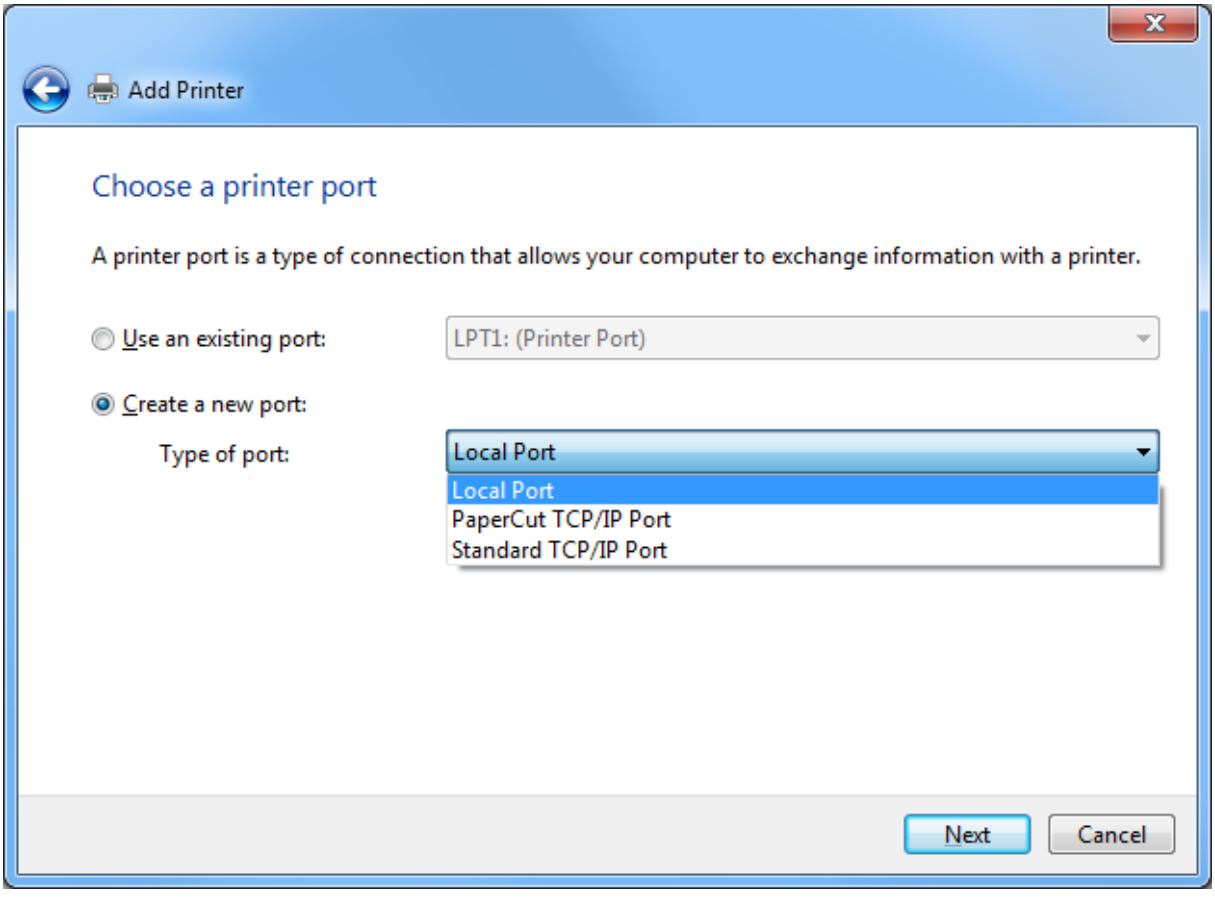
8. Click **Add Port** to save the new port.



9. Click **Close** on each dialog window.
10. This printer is now configured to use the new port. Delete the previous port if it is no longer in use by other printers.

To create a new printer queue to use a **PaperCut TCP/IP Port**:

1. Open the **Printers** list
2. Click **Add a Printer**.
3. Choose to add a **Local printer**.
4. When prompted for the printer port, select **Create a new port**.
5. Select the **PaperCut TCP/IP Port** option; then click **Next**.



6. Enter the printer IP address and port name.
7. Click **Add Port** to save the new port.
8. Complete the **Add Printer** wizard as normal choosing the drivers, etc.

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Novell, Linux and Mac printer queue configuration

When using Novell, Linux or Mac there is no additional configuration of the operating system required for hardware checks to be enabled. This function is controlled through the PaperCut Admin web interface and comes into affect automatically shortly after the hardware checks are enabled. On Linux or Mac, the hardware checking is supported for the CUPS backends of *socket*, *ipp* and *lpd*.

Changing the SNMP community string

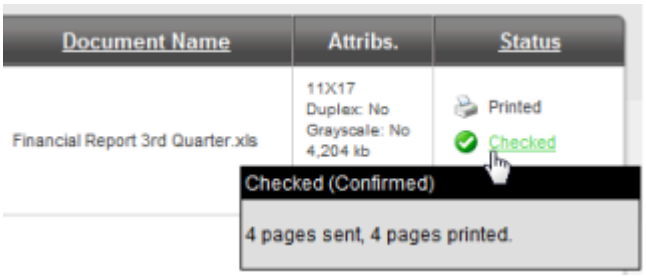
By default, the hardware checks use the SNMPv1/v2c community string of "public". For a basic level of security, you can change the community string. You must also set the same community string in the configuration of the actual printer.

1. Open the file `[app_dir]/providers/print/[platform]/print-provider.conf` in a text editor such as Notepad.
2. Locate the line `SNMPCommunity=` and enter the new community string on the right side of the equals line. For example:
   ```
   SNMPCommunity=secretcommunity
   ```
3. Go to the printer and update its configuration. For more information, refer to the printer's Embedded Guide.

4.6.13.7. Reviewing hardware check results

Hardware check results are recorded in PaperCut on the Job Log page. When a hardware check is recorded, the **Checked** status is displayed in the **Status** column of the print logs as shown below.

To see the basic details of the hardware check, hover your mouse over the **Checked** status.



When the hardware check detects a difference, click the **Checked** status link to see more detailed information.

To manually apply hardware checks to a print job (if this is not configured to apply automatically):

1. Click the **Checked** status.
2. Review the hardware check information.
3. Click **Apply Differences**. This applies the page counts and any cost differences to the print

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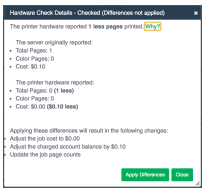
log.



4.6.13.8. Known limitations

Hardware-level page count checks are not enabled by default. Always carefully consider these limitations and known issues before implementing:

- Hardware-level checks slow down printing a little (a few seconds between each job). The system needs to take a count snapshot before and after a job. The start/end of a job is detected by the printer entering an idle state and stabilization on some devices can take a few seconds (printing => idle). This process adds a small delay between each job.
- Copier functions that delay printing such as printing to a "Mailbox" will prevent PaperCut from detecting the print job as it is expected that the print job is printed immediately.
- Not all devices support SNMP and even some devices that do, do not support the ability to check page counts at the hardware level. Most major MPF/MFD devices support SNMP, however, smaller printer brands might not. Make sure you test this option across your device type(s) once enabled.
- On Windows, install/configure a different Printer Port to support this level of device integration. Care has been taken to emulate the behavior of the **Standard TCP/IP Port**, however, some drivers might complain if a non-default port is selected. Although this is rare, it can cause issues with some drivers. Always test the printer after changing the printer port. The development team is looking at ways to remove the dependency on a custom port, however, at the current time this method has proven to be the most reliable.
- The use of non-PaperCut hold/release functionality on printers and copiers can cause inaccurate hardware validation as it appears that the job never prints, or at least in a timely manner. We recommend you use PaperCut Release Stations where required. (See Secure print release
- If you have many printers, it's very time consuming to use the Windows GUI to change the ports! We have not found a reliable way to script this process. We recommend you first test on a representative sample of your devices for a few days, then roll the port change out across your fleet.

4.6.13.9. Troubleshooting

The "Checked" status is not displayed on any print logs

- Verify that the printer supports SNMP and that SNMPv1/v2c is enabled in the printer's Admin web interface.

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To enable SNMPv1 or v2, set the "public" Community name in the Admin web interface to be the same as on the device. See Using the Advanced Config Editor to find out how to set the advanced configuration variable (`printer.snmp.community`) to be the same as on the device.

- Ensure that your networks and firewalls allow SNMP traffic (that is, UDP port 161) between your print server and printers.
- If you're using a Windows print server, check that the printer is configured to use the **PaperCut TCP/IP Port**. See Windows printer queue configuration.
- Verify that hardware checks are enabled in PaperCut. See Configuring hardware checks.
- You can test that PaperCut NG/MF can query SNMP data from the printer by running the following in a command prompt or terminal/shell:

  Windows:

  ```
  [app-path]\providers\print\[platform]\pc-print-monitor.exe -p
  -h [printer-ip]
  ```

  Mac/Linux/Novell:

  ```
  [app-path]/providers/print/[platform]/pc-print-monitor -p -h
  [printer-ip]
  ```

  If SNMP data can be retrieved, some basic status information is printed. If not, an error is displayed.
- If you are still unable to diagnose the problem, then send the following log files in a support request:

  Windows:

  ```
  [app-path]\providers\print\[platform]\print-monitor.log*
  [app-path]\providers\print\[platform]\print-provider.log*
  ```

  Mac/Linux/Novell:

  ```
  [app-path]/providers/print/[platform]/print-provider.log*
  ```

Why is the "Checked" status missing on some print logs?

- An intermittent networking problem between the print server and printer might have stopped the SNMP page counts from being retrieved. That is, the network was briefly interrupted while PaperCut NG/MF was waiting for the print job to finish printing.
- If the job is deleted from the print queue while in progress, PaperCut NG/MF cancels any hardware checks and the **Checked** status is not displayed in the print log. To avoid this, fix any problems (for example, out of paper) at the printer and then allow the document to finish printing. This allows PaperCut NG/MF to retrieve the page counts from the printer after the job completes. Delete the job from the queue only if it stays stuck even after the printer error is resolved.

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Why is the PaperCut TCP/IP Port not available to be chosen in port selection on Windows?

- A possible reason why the PaperCut TCP/IP Port is not available is because the port was unable to be installed due to a Security Policy disabling the installation of unsigned drivers. A solution for this is to change the Security Policy for the unsigned driver installation behavior to either allow unsigned driver installations or to warn but allow their installation.

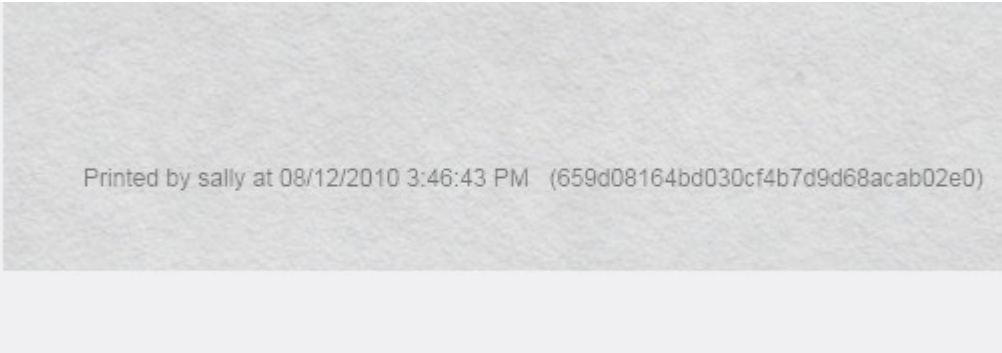
4.6.14. Watermarking/job annotation

Watermarking is a feature that allows text to be written to every page in a print job. You can write the text to the top (or bottom) of a page, in a custom location (such as the middle of the page), or over the entire page. Watermarking is a powerful and flexible feature. Typical uses of watermarking include:

- adding a username to the bottom of every page to help identify the owner
- writing job metadata in the footer, such as print time, printer or document name
- applying a digital signature to help track and verify documents
- applying a copyright notice across proprietary content to prevent plagiarism

You can apply watermark text to printers individually. Print scripting makes it possible to change watermarks dynamically (see Advanced scripting (print scripting)). Watermarks can contain substitution variables allowing the insertion of document metadata such as date/time, username, document name, etc.

A typical watermark is shown in the picture immediately below. This watermark uses the `%user%`, `%date%` and `%signature%` substitution variables described in the Substitution Variables section.



Note:
PaperCut NG/MF watermarks print jobs by modifying the print stream as jobs spool via the print server. The watermark is injected into the job using advanced PDL methods, such as macros and overlays. This is the reason why PaperCut NG/MF supports only the following standards based print languages:

- PCL5 (Full page watermarking is not supported)
- PCL6

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- PostScript.

PCL6 and PostScript drivers are recommended for devices that support these drivers, as they provide better quality and consistent prints with watermarks.

4.6.14.1. Typical uses

- **Owner Identification.** Add the username to each page so it is easy to find the owner (e.g. uncollected print jobs).

  Suggested Watermark: `Printed by %user%`

- **Student Assignments.** Add the username and time of printing to each page. This helps teachers match up student work and help students prove that assignments were delivered on time.

  Suggested Watermark: `Printed by %user% at %date% on printer %printer%`

- **Tracking an Organization's Physical Documents.** Add a sequentially allocated number to every document printed. This number is a document-level Bates number (http://en.wikipedia.org/wiki/Bates_numbering). It is recorded in the PaperCut NG/MF database and is useful for organizing document trails.

  Suggested Watermark: `Document No.: %bates% composed of %pages% pages`

- **Identification and Source Tracking.** Add a unique and secure digital signature to each document. Use this to verify the origin and generation details of a document. (Note: see Digital Signatures in Detail section below if security is required).

  Suggested Watermark: `%signature%`

- **Content ownership and copyright.** Add a repeated pattern stating the copyright notice or company name across the entire page to protect valuable documents where royalties apply. .

  Suggested Watermark: `Copyright ABC Corporation. All rights reserved. Document Signature: %signature%`

- **Behavioral Change.** The cost of each print job is added to the bottom of each page. This gives the user immediate feedback on the cost of their printing.

  Suggested Watermark: `The cost of this print job is: %cost%`

Tip:

To configure watermarking based on the user (e.g. a user's group membership) or job attributes, consider the Advanced Scripting feature. Advanced Scripting allows the watermarking to be enabled/disabled and the watermarking text to be adjusted to meet any need. See Advanced scripting (print scripting) for more details.

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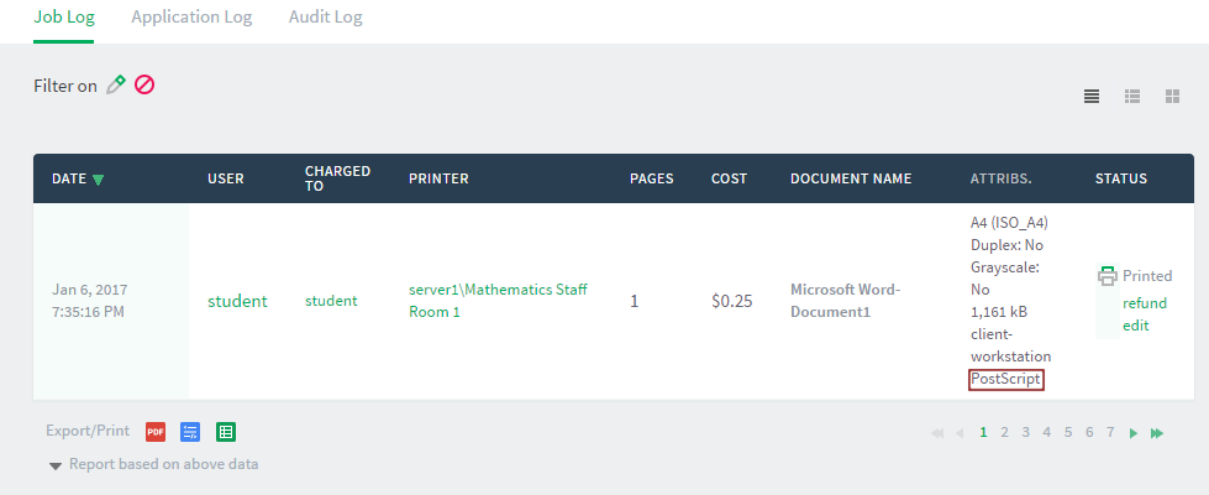
4.6.14.2. Requirements

Watermarking is currently available for printers using PostScript and PCL drivers. You should ensure that the printer driver uses the PostScript or PCL language rather than GDI or other languages. You can verify this by observing the word `PostScript`, `PCL5` or `PCL6` in the Job Log as shown in the screenshot below.



On Windows systems, if the language lists as EMF, then turn off **Advanced Printing Features** as described in Troubleshooting.

4.6.14.3. Enabling watermarking

To enable watermarking:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Advanced Configuration** area, select the **Apply watermark / digital signature to all pages** check box.

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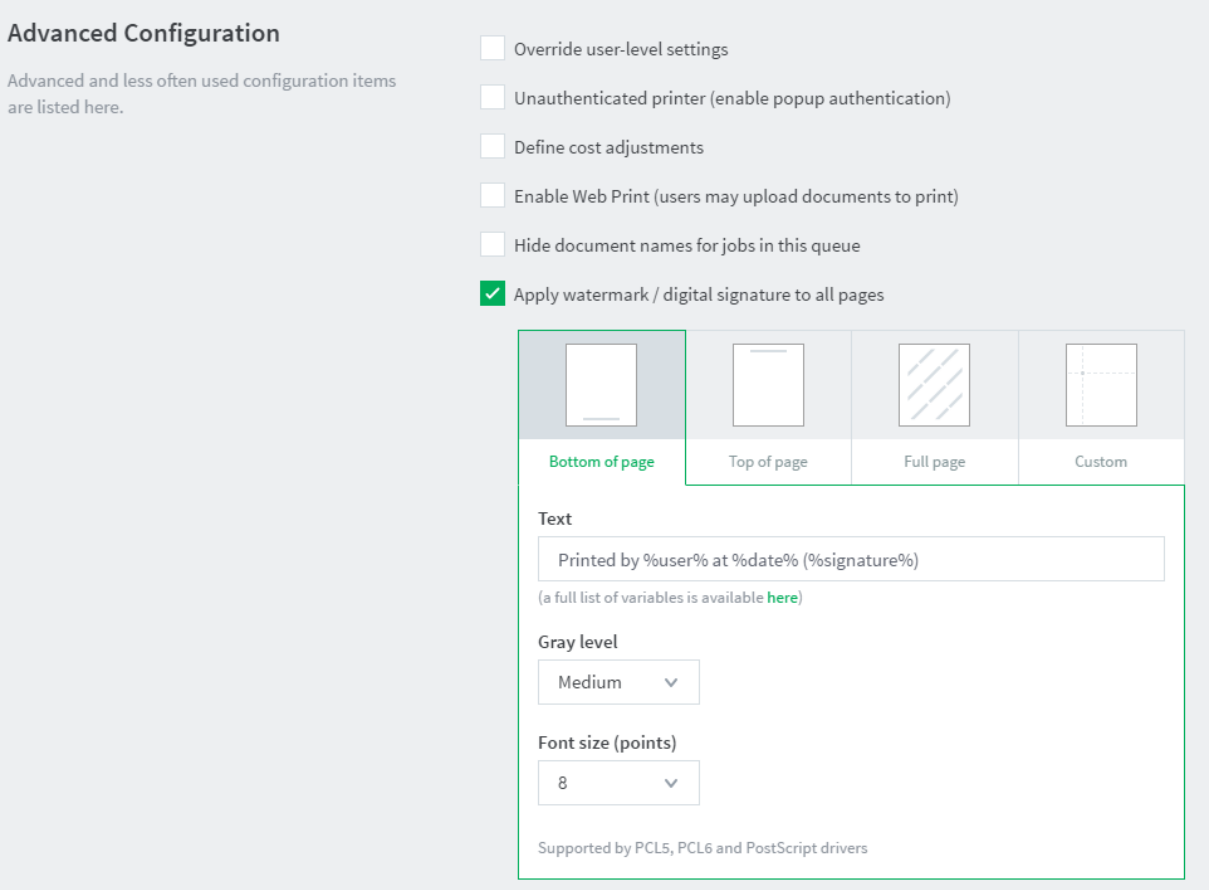

4. In **Text**, enter the text to be printed in the watermark. You can use macro substitution variables, such as `%user%` and `%date%`. For a complete list of the variables, see Substitution variables/macros.
5. In **Position**, select the location on the page where you want watermark to be displayed. This can be Bottom of page, Top of page, Full page, or Custom. Custom is intended for advanced situations where some tweaking is required due to differences in the page printable area. Custom positions are specified as the distance, in millimeters, from the top or bottom of the page (Longitude), and from the left or right of the page (Latitude).
6. For **Bottom of page** and **Top of page**, complete the following options:
   - In **Text**, enter the text to be printed in the watermark. You can use macro substitution variables, such as `%user%` and `%date%`. For a complete list of the variables, see Substitution variables/macros.
   - **Gray level**—determines how dark or light the text will be. Medium is the default. Light is just viewable.
   - **Font size (points)**—determines the watermark text size.
7. For **Full page**, complete the following options:
   - In **Text**, enter the text to be printed in the watermark. You can use macro substitution variables, such as `%user%` and `%date%`. For a complete list of the variables, see Substitution variables/macros.

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> **Note:**
> For **Full page**:
> - you cannot select any options. By default, the watermark will print in 14pt with Medium gray scale.
> - Only PCL6 and postscript drivers are supported.

8. For **Custom**, complete the following options:
   - In **Text**, enter the text to be printed in the watermark. You can use macro substitution variables, such as `%user%` and `%date%`. For a complete list of the variables, see Substitution variables/macros.
   - **Gray level**—determines how dark or light the text will be. Medium is the default. Light is just viewable.
   - **Font size (points)**—determines the watermark text size.
   - **Horizontal Position**—the distance, in millimeters, from the top or bottom of the page. Select one of the following, then enter the number of millimeters:
     - Distance from top of page
     - Distance from bottom of page
   - **Vertical Position**—the distance, in millimeters, from the left or right of the page. Select one of the following, then enter the number of millimeters:
     - Distance from top of page
     - Distance from bottom of page
9. Click **OK**.

Substitution variables/macros

Table 37: Substitution variables / macros

Field	Description
`%user%`	The name (username) of the user that printed the document.
`%user_primary_card_id%`	The user's primary ID code.
`%user_secondary_card_id%`	The user's secondary ID code.
`%user_full_name%`	The full name of the user that printed the document.
`%user_`	The email address of the user that printed the document.

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Field	Description
email%	
%date%	The date/time that the document was printed. The date is formatted in according the locale of the server. An example of a %date% is 12/12/2010 3:12:37 PM.
%document%	The name of the document that printed.
%server%	The server name that is hosting the printer that printed the print job.
%printer%	The name of the printer where the print job was printed.
%client_ip%	The IP address of the workstation the job was sent from.
%client_machine%	The name of the workstation that sent the print job.
%job_id%	The PaperCut NG/MF job id of the job.
%copies%	The number of copies of the document that was printed.
%cost%	The cost of the print job.
%pages%	The total number of pages in the print job.
%bates%	A sequentially incrementing number based on a Bates Numbering (http://en.wikipedia.org/wiki/Bates_numbering) scheme. All pages in the document are stamped with the same number. The number is recorded as a signature in the print log.
%signature%	A unique secure digital signature (in text form) generated via an MD5 HMAC. The signature is recorded in the print log. See Digital Signatures in Detail (Advanced) below for technical details.
%digest%	A unique digital signature (in text form) generated using an MD5 of various document attributes.
%sig_md5%	Same as %signature%.
%digest_md5%	Same as %digest%.
%sig_sha1%	Same as %signature% but based on the SHA1 message digest algorithm.
%digest_sha1%	Same as %digest% but based on the SHA1 message digest algorithm.

Restrictions and limitations

To ensure a document that has a unique single signature, use only one digital signature macro in a watermark. The digital signature macros are:

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- `%bates%`
- `%signature%`
- `%sig_md5%`
- `%sig_sha1%`

4.6.14.4. Digital signatures in detail (advanced)

Signature algorithm

PaperCut NG/MF document digital signatures are generated using a cryptographic technique called an HMAC (http://en.wikipedia.org/wiki/HMAC). This works by taking various print job attributes, such as print time, username, printer name, and document name, and combining them with a secret key. The result is then passed through a digest algorithm such as MD5. The resulting signature is unique to the document. The secret key portioning ensures that it is not possible to predict a signature. Two message digest algorithms are available:

- **MD5**— MD5 is secure enough for print job signature applications. Because the signatures are shorter, using MD5 makes it easier to enter keys to find matching print jobs.
- **SHA1**—provided as an option for cryptographic completeness.

Note:

The algorithm used is:

- `Digest = Hash(date time || username || server name || printer name || document name || job id)`
- `Signature = Hash(Digest || Key)`

where:

- `key` is a random string generated on first use and stored in the config key "print.signature.hmac-key" and hash is either MD5 or SHA1.
- `date time` is formatted in ISO 8601 basic format from year to second ("yyyyMMddTHHmmss"). The time is local time (not UTC). E.g. "20100130T141059"

Verifying a signature

If a document is located, for example, due to an information leak, you can use the signature to track down the print event details such as the originating user, time of print, and other details. This is done as follows:

1. Click the **Logs** tab.

   The **Job Log** page is displayed.
2. Click **edit** next to **Filter on**.

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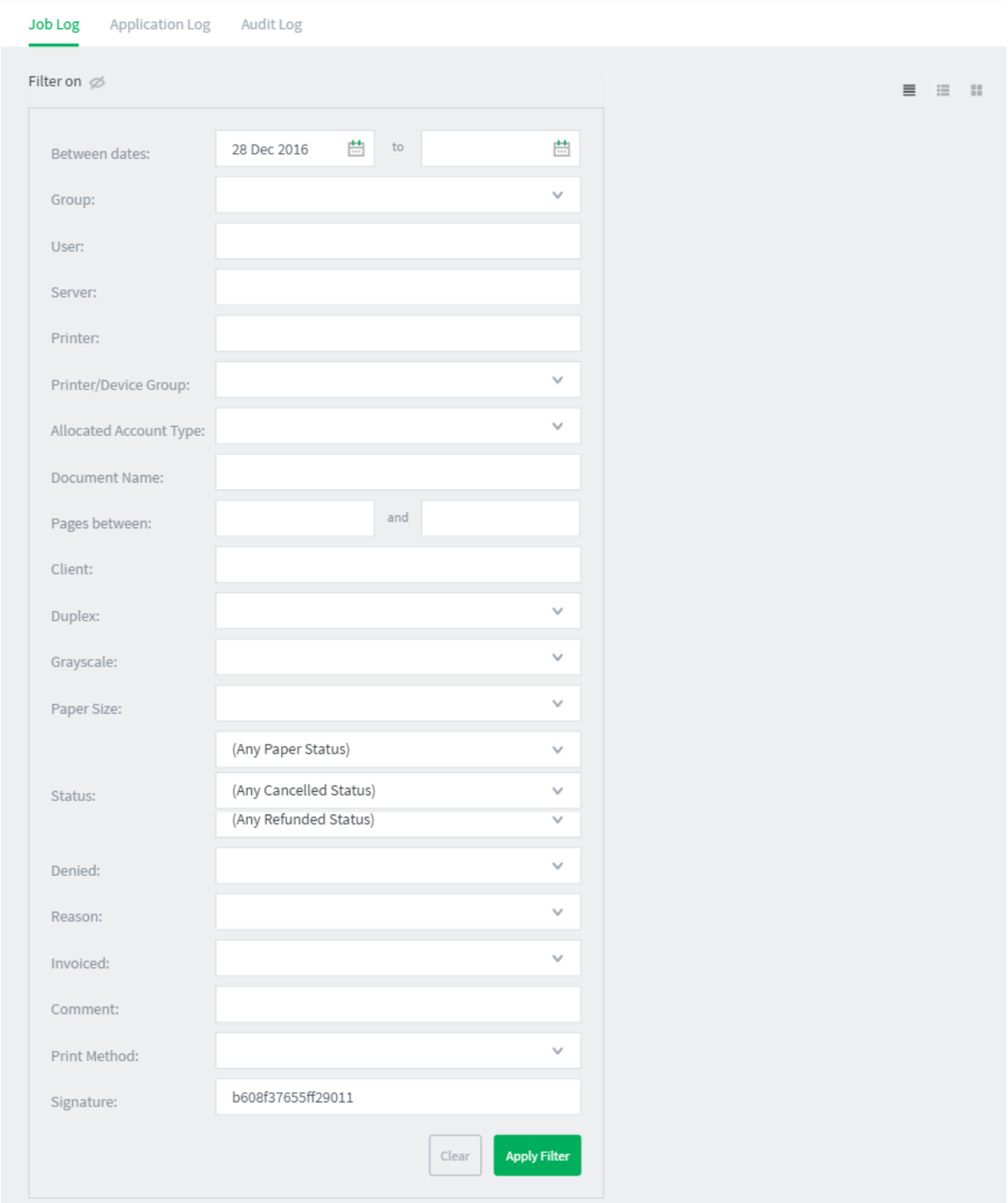
3. In **Signature**, enter the signature.
4. Click **Apply Filter**. The matching job should list.

For example, the following screenshot shows how to search for the print job with signature `b608c7a39f08643768051217f2f5315a` in the job log.



4.6.14.5. Troubleshooting

Watermarking requires print jobs to be printed in PostScript or PCL format. If your document is printed in EMF you might be able to print in PostScript or PCL by following the procedure listed in the

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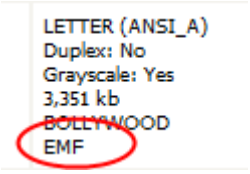
EMF section below. For all other drivers, see Other Printer Languages.

EMF

On Windows systems, if the printer language for a job lists as `EMF`, then turn off **Advanced Printing Features**. Disabling this option causes print jobs to be rendered into their printer language on the client side. Enabling it can result in rendering on the server side, which is usually unwanted.



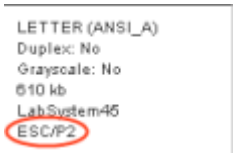
You can do this by following these steps:

1. On the print server, select **Start > Control Panel > Printers > [right-click printer] > Properties > Advanced**.
2. Turn **off** (disable) the **Enable advanced printing features** option.
3. Test printing and check the printer language to ensure that it is now PostScript or PCL.

You can read more about this setting on the Microsoft website at: http://support.microsoft.com/?kbid=268093.

Other printer languages

If the printer language for a job is listed as a non-supported language, such as ESC/P2(Epson), then watermarking does not work. The manufacturer might also support other languages, such as PostScript. Check the printer manufacturer's website download page for details.



Updating printer drivers

When updating printer drivers, it is important to update the printer drivers on **both the client and the server**.

4.6.15. Behavior on server connection failures

There are various scenarios where the users want to print their print jobs but the PaperCut NG/MF Application Server is unable to receive the information about the printing, including when:

- The Application Server's machine is being rebooted,
- The network link is down between a secondary print server on a remote machine and the Application Server,
- The administrator has decided to shutdown the Application Server for maintenance.

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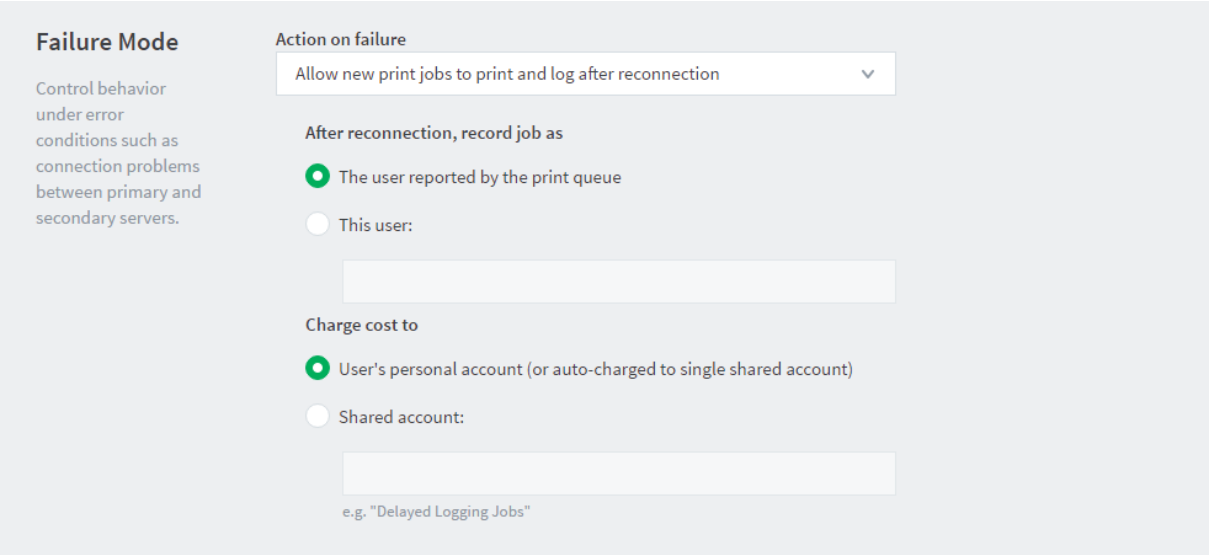
When this occurs PaperCut NG/MF must decide on how to handle the print job without communicating with the Application Server. The administrator can configure PaperCut NG/MF to handle new jobs in 3 ways:

1. Allow new print jobs to print but do not log (default),
2. Allow new print jobs to print and log after reconnection,
3. Do not allow new print jobs to print but hold and wait for reconnection.

Each of these options offer different compromises, and the best option depends on the needs and priorities of a particular installation. For example, if it's important to never interrupt printing then select options 1 or 2. If it's important to strictly enforce quotas (i.e. allow the job to be canceled if they do not have enough quota) and it is acceptable to delay printing until the connection is reestablished then choose option 3. These options are discussed in detail below.

These configuration options are controlled under the **Printers [select printer] > Failure Mode** .



4.6.15.1. Failure mode settings

Mode 1: Allow new jobs to print but do not log

This is the default mode and allows jobs to print when the connection to the server is down (a "fail open" mode). The jobs printed during this period are not logged in the Application Server. Use this mode when:

- It is important to not interrupt printing when outages occur,
- The setup needs to be simple and easy to understand,
- It is not important to log jobs printed during failures,
- Strict quota enforcement is not required, Users will not be charged for printing that occurred during the outage.

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Mode 2: Allow new jobs to print and log after reconnection

This mode allows jobs to print when the connection to the primary server is down, but when the connection is re-established these jobs are re-sent to the Application Server and logged (a "fail open" mode with re-send/offline mode). Use this mode when:

- It is important to not interrupt printing when outages occur,
- It is important to log/charge every job printed during failures,
- Strict quota enforcement is less important. Users can use more credit than they have available.

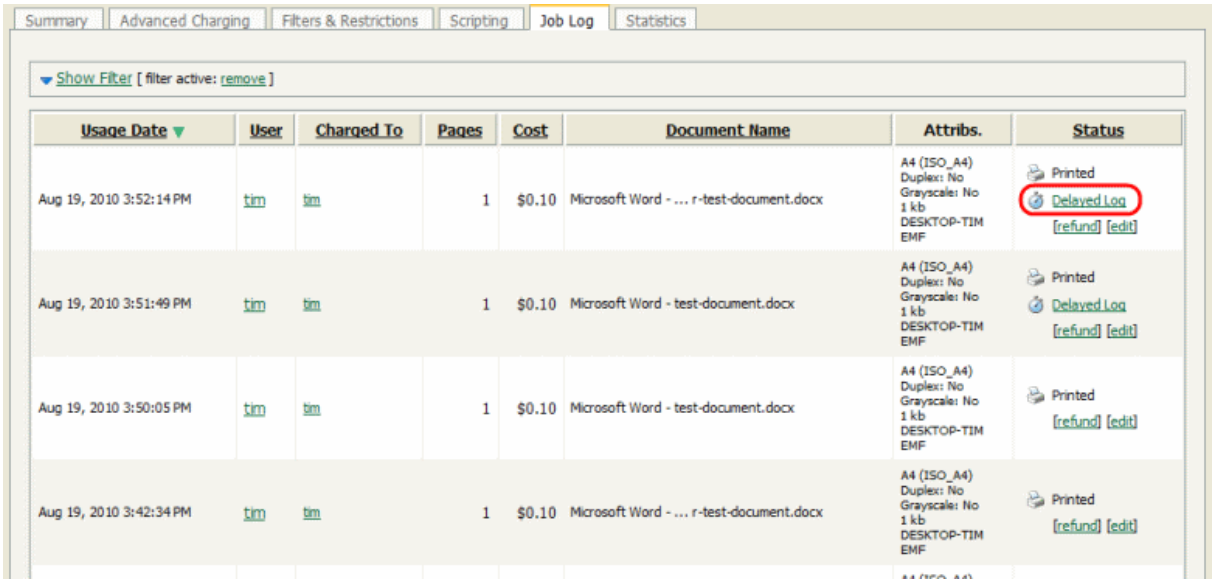
In this failure mode the administrator can configure how these resent jobs are recorded in the job log:

1. Leave the job information unchanged (i.e. log the job against the user that printed it),
2. Change the recorded user to another nominated user,
3. Change the charging of the print job to a nominated shared account.

The default reconnection option is 1, where logging and charging is done in the same way as if the recording was done live. The administrator might consider this unfair to charge the user during this failure time (as there were no warning popups or ways of telling that the user's quota was reaching its limit). It might be more reasonable to use the reconnection options of 2 or 3. With option 2, the administrator can choose a new user, such as "AppServerDown" to record the job as and in this way completely divorce the user from jobs printed during the failure.

If the administrator wants to track who did the printing but thinks it is unfair to charge their personal account, then choose reconnection option 3, and a new shared account such as "AppServerDown", or an account corresponding to the department owning the printer can be charged. Jobs are still recorded under the user's name.

When the connection to the Application Server opens up again, the print jobs show up in the Application Server's job log within a few minutes. They show up with a special status and icon in the job log (see figure below).



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Mode 3: Do not allow new print jobs to print but hold and wait for reconnection

In this mode all jobs are held in the queue while the connection to the server is down (a "fail closed" mode). Once the connection to the server is reestablished the jobs are sent to the server and printing is processed as normal. Use this mode when:

- Strict quota enforcement is required,
- Secure Print Release or Find-me printing is used and jobs must not be printed until released by a user.

4.6.15.2. Failure mode settings on virtual queues

When using virtual queues and Find-me printing (see Find-Me printing and printer load balancing), it is recommended to hold the all jobs and wait for reconnection when the server connection is down. By default, this setting is enforced by PaperCut to ensure the correct operation of the virtual queue.

If jobs are released from the virtual queue when the server connection is down, the jobs would be released to the configured printer (i.e. the configured printer port). If the queue is configured with a NULL port, the jobs are deleted. If configured for a non-existent printer (e.g. LPT1) then the jobs go into an error state. If configured for a real printer, the jobs are sent to the printer (contrary to the secure release / Find-me printing that the user expects). It is for these reasons that the failure mode on virtual queues is set to hold all jobs.

Some organizations prefer to have the virtual queue pointing to a real/physical printer so that if a failure occurs the jobs are printed. This is usually only acceptable if the organization is happy that users jobs be printed on a single queue (bypassing any secure print release function). To configure this, select the **Override virtual queue failure mode** check box; then select one of the alternative modes. This option is visible only on virtual queues.

4.6.16. Retrieve toner levels (for supported printers)

- Overview
- How toner level information is retrieved
- Generate a report of toner levels

4.6.16.1. Overview

Managing printer toner on a large fleet of printers can be a time-consuming task. The administrator must track toner usage and ensure that replacement toner cartridges are available when printer toner runs out. Often the administrator is only made aware that a printer is out of toner after receiving complaints from users. PaperCut NG/MF can track the toner levels for supported printers and provide toner level information in reports or email notifications when the toner is low.

Armed with this information the administrator can purchase toner supplies in advance and replace toner cartridges before the printer runs out of toner. This saves time and ensures that printer downtime is minimized.

You might also want to take a look at Low printer toner notifications.

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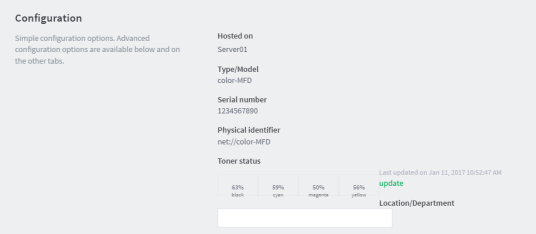

4.6.16.2. How toner level information is retrieved

PaperCut NG/MF retrieves toner information from supported printers using the SNMP network protocol. Most modern network printers allow the toner information to be queried via SNMP.

PaperCut NG/MF can retrieve toner information for printers that meet the following requirements:

- The printer supports the SNMP standard for printers (RFC 1759) that allows toner information to be retrieved in a standardized way. Most network printers support this standard. There is also support for the private MIBs of Brother and Ricoh.
- SNMPv1/v2c or SNMPv3 is enabled and configured.
- The printer is networked (that is, it is connected to your network and not directly to a computer with a USB or parallel port).
- Your network (for example, routers, firewalls, etc.) allows the PaperCut NG/MF server to establish SNMP connections between the PaperCut NG/MF server and your printers.

> **Tip:**
> When the PaperCut NG/MF server is unable to establish SNMP connections, the number of retry attempts made to re-establish connections and the duration of the timeout between each retry attempt, are configurable. Configure these values using the following advanced configuration variables:
>
> `printer.snmp.retries` – Determines how many retry attempts will be made by the PaperCut NG/MF server to re-establish SNMP connections. By default, 4 retry attempts are made.
>
> `printer.snmp.timeout-millis` – Determines the duration of the timeout (in milliseconds) between each retry attempt. By default, the timeout is 5 milliseconds.

4.6.16.3. Generate a report of toner levels

PaperCut NG/MF regularly updates the toner information to ensure the data is kept up to date.

You can generate a report with 'Toner Status', 'Lowest Toner Value' and 'Toner Last Updated on' fields from the Admin web interface.

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. At the bottom of the list select **Export / Print in Excel format**.

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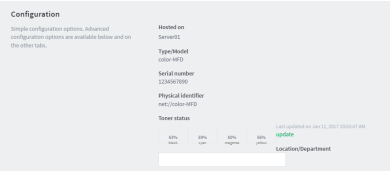
Tip:
The thresholds for low and very low toner level warnings visible on Dashboard are configurable. Configure the threshold values using the following config keys - `toner.low-threshold` and `toner.very-low-threshold` . See Using the Advanced Config Editor to find out how to change config keys.



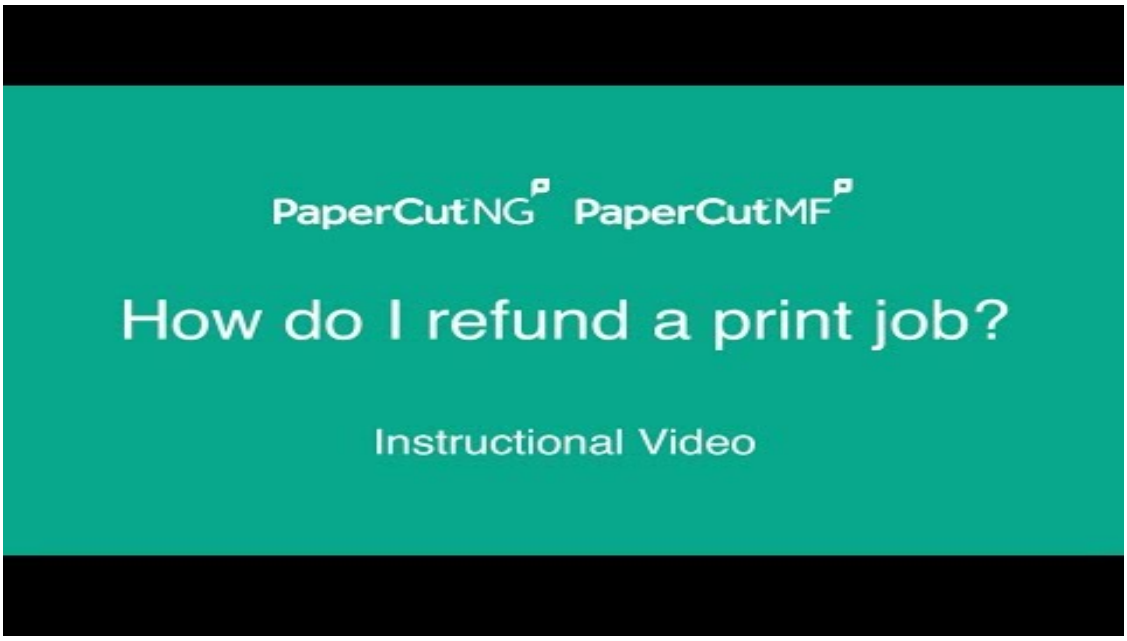
4.6.17. Refund print jobs

Paper jams, toner problems, and print quality issues always occur. Larger organizations require a policy to address these situations and under what conditions a print job can be refunded. The assessment to give a refund or not is subjective and needs to be managed by responsible administrators. To streamline and partially automate the process PaperCut NG/MF provides a browser based refund management process.

Highlights include:

- Users can request refunds via a simple form and track their status.
- Administrators can quickly approve/deny requests with one click.
- Administrators can be alerted via email when requests are pending.
- Issue partial and manual refunds.

4.6.17.1. Enabling end user refunds



Users request refunds via the end user web pages. This feature is enabled as follows:

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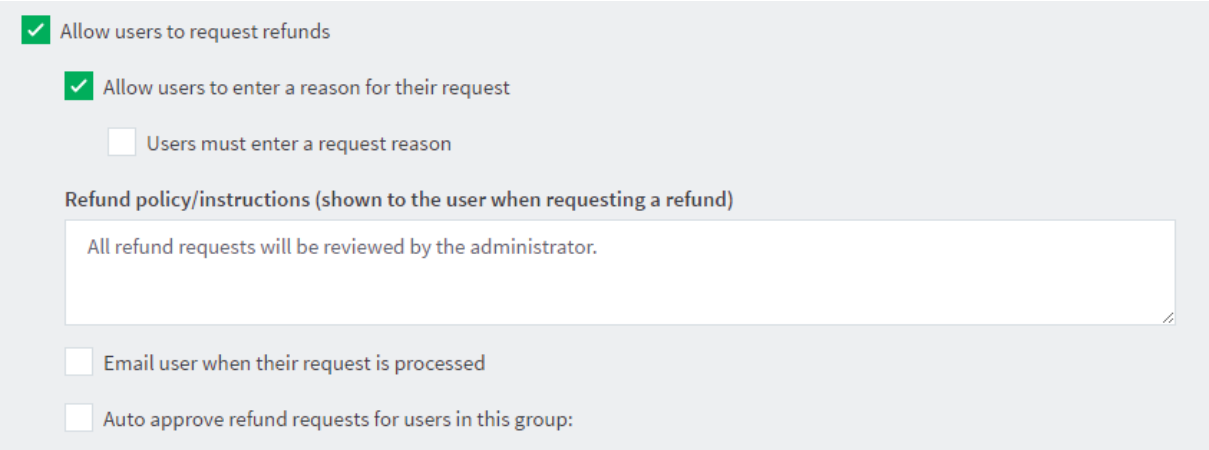
1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **User Features** area, select the **Allow users to request refunds** check box.



3. If you want users to enter a reason for the refund request:
   - Select the **Allow users to enter a reason for their request** check box. You might want to disable this feature to prevent users writing inappropriate comments.
   - If you want to force a user to enter a request reason, select the **Users must enter a request reason** check box.
4. In **Refund policy/instructions**, enter your formal refund policy details. This text can also include basic HTML markup, such as a link to an external policy page.
5. If you want an email to be sent to the user requesting the refund:

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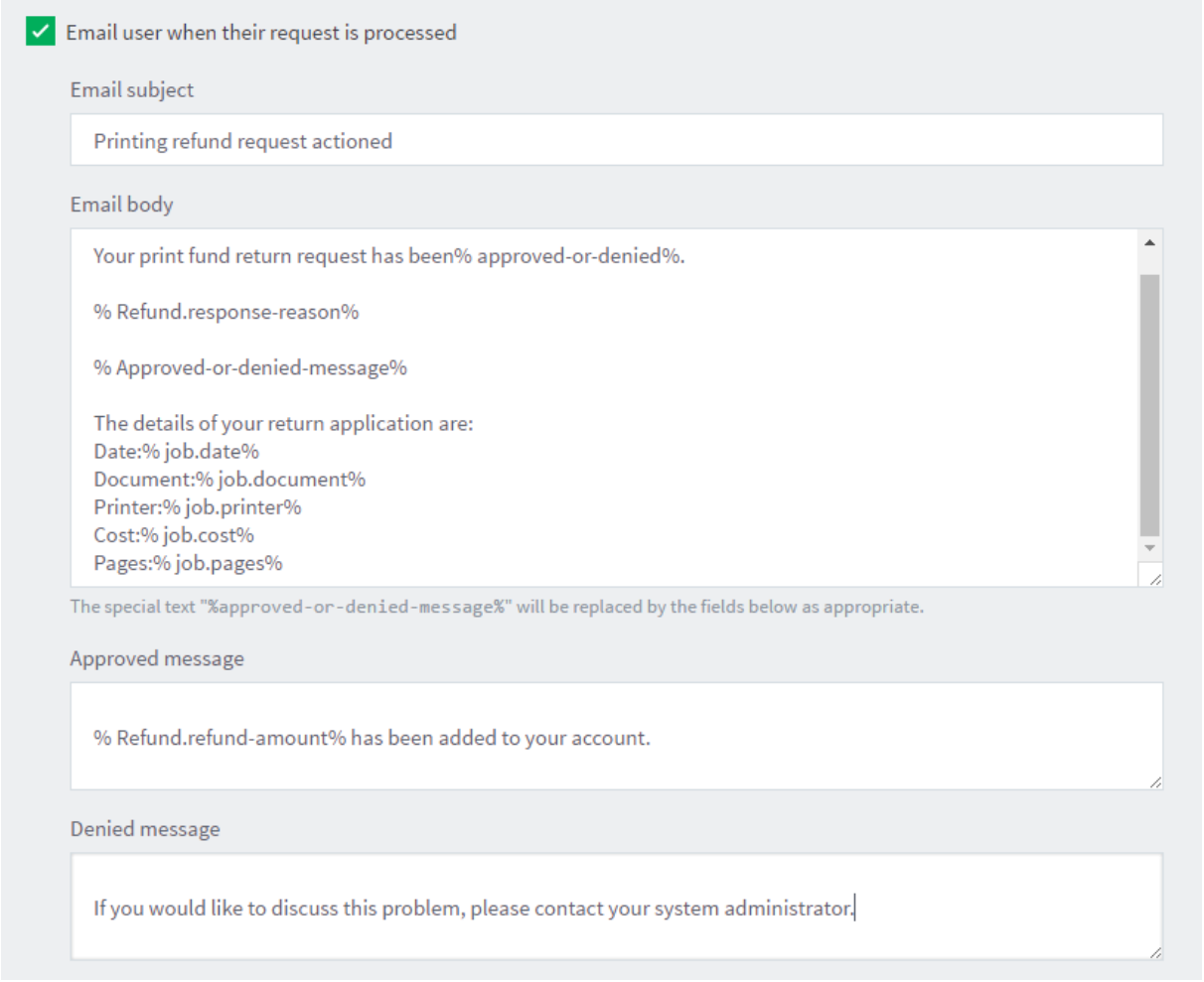
a. Select the **Email user when their request is processed** check box.



b. Complete the **Email subject** and **Email body** fields. You can use fields in the email subject and body. For more information about the available fields, see User notification fields.

c. Complete the **Approved message** and **Denied message**. These are used to replace the field `%approved-or-denied-message%` in the email body.

d. Define an SMTP server so that emails can be sent (see Configure email).

> **Note:**
> Either the user must have an email address defined, or the *email suffix* must be enabled.

6. If you want to automatically approve refunds for all users in a group, select the **Auto approve refund requests for users in this group** check box; then select the group.
7. Click **Apply**.

User notification fields

Other than the `%approved-or-denied-message%` marker, you can use the following markers in any of the above four fields:

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Table 38: Fields available printer refund request user notifications

Field	Description
%job.copies%	The number of copies in the print job.
%job.cost%	The original cost of the print job.
%job.date%	The date the original print job was sent.
%job.document%	The document name of the print job.
%job.pages%	The number of pages in the print job.
%job.paper-size%	The paper size of the print job.
%job.printer%	The printer the print job was sent to.
%refund.refund-amount%	The amount that was refunded.
%refund.request-amount%	The refund amount requested by the user.
%refund.request-date%	The date the user made the refund request.
%refund.request-reason%	The reason the user gave for the refund request.
%refund.request-username%	The username of the user making the refund request.
%refund.response-date%	The date the refund was actioned.
%refund.response-reason%	The reason the admin user gave for approving/denying the refund request.
%refund.response-username%	The username of the administrator who actioned the refund request.
%refund.status%	The status of the refund request as it is displayed in the **Job Log**.

4.6.17.2. Managing refunds

The refund process is best described in the form of an example.

How users request refunds

Debbie's print job failed to fully print due to a printer jam, forcing him to reprint the remainder of the job on another printer. He has requested a refund of approx. 50% of his job cost for the first failed job. Debbie would place the request as follows:

1. Log in to the user web interface at `http://[server_name]:9191/user` using his network username and password.
2. Locate the first, failed print job on the **Recent Print Jobs** page.
3. Click the **[Request Refund]** link.

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4. Enter a reason.

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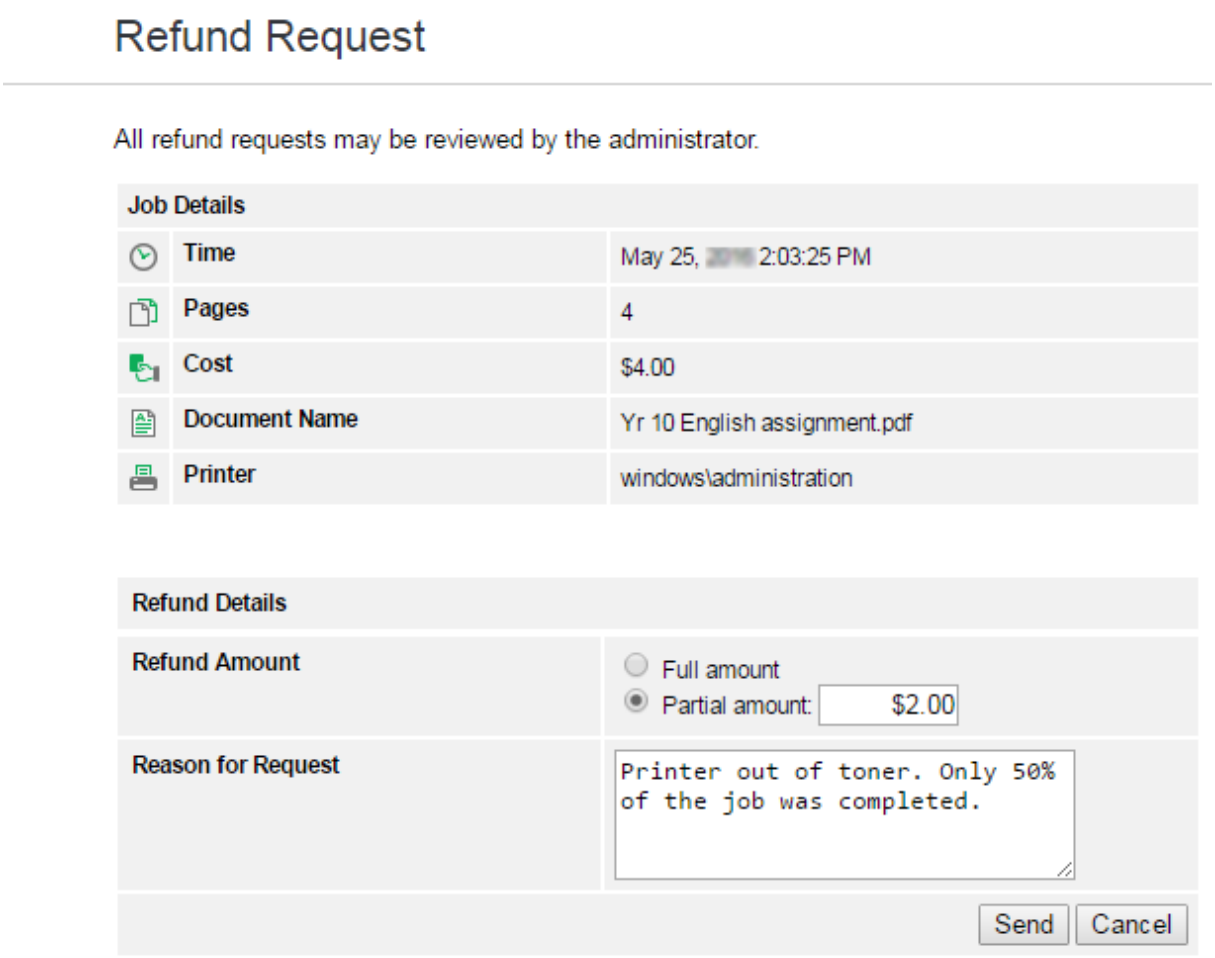

5. Click **Send**.

The administrator approval process

Jenny is an IT administrator at John's school. She has just received an email indicating that refund requests are pending review. To approve Debbie's request Jenny would:

1. Select **Printers > Refunds**.

   The **User Refund Requests** page is displayed.
2. Locate Debbie's request and review.

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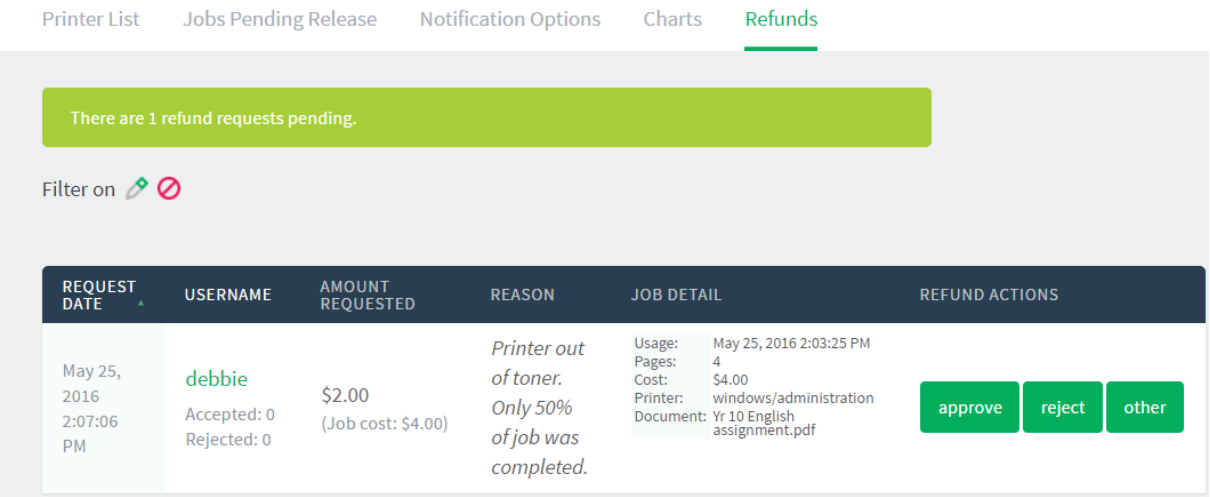
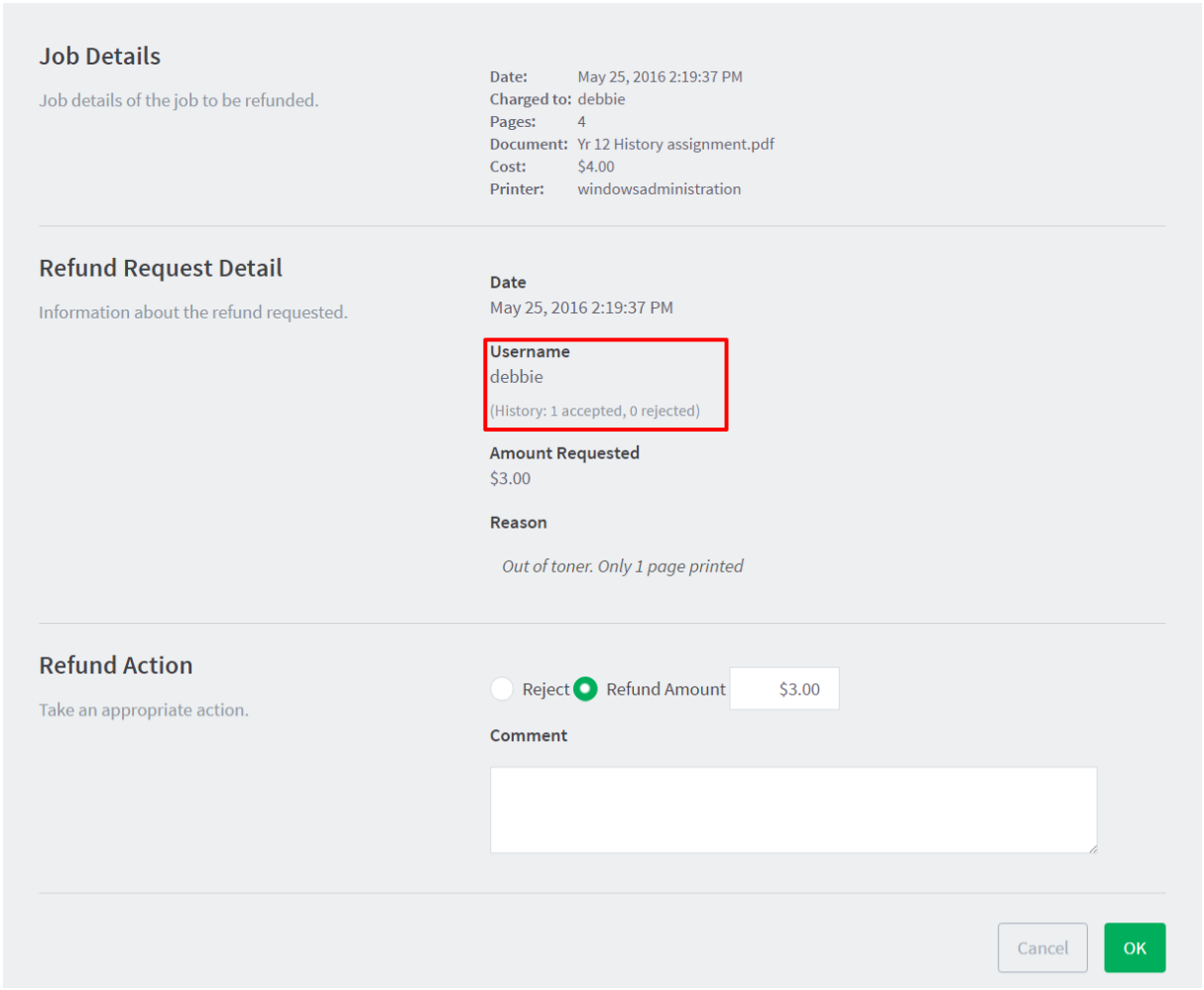
3. Click the **Approve** link.



Jenny could have denied the refund request by clicking **[reject]** link. Clicking the **[other]** option would have allowed Jenny to review Debbie's previous requests for refunds, edit the requested amount and write a comment.



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4.6.17.3. Admin notifications

Administrators can receive regular emails about pending refund requests. To enable email notifications:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. In the **System Notifications** area, select the **Pending refund requests** check box.
3. Click **Apply**.

For more information, see Pending refund request notifications.

Emails can be delivered hourly or daily. By default daily messages are delivered at 7 a.m. Configure the hour of the day via the config key `notify.pending-refund-requests.daily-hour-of-day`. For more information about changing config keys, see Using the Advanced Config Editor.

4.6.18. Define custom printer fields

To assist with device management, enable custom fields on printers. You can assign custom fields user-defined names and can represent any data you would find useful for printer management in your organization. Common examples include recording metadata such as asset number, lease period, device status, date of acquisition, last maintenance date, department ownership, etc.

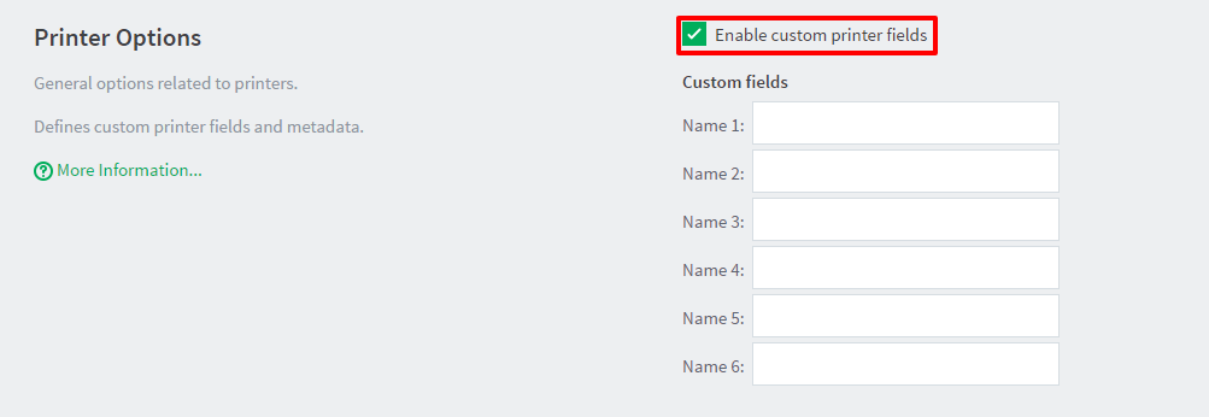
You can define up to six custom fields. The names are set by the administrator as per the site requirement. In turn, you can use these custom fields for many purposes, such as recording data, filtering lists, and creating/exporting reports.

4.6.18.1. Defining custom printer fields

To define a custom printer field(s):

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Printer Options** area, select the **Enable custom printer fields** check box.



3. Enter an appropriate name for `Name 1` and repeat for any other fields that you plan to use.
4. Click **Apply**.

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The custom fields are visible in the **Printer Details** page.

You can also use the custom field in other areas of the application, such as filtering the printer list, and applying ad-hoc reporting conditions.

4.6.19. Extract usernames in enterprise print environments (e.g. SAP, Unix)

It is common in an enterprise print environment using packages such as SAP, JD Edwards, Oracle Financials or Unix systems for print jobs (e.g. batch reports) to be displayed in print queues under a system account name rather than the instigating user's account name. The result is that all jobs printed from these programs are recorded in the PaperCut NG/MF job log as owned by the program/system account.

In most environments, you can configure these programs or systems to write the username into the print spool file (PDL). For example, you can add the username as a PJL header. If this is done, then PaperCut NG/MF can extract the username and use it in place of the username supplied to the print queue.

Tip:

This feature is often combined with Username Aliases (enable **Username aliasing** under **Options > Advanced**) when dealing with differences between the usernames used in the PaperCut NG/MF environment and the external system or program that submits these jobs. For example, `john.wayne` in PaperCut NG/MF might have jwayne as a SAP user ID. For more information see Enable username aliasing

The extraction process, when configured, applies the following rules:

1. You can define multiple patterns to extract the username. The matching process returns the first valid result found.
2. Username extraction at the current time is not supported on Novell.
3. The username is included in the first megabyte of the spool file.

4.6.19.1. Configuring PaperCut to extract usernames from spool files

Username extraction from spool files is performed by the PaperCut Print Provider and as such any configuration text described in the following steps needs to be inserted into `[app_`

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path]\providers\print\win\print-provider.conf. After a change to the config is made, restart the Print Provider service before testing.

Extracting usernames using the simple method

The Simple Method uses prefix and suffix text as static bookends for the username that is extracted. In the below example (which you can copy and paste into your print-provider.conf), the user john.wayne is extracted from the string @PJL COMMENT SAP_USER="john.wayne". Simple Matching is sufficient in the majority of customer environments.

```
#
# Extract username from spool files coming from our enterprise
system.
# Look for a header that matches @PJL COMMENT SAP_
USER="john.wayne"
#
UsernameOverridePrefix=@PJL COMMENT SAP_USER="
UsernameOverrideSuffix="
```

Extracting usernames using the advanced method (regular expressions)

The Advanced method adds powerful regular expression pattern plus the ability to define up to five of these patterns, labelled UsernameOverrideRegex1 to UsernameOverrideRegex5. Administrators using this method need to be familiar with regular expressions. The username is extracted from the first bracketed match group (e.g. $1).

In the example below two patterns are matched:

```
#
# Extract username from spool files coming from our enterprise
system.
# Username may be defined in one of two formats:
# (john.wayne) XJXsetUserName
# /Author (john.wayne) def
#
UsernameOverrideRegex1=\((\S+?)\)\s*XJXsetUserName
UsernameOverrideRegex2=Author\s*\((\S+?)\)\s*def
```

The table below shows some further examples of username declarations seen in spool files and corresponding regular expressions that can extract the correct username.

Table 39: Examples of usernames seen in spool files and regular expressions to extract them

Username in Spool File	Regular Expression to Extract Username
@PJL SET USERNAME-E="john.wayne"	@PJL\s+SET\s+USERNAME\s*=\s*"(\S+?)"

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Username in Spool File	Regular Expression to Extract Username
@PJL SET USERNAMEW-W="john.wayne"	@PJL\s+SET\s+USERNAMEW\s*=\s*"(\S+?)"
@PJL XJAUSERNAME = "john.wayne"	@PJL\s+XJAUSERNAME\s*=\s*"(\S+?)"
@PJL COMMENT "User-name: john.wayne"	@PJL\s+COMMENT\s+"Username\s*:\s*(\S+?)"
@PJL COMMENT CANPJL SET USERNAME-E="john.wayne"	@PJL\s+COMMENT\s+CANPJL\s+SET\s+USERNAME\s*=\s*"(\S+?)"
@PJL COMMENT "User-name: john.wayne;App FileName: True Grit.doc"	@PJL\s+COMMENT\s*"Username\s*:\s*(\S+?)\s*;
@PJL OKIAUXJOBINFO DATA-A="UserName=john.wayne"	@PJL\s+OKIAUXJOBINFO\s+DATA\s*=\s*"UserName\s*=\s*(\S+?)\s*"
%%For: john.wayne	%%For:\s*\(?([\w\.-=]+?)\)?\b
/USERNAME (john.wayne) def	/USERNAME\s*\((\S+?)\)\s*def
/UserName (john.wayne) def	/UserName\s*\((\S+?)\)\s*def
/Author (john.wayne) def	/Author\s*\((\S+?)\)\s*def
(john.wayne) /RRCus-tomProcs /ProcSet find-resource begin logusername end	\((\S+?)\)\s*/RRCus-tomProcs\s*/ProcSet\s+findresource\s+begin\s+logusername
(john.wayne) XJX-setUserName	\((\S+?)\)\s*XJXsetUserName

4.6.20. Printer FAQs

How do I view printing history?

You can quickly access printing history via a number of areas. The most appropriate area depends on the information required.

- To view a user's printing history select the **Job Log** under the user's details page.
- To view recent print jobs printed on a printer, select **Job Log** under the appropriate printer's details page.
- To view all print jobs printed on the network with advanced search and filtering options, use the global Print Log on the **Logs** tab.

How do I add a new printer?

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On Windows systems, new printers are added to the system automatically once the printer is added to a monitored server. On a Mac or Linux system, after PaperCut NG/MF is enabled on the printer, it is displayed in the Admin web interface after the first print. New printers are assigned initial settings based on the configuration assigned to the `[Template Printer]`.

How do I delete a printer?

Once the printer is removed from the operating system's print list, you can delete the printer from PaperCut NG/MF via the delete printer action under the printer's detail page. This action removes the printer from the monitored list. Print history logs are still maintained allowing access to historical data. Always confirm your action before proceeding with the delete!

How do I disable a printer?

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Configuration** area, in the **Enable/Disable** list, select one of the disable options.

How do I tell PaperCut NG/MF to ignore (not monitor) a printer?

By default on Windows systems all printers are tracked by PaperCut NG/MF. You can instruct the *Print Provider* to ignore a printer by setting the `IgnorePrinters=` attribute in the `print-provider.conf` file. A restart might be required for this to take effect.

Note:
This setting only stops monitoring. The printer is still listed on the Printer List page until it is manually deleted using the **Delete printer** action.

For more information see Add and remove/delete/ignore printers.

What can I use the printer notes field for?

The **Notes** field under each printer is useful for tracking all manner of information. Typical uses include:

- Tracking configuration changes
- Recording maintenance and/or toner replacements
- Documenting problems
- Leaving notes/comments to assist other administrators.

4.7. Find-Me printing and printer load balancing

This section covers two powerful features: printer load balancing and "Find-Me" printing.

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- **Find-Me printing**—solves the problem of finding the closest printer from a long list of available printers. It is a roaming print service that allows print jobs to find users based on their physical location. It's sometimes referred to as "Pull Printing" or "Push Printing".
- **Printer load balancing**—covers the act of automatically distributing print load between multiple physical printers.

These topics are addressed together in this section as they both involve the concept of *print job redirection*, where a job is taken from one queue and transferred to another.

The topics covered in this section are relatively advanced in nature and targeted towards the administrator who is already comfortable with PaperCut NG/MF and print queue configuration. If implementing PaperCut NG/MF for the first time it is recommended to plan a simple configuration in the first phase, then return to implement find me printing or load balancing in a later phase once users and administrators are comfortable with the basic features.

4.7.1. Find-Me printing

Find-Me Printing is best described not by what it does but by the problem it solves. Consider a large organization with hundreds of printers. The task of selecting the "best" printer from the list at the time of print can be daunting. Organizations tend to mitigate this concern using a number of methods:

- **Naming conventions**—use a printer naming convention that helps users locate the best printer. A common convention is to use the room name or floor number. This is usually complemented by a sign on the printer itself.
- **Location adaptive login scripts**—a location adaptive login script automatically adds printers to a computer based on the computer's physical location (denoted by the computer name). For example, any workstation containing "lvl2" in the name has the two printers on Level-2 by default. Users need to consult the full list of printers only on the rare occasion that they want to print to a printer outside their physical level/room.
- **Global profile**—administrators map the "best" printer based on location of the workstation (e.g. using `rundll32 printui.dll,PrintUIEntry /ga /n\\server\printer` on Windows). Any user that logs in to the computer has the most appropriate printer selected by default.

All these methods have their drawbacks and require careful planning on the part of administrators, and the need for end users to understand conventions/processes. *Find-Me Printing* solves the problem by asking the print job to find the user, rather than having the user find the printer. It works as follows:

1. The user prints to a single site-wide global queue.
2. The user then walks up to a Release Station, logs in, locates their job, then releases it.
3. The job automatically prints to the printer closest to the Release Station.

Administrators need to consider and plan hardware and driver compatibility. Find-Me Printing works by re-directing a job targeted at one queue to another so printer compatibility is important. For example, a job designed to print on an inkjet photo printer is not usually suitable for printing on a laser printer.

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Note:
If you're using virtual queues on a Windows server that are redirecting to other target queues, you can use LPT or 'nul' ports for the virtual queues, since no jobs should be printing from that queue.

Implementation by example

Implementing *Find-Me Printing* is best described by way of example. The following sections cover some common scenarios for implementing Find-Me Printing.

Example 1: Single virtual queue (high school)

Scenario

East Beach High School has seven high volume laser printers of the same model at various locations throughout the campus. When sending a print job, students must currently select the printer nearest to them before retrieving the document. Students often send jobs to the wrong queue and rather than going to pick it up they re-send the document to a closer queue and leave the original document uncollected.

The current print queues are named `laser-1` through `laser-7` with the number corresponding to a label on the printer. All printers are hosted on the print server called `print-server`. All printers are the same make and model (using the same driver).

In the library, there are two printers, `laser-6` and `laser-7`, side by side.

The goal is to implement one central queue to receive all print jobs. A Release Station is set up next to each printer. Each Release Station allows users to have their job printed at the nearby printer.

Implementation

This scenario involves creating a new print queue on the print server. Then in PaperCut NG/MF, this queue is configured as a *virtual queue* with *hold/release* enabled. When students print to the virtual queue, their job is held, and the Release Station the user releases the job at determines the printer to which the job is sent (the job is pulled from the virtual queue to a printer near the user).

Step 1: Create a print queue

1. On the print server, create a new queue called **find-me-queue**.
   - Create the queue using the same driver that `laser-1` through `laser-7` use.
   - Point the queue to the IP address of one of the printers - this is not strictly necessary as the "virtual queue" is just a *collecting queue* that forwards jobs to real queues, however, some printer drivers "complain" if they do not point to a real printer.
2. Ensure that the print queue has registered itself with PaperCut NG/MF by checking the **Printers** tab of the Admin web interface. For more information about adding printers, see Add and remove/delete/ignore printers.

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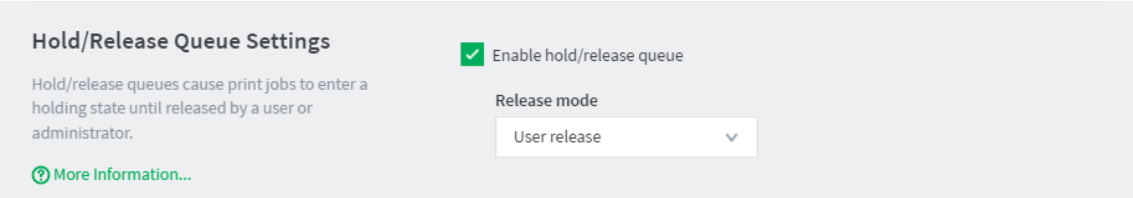
Step 2: Configure the print queue as a virtual queue with hold/release enabled

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select **find-me-queue**.
2. In the **Configuration** area, in **Queue type**, select **This is a virtual queue (jobs will be forwarded to a different queue)**.

   The **Job Redirection Settings** area is displayed.

   This area determines which queues `find-me-queue` is capable of redirecting to.
3. In **Jobs may be redirected to these destination queues**, select **print-server\laser-1** through **print-server\laser-7**.
4. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



5. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
   - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

   Tip:
   To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.
6. Click **OK**.

Step 3: Configure the Release Stations

1. Configure each Release Station as per Configure a Release Station . In this scenario students should be able to see and release only the jobs they have personally printed, so set up the Release Station in *Secure* mode.
2. Configure each Release Station to release jobs on the printer it is associated with by setting the `releases-on` option in the Release Station config file. E.g. for the Release Station set up near the printer `laser-4`, set the option to:

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```
releases-on=print-server\\laser-4
```

In the library (where there are two printers side by side), configure a single Release Station to release to either printer by setting the option to:

```
releases-on=print-server\\laser-6,print-server\\laser-7
```

In this case, when a user releases a job at the library Release Station, PaperCut NG/MF selects either `laser-6` or `laser-7` based on a load balancing algorithm (see Example 1: Simple Load Balancing).

Now, when students print from a lab computer to the virtual `find-me-queue` queue, their job is held. The student can visit any Release Station and see their job. When the student releases their job at a Release Station, the job is pulled from the virtual queue into the queue or queues associated with the Release Station for printing. This setup is illustrated in the image below. Administrators should also ensure that the `find-me-queue` queue is set as the default queue on all workstations.

The administrator can now optionally un-share all but the virtual queue. This would enforce that users use the "find me" process rather than printing directly to one of the target printers.

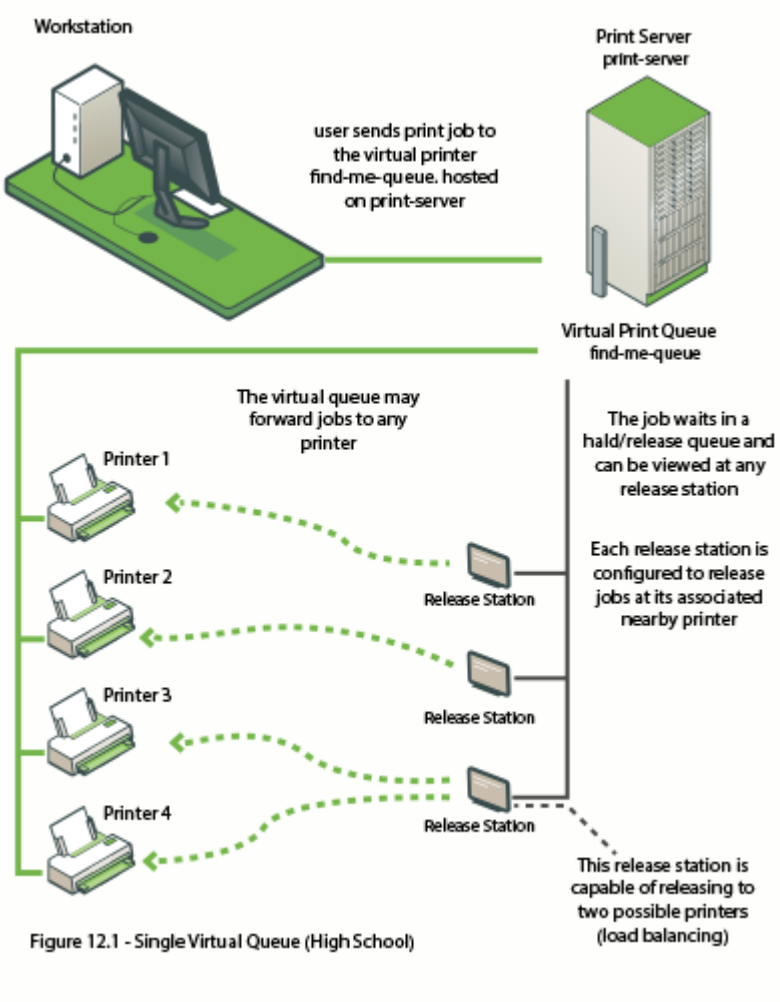

Figure 40: Single virtual queue (high school)

Example 2: Multiple virtual queues (different printer types)

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Scenario

West Face University has a Graphic Design department that uses two wide format plotters and seven color laser printers. The two plotters and two of the laser printers are located in the department print room, while the other laser printers are scattered around various locations. The plan is to add more printers next year.

The two wide format plotter queues are named:

- `wf-plotter-1`
- `wf-plotter-2`

The color laser printers are named `color-laser-1` through `color-laser-7`

The goals of the project are:

- Implement Find-Me Printing so users don't need to remember the names associated with the ever growing list of printers.
- Implement Release Stations. This ensures the student/staff member is there to collect their work minimizing the chance of one person accidentally collecting another's work.
- Ensure the procedure is similar for all types of printers, meaning users only have to learn one process.
- Automatic load balancing in the print room to ensure all printers receive an equal load and throughput is maximized.

Implementation

This implementation differs from the previous implementation in that you have two distinct printer types. It is not technically possible to have one "find-me-queue" as jobs rendered by the application for the wide-format printer can't be printed on a laser printer and vice versa. See Requirements for job redirection (load balancing or Find-Me printing) for more discussion on compatibility.

You need to create a new print queue for each printer type on the print server. These queues will be configured as *virtual queues* with *hold/release* enabled. When a student prints to a virtual queue, their job is held at displayed at the Release Station. When a student releases their job, PaperCut NG/MF knows which target queues are compatible (based on configuration) and selects one of the available target queues using an intelligent load balancing algorithm.

Step 4: Create the print queues

1. On the print server (`graphics-print`), create two new queues called `wf-plotter` and `color-laser` respectively .
    - Create `wf-plotter` using the same driver as the existing queues `wf-plotter-1` and `wf-plotter-2`, and likewise `color-laser` uses the same driver as its counterparts.

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- Point both new queues to any physical device of the same type, e.g. `wf-plotter` to `wf-plotter-1`. This last point is not strictly necessary, but some printer drivers complain if they do not point to a real printer.

2. Ensure that the print queue has registered itself with PaperCut NG/MF by checking the **Printers** tab of the Admin web interface. For more information about adding printers, see Add and remove/delete/ignore printers.

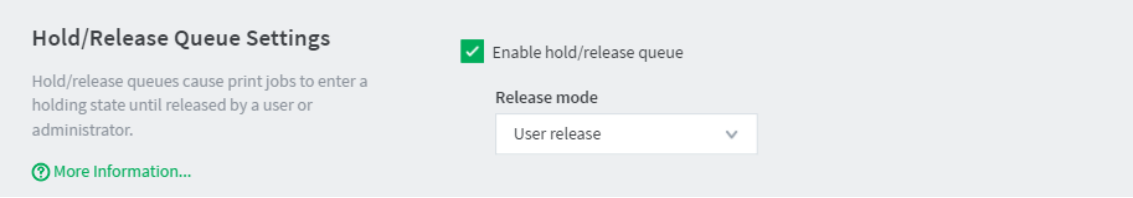
Step 5: Configure the print queue as a virtual queue with hold/release enabled

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select **wf-plotter**.
3. In the **Configuration** area, in **Queue type**, select **This is a virtual queue (jobs will be forwarded to a different queue)**.

   The **Job Redirection Settings** area is displayed.

   This determines which queues `wf-plotter` is capable of redirecting to.
4. In **Jobs may be redirected to these destination queues**, select `graphics-print\wf-plotter-1` and `graphics-print\wf-plotter-2`.
2. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



3. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
   - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

> **Tip:**
> To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.

5. Click **OK**.
6. Repeats steps 2 through 5 for the `color-laser` queue, except set **Jobs may be**

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redirected to these destination queues in step 3 to `graphics-print\color-laser-1` through `graphics-print\color-laser-7`.

Step 6: Configure the Release Stations

1. Configure a Release Station as per Configure a Release Station . In this scenario, students should be able to see and release only the jobs they have personally printed, so set up the Release Station in *Secure* mode.
2. Configure the Release Station to release jobs to the printers it is associated with by setting the `releases-on` option in the Release Station config file.Set the option to the four printers:
   ```
   releases-on=graphics-print\\wf-plotter-1,graphics-print\\wf-plotter-2,\
   graphics-print\\color-laser-1,graphics-print\\color-laser-2
   ```
3. Set up a separate Release Station next to each of the five remaining laser printers in the department. Set the `releases-on` to the single adjacent printer in each case.

Now when a student prints from a lab computer to either virtual queue (`wf-plotter` or `color-laser`), their job is held. The student can visit the Release Station and see their job. When the student releases their job in the print room, the system automatically implements load balancing and selects an available compatible printer. This setup is illustrated in the image below.

Important:
Load balancing is not appropriate on plotters if manual loading of paper media is required, as it is not possible to know beforehand which target printer will be selected. In this case a separate Release Station is required for each plotter.

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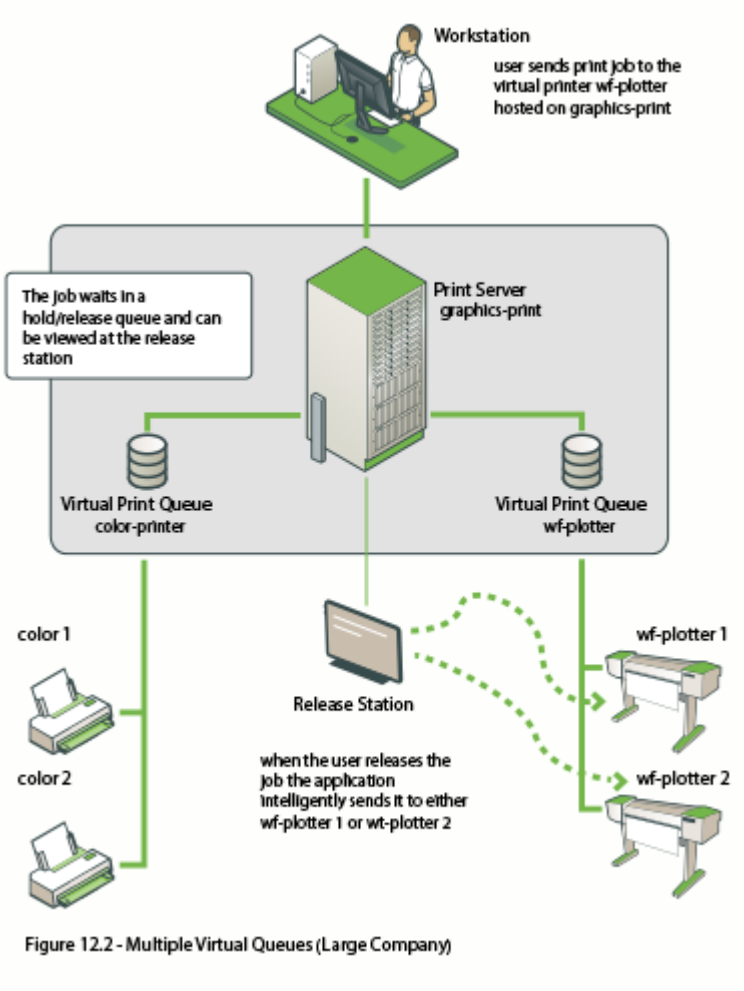

Figure 41: Multiple virtual queues (Graphics department)

Example 3: Multiple location specific virtual queues (large company)

Scenario

Acme Inc. is a large organization with hundreds of printers located throughout. They maintain a common printer fleet of grayscale devices and a smaller but matching fleet of color devices.

The existing grayscale devices use a naming scheme such as `site1-server\B02_F12_G04`, where `B02` represents "building 2", `F12` represents "floor 12", `G04` meaning it is the fourth grayscale printer on that floor. Color devices use the same naming scheme except the `G` is replaced with a `C`.

Each floor of each building has a print room with several grayscale devices and two color devices. The organization also has multiple offices located and separate physical sites. Each sites hosts their local print queues on their own local print server, however, all sites exist in a single WAN and shared domain.

Through trial testing, the IT administrators have confirmed that the Postscript drivers supplied with the color devices also work with the lower cost grayscale-only version of the printers. This means that one common driver will work across the full fleet.

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The main goals of the project are:

- Simplify the printing process for users, so that they do not need to decipher the naming scheme to work out their closest available printer.
- Implement a system/procedure common across all sites.
- Reduce wasted printing by ensuring the user is physically present in the print room to pick up their job when it prints.
- Ensuring high uptime by minimizing single points of failure.

Implementation

This implementation differs from the previous implementation in that there is a large number of printers and users spread across multiple physical sites. Although it is possible to implement one global virtual "Find-Me Queue", there are some benefits in implementing multiple virtual queues - one per site:

- Minimize network traffic—jobs should only spool on queues on the local server where possible.
- No single-point-of-failure—if an issues occurs on the single "Find-Me queue", it would affect printing at all sites.

Implementing multiple virtual queues offers considerable benefits. Consider one queue per site, or maybe even one queue per floor/department on larger sites as the benefits outweigh the small additional overhead in administration/setup.

Step 7: Create the print queues

1. On each of the sites' servers, create a new print queue called "find-me-queue"
   - Set up this queue using the common Postscript driver that was confirmed to work with all models in the printer fleet.
2. Ensure that the print queue has registered itself with PaperCut NG/MF by checking the **Printers** tab of the Admin web interface. For more information about adding printers, see Add and remove/delete/ignore printers.

Step 8: Configure the print queue as a virtual queue with hold/release enabled

Perform the following on each new virtual queue (for example, `site1`).

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select **site1-server\find-me-queue**.
3. In the **Configuration** area, in **Queue type**, select **This is a virtual queue (jobs will be forwarded to a different queue)**.

   The **Job Redirection Settings** area is displayed.
4. Because this virtual queue is capable of forwarding to all printers in the organization, select the **Select all printers** check box.

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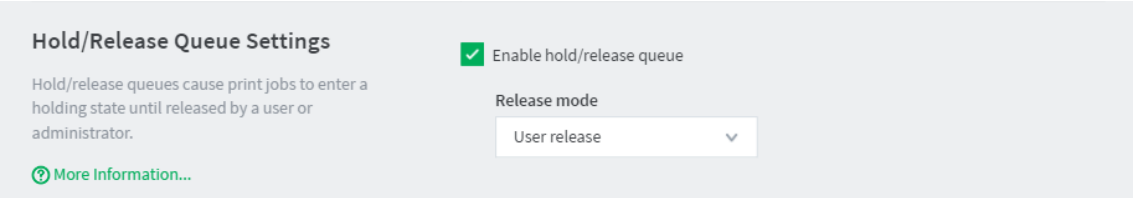
2. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



3. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
   - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

> **Tip:**
> To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.

5. Click **OK**.
6. Repeats steps 2 through 5 for all other `find-me-queue`'s on each Site Server.

Step 9: Configure the Release Stations

Configure a Release Station for each floor's print room:

1. Configure a Release Station as per Configure a Release Station . The Release Station is configured in *Secure* mode so that staff can only see and release the jobs they have personally printed.
2. Configure the Release Station to release jobs to the printers it is associated with by setting the `releases-on` option in the Release Station config file. The administrator sets the option to the full name of the printer(s) in each print room:

```
releases-on=site1-server\\B02_F1_G01,\
site1-server\\B02_F1_G02,site1-server\\B02_F1_C01
```

3. Configure all workstations to use the local `find-me-queue` on each site by default.

Now when a staff member prints to either virtual queue, their job is held. The staff member can visit the Release Station and see their job. When the staff member releases their job, it is sent to any of the available and compatible devices in the floor's print room. This setup is illustrated in the image below (Multiple Location Specific Virtual Queues (Large Company)).

Advanced: PaperCut NG/MF can also support redirection between print queues on different servers. In this example, it might occur when a laptop user who roams between sites prints. Their

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laptop might be configured to print to the virtual queue in `site1`, but they have released their job on a printer hosted on the server in `site2`. Directing between different servers is supported, however, some additional configuration might be required. For more information, see Cross-Server Job Redirection.

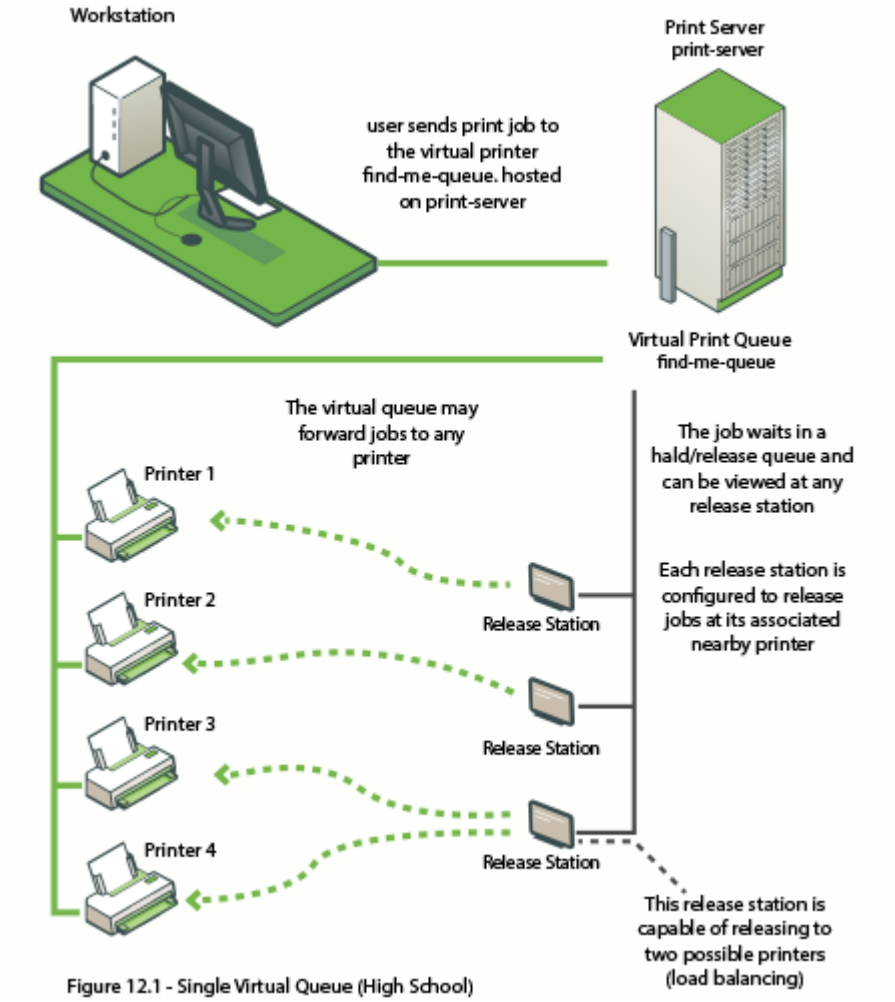

Figure 42: Multiple location specific virtual queues (large company)

Find-Me printing and web-based release

The *Find-Me* printing examples covered above involve setting up a Release Station so that users can release jobs to the printers at their current location. The web based release interfaces are also supported (via the user web tools, Admin web interface or full screen web based release interface), although due to the lack of location information the user is asked to select the destination printer.

When a user releases a job held in a virtual queue using one of the web based release interfaces they are presented with a list of target printers and their locations, as shown in the image below.

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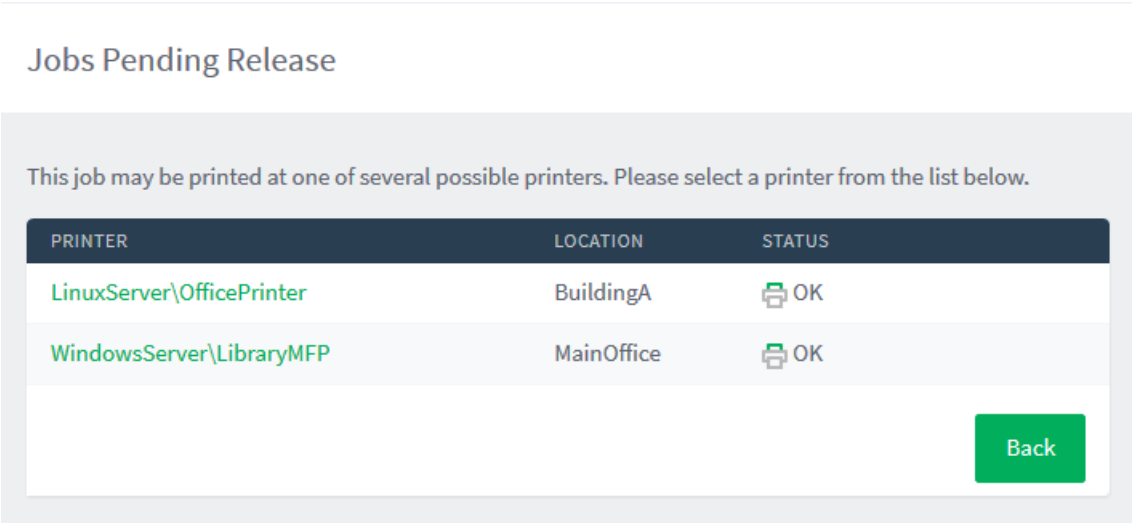

When using web based release interfaces in conjunction with Find-Me Printing you should populate the **Location** field on printers for the convenience of users.

Automatic detection of a virtual queue

You can configure PaperCut NG/MF to automatically create a virtual queue for any printer that has a specified keyword in its name (default is **virtual**). You can change the default keyword to anything you want, or alternatively, you can turn off this feature.

Specifying a keyword has the same effect as setting **Queue Type** in the **Configuration** area on the **Printers > Printer Details > Summary** page to **This is a virtual queue (jobs will be forwarded to a different queue)**. You do however, still need to select the printers to which print jobs can be redirected in the **Job Redirection Settings** area.

Change the keyword used to automatically detect a virtual queue

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.

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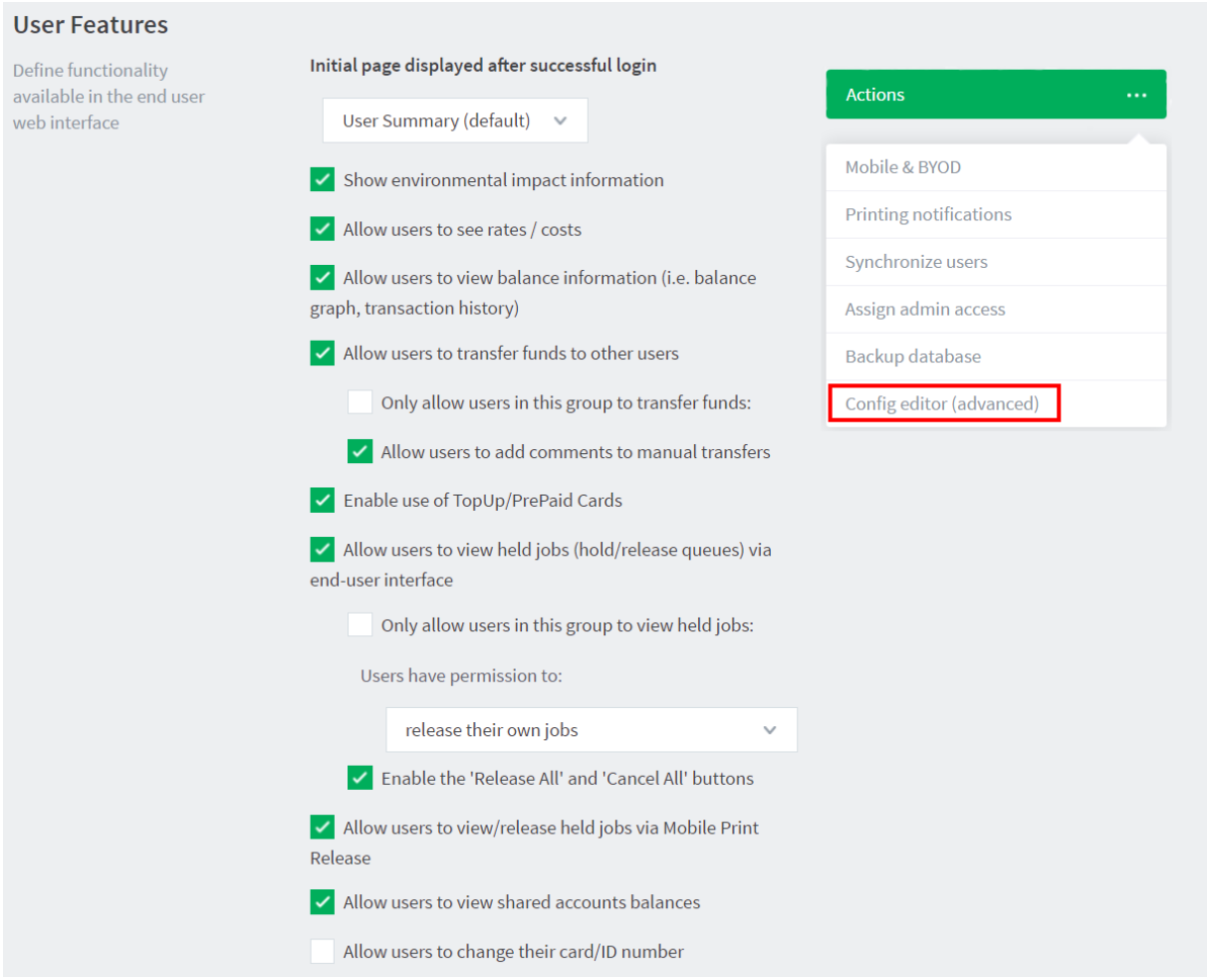
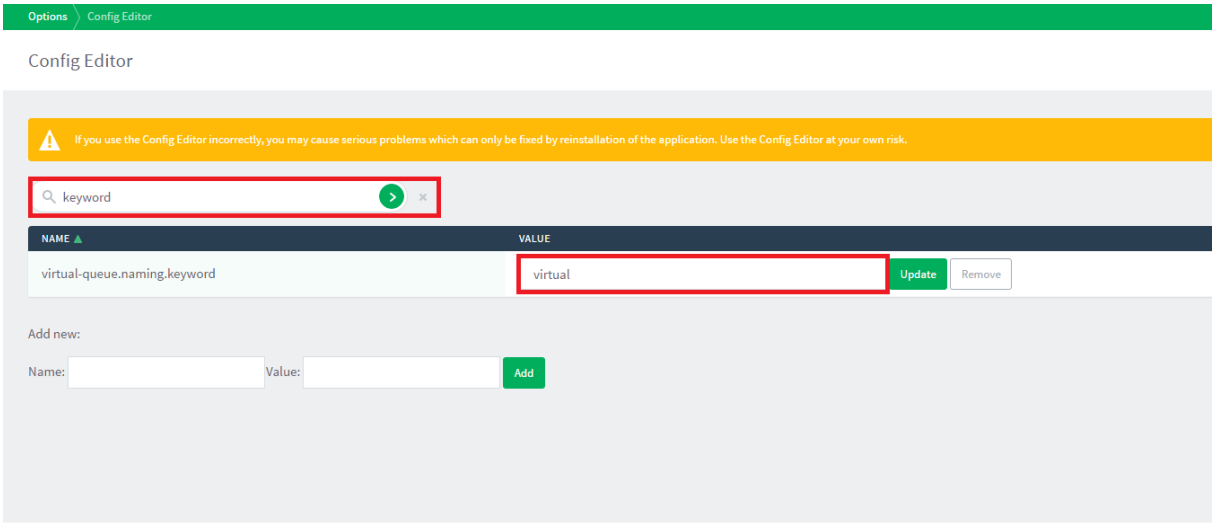


The **Config Editor** page is displayed.

3. In **Quick find**, enter keyword; then click **Go**.

   The **virtual-queue.naming.keyword** configuration key is displayed.



4. In **Value**, type the keyword you want to use.
5. Click **Update**.

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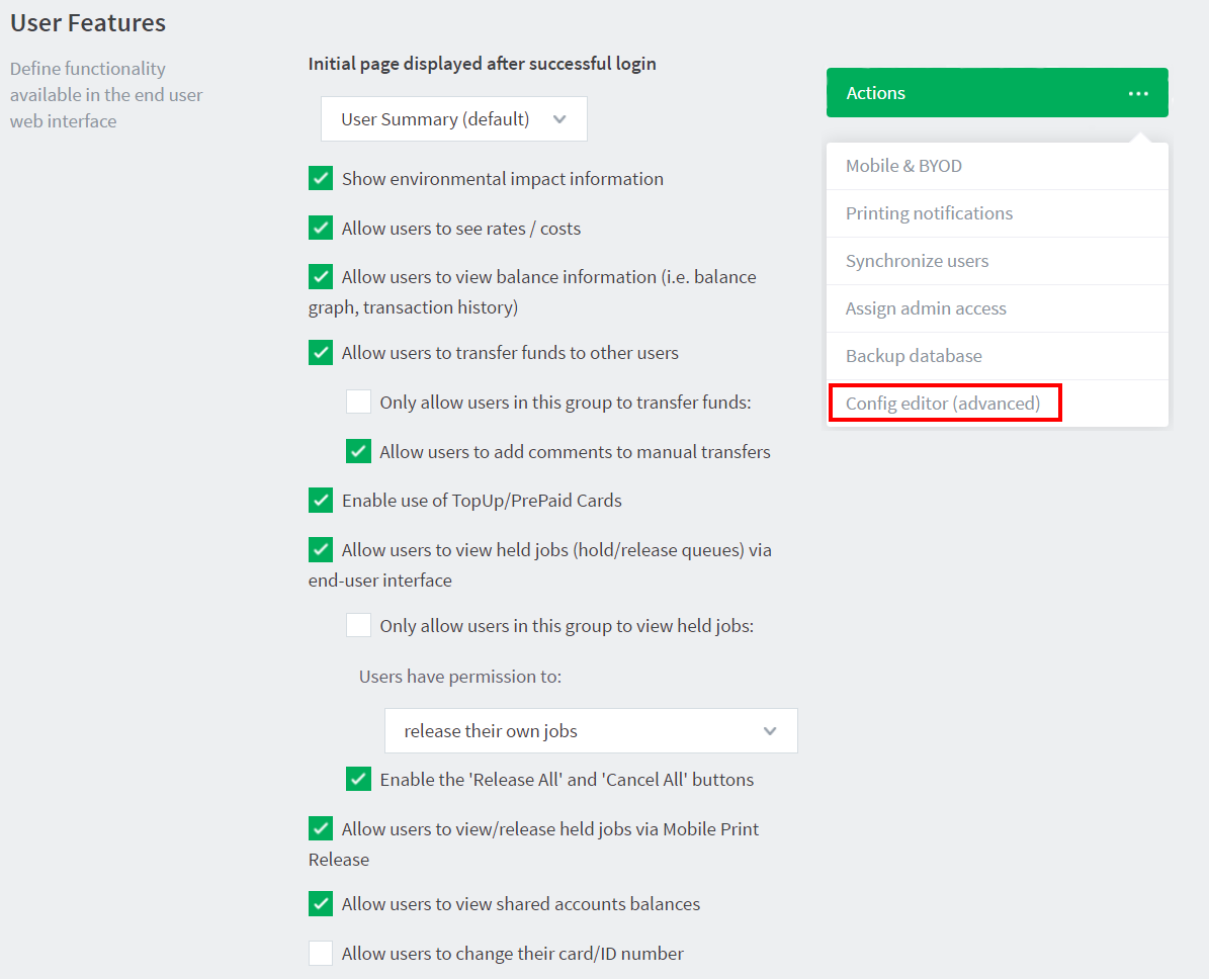
Turn off virtual queue auto-detection

1. Click the **Options** tab.

   The **General** page is displayed.

2. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.

3. In **Quick find**, enter keyword; then click **Go**.

   The **virtual-queue.naming.keyword** configuration key is displayed.

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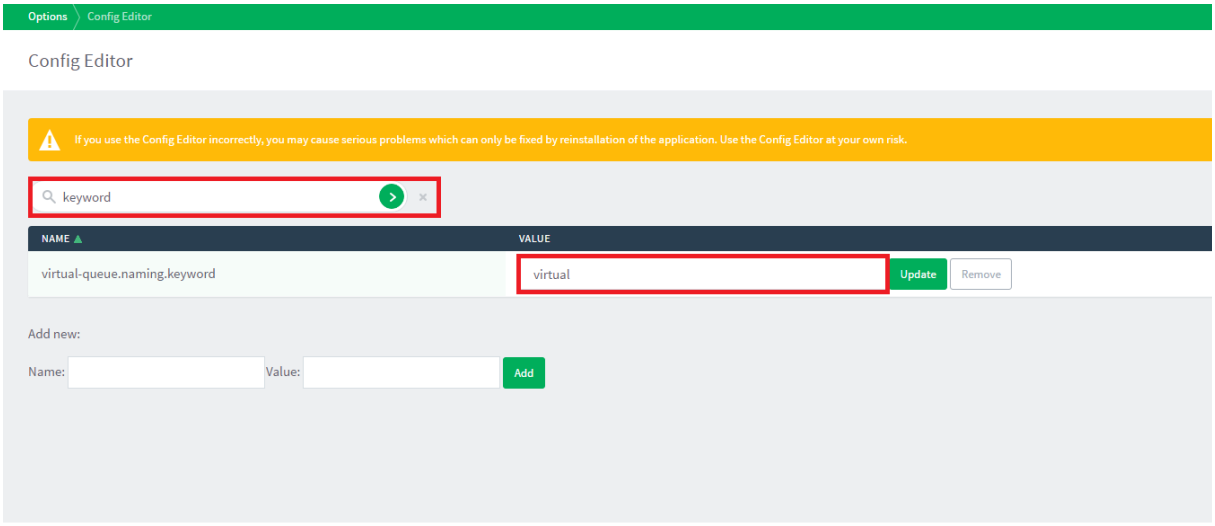
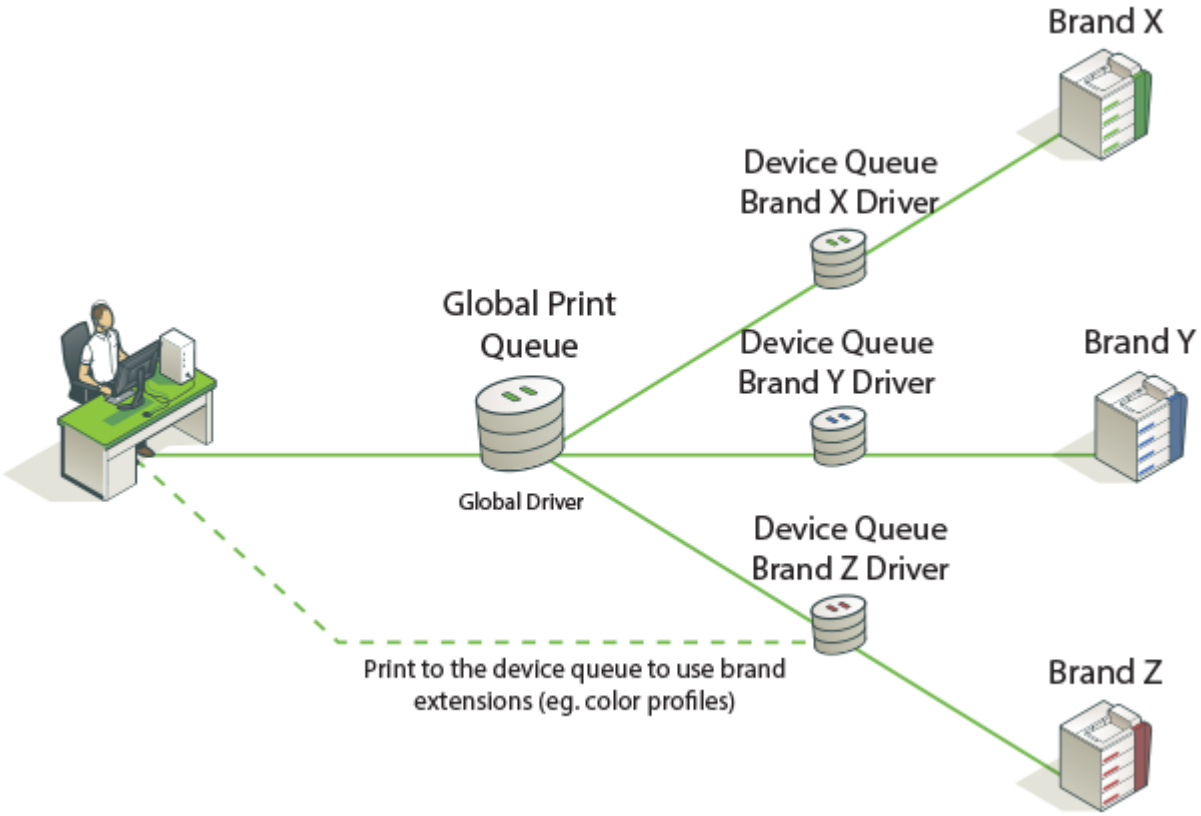


4. Click **Remove**.

4.7.2. Global Print Driver

A global find-me print queue, combined with secure print release, provides convenience to end users. On the flip side it poses a number of technical challenges for the SysAdmin. One challenge is print driver selection in a mixed brand environment.



A single global queue means one print driver, whose output must be compatible with N possible target printers. Finding a suitable driver is often a difficult trial and error exercise. The available solutions are:

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The PaperCut Global Print Driver

If your organization has a mix of printer brands, the PaperCut Global Print Driver is the most straightforward solution.

- A brand independent maximum compatibility signed print driver.
- Designed to work on the widest possible range of printers out of the box.
- Supports all main print features (duplex, color, paper size, tray selection, and stapling).

Predominant brand/vendor driver

If your organization has one predominant printer brand, it might be appropriate to use this brand's driver for the global queue, and use PaperCut's adaptive transforms to enable compatibility on other brands.

4.7.2.1. About the PaperCut Global Print Driver

The PaperCut Global Print Driver should not be confused with "universal drivers" offered by leading printer manufacturers. Manufacturer universal drivers are designed to work with multiple models across a single brand. PaperCut's Global Print Driver works across **both** multiple models and multiple brands.

Windows

The PaperCut Global Print Driver is a brand neutral, maximum compatibility PostScript driver developed by PaperCut for Microsoft Windows. As a signed driver, it can be deployed and installed like any standard Windows print driver. You can find the driver at:

```
[install-path]/providers/print/drivers/global/win/
```

Mac and Linux

PaperCut does not offer a Global Print Driver for Mac and Linux, and instead recommends the use of the "Generic PostScript Driver" included within these platforms. PaperCut's server software is designed to use the output of the generic driver and complement it with adaptive transforms, to give maximum compatibility with a wide range of popular printer brands.

How it works

The PaperCut Global Print Driver is a standards compliant PostScript driver developed to produce PostScript output that is as widely compatible as possible. If vendor specific extensions are required to achieve functionality, the PaperCut server software works transparently in conjunction with the driver to apply these extensions to each job. This is done in the background using in-built Print Description Language (PDL) transforms.

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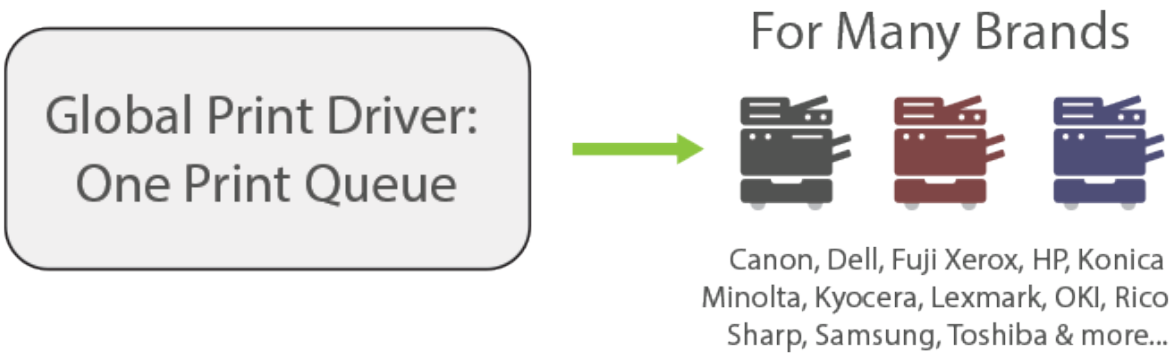
Benefits

- Easy to deploy
- Consistent user experience across brands
- Familiar Windows print dialog design

Tradeoffs

- Devices connected to the global queue must support PostScript (other languages are in development). That is, the device must be able to understand the postscript language. (You can use PCL drivers but the hardware has to be able to understand postscript.)
- Advanced vendor specific extensions (e.g. color profiles) are not available via the Global Queue.
- The broad set of capabilities available to the Global Print Driver might not be available on the destination printer.

  For example, an A3 or Tabloid job can be sent to a device that prints only A4 or Letter. Depending on the target printer, the job can be scaled to A4 or Letter, cropped to size, or rejected by the device entirely.



4.7.2.2. Installation and setup

Setting up Find-Me printing with the PaperCut Global Print Driver on Windows is done as follows:

Important:

- Make sure the **Enable Advanced Printing Features** option is **disabled** in the virtual queue's properties dialog.
- Only use the PaperCut Global Print Driver on the global virtual queue(s). Do **not** use it on the individual device queues. It is important that the manufacturer's own driver is installed on the device's direct print queue, because PaperCut uses the

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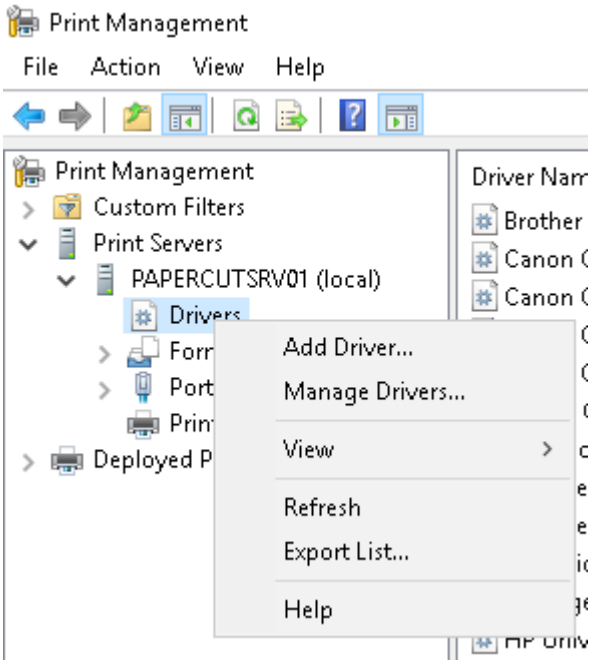
manufacturer's driver to identify the device and determine the type of output required.

- Step 1: Set up each device queue using the manufacturer's standard driver (important).
- Step 2: Install the PaperCut Global Print Driver (see below).
- Step 3: Set up the Find-Me printing using the PaperCut Global Print Driver.
- Step 4: Configure Secure Print Release and Find-Me printing
- Step 5: Test the Global Print Driver with your printers, following the guidelines in Compatibility Testing.

4.7.2.3. Install the PaperCut Global Print Driver

1. Open the Print Management Console:
   a. Log into your Windows Print server.
   b. Click **Start**.
   c. Type **printmanagement.msc**; then press **Enter**.
2. Right-click **Drivers** and click **Add Driver** to launch the **Add Printer Driver Wizard**:



The **Processor Selection** dialog box is displayed.

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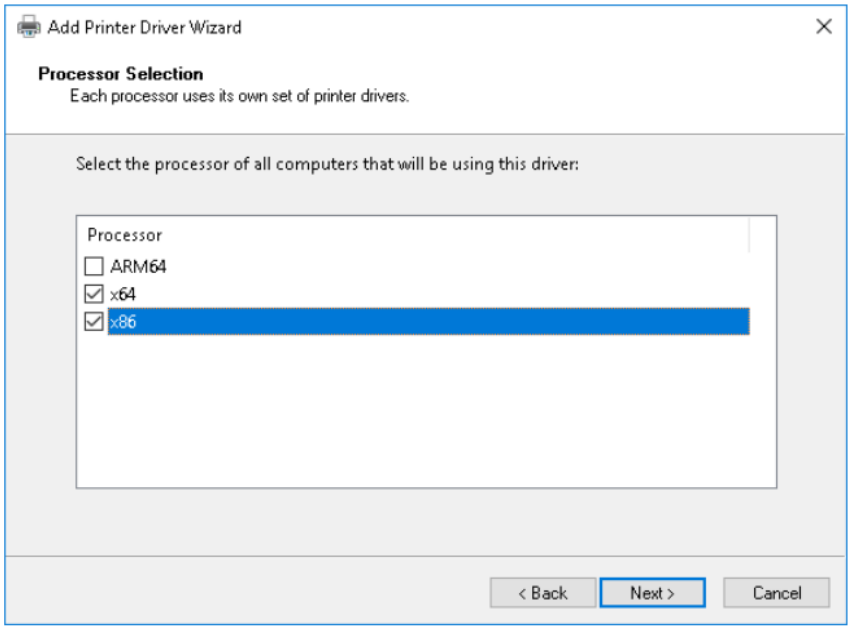
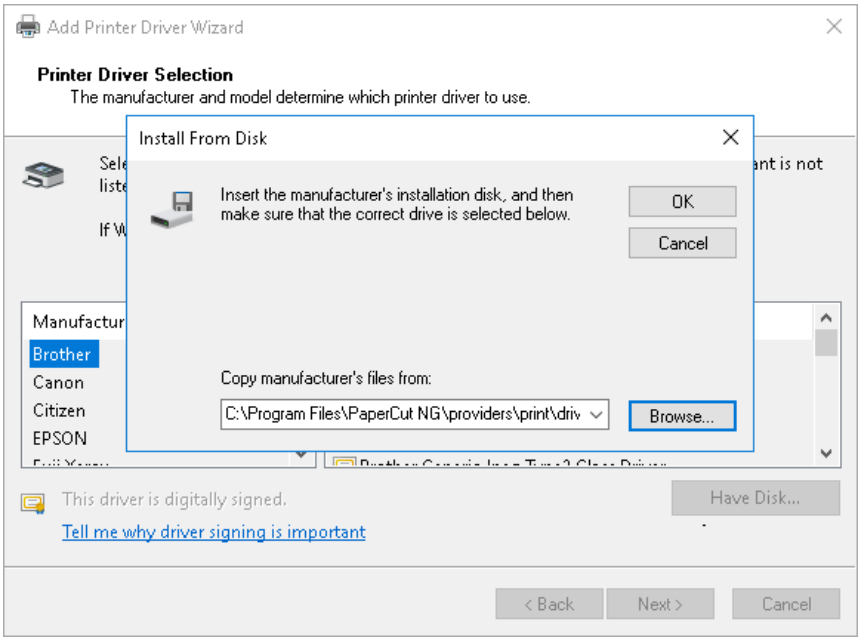


3. Select the **x64** and **x86** checkboxes; then click **Next**. The **Printer Driver Selection** dialog box is displayed.



4. Select **Have Disk**.
5. Navigate to **Program Files\PaperCut application directory\providers\print\drivers\global\win**.
6. Select **PCGlobal.inf**.
7. Click **Open**, **OK** then **Next**. The **Completing the Add Printer Driver Wizard** dialog box is displayed.

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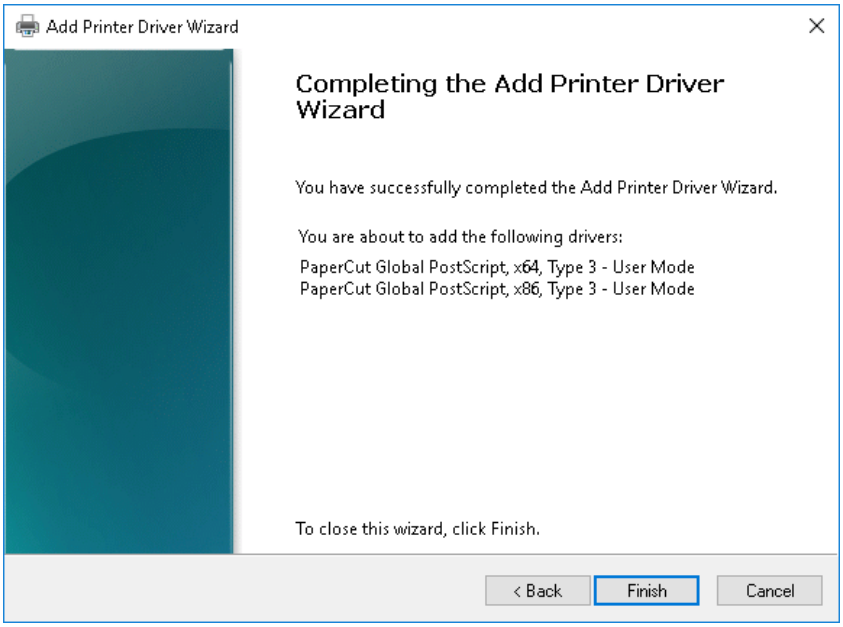
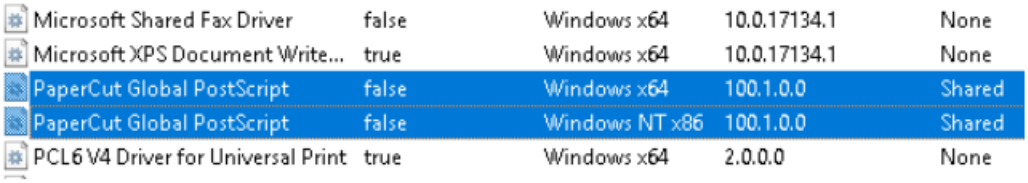


8. Confirm the details and click **Finish**.
9. When prompted to install the print drivers for x86 processors, click **Browse**, navigate back to the PCGlobal.inf (**Program Files\PaperCut application directory\providers\print\drivers\global\win**); then click **Open**.
10. Confirm that you see both versions of the PaperCut Global Print driver on your print server.



User education

The Global Print Driver should satisfy the vast majority of end users' standard printing requirements. Should a user require device-specific functionality, such as color profile settings, they can achieve this by printing to the direct device queue, which is set up with the vendor's driver (see Step 1 above).

Best practice is to set up the Global Virtual Queue as the desktop default printer.

4.7.2.4. Using vendor driver and adaptive PDL transforms

An alternative to using the PaperCut Global Printer Driver is to use a vendor/manufacturer driver and adapt its output if required. This setup might be preferred if there is a single dominant vendor on the site and there are reasons to use the vendor's own driver. In some cases, vendor specific output does not work on another brand, such as differing tray names. You can use PaperCut adaptive PDL Transforms to solve this problem.

This is an advanced subject. Unlike the PaperCut Global Print Driver, you need to configure vendor specific transforms on a site-by-site basis. Transforms are defined using a transform script. For more information, see PDL transform language. Professional services are available via Authorized Solution Centers and certified resellers.

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Supported transform environments

PDL transforms on remote target printers are only supported on Windows. In addition, transforms are only applied when the virtual queue and the target printer are set up on the same operating system type e.g. Windows to Windows, Mac to Mac.

Table 43: Supported transform environments

Source Print Server	Destination Print Server	Global Virtual Queue Location
Windows	Windows	Local and Remote
Linux	Linux	Local only
Mac	Mac	Local only

Finishing options

By default the Global Print Driver uses PDL transforms to support stapling for all major printer brands. Other finishing options will be introduced in the future.

4.7.3. Requirements for job redirection (load balancing or Find-Me printing)

When redirecting a job from one queue to another, the job is rendered by the source queue's driver, and printed by the destination queue's printer. It is therefore vital that the destination printer is compatible with the source driver.

To be compatible, the source (or *virtual*) print queue and the destination print queue must at least use drivers that produce the same print language (e.g. PostScript to PostScript or PCL5 to PCL5). However, due to the differences in the way each manufacturer uses a print language, and even differences between models from the same manufacturer, compatibility can be limited to printers of the same or similar models.

The ideal setup for job redirection is when all target printers are of the same model. If this is not the case, select a driver for the virtual queue that gives the best result across your fleet of destination printers.

A great way to achieve compatibility with a wide range of PostScript printers on Windows is to use PaperCut NG/MF's Global Print Driver on the virtual (source) print queue.

If instead you want to use a manufacturer driver for the virtual (source) print queue, pick a simple *lowest common denominator* driver and test it for compatibility with each one of your printers. On the Mac the "Generic Postscript Driver" is a good choice. On Windows select a Color Postscript driver for a mid range popular model. Always carefully test driver compatibility before implementing Find-Me Printing. Take care to address corner cases such advanced graphics options, grayscale mode, paper sizes, duplexing, tray selection, etc. If a common driver cannot be found, you might need to implement multiple virtual queues as discussed in Example 2 above. The following sections provide a simple procedure that you can follow to test printer compatibility.

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Tip:
You might be able to solve compatibility problems with manufacturer drivers using adaptive PDL transforms. See Using vendor driver and adaptive PDL transforms.

4.7.3.1. Compatibility testing

1. Select your candidate driver to use for your global virtual queue. Use it to set up a print queue on the server, and share the queue.
2. Select the new printer in PaperCut NG/MF and change it to a virtual queue.
3. In the list of compatible queues, select the printers for which you want to test compatibility.
4. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box.
5. Print a test document (e.g. print an email) to the virtual queue from a computer. The job should hold in the virtual queue.
6. Select **Printers > Jobs Pending Release**.

   The **Jobs Pending Release** page is displayed.
7. Release the held job. Select a target queue to test when prompted.
8. Verify that the job printed correctly. Also check the **Logs > Application Log** tab for any error reports.
9. Repeat the previous 3 steps for all printer types and using different document settings and applications.

Make sure you test a variety of print options targeted at all device types. Problems can manifest in various and subtle ways:

- Error events logged in PaperCut NG/MF's **App Log.**
- Error status on the printer (e.g. a red light and failed print status message).

Or more subtle issues such as:

- Truncated documents because of different device margin sizes (printable area).
- Errors only when non-default options options are selected (e.g. finishing options).
- Issues only on very large documents (due to printer memory limitations).
- Errors/problems when certain paper sizes are selected.

If issues/problems/errors occur:

1. Disable the **Enable Advanced Printing Features** option in Windows on the virtual queue on the server. This is accessed by right-clicking the printer, selecting **Properties**, then the **Advanced** tab. This change can improve redirection results with some drivers and is required if using the PaperCut Global Print Driver.
2. If you continue to experience compatibility issues, consider setting up multiple virtual queues (for each printer type/class) as discussed in Example 2: Multiple Virtual Queues (Different Printer Types).

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4.7.3.2. Find-Me printing implementation checklist

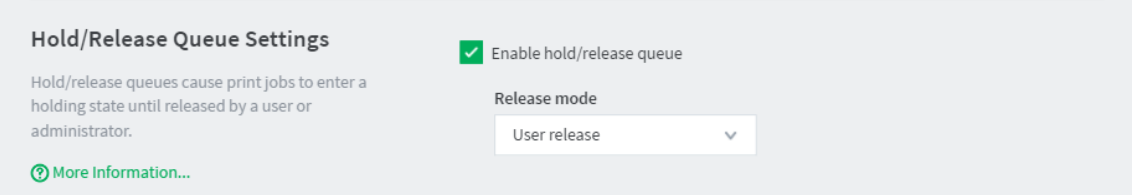
Setting up *Find-Me Printing* involves several configuration steps that you must complete before the setup will work. Following is a checklist that you can use to ensure that the main requirements have been carried out. It can also serve as a troubleshooting guide in case of unexpected results.

1. Create a new print queue to function as the virtual queue. Create this print queue using the standard methods or tools provided by the host operating system.
2. Confirm that the driver in use by the virtual queue is compatible with the target printers. The output produced by this driver is what is sent to the printer, so it must be compatible.
3. Configure the following settings in the PaperCut NG/MF Admin web interface for the virtual print queue:
    a. Click the **Printers** tab.

    The **Printer List** page is displayed.

    b. Click the virtual queue.
    c. In the **Configuration** area, in **Queue type**, select **This is a virtual queue (jobs will be forwarded to a different queue)**.

    The **Job Redirection Settings** area is displayed.
    d. In the **Job Redirection Settings** area, in **Jobs may be redirected to these destination queues**, select all the target print queues this Find Me queue can redirect to.
    e. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



    f. In **Release mode**, select one of the following:
        - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
        - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

> **Tip:**
> To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.

    g. Click **OK**.

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4. When using Find-Me Printing, Release Stations are recommended because they can automatically select the best nearby printer (based on a match between the virtual queue's configured compatible queues, the Release Station's configured "releases on" queues and current printer load). If the web based release interface is used instead, the user must select the desired printer from the list of all compatible queues.
5. Configure the `releases-on` option in the Release Station configuration file to reflect where jobs released at this station can be sent. PaperCut NG/MF compares this list with the **Jobs may be redirected to these destination queues** setting of the virtual queue to find possible target queues. Take care to ensure the name is spelt exactly the same as listed in the printer list.
6. The `show-jobs-from-queues` option in the Release Station configuration file can optionally be configured to limit the jobs shown in the Release Station to one or more queues. This is useful for situations with multiple virtual queues and Release Stations running in *Release Any* mode.
7. If there are multiple print servers and the ability to redirect jobs across print servers is required, ensure that the requirements in Cross-Server Job Redirection are met.

4.7.4. Advanced configuration

4.7.4.1. Overriding cost and filter settings

The default (and recommended) setup is to have the filter and cost settings applied to the virtual queue, For example, the global "find-me-queue" as explained in the examples. This ensures that you have a common cost and access policy across all printers associated with that queue - a model that your end users can easily understand. There might, however, be some special cases where you want to apply cost and filter settings based on the target queue/printer selected instead :

- A printer might have less memory than others and jam/error on large jobs. Implementing a page or job size filter at the target queue level can help prevent problems.
- A printer might not support the full range of paper sizes and can jam if an incorrect paper size is selected.

The settings are overridden by the option **Cost and filter settings are overridden by the target queue**. Use this option with care and careful consideration.

Important:

If used incorrectly, the **Cost and filter settings are overridden by the target queue** option can be very confusing to end users. For example, the cost that is displayed in the Release Station and/or client popup is as calculated by the virtual queue settings. If, after the job is redirected, the cost changes, the user might become confused. As a general rule, don't override the cost, or if it must be overridden, communicate this situation to your users beforehand.

4.7.4.2. Mixed color and grayscale printers

When the organization has a mix of grayscale and color printers it is important to configure Find-Me Printing carefully. Often the simplest approach is to configure 2 virtual queues: one configured as a

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color queue and the other as a grayscale queue. This makes it simpler for users to understand where to print and what they'll be charged if they need color or grayscale printing. Configure the queues as follows:

- Grayscale virtual queue - configured to default to grayscale printing, the color mode detection set to **This is a grayscale printer**, and can release on all printers (including color printers).
- Color virtual queue - configured to default to color printing, and can only release to color printers.

Using a single virtual queue is also a valid option. There are no technical problems with this approach, however, it is a little more complicated for users to understand.

Important:
If a physical printer is a grayscale printer then it is recommended that you set the color detection mode to **This is a grayscale printer** in PaperCut NG/MF. This ensures the job is logged as grayscale, and the user is charged correctly (i.e. not charged for color). This also applies if there is a single virtual queue. If the job is released to a grayscale printer it is logged and charged as a grayscale job.

4.7.4.3. Cross-server job redirection

PaperCut NG/MF supports redirecting print jobs across print servers, but due to technical limitations the print servers must be running the same operating system (e.g. Windows to Windows, Mac to Mac, etc.).

Cross-server job redirection on Windows

To enable redirection of print jobs from one Windows print server to another some additional configuration is required. This section covers the steps necessary to set it up.

The `PaperCut Print Provider` service is the Windows service responsible for interaction with print queues. For security reasons this service, as for most other Windows services, runs as the `SYSTEM` account. This account does not have the privileges required to access another system and place a print job in one of its queues. Therefore to enable this functionality the privileges of the `PaperCut Print Provider` service must be escalated.

The recommended way to escalate the privileges of the `PaperCut Print Provider` service to the required level is as follows. First a service account is created with permission to create new print jobs:

1. Create a new domain user called `papercut_service` (or something suitably descriptive). This account has permission to print on both/all print servers.

   If there are multiple domains involved it might be easier to create local users on each print server that all have the *same username and password*.
2. Ensure that the **Password never expires** option is selected.
3. Grant this user *local* administrator rights on the print server where it is installed. This gives the

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`papercut_service` the same privileges as the Windows `SYSTEM` account.

4. Ensure this user has the rights to print on all remote printers.

Next the `PaperCut Print Provider` service on each print server is configured to run as the new service account (changed from default `SYSTEM` to `papercut_service`):

1. Open the Windows **Services** list.
2. Stop the service **PaperCut Print Provider**.
3. Right-click the **PaperCut Print Provider** service; then select **Properties**.
4. Select the **Log On** tab.
5. Select **This account**.
6. Enter the username and password of the newly created service account.
7. Click **OK**.
8. Start the **PaperCut Print Provider** service.

Now PaperCut NG/MF has the ability to redirect jobs to the remote print queues to which it has access. Test by setting up a simple job redirection scenario, such as that described in Example 1: Simple load balancing.

4.7.5. Printer load balancing

Printer load balancing means distributing the printing load between two or more printers. While this can be implemented quite effectively by relying on users to pick a printer that is free, thereby distributing the load, the term generally refers to automatically managed load balancing.

You can implement load balancing in PaperCut NG/MF as part of *Find-Me Printing* as discussed in the preceding section, or separately without the need for Release Stations in a direct printing environment. This section discusses load balancing in general including how it works, as well as how to set it up in a direct printing environment (without Release Stations).

You can implement load balancing at several different layers (none of which are usually mutually exclusive), including:

- **the hardware/network layer**, otherwise known as clustering (see Clustering and high availability).
- **the operating system layer**, known as printer pooling in Windows and Novell environments, and CUPS classes in Mac and Linux.
- **within PaperCut NG/MF itself**, which is the topic of this section.

PaperCut NG/MF adds value to the load balancing available in clusters and operating systems by ensuring equal load between printers. For comparison the primary objective of Windows printer pools is to provide fault tolerance while load balancing is secondary and to a large extent non-existent. Printer pooling on Windows often picks the first available printer in a predefined order. The result is that wear and tear of printers is not even; the first printer in the group has the heaviest usage and the others might be mostly idle. SysAdmins often mitigate this by rotating printers periodically. With load balancing in PaperCut NG/MF none of this is necessary: jobs are distributed evenly between queues based on intelligent algorithms taking into account several factors:

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- An estimate of the current print load (i.e. pages remaining to print) by inspecting past print history. The estimate is done by using a Pages Per Minute (PPM) for an average printer, however, PaperCut NG/MF improves on the PPM value by "watching" the printer and learning over time.
- The printer that is likely to get the job done quickest is selected.
- If all printers are currently equal (e.g. all idle), then a random printer is selected. This ensures that over time, load is distributed evenly.
- Printers currently in an error condition are avoided if possible. PaperCut NG/MF determines if a printer is in error by using SNMPv1.

  Important:
  This feature is available using SNMPv1/v2c only.

- (Optionally) Printers a user has recently printed to.

Find-Me Printing also makes use of printer load balancing while giving users the option of where to send their print job. For more information about Find-Me Printing see Find-Me printing.

Implementing load balancing in PaperCut NG/MF is best described by way of example. The following section covers a common scenario for implementing printer load balancing.

4.7.5.1. Example 1: Simple load balancing

Scenario

The science department at East Beach High School has a computer lab with a high volume of printing. Students send their print jobs to the nearby print lab, which hosts two high volume laser printers of the same model.

The current print queues are named `sci_laser_1` and `sci_laser_2`, and are hosted on the print server called `science-lab`. Both queues use the same printer driver and settings.

In this scenario there is some natural form of load balancing, as students can select a queue at random or perhaps know which queue is available. Ideally this load balancing would be automatic, and students do not need to worry about which queue to select.

Implementation

The first step is to create a new print queue on the print server. This queue will be a *virtual queue*. Students will print to this virtual queue, and PaperCut NG/MF handles the load balancing to the target ("real") queues.

A new queue called `sci_laser` is created by the administrator on the `science_lab` print server using the normal methods for the operating system in use. The queue is created using the same driver that `sci_laser_1` and `sci_laser_2` use. The queue points to the same physical printer that `sci_laser_1` points to. This last point is not strictly necessary but some printer drivers complain if they do not point to a real printer.

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The administrator ensures that the print queue has registered itself with PaperCut NG/MF by checking the **Printers** tab of the Admin web interface. For more information about adding printers, see Add and remove/delete/ignore printers.

Following creation of the new queue the administrator performs the following:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select the **sci_laser** printer.
3. In the **Configuration** area, change the **Queue type** to **This is a virtual queue (jobs will be forwarded to a different queue)**.

   The **Job Redirection Settings** area is displayed.

   Jobs may be redirected to these destination queues determines which queues `sci_laser` is capable of redirecting to.
4. Select **science-lab/sci_laser_1** and **science-lab/sci_laser_2**.
5. Click **OK**.

Now when students print from a lab computer to the virtual `sci_laser` queue PaperCut NG/MF intelligently redirects the job to either `sci_laser_1` or `sci_laser_2`, as illustrated by the image below (Simple Load Balancing).

The administrator can now optionally un-share the `sci_laser_1` and `sci_laser_2` queues. Doing so ensures that all printing is via `sci_laser` and therefore, load balanced.

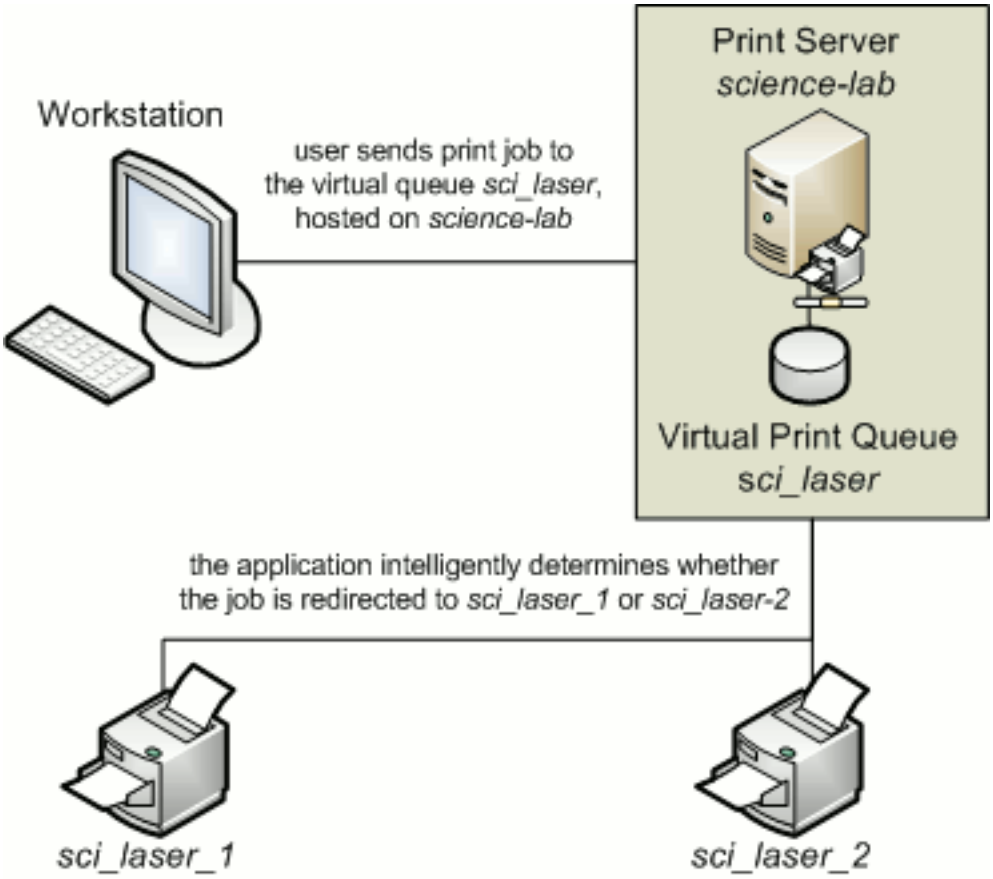

Figure 44: Simple load balancing

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4.7.5.2. Bypassing load balancing for recent print jobs

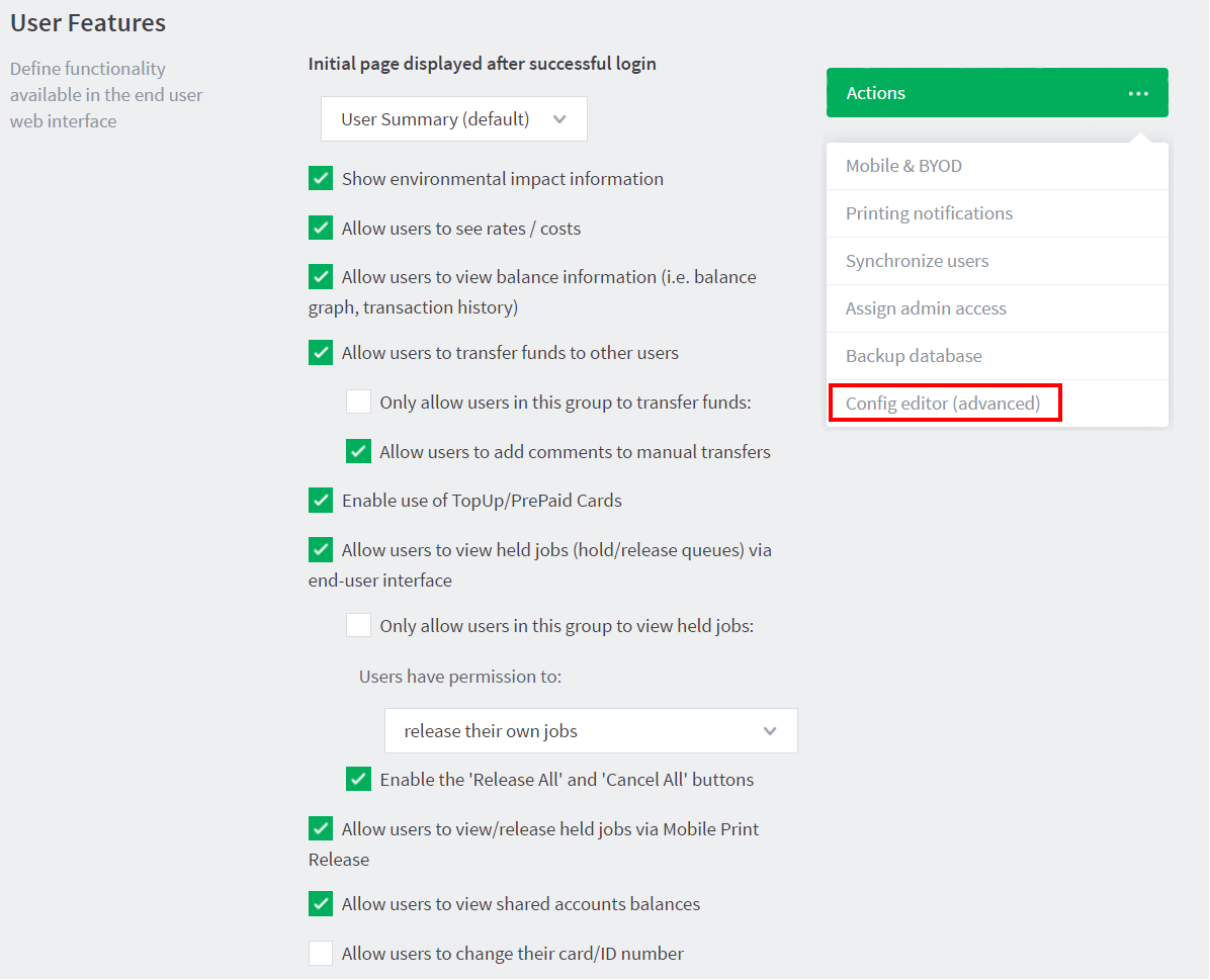
Students printing multiple documents might not want their print jobs distributed between multiple printers - especially when they're at opposite ends of the lab! PaperCut provides the capability to bypass Load Balancing for multiple recent print jobs.

By default, this feature is enabled and is set to a window of 20 seconds, that is, a print job is not considered for Load Balancing if a user has printed up to 20 seconds ago, and is sent to the previous job's destination instead.

To configure this setting:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.
3. Modify the config setting `print.load-balancer.default.reuse-printer-window-seconds`. Set this value to `0` to disable this feature.

4.7.6. Find-Me printing and printer load balancing FAQ

Why do redirected jobs have document names starting with `R:123456:`?

This is a security feature. PaperCut NG/MF marks redirected jobs with a special token in the

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document name to both distinguish between regular jobs and prevent circumvention by users.

When jobs are redirected are they logged in PaperCut NG/MF against the virtual queue or the target queues?

Jobs are logged against target queues. Virtual queues do not represent real printers so do not have printing associated with them. This is why the Job Log and Statistics pages are disabled when viewing a virtual queue.

4.8. Secure print release

In a standard network printing environment, when a user prints from an application, the job is sent directly to the printer and starts printing immediately. In some environments it might be advantageous to place the job in a holding state prior to printing. Some common examples include:

- **Secure printing**—In a secure printing environment jobs are only printed when the user arrives at the print area and confirms his or her identity. This ensures the user is there to collect the job and other users can't "accidentally" collect the document.
- **Approved printing**—In some organizations it might be appropriate to hold jobs until they are approved by selected individuals. A good example would be a teacher approving printing on an expensive color printer.
- **Authentication**—use hold/release queues as a form of authentication in an unauthenticated environment. Users must authenticate prior to releasing their jobs allowing PaperCut NG/MF to confirm their identity.

PaperCut NG/MF provides the framework and software interface to implement hold and release queues.

Users can interact with the *hold/release queues* (e.g. release their jobs) in a number of ways. This normally takes the form of a *Release Station* - a dedicated computer terminal located next to the printers, however, other interaction methods include access via a browser-based interface. Hold/release queues are used for a wide variety of purposes depending on the requirements of the organization.

The simplest way to get started with hold/release queues is to read through the Hold/release usage scenarios, and decide which best suits your needs. These scenarios outline the steps required to configure and manage a queue.

Tip:
You can use the hold/release queues to implement a *Find-Me printing* environment. See Find-Me printing and printer load balancing for details.

4.8.1. Release Station interfaces

PaperCut NG/MF includes a number of different interfaces to manage hold/release queues.

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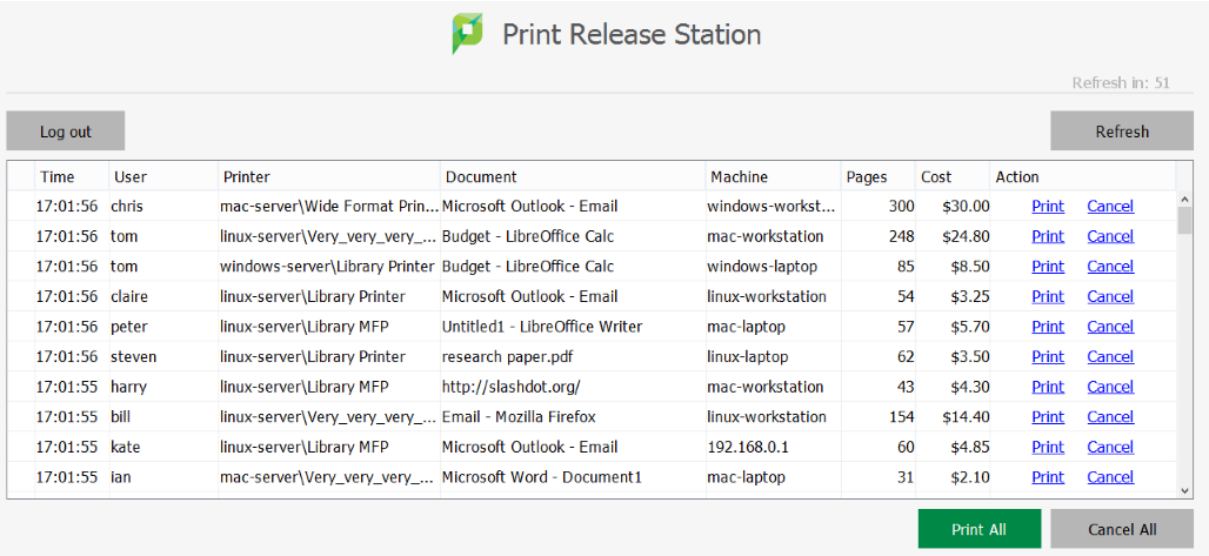
- Standard Release Station
- Manager mode web Release Station
- Admin web interface Release Station
- User web interface Release Station
- Mobile Print Release

4.8.1.1. Standard Release Station

The standard Release Station is typically used on dedicated workstations located near-by the printers. It usually runs in a full-screen mode that cannot be exited. You can run the Release Station in a number of modes that changes its behavior depending on your needs. These modes are described in Release Station Modes.

For more information regarding deployment of the Standard Release Station see the `[app-path]\release\README.txt` file. For information regarding configuration of the Standard Release Station see Standard Release Station Configuration.

The Release Station scenarios below describe which mode to use for different situations.



Tip:
To educate users about printing using a Release Station, administrators might find the Example 3: Printing using a Release Station helpful.

4.8.1.2. Manager mode web Release Station

The manager-mode web-based Release Station provides functionality equivalent to the standard Release Station running in "Manager mode". However, the web-based Release Station can be more convenient because you can run it from anywhere using a web browser. It allows release managers and PaperCut administrators to manage held jobs and release or cancel jobs printed by any user.

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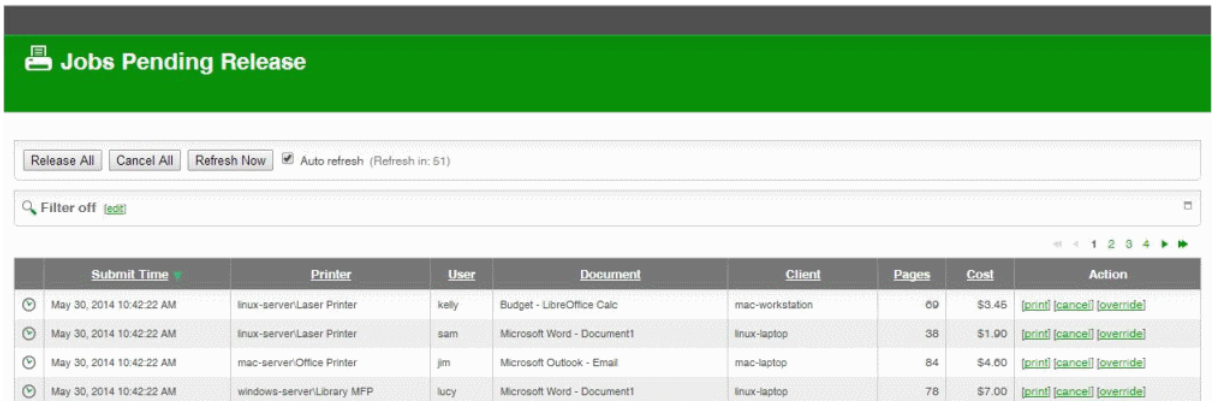
You can apply a filter to the jobs table. The default filter is the one that was last used by the user (except for the default admin user).

Access the web-based Release Station by visiting the following URL, and logging in as a user with `admin` or Release Station manager permissions.

```
http://[servername]:9191/release
```

where [servername] is the name of the PaperCut NG/MF server. To make a user a hold/release queue manager see Hold/release queue managers.



Tip:

Want to know more about the Override action? See Override/Change Account Selection during Admin Web Release.

4.8.1.3. Admin web interface Release Station

When logged into the Admin web interface, a SysAdmin can view all jobs held by Release Stations by:

1. Select **Printers > Jobs Pending Release**.

   The **Jobs Pending Release** page is displayed.

This interface is identical to the full-screen web-based Release Station, but can be more convenient for users already logged into the administration pages.

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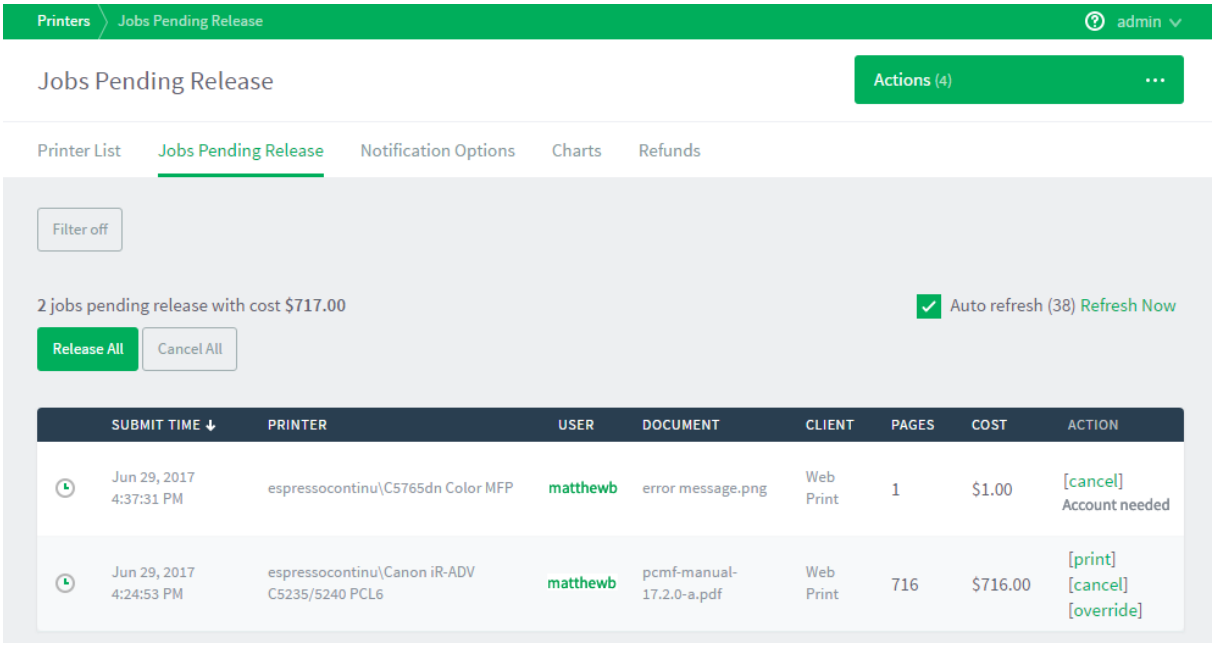
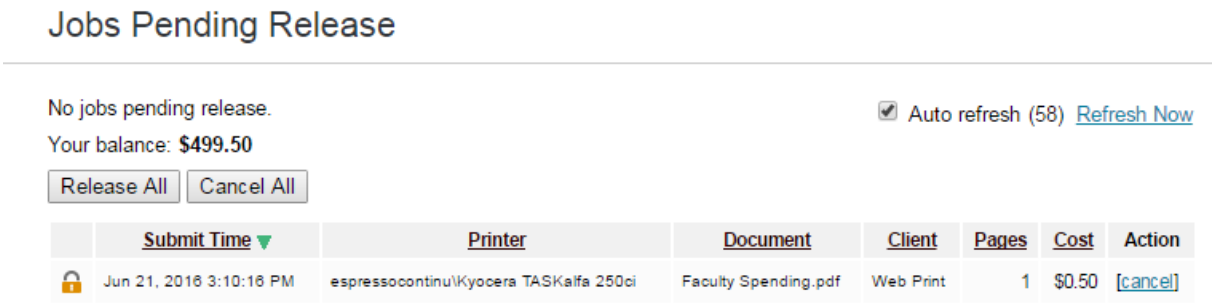


4.8.1.4. User web interface Release Station

When end users are logged into the user web interface, they can view their print jobs that are currently held pending release. The administrator can decide whether this interface is visible to end users, and which type of jobs a user can release. For more information, see End-User Web Based Release Interface Configuration.



4.8.1.5. Mobile Print Release

This print release interface allows end users to release their own jobs via their mobile device. This allows administrators to provide secure print release without the need for dedicated hardware. For more information, see Mobile Print Release—releasing print jobs using your mobile device chapter.

4.8.2. Hold/release usage scenarios

This section describes various usage scenarios discussing why and how to use a hold/release queue. They provide a good starting point for your own implementations.

- Saving paper and toner
- Secure printing
- Pay per print
- Expensive printers (approved printing)

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- Delegated Print Release
- Override/change account selection using Admin web interface Release Station
- Cancel jobs without accounts using Admin web interface Release Station
- Unauthenticated printing

4.8.2.1. Saving paper and toner

A large source of wasted paper in organizations are documents that were never collected from the printer. Some of these uncollected documents are caused by accidental printing, and others were just forgotten. But the majority of these documents end up in the bin.

If the document is not printed until a user walks to the printer to collect it, then this source of waste can be mostly eliminated.

To implement a Release Station to save paper:

- Set up a low-end workstation near the printer(s).
- Run the Standard Release Station in the default mode (Release Any mode). For more information, see Release Station Modes.
- In PaperCut NG/MF, enable the printer(s) for Release Station use. For more information, see Enabling hold/release support on a printer.
- To allow users to release jobs via the User web interface Release Station, also enable Release Any mode for the web tools interface. For more information, see End-User Web Based Release Interface Configuration.

4.8.2.2. Secure printing

When users print documents that contain sensitive information, it is important that no one else picks up the document from the printer. Even when the printers are close-by, people can accidentally leave sensitive documents on the printer. Use print Release Stations to implement Secure Printing, which ensures that a document can only be released by the person who printed it and only when that person is standing near the printers.

Secure printing is implemented as follows:

- Setup a low-end workstation near the printer(s).
- Run the Standard Release Station in "Secure" mode. For more information, see Release Station modes.
- In PaperCut NG/MF, enable the printer(s) for Release Station use. For more information, see Enabling hold/release support on a printer.
- Mobile Print Release—releasing print jobs using your mobile device for secure printing without dedicated hardware.

Secure printing requires users to be authenticated on the network when printing (i.e. an Active Directory domain). This allows the Release Station to enforce the secure printing so that users can only release documents they print.

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4.8.2.3. Pay per print (e.g. library or Internet cafe)

Libraries and Internet cafes usually only allow printing once a user has paid for the cost of the printed document.Implementing pay-per-print can often involved deploying expensive card-based payment solutions, however, PaperCut NG/MF Release Stations allow this to be implemented in a more cost effective way.

An example of how print Release Stations would be used in this scenario is:

1. Users print documents from a workstation without any assistance from staff.
2. The printed documents are held in the queue until released by a staff member.
3. The user goes to the staff desk and asks for the document to be released.
4. The staff member opens a Release Station (the program or a web page), finds the user's job, notes the cost and collects the payment from the user.
5. The staff member clicks **Print**, allowing the job to be printed.
6. The user then collects the printed document from the printer.

If the user does not pay for a print, then the print job is automatically deleted without any staff interaction.

To implement a pay-per-print hold/release queue:

- In PaperCut NG/MF, enable the hold/release option on the printer(s). For more information, see Enabling hold/release support on a printer.
- In PaperCut NG/MF, setup the staff to be a "hold/release queue manager". This allows them to log in to the "manager mode" Release Stations. For more information, see Hold/release queue managers.
- On the staff desk workstations, run the Release Station in "Manager mode". For more information, see Release Station modes.
- There are two release interfaces:
  - Standard Release Station in "Manager mode" - requires minimal setup.
  - Web-based release interface - requires only a web browser.

4.8.2.4. Expensive printers (approved printing)

At times it is necessary to restrict access to an expensive printer (like a color laser printer), or other printer that should be used only with an administrator's permission. Instead of locking the printer away where no one has access to it; you can configure the printer so that only administrators or hold/release managers can release print jobs. In this situation:

1. The user prints the document to the restricted printer.
2. The document is held in the queue awaiting approval by an authorized person.
3. The user talks to the administrator (or approved user) who would decide whether the user is allowed to perform the print.
4. The administrator logs into the web-based release interface from any machine on the network, and "Release" or "Cancel" the job as appropriate.

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To implement admin/manager only release interface:

- In PaperCut NG/MF, enable the hold/release mode on the printer(s); then select the **Admin/Manager only release** mode. For more information, see Enabling hold/release support on a printer.
- You do not need to set up a dedicated Release Station near the printer, because the web-based release interface can be used from any machine on the network.
- It is also a good idea to put a notice on the printer that tells users how to have their documents released.

4.8.2.5. Delegated Print Release

You can allow a user to release jobs printed by other users. This is called *Delegated Print Release*. An example scenario is when a teacher needs to view and release jobs printed by their students. If you make each teacher a hold/release queue manager, they can view and release any job, including other teachers' jobs. By using Delegated Print Release, teachers can view and release only the print jobs they need to manage.

In this situation:

1. A student prints a document.
2. The document is held in the queue awaiting approval by a teacher.
3. The student talks to their teacher who will decide whether the document should be allowed to print.
4. The teacher logs into their User web-interface Release Station from any machine on the network and releases or cancels the job as appropriate.

Important:

This requires users to use the User Client for cost allocation and job confirmation. As a result, even if the MFD supports the ability to assign accounts, this is unavailable for delegated print jobs without accounts.

To implement delegated print release:

1. In PaperCut NG/MF, enable the hold/release option on the printer(s). For more information, see Enabling hold/release support on a printer.
2. Select the teacher's account on the **User List** page.
3. In the **Advanced Options**area, select the **Allow this user to release jobs printed by others (Delegated print release)** check box.
4. Enter a list of student usernames delegating print release to the teacher. Alternatively enter an existing group name under **Groups**. For example, if all students belong to "students" group, you can enter "students".
5. Click **Apply**.

   Now this teacher can release delegated jobs via the User web interface Release Station.

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6. To apply this setting to multiple teachers, use **Bulk User Actions** link under **Users** tab. For more information, see Bulk user operations

To prevent students from viewing/releasing their own jobs, only allow group "teachers" to view held jobs:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **User Features** area, select the **Allow users to view held jobs (hold/release queues) via end user interface** check box.
3. Select the **Only allow users in this group to view held jobs** check box.
4. Set the group name to "teachers".
5. Click **Apply**.

4.8.2.6. Override/change account selection using Admin web interface Release Station

Many educational organizations want to charge for printing, which means that some users might not be able to print because of a low balance. This means that the print job waits in the Secure hold/release queue until it is either canceled, times out, or the user obtains sufficient credit to release the job.

A hold/release queue manager (for more information, see Hold/release queue managers) can use the Admin web interface Release Station to override the selected account (shared account or personal balance) and charge the print job to a specific shared account, moving the cost of the print job from the selected shared account or user's personal balance to a shared account that the hold/release queue manager has access to.

Important:
The hold/release queue manager's must have access to the desired shared account for feature to work. They do not require the standard account selection popup to be used.

In this situation:

1. A student prints a document.
2. The document is held in the queue awaiting additional funds.
3. The student talks to their teacher who will decide whether the document is allowed to print.
4. The teacher logs into their User web interface Release Station from any machine on the network and selects the **[override]** action for the job.
5. The teacher then selects a shared account to charge the job to, optionally enters a job comment; then clicks **Print**.

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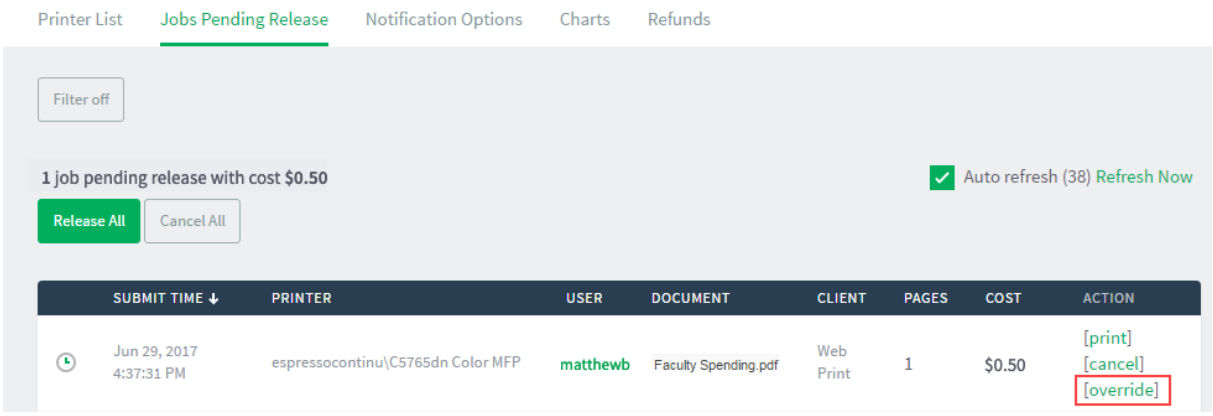

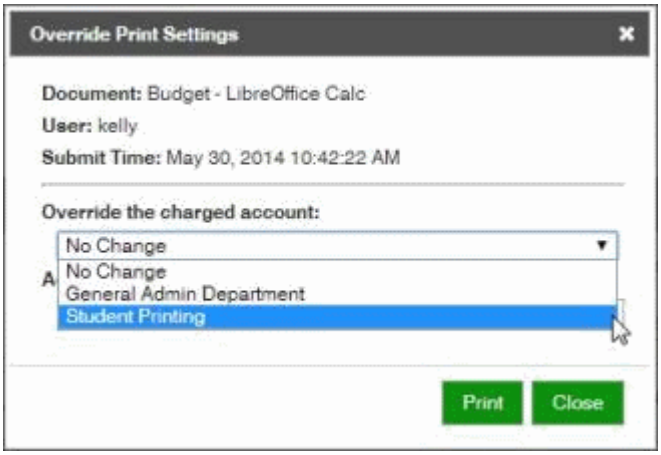

To implement Override Print Settings to charge to a shared account:

1. In PaperCut NG/MF, enable the hold/release option on the printer(s). For more information, see Enabling hold/release support on a printer.
2. On the **User List** page, select the teacher's account .
3. Click the **Accounts** tab.

   The **Shared Account List** page is displayed.
4. In the **Actions** menu, click **Create a new account**.

   The **Account Details** page is displayed.
5. Give the shared account a name. Determine if this is to be a restricted shared account (e.g. cannot have a negative balance, limiting the amount of use) or if it is unrestricted and allowed to accrue a negative balance.
6. Click **Apply**.
7. Click the **Security** tab.
8. In the **Users** area, select the teacher's user account; then click **Add**.

   This teacher can now override jobs using the Admin web interface.

4.8.2.7. Cancel jobs without accounts using Admin web interface Release Station

Since PaperCut MF 19.0.0 and above allows users to send print jobs with or without an account, directly to the printing device, there could be a mix of held print jobs at the device (jobs with and

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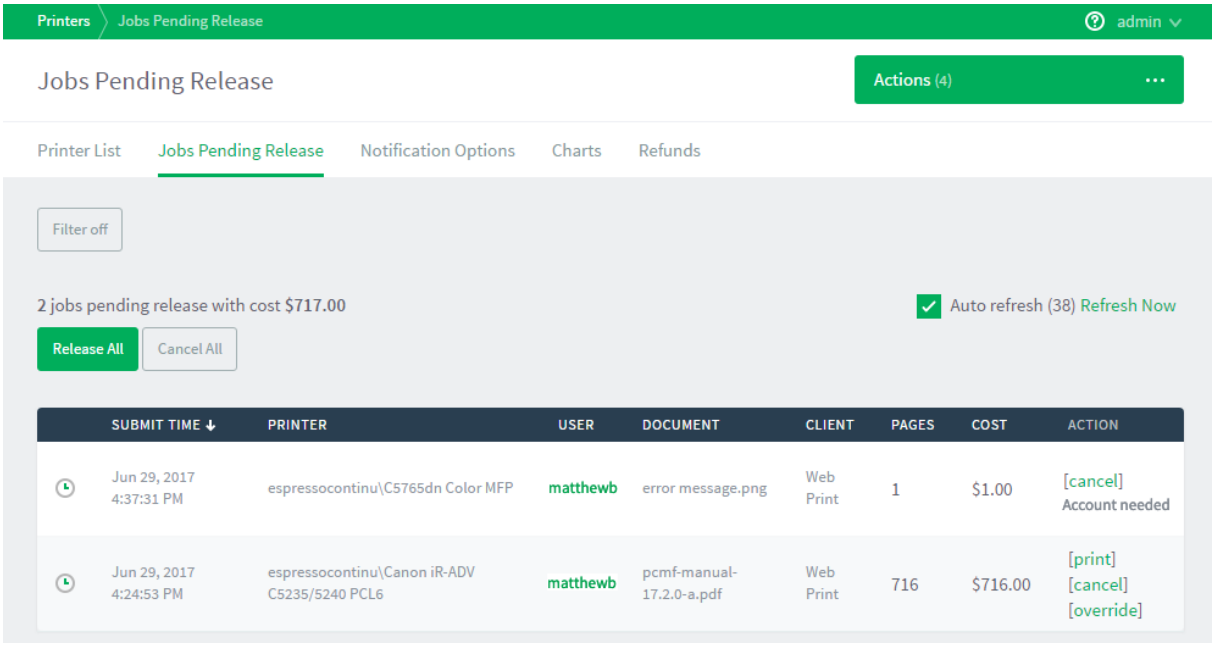
without accounts). Such jobs can be released/ printed only after they have an account to charge to. This means that the print job waits in the Secure hold/release queue until it is canceled, times out, or the job is associated with an account to charge to. A hold/release queue manager (for more information, see Hold/release queue managers) can use the Admin web interface Release Station to cancel the job.

In this situation:

1. A student prints a document, but does not assign an account.
2. The document is held in the queue awaiting an account.
3. The teacher logs into the Admin web interface Release Station from any machine on the network and selects the **[cancel]** action for the job.



4.8.2.8. Unauthenticated printing

In some environments it is not possible (or very difficult) to have users authenticated when printing. This could be due to a technology constraint (like using Macs in mainly Windows environment) or could be for convenience (like having kiosk computers in the library that people can use without logging in).

In these scenarios, print jobs are printed under one name, but charging is allocated to another. For example, a job is printed by a generic "library user", but you need to charge to the user's real account. In order to charge the correct user for printing, PaperCut NG/MF needs to identify the user to charge. You can achieved this using a Release Station in "Release Any" mode.

This works as follows:

1. The user prints from a workstation but is not authenticated, so jobs are allocated to a generic user.
2. The print job is held in the queue awaiting release.
3. The user walks to the Release Station and enters a username and password. Alternatively the

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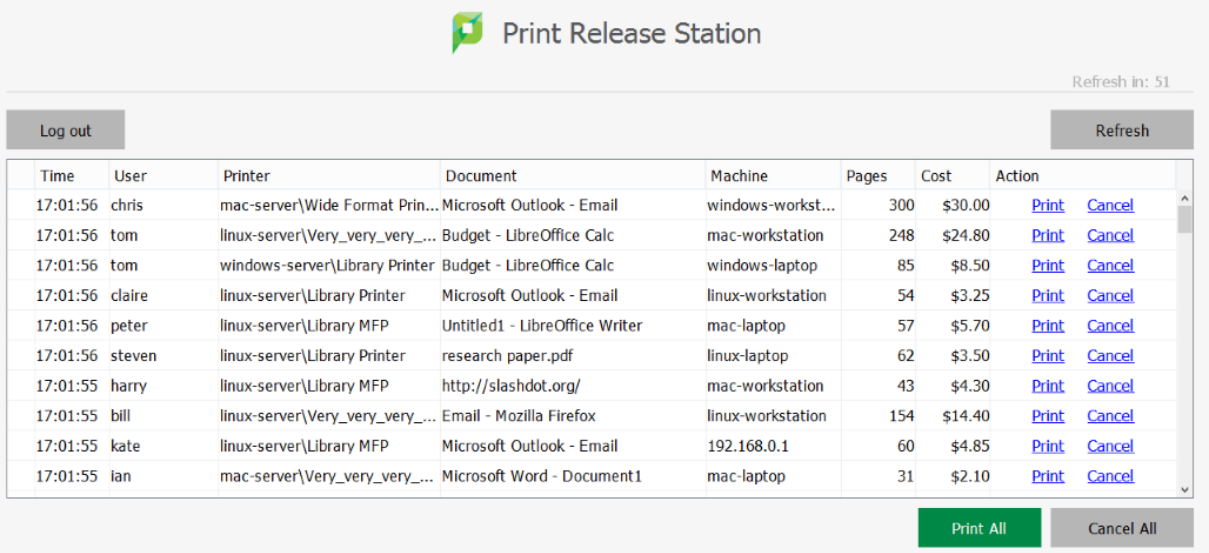
user can log in to the PaperCut NG/MF User interface; then select **Jobs Pending Release**.

4. All jobs held are listed. Jobs can be identified by document name or workstation machine name.
5. The user selects his or her jobs. Any jobs released are charged to that user's account.



To implement unauthenticated printing using a Release Station:

- Set up a low-end workstation near the printer(s).
- Run the Standard Release Station in "Release Any" mode. For more information, see Release Station modes.
- In PaperCut NG/MF, enable the printer(s) for Release Station use; then select **User release** mode. For more information, see Enabling hold/release support on a printer.
- To allow users to release jobs via the User web interface Release Station, also enable Release Any mode for the web tools interface. For more information, see End-user web based release interface configuration.

To implement unauthenticated printing using the browser interface:

- In PaperCut NG/MF, select the **Hold/Release** mode on the appropriate printer(s). For more information, see Enabling hold/release support on a printer.
- Ensure end users have the ability to view held jobs and can **release any job (charging to their account)**. For more information, see End-user web based release interface configuration.

4.8.3. Install a Release Station

Tip:
We recommend a zero-deployment installation of the Release Station, so it is automatically upgraded when the application is upgraded. We do support local installation of Release Stations, but this topic assumes the zero-deployment install.

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The Release Station terminal (normally a budget workstation system) should be located close to the printers so users can release the jobs and pick up the printing nearby.

You can:

- Install a Release Station on Windows
- Install a Release Station on a Mac

4.8.3.1. Install a Release Station on Windows

Tip:
We recommend a zero-deployment installation of the Release Station, so it is automatically upgraded when the application is upgraded. We do support local installation of Release Stations, but this topic assumes a zero-deployment installation.

Step 1: Set up a Windows workstation near the printer

The Release Station terminal (you can use any machine) should be located close to the printer so users can release the jobs and pick up the printing nearby. The Release Station terminal should meet the following requirements:

- Windows 7 Home or Professional (or later)
- 2GB ram (64-bit)
- Attached to the network so that it can communicate with the Application Server.

Step 2: Set the workstation to automatically log in (optional)

If you want the Release Station to automatically start when the terminal is rebooted, you need to set the workstation to automatically log in.

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1. Create an account for the Release Station to log in with. The account should be a normal local or domain user and not have any administration privileges.
2. Set up automatic log in on Windows. For more information, see https://support.microsoft.com/en-us/kb/324737.

Step 3: Set up the Release Station to run on startup

To set the Release Station software to run on startup:

1. Create a new shortcut icon in the user's Startup folder.

   ```
   %APPDATA%\Roaming\Microsoft\Windows\Start Menu\Programs\Startup
   ```

   The **Create Shortcut** screen is displayed.
2. In **Type the location of the item**, enter `\\[servername]\PCRelease\pc-release-local-cache.exe`

   where `[servername]` is the name of the server hosting the Application Server.
3. Log out and log back in again.

You can also run the Release Station by copying the files from the server hosting the Application Server to the dedicated workstation. These files are located under `[app-dir]/release`.

This runs the Release Station in default mode with default configuration options. You can change the default configuration by modifying the following file:

```
[appdir]\release\config.properties
```

This configuration file has many options that allow you to customize the Release Station behavior and look. The options are documented in the configuration file. In addition to the look, you can also configure behavior such as limiting the list of destination printers the Release Station can release to.

If you are running multiple Release Stations, you can provide a custom configuration for each Release Station. Create a machine specific configuration file in the `[appdir]\release` directory named:

```
config.[machine-name].properties
```

where `[machine-name]` is the name of the Windows machine running the Release Station. Any settings in this file override settings in the global `config.properties` file.

Step 4: Lock down the Release Station machine

You should lock down the Release Station terminal to stop users from performing administrative operations, such as changing the user's password. You can disable settings using group policy:

1. Open the **Local Group Policy Editor**:
   a. Click **Start**.
   b. Enter **Run**.

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c. Type **gpedit.msc**.

d. Click **OK**.

2. Navigate to **User Configuration > Administrative Templates > System > Ctl+Alt+Del Options**.
3. Prevent users from being able to use the following functionality by enabling the removal of the functions:
   - **Remove Task Manager**
   - **Remove Lock Computer**
   - **Remove Change Password**
   - **Remove Logoff**

   To enable these to be removed:

   a. Double-click the option.

   b. Select **Enabled**.

   c. Click **OK**.

Depending on the level of security required, administrators can lock down many other Windows features and options using group policy.

Step 1: Configure the Release Station (optional)

This step is required only if the default mode or settings need to be changed.

The Release Station configuration is stored in the following file:

```
[appdir]\release\config.properties
```

This configuration file has many options that allow you to customize the Release Station behavior and look. The options are documented in the configuration file.

If you are running multiple Release Stations, you can provide a custom configuration for each Release Station. Create a machine specific configuration file in the `[appdir]\release` directory named:

```
config.[machine-name].properties
```

where `[machine-name]` is the Windows machine name running the Release Station. Any settings in this file will override settings in the global `config.properties` file.

You can also specify an override configuration file via the command-line using the following syntax:

```
pc-release.exe --config "[config file path]"
```

Step 2: Enable Release Station support for the printers

By default, print jobs are sent directly to the printer and not held by the Release Station. To enable Release Station support on a printer:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.

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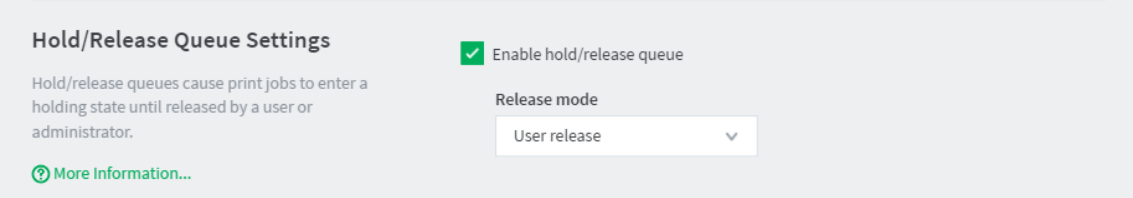
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.

3. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



4. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
   - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

> **Tip:**
> To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.

5. Click **OK**.

You can copy Release Station settings from printer to printer using the **Copy settings to other printers** action.

Step 3: Perform testing

Perform some tests to see print jobs in the Release Station.

1. Print to a printer with Release Station support enabled.
2. Open the Release Station application.
3. Log in to the Release Station as the user who performed the print.

   The print job should be displayed in the list.

4. Click the **Print** link to release the job or **Cancel** to cancel the job.

4.8.3.2. Install a Release Station on a Mac

> **Tip:**
> We recommend a zero-deployment installation of the Release Station, so it is automatically upgraded when the application is upgraded. We do support local installation of Release Stations, but this topic assumes the zero-deployment install.

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Step 1: Set up a Mac workstation near the printer

The Release Station terminal (normally a budget workstation system) should be located close to the printers so users can release the jobs and pick up the printing nearby. The Release Station terminal should meet the following requirements:

- Apple Mac OSX 10.8+
- 2GB or more of system memory
- Attached to the network so that it can communicate with the Application Server.

Step 2: Set the workstation to automatically log in (optional)

If you want the Release Station to automatically start when the terminal is rebooted, you need to set the workstation to automatically log in.

1. Create an account for the Release Station to log in with. The account should be a normal local or domain user and not have any administration privileges.
2. Set up automatic log in on the workstation. For more information, see Set your Mac to automatically log in during startup.

Step 3: Set up the Release Station to run on startup

To set the Release Station software to run on startup:

1. Open **System Preferences**; then select **Users & Groups**.
2. Select the user account that you created in Step 2.
3. Click **Login Items**.
4. Click **+** at the bottom of the screen; then browse to your PaperCut NG/MF server share under `[app-dir]/release`.
5. Select `pc-release-mac.command`.

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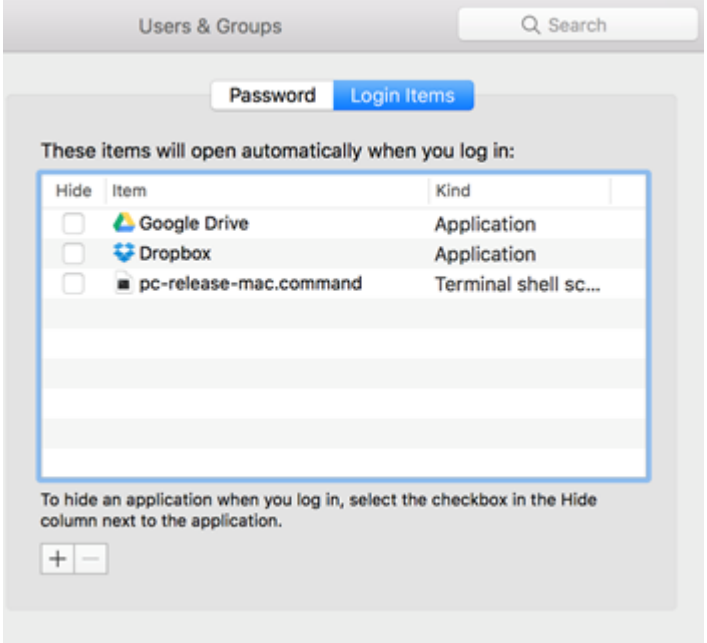

6. Reboot the system.

You can also run the Release Station by copying the files from the server hosting the Application Server to the dedicated workstation. These files are located under `[app-dir]/release`.

This runs the Release Station in default mode with default configuration options. You can change the default configuration by modifying the following file:

```
[appdir]\release\config.properties
```

This configuration file has many options that allow you to customize the Release Station behavior and look. For more information about the Release Station modes, see Release Station interfaces.

Step 4: Lock down the Release Station machine

You should lock down the Release Station terminal to stop users from performing some operations.

These operations can be restricted by using the built in Parental Controls in Mac OS. For more information, see Set up parental controls.

Step 1: Configure the Release Station (optional)

This step is required only if the default mode or settings need to be changed.

The Release Station configuration is stored in the following file:

```
[appdir]\release\config.properties
```

This configuration file has many options that allow you to customize the Release Station behavior and look. The options are documented in the configuration file. For more information about the options, see Standard Release Station settings.

Step 2: Enable Release Station support for the printers

By default, print jobs are sent directly to the printer and not held by the Release Station. To enable Release Station support on a printer:

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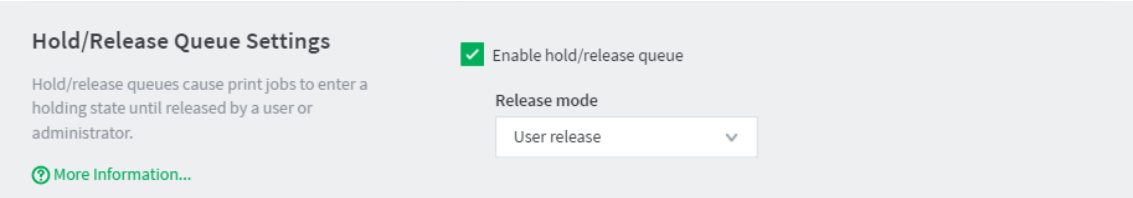
1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



4. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
   - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

   Tip:
   To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.
5. Click **OK**.

You can copy Release Station settings from printer to printer using the **Copy settings to other printers** action.

Step 3: Perform testing

Perform some tests to see print jobs in the Release Station.

1. Print to a printer with Release Station support enabled.
2. Open the Release Station application.
3. Log in to the Release Station as the user who performed the print.

   The print job should be displayed in the list.
4. Click the **Print** link to release the job or **Cancel** to cancel the job.

4.8.4. Configure a Release Station

This section describes various aspects to configuring Release Stations.

Some additional installation notes can also be found in the Release Station README file located here:

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```
[app-path]\release\README.txt
```

4.8.4.1. Enable hold/release support on a printer

By default, print jobs are sent directly to the printer and are not held. To turn on hold/release support on a given printer:

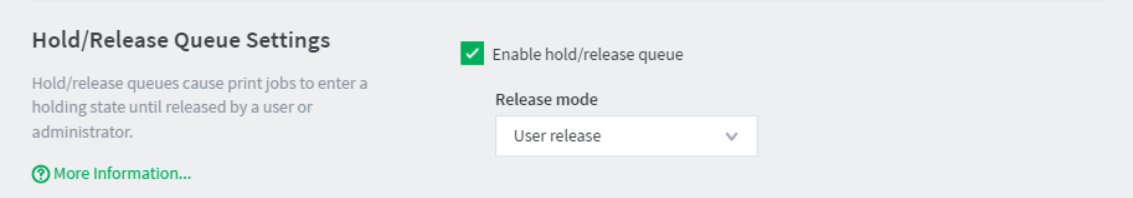
1. Click the **Printers** tab.

   The **Printer List** page is displayed.

2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.

3. In the **Hold/Release Queue Settings** area, select the **Enable hold/release queue** check box. This ensures that jobs are held in the print queue until users are ready to release their jobs.



4. In **Release mode**, select one of the following:
   - **User Release**—(default) allows users to release and view only the jobs printed under their name/user account.
   - **Admin/Manager only release**—jobs can only be released by administrators or hold/release queue managers.

> **Tip:**
> To configure multiple printers with hold/release queue support, use the **Copy settings to other printers** function. To use this, configure one printer as required, click **Copy settings to other printers**; then select the printers to copy the settings to.

4.8.4.2. Assign hold/release queue managers

A hold/release queue manager is a user that has additional privileges to manage Release Stations and jobs held in hold release queues. Managers can:

- Log on to the "manager mode" Release Stations (both the software and web-based Release Station).
- Log on to the "secure mode" Release Stations, which switches them into manager mode so that users' print jobs can be released.
- Release jobs that can only be released by managers or administrators.
- Can close the Standard Release Station when running in full-screen mode.
- Use the Override Print Account selection in the web-based Release Station.

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Assign a hold/release queue manager role to a user or group

1. Select **Options > Admin Rights**.

   The **Admin Rights** page is displayed.
2. Assign administrator access to a user or group.
3. Restrict the held jobs that a hold/release queue manager can view based on user and printer groups.
   - To restrict them to a group of users:
     a. Change **Allow job releases for** to `Users from the following groups`.
     b. Select at least one user group from the list.
   - To restrict them to a group of printers:
     a. Change **Allow job releases for** to `Printers from the following groups`
     b. Select at least one printer group from the list.
   - If both user groups and printer groups are selected, then the hold/release queue manager is restricted to only jobs that meet the user and printer group criteria.
4. To restrict their access to only the Release Station interface, deselect all the other admin rights.
5. Click **Apply**.

For more information about assigning admin rights see Assign administrator level access.

Make a user a hold/release queue manager

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Hold/Release Queues** area, in **Hold/Release Queue Managers**, enter the user's username. To enter multiple users, separate usernames with a comma (`,`).
3. Click **Apply**.

Note:
This method of assigning hold/release queue manager permissions gives unrestricted access to all held print jobs.

4.8.4.3. Configuring a Standard Release Station

The Standard Release Station is configured using a configuration file located in the directory where the Release Station executables are located. The default configuration file is:

```
[app-path]\release\config.properties
```

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This configuration file allows you to configure the behavior and look of the Release Station in a number of ways. Each of the configuration items are described in the table below:

Note:
There are more advanced options listed in the config.properties file. If you don't see what you're looking for in the table below, take a look through the config file to check if the option is listed there.

Table 45: Standard Release Station config settings (for other advanced config settings, see the config.properties file)

Config name	Description
mode	The mode changes the behavior of the Release Station depending on the need. The available modes are described in Release Station modes.
use-username-authentication	(Y/N) - Enable username authentication. Users are required to enter their domain username to log in to the Release Station. They might also be required to enter their password, depending on the 'mode' setting. Default: Y (Yes).
use-card-authentication	(Y/N/USERNAME) - Enable card-based authentication. This is designed for use with dedicated hardware card readers. If Y: The card number is validated against the user's card-number field. If USERNAME: The card value is interpreted as a username. The user is prompted for a password if required. Default: N (No).
show-jobs-from-queues	Filters the list of jobs to only those print queues listed. This is a comma separated list of full printer names (i.e. server\printer). This is useful when there are multiple Release Stations, each managing the queues of a different set of printers.
releases-on	This option applies to installations using *Find-Me Printing* and sets the behavior of jobs released from a virtual queue. For more information see Find-Me printing and printer load balancing. This setting defines the printer (or list of printers) that the jobs are printed to when released. This is usually the printer(s) in close proximity to this Release Station.
confirm-printing	When enabled (Y) and users release a job that is charged to their personal account, a confirmation dialog is displayed to confirm that the user wants to print and be charged for the job. When disabled (N) the confirmation dialog is never displayed.
display-columns	Used to customize the columns displayed and the order they are displayed in the list of print jobs. The default value is: date,user-,printer,document,machine,pages,cost
display-column-widths	Used to customize the width of columns displayed. The setting can only be used if the `display-columns` is defined. The

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Config name	Description
	number of values must match the number of values in the `display-columns` setting. The default value is: 8,12,25,30,15,8,8
hide-printer-server-names	(Y/N) - Used to hide the printer server names from the list of print jobs. Default: N (No)
show-print-all	(Y/N) - Indicates whether **Print All** is displayed. Default: Y (Yes)
show-cancel-all	(Y/N) - Indicates whether **Cancel All** is displayed. Default: Y (Yes)
max-idle-secs	The number of seconds without user input, before the user is logged out of the Release Station. The default is 30 seconds.
show-user-balance	(Y/N) - Indicates whether to hide the user balance information when a user logs into the Release Station. Default: Y (Yes)
background-color	Allows for customizing the background color of the Release Station to match the organization's colors. The color format is the hexadecimal color code used in HTML - #RRGGBB (where RR is the red component, GG is the green component and BB is the blue component).
font-color	Allows for customizing the font/foreground color used in the Release Station. The color format is the hexadecimal color code used in HTML.
locale	Allows to override the default language used for the Release Station. The value is a valid ISO language code. E.g. en, zh_HK.
title	The title that is displayed at the top of the Release Station screen.
instructions	The instructions to display at the login page. Include a ` ` to start a new line.
card-and-username-instructions	The instruction text that is displayed when using both card authentication and username authentication, displayed in-between the card entry and username entry fields. Include a ` ` to start a new line.
username-label	Override the label text for the Username field.
password-label	Override the label text for the Password field.
logo-image	Allows a custom logo image to be displayed. For best results the image should be between 50 and 80 pixels in height. PNG, JPG or GIF images are allowed.
scale-factor	Allows to adjust the size of text displayed in the Release Station. Higher value increases the text size. Larger text might be preferable on high resolution screens or touch screens. The default is 1.5.

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Config name	Description
release-cancel-gui-style	Allows to set the GUI style of the Release Station actions. The valid styles are `link` and `button`. Setting it to `button` is useful when running Release Station on touch screens. The default is `link`.
enable-card-self-association	(Y/N) - Enable or disable card self-association. This allows users to associate their card with their account without needing any administrator assistance. Default: N (No)
enable-on-screen-keyboard	(Y/N) - Enable or disable the on-screen (software) keyboard. Use of the on-screen keyboard is recommended for touch-screen devices. Supported on Microsoft Windows only, via the on-screen keyboard utility (osk.exe) or an alternate application. Default: N (No)
on-screen-keyboard-path	Specify an alternate on-screen keyboard application to the Microsoft Windows default. Supported on Microsoft Windows only. Default: (none)

Tip:

When running Release Stations from the `\\server\PCRelease` share, each workstation can have its own configuration file. The "config.properties" is used for default settings for all Release Stations, but you can override settings by defining another configuration file for each Release Station. Put these files in the same directory and use the following naming convention:

```
config.[machine-name].properties
```

where [machine-name] is the name of the machine running the Release Station.

Since the machine specific configuration file overrides the default settings, if you want to clear a setting then it must be unset or commented out in both configuration files. Apple OSX servers might require the fully qualified domain name of the machine running the Release Station rather than the short name. A custom configuration file can also be specified as a startup command-line option using the following syntax: pc-release.exe --config "[config file path]"

Release Station modes

The Release Station modes available are described below. The Release Station mode is changed in the configuration file as described in Standard Release Station Configuration.

Table 46: Standard Release Station modes

Mode	Description
ReleaseAny	It allows a user who logs onto the Release Station to release any held jobs. Any jobs released are charged to the logged in user.

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Mode	Description
Manager	Manager mode allows only administrators or hold/release queue managers to log in to the Release Station. In Release Station mode, all jobs are listed and users are not automatically logged out due to inactivity.
Secure	This is the default mode. Secure mode allows users to only see and release print jobs that they have printed. Release Station managers can see and release all users' print jobs.
NoPassword	This works similar to the secure mode, however, users don't need to enter the password to view jobs.

In all modes except Manager mode, users are logged out automatically after a period of inactivity defined in the configuration file, the default being 30 seconds.

Card-based user authentication

In some environments, users are issued with identity cards that are used for authentication. The cards might be used to gain entry to buildings, or borrow from a library. The cards can also be used to authenticate users at the standard Release Station. Using a card is often much more convenient and less error-prone than entering a username and password.

To use card-based authentication an appropriate hardware card-reader is required. The card reader must be connected to the machine running the Release Station and act as a keyboard. i.e. when the user swipes/scans their card, the card reader outputs the digits just as if someone entered them using the keyboard. There are card readers that can do this for all commonly used card types (e.g. magnetic stripe, barcode, etc). An easy way to test a card reader is to open a text editor and place the cursor in a new text document. Then when a card is swiped the card number is displayed in the text file.

The card numbers entered at the Release Station are validated against the **Card/Id number** field for the user. This is located at the bottom of the **User Details** screen in the Admin web interface. Before card authentication can be used, the users' card numbers must be associated with the user record in PaperCut NG/MF. You can manually enter the numbers, automatically synchronized from Active Directory or LDAP (see Synchronize user and group details) or imported in bulk using the Batch User Import file (see Batch import and update user data).

Once card numbers are associated with users, you can enable the card-based authentication in the Release Station by setting the `use-card-authentication` to `Y` in the Release Station's `config.properties` file. Once the Release Station is restarted it is in card-authentication mode, and can be tested by swiping a card through the card-reader.

Alternatively, users can self-associate card numbers at the Release Station. Enable this functionality by setting `enable-card-self-association` to `Y`. Note that this also requires `use-card-authentication` to be enabled as well.

The `config.properties` file has some other settings to change how the card-number is read from the reader. For example, you can change the header and trailer characters used by some card readers to indicate the start and end of the card number. See the config file for details.

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Friendly client machine aliases

In some environments (for example, public libraries), it is important for users to identify print jobs by the client machine from which they were printed. By default, the Release Station lists either the IP address or the machine's unique network name Neither of these are helpful to Release Station users. To avoid this problem the administrator can define a list of aliases, that map the unfriendly names to a more user-friendly name.

For example, print jobs might be displayed in the Release Station as `192.168.1.100` or `winpc0076`, but would be more meaningful for the user to be displayed as `Public PC 1`.

These aliases are defined in the `[app-path]/release/client-machine-aliases.properties` file. The entries are in the format:

```
[machine]=[alias]
```

It is also valid to have multiple entries that map to the same alias. So to add aliases for the example above the following lines would be added to the `client-machine-aliases.properties` file:

```
192.168.1.100=Public PC 1 winpc0076=Public PC 1
```

Unreleased Held Jobs timeout

If users do not release held print jobs, then after a defined time, these unreleased held print jobs are automatically deleted. This prevents a buildup of old and abandoned jobs in the Hold/Release queue. The default timeout is `30` minutes.

To change the timeout:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Hold/Release Queues** area, in **Delete held jobs if not released after**, enter the number of minutes to wait for users to release their job before it is deleted.
3. Click **Apply**.

Note: In environments where user interaction for Account Selection is required, and can be done BOTH via User Client AND at the printing device (the ability to assign accounts at the printing device is available), after the User Client timeout, any held print jobs without accounts:

- are not canceled
- are no longer available on the User Client
- are ONLY available at the printing device

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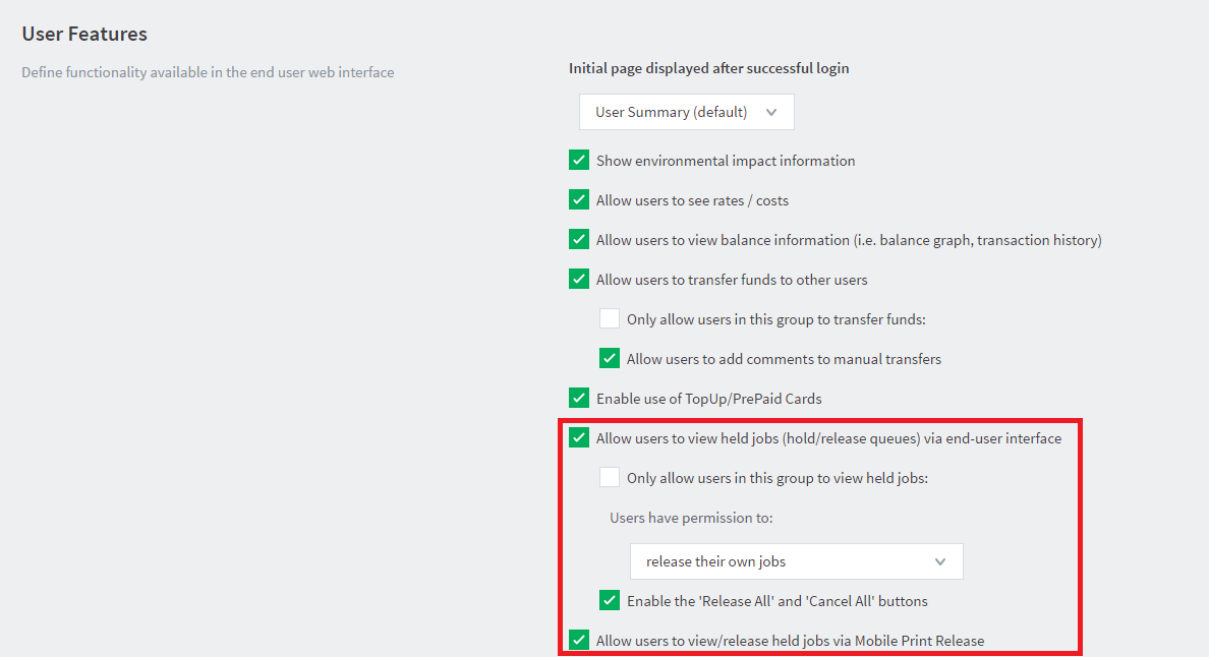
- are canceled after this Unreleased Held Jobs timeout (instead of the User Client timeout).

For more information see User Client and Assigning accounts to print jobs at the device.

4.8.4.4. Configuring the User web interface Release Station

1. Click the **Options** tab.

   The **General** page is displayed.



2. In the **User Features** area, complete the following options as appropriate:
   - **Allow users to view held jobs**—enables the **Jobs Pending Release** screen in the User interface. When this check box is cleared, no related functionality is available from the User interface.
   - **Only allow users in this group to view held jobs**—enables the **Jobs Pending Release** screen in the User interface for all users in a group.
   - **Users have permission to**—changes the type of jobs users can see and release. The available options are:
     - **view their own jobs only**—users see their own jobs that are held in the hold/release queue. Jobs printed by other users are not displayed. They can cancel their own jobs, but cannot release them. This is useful if users are required to be physically at the printer to release a job, where a standard Release Station is running.
     - **release their own jobs**—users can release or cancel their own jobs. Jobs printed by other users are not displayed.
     - **release any jobs (charged to their account)**—users can release or cancel any

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job that is being held, including jobs from other users. If a user releases a job that was sent by a different user, the releasing user is charged for the job. This option is equivalent to the `Release Any` mode used in Release Station and is ideal for authenticating printing in a unauthenticated environment.

- **Enable the 'Release All' and 'Cancel All' buttons**—allows users to release or cancel all held jobs by clicking one button. When this option is disabled, users must release or cancel jobs individually.

  This option is for the convenience of the users. It can save a user a few clicks when they want to release all their jobs at once. However, if the user is able to release jobs other than their own, a user might accidentally release (and be charged for) many other users' jobs.

3. Click **Apply**.

4.8.5. Prevent jobs being released to a printer in error

When a printer is in error, print jobs can get lost, refunds might be needed, and highly-sensitive documents could be compromised. Support demands can quickly escalate when you have to deal with frustrated users on top of resolving the error.

PaperCut NG/MF gives you the ability to choose whether or not users can release jobs to printers that are reporting an error. If you choose to block jobs from being released to a printer reporting an error, a message is displayed on the Release Station interface Held Jobs pageindicating that the job has not been released as well as directions for how to resolve the error. The user can then choose to either resolve the error or release to an alternative MFD in a Find-Me environment.

Not only do you have the control to block users releasing jobs when an error is reported, but when used in combination with the System Health Monitoring interface, you can be notified when printers go into error so you can resolve the issue quicker, further improving user experience.

Note:
Any print jobs that were released before the printer went into error will still be printed when the error is fixed.

By default, this functionality is not switched on. You can switch this on for:

- individual Standard Release Stations
- all web-based Release Station interfaces (including the Admin web interface Jobs Pending Release, User web interface Jobs Pending Release, Release Manager interface, and the Mobile Release interface. For more information about these interfaces, see Release Station interfaces).

Important:
The way in which you set this up for each type of Release Station (that is web-based, or standard Release Station interfaces) is different. If you switch on this functionality only for web-based Release Stations, it will be enabled in the Admin web interface Printers > Jobs

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Pending Release, User web interface > Jobs Pending Release, Release Manager interface, and the Mobile Release interface, but NOT in the Standard Release Station.

Important:
This feature is available using SNMPv1/v2c only.

4.8.5.1. Prevent jobs being released from a Standard Release Station when a printer is in error

Important:
This feature is available using SNMPv1/v2c only.

Note:
- For more information about blocking the release of jobs to a printer in error from a *web-based Release Station*, see Prevent jobs being released from a web-based Release Station when a printer is in error.
- You cannot block jobs from being released from a Fast Release terminal.

To block the release of jobs from a Standard Release Station when a printer is in error:

Step 1: Update the Release Station configuration file

Step 2: Copy the block release on printer setting to each Standard Release Station.

Step 3: (Optional) Change the default printer errors that will hold released print jobs.

Step 1: Update the Release Station configuration file

1. On the Application Server, open the following file in a text editor:
   `/<install folder>/release/config.properties`
2. Locate the following text:

   ```
   ##block-release-on-printer-error
   ##
   ##When enabled, the print job will not be released if the printer is in error. A message will be displayed in the
   ##interface stating that the job has not been released, and what action is required to fix the printer error.
   ##Options: Y/N
   ##Default: N
   ##
   block-release-on-printer-error=N
   ```
3. Change the value for `block-release-on-printer-error` to **Y**; then save the file.

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Step 2: Copy the block release on printer setting to each Standard Release Station

1. Copy the following block of text from the `config.properties` file.

   ```
   ##block-release-on-printer-error
   ##
   ##When enabled, the print job will not be released if the printer is in error. A message will be displayed in the
   ##interface stating that the job has not been released, and what action is required to fix the printer error.
   ##Options: Y/N
   ##Default: N
   ##
   block-release-on-printer-error=Y
   ```

2. Paste the text into the `config.properties` file on each Standard Release Station; then save the file.
3. Restart the Release Station.

Step 3: (Optional) Change the default printer errors that will hold released print jobs

PaperCut NG/MF gives you the flexibility to roll out the prevention of job release to printers in error in a manner that suits your unique requirements. For example, if there is always a supply of paper next to the printers, you might not want to block the release of jobs when a printer is out of paper.

By default, the following reported printer errors will block the release of jobs:

- PAPER_JAM
- PAPER_OUT
- PAPER_PROBLEM
- OUTPUT_BIN_FULL
- NOT_AVAILABLE
- OUT_OF_MEMORY
- OFFLINE
- DOOR_OPEN
- USER_INTERVENTION

We recommend using the default list of errors, but if you need to exclude any of these errors or add any additional errors, follow the steps below.

Note:
The selected printer errors apply to all printers. You cannot select the errors on a per

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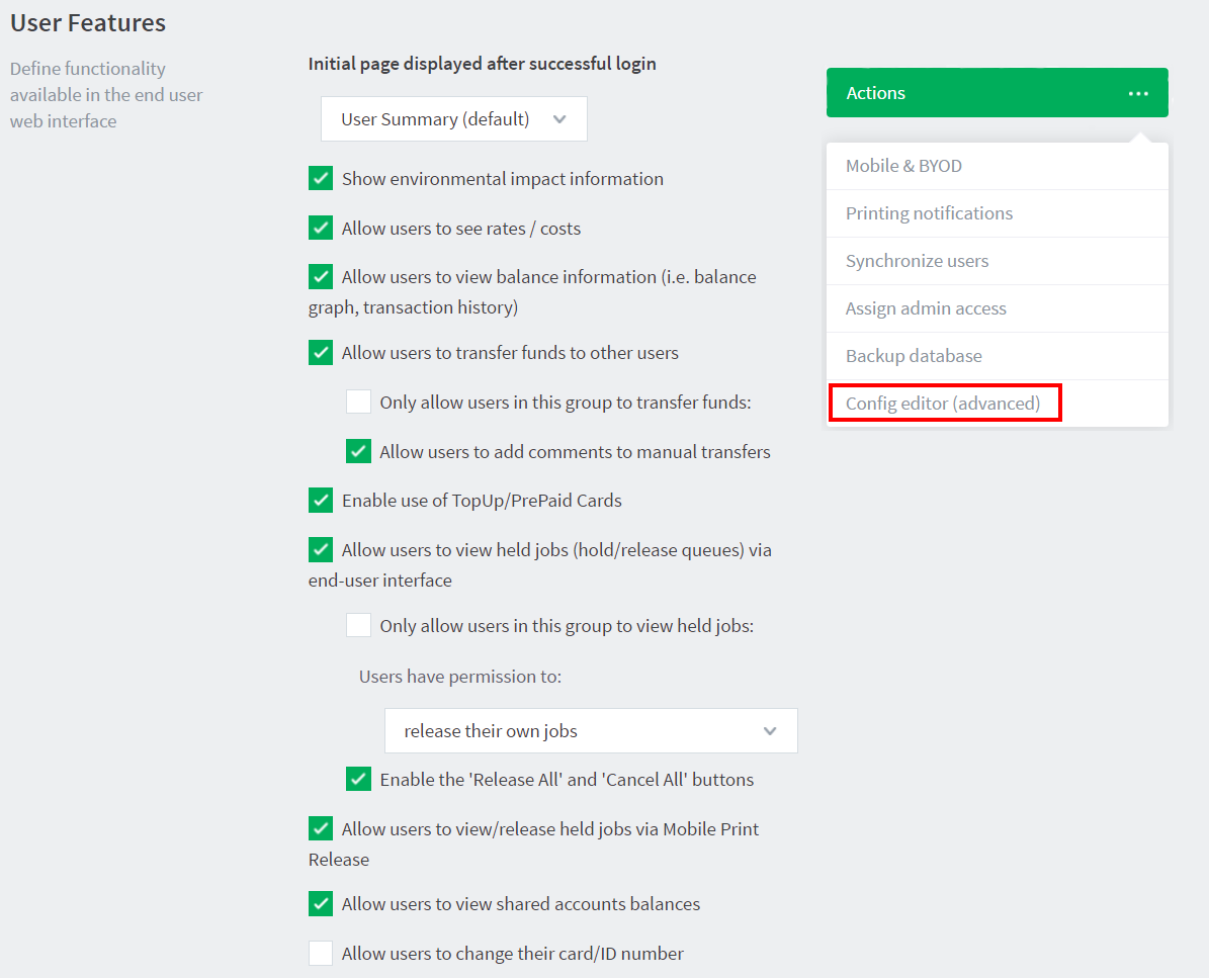
printer basis.

1. Click the **Options** tab.

   The **General** page is displayed.

2. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.

3. In **Quick find**, enter **release-station.block-release-on-printer-error.error-list**. The default value is `DEFAULT`, which includes all of the errors listed above. You can customize this list by either adding extra error types, or removing some of the default error types.by copying the list and then removing individual errors.

4. In **Value**:

   a. Paste the following full list of error types:

      PAPER_JAM, PAPER_OUT, PAPER_PROBLEM, OUTPUT_BIN_FULL, NOT_AVAILABLE, OUT_OF_MEMORY, OFFLINE, DOOR_OPEN, USER_INTERVENTION, ERROR, UNKNOWN,NO_TONER

   b. Delete any error types you do not want to use.

5. Click **Update**.

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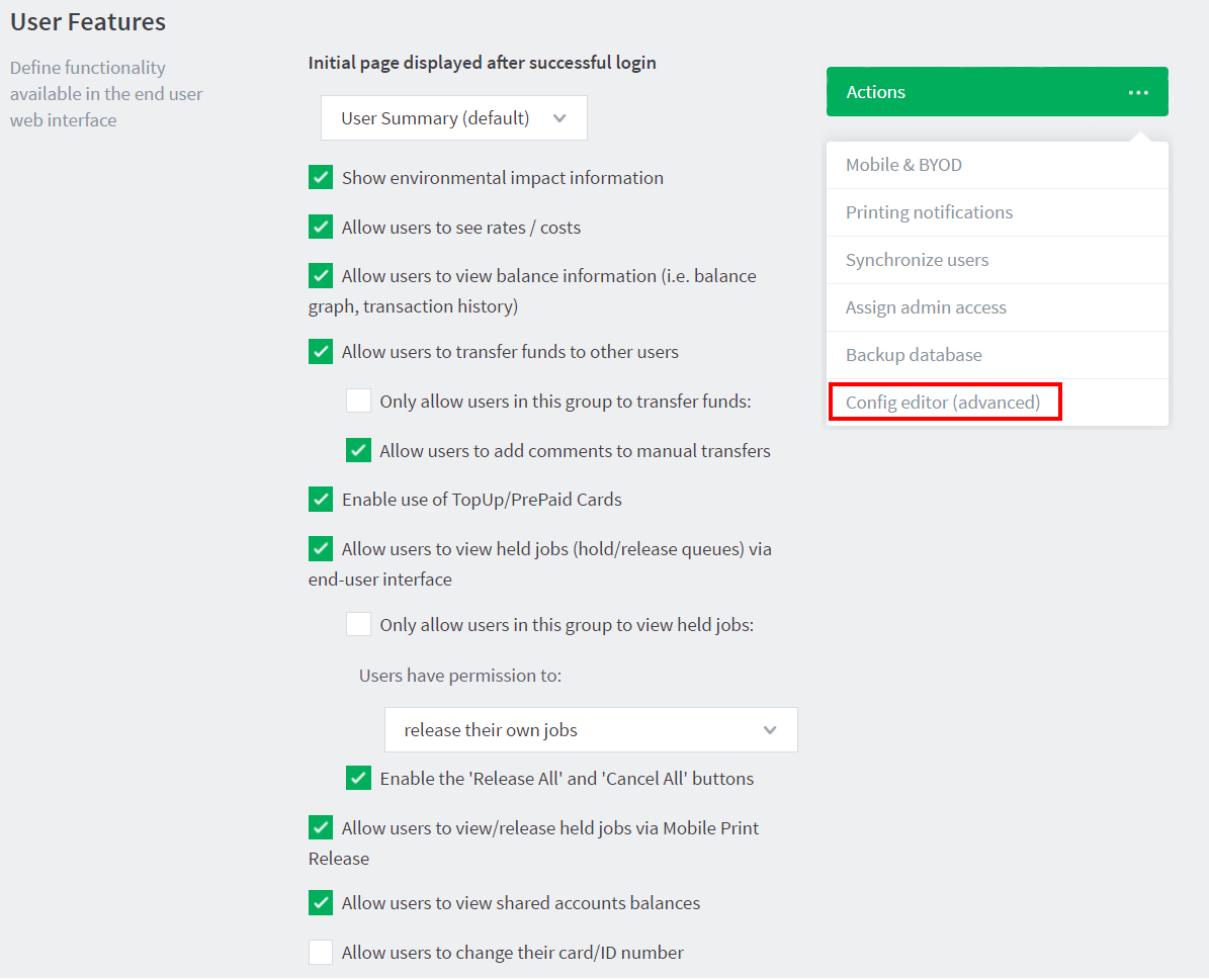
Note:
If you have hardware page count validation enabled, you must ensure the list of printer errors specified for **release-station.block-release-on-printer-error.error-list** does NOT include any errors excluded for hardware page count validation. For more information, see Block release of print jobs to printers in error with hardware check.

To reset the printer errors to the default list

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.
3. In **Quick find**, enter **release-station.block-release-on-printer-error.error-list**.
4. In **Value**, enter **DEFAULT**.
5. Click **Update**.
6. Release a test print job to a printer in error to check if there were no copy and paste mistakes.

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4.8.5.2. Prevent jobs being released from a web-based Release Station when a printer is in error

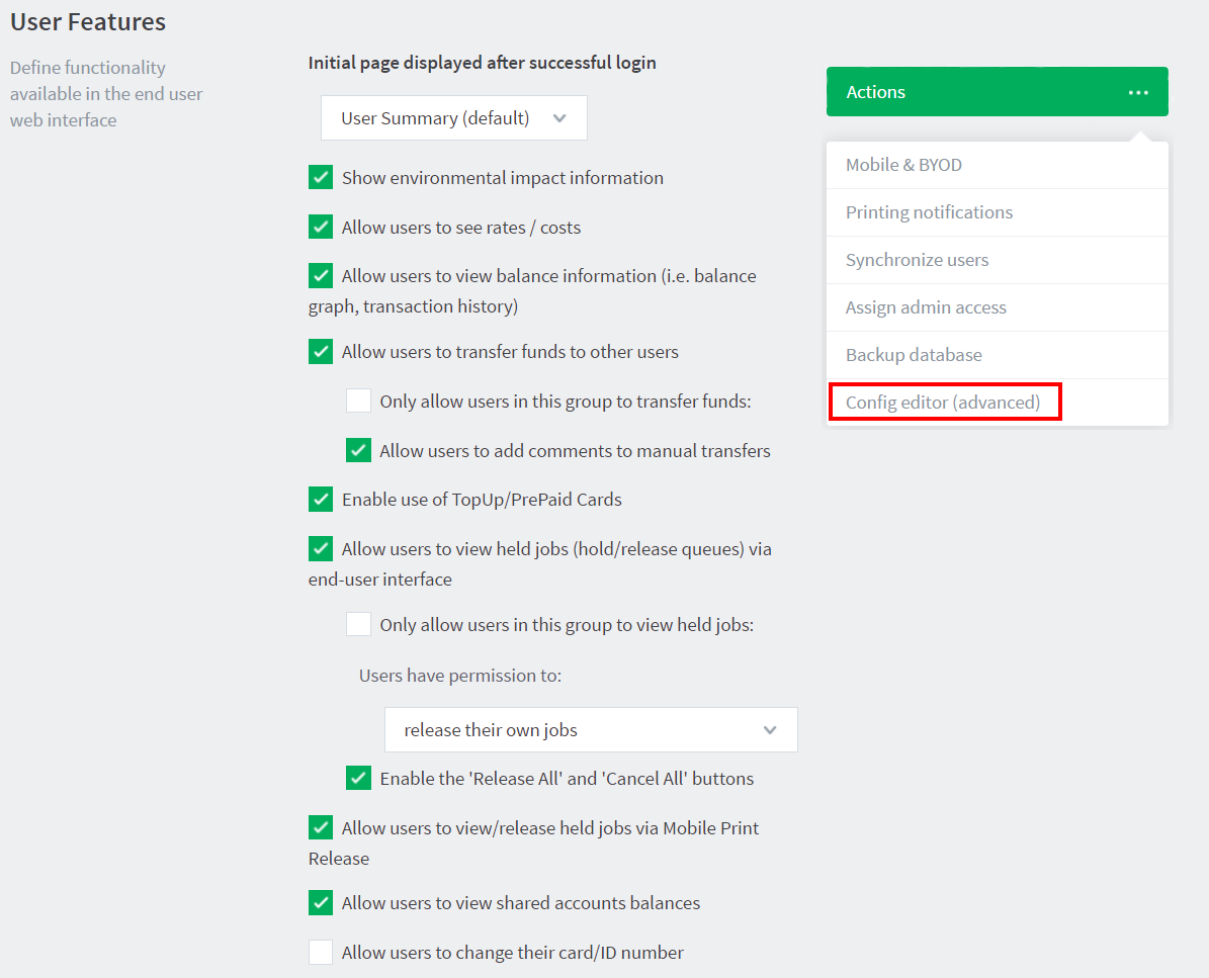
Important:
This feature is available using SNMPv1/v2c only.

Note:
- For information about blocking the release of jobs to a printer in error from a *Standard Release Station*, see Prevent jobs being released from a Standard Release Station when a printer is in error.
- You cannot block jobs from being released from a Fast Release terminal.

Step 1: Enable blocking jobs from being released to printers in error

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.



The **Config Editor** page is displayed.

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3. In **Quick find**, enter **release-station.block-web-release-on-printer-error**.
4. In **Value**, enter **Y**.
5. Click **Update**.

Step 2: (Optional) Change the default printer errors that will hold released print jobs

PaperCut NG/MF gives you the flexibility to roll out the prevention of job release to printers in error in a manner that suits your unique requirements. For example, if there is always a supply of paper next to the printers, you might not want to block the release of jobs when a printer is out of paper.

By default, the following reported printer errors will block the release of jobs:

- PAPER_JAM
- PAPER_OUT
- PAPER_PROBLEM
- OUTPUT_BIN_FULL
- NOT_AVAILABLE
- OUT_OF_MEMORY
- OFFLINE
- DOOR_OPEN
- USER_INTERVENTION

We recommend using the default list of errors, but if you need to exclude any of these errors or add any additional errors, follow the steps below.

Note:
The selected printer errors apply to all printers. You cannot select the errors on a per printer basis.

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.

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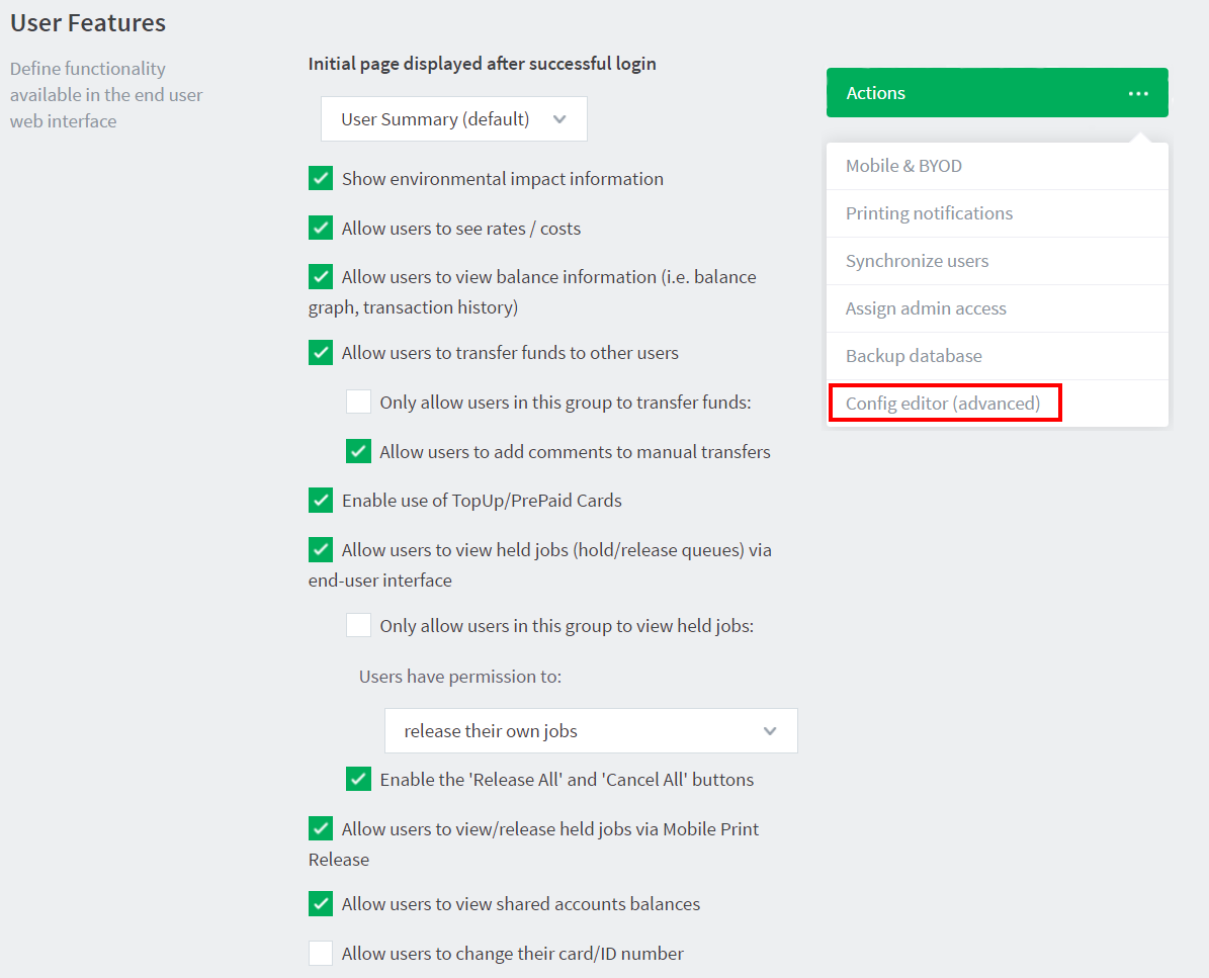

The **Config Editor** page is displayed.

3. In **Quick find**, enter **release-station.block-release-on-printer-error.error-list**. The default value is `DEFAULT`, which includes all of the errors listed above. You can customize this list by either adding extra error types, or removing some of the default error types.by copying the list and then removing individual errors.
4. In **Value**:
   a. Paste the following full list of error types:

      PAPER_JAM, PAPER_OUT, PAPER_PROBLEM, OUTPUT_BIN_FULL, NOT_AVAILABLE, OUT_OF_MEMORY, OFFLINE, DOOR_OPEN, USER_INTERVENTION, ERROR, UNKNOWN,NO_TONER

   b. Delete any error types you do not want to use.
5. Click **Update**.

Note:

If you have hardware page count validation enabled, you must ensure the list of printer errors specified for **release-station.block-release-on-printer-error.error-list** does NOT include any errors excluded for hardware page count validation. For more information, see Block release of print jobs to printers in error with hardware check.

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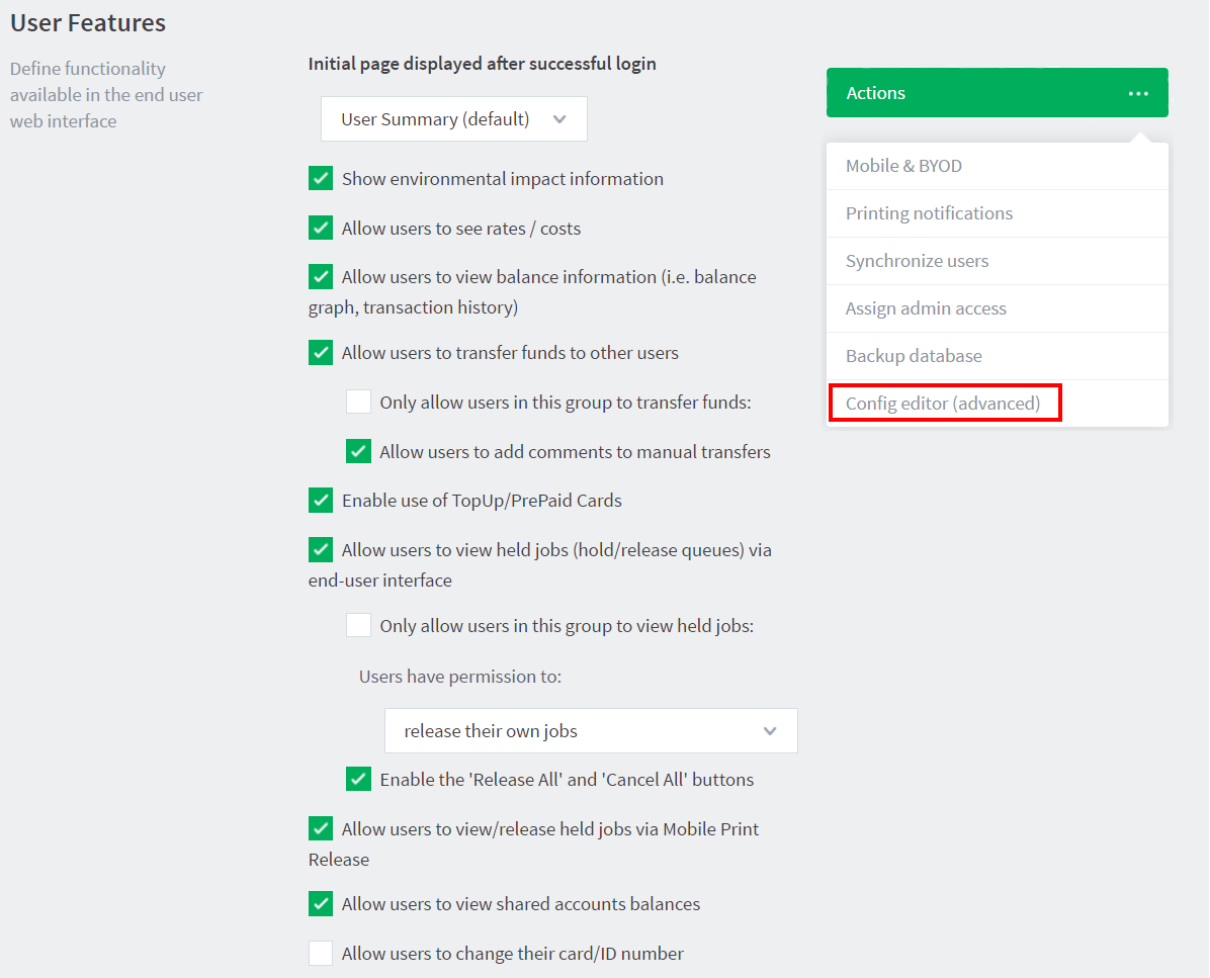
To reset the printer errors to the default list

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.
3. In **Quick find**, enter **release-station.block-release-on-printer-error.error-list**.
4. In **Value**, enter **DEFAULT**.
5. Click **Update**.
6. Release a test print job to a printer in error to check if there were no copy and paste mistakes.

4.8.6. Configure Mobile Print Release

Mobile Print Release configuration is detailed in the Mobile Print Release—releasing print jobs using your mobile device.

4.9. Mobile & BYOD printing

Bring Your Own Devices (BYOD) and mobile devices are now accepted as playing an essential role in many organizations and are here to stay. However, providing printing support across the varied

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devices available is challenging as there are many competing technologies with no standardization. Current BYOD printing solutions are problematic because:

- There are lots of choices
- They might not be compatible with your printing infrastructure or are difficult to integrate
- They keep changing

The key mobile print technologies supported by PaperCut NG/MF are:

- PaperCut NG/MF provided technologies
  - Mobility Print
  - Email to Print
  - Web Print (driver-less printing via a web browser)
- Native mobile print technologies
  - Google Cloud Print
  - iOS printing (iPad & iPhone)

PaperCut NG/MF supports your freedom to design your print network to suit your specific needs. Mobility Print is our newest solution and it will work for most organizations, however, each of our solutions meets a particular need giving you the choice. If using Web Print is the right answer for you, PaperCut will continue to directly integrate with this service. If your users are more comfortable with emailing, Email to Print will be the right choice. More options means a solution more likely to fit into your design.

At a technical level, it's important to understand your IT infrastructure requirements and the impact your choices have on your data and security policies. The following table will help you choose the right mobile and BYOD print strategy for your organization.

	Mobility Print	Web Print	Email to Print	Google Cloud Print	iOS Printing
Device OS	Windows, iOS, macOS, Chrome OS, Android, Linux	Windows, macOS, Linux	Windows, iOS, macOS, Chrome OS, Android	Windows, iOS, macOS, Chrome OS, Android, Linux	iOS, macOS
Print Server OS	Windows, macOS, Linux	Windows, macOS, Linux, Novell	Windows, macOS, Linux, Novell	Windows, macOS, Linux	macOS
Printer Accessibility	Local Network	Local Network Internet	Local Network Internet	Local Network Internet	Local Network Internet
Print Usability	Great ●●●	Limited ●○○	Limited ●○○	Good ●●○	Good ●●○
File Formats Supported	All	Default: XPS; Sandbox: PDF, IMG TXT, MS Office	Emailable File: PDF, IMG, TXT, MS Office	All	All
Setup Ease	Easy ●●●	●●● / ●○○	Limited ●○○	Complex ●○○	Moderate ●●○
Print Options	User selected	Pre-configured	Pre-configured	User selected	User selected
Print Restrictions	Group access	All	All	All	All

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Detailed information on each technology is provided in subsequent sections.

Table 47: Technology benefits

Technology	Benefit
Mobility Print	Mobility Print delivers network print services for iOS, Windows, macOS, Android, and Chrome devices across mixed fleet environments. It allows both managed and unmanaged devices to securely print to any printer on your network. Mobility Print is easy to set up and allows users to select from various print options and print all file types. It provides a native printing experience across all platforms.
Web Print (driver-less printing via a web browser)	A simple web based experience suitable for any BYOD laptop or Netbook users. End-users upload their document via a standard browser form. No special or client print driver setup required.
Email to Print	A lowest common denominator, and simplest solution that works on any device that's able to send email attachments. PDF, picture files or Microsoft Office document attachments are converted to print jobs.
Google Cloud Print (GCP)	GCP is Google's preferred mobile and Chromebook (Chrome OS) printing experience. It is the native printing experience for Android, Chromebooks, and Google applications on iOS. GCP is also an option for laptop users (when using the Chrome browser or a custom driver/service). All of PaperCut NG/MF's print management features integrate with GCP.
iOS printing (iPad & iPhone)	iOS provides users with a native and mature print experience on iPhones and iPads. Users can select various printing options, such as copies and grayscale, and can print from many applications without the need for additional software. Users can use PaperCut NG/MF via the Mobile web client app.

Common questions that come up during planning

Do I have to turn on all of these mobile solutions at once?

No. It's best to pick the ones that are suitable for your environment, and perform a controlled rollout of the new feature.

Email to Print works with all platforms. Why would I not just implement this?

This is a viable option and one that many organizations adopt. Our recommendation is to look at native print options first where possible. The benefit for native print options is that they offer a richer and more familiar end user experience.

What does it cost to add BYOD features to my PaperCut installation?

All BYOD features are included in the standard PaperCut license. There are no additional licensing costs.

I want to allow printing, but I don't allow mobile devices to connect to our network.

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Is there an option?

Google Cloud Print and Email to Print work without requiring users to connect to your network.

I want to use Google Cloud Print, but don't want users sending documents via Google's servers. Is there a version that I can run on my own server?

Although Google Cloud Print uses open protocols (and upcoming standards), Google is the only server provider we're aware of at the time of writing. By contrast, Email to Print involves documents routing via your email server, and Mobility Print iOS Printing (if you are supporting mainly Apple devices) is network-internal.

Does Mobility Print work at a site with a Site Server rather than an Application Server?

Yes! You can set up Mobility Print on any Windows secondary server, including sites with a Site Server instead of an Application Server. However, there must be a connection between the Site Server and the Application Server for Mobility Print to work.

4.9.1. Mobility Print

Download Mobility Print Server

Mobility Print simplifies the printing process for bring your own devices (BYOD) and other end-user managed devices, such as smartphones, tablets, laptops or Chromebooks. End users can quickly discover and set up printers on their own, regardless of their operating system or the brand of printer.

Mobility Print delivers secure network print services for iOS, Windows, macOS, Android, and Chrome devices. Mobility Print is easy to set up so users can print from their own devices without the need to reach out to a SysAdmin for help.

Mobility Print can scale from a small single subnet to the most complex enterprise network serving tens of thousands of users.

Set up Mobility Print

The Mobility Print Server is a separate application that can be launched from the PaperCut NG/MF Admin web interface. It is a separate installer because you can install Mobility Print on multiple servers. For more information see, Set up multiple Mobility Print Servers.

1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.
2. Scroll to the **Print Mobility** area.

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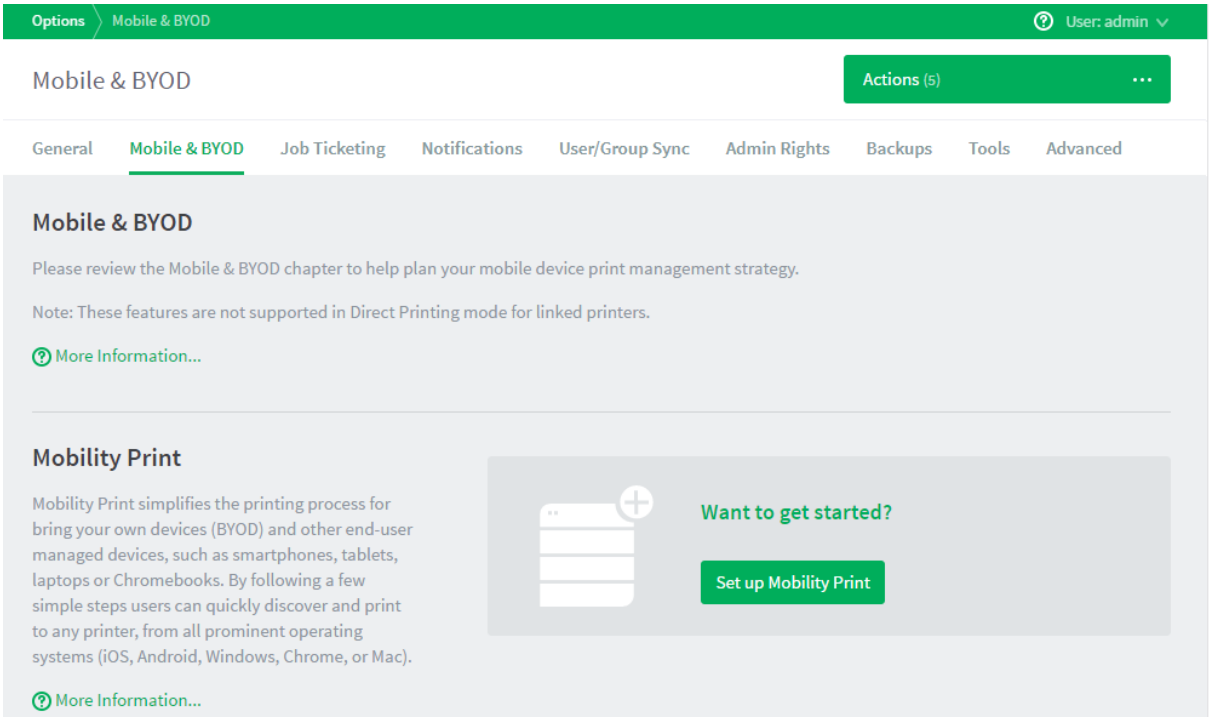


Before a Mobility Print server is set up, this area does not display any information, just a **Set up Mobility Print** button.

After you have set up a Mobility Print server, this area is where you can see information about each server. For more information, see View the Mobility Print server status.

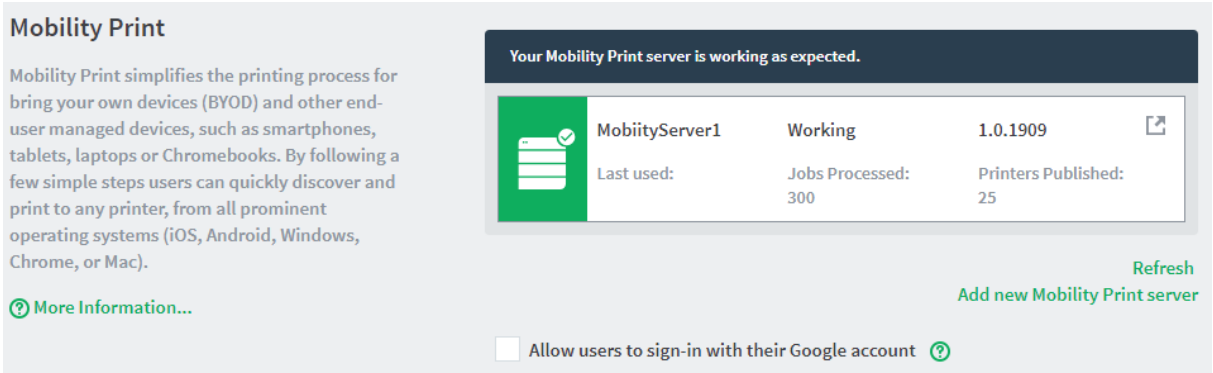
3. Click **Set up Mobility Print**.

   The Mobility Print Help Center is displayed.

4. Click **Set up Mobility Print** to see detailed instructions on how to set up a Mobility Print server.

   During the installation, all available printers will automatically detected and you'll be prompted to select which printers to make available to your users.

   When you have finished setting up your Mobility Print server, it is listed in the PaperCut NG/MF Admin web interface, on the **Mobile & BYOD** page.



5. If your users have a Google email account configured as their primary email address, select the **Allow users to sign-in with their Google account**.

Set up multiple Mobility Print servers

You can set up multiple Mobility Print servers. To set up additional Mobility Print servers:

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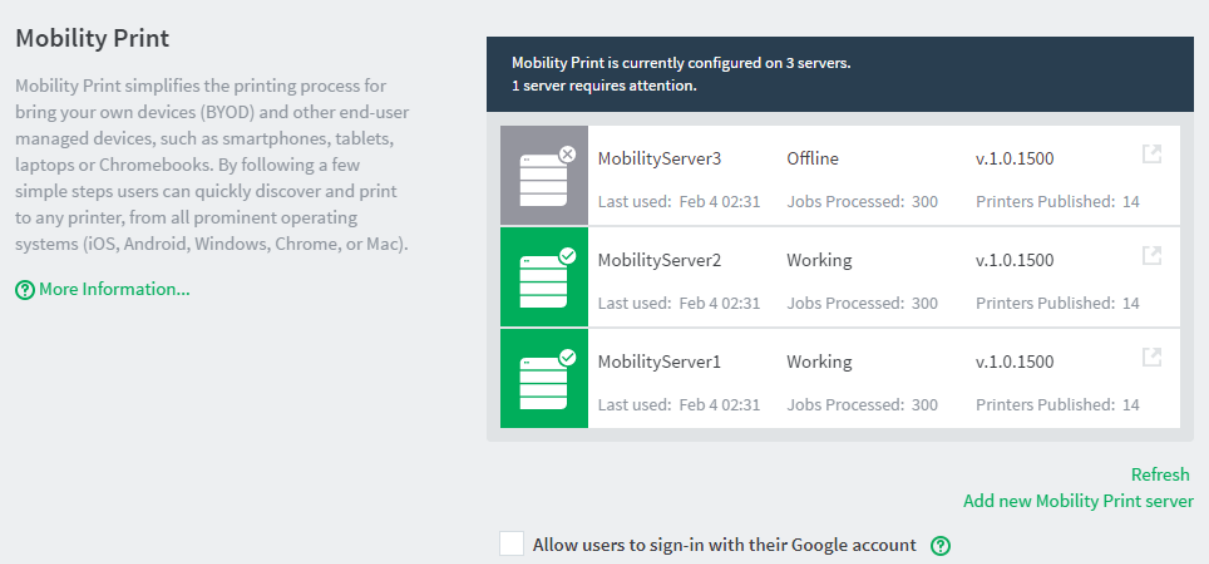
1. Copy the Mobility Print Server installer to the print server on which you want to install it.

   Important:
   - The print server must be set up as a secondary server (Print Provider installed).
   - Do not install Mobility Print on a DNS server.

2. Set up Mobility Print as described in The Mobility Print Help Center.

   All Mobility Print servers are listed in the PaperCut Admin web interface, on the **Mobile & BYOD** page.



Set up Mobility Print with Site Servers

If you have sites with Site Servers, you need to install Mobility Print on each print server at each site, including both the Application Server and the Site Servers. All of the printers at a site are published to devices at that site. For more information about how Mobility Print works when the Application Server is offline, see Offline operations.

View the Mobility Print server status

The PaperCut NG/MF Admin web interface displays the status of the Mobility Print servers. To view the status of the Mobility Print servers:

1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.

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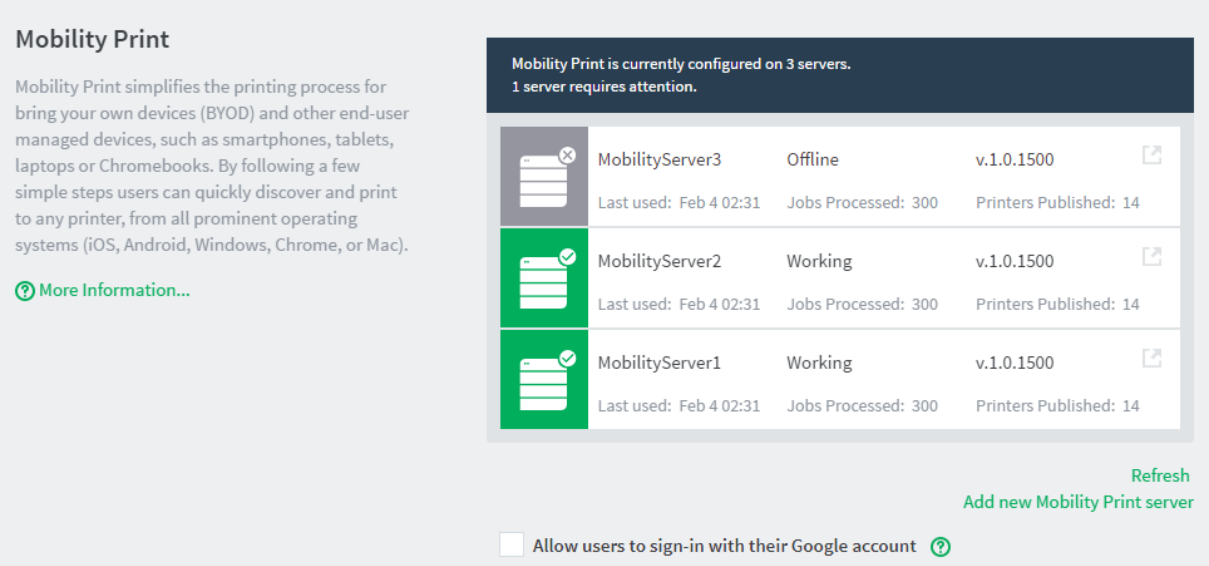
2. Scroll to the **Print Mobility** area.



The status of each Mobility Print server is listed. The following details are displayed:

- server name and status
- Mobility Print server version (make sure the version is the same for all servers)
- number of minutes since the server was last used
- number of jobs that have been processed by the server
- number of printers published by the server

If you have more than one Mobility Print server, only the first 10 are displayed on the page. To see the rest of the servers, scroll down the list. Servers that are in error are displayed first, followed by those that have a warning.

If a server is in error, click it in the list to open the Mobility Print Admin interface for more information about how to resolve the issue.

4.9.2. Google Cloud Print

4.9.2.1. Overview

Google Cloud Print (GCP) is a cloud based printing service from Google that lets people print anywhere from any device. Users are increasingly bringing their own mobile devices (BYOD) to the workplace and need a printing solution. Google Cloud Print provides a way to print from any mobile phone or tablet, running Android or iOS.

On its own, Google Cloud Print provides untracked printing only to Google Cloud Print enabled printers. Coupled with PaperCut, Google Cloud Print becomes a powerful mobile and BYOD printing solution for organizations of any size:

1. PaperCut tracks and controls Google Cloud Print jobs the same as any other PaperCut print job.
2. Google Cloud Print deployment is managed centrally, using the PaperCut Admin web interface to publish and deploy Google Cloud Print on selected printers.

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3. Rich enterprise PaperCut features such as Find-Me Printing (see Find-Me printing and printer load balancing) work alongside Google Cloud Print.
4. Use Google Cloud Print with your existing printers. With PaperCut you do not need to have Google Cloud Print Aware printers.

Supported environments

Note:
Google Cloud Print is not available on direct print queues. To offer this service to your users, set up a server queue for this device/printer.

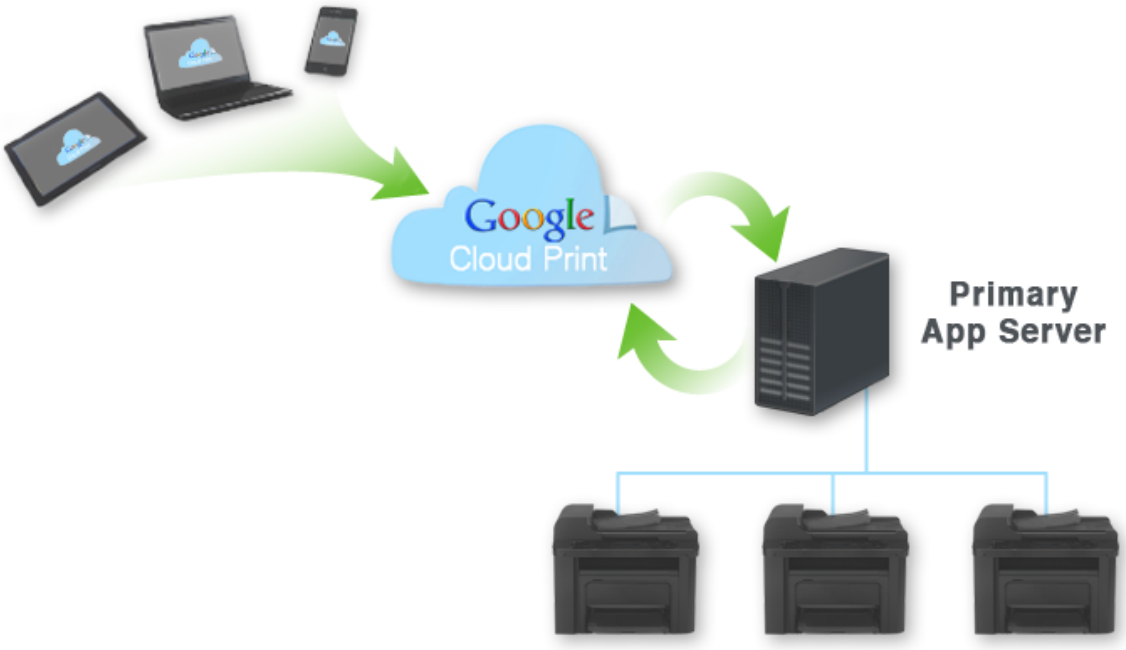
Users can print to Google Cloud Print in many ways:

1. From a Chrome browser (mobile or desktop) or Chromebook device
2. From an iOS or Android device with a Google Cloud Print enabling app installed
3. From Google applications, such as Drive, Gmail on all platforms
4. From a Windows or Mac desktop using the Cloud Printer app

A current list of compatible printing applications is available at https://www.-google.com/cloudprint/learn/apps.html.

How it works

Google Cloud Print and PaperCut



The diagram shows PaperCut as the bridge between an organization's printers and the Google Cloud Print service.

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1. PaperCut publishes selected printers to Google Cloud Print, making them available to Google Cloud Print user applications.
2. A mobile or desktop user prints a document or email using Google Cloud Print and selects a published printer.
3. PaperCut is notified and downloads the print job from the cloud.
4. PaperCut authenticates the user sending the job, then renders and spools the job to the specified printer.
5. PaperCut tracks and manages the print job in the same way as any normal print job.
6. PaperCut informs Google that the job is complete.

PaperCut takes care of publishing printers with Google, downloading jobs from the Google cloud, and managing the print work-flow. This makes it very easy to integrate Google Cloud Print into your existing print service.

Printers must be published to Google Cloud Print to make them available for users to print. Once Google Cloud Print is enabled, a single click is all that is needed to publish a printer. PaperCut manages any Google Cloud Print print jobs on behalf of the printer, and jobs are processed by the normal PaperCut work-flow.

Tip:
Some internet printers are marketed as Cloud Print Ready and can be connected directly to Google Cloud Print. However, if you directly connect a printer to Google Cloud Print, you cannot track and control print jobs from Google. We recommend you use PaperCut to connect your printers with Google Cloud Print. Cloud Print Ready printers are not required.

Requirements

The following requirements must be met for a successful Google Cloud Print integration:

1. Google Cloud Print is supported by PaperCut Print Providers running on Windows, Linux or Mac OS. Printers managed by a Novell print server cannot be published to Google Cloud Print.
2. The Print Provider software must be running a version of PaperCut that supports Google Cloud Print. Printers managed by an older version of the Print Provider cannot be published to Google Cloud Print.
3. Some printers and printer drivers do not respect all printer settings, such as color or grayscale, single sided or duplex as specified by the user in the Google Cloud Print User Client. If you observe issues in this area, try upgrading to the latest drivers, as Google is working with the printer manufacturers to resolve any such issues.
4. If users are configured with Account Selection options (or you have print scripts) that require user interaction that can ONLY be done via the Mobile web client (and cannot be done at the printing device), then running the Mobile web client is mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the Google Cloud Print job

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remains paused and does not appear on the printing device.
However, if users are configured with Account Selection options that require user interaction and this can be done BOTH via the Mobile web client AND at the printing device (the ability to assign accounts at the printing device is available), running the Mobile web client is not mandatory. It may be required if it is also being used for other purposes, besides Account Selection (such as, viewing current account balance, cached user comments, "low credit" warning messages, notifications about print policies, etc). For more information, see Mobile web client and Assigning accounts to print jobs at the device.

5. The PaperCut Application Server must be able to connect to the internet to communicate with Google Cloud Print servers. You might need to make ports or exceptions in firewalls or proxy servers. The full details are: TCP (HTTPS) port 443 connections to `https://www.googleapis.com/*`, `https://accounts.google.com/*` and `https://www.google.com/cloudprint/*`, as well as a TCP port 5222 (XMPP with STARTTLS) persistent connection to `talk.google.com`.
6. Configure Google Cloud Print to allow the use of a proxy server by setting the following config keys:

   `system.network-proxy-address`

   `system.network-proxy-port`

   `system.network-proxy-user`

   `system.network-proxy-password`

   For information about setting config keys, see Using the Advanced Config Editor.

4.9.2.2. User authentication and printer sharing with Google Cloud Print

Google Cloud Print uses Google's OAuth based system for identifying users and printers. These must be reconciled with the users and printers managed by PaperCut so that you can track Google Cloud Print jobs as normal PaperCut jobs and allocate them to the correct PaperCut user.

This integration between Google Cloud Print and PaperCut domains is managed as follows:

1. A Google account is set up for Google Cloud Print administration. PaperCut uses this account to publish printers and communicate with Google Cloud Print over the internet.
2. User's Google accounts are added to the PaperCut user database as secondary email addresses. This can be done either manually or via an automated email verification process.
3. Printers are published using PaperCut then shared with users using Google's sharing tools.

Each of these topics are covered in detail in the sections below:

Administrator authentication

You need a Google administrator account

When Google Cloud Print is enabled in the PaperCut Admin web interface, you are asked to authenticate with Google credentials. All printers are published by PaperCut using these credentials.

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The use of one set of credentials to register all printers is in line with Google's best practice recommendations.

You can use any Google account for this purpose, but we recommend that you set up a dedicated account for Google Cloud Print administration. A personal account is not recommended as it might be deleted if an employee changes role or leaves your organization.

When you first enable Google Cloud Print, you are asked to log in to your Google administrator account and authorize PaperCut to have access to the Google services needed to manage Cloud Print. After accepting this request, PaperCut permanently stores an access token, which means you do not need to authenticate each time.

User authentication

Each Google Cloud Print user must have a Google account associated with their PaperCut account.

Each Google Cloud Print user requires a Google account. This account might be self-registered, or provided to the user under a Google Apps managed environment.

PaperCut must map each user's Google account used for cloud printing to a PaperCut user. For example, Google might know a user as joeadams@gmail.com, whereas the same user in PaperCut might be adamsj with an email joe.adams@myorg.com.

As with this scenario, PaperCut allows multiple email addresses to be associated with a user. Each user can have one primary email address and multiple secondary email addresses. All addresses must be unique across the system.

PaperCut provides two ways to populate the secondary emails on behalf of each user. You should select which method is best for your organization:

1. Manual configuration. An administrator can add and remove secondary email addresses on behalf of a user in the **Users** tab of the PaperCut Admin web interface.
2. Self registration through automatic email verification.

When a print job arrives from Google, PaperCut finds the user with a primary or secondary email address matching the address of the sender. The matching user is then associated with the incoming print job.

If no matching user is found, you can choose to have PaperCut cancel the job, or hold the job and perform automatic email verification. Cancelling the job is the appropriate response if you are choosing to manually configure the secondary email addresses.

Automatic email verification works as follows:

1. When a job arrives from an unknown user, the job is held and an email is sent to the originating Google email address asking for the user to click a link to validate their account.
2. The link takes the user to the login screen for the PaperCut web interface.
3. The user logs into their PaperCut account and the Google address is automatically associated with this account.
4. The job proceeds to print as the verified PaperCut user.

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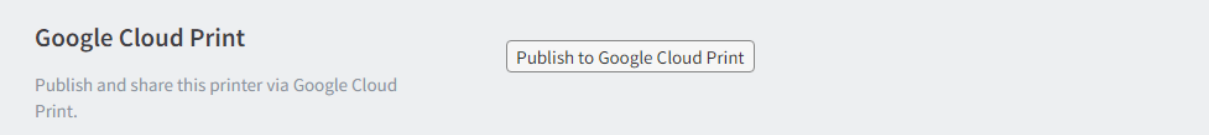
Publishing and sharing printers

Each printer must be published and Shared with end users.

Printers are *published* to Google Cloud Print in order to make them available for Cloud printing. By default, printers managed by PaperCut are not published to Google Cloud Print. To publish a printer after enabling Google Cloud Print:

1. On the **Printer Details** page, click **Publish to Google Cloud Print**.



PaperCut publishes printers by using your chosen Google administrator account. By default only that account has access to the printers for printing. To make printers available to your Google Cloud Print users, you must *share* your printers.

Printer sharing is a Google feature and is administered in Google's Cloud Print web interface (https://www.google.com/cloudprint#printers), not in PaperCut.

You can share printers with individual users by specifying a list of Google email addresses. You can also share printers with a Google Group. For example, you could set up a Google Group for Students and another group for Teachers and share printers to those groups. Users can self-register with the appropriate Google Groups, but you might need to moderate these registrations. Google provides mechanisms for people to request membership to a Google Group and for a moderator to accept or reject those requests.

Tip:

When a printer is shared with a user, the user must accept the sharing invitation before they are able to use the printer for printing. This is done within Google's web interface and at the time of writing is not available on some mobile devices. We recommend you test the sharing of printers at your site and provide users with any guidance needed to ensure they are able to successfully accept printers shared with them. People might need to use a computer browser to accept the sharing invitation.

4.9.2.3. Setting up Google Cloud Print

Setting up Google Cloud Print in PaperCut is straightforward. First you must create an administrator Google account (see Administrator Authentication). Then:

1. Enable Google Cloud Print in **Options > Mobile & BYOD > Google Cloud Print** .
2. Publish printers to Google Cloud Print and share with your users.
3. Test your major user printer scenarios on a range of devices and printers.

These steps are covered in detail below:

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Enabling and Configuring Google Cloud Print

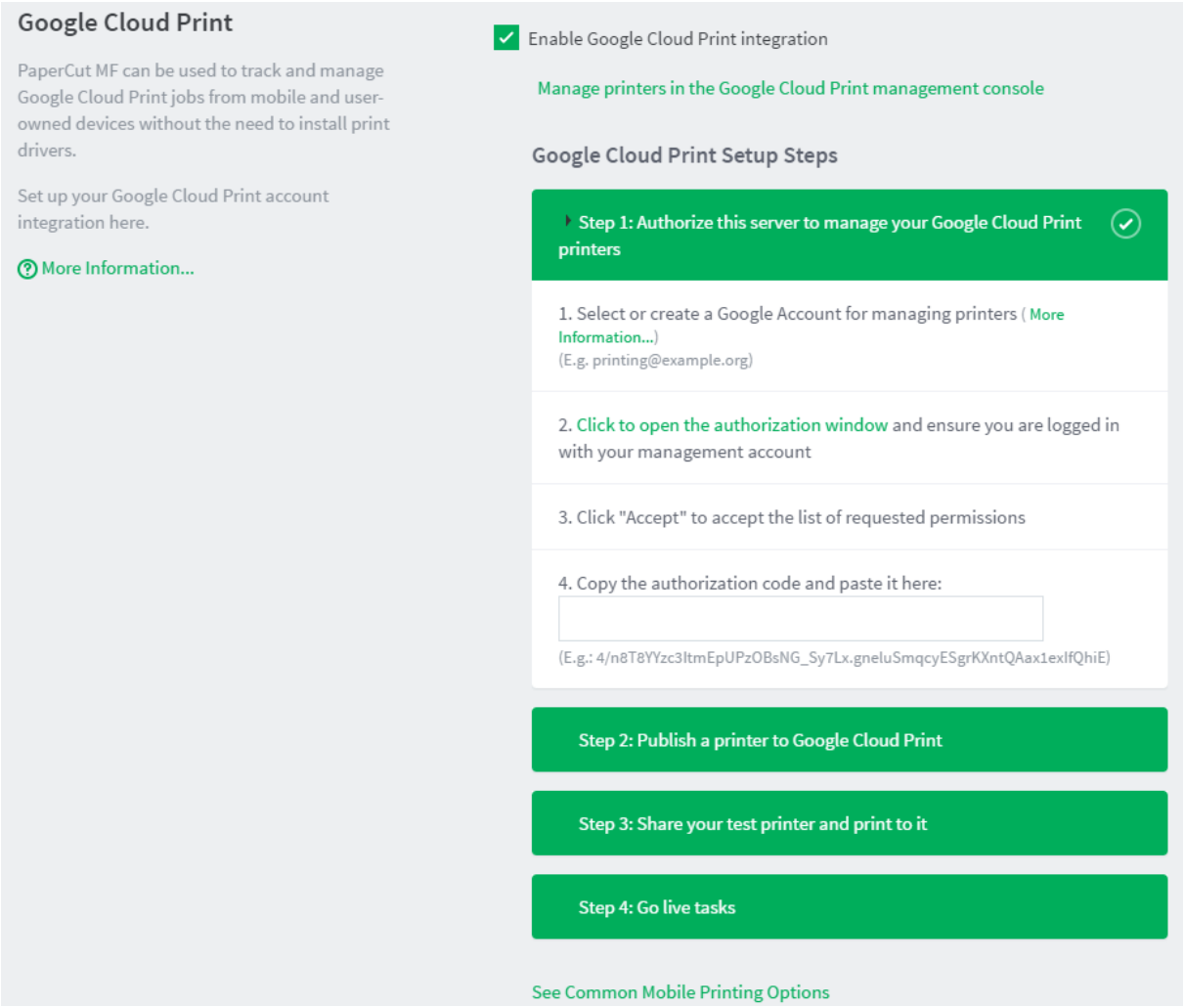
1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.

2. In the **Google Cloud Print** area, select the **Enable Google Cloud Print integration** check box.

   A wizard is displayed to lead you through the process.

Google Cloud PrintSetup Wizard



The first step in the process is to authorize PaperCut to use your administrator Google account. (See Administrator Authentication.) Give PaperCut permission to use your Google account to obtain an authorization code. The authorization code is needed for PaperCut to use your administrator account to manage your printers with Google Cloud Print on your behalf.

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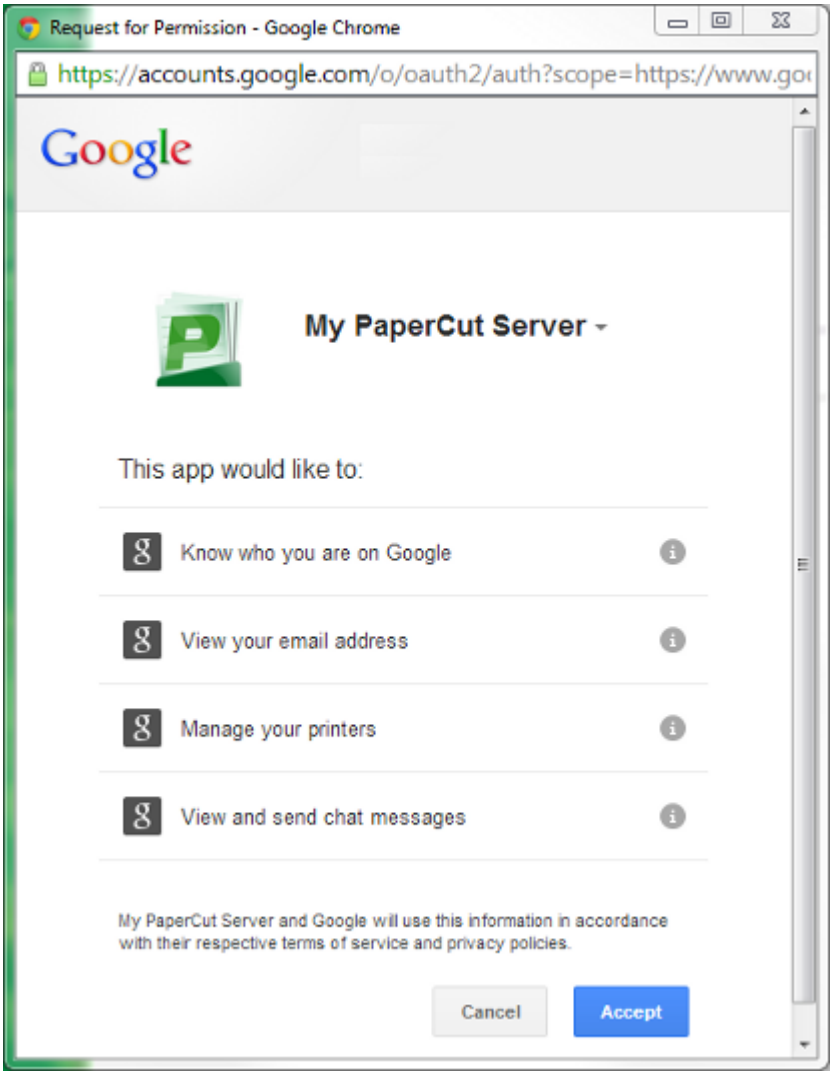
Google Request for Permissions Window



Note:
You must grant permission for *your* PaperCut Application Server to use your administrator Google account to work with Google Cloud Print on your behalf. You are *not* granting permission for any third party, including PaperCut Software, to access your account. Your authorization only applies to your PaperCut Application Server instance.

Once your Google Cloud Print administrator account is authorized, you can publish a printer to Google Cloud Print and test. Printers are published using a button on the **Printer Details** page. See Publishing Printers to Google Cloud Print via PaperCut for more information.

There are several choices to make on how PaperCut process Google Cloud Print jobs with respect to user authentication and client popup reminders.

1. *Configure what PaperCut should do when a job arrives from an unknown email address.*

   PaperCut searches the user database for the originating email address of each job. If the email address is not found, you can choose to have PaperCut cancel the job or hold the job

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and email the user with instructions for verifying their Google email address. (See User Authentication.)

You might want to cancel the job if you have decided to manually configure the user Google email addresses on the Users page.

2. *Choose whether to send a reminder email for jobs requiring a popup response.* (See Mobile web client.)

Publishing Printers to Google Cloud Print via PaperCut

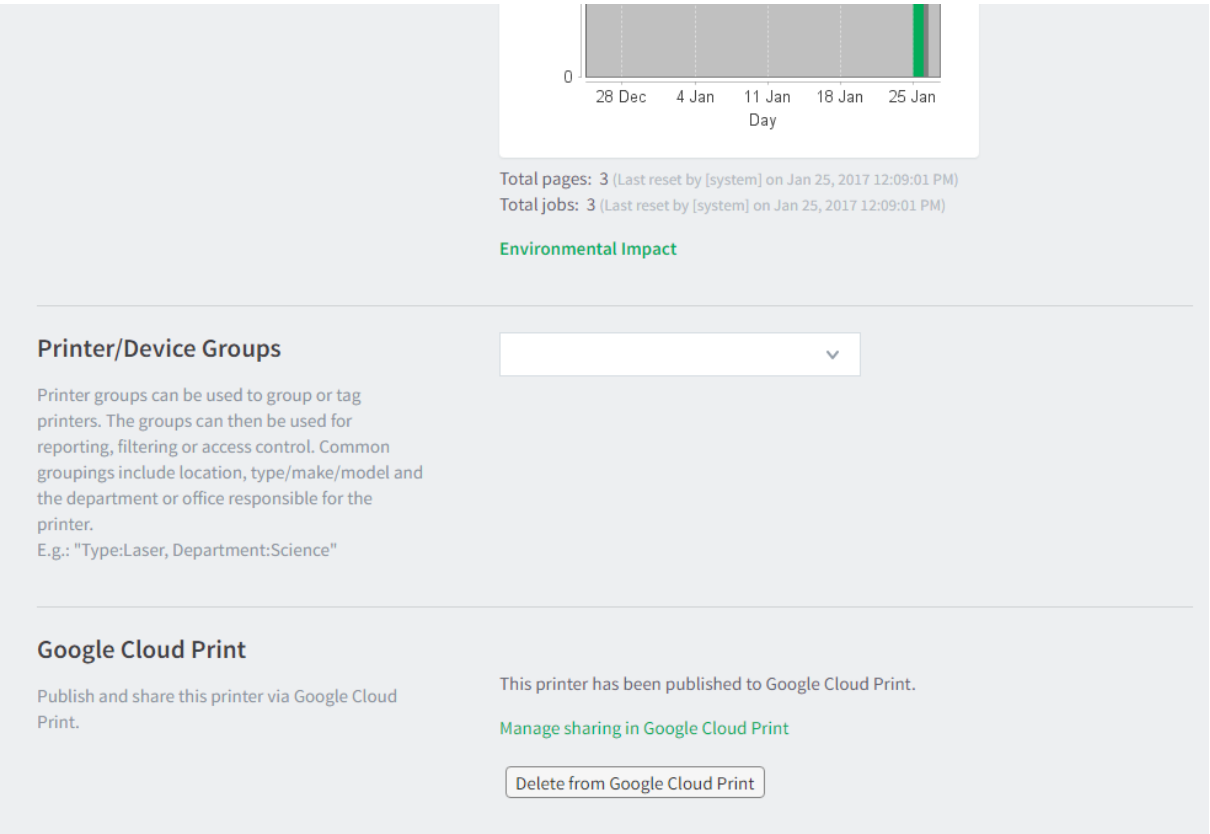
Before a printer can be used with Google Cloud Print it must be published to Google and shared with users. Publishing a printer to Google Cloud Print makes the printer known to Google and enable access from Google's Google Cloud Print user interfaces.

1. Printers are published to Google Cloud Print on the printer details page for a selected printer in the Printers tab. Click **Publish to Google Cloud Print** to publish a printer. The printer remains published indefinitely.

   If you do not see a Google Cloud Print area on the printer details page, check that Google Cloud Print is enabled under **Options > Mobile & BYOD > Google Cloud Print** .

2. Once published, you must *share* your printer with users, using your Google administrator account to log in to the Google Cloud Print printer management page: https://www.google.com/cloudprint#printers

Printer published to Google Cloud Print



You can unpublish a printer by clicking **Delete from Google Cloud Print**.

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Sharing a printer sends a *sharing invitation* to each invited user. Each user must respond by accepting the invitation by logging in with their own Google account to the Google Cloud Print printer management page: https://www.google.com/cloudprint#printers

The printer sharing process is provided by Google as their solution for printer security and access control. This is not included in this manual as Google's interfaces for sharing printers are likely to change. For example, at the time of writing, the sharing interfaces require a computer or Chromebook browser.

You should test sending and accepting printer sharing invitations at your site, using your targeted mobile devices, and document any required steps for your users.

Tip:

You can list only those printers published or not published to Google Cloud Print using a filter:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Click **[edit]** to edit the filter.
3. From Published to Google Cloud Print select Yes or No; then click **Apply Filter**.

Testing Google Cloud Print

You should test the operation of Google Cloud Print before rolling out the system to your users. Your test plan should factor in the following items:

1. Sharing and accepting printer sharing invitations. Share your printers and test using your targeted mobile devices and applications.
2. Printing to a range of printers, page sizes, duplex and color settings.
3. Automatic email verification (if used). Send a print job from an unknown Google account and check that a verification email is sent. Follow the steps in the email to associate the account with a PaperCut user and print the job.
4. Tracking and control of Google Cloud Print jobs. Verify that print jobs from Google Cloud Print are associated with the correct user and are being tracked in the print log.

You should take into account the requirements listed in Requirements when creating your test plan.

4.9.2.4. Troubleshooting Google Cloud Print Problems

Troubleshooting Printer Publishing Problems

Some printers might not be able to successfully publish to Google Cloud Print. There are several possible causes:

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1. *The PaperCut secondary print server is running on Novell*

   For various technical reasons, PaperCut does not currently support Google Cloud Print on Novell print servers.

2. *The secondary print server is a Windows desktop machine*

   When running the Print Provider on a Windows desktop, PaperCut disables by default the server events needed for Google Cloud Print operation. This is done for performance reasons for sites running many desktop Print Providers.

   You can enable server events on a desktop Print Provider machine by adding the following line to the print-provider.conf file and restarting the Print Provider service:

   ```
   ServerEventsEnableOnDesktops=on
   ```

   There might be performance implications if this change is made on a large number of desktops.

3. *The secondary print server is running an older version of PaperCut*

   The Print Provider must be running a version of PaperCut that supports Google Cloud Print.

   Google Cloud Print support was first introduced in PaperCut release 13.5.

4. *A connection from the Application Server to the Internet is unavailable*

   The Application Server must be connected to the Internet to publish printers and process Google Cloud Print jobs.

5. *Google access has been revoked*

   This might occur if the Google administrator account used to publish printers has been deleted or PaperCut's access to this account has been revoked. To recover from this scenario, disable and re-enable Google Cloud Print in **Options > Mobile & BYOD > Google Cloud Print** and re-publish and share your printers.

Troubleshooting printing problems

Print jobs printed to Google Cloud Print might not print correctly. If this occurs, check the **App Log** for error or warning messages. The user should also check Google's print job page https://www.google.com/cloudprint#jobs for job status information. If the job was submitted, but has not printed, some causes are listed below:

1. *The job is from an unknown user*

   PaperCut must map the Google email originating the job with a PaperCut user. If no user is matched, the job is canceled. See Enabling and Configuring Google Cloud Print. To resolve, manually add the Google email as a user's secondary email address in the **User Details** page. Or you can enable automatic email verification.

2. *The job requires a popup response and no response received*

   If a job requires popup response, for example, to select an account to charge, and no response is received, PaperCut waits up to 10 minutes before cancelling the job. Users must respond using the Mobile web client - see Mobile web client. PaperCut sends a reminder email to use the Mobile web client. If a user has not received this email, check that the reminder setting is on, and that the email is not being diverted to the user's spam/junk folder.

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3. *The print driver is not capable of rendering the job*

   When printing using CUPS (Linux and Mac Print Providers), the print driver is responsible for rendering the PDF document from Google Cloud Print. Some drivers, such as a generic Postscript driver, might not be able to render a PDF document. If you are using a generic Postscript driver as pass-through, you might need to set up a separate queue for Google Cloud Print using the proper printer driver for your printer.

4. *The print driver does not perform as expected*

   Some print drivers might not fully comply with the print ticket from Google Cloud Print. This can result in the printed output not respecting the requested paper size, color or duplex setting. Google is working with printer manufacturers to resolve such problems. The first course of action is to update the printer driver to the latest version to see if the problem has been resolved. Otherwise, you can report the issue to our support team.

   If the PaperCut page counts or color page counts are incorrect, contact our support team.

5. *The PaperCut Application Server has lost connection with the Internet*

   The Application Server must be connected to the Internet to publish printers and process Google Cloud Print jobs.

6. *The printer or secondary print server is down*

   A printer can still appear available in Google Cloud Print even if the printer is currently down or the Print Provider managing the printer is unavailable. The job will print when the Print Provider is brought back up.

4.9.3. Email to Print

Email to Print allows users to print by emailing their documents to a special address. No client software or drivers are required, providing a simple way for your organization to print from any device that can send an email.

Email to Print is part of a collection of solutions to manage mobile and BYOD printing. For more information see Mobile & BYOD printing.

Note:
Email to Print is not available on direct print queues. To offer this service to your users, set up a server queue for this device/printer.

4.9.3.1. How does it work?

- Each printer has a unique email address e.g.`printing@example.org`
- Users compose an email, attach printable document(s), and email to the printer's address.
- PaperCut receives the email and prints the documents on behalf of the user.

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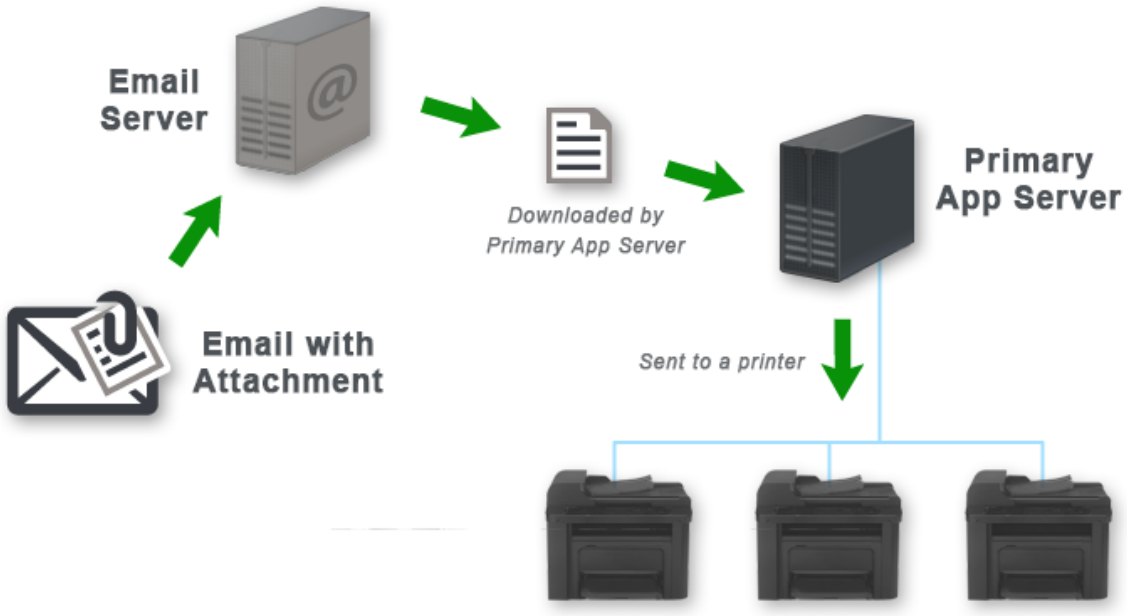

Figure 48: workflow

4.9.3.2. Solution summary

- Easy to use, easy to set up.
- Works with nearly any device (anything that can send an email with an attachment).
- Supports PDF and picture file attachments. Additionally supports Microsoft Office attachments when a Web Print Sandbox is configured.
- All print options are locked to the OS print queue defaults.

Tip:

- You can set up multiple OS print queues for the one printer with different default settings e.g. one for single-sided, one for double-sided.
- You can use Email to Print in conjunction with Find-Me printing and printer load balancing. Rather than one email address per printer, you can use a single address for multiple printers. Users could then release their jobs at the printer of their choice.
- You can use Email to Print in conjunction with PaperCut internal users. This allows users without a domain account to register their own account with an email address. For more information, see Internal users (users managed by PaperCut NG/MF) for details.

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You can also use Email to Print to create a guest printing solution for visitors and guests with BYOD devices. See Anonymous guest printing for details.

4.9.3.3. Before you start: aliases

When processing Email to Print jobs, PaperCut connects to a single mailbox on a mail server. The mailbox receives the emails of all printers, where each printer has its own email alias. This is achieved in one of three possible ways:

1. **Dynamic aliases**—Many email servers support the dynamic alias "+ syntax" e.g. `printing+library@example.com` gets delivered to the `printing` mailbox. This is the simplest option to set up and maintain. However, removing or renaming a dynamic alias doesn't stop emails for the now defunct printer name. Also, the email addresses are arguably not as nice to look at!
2. **Server-side aliases**—The email address for each printer is an email alias of the mailbox e.g. `library@example.org` is an alias of `printing@example.org`. This is the recommended approach when using Google Apps (gmail) and Outlook.com.
3. **Email forwarding**—If options 1 and 2 are not possible with your email server, another option is to configure one mailbox per printer. Each mailbox could then forward all mail to the "main" mailbox e.g. `library@example.org` is a mailbox that forwards to `printing@example.org`.

Pick a strategy that suits your environment and you are ready to start.

Important:
The Microsoft Exchange email server (including Office 365) does not support "aliasing" in Email to Print because it replaces the alias address with the destination address.For more information, see Email to Print with Microsoft Exchange and Email Aliases.

4.9.3.4. Prepare the PaperCut server

1. Configure your SMTP server details in PaperCut at **Options > Notifications** .

   This is required so PaperCut can respond to user emails e.g. to let them know their job has been received.

   Tip:
   When configuring your SMTP settings, use a real, attended **From address**. Users can reply to this address to ask questions. They will have a better experience if they receive a reply.

2. Configure a user facing server address at **Options > Advanced > Server Address >**

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Server address presented to users .

Email to Print sends emails to users that include links to the PaperCut server, so it needs to know the server's network address. If you want to support Email to Print from the internet, this address needs to resolve both internally and externally to your network i.e. a fully qualified public DNS name.

For more details see Change the server address presented to users.

4.9.3.5. Setting up a mailbox

1. Set up a new mailbox on your email server. Email to Print supports mailboxes with either POP3 or IMAP protocols.

   This mailbox receives all emails for Email to Print. Each email is deleted from the email server after it is processed, so the storage requirements should not be large.

   Tip:
   If you are using Gmail to host your mailbox, there are default actions for emails deleted. These actions are based on the protocol being used. POP3 keeps a copy of the email in the Inbox, while IMAP archives it. If you prefer a different behavior, you can log in to the Gmail account and change the following settings: **Settings > Forwarding and POP/IMAP > POP Download > When messages are accessed with POP** - `Delete`, `Mark` or `Archive` [your org's] copy **Settings > Forwarding and POP/IMAP > IMAP Access > When a message is marked as deleted and expunged from the last visible IMAP folder** - `Archive`, `Move to the Bin` or `Delete forever`

   Important:
   Do not use your personal email address for testing, unless you want to print every PDF ever sent to you! One of our developers did this. It wasn't pretty.

2. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.

3. In the **Email to Print** area, select the **Enable Email to Print** check box.
4. Configure the **Receiving Email Account / Mailbox** area according to your mail server and newly created mailbox. Note that with some email servers, the **Username** might not be in the email address format.

The remaining settings are discussed later in this section. The default values will suffice for testing.

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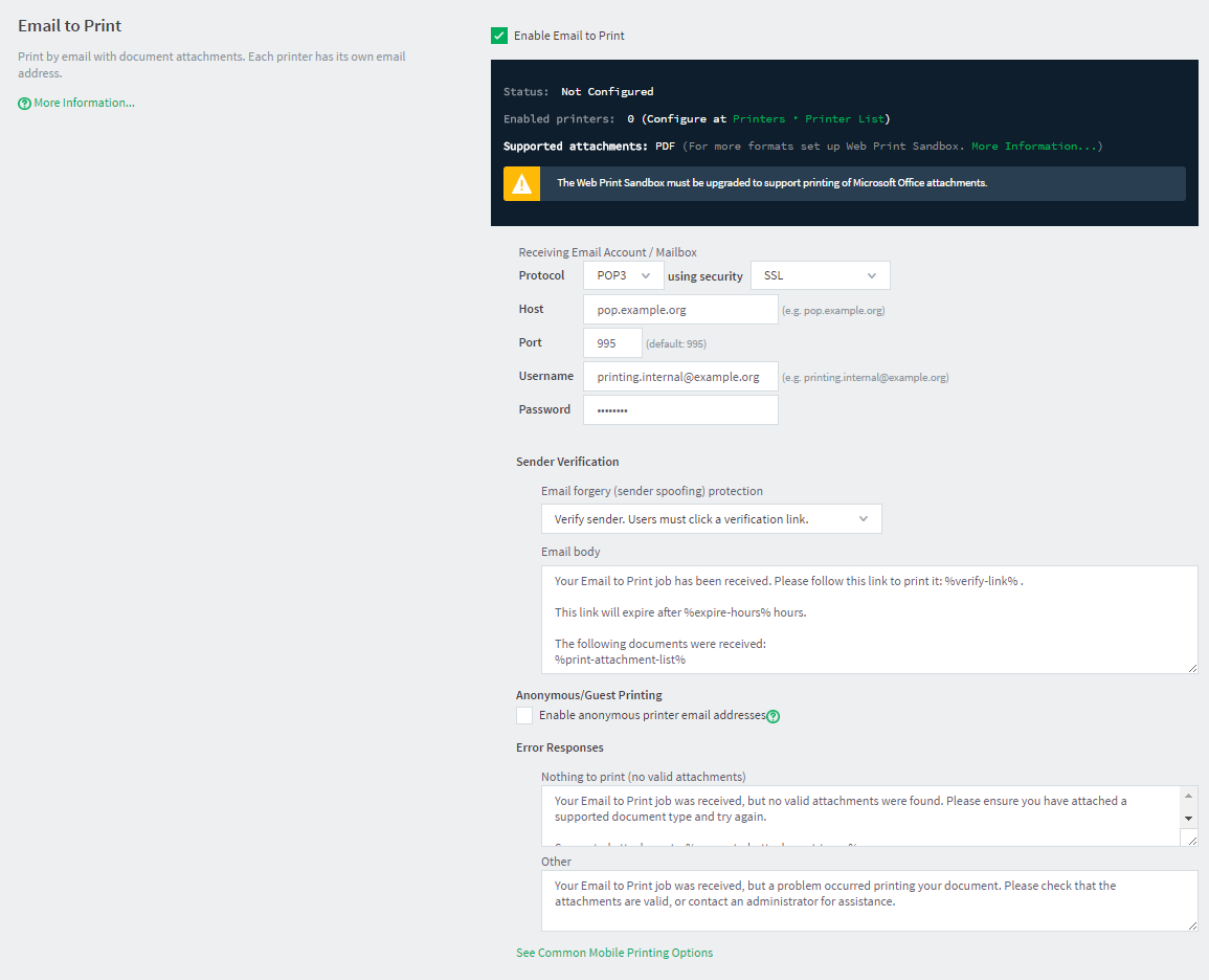

4.9.3.6. Testing Email to Print

1. Click the **Printers** tab.

   The **Printer List** page is displayed.

2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.

3. In the **Email to Print** area, give the printer a unique and simple email alias.
4. Depending on your chosen alias type, configure the email server to point the new email alias to the Email to Print mailbox (see Before You Start: Aliases).
5. Pick a test user account from the **Users** tab and ensure it has an associated email address you can send an email from (**Primary email** or **Other emails**). If you don't have a test email account, you can temporarily assign your own email address to the test user.
6. From the test user's email address, compose a new email, attach a PDF, and send it to the printer's email address (the alias, not the mailbox).
7. In a short time you should receive a verification email (see Customization). Click the link in this email. Your job should now print!

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> **Note:**
> Jobs can be held pending further action when features, such as Account selection or Secure print release are in effect. You need to address this as per a normal print job. See Interaction with other features for details.

8. Check your job printed successfully, and inspect the print log at **Printers > Job Log** .

If you want to support Microsoft Office document attachments in addition to PDF and picture files, see Adding support for Microsoft Office Documents.

Continue with Customization below to tweak settings to your site's needs.

4.9.3.7. Customization

The following customization settings are in **Options > Mobile & BYOD > Email to Print**.

Sender verification

This option controls how PaperCut responds when it receives an Email to Print job from a user.

The default setting, **Verify sender. Users must click a verification link.**, sends an email with a link the user must click before their job is printed (or proceeds to the next stage, such as a Secure print release). The purpose of this setting is to verify the sender of the email actually owns the email address. In the **Email body** for this setting, the special replacement marker `%verify-link%` is required.

If verification of the sender address is not important, you can use the setting **Do not verify sender. Respond to job with confirmation.**. When this setting is used, jobs are processed immediately, and the user receives an email to let them know their job was received. In the **Email body** for this setting, use the special replacement marker `%client-url%` as a link to the Mobile web client, which shows the job's status.

Anonymous/guest submission

This item enables the sending of Email to Print jobs from anonymous guest users. These jobs are sent to a special guest printer alias. Jobs are logged to the specified user (default is `guest-user`.)

See Anonymous setup for more information.

Error responses

These options allow the customization of response emails sent to users when things go wrong.

- **Nothing to print (no valid attachments)**—Used when an email is received but no valid attachments were found. The user might have forgotten to attach their document, or perhaps attached an unsupported document type.
- **Other**—Used when any other problem occurs e.g. if the document was corrupt and couldn't be printed, or something went wrong with the print driver attempting to print.

The following special replacement markers can be used in each of the customization settings.

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Special replacement marker	Description
%printer%	The name of the printer.
%printer-server%	The server name component in the printer's name.
%printer-queue%	The queue name component in the printer's name.
%location%	The printer location/department.
%document%	The document name.
%print-attachment-list%	A list of email attachments to be printed.
%expire-hours%	The number of hours before the email verification link expires.
%supported-attachment-types%	Supported email attachment types.
%verify-link%	The verification URL that a user must click before their job is printed.
%client-url%	The Mobile Client URL.

See Self association for emails and email verification/validation for additional customization settings that apply to both Email to Print and Google Cloud Print.

4.9.3.8. Interaction with other features

User interactions (account selection, confirmation, print scripts)

If users are configured with Account Selection options (or you have print scripts) that require user interaction that can ONLY be done via the Mobile web client (and cannot be done at the printing device), then running the Mobile web client is mandatory. If not, the user is unable to carry out the configured user interaction for Account Selection, and the Email to Print job remains paused and does not appear on the printing device. To make this easy use the default job response templates and include links to the Mobile web client. You can tweak the templates to indicate that users must follow the included link to progress their job.
However, if users are configured with Account Selection options that require user interaction and this can be done BOTH via Mobile web client AND at the printing device (the ability to assign accounts at the printing device is available), running the Mobile web client is not mandatory. It may be required if it is also being used for other purposes, besides Account Selection (such as, viewing current account balance, cached user comments, "low credit" warning messages, notifications about print policies, etc). For more information, see Mobile web client and Assigning accounts to print jobs at the device.

Hold/release queues

Hold/release queues allow jobs to be held in a queue and later released by a user. This can be used, for example, to require that users are physically at the device to collect their job ("secure print release").

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You can use hold/release queues with Email to Print in the same way as other job types. For more information on hold/release queues, see Secure print release.

Find-Me Printing

Find-Me Printing removes the need for a user to select a printer when printing their job. Instead they print to a "virtual", sometimes called "global", queue. They then release their job at the device of their choosing. PaperCut handles routing of the job to the right printer.

You can use Find-Me Printing with Email to Print in the same way as other job types. For more information see Find-Me printing and printer load balancing.

Internal users

Internal users are users who exist only in the PaperCut database, not in the organization's domain. They allow you to quickly set up users for printing (or have users set up their own account) without having to go through the normal process of creating full domain accounts.

You can combine internal Users with Email to Print, allowing users to register their own account (and email address) to set themselves up for printing. The recommended approach is as follows:

1. Enable internal user self-registration (see Internal users (users managed by PaperCut NG/MF). This adds a link to the login screen for users to create a new username, password and email.
2. Enable email self-association (see Unknown emails and email self-association). This allows jobs from unknown email addresses to be held until the email "becomes known". When the user sends their first job via Email to Print, they will receive a response email asking to verify their email address by logging in. Change this default template to be "If you do not have a username, create one using the Register link on the login screen" or something similar.

After the user has verified their email address, their job continues to print. Future jobs print as per normal.

Adding support for Microsoft Office documents

Email to Print prints PDF and picture file attachments by default (See Supported Applications and File Formats for full details). You can add support for Microsoft Office document attachments by configuring a Web Print Sandbox running Microsoft Office. The Web Print Sandbox functions as a document conversion service. Incoming email attachments are sent to the sandbox, and the associated Microsoft Office program automatically converts the source document to a PDF file, which is then sent to the printer.

See Sandbox Mode Setup for information on how to set up a Web Print Sandbox running Microsoft Office.

4.9.3.9. Rollout

The following is a list of considerations when moving from a test Email to Print environment that is working as desired, to a wider or organization-wide rollout.

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- Create and publish printer aliases for all printers available via Email to Print. This could involve:
  - Adding the printer's email to a sign on the printer
  - Publishing a web page with email addresses for all printers
  - Adding printer email addresses to a shared address book
- Modify the procedure for creating new printers in PaperCut to optionally include an Email to Print alias.

4.9.3.10. Advanced configuration

The following Email to Print settings are for advanced users or special cases, and does not normally need to change. They are found in the PaperCut Config Editor. See Using the Advanced Config Editor for more information on advanced configurations.

Table 49: Email to Print advanced configuration

Config Name	Description
email-printing.attachment-min-image-bytes	Often emails have small images attached as part of the email signature, which users are not likely to want printed. To avoid printing these images, Email to Print ignores image attachments smaller than this value. The default value is 20000 bytes.
email-printing.debug	Set this to `Y` to enable detailed logging of Email to Print emails received, emails sent, and how PaperCut is connecting to the email server.
email-printing.service-freq-secs	By default, PaperCut checks (poll) for new emails every 20 seconds. This config item can change the polling frequency. Less than 20 seconds is not recommended so not to burden the email server. If this value is too large, users will find that sometimes jobs will take a long time to print. How long "too long" will vary between sites.
email-printing.imap-read-folder	By default, PaperCut looks at the 'Inbox' folder of the mailbox. This is usually the right setting for most mailboxes. When using IMAP as the protocol, emails can be from any folder on the mail server; so if you want to read emails from a specific folder (e.g. setting a rule to forward emails with attachments to a pre-defined 'PrintQueue' folder) you can set the folder name here.

4.9.3.11. Print options

As the user communicates with Email to Print through emails, there is little opportunity for setting print options. Instead, PaperCut attempts to use default settings for the printer.

Setting printer defaults

Email to Print printing is performed by the PaperCut Print Provider running on the print server for the target printer.

On CUPS print servers, Email to Print uses the default printer settings.

On Windows print servers, default printer settings are configured under: **Start > Devices and Printers > your printer > Printing Preferences**

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However, these printer settings are not available when the Print Provider service is running under the SYSTEM account, which is the default. If you want Email to Print to use the Windows printer defaults (Printing Preferences), run the Print Provider service under a user account that has access to the Windows printer settings.

1. Select **Start > Control Panel > Administrative Tools > Services** .
2. Find the `PaperCut Print Provider` service; then select **Properties > Log On** .
3. Set a user account that has access to the Windows printer settings.

Image print scaling

When printing large image file attachments, Email to Print might need to rotate and/or scale the image to make it fit on the page.

To do this, Email to Print assumes a page size of either A4 or Letter. If an image is too large to fit on an A4 or Letter sized page, Email to Print rotates and/or scales down the image as needed to fit.

4.9.3.12. FAQ

Can multiple documents be printed at once?

Yes, all attachments are printed (when the attachment type is supported).

Can a job be printed on more than one printer at a time?

Yes, the job is printed to each printer in the To or CC field of the email.

Will you add support for HTML formatting in the reply emails?

Probably. Email support to let us know you're interested!

I encrypt/sign my emails, do you support PGP and similar features?

At this time PaperCut NG/MF supports plain emails. If you need support of other features, email support to let us know you're interested!

I want to support Email to Print without assigning email addresses to users (and without requiring users to associate their own address with their account) i.e. to allow printing without user-level control. Will you add support for this?

Probably. One possible solution would be to allocate all jobs from unknown emails to a special user account (e.g. `guest`). Please email support to let us know you're interested!

My email server supports SPF (Sender Policy Framework) header checking. Can you add functionality to send a confirmation response when it checks out, and a verification response when it doesn't?

Maybe. Please email support to let us know you're interested!

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4.9.3.13. Troubleshooting

My users are having my Email to Print response emails flagged as spam. How can I prevent this?

1. Ensure you have configured a public DNS name for your PaperCut server and have configured it at **Options > Advanced > Server Address > Server address presented to users** , so your response emails do not contain (internal) IP addresses.
2. Ensure you are using a valid SMTP 'From' address (**Options > Notifications > Email Options > From address**). For the best user experience, use an attended email address.

The links in my PaperCut response emails contain IPs. How can I use a DNS name?

Configure the public DNS name for your PaperCut server at **Options > Advanced > Server Address > Server address presented to users** .

The Email to Print status in the Admin web interface says there is an error. What should I do?

1. Check the **App. Log** tab for any obvious errors.
2. Check your Email to Print mail server configuration. Ensure the server name, username, password etc. are all correct.
3. If there is no obvious cause, contact support for assistance.

Email to Print jobs are not coming out of the printer, but the status in the Admin web interface says OK. What should I do?

1. Check the **Application Log** tab for any obvious errors.
2. On the **Dashboard** tab, check the **Realtime Activity** area. This contains a lot of information about the state of print jobs. Try sending a new Email to Print job while watching this status area. Look for messages about the job being held in a hold/release queue, etc.
3. Is the job:
   - canceled, because the email address was unknown?
   - canceled due to filters or not enough credit?
   - awaiting the user to verify their email?
   - awaiting the user to click a job verification link? (is the email in the user's spam folder?)
   - awaiting account selection, job confirmation, or a print script popup? (try opening the Mobile web client)
   - held in a hold/release queue?
4. If it's still a mystery, contact support for assistance.

If your print server is a Windows Server Core and the text in your Email to Print jobs is missing or not rendering properly, the problem might be due to missing fonts.

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1. On a standard Windows server, open the Registry Editor.
2. Export the following registry:

   `[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Fonts]`
3. Copy the fonts registry file to the Print Server
4. On the print server, create the following folder:

   `C:\Windows\Fonts`
5. On the standard Windows server, copy all of the font files in `C:\Windows\Fonts` to the same location on the print server.
6. On the print server, open the Registry Editor.
7. Import the fonts registry file.
8. Restart the print server.

4.9.4. Web Print (driver-less printing via a web browser)

Web Print is a driver-less printing service that allows users to print by uploading documents from a web browser. No client software or driver installation is required.

Your Web Print deployment can be scaled to meet the needs of your organization, removing bottlenecks and improving reliability. Web Print scaling through the use of multiple Web Print servers, increases throughput and minimizes users' wait time for print jobs. Using multiple servers also provides resilience against possible network and server outages.

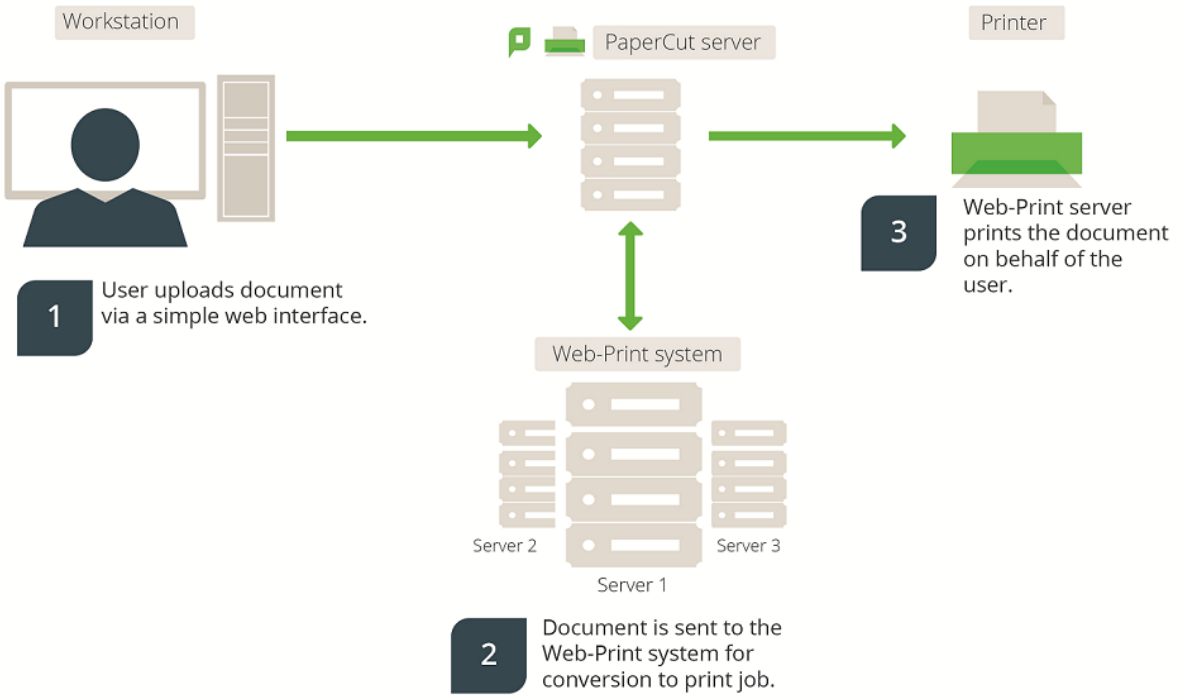

Figure 50: Web Print architecture overview

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With Web Print, users are authenticated when they log in to the PaperCut NG/MF User web interface. Any documents they upload can then be tracked against their user name and the selected shared account.

Note:
Web Print is not available on direct print queues. To offer this service to your users, set up a server queue for this device/printer.

Key features

Some of the key features of PaperCut's Web Print solution include:

- Simple wizard style interface, accessed from any web browser.
- Users authenticate with their regular (network / domain) logins.
- 100% web based. No drivers, client software, or browser plugins required.
- File uploads with progress indicator.
- Supports popular document formats including PDF, DOC/DOCX (and other Microsoft Office Word formats), XLS/XLSX (and other Microsoft Office Excel Formats), PPT/PPTX (and other Microsoft Office PowerPoint formats) and Microsoft XPS (XML Paper Specification). Web Print also supports common image formats including JPG, GIF, PNG, TIFF and BMP.
- Users select printers from an auto-generated list or a clickable printer map, which you can design or import using open standards and free software.

Introduction to Web Print

You can use Web Print in one of two possible modes: .

- **Default Mode**—involves running the Web Print software on the same system as the PaperCut NG/MF Application Server. On Windows, it runs as a Service. This is the fastest and easiest way to get Web Print working. However, only printing of PDF documents (and picture files on Windows) is supported in this mode. See Set up Web Print: Default mode).
- **Sandbox Mode**—uses a sandboxed or virtualized system, isolated and dedicated to the task of processing Web Print jobs or converting documents for Email to Print. *Sandbox Mode* takes a little more time to configure, but offers several advantages, including improved security, higher throughput, and more supported document formats.

  This mode accepts popular file formats and converts them to print jobs using common external applications. This is done by orchestrating applications such as Adobe Reader TM, Microsoft Office TM, and the Microsoft XPS Viewer as background server-side tasks.

  See Set up Web Print: Sandbox mode .

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Table 51: Web Print setup options (by platform)

Primary server type	Default mode	Sandbox mode
Microsoft Windows	Yes (PDF and picture files only)	Yes. All formats supported
Apple Mac	Yes (PDF only)	Yes. All formats supported
Linux running CUPS	Yes (PDF only)	Yes. All formats supported
Novell OES Linux	No. Default Mode not supported	Yes. All formats supported

Important:
Adobe Reader, Microsoft Office and XPS Viewer are not supplied with PaperCut. It is your responsibility to purchase and conform to the licensing requirements of any third party software.

Supported applications and file formats

The following table lists the supported document types and associated applications that Web Print can use to render and print jobs. Before some file formats can be accepted as an upload, you must install its supporting application.

Table 52: Web Print file formats and applications

Document Type	File Format(s)	Direct Printing	Supported External Applications	Default Mode	Sandbox Mode
Portable Document Format	PDF	Support built-in (all platforms)	Adobe Reader 9, Adobe Reader X (10), Adobe Reader XI (11), Adobe Reader DC	✓	✓
Picture File	BMP, DIB, GIF, JFIF, JIF, JPE, JPEG, JPG, PNG, TIF, TIFF	Support built-in (Windows only)		✓	✓
Word Document	DOC, DOCX, etc.	External application required	Microsoft Office Word 2007, 2010, 2013, 2016, 365		✓
Spreadsheet	XLS, XLSX, etc.	External application required	Microsoft Office Excel 2007, 2010, 2013, 2016, 365		✓
Presentation	PPT, PPTX, etc.	External application required	Microsoft Office PowerPoint 2007, 2010, 2013, 2016, 365		✓

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Document Type	File Format(s)	Direct Printing	Supported External Applications	Default Mode	Sandbox Mode
Microsoft XPS	XPS	External application required	Microsoft XPS Standalone Viewer (Essentials Pack) - For more information see Installing XPS Viewer.		✓
Text file	TXT	External application required	Microsoft Office Word 2007, 2010, 2013, 2016		✓
Apache OpenOffice text file	ODT, OTT	External application required	Microsoft Office Word 2010, 2013, 2016, 365		✓
Apache OpenOffice spreadsheet	ODS, OTS	External application required	Microsoft Office Excel 2010, 2013, 2016, 365		✓

Note:

- * Picture files are not supported for Mac and Linux Application Servers.
- If you have Acrobat installed on the Web Print server, when users print multiple copies of PDF files, each copy is processed as a separate print job. To reduce the server and network load, we recommend uninstalling Acrobat and using Xpdf, which is the default PDF viewer.

Security considerations

Before setting up Web Print it is worth considering any security implications. Because Web Print allows any user with access to the PaperCut NG/MF user web interface the ability to upload a document for printing, it naturally increases surface area for attack.

More specifically, security vulnerabilities that might usually be considered local, because they are triggered by opening a document in a Microsoft Office application or Adobe Reader can become a remote vulnerability. This is because these same applications are used to render print jobs on the server after the user has uploaded their document.

You can mitigate much of the security risk through security best practice, such as regularly applying security updates to the orchestrated applications. Organizations that are very security conscious might consider the sandbox approach. Sandboxing the Web Print server provides an extra layer of protection/isolation.

4.9.4.1. Set up Web Print

You can configure Web Print in one of two possible modes:

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- Default mode
- Sandbox mode

Set up Web Print: Default mode

Default mode involves running the Web Print software on the same system as the PaperCut NG/MF Application Server. It is the fastest and easiest way to get Web Print working. It is suitable for testing Web Print functionality or where only PDF support is required.

In *Default mode*, the Web Print software runs as a service (background process or daemon) that is responsible for watching a directory for documents submitted by users e.g. PDFs. When a new document is detected, the background process opens the document and prints it.

Set up Web Print Default mode: Windows servers (PDF and picture files Only)

This section describes how to configure Web Print on the same Windows system as the PaperCut Application Server. This is the fastest and easiest way to get Web Print up and running on a Windows system. Due to the inability of Microsoft Office or XPS Viewer applications to run as a system service, these file formats are available on Windows only when Web Print is configured in sandbox mode. See Sandbox mode setup for more information.

Web Print *Default mode* supports the printing of PDF documents and image files on Windows systems. No additional configuration is required.

Important:
In Windows Services, check that the Web Print service is configured to start automatically. If needed, start the service.

To confirm that everything is configured correctly:

1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.
2. In the **Web Print** area, check that the **Status** is **OK**.
3. Click the **Printers** tab.

   The **Printer List** page is displayed.
4. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
5. In the **Advanced Configuration** area, select the **Enable Web Print (users may upload documents to print)** check box.
6. Repeat step 3-5 for all printers that will use Web Print.

If there are any status issues, or if basic Web Print testing produces some errors, consider these limitations/requirements:

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- The printers targeted for use via Web Print must be queues that are managed by the primary PaperCut Server. This includes print servers with the PaperCut secondary server installed.
- If you want to print to remote printers, then the PaperCut NG/MF Web Print server needs to run under a user account that has permission to access these printers.

  Create a new user account called `webprint` (or equivalent). If it is not possible to create a domain user or the system is not a member of a domain, then create a local user account instead. Set the password for this account to never expire. At a minimum, this account needs access to all the printers you want to print to.
- The printers (as configured on the server) must have working compatible drivers.
- The following log file is useful in diagnosing issues: `[app-path]/providers/web-print/[platform]/logs/web-print.log`

Set up Web Print Default mode: Mac and Linux servers (PDF Only)

The Web Print *Default mode* supports PDF documents on Mac and Linux systems (running CUPS). No additional configuration is required.

To confirm that everything is configured correctly:

1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.
2. In the **Web Print** area, check that the **Status** is **OK**.
3. Click the **Printers** tab.

   The **Printer List** page is displayed.
4. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
5. In the **Advanced Configuration** area, select the **Enable Web Print (users may upload documents to print)** check box.
6. Repeat step 3-5 for all printers that will use Web Print.

If there are any status issues, or if basic Web Print testing produces some errors, consider these limitations/requirements:

- The printers targeted for use via Web Print must be queues that are managed by the primary PaperCut Server. This includes print servers with the PaperCut secondary server installed.
- The printers (as configured on the server) must have working compatible drivers.
- Linux: The primary server must be running CUPS version 1.2 or higher.
- The following log file might be useful in diagnosing issues: `[app-path]/providers/web-print/[platform]/logs/web-print.log`

Note:
Default mode is not available for Novell OES Linux and iPrint. Novell OES users should implement the Sandbox mode.

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Set up Web Print: Sandbox mode

Web Print *Sandbox mode* runs the Web Print software on one or more dedicated servers, often virtual machines. Documents are opened and rendered by standard applications, such as Adobe Reader and Microsoft Office applications.

Use *Sandbox mode* to:

- Support printing of Microsoft Office documents from Web Print
- Support printing of Microsoft Office documents from Email to Print
- Render documents in a secure, sandbox environment away from your main server
- Increase reliability and throughput of your Web Print system with multiple servers.

Sandbox mode takes a little more time to configure, but offers several advantages, such as support for Microsoft Office formats, increased throughput with the use of multiple servers, and improved security. Security is gained by opening and printing documents on an isolated system, separate from the Application Server; with the only connection between the two being a simple file share / mapped drive.

Tip:
PaperCut is shipped with a high quality rendering engine for PDF documents. However, document rendering by Adobe Reader is also supported. Simply install Adobe Reader in your Web Print Sandbox.

Your Web Print deployment can be scaled to meet the needs of your organization, removing bottlenecks and improving reliability. Web Print scaling through the use of multiple Web Print servers, increases throughput and minimizes users' wait time for print jobs. Using multiple servers also provides resilience against possible network and server outages.

While you can use a single Web Print Server, we recommend a minimum of two. Using only one Web Print server causes a single point of failure and potential bottlenecks. Best practices in server management recommend building redundancy into your network and monitoring the health of your environment.

Note:
The use of multiple Web Print servers is available in PaperCut NG/MF 16.2 and later.

Web Print scaling also allows you to select the applications supported on each server based on your file type printing usage. This means you do not need to install all supported applications on all Web Print servers.

The Print System Health interface includes endpoints to monitor the health of your Web Print environment with your existing monitoring tool, giving you peace of mind that users can print and that waiting times in queues are low. For more information about the Print System Health interface, see Monitor print system health.

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Prerequisites:

- One or more dedicated, standalone, cleanly installed systems or virtual machines.
- Windows operating system (Windows Vista or later).
- Adobe Reader 9 or later (optional)
- Microsoft Office 2007, 2010, 2013, 2016, and 365 (to support Office formats)
- Microsoft Standalone XPS Viewer / XPS Essentials Pack (to support Microsoft XPS) - download here

Set up Web Print in Sandbox mode

Setting up Web Print in Sandbox mode involves the following steps:

1. Set up a Web Print server
2. Install Web Print
3. Install applications on the Web Print server
4. Enable Web Print at the system level
5. Enable Web Print on printers
6. Test the Web Print setup

Step 1 to 3 need to be performed on each Web Print server.

Step 1: Set up a Web Print server

Important:
Web Print Sandbox mode is supported only on Windows servers, however, your Application Server can be on any operating system.

1. Disable *Default mode*:
   - **On a Windows Application Server**
     a. Stop and disable the `PaperCut Web Print Server` System Service (set its **Startup type** to **Disabled**).
   - **On a Mac or Linux Application Server**
     a. Open the following file in a text editor:
     `[app-path]\providers\web-print\[platform]\web-print.conf`
     b. Change the setting `enabled` to `enabled=off`.
     c. Save the file.
     d. Stop service `pc-web-print`.
2. Set up a new virtual machine using VMware Server, Microsoft Virtual Server or VirtualBox, or set up a standalone system e.g. a dedicated desktop PC. This system houses the Web Print server software and any required printing applications, and is called the *Web Print server*.

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This system does not need access to all network resources, but needs access to the hot folder share. This is created later. It also needs access to printer shares if used for Web Print (not Email to Print).

3. Create a new user account called `webprint` (or equivalent). Set the password for this account to never expire. At a minimum, this account needs access to the printers, the ability to run local programs, and the ability to access the hot folder share (created in step 6).
4. Ensure that the Web Print server can print to all Web Print enabled printers.
5. *Skip this step if using the Sandbox for Email to Print only.*
   a. Log in as the `webprint` user.
   b. Add print queues for the printers that you want to make available to users via Web Print.
   c. Add the print queues in the same way you would to a computer. They should point to the print queues hosted on the print server, i.e. a network printer mapped to `\\server\printer-share`. *It is important that the jobs pass via the queue on the server - do not add a local printer.* Add the printers using the print server's machine name and not an IP address.
6. Configure the Web Print server to automatically log in as the `webprint` user on startup. The service then runs when Windows is started, and is logged in as this user. For more information, see Automatic logon for Windows.

> **Tip:**
> Windows Vista/7 machines on a domain might require direct editing of the registry, as described here: Microsoft Technet - Configuring Accounts to Autologon. You might want to consider a Group Policy Object (GPO) to make the registry changes.

7. The Application Server and the software on the Web Print server communicate via a standard network file share. On the PaperCut NG/MF Application Server, share the folder `web-print-hot-folder` located at `[app-path]\server\data\web-print-hot-folder\`. The hot folder facilitates communication between the primary server and the Web Print server.

> **Tip:**
> By default, Web Print uses this folder, not a sub-folder. You do not need to create a sub-folder in this folder.

- **Samba sharing on a Linux Application Server**

  On a Linux PaperCut NG/MF Application Server, name the share `PCWebPrint`, and adjust both the **Sharing** and **Security** (NTFS/file) permissions of the `PCWebPrint` share to allow the `webprint` user read *and write* access.

  The following Samba configuration settings might be useful.

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```
[PCWebPrint]
comment = PaperCut Web Print Hot Folder
path = /home/papercut/server/data/web-print-hot-folder/
public = no
writeable = yes
read only = no
valid users = webprint
```

You also need to add the `webprint` username to Samba via `smbpasswd -a [username]` and you should consider disabling the `[home]` shares in your `smb.conf`.

Important:

Ensure that your umask and Samba settings allow for the `papercut` Linux user to be able to read and write to all files in the `web-print-hot-folder`. When using Novell and Linux, the Web Print server might create files owned by a user other than the one the PaperCut NG/MF Application Server runs as, preventing the files from being accessed.

- **Samba sharing on a Mac Application Server**

  On a Mac PaperCut Application Server, adjust both the **Sharing** and **Security** (NTFS/file) permissions of the `PCWebPrint` share to allow the `webprint` user read *and write* access.

  a. Create a user in **Users & Groups**. This user will be used to read and write to the shared folder. Name the user `webprint` and assign it to the `admin` group.

  b. In **Sharing > File Sharing**, share the folder `[app-path]/server/data/web-print-hot-folder/`; then add Read & Write permissions for the `webprint` user.

  c. Click **Options** on the same menu; then check the `webprint` user under **Windows File Sharing**.

  d. Set read access to everyone on the Web Print hot folder and any files under it by creating a new ACL. Open the Terminal app and type under `[app-path]/server/data` folder:

  ```
  sudo chmod +ai "everyone allow read,file_
  inherit" web-print-hot-folder
  ```

8. Log in to the Web Print server as the `webprint` user.
9. Map the `W:` drive to the hot folder share you have defined. Ensure that the option **Reconnect at logon** is selected when mapping the drive. If your `webprint` user's credentials on the PaperCut NG/MF Application Server are different from the Web Print server's user, click **Connect using different credentials** and enter them.
10. Test that the file share can be accessed and written to by the Web Print server (e.g. by

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creating a new text file on `W:`). You should also test in the other direction, and confirm that files created on the Application Server in the folder `web-print-hot-folder` can be opened/seen by the Web Print server.

Step 2: Install Web Print

1. Run the main PaperCut NG/MF installer on the Web Print server. Select the **Web Print server installation (sandbox mode)** install option.
2. Configure the `webprint` user to run `[app-path]\providers\web-print\win\pc-web-print.exe` at login if it does not automatically start. You can do this by adding a shortcut to the user's `Startup` folder.
3. Reboot the system. Ensure the system automatically logs in as the `webprint` user when it starts up, and that the **PaperCut Web Print** dialog is displayed shortly afterwards.

If the dialog indicates an error, see Troubleshooting Web Print problems.

Step 3: Install applications on Web Print servers

1. Install the applications you want to support on the Web Print server. For more information about the supported file formats, see Web Print (driver-less printing via a web browser).

   Make sure you *permanently* acknowledge any license agreement screen, initial-run wizard, or customer experience program dialog during this process.

Tip:

- When installing Microsoft Office applications, select all optional components for installation. This prevents printing issues occurring due to missing components.
- Microsoft Office macros are allowed by default. To block these macros, set the config key `web-print.disable-macros` to Y. For more information, see Advanced Web Print configuration and Using the Advanced Config Editor.
- Adobe Reader introduced a Protected Mode setting, which prevents printing

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from the command interface used by Web Print. Using Adobe Reader therefore requires the Protected Mode feature to be disabled. Web Print *automatically* disables Protected Mode for your `webprint` user. (You can also disable Protected Mode manually by disabling the **Enable Protected Mode at startup** setting in Adobe Reader under **Edit > Preferences > Security (Enhanced)**)

2. If you are not supporting all of the file formats:
   a. On the Web Print server, open the following file in a text editor:
      `[app-path]\providers\web-print\[platform]\web-print.conf`
   b. Comment out the handler for the applications that are not supported. For example:

```
# Advanced: The handlers define which programs are responsible for
# printing different classes of documents.
#
# It is not necessary to change these settings unless requested by the
# support team.
#
handler.ms-word=handlers\mso-word.exe
#handler.ms-powerpoint=handlers\mso-powerpoint.exe
handler.ms-excel=handlers\mso-excel.exe
handler.pdf=handlers\pdf.exe
handler.xps=handlers\xps-foreground.exe
handler.image=handlers\image-handler.exe
```

   c. Navigate to:
      `[app-path]\providers\web-print\[platform]\handlers\`
   d. Delete the `.exe` files for the unsupported applications, for example, `mso-powerpoint.exe`.
3. As the `webprint` user, open a file in each of the installed applications, then print to several different printers, ensuring that all work as expected.
4. Restart the Web Print service.

Step 4: Enable Web Print at the system level

1. Select **Options > Mobile & BYOD**.
   The **Mobile & BYOD** page is displayed.
2. In the **Web Print** area, select the **Enable Web Print (users may upload documents to print)** check box.
   The Web Print fields are displayed.

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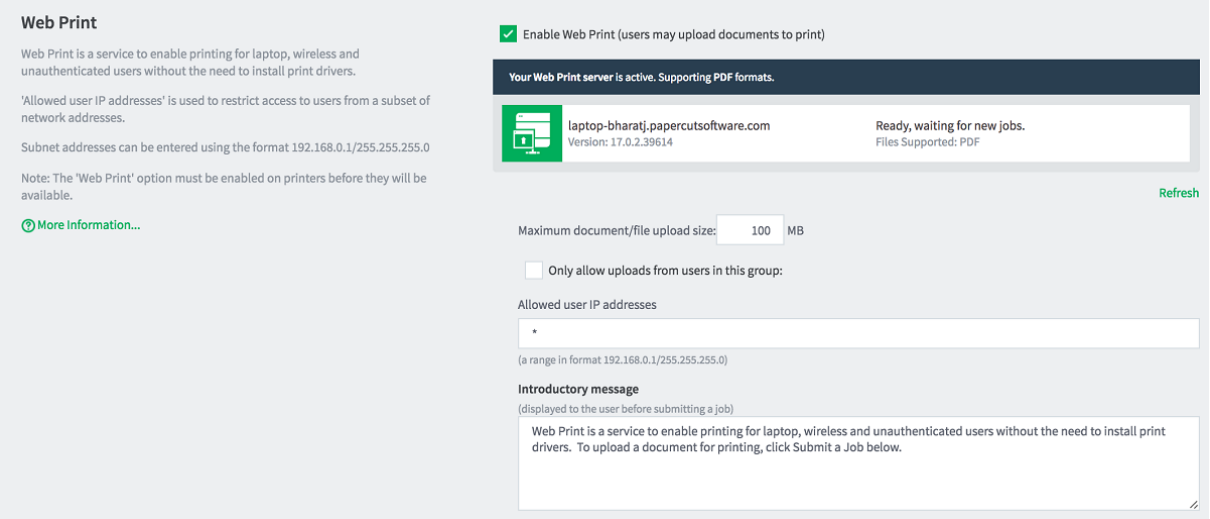

3. Complete the following fields as required:
   - **Maximum document/file upload size**— If a user uploads a document greater than the specified size (in MB), their upload is rejected.
   - **Only allow uploads from users in this group**—Restrict Web Print access to a particular group of users. When this option is enabled, users not in the specified group do not see the **Web Print** item in the navigation menu.
   - **Allowed user IP addresses**—Use this option to restrict Web Print access to a selected IP address range. For example, access might be limited to systems on a wireless network (i.e. force users on the wired network to use standard print queues). Address ranges are entered in the format: `1.2.3.0\255.255.255.0`.
   - **Introductory message**— The message to be displayed on the first page after a user clicks the **Web Print** menu option. Use this message to explain the service, offer site-specific advice, or other information to assist the user. HTML is supported, e.g. use <p> tags to start a new paragraph, or an <a> tag to provide a link.
4. Click **Apply**.

   The **Web Print** option is now available in the navigation menu of the User web interface, and users are able to use Web Print functionality.

Step 5: Enable Web Print on printers

Enable Web Print on all printers to be used for Web Print. For more information, see Enable Web Print on a printer.

Step 6: Test the Web Print setup

Log in as a user and submit a test print job. For more information, see Submit a Web Print job.

Enable Web Print on a printer

Each printer that will be available with Web Print must have Web Print enabled. Smaller organizations might want to make all printers available, while larger organizations might want to restrict to a subset e.g. limiting access to printers located in public areas.

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You can replace the printer list with a clickable map or other custom content. See Designing printer maps / custom printer selection lists for details.

Tip:
Web Print works great in conjunction with Secure print release and Find-Me printing and printer load balancing.

To enable Web Print for a printer:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. In the **Advanced Configuration** area, select the **Enable Web Print (users may upload documents to print)** check box.

   Tip:
   If this option is not available, check that Web Print is enabled at the system level. For more information, see Set up Web Print: Sandbox mode
3. Confirm that the printer is enabled for Web Print:
   a. Select **Options > Mobile & BYOD**.

      The **Mobile & BYOD** page is displayed.
   b. In the **Web Print** area, ensure that the **Status** is **OK**. If the status indicates an error, see Troubleshooting Web Print problems.

   If your Web Print server is for Email to Print only, you should see the full set of supported document types in the Email to Print set up area. If there is a problem, temporarily enable Web Print so you can take advantage of the additional status information provided in the Web Print setup.

Tip:
To enable Web Print for all printers:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select the The template printer.
3. Select the **Enable Web Print (users may upload documents to print)** check box.
4. Copy the setting to all other printers using Copy printer settings.

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Configure Web Print (optional)

The default Web Print configuration will meet the needs of most organizations. However, if required, the following additional configuration is available:

- Modify default Web Print settings
- Create a Web Print printer map or custom printer list
- Advanced Web Print configuration

Modify default Web Print settings

Modify default Web Print system configuration

The default Web Print configuration options are:

- **Maximum document/file upload size**— If a user uploads a document greater than the specified size (in MB), their upload is rejected. The default value is 100MB.
- **Only allow uploads from users in this group**—Restrict Web Print access to a particular group of users. When this option is enabled, users not in the specified group do not see the **Web Print** item in the navigation menu. By deafult, not groups are selected.
- **Allowed user IP addresses**—Use this option to restrict Web Print access to a selected IP address range. For example, access might be limited to systems on a wireless network (i.e. force users on the wired network to use standard print queues). Address ranges are entered in the format: `1.2.3.0/255.255.255.0`. By default, no IP addresses are selected.
- **Introductory message**— The message to be displayed on the first page after a user clicks the **Web Print** menu option. Use this message to explain the service, offer site-specific advice, or other information to assist the user. HTML is supported, e.g. use <p> tags to start a new paragraph, or an <a> tag to provide a link. The default message is:

  ```
  Web Print is a service to enable printing for laptop,
  wireless and unauthenticated users without the need to
  install print drivers. To upload a document for printing,
  click Submit a Job below.
  ```

To change any of these settings:

1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.
2. In the **Web Print** area, update the settings as required.

   The Web Print fields are displayed.

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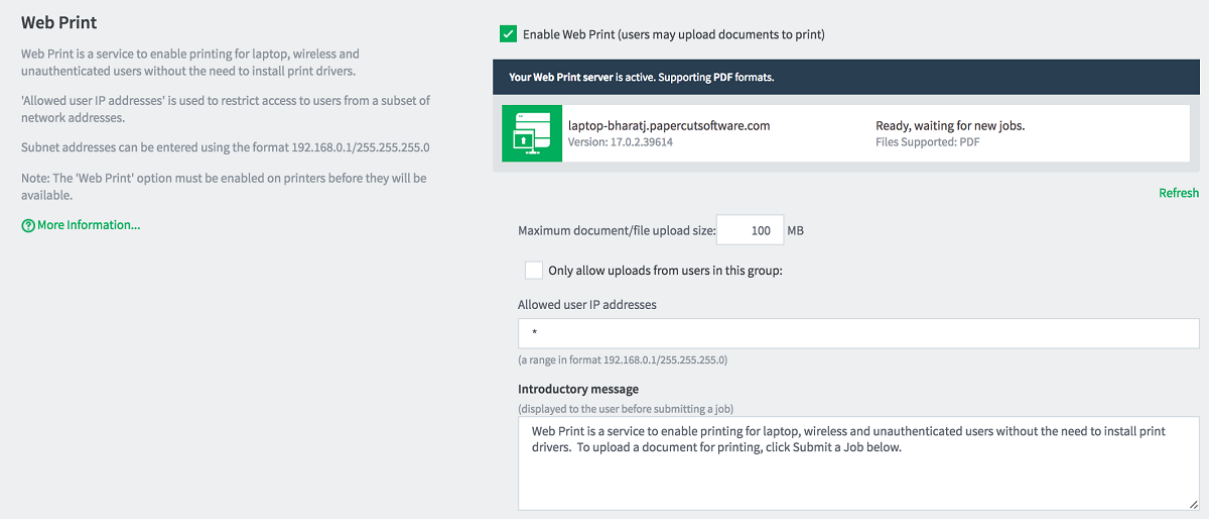

3. Click **Apply**.

Modify print options

The print options selected during the Web Print wizard are currently limited to the number of copies to print. Other print options such as grayscale, duplex, paper size etc. are selected based on the default options of the print queue.

Most organizations configure at least four print queues in conjunction with Secure print release and Find-Me printing and printer load balancing, which include:

- Black and white - Simplex
- Black and white - Duplex
- Color - Simplex
- Color - Duplex

If it is important to provide the user with a print option choice (e.g. when the same printer has trays for Letter and Legal paper). You need to create two print queues each with different default settings e.g. one print queue called `Library Printer (Letter)` defaulting to the Letter size and tray, and a second print queue (pointing to the same physical printer) called `Library Printer (Legal)` defaulting to the Legal size and tray.

When printing an image file, Web Print rotates and/or scales down the image if needed so that it fits on the page.

Create a Web Print printer map or custom printer list

Part of the Web Print wizard involves selecting the target printer from a list. This is great for most environments, but organizations with many printers or large sites might prefer something that provides users with more context about the printer they are selecting.

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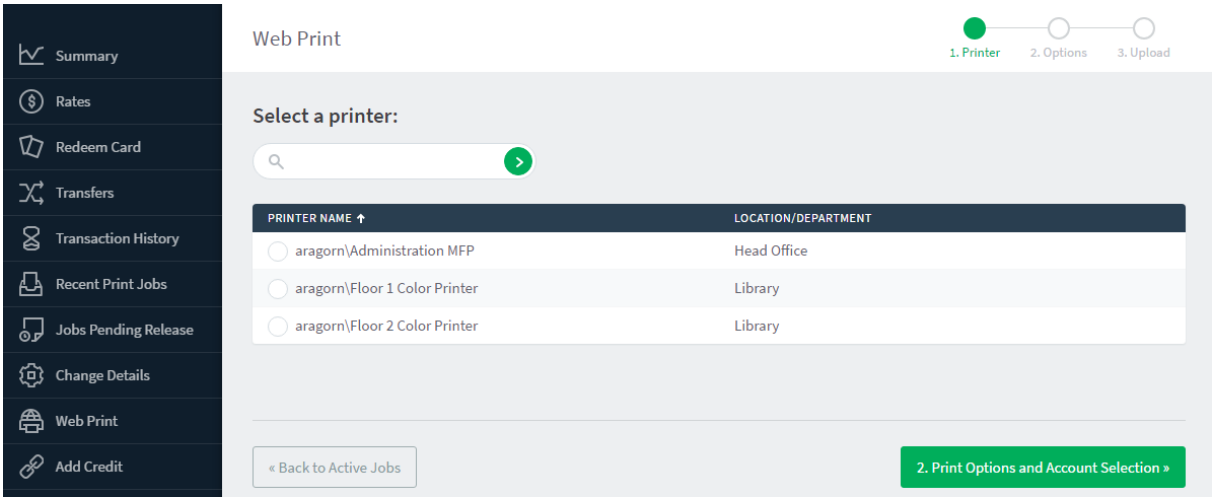
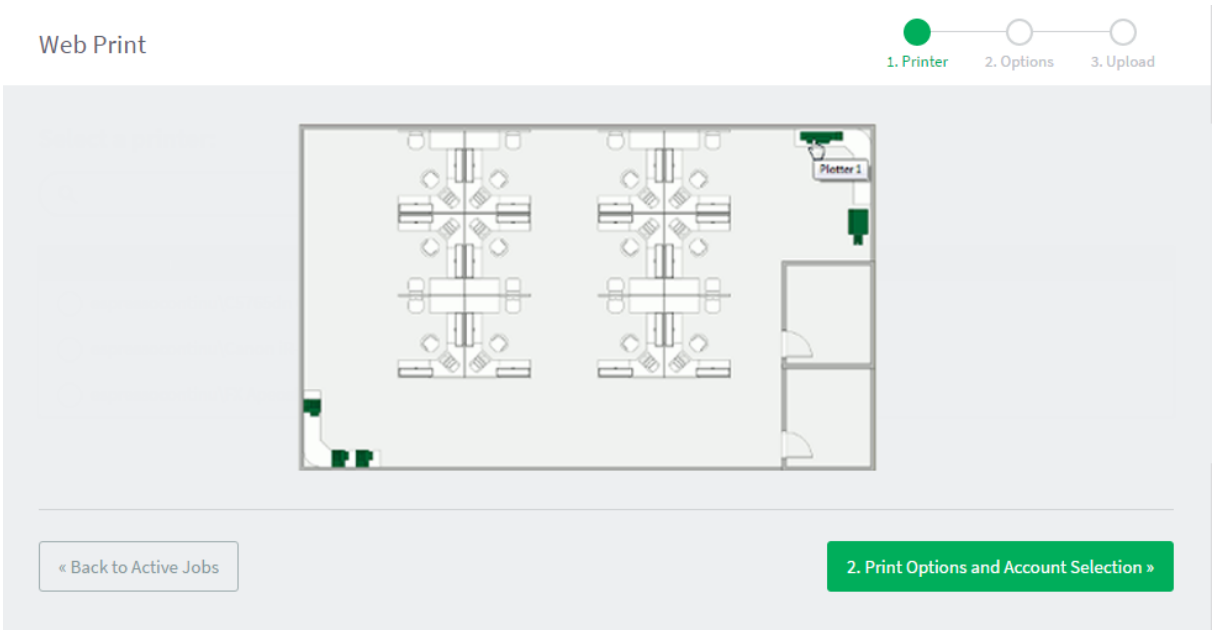


Using a graphical map can assist users to find the most convenient printer. A map allows a user to select a printer by location, rather than guessing the printer's location based on its name. Using printer maps or other types of custom printer lists in PaperCut NG/MF does not require any special or proprietary software - they can easily be implemented using open standards and free software.



Custom content is loaded in place of the printer list, by placing the appropriate file at `[app-path]/server/custom/web/` as described in the following table:

Table 53: Files used for custom printer selection in the Web Print wizard

File Name	Description
`printer-map.html`	If this file exists, it is loaded as an HTML page and displayed in an in-line frame (iframe), in place of the printer selection list. The HTML can contain any content or images, including links to other pages (which are also loaded in the iframe by

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File Name	Description
	default).
`printer-map.svg`	If this file exists, it is loaded as an SVG page, and displayed in an iframe in place of the printer selection list. The SVG can contain links to other pages or other SVGs. You can create an SVG using software such as Microsoft Visio or the free/open source Inkscape, and is a convenient way of displaying a map or floor plan with clickable links.

Tip:

- You can access any custom content placed in `[app-path]/server/custom/web/`, such as additional images, a URL beginning with `/custom/`. For example, if a file named `floor-plan.png` is placed in `[app-path]/server/custom/web/` it is accessed via the URL `/custom/floor-plan.png`.
- The custom printer map is displayed in an iframe with dimensions 776px x 400px. If the content is larger than this, then scrollbars are visible (the area will not expand to fit the content).

Example 1: Creating a printer map using an HTML image map

1. Create a file named `printer-map.html` at `[app-path]/server/custom/web/`. This file is loaded as an HTML page in an iframe in place of the default printer selection list, and can contain any content you choose; including links to further pages. Open this file in a text editor.
2. Add the site plan image:

   ```
   <img src="site-plan.png" usemap="#buildings"
   style="width: 422px; height: 190px; border: none;" />
   ```

   The `usemap="#buildings"` attribute tells the image to look for an image map with the name `buildings`. Image maps allow you to make parts of an image "clickable". For more information about the HTML `<map>` element see xhtml.com's map element reference.
3. Define the image map.

   ```
   <map name="buildings">
   <area shape="poly" coords="" href="building-a.html"
   alt="Building A" title="Building A" />
   <area shape="poly" coords="" href="building-b.html"
   ```

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```
alt="Building B" title="Building B" />
</map>
```

This defines a new image map called `buildings`, with two clickable areas. These areas are polygon shapes (`shape="poly"`), which means you can specify a list of points that form the outline of the clickable area (i.e. the area inside the points is clickable).

Clicking the first area loads the page `building-a.html`. The `alt` and `title` tags provide information about the link, and display a tooltip when the user hovers over the area.

4. You have defined two areas and the pages they link to, but you have not yet defined the coordinates for these areas. This is done using the `coords` attribute of the two `area` tags. Using an image editor, you can find coordinates for the outline of the two areas. Most image editors, including MS Paint, display pixel coordinates when hovering the mouse over the image.

   Using the image editor, find the following points for *Building A* (the lefthand building), starting from the top left corner, in `(x,y)` format: `(0,48), (84,0), (143,34), (143,142), (60,190), (0,155)`. Pixels are counted from the top-left corner of an image, so the coordinate `(60,190)` means *"60 pixels from the top, 190 pixels from the left"*.

5. Repeat the previous step for the second building to get coordinates similar to: `(242,50), (320,4), (422,63), (422,135), (332,190), (226,131).`

6. Now that you have the clickable area coordinates, you can define them in the image map.

   The definition for the `area` tag when using a `poly` type shape, tells you that the coordinates are specified in a list of x,y coordinates (i.e. "x1,y1,x2,y2...xn,yn"), so you enter the coordinates in the `coords` attributes as follows:

   ```
   <map name="buildings">
   <area shape="poly"
   coords="0,48,84,0,143,34,143,142,60,190,0,155"
   href="building-a.html" alt="Building A"
   title="Building A" />
   <area shape="poly"
   coords="242,50,320,4,422,63,422,135,332,190,226,131"
   href="building-b.html" alt="Building B"
   title="Building B" />
   </map>
   ```

7. Open `printer-map.html` in a web browser to display the site plan image. Hovering the mouse over each building displays the link cursor, and indicates a link to the respective pages.

8. Create the `building-a.html` page. Using a similar process to the existing page, add `floor-plan.png` and create an image map for it:

   ```
   <div>Building A (<a href="printer-map.html">back</a>)</div>
   ```

   This map is mostly similar to the previous one, except that you have defined five rectangle shapes (`shape="rect"`) and provided a link back to the main site plan (`printer-map.html`).

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Rectangle shapes in an `<area>` element are defined with the coordinates of top-left and bottom-right corners (`"x1,y1,x2,y2"`).

9. Now you have the images and shapes in place for the site plan and one building's floor plan. To finish off this building, define what happens when each printer is clicked. This is done using a JavaScript function `selectPrinter`. Calling `selectPrinter('my-server', 'Library Printer')` submits the form on this step of the Web Print wizard, selecting the printer called `Library Printer`, hosted on the print server called `my-server`.

   Call this JavaScript function when one of the defined areas is clicked by setting the `href` attribute as follows:

   ```
   <area shape="rect" coords="4,289,22,307"
   href="javascript:parent.selectPrinter('building-a',
   'Printer 1');"
   alt="building-a\Printer 1"
   title="building-a\Printer 1" />
   ```

10. Repeat the previous step for the remaining printers, taking care that the server and printer names are entered correctly. Note that the printer name is the printer's unique name on the print server, and can be different to the printer's "share name".
11. Repeat the steps for creating `building-a.html` to create `building-b.html` (or copy the file and modify to suit).
12. Test the Web Print wizard to ensure that clicking a building takes you to that building's floor plan, and clicking a printer submits the form to select that printer. Note that if the names you've used for the printers don't actually exist in your PaperCut NG/MF server, then you'll see an error message about the printer not being available. You might want to modify the details for one of the printers to match a real printer so that you can test the wizard end-to-end.

    The source for this example contains some additional tweaks to improve browser consistency, such as removing the border and white background of the iframe in Internet Explorer.

Example 2: Creating a printer map using SVG

This example explains how to use an SVG image for a clickable printer map. This method is most suitable if you have plans or drawings in a vector format that can be saved as SVG. Otherwise Example 1: Creating a Printer Map Using an HTML Image Map might be more suitable.

An example SVG floor plan with clickable printers is located in `[app-path]/server/examples/printer-maps/html-image-map/`.

Modern web browsers are capable of displaying an SVG file in a similar way to displaying a web page. Mozilla Firefox and Opera can display SVGs "out of the box", and Microsoft Internet Explorer can display SVGs using the Adobe SVG Viewer add-on. In addition to drawing the image, you can make parts of the image "clickable" to provide links to other pages or, as in this case, to call a JavaScript function that selects a printer.

This example describes how to take an existing SVG image, and make parts of it clickable so you can select printer.

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Tip:
You can save a Microsoft Office Visio drawing as SVG and used in this example.

1. Download and install Inkscape, the free/open source vector graphics editor, and use it to open your SVG.
2. Select the object that you want to be "clickable". A dotted background is displayed around the object.
3. Right-click the object; then select **Create Link**.
4. Right-click the object; then select **Link Properties**.

   The **Link Properties** dialog box is displayed.
5. In **Href**, enter a value such as: `javascript:parent.selectPrinter ('server', 'printer');`, where `server` is the name of the print server, and `printer` is the name of the print queue.
6. Repeat to create links for each printer in the image.
7. Select **File > Save As**; then select a file type of `Plain SVG (*.svg)`. Save the image to `[app-path]/server/custom/web/printer-map.svg` on the PaperCut NG/MF server.
8. Try testing with the Web Print wizard. The SVG is visible on the first step of the Web Print wizard, in place of the printer list. Clicking a printer should move on to the next step.

Advanced Web Print configuration

The following advanced configuration options are available via the Config editor. See Using the Advanced Config Editor for information about using the Config Editor.

Table 54: Web Print config keys

Config key	Description
web-print.job-idle-timeout-mins	If a Web Print job remains unchanged for longer than this period of time, it is considered finished and is "cleaned up". The document and associated files are removed, and the job is no longer displayed in the user's list of current Web Print jobs. The default idle job timeout is 20 minutes.
web-print.job-rendering-timeout-mins	The Web Print server is given this length of time to render a Web Print document. If a print job has not been generated from the document after this time, the job is marked as errored and associated files are removed. The default job rendering timeout is 5 minutes.
web-print.max-copies	This is the maximum number of copies a user can print via Web Print. This option exists to prevent users accidentally (or thoughtlessly!) printing too much.

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Config key	Description
web-print.hot-folder	When a user uploads a file via the Web Print interface, it is written into the "hot folder", along with a `.metadata` file containing information about how to print the job (the data selected by the user in the Web Print wizard). The Web Print server looks for new files in this folder, and prints them as required. The default hot folder location is `[app-path]/server/data/web-print-hot-folder/`. You can specify an alternate location using this config key. The location must be local to the PaperCut NG/MF primary server (it cannot be a network share or mapped drive due to Windows denying share access to .the `SYSTEM` account).
web-print.disable-macros	Disable Microsoft Office macros. Values = `Y`, `N`, `DEFAULT` Default = `DEFAULT` (Microsoft Office macros are allowed by default). To block Microsoft Office macros, set the value to `Y`.

The following configuration options are available in the Web Print server configuration file, located at `[app-path]/providers/web-print/[platform]/web-print.conf`.

Table 55: Web Print server config keys

Config Name	Description
hotfolder	The location of the Web Print hot folder. This is generally a mapped drive letter (Windows) or a mount point that maps to a file share (Mac, Linux). It might also be a local path, if the Web Print server software is running on the same system as the PaperCut NG/MF primary server.
debug	Set to `on` to enable debug logging.
options.pdf	Set to `xpdf` to force PDF printing to use the built-in PDF printing routines. Set to `acrobat` to force PDF printing to use Adobe Reader.

4.9.4.2. Submit a Web Print job

1. Log in to the PaperCut NG/MF user interface; then click the **Web Print** link in the navigation menu.

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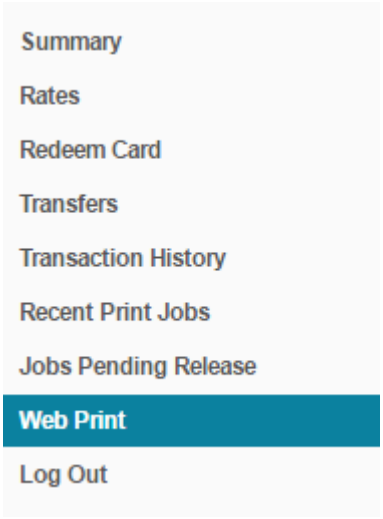

The front page contains a list of active and recently submitted Web Print jobs for the logged in user. At first, the list is empty. Later, the list shows the status of submitted jobs.

2. Click **Submit a Job** to start the Web Print wizard.
3. The first step of the Web Print wizard is selecting a printer. This is the printer to which the uploaded document will print.

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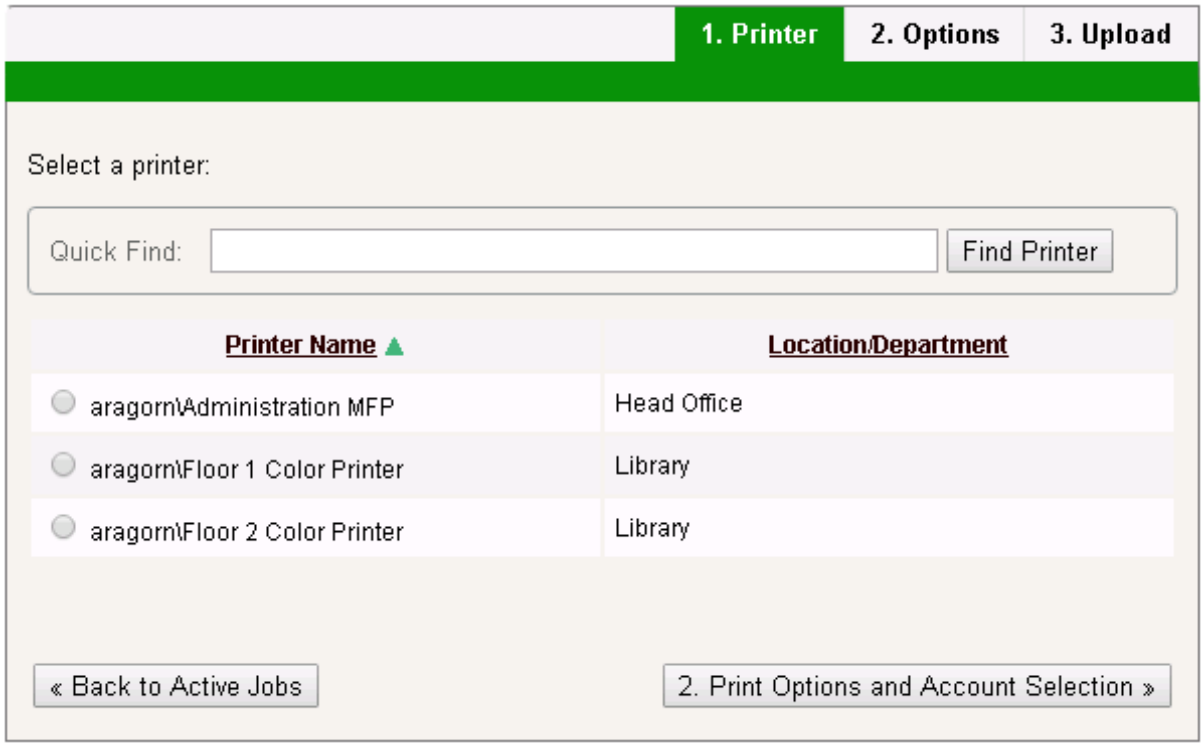
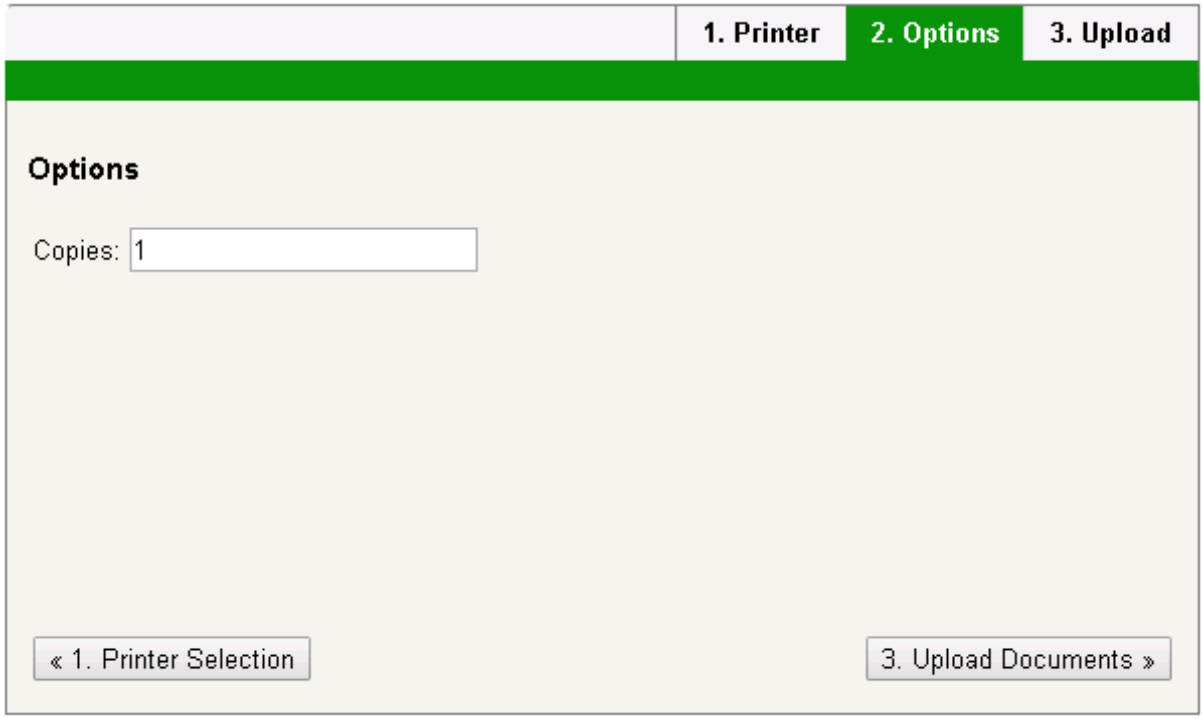


4. After selecting a printer, the second step is to select the print and/or account selection options. Most users will see an option to select the number of copies to print:



Users with print account selection options will see additional options on this page, equivalent to what they would see on their popup:

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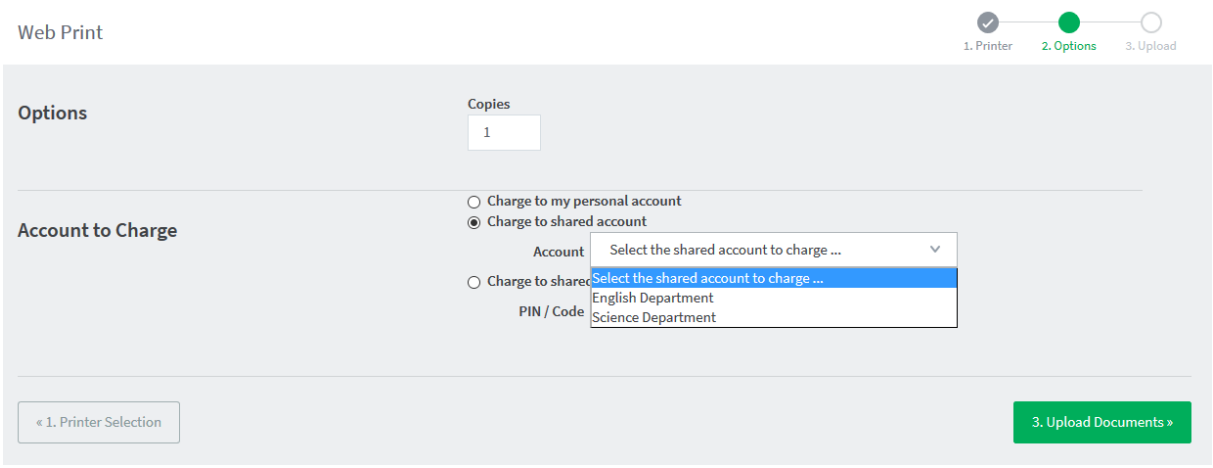
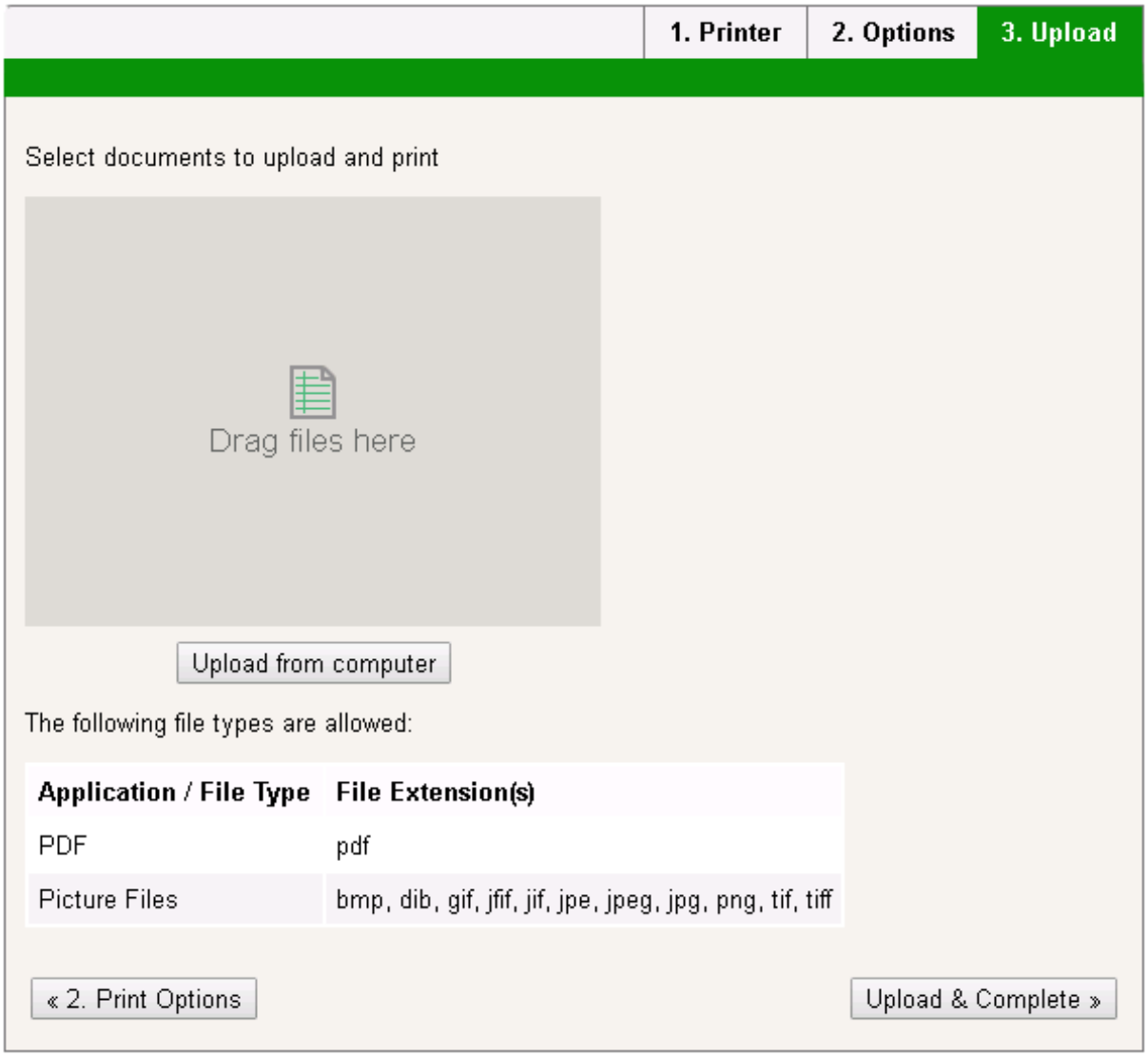


5. After selecting the print options and/or account selection settings, the third and final step in the Web Print wizard is to upload a document to print. This page lists the applications and associated file extensions that are supported.



After you select a document and click **Upload & Complete »**, the file uploads to the server.

6. Once the document upload is complete, the user is returned to the front **Web Print** page. The

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table displays the status of the user's job. The status changes to indicate the progress of the job from rendering to printing, and job details such as cost and number of pages are populated when known. The user can stay at this page to track the status of the job, or navigate away / close their browser - the job is not affected.

	Submit Time	Printer	Document Name	Pages	Cost	Status
	Jan 16, 2012 1:52:07 PM	desktop-tom2\TestPrinter	Poster.pdf			Rendering successful. Preparing job for processing.
	Jan 16, 2012 1:51:49 PM	desktop-tom2\TestPrinter	Biology Homework.docx	1	$0.10	Held in a queue

At this stage the PaperCut Application Server accepts the uploaded document and sends it to the Web Print server. The Web Print server renders the document into a print queue by automating the process of opening the application (e.g. Adobe Reader) and printing to the target printer.

4.9.4.3. Scaling your Web Print environment

When using Sandbox mode, we recommend a minimum of two Web Print servers. Using only one Web Print server causes a single point of failure and potential bottlenecks. Best practices in server management recommend building redundancy into your network and monitoring the health of your environment.

However, two Web Print Servers might not be enough for sites that see very high Web Print throughput. While you can simply continue to add Web Print Servers until the Web Print performance during peak printing hours is acceptable, sites with particularly demanding throughput will benefit from using statistics for their capacity planning.

Analyzing these statistics will help you plan your Web Print deployment. While we recommend a minimum of two Web Print servers as a starting point, the unique demands and performance characteristics of your environment are the key drivers in determining what you need. You will need to balance the acceptable average wait time that is appropriate for your users, against the resources needed to deploy additional Web Print servers.

Note:
The use of multiple Web Print servers is available in PaperCut NG/MF 16.2 and later.

Determine the number of pending Web Print jobs

To statistically determine the number of Web Print servers you need to adequately handle your throughput, you should evaluate the number of pending jobs your system has awaiting Web Print processing.

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The Print System Health interface provides a monitoring endpoint that tracks the number of pending print jobs in a Web Print queue at a specific point in time. You can use this data to determine the average number of pending jobs as well as the maximum number during peak periods. For more information about this endpoint, see Base system health URL.

A direct link to this endpoint is available in the Admin web interface:

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **System Health Monitoring** section, click the **Detailed system information** link.

The attribute is `webPrint > pendingJobs`.

You can use a monitoring tool to accurately track how this value changes over time. A large number of pending Web Print jobs that rarely or never varies during printing hours, might indicate that users are experiencing consistently high wait times. If, however, the number of pending jobs peaks at random points in time, the average wait time might not be an issue. You can test if this is the case by submitting a number of test Web Print jobs during a peak print period, and timing how long it takes for the job to process. Good test documents would be a one page PDF and a one page Microsoft Word document.

1. Log in to the User web interface.
2. Submit a test Web Print job.
3. On the **Web Print** page, time how long it takes for each job to progress in the queue from having a **Status** of **Queued in position** to **Finished: Queued for printing**.

> **Tip:**
> You might need to manually refresh the page to keep across the changes in job status.

Averaging out the wait times incurred for test jobs during these periods of sustained high load provides an idea of the average time it takes to process a Web Print job in your current environment.

View historical Web Print trends

Historical data is another good tool for tuning your Web Print scaling setup. The number of jobs processed during key periods (for example, during peak times), will provide you with an estimated mapping of job numbers to average queue length. You can use this value to estimate future average queue lengths based on expected changes in the Web Print job load.

To generate a Web Print report:

1. Select **Reports > Printer**.

   The **Printer Reports** page is displayed.
2. In the **Print Log Reports** area, for the **Print logs** report, select **Adhoc** from the drop-down list.

   The **Ad-hoc Report: Print** logs page is displayed.

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3. In **From date**, enter the start date for the period you want to run the report.
4. In **To date**, enter the end date for the period you want to run the report.
5. In **Print method**, select **Web Print**.
6. In **Report Format**, select **CSV**.
7. Click **Run Report**.

   The report will be a spreadsheet containing information for all Web Print jobs performed over a specified interval of time.

It is a good idea to also compare the average wait times for jobs that can be processed by any of your Web Print servers (for example, PDF files) versus those that can be processed only by servers equipped with additional licensed software (for example, Microsoft Word documents). If jobs that require licensed software are taking significantly longer than those that can be processed by any Web Print server, you might want to consider purchasing additional licenses for the software and deploying it to a larger proportion of your Web Print servers.

You can use this report to determine the proportion of Web Print jobs of each file type, which can indicate if you need to license additional software for your Web Print servers. To do this, generate a separate report for each file type by entering values, such as **.doc**, **.pdf**, **.xls**, **.jpg**, in the **Document name** field. Sum the data provided in the **Total Printed Pages** or **Size (KB)** columns to give you an idea of the typical complexity of submitted jobs; a higher file size or page count indicates that a printed document was more complex, and thus would take longer for a Web Print server to render than a smaller job.

For a Web Print scaling example, see Web Print Scaling Example.

4. Add or remove a Web Print server

Your Web Print deployment can be scaled to meet the needs of your organization, removing bottlenecks and improving reliability. Web Print scaling through the use of multiple Web Print servers, increases throughput and minimizes users' wait time for print jobs. Using multiple servers also provides resilience against possible network and server outages.

For more information about determining the Web Print server requirements, see Scaling your Web Print environment.

Add a Web Print server

If you want to deploy multiple Web Print servers, you should:

1. Set up one Web Print server (see Set up Web Print: Sandbox mode).
2. Copy this machine's image to a new server.
3. Change the host name on the new server, and ensure the new hostname/IP address for the server is reflected in your network configuration (DNS, DHCP, etc).

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> **Note:**
> If you do not change the host name, the new Web Print server will function, but will not be displayed on the **Options > Mobile & BYOD** page in the **Web Print** status list.

4. Ensure that the Web Print server can print to all Web Print enabled printers.
5. In the Admin web interface, select **Options > Mobile & BYOD**.
6. In the **Web Print** area, check the following for the newly added server:
   - **Status**— check that the new server is in the list and the Status if **OK**.
   - **Version**—check that your Web Print servers have the same version. Web Print server versions earlier than 16.2 are not compatible with a multi-Web Print server environment, and should be either upgraded or removed from the cluster.

Remove a Web Print server

If you decommission a Web Print server, it will still be displayed in the Admin web interface on the **Options > Mobile & BYOD** page, in the **Web Print** area. However, the status of the server will be *ERROR*.

To remove a Web Print server from the Web Print server list:

1. In the Web Print hot folder, delete the following files:
   - `[server].web-print-server.activity`
   - `[server].web-print-server.status`

> **Tip:**
> By default, the hot folder is located at `[app-path]\server\data\web-print-hot-folder\`.

4.9.4.4. Monitor a Web Print server

You can monitor your Web Print servers in the following ways:

- View the Web Print server status in the Admin web interface
- Monitor the Web Print System Health endpoints using a monitoring tool

View the Web Print server status in the Admin web interface

1. Select **Options > Mobile & BYOD**.
   The **Mobile & BYOD** page is displayed.

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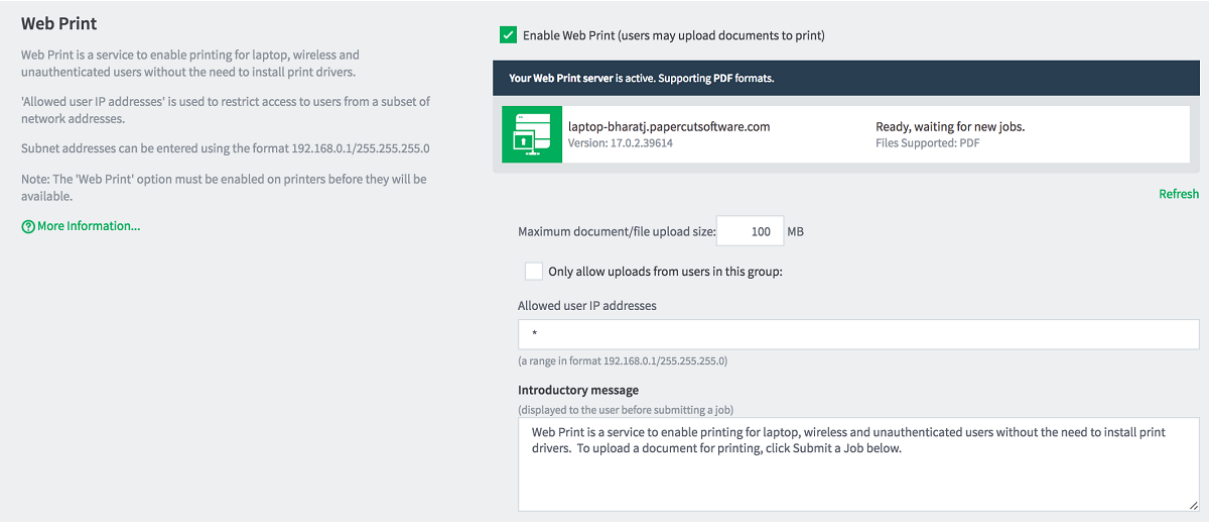
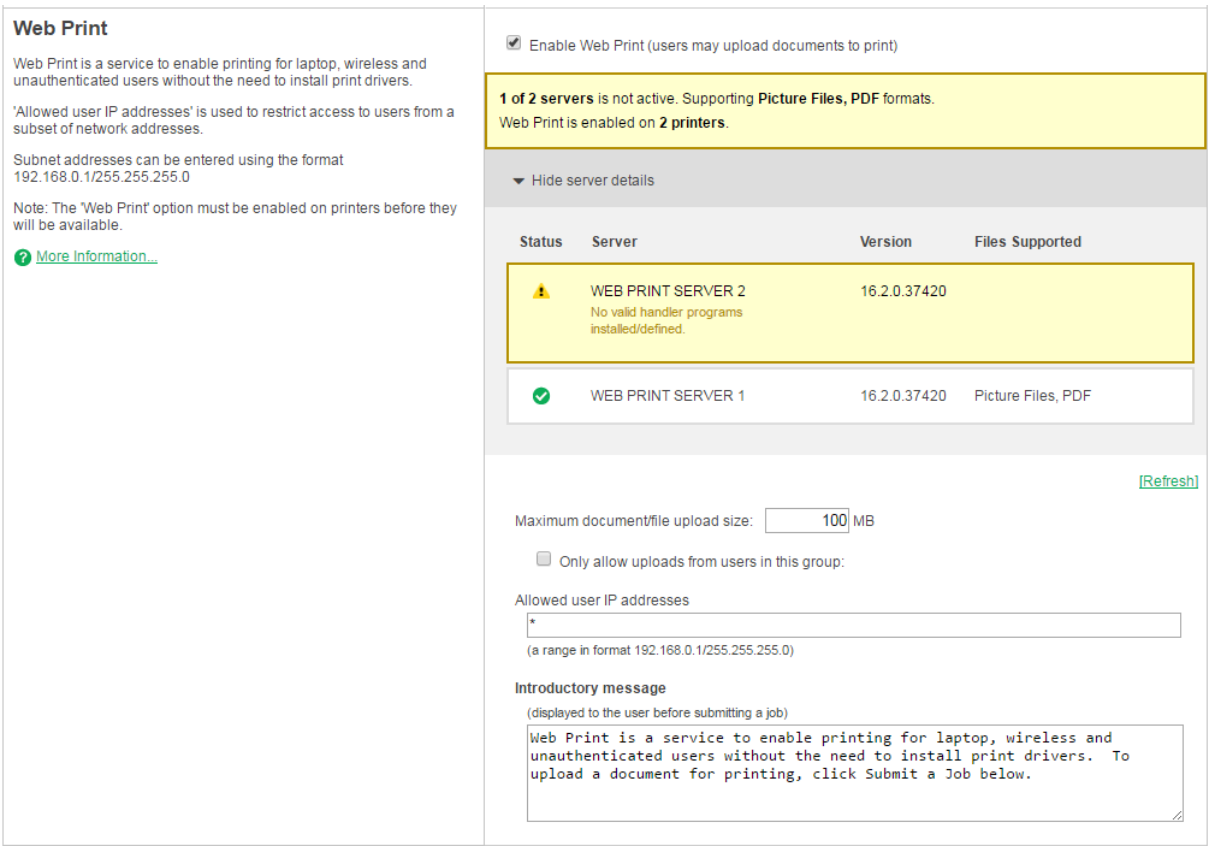
The **Web Print** area displays details of your Web Print servers. If you have only one Web Print server, the details are displayed as shown in the image below.



2. If you have multiple Web Print servers, click **Show server details**.



The following details are displayed for each Web Print server

- **Status**—an icon indicating whether the server is OK or in error.
- **Server**—the name of the server. If the server is in error, an error message is also displayed.
- **Version**—the version of the Web Print application installed on the server. You can use

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this to identify any servers that need to be updated.

- **Files Supported**—the file types supported by this server.

Monitor the Web Print System Health end-points using a monitoring tool

The Print System Health interface includes endpoints to monitor the health of your Web Print environment with your existing monitoring tool, giving you peace of mind that users can print and that waiting times in queues are low. For more information about using the System Health interface, see Monitor print system health.

4.9.4.5. Troubleshooting Web Print problems

Why are some file formats not available? (Supported file formats listed in Supported Applications and File Formats are not listed under Options > Mobile & Print > Web Print > Status page, or not accepted when uploading a file.)

First, check Supported Applications and File Formats to see that the file format is supported in the mode that the Web Print server is running in. Some file formats are only supported in sandbox mode.

Next, ensure that the associated application is installed and working. If running in sandbox mode, log in as the `webprint` user, then open and print a document with the application to ensure the user has the correct permissions.

The next step is to check the Web Print log files. The Web Print server has a *handler* for each supported application. Each handler has a log file, which can provide more information about why the file format is not available. The handler log files are named `web-print-handler-*.log`, where `*` is the name of the application. See below for the location of the Web Print logs folder.

Open the log file that matches the application of interest in a text editor (e.g. `web-print-handler-mso-word.log` for Microsoft Office Word documents). Check the log file for any obvious errors, such as not being able to find the application or problems launching it.

For further assistance, contact support.

The status in the Admin web interface or on the Web Print dialog is indicating an error. What can I do?

The Web Print server is not running or could not be contacted

When running in *Default mode*:

- The service `PaperCut Web Print Server` should be running.

When running in *Sandbox mode*:

- The Web Print dialog should be visible on the Web Print server, and the **Status** should not indicate any error.
- While logged onto the Web Print server as the `webprint` user, ensure that the mapped hot

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folder is accessible, has write permissions, and maps to:
`\\[app-server]\[app-path]\server\data\web-print-hot-folder\`.

- While logged onto the Web Print server, open the following file in a text editor:
  `[app-path]\providers\web-print\[platform]\web-print.conf`
  Ensure the `hotfolder=` option is set to the path to which you mapped the `web-print-hot-folder`.

For further assistance, contact support.

The Web Print service is running as the SYSTEM account, and does not have access to render print jobs.

Default mode

If running Web Print in *Default Mode*, check if the printer being printed to is running on the local computer. The SYSTEM account does not have privileges for printing to remote printers.

If the printer is remote, then check the steps listed in Default Mode Setup to ensure that the service is correctly configured to run as the `webprint` user account.

If the printer is local, check that the printer's privileges allow the SYSTEM account to print to it.

If the above steps do not fix the problem, then the failure is logged in `[app-path]/providers/web-print/[platform]/logs/web-print-handler-pdf.log`. Tech support will analyze this file, and help you find out the cause of the failure.

Sandbox mode

If running Web Print in *Sandbox Mode*, this error can indicate that the service `PaperCut Web Print Server` is running. This service is not required in sandbox mode, and should be *disabled*.

No valid handler programs installed/defined

See *Why are some file formats not available? (Supported file formats listed in the section called "Supported Applications and File Formats" are not listed under Options → Mobile & Print → Web Print → Status page, or not accepted when uploading a file.)*

The configured hot folder location is not writable.

- Check that the location indicated by **Hot folder** on the Web Print dialog is correct.
- As the `webprint` user, navigate to the configured `web-print-hot-folder`. Try creating an empty text file. If this action fails, there is a problem with permissions. Check the **Sharing** and **Security** (NTFS/file) permissions for `web-print-hot-folder` share on the PaperCut primary server. Allow the `webprint` user read and write access.

Other error messages

Check the Web Print server log file `web-print.log`. See *Where is the Web Print logs folder?* for the location of the logs directory.

For further assistance, contact PaperCut Software Support.

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Where is the Web Print logs folder?

A separate logs folder is located on each system running the Web Print server software. If you are running in Default mode, log files are collected from the PaperCut NG/MF Application Server. If running in Sandbox mode, the relevant log files are found on the Web Print server that is in error.

On Windows, the location of the logs folder depends on configuration and the Windows edition. Logs can be written to

`[app-path]\providers\web-print\win\logs\`, or to

`%USERPROFILE%\web-print-logs\`

(e.g. `C:\Users\[username]\web-print-logs\` on Windows Vista/2008.

For a definitive answer, open the following file on the PaperCut NG/MF Application Server in a text editor, and check the line beginning with `server.log-file=`:

`[app-path]\server\data\web-print-hot-folder\[server name].web-print-server.status`

Why is my print queue "currently not available"?

When using the Web Print interface, some print queues might display the following error message:

Errored: Printer '\\servername\queuename' is currently not available.

This can be caused by trying to use Web Print on a print queue that has been deleted, or by trying to print to a print queue that is not installed on the Web Print Sandbox. Confirm this by logging into the Web Print Sandbox as the Web Print user, and attempting to print to the above print queue.

Note:
It is important that the jobs pass via the queue on the server - do not add a Local Printer. You should also add the printers using the print server's machine name and not an IP address.

I've added multiple Web Print servers in Sandbox Mode, but Web Print jobs are taking the same amount of time to print?

First, check that your new Web Print servers are not in error. The status of your Web Print servers, along with information about any issues, is displayed in the Admin web interface under **Options > Mobile & BYOD**. The version of each Web Print server is also displayed here. Web Print servers running version 16.1 or earlier interacted with the Web Print hot folder in a different way, and are incompatible with Web Print version 16.2 or later. If a Web Print server running version 16.1 or older is detected, all other Web Print servers will stop accepting jobs until this older Web Print server is updated to version 16.2 or later.

Adding more Web Print servers does not improve the time taken to render each individual Web Print job, but it does allow multiple jobs to be rendered at the same time.

Can I improve Web Print job speed by increasing the resources allocated to my Web Print servers?

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To an extent, yes. To ensure stable performance, we recommend that each Web Print server has two cores and a minimum of 2GB of memory. Adding more cores beyond this will not further improve performance. Instead, improving the priority/performance of each core will potentially improve job rendering times. Also, adding more Web Print servers allows multiple jobs to be rendered at the same time.

4.9.4.6. Install the XPS Viewer

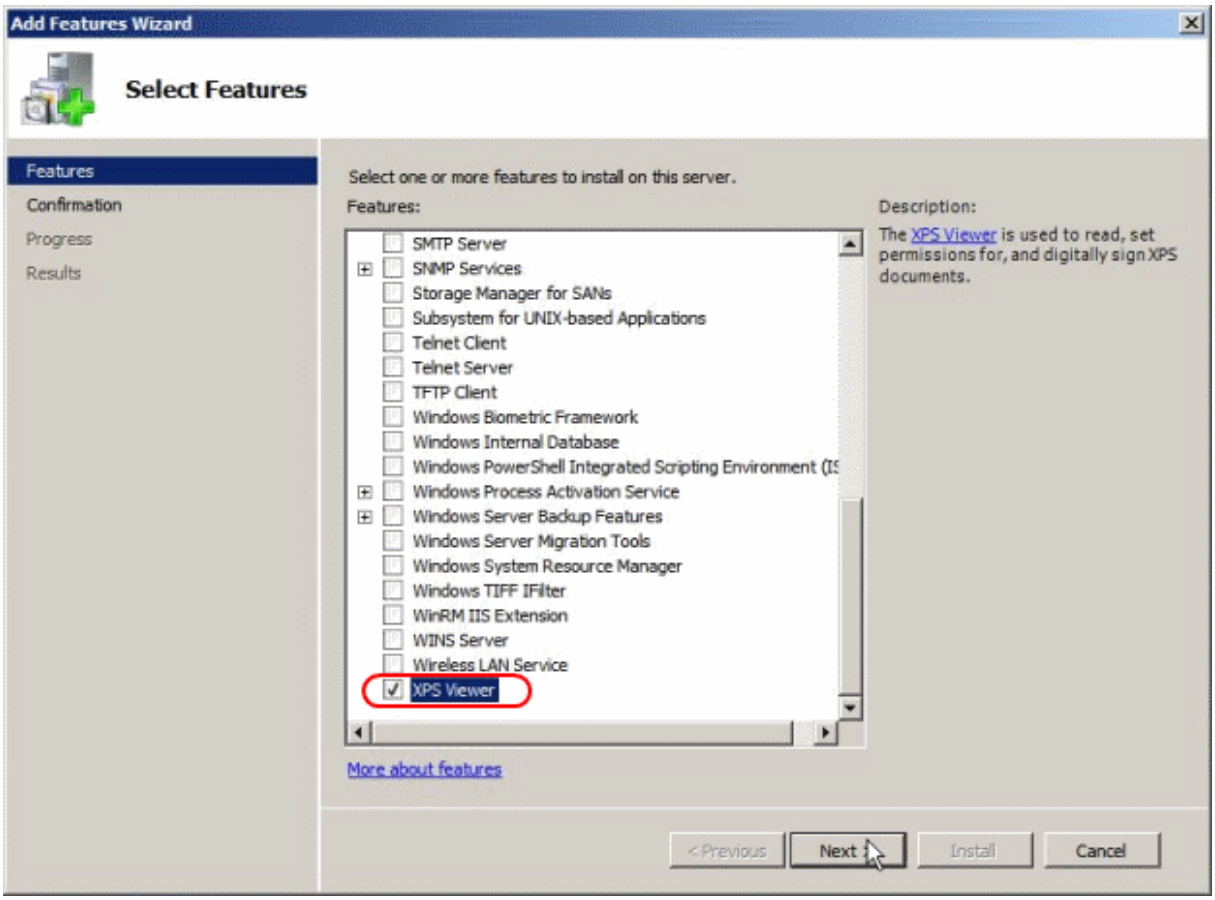
By default, Windows 7, 8, and some versions of 10 includes a compatible XPS Viewer if .NET Framework 3.0 is already installed.

- Microsoft XML Paper Specification Essentials Pack

For other versions of Windows, you may need to install XPS Viewer from **Apps and Features** in the **Settings** app.

Customers running Microsoft Windows Server 2008, must install the XPS Viewer from the Features module of the Server Manager MMC snap-in.

1. Load the Server Manager MMC snap in via **Start menu > Administrative Tools > Server Manager** .
2. Right-click **Features**; then select **Add Feature**.
3. Select the **XPS Viewer** check box; then click **Next**.



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4. On the **Confirm Installation Selections** dialog box, click **Install** .
5. When the installation is complete, click **Close** .

4.9.5. iOS printing (iPad & iPhone)

PaperCut NG/MF's iPad / iPhone Printing support enables printing to all your PaperCut NG/MF managed printers across your enterprise (and iOS devices - iPad, iPhone, iPod Touch). As well as enabling printing, the PaperCut NG/MF iPad / iPhone App also provides the rich functionality desktop users are used to, such as authentication, balance display and selecting / charging to Shared accounts when printing.

The PaperCut NG/MF iPad / iPhone App is able to be deployed / installed in a pre-configured form for your network via a simple URL.

PaperCut NG/MF's iPad / iPhone Printing support works by providing two key parts:

1. The PaperCut NG/MF Printer Advertiser - advertises the Apple CUPS printers managed by PaperCut NG/MF using Bonjour/mDNS (so the iPads / iPhones users can find the PaperCut NG/MF controlled queues).
2. The PaperCut NG/MF iOS App, providing support for print authentication, balance display, account selection and other features.

At the time of writing there is no built-in option provided by Apple to print from an iOS device to server shared print queues. PaperCut NG/MF uses existing technologies built into Mac OS (Bonjour/mDNS) to advertise PaperCut NG/MF managed server shared print queues so you an track and control iPad / iPhone printing. Mobility Print, however, allows you to see the print queues across multiple subnets. For more information, see Mobility Print.

Some printers include built-in support for AirPrint® (for printing direct from iOS devices to the printer), however, the nature of print control/accounting requires that print jobs are intercepted by a central server. Additionally, most larger organizations want to leverage their existing print infrastructure, policies and print rules rather than change them. PaperCut NG/MF's solution for iPad / iPhone Printing now allows you to leverage your existing network and PaperCut NG/MF setup.

Note: "AirPrint" is a registered trademark of Apple Inc.

4.9.5.1. Requirements

1. Mac OS X 10.10 or greater system to share the print queues (computer version is fine, server tools not required)
2. Apple iOS 5 or greater devices to print from
3. Wireless network

The PaperCut Printer Advertiser is a part of the PaperCut primary and secondary server installation and advertises the PaperCut print queues to iOS devices.

For Windows, Linux or Novell sites (or sites with a Mac OS 10.6 or older print server they would prefer not to upgrade), you can configure a separate (secondary) Mac OS 10.8 print server to share

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print queues. This can be as simple as purchasing a *Mac Mini* system and making it accessible from the wireless network.

4.9.5.2. Sharing printers to iOS devices

1. Set up a Mac OS 10.8+ system to act as your iPad / iPhone print server. This can be your existing Mac print server (if it meets the system requirements), or a separate (secondary) print server (see Configure a Macintosh secondary print server for details).
2. Install the print queues and drivers for the printers you want to share to your iOS devices. These print queues should point directly to the printer, not another print server.
3. Test printing from a local application (e.g. Safari) to ensure that the drivers and printers are functioning correctly.
4. Install PaperCut. If you are setting up a secondary Mac print server (i.e. the primary PaperCut server is on another system), follow the steps at Configure a Macintosh secondary print server.

   Ensure that your Mac server is connected to the same subnet as the wireless network that the iOS devices will connect to. Without further configuration, the publishing protocol Bonjour broadcasts to the local subnet only and devices on other subnets will not see your printers.

   You can overcome the single subnet limitation by connecting your Mac server to multiple subnets. If you are using a cabled network, your Mac needs a separate Ethernet interface for each network connection. However, if you are using a wireless network, you can add multiple IP addresses, one for each subnet, to the same network interface. To add multiple addresses to a wireless interface:

   a. Open Network Preferences (**System Preferences > Network**); then select your wireless interface.
   b. Click the gear icon underneath the interface list; then select **Duplicate Service**.
   c. Enter a name for your new network; then click **Duplicate**.
   d. Select the duplicated network connection; then click **Advanced**.
   e. Click the **TCP/IP** tab; then select **Configure IPv4 Manually**.
   f. Enter an IPv4 address for the subnet you want to connect to.

      Your chosen IP address must be unique. Make sure you choose an IP address outside the DHCP address allocation range so there are no address conflicts. Alternatively, you can configure DHCP to permanently reserve the chosen address for your Mac Server. (DHCP configuration is normally performed on your network router.)
5. *Share* all the printers that you want to publish to iOS devices: **System Preferences > Print & Scan > [select printer] > Share this printer on the network** (to do this, **Printer Sharing** must first be enabled in the **Sharing** pane).

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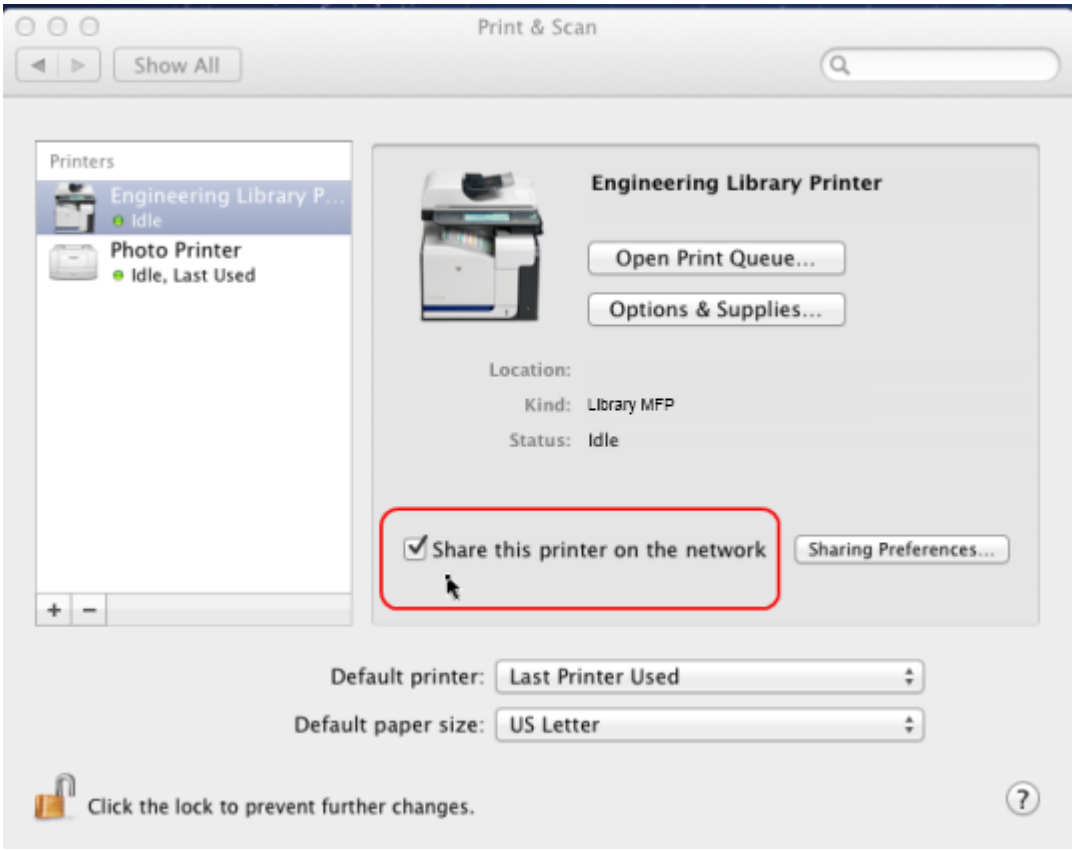

6. Run `/Applications/PaperCut NG/MF/Control Printer Monitoring.command`; then choose to *disable* print tracking on the print queues that will be shared (see On Mac for details). This allows you to test iOS Printing functionality without PaperCut's monitoring involved (to limit what is being tested).
7. Print a document from your iOS device e.g. open Safari, load a web page, touch the "arrow" menu; then select **Print**. When selecting a printer, the queues shared from your Mac print server are displayed (if not, see Troubleshooting). The job should print correctly.
8. Test printing across a number of printers and apps such as Mail, Safari, Photos and iBooks / PDFs. Not all printers are capable of supporting all formats. Take the time to test and ensure the printers that you are making available produce acceptable results.
9. Re-enable PaperCut tracking using `/Applications/PaperCut NG/MF/Control Printer Monitoring.command` (see On Mac for details).

You now need to install the iPad / iPhone app (Mobile web client) to print. See the next section for details.

4.9.5.3. The Mobile web client (web clip)

The Mobile web client is required for printing to PaperCut managed printers. This tool authenticates each print job - effectively linking up users with their print jobs. It can also provide balance display, print job confirmation, user interactions required for Account selection, and message notifications, etc.

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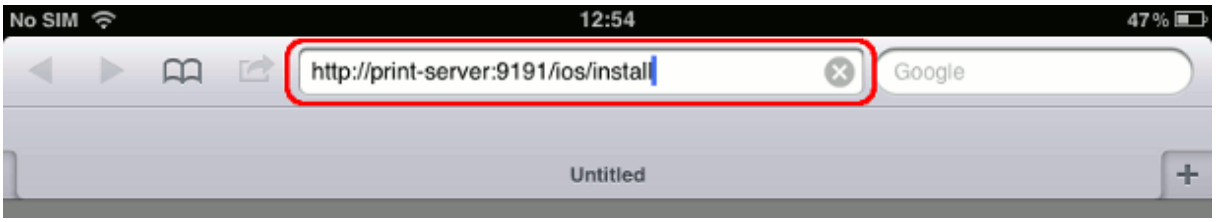
Important: Running the Mobile web client is mandatory even if user interactions required for Account selectioncan be done BOTH via the Mobile web client AND at the printing device (the ability to assign accounts at the printing device is available). For more information, see Assigning accounts to print jobs at the device.

Deployment

Deploying the Mobile web client on an iOS device involves the user accessing the following URL:

http://[primary-server]:9191/ios/install,

where `[primary-server]` is the preferred hostname or IP address of your primary PaperCut server.



Tip:
For easier distribution of the installation URL, try adding a link on an intranet page, sending it in an email or printing the URL on posters. It might help to add a short DNS name for your print server or even set up a simple redirect URL (e.g. http://myorg/ios/install > http://print-server.myorg.edu:9191/ios/install).

After accessing the installation URL on an iPad / iPhone (iOS device), an **Install Profile** dialog is displayed. Follow the prompts to create a **Printing** Web Clip to access the Mobile web client.

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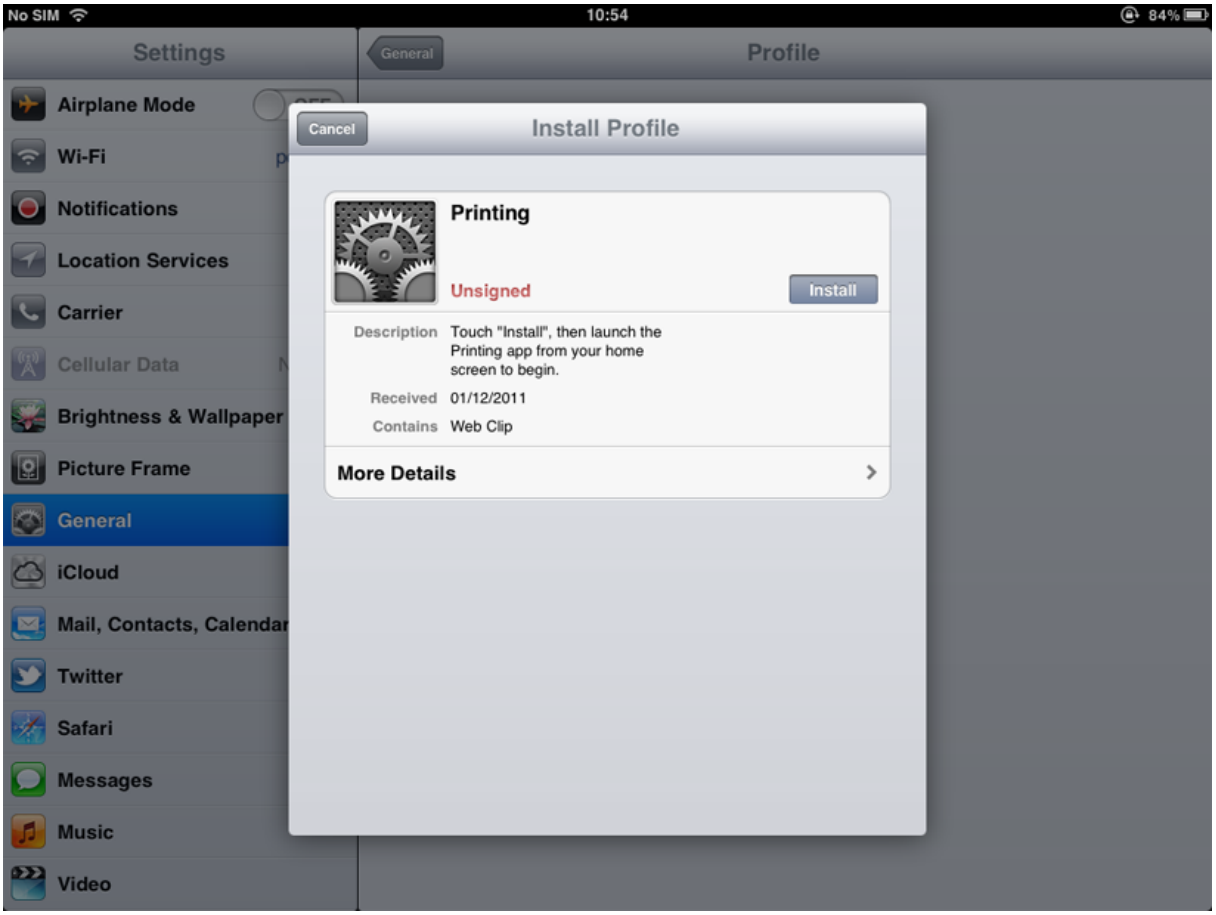

For alternative and advanced deployment options, see Advanced App Deployment.

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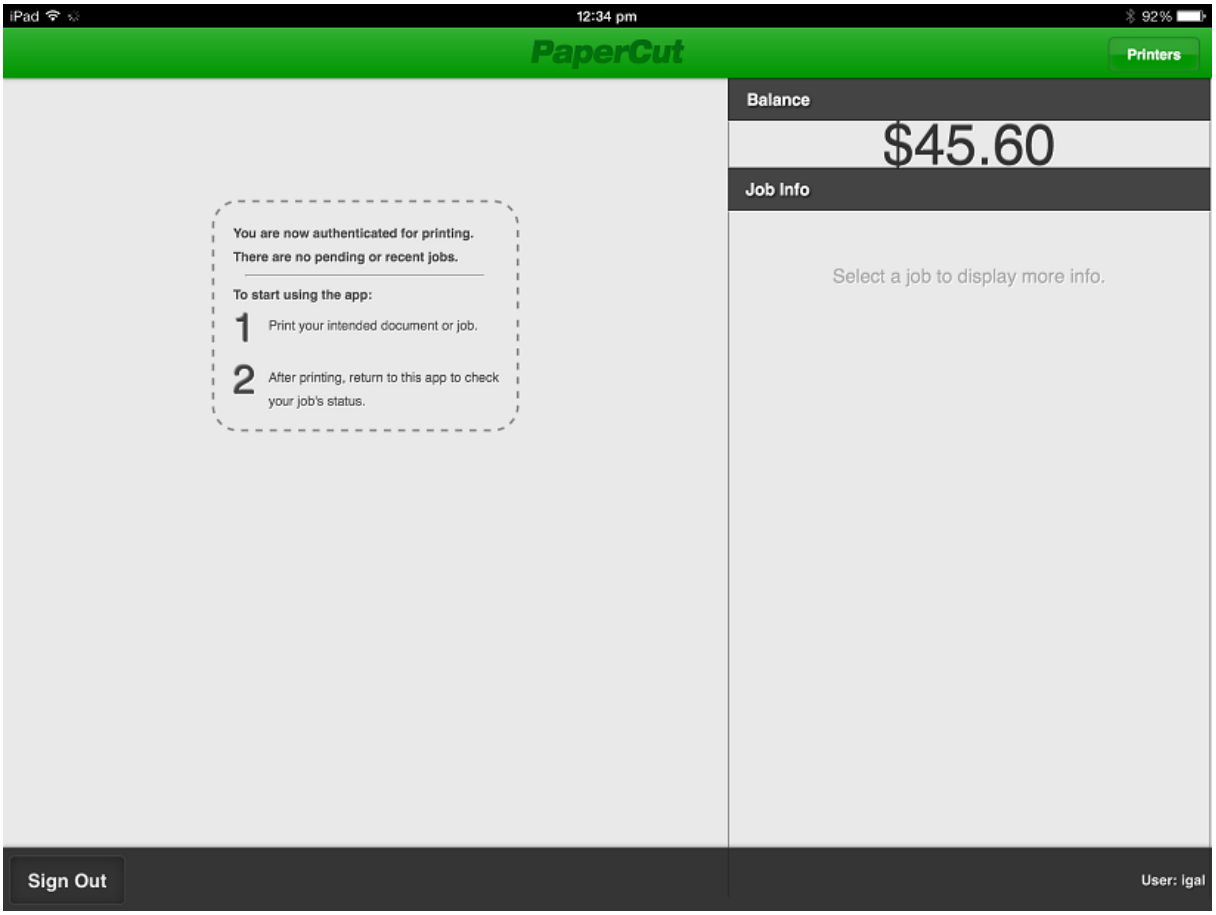
Usage

The PaperCut Mobile web client is used to:

- Authenticate the user and their print jobs.
- Display the user's balance.
- Perform print job confirmation.
- Perform Shared accounts selection.
- Display Advanced scripting (print scripting) messages.
- Perform other functionality such as message notification.



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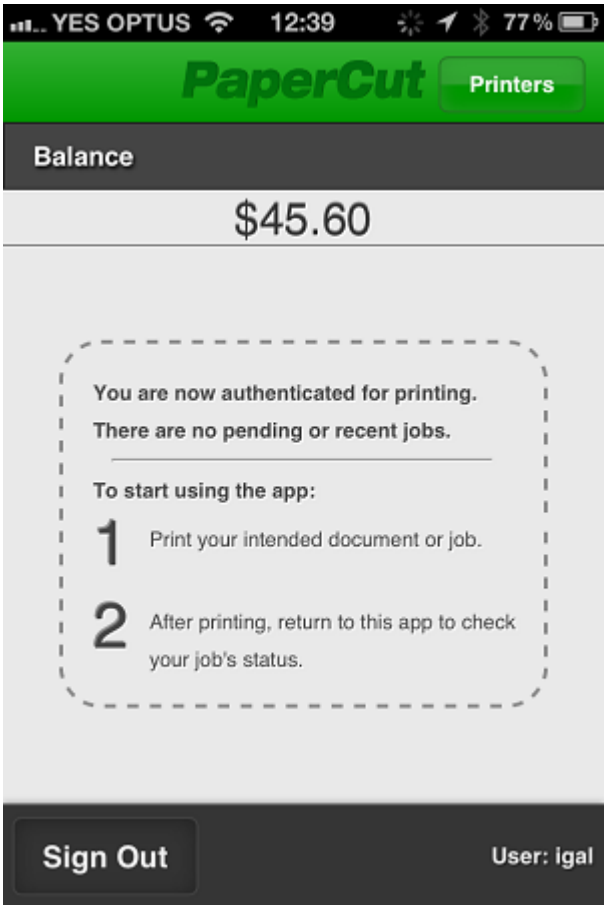

The following examples illustrate typical usage of the App for a student (immediate print) and a staff member (account selection).

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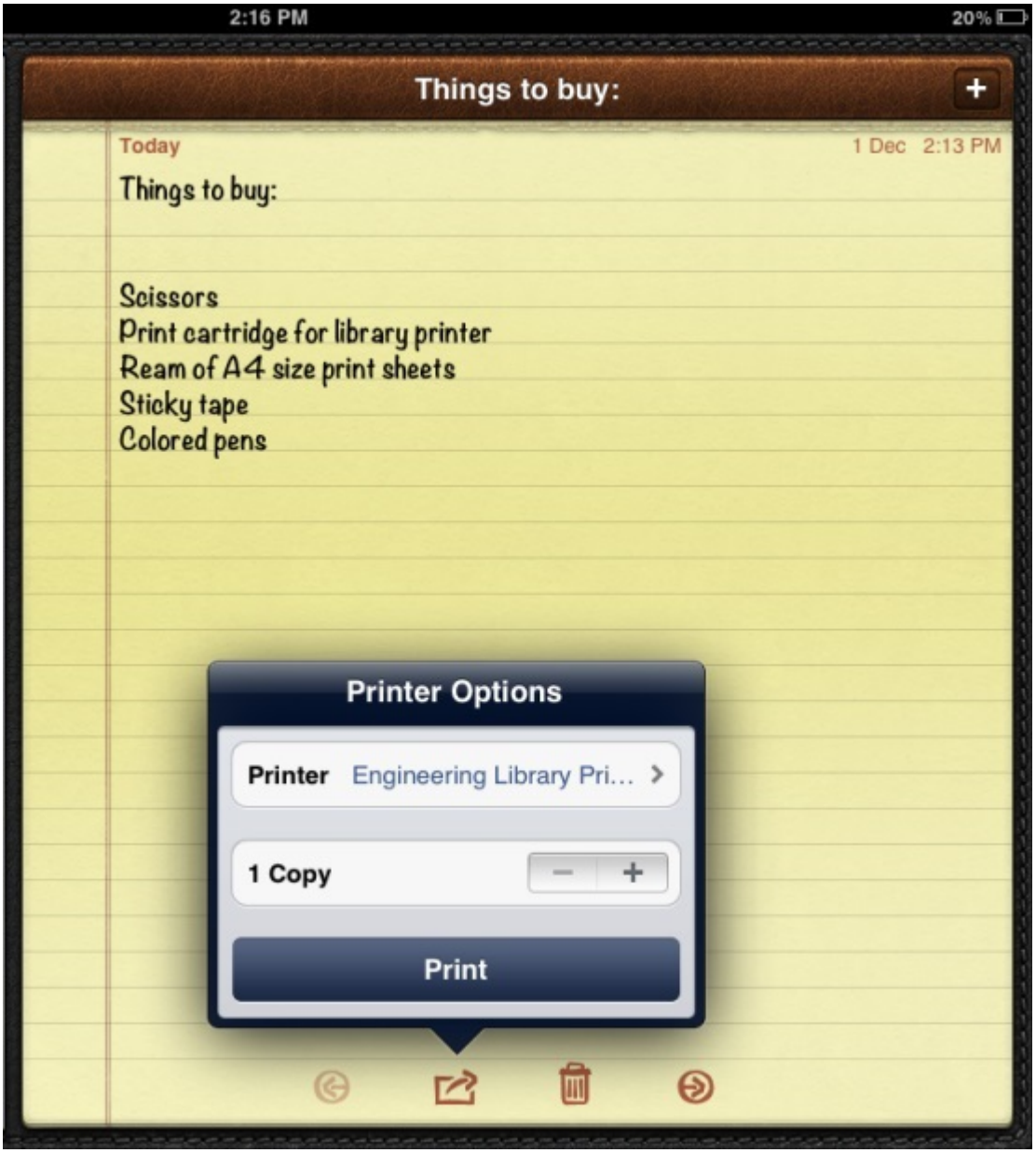
Scenario: Student printing

1. The student prints from their selected app.



2. The student closes the app and opens the Printing (PaperCut) app.

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3. The student enters their username and password. On a personal device this step only needs to be performed once. Future logins are performed automatically through the use of an authentication cookie.

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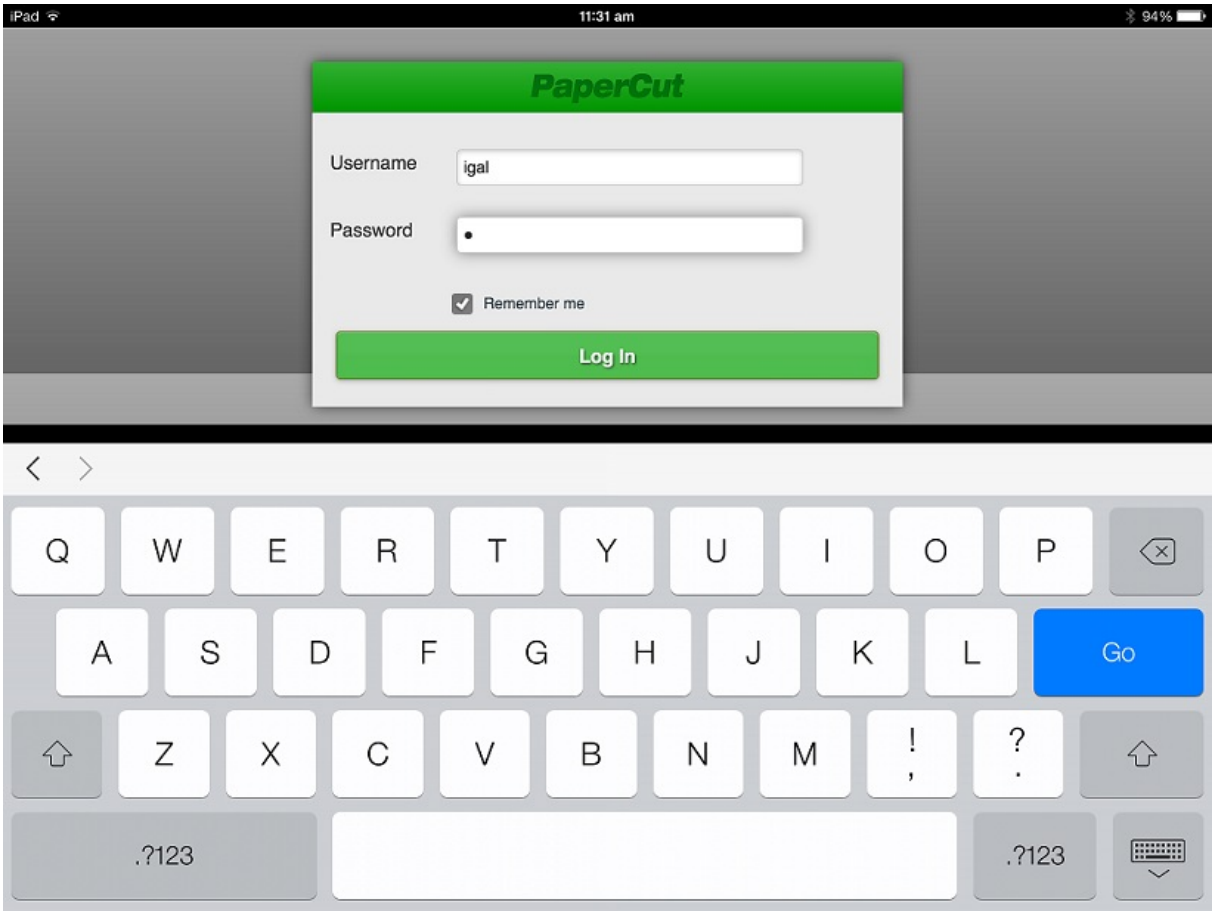

4. The student's print job is authentication and proceeds to print. The student can see their job's progress in the app.

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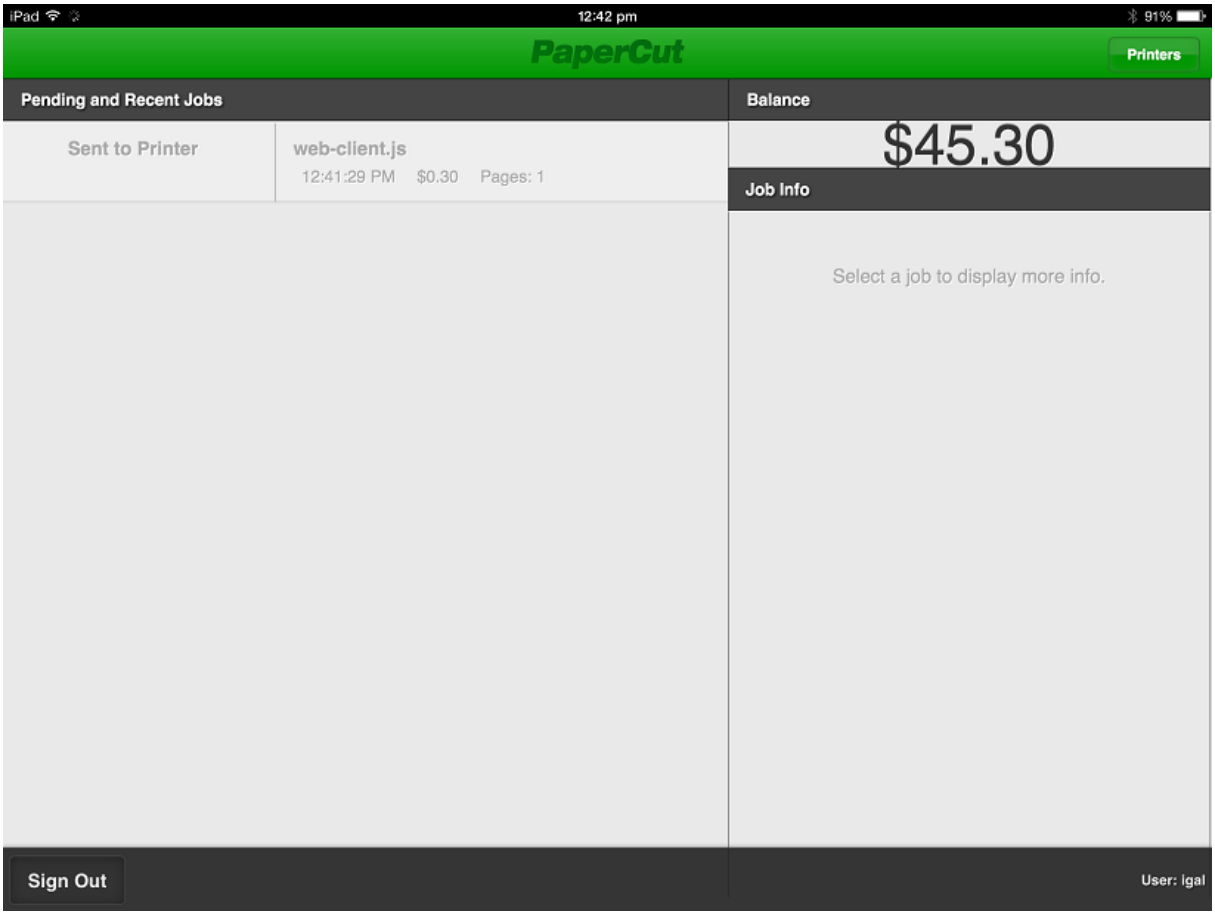

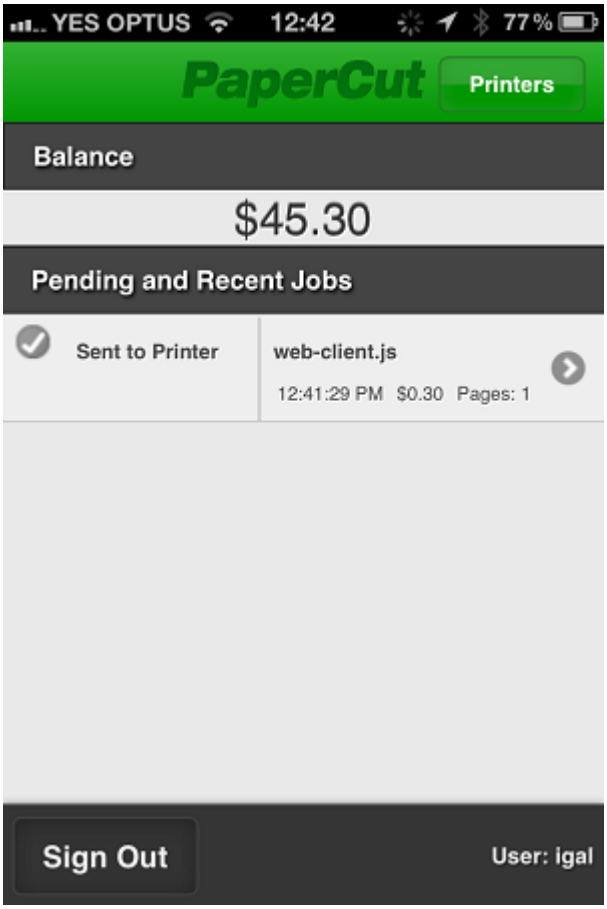

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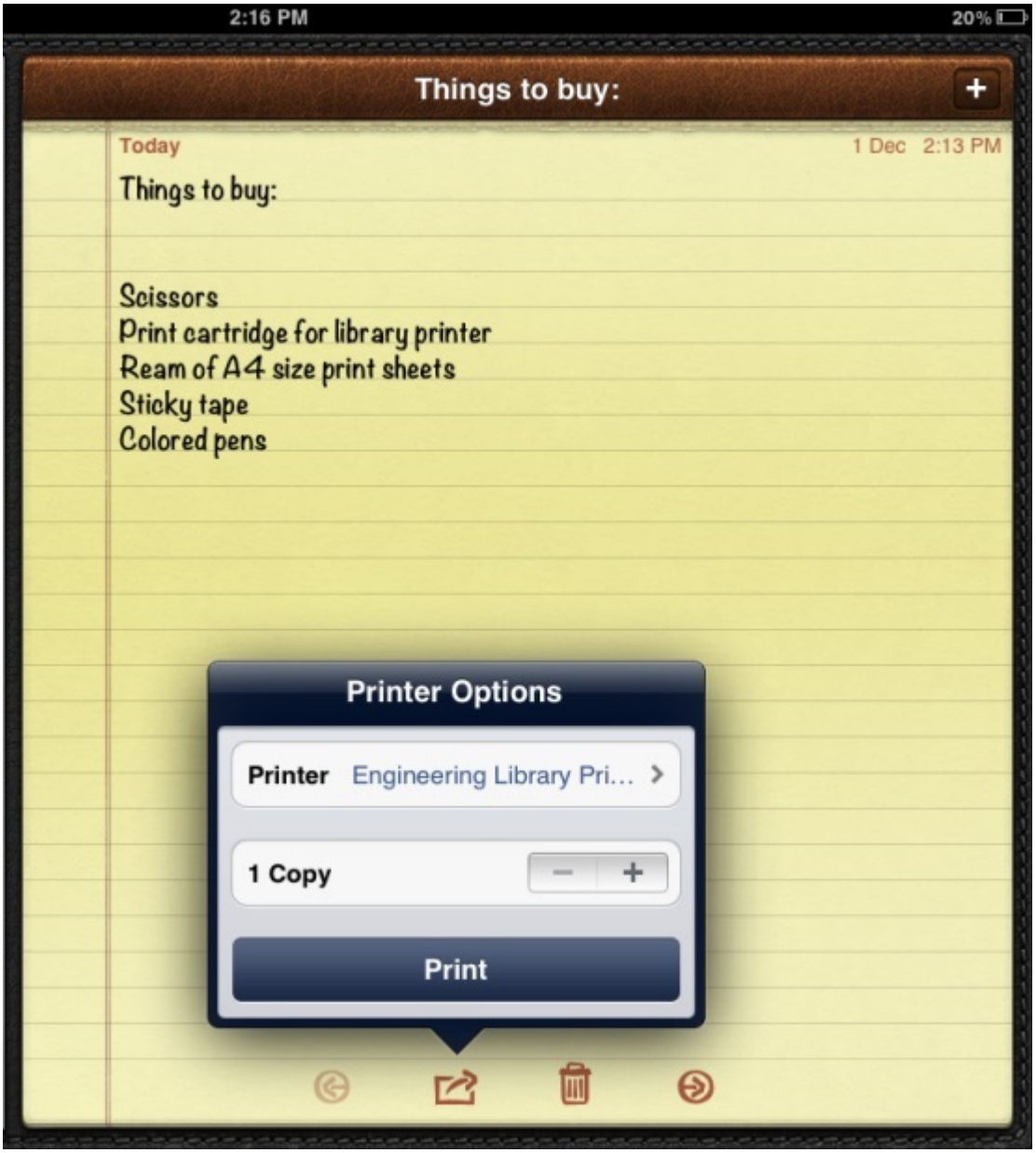
Scenario: Staff printing (account selection)

1. The staff member prints from their selected app.



2. The staff member closes the app and opens the Printing (PaperCut) app.

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3. The staff member enters their username and password. On a personal device this step only needs to be performed once. Future logins are performed automatically through the use of an authentication cookie.

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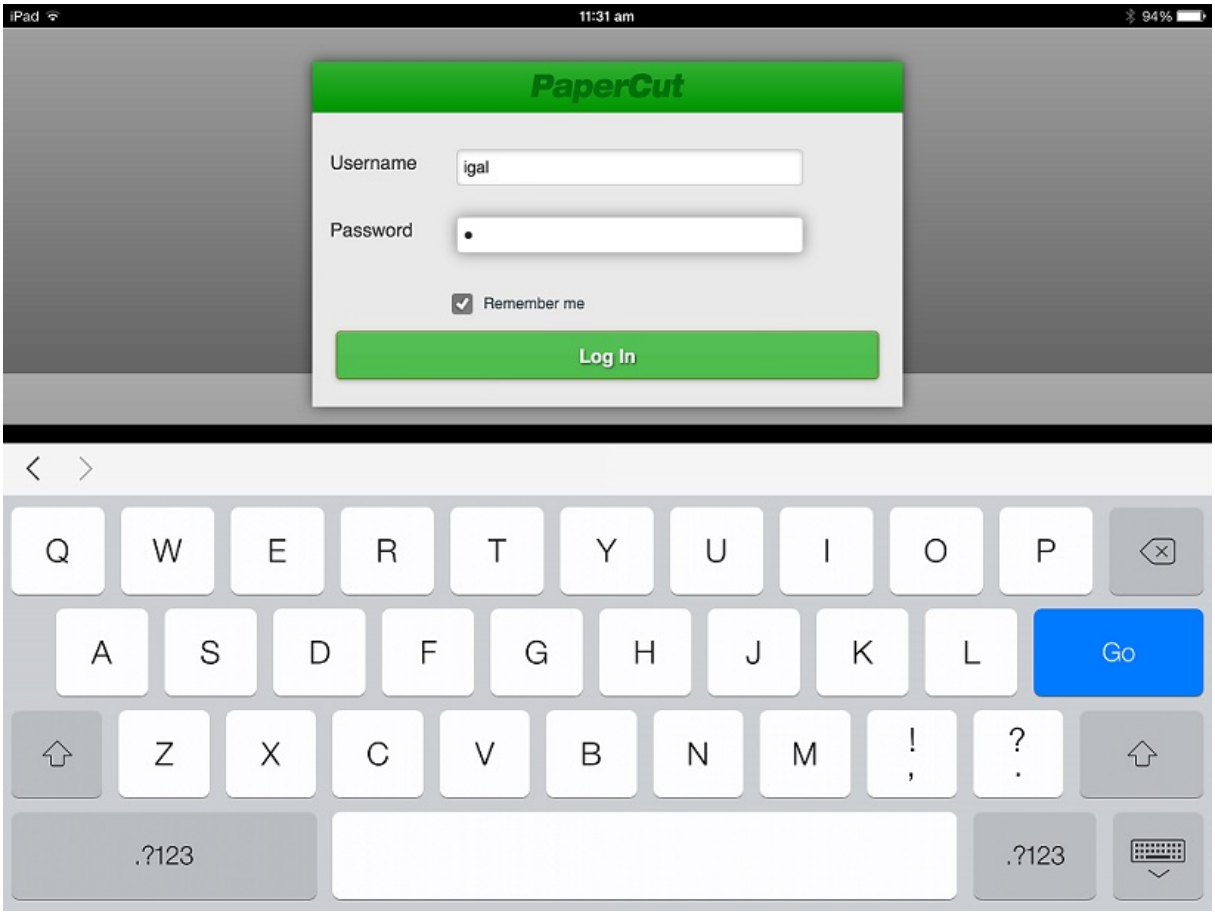

4. The print job is authenticated and is ready for account selection. The account selection dialog is displayed.

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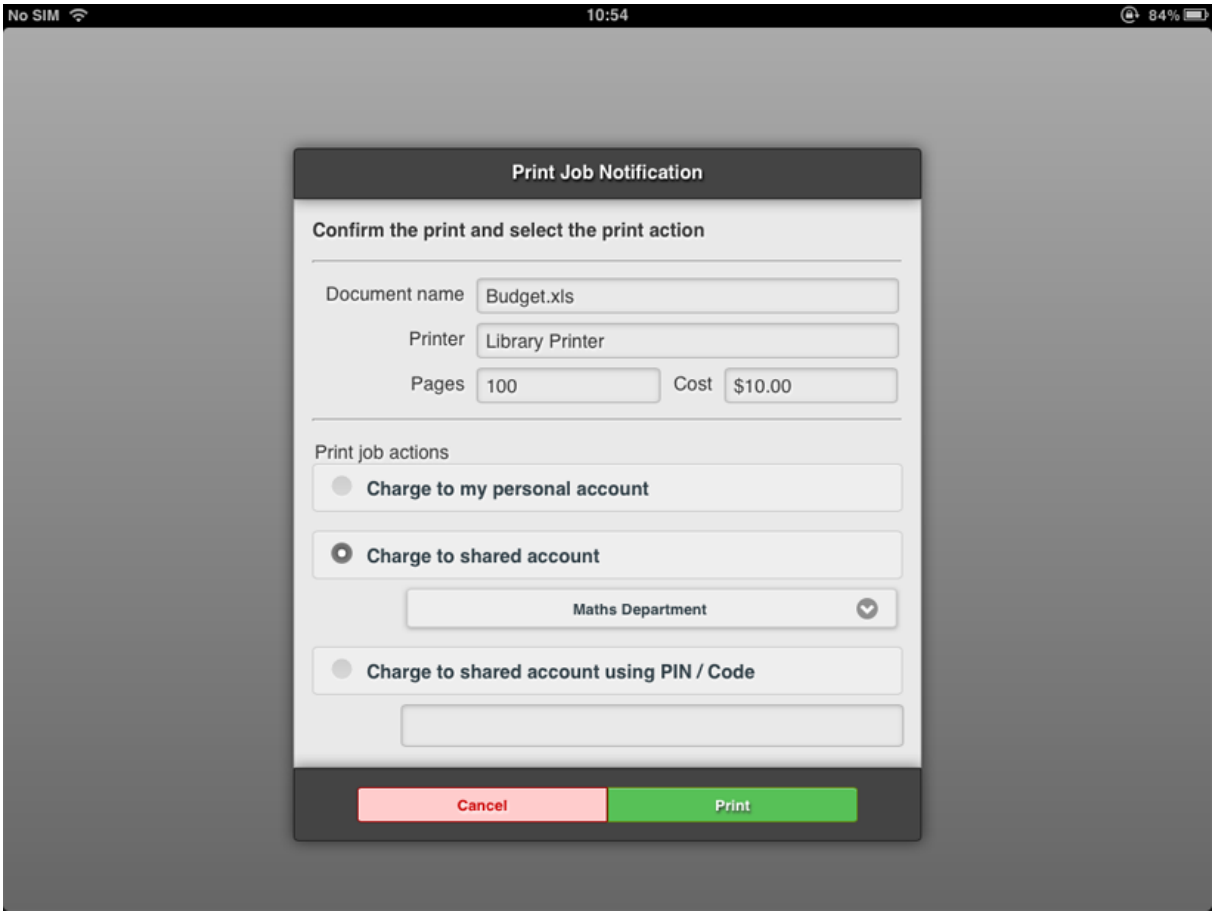

5. The staff member selects their chosen shared account and touches **Print**. The job prints, and the staff member can see their job's progress in the app.

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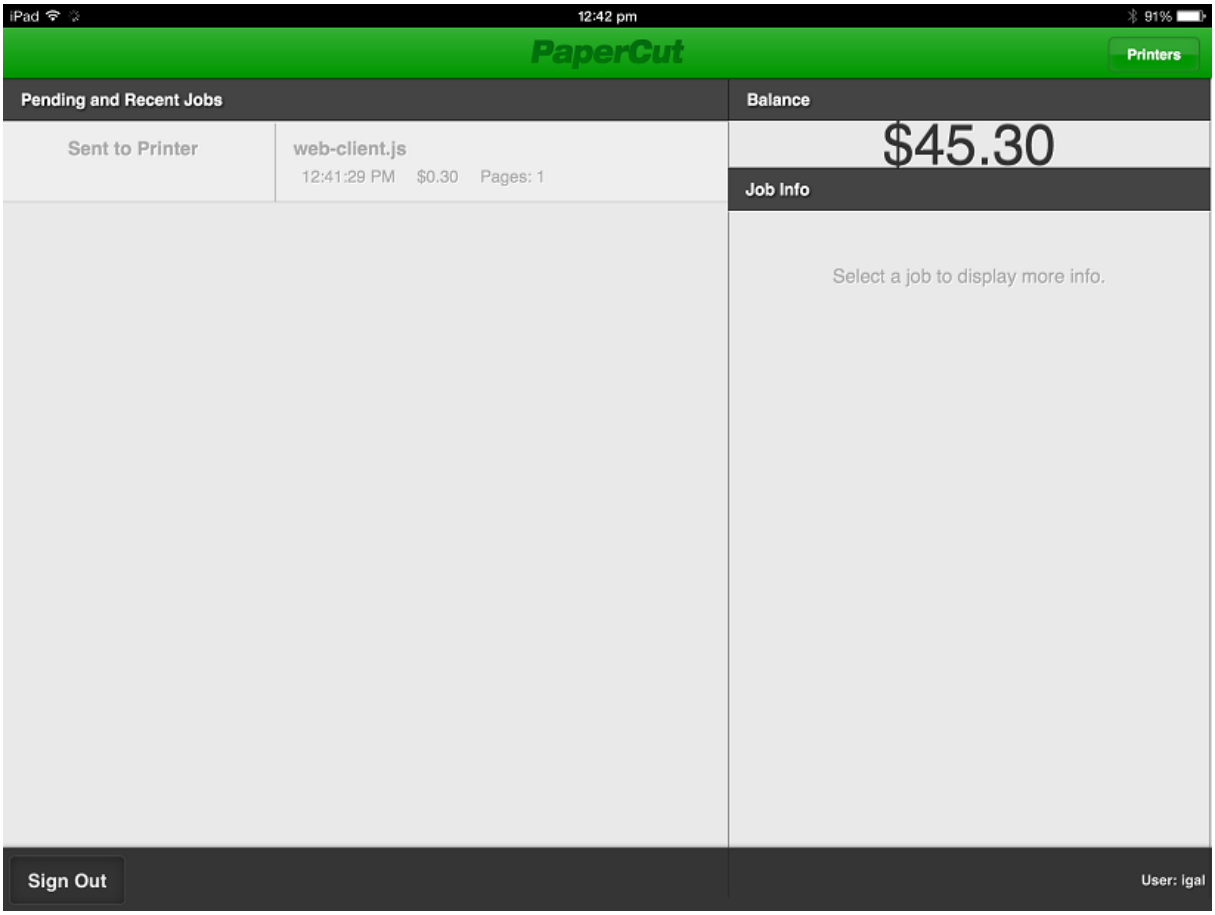

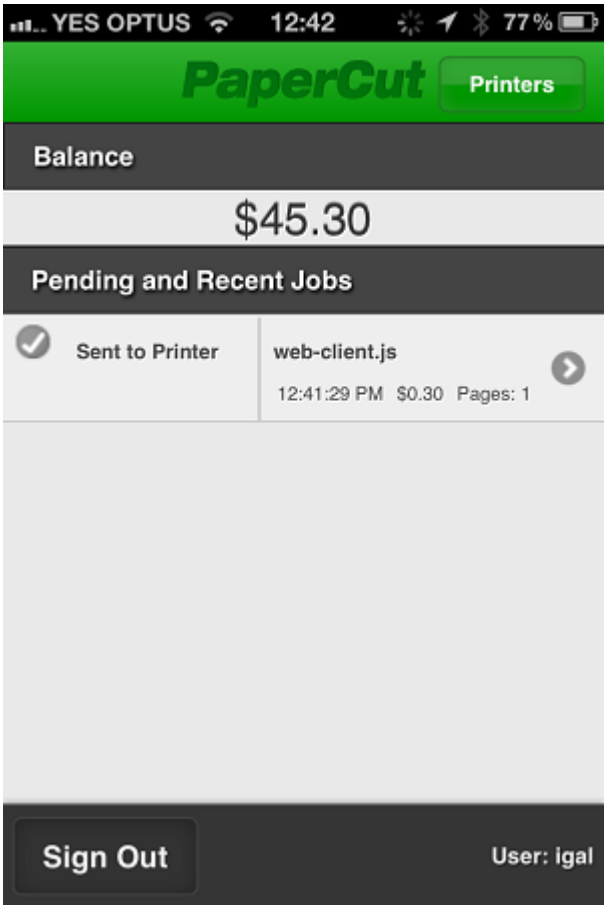

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4.9.5.4. Troubleshooting & FAQ

Jobs won't print.

1. Are you printing double sided? Try turning double sided off. There seems to be issues with double sided printing on some iOS devices, as of iOS 5.0.1.
2. Try printing with PaperCut tracking disabled (using `/Applications/PaperCut NG/MF/Control Printer Monitoring.command`) to help diagnose the problem (see On Mac for details).

My printers don't show up on the iOS devices when selecting a printer.

1. Ensure that the printers are *shared* on the Mac server.
2. Ensure that PaperCut is installed on the Mac server (primary or secondary server install).
3. It can take a few minutes before the printers show up on the iOS devices. Has it been that long since sharing the printers?
4. Ensure that the Mac server is on the same subnet as the iOS devices. Bonjour/mDNS, the protocol used to publish/advertise the print queues, is broadcasted only to the local subnet without further configuration (a "reflector", the configuration of which is beyond the scope of the documentation).

   You can overcome this limitation by connecting a wireless interface on your Mac server to multiple subnets. For more information, see Sharing Printers to iOS Devices.
5. Try rebooting the Mac server. This refreshes the list of available printers and restarts the Bonjour services that publish them.

My jobs do not show in the iPad / iPhone App.

PaperCut uses the IP address of your iOS device to determine which jobs to display. If you access PaperCut via a proxy server, the remote IP address might not be immediately accessible and jobs will not be displayed.

Some proxy servers retain the remote IP address in an X-Forwarded-For header. PaperCut can use this header to obtain the remote IP address, but for security reasons you must first add your proxy servers to PaperCut's list of trusted proxy servers.

In PaperCut's Admin web interface:

1. Go to **Settings > Advanced > Security**
2. Add the IP addresses of your proxy servers to the Trusted Proxy Servers list.
3. Click **Apply**.

Other users' jobs are showing up in the PaperCut iPad / iPhone App.

1. The IP addresses of the iOS devices must be unique. Ensure that the devices are not behind a NAT relative to the Mac print server sharing the print queues.
2. If just one other user's jobs are showing up, ensure that the DHCP lease times aren't too short.

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I changed a printer's Location field and it's not reflected on the devices.

Changes to the printer's location and name are not reflected immediately. You might need to restart the system or services to promptly broadcast these changes.

Under what username do jobs from iOS devices arrive in the print queue?

`guest`. The CUPS web interface displays this username as **Withheld**.

Jobs are printing as `[generic account]`, e.g. "`guest`".

Ensure that `[generic account]` is marked as **Unauthenticated** in PaperCut.

How do I uninstall / reinstall the PaperCut App on my iPad / iPhone?

1. Delete the **Printing** app (Web Clip) (hold your finger down over the app until the icons "go wobbly", then touch the cross icon next to the app).
2. Delete the **Printing** profile via **Settings > General > Profile > Printing > Remove** It is important that the app / Web Clip is deleted before deleting the profile (if not, problems have been reported such as multiple blank icons returning once the profile is reinstalled, as of iOS 5.0.1).
3. To reinstall, follow the installation procedure again.

How do I prevent a printer being shared?

See Limiting Printer Deployment.

How do I disable or re-enable iOS printing support on a Mac Print server?

There are two commands that you can run from the OS X termninal or the OS X Finder:

- `[app-path]/providers/iosprint/mac/disable-iosprint.command`. Stops (and disables) the iOS print service and creates a marker file that is used during susbquent upgrades to respect the iOS print status.
- `[app-path]/providers/iosprint/mac/start-iosprint.command`. Enables (and starts) the iOS print service and removes the marker file.

Can the PaperCut App for iPad / iPhone Printing display print scripting popups?

Yes. Scripting popups for the PaperCut App is possible.

4.9.5.5. Advanced iPad / iPhone printing setup

iPad / iPhone printing technical description

PaperCut for iPad / iPhone Printing works by providing four distinct parts:

1. PaperCut enables Mac OS's built-in Bonjour/mDNS publishing to advertise/publish PaperCut managed/tracked shared print queues, so that they are displayed in the **Print** menu on iOS devices (on the same network).

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2. CUPS on Mac OS accepts print jobs (as PDF) and renders them into the queue's target printer language (generally PostScript).
3. PaperCut identifies the print jobs, generally arriving as user `guest`, as being unauthenticated. The device IP address is used to identify the device sending the print job.
4. The PaperCut App on the iOS device is used to authenticate the user from their device IP address, linking their print jobs with their username.
5. The App receives directions from the PaperCut server, such as to display print job details or account selection.

Limiting printer deployment

When PaperCut is installed on a Mac OS 10.8+ print server, all PaperCut NG/MF *managed and shared* printers are published (made available) to iOS devices by default (see Sharing Printers to iOS Devices for details). If you want to share printers to OS X (desktop) systems but not to iOS devices, you can turn off broadcasting/advertising by adding "`No iOS`" anywhere in the printer's location field, then restarting the system e.g.:

1. Select **System Preferences > Print & Scan > [select printer] > Options & Supplies > Location**
2. In **Location**, enter the text "`No iOS`" te.g. "`Lab G4.01 (No iOS)`".
3. Restart the system for this change to take effect.

Advanced app deployment

Large deployments such as universities, school districts or corporations with organization-wide iPad / iPhone deployments might want to consider more advanced app deployment techniques. Other than the standard URL based (Configuration Profile) deployment covered in Deployment, there are several other deployment options, all of which are compatible with PaperCut:

- If you are using the iPhone Configuration Utility to distribute Configuration Profiles to your iOS devices, you can a Web Clip to them. Use a URL of the form http://[primary-server]:9191/ios. If you are using an SSL certificate with PaperCut that is trusted by your iOS devices, you can use an HTTPS URL of the form https://[primary-server]:9192/ios. You can find an icon at http://[primary-server]:9191/images/icons2/72x72/web-client.png.
- If you are using a Mobile Device Management (MDM) server to send configuration to your iOS devices, you can add distribution of the PaperCut App as a Web Clip. Use a URL of the form http://[primary-server]:9191/ios. If you are using an SSL certificate with PaperCut that is trusted by your iOS devices, you can use an HTTPS URL of the form https://[primary-server]:9192/ios. You can find an icon at http://[primary-server]:9191/images/icons2/72x72/web-client.png.
- You can access the PaperCut App for iOS devices from Safari using a URL of the form http://[primary-server]:9191/ios. From here, you can either continue to use the app in Safari, or select **Add to Home Screen** from the "arrow" menu. Launching the App from the home screen is recommended for the best experience.

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4.9.6. Mobile Print Release—releasing print jobs using your mobile device

Document security is an important requirement in the modern print environment. In a standard environment a user's job prints immediately and can accidentally be collected by another user. This problem is usually addressed with Secure print release by implementing dedicated Release Stations, embedded MFD applications, or specialist hardware.

PaperCut NG/MF's Mobile Print Release provides an alternate, cost-effective solution that leverages the powerful devices that exist in almost everyone's pocket—the mobile phone.

Features:

- Release held jobs from any print queue with hold/release enabled
- Simple intuitive interface, optimized for touch screens
- Designed to work with most modern cell and tablet devices
- Quickly locate printers with keyword searching (location, name, or code)
- Can be used in environments with Find-Me Printing configured, giving the user ultimate control over where and when their jobs are released
- Supports QR code printer location/lookup

Requirements:

- iPhone iOS 5 and newer (both iPhone and iPad)
- Android ICS and newer (Chrome recommended)
- Other modern mobile web browsers

4.9.6.1. Usage and features

Once logged in, the user is able to see a list of printers that are available to them. The printer's name, location, and alternate ID (if set) are displayed. Mobile Print Release also displays recently used printers, as well as popular printers.

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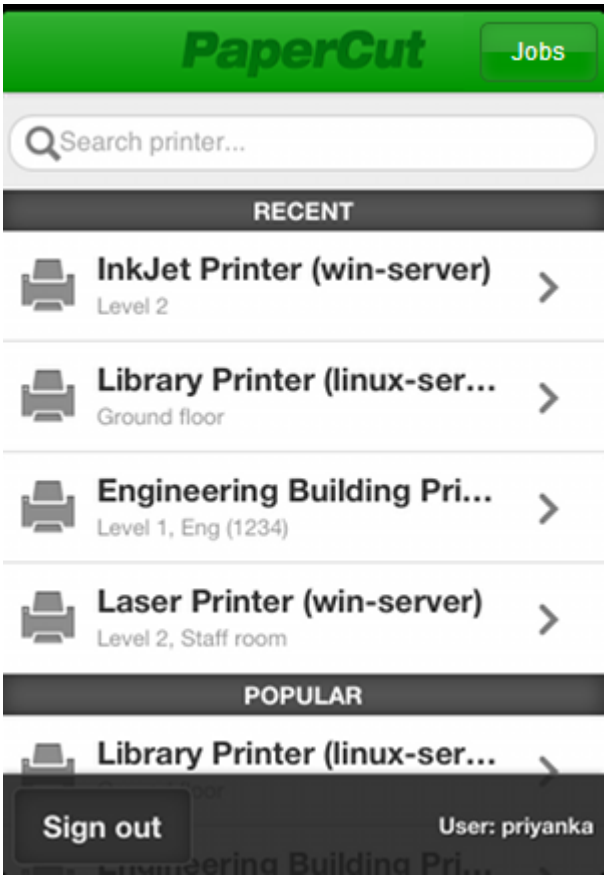

Selecting a printer shows the held jobs that the user can release on the printer. The list includes jobs held in virtual queues that redirect to the selected printer. In the screenshot below there are no jobs available for release.

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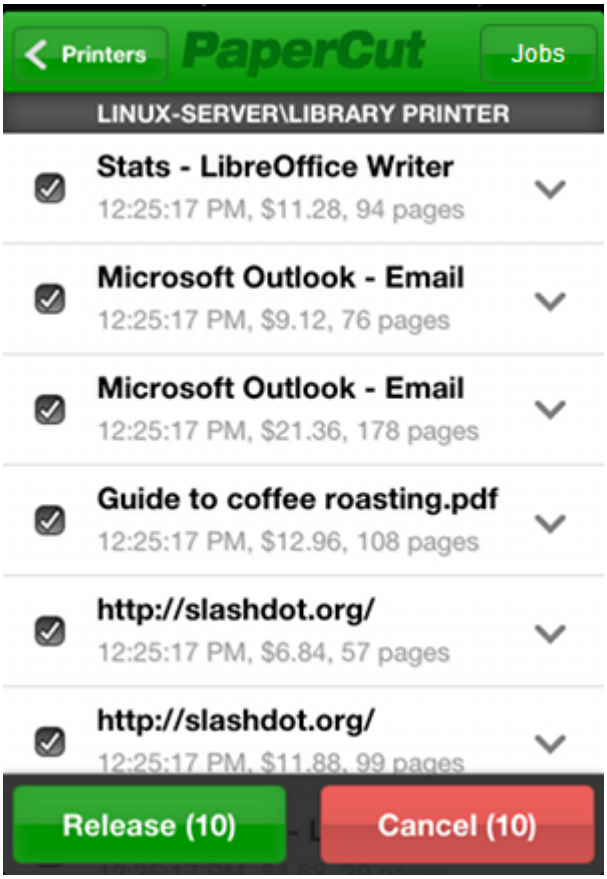
In the screenshot below you can see there are many jobs available to release. Simple details such as the job name, cost, number of pages, and time that it was queued are displayed.



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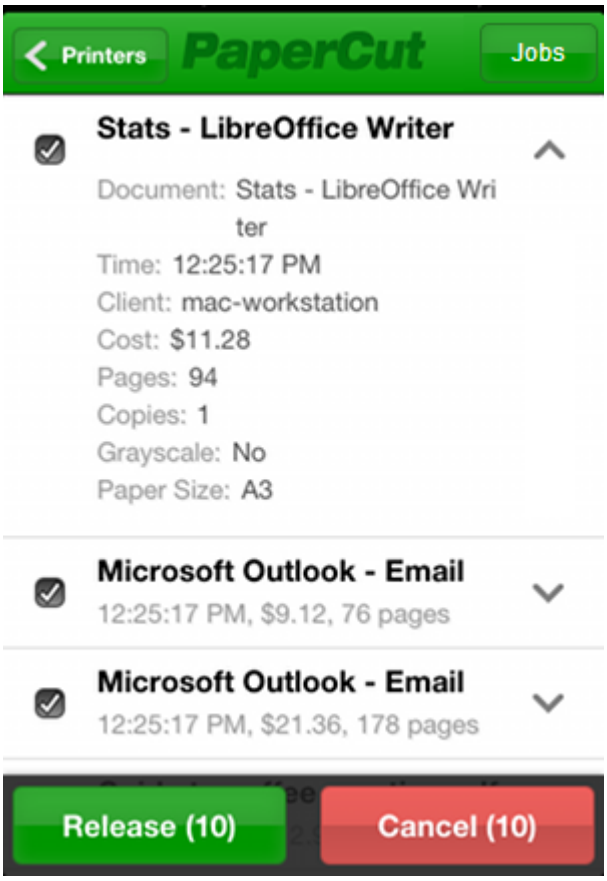
Clicking the arrow next to a job displays more detailed information about the job. In the case where there are multiple jobs with similar names, users can use this information to differentiate jobs.



If the user only wants the perform an action on a subset of jobs, they can use the checkboxes to the left of the job titles to either select or deselect them. By default, all jobs in the list are selected. Users can release or cancel the selected jobs by clicking either the green or red buttons at the bottom of the screen.

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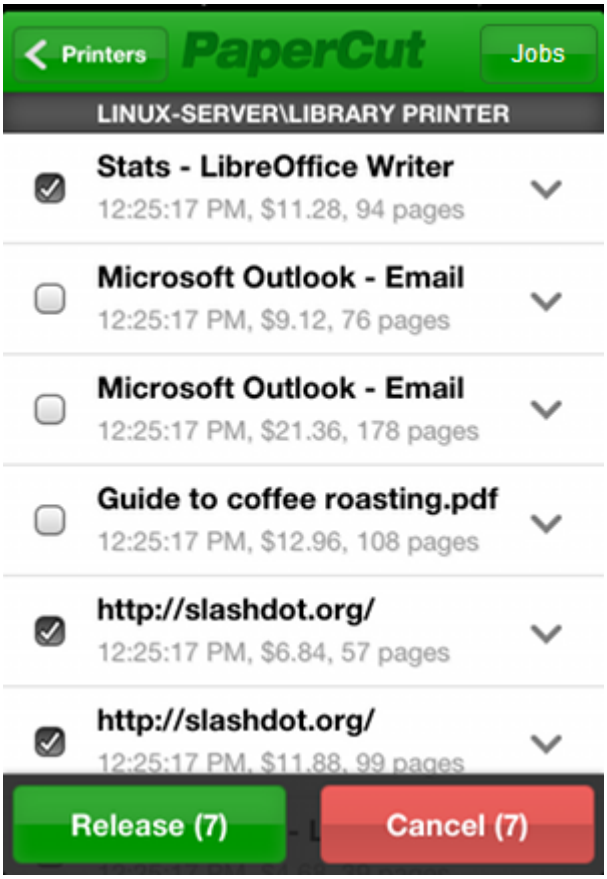

Other highlights for Mobile Print Release include:

- Avoid logging in every time with the "Remember Me" option
- Search for printers using name, location or alternate ID
- Jump straight to your favorite printer by bookmarking the page (or adding to home screen)

4.9.6.2. Mobile Print Release installation

Mobile Print Release offers secure release on any type of printer from a mobile device. A common configuration is to have two queues for a physical printer; one direct queue (normal printing) and one secure queue (a hold/release queue). When document security is important users can select the secure queue and release the job from their mobile phone. Alternatively, many sites want a 100% secure environment, mandating release on every job. You need to set up Secure print release to use Mobile Print Release.

Mobile Print Release is a core feature included in PaperCut NG/MF. It's a mobile web application, which means there's no need for users to install 3rd party applications or access an off-site App store (such as Apple's iTunes store). The advantage of this model is that all network traffic and application deployment is managed securely in your own network.

You can access the application by opening the phone's Internet browser (while connected to your network's local WiFi) and going to any of the follow URLs:

HTTPS

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- `https://[servername]:9192/mr`
- `https://[servername]:9192/mobile/release`

HTTP

- `http://[servername]:9191/mr`
- `http://[servername]:9191/mobile/release`

"/mr" is a shortened version provided for convenience. HTTPS is highly recommended, as users will authenticate themselves via this connection. By default, PaperCut NG/MF installs with a self-signed certificate and raises warnings in secure browsers. Consider installing a Generate SSL/HTTPS keys, or use the HTTP URL. We would recommend HTTP only as a secondary option, and only on secured WiFi.

Users can bookmark or "Add to Home Screen" the Mobile Print Release app on their device to quickly access the application. Held job pages can also be bookmarked, which is convenient for users who often release from the same device.

Tip:
You can also deploy Mobile Print Release to iOS devices as an App. The user needs to access `https://[servername]:9192/mr/install`. This installs a web profile that automatically creates the home screen icon, which might be preferred to manual bookmarking on some sites.

iOS users can also print directly from their device using iOS printing (iPad & iPhone). Use these two applications together to provide a comprehensive mobile printing solution.

4.9.6.3. Management tips for large networks

Here are some tips to help educate your users to get the most out of Mobile Print Release:

User education

When implementing Mobile Print Release across a large network, it can be hard to educate the users of how and when to use the application. Many administrators have used stickers with URLs printed on them to direct users to access the application. Informational posters give administrators a more noticeable and detailed space to explain the enhanced printing architecture.

Power features

Regular users of Mobile Print Release can improve their experience by bookmarking the printers that they use the most. When used in conjunction with the "Remember Me" option, users can release their jobs extremely quickly. This allows users to click a single icon on their mobile device and go straight to the held job list from which their print job can be released.

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Quick printer location

Sites with hundreds of printers should educate their users to use the search function in Mobile Print Release. The Mobile Print Release printer search field provides a quick way for users to find their desired printer. The search terms are matched against the printer's name, location and alternate ID.

Printer names are usually read on a computer screen, while *alternate IDs* are short, easy-to-remember details that users type on a mobile device.

The alternate ID is an admin-defined code that you assign to a print queue. A suggested approach is to use a 4-digit code (for example 1234) as the alternate ID. You can then print labels that show the alternate ID and stick them on the printers so users know what term they should search for.

You can use the location or alternate ID to access the printer's Mobile Print Release page directly:

- `https://[servername]:9192/mr/[location]`
- `https://[servername]:9192/mr/[alternate_id]`

Using QR codes

While your users can use printer search to locate a device, QR codes provide a mechanism to launch Mobile Print Release directly with the printer automatically selected. The process works as follows:

3. The user uses their mobile phone to scan the QR code on the sticker on the printer.
4. If the user has not previously authenticated, they are prompted to do so.

   The mobile's browser opens with a list of their print jobs.
5. The user selects their jobs; then taps **Release**. The jobs print immediately.

Below is an example of a sticker that is adhered to a printer. The QR code results in the URL `https://printerserver:9192/mr/1234`. Note that this URL uses the alternate printer ID of 1234 (See above).

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4.9.6.4. Advanced options

The following Mobile Print Release configuration keys are available. You can edit Configuration keys at **Options > Actions > Config editor (advanced)** .

Table 56: Advanced Mobile Print Release Config Keys

Config name	Description
mobile-release.max-recent-printers	The maximum number of recently used printers displayed in Mobile Print Release interface. These printers are the ones that have been recently used to release jobs via Mobile Print Release. It helps users in selecting their preferred printer quickly. The default value is `4`.
mobile-release.max-popular-printers	The maximum number of popular printers displayed in Mobile Print Release interface. These printers are organization's popular printers. The default value is `3`.
mobile-release.session-timeout-mins	Inactivity timeout for Mobile Print Release interface. The value of 0 indicates that the session will never time out. The special value DEFAULT indicates that the PaperCut's default value will be used. The default value is `1440 minutes (24 hours)`.
generate-printer-qr-codes	Generate a QR code for each printer and saves the QR codes in a directory. Users can use the QR codes from the Mobile Print Release app to release a job without having to log in to the device.

See Using the Advanced Config Editor to find out how to change config keys.

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Mobile Print Release customization

It is also possible to customize the logos and the look of Mobile Print Release. For more details, see Customize Mobile Print Release.

4.9.7. Mobile web client

When printing from a desktop or organization-owned laptop, the User Client provides a range of functionality such as

- showing the user their balance / quota,
- delivering notification messages,
- confirming the cost of jobs and
- allocating jobs to shared accounts.

For user-owned and mobile devices it might not be possible or practical to deploy (or have the user install) the desktop client. Instead, the Mobile web client offers most of the same functionality and can run in a web browser on nearly any device.

In most cases, use of the Mobile web client is optional and serves only to provide information to users about their print jobs. However, running the Mobile web client is mandatory if users are:

- printing from an iOS device that requires the Mobile web client for user authentication (See iOS printing (iPad & iPhone))
- configured with Account Selection options (or you have print scripts) that require user interaction that can ONLY be done via the Mobile web client (and cannot be done at the printing device). In this case, if the Mobile web client is not running, the user is unable to carry out the configured user interaction for Account Selection, and the job remains paused and does not appear on the printing device.

> **Tip:** If users are configured with Account Selection options that require user interaction and this can be done BOTH via the Mobile web client AND at the printing device (the ability to assign accounts at the printing device is available), then running the Mobile web client is not mandatory. It may be required if it is also being used for other purposes, besides Account Selection (such as, viewing current account balance, cached user comments, "low credit" warning messages, notifications about print policies, etc). For more information, see Assigning accounts to print jobs at the device.

The Mobile web client can be accessed from a web browser at `http://[servername]:9191/client`. Rather than have users type the URL into their browser, we recommend providing a prominent link, for example, on an intranet page, or deploying a link to

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devices where possible. Specific instructions for deploying to iOS devices are available in The PaperCut NG/MF iPad / iPhone App (Mobile web client).

For Google Cloud Print and Email to Print jobs, a reminder email message can be sent if the Mobile web client is detected as being idle, without any user interaction for some time (90 seconds after submitting the job by default).

To configure an email reminder:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Mobile &BYOD**.

   The **Mobile &BYOD** page is displayed.
3. In the **Common Mobile Printing Options** area, select the **Send a reminder email when a job requires user action (e.g. account selection)** check box.
4. Click **Apply**.

4.9.8. Self association for emails and email verification/validation

4.9.8.1. Unknown emails and email self-association

When mobile printing technologies identify job owners by email address, PaperCut needs a way to identify and authenticate the email's owner. E.g. with Google Cloud Print, jobs are "owned" by a Google Account, which is an email address. With Email to Print, the job's owner is identified by the sending email address.

PaperCut provides three main ways to populate email addresses. Select the method that best suits your organization.

- Email addresses are automatically imported from the user directory. If you have configured organization / "official" addresses in your user directory then these are imported to PaperCut and further configuration might not be required.
- Manual configuration. A SysAdmin can add and remove email addresses on behalf of a user on the **Users** tab of the PaperCut Admin web interface. We recommend using the **Other emails** section for this purpose if you are adding "official" organization addresses in case you later decide to add them to your user directory.
- Email self-association, allowing users to add an email address to their user account by themselves.

Select how to handle jobs from an unknown email address

1. Select **Options > Mobile & BYOD**.

   The **Mobile & BYOD** page is displayed.
2. In the **Common Mobile Printing Options** area, in **When a job arrives from an unknown email address**, select one of the following options:

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- **Cancel the job**—Cancel the job and optionally send an email when the job requires user action (for example, account selection). Select this option if you are manually configuring the email addresses.
- **Cancel the job and email the user with further information**—Cancel the job and always send an email with further information.
- **Hold the job and email the user with instructions for verifying the address**—Hold the job and offer the user to verify (self-associate) their address.

> **Note:**
> Email self-association works as follows:
>
> 1. When a job arrives from an unknown user, the job is held and an email response is sent to the user that includes a link.
> 2. Clicking the link prompts the user to log in.
> 3. The user logs into their PaperCut account and the email address is added to their account. When viewing the user in the Admin web interface, it is displayed under **Other emails**.
> 4. The job is assigned to the verified user and proceeds to print.
> 5. Future jobs are automatically assigned to the verified user.

3. Click **Apply**.

4.10. TopUp/Pre-Paid cards

Many organizations run PaperCut NG/MF in either a silent logging mode or as a way of enforcing sensible quotas. On the other hand, other organizations choose to run PaperCut NG/MF in charging mode requiring users to make payments in advance. Recording and entering payments can be a time consuming process for staff or system managers. PaperCut NG/MF offers a web interface for user account management to assist with the process, however, there is still the need for someone to manually assign credit. The TopUp/Pre-Paid Card system included with PaperCut NG/MF streamlines the payment process and moves much of the manual handling over to the end user.

Cards are also known as:

- Vouchers
- Re-charge cards
- Pre-Paid cards

4.10.1. The card system

PaperCut Software International Pty. Ltd. has worked with a number of organizations to design the TopUp/Pre-Paid Card system. A number of payment technologies were evaluated over the period of two years. These technologies included vending machines, smart cards, micro-payment systems, and manual processing. The card system proved to be the most successful and cost effective

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solution. The card concept is now the de facto standard in other industries such as pre-paid mobile phones.

The PaperCut NG/MF card system is 100% software based. There is no need for special hardware such as smart card readers or special vending machines.

The card system is included as standard with PaperCut NG/MF. The system includes:

- A card wizard application for assisting with the process of creating new cards.
- A web page for end users to enter card numbers.
- A security framework for tracking card redemption and implementing fraud prevention.

Example:

The card system is best described by walking through the payment process:

- **The user**— Amy is a student at a local high school. The school uses PaperCut NG/MF for their charging. Amy is allocated $5.00 a week for printing. This week she has used all her allocation but still has one assignment to print on Friday. She purchases a $5.00 Card from the school canteen. The card contains a 16-digit identification number. She logs onto the schools intranet site, enters the PaperCut section, and enters the card's ID number. Her account is automatically credited $5.00.
- **The administrator**— Andrew is a SysAdmin at the same high school. At the start of the term he used the PaperCut NG/MF card wizard to generate 500 TopUp/Pre-Paid Card of $5.00 value. These were generated in 2 batches. The first batch was prefixed with C1 and the second batch L1. The C1 batch was sold at the school canteen and the L1 batch sold at the school library. The cards are kept secured at these locations.

  The card wizard generated a *number definition file* for each batch. Andrew imported these numbers into PaperCut. Andrew took the time to customize the look of the cards to include the school logo and simple instructions on how to redeem the card.

  During the year Andrew is able to track the cards sold and uses the batch prefixes to track where students purchase cards. Andrew also keeps an eye on the event log and has disciplined students attempting to guess card numbers.

4.10.2. Create new cards

4.10.2.1. Overview and definitions

Cards are generated using the *Card Wizard*. The Card Wizard is a Microsoft Windows application that integrates with Microsoft Word.

Important:

The *Card Wizard* integrates with Microsoft Word. Ensure that Microsoft Word is installed

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before using the *Card Wizard*.

Card terminology

- **Card Wizard**—A tool to help administrators produce a set of cards. The wizard generates cards ready for printing and a *number definition file* suitable for importing into the PaperCut NG/MF system.
- **Card Number**—All cards are designated a random unique number. PaperCut uses this number to identify the card and its value. Users enter this number to allocate the credit to their account. An example number:

  ```
  P0409-1945-4833-5750-4452
  ```

- **Batch ID** —A batch ID is a user-defined ID or number assigned to all cards in a batch. The batch ID prefixes all card numbers and are used to identify the source of a card. Assign a unique number to each batch.
- **Valid Till Date (Expiration Date)**—Define the date on which a card can no longer be used. It's analogous to a use by date on a gift certificate. Expiration dates ensures cards only remain in circulation for a limited period of time. A six to 12 month period is recommended. In a school environment it is useful to define an expiration date as the last day of the semester.
- **Mail Merge**—Mail merge is an advanced feature of Microsoft Word. The mail merge feature takes a design template and a data source, and merges the two together to construct a composite document. In the card wizard's case, the number list is the data source and the design template is the template Microsoft Word document.
- **Number Definition File**—The number definition file contains information on all cards in a batch including a list of card numbers, their expiration date, and value. The card wizard creates this file during the generation process and the SysAdmin can import this file into the Card administration section.
- **Card Number Entry Page**—The card web entry page is a designated page inside the user login section

4.10.2.2. Using the Card Wizard

This section describes how to create a batch of TopUp/Pre-Paid Cards. The example covers creating a batch of 100 cards of value $10.00 each.

The Cards feature is accessed via the **Cards** tab. By default there is no **Cards** tab in the Professional (Client Billing) installation. To enable the **Cards** tab:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **User Features** area, select **Enable use of TopUp/PrePaid Cards**.
3. Click **Apply**.

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Step 1 - Install the Card Wizard

1. Click the **Cards** tab.

   The **TopUp/PrePaid Card Management** page is displayed.
2. In the **Actions** menu, click **Download card wizard**.

   The **Import Card Numbers** page is displayed.
3. Run the downloaded `exe` file.

   The **Card Creation Wizard** is displayed.
4. Run the install program and complete the installation process.

Step 2 - Welcome

1. Open the **Card Wizard** from the Start menu.
2. Click **Next**.

Step 3 - Batch ID & Format

1. In **Batch ID**, enter a unique identifier for the batch.

   > **Tip:**
   > We recommend adapting a consistent convention. For example, choose numbers representing the date, or a sequential numbering scheme.

2. Click **Next**.
3. In **Format**, select the card number format:
   - **Numeric**—this is the most secure and generates long numbers.
   - **Alphanumeric**—produces a shorter format consisting of letters and numbers. The Alphanumeric format is a little less secure due to the reduced number of possible permutations, however, it does offer a shorter, more convenient entry format.

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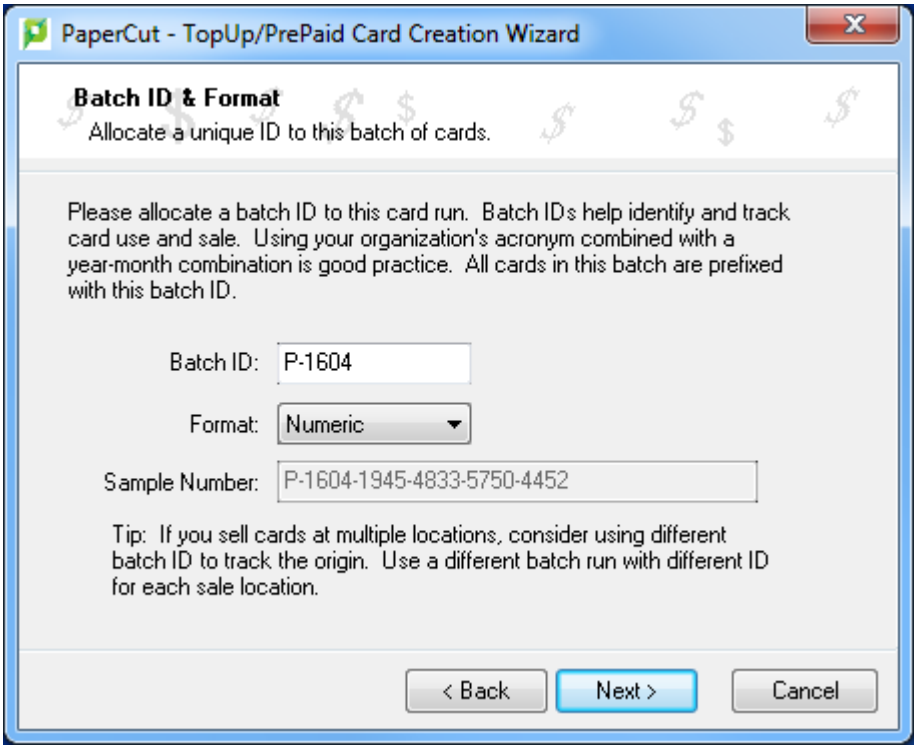
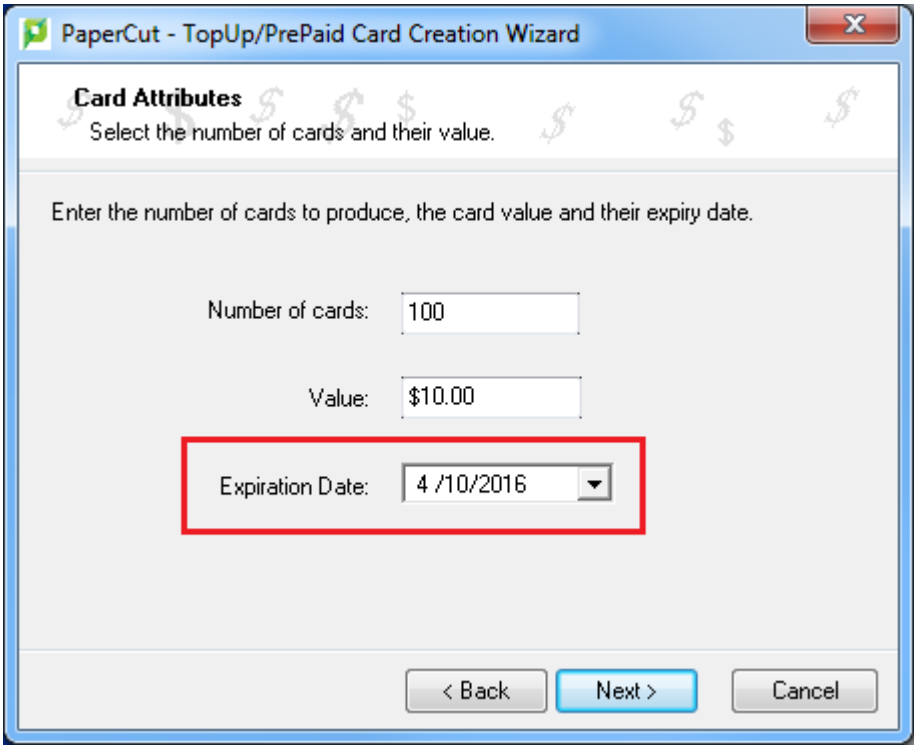


Step 4 - Card Attributes

1. In **Number of cards**, enter **100**.
2. In **Value**, enter **$10.00**.
3. In **Expiration Date**, set an appropriate date that corresponds to a fixed event, such as the end of the year, budget year, term or semester. By default the valid till date is set 6 months in the future.



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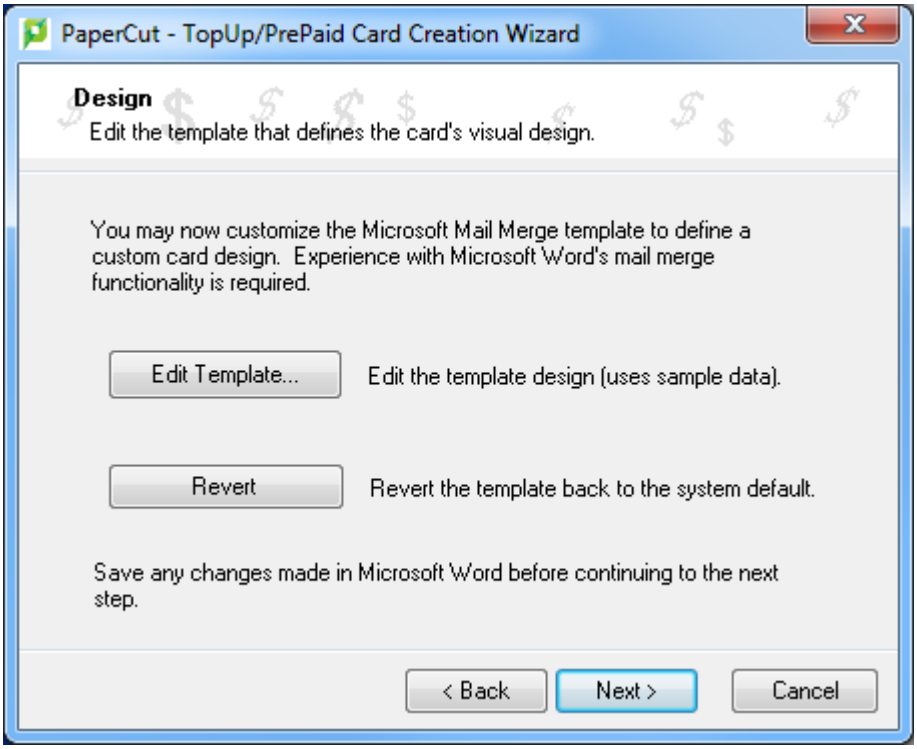
Step 5 - Design

To produce a set of standard cards, you do not need a custom design.

1. Click **Next** to move to the next step. Modifying the custom design requires knowledge of Microsoft Word's mail merge functionality. See the TopUp/Pre-Paid Card Tips for further details.



Step 6 - Generate numbers

1. Click **Next** to generate the card numbers. The **Save Number Definition File** is displayed.
2. Navigate to where you want to save the number definition list; then click **Save**. You can save the file on the local hard driver or a secure network drive.

   A screen is displayed informing you that a merged Microsoft Word document will be created.

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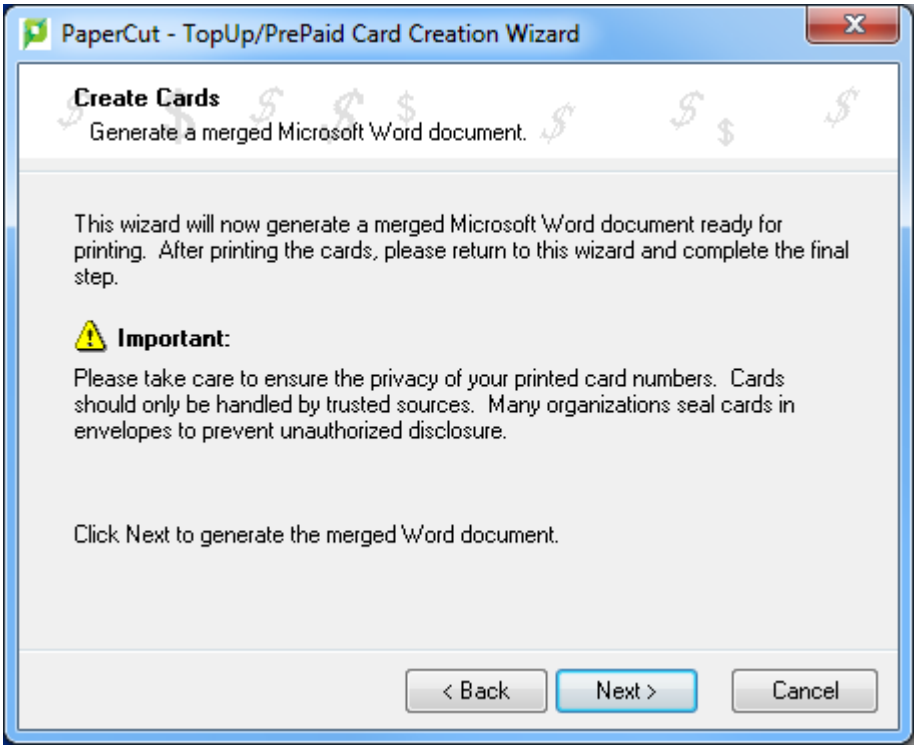
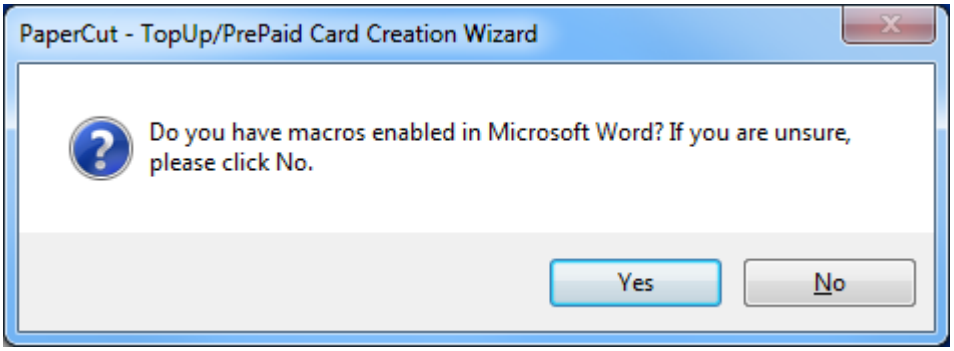


3. Click **Next**.

Step 7 - Create cards

A prompt is displayed asking you if you have macros enabled in Microsoft Word.



The card wizard uses Word Macros to automate much of the card generation process.

1. Ensure macros are enabled:
   - If you have macros enabled, click **Yes**.
   - If you do not have macros enabled, or are unsure, click **No**. The card wizard guides you through the process of enabling macros.

Enable macros in Microsoft Word

1. Open Microsoft Word.
2. Open a blank document.
3. Click **File**.
4. Select **Options**.

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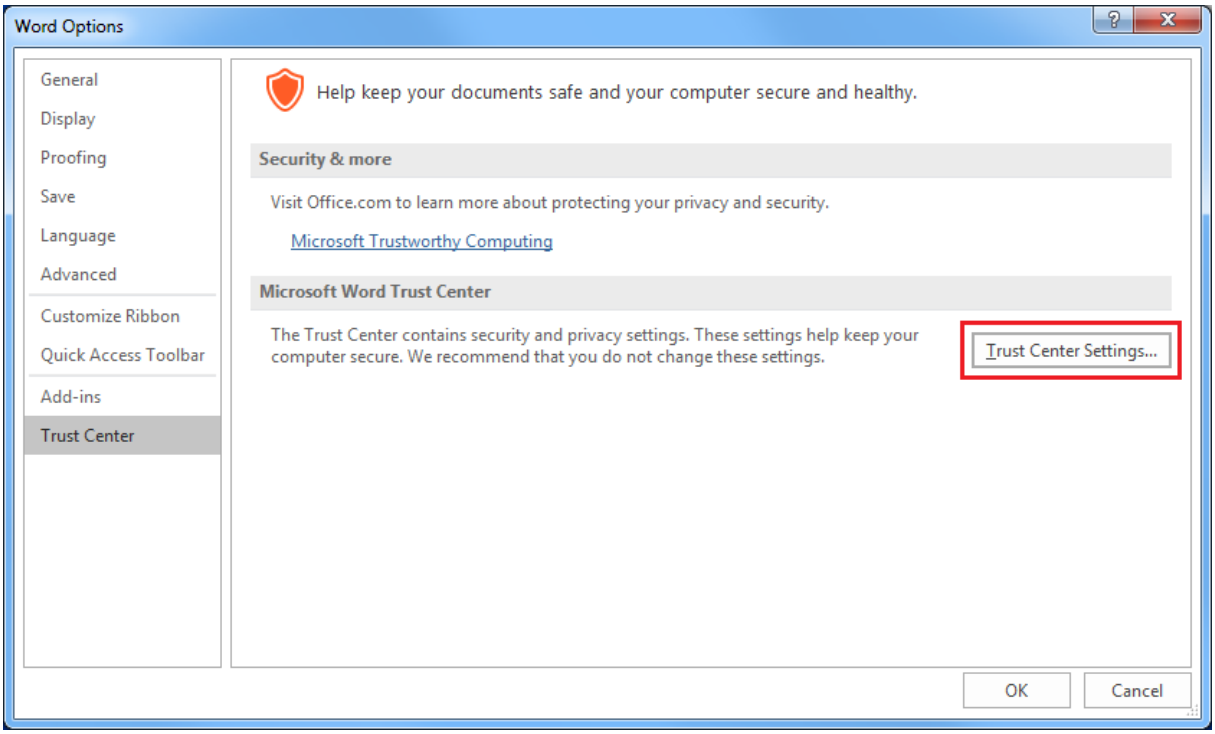
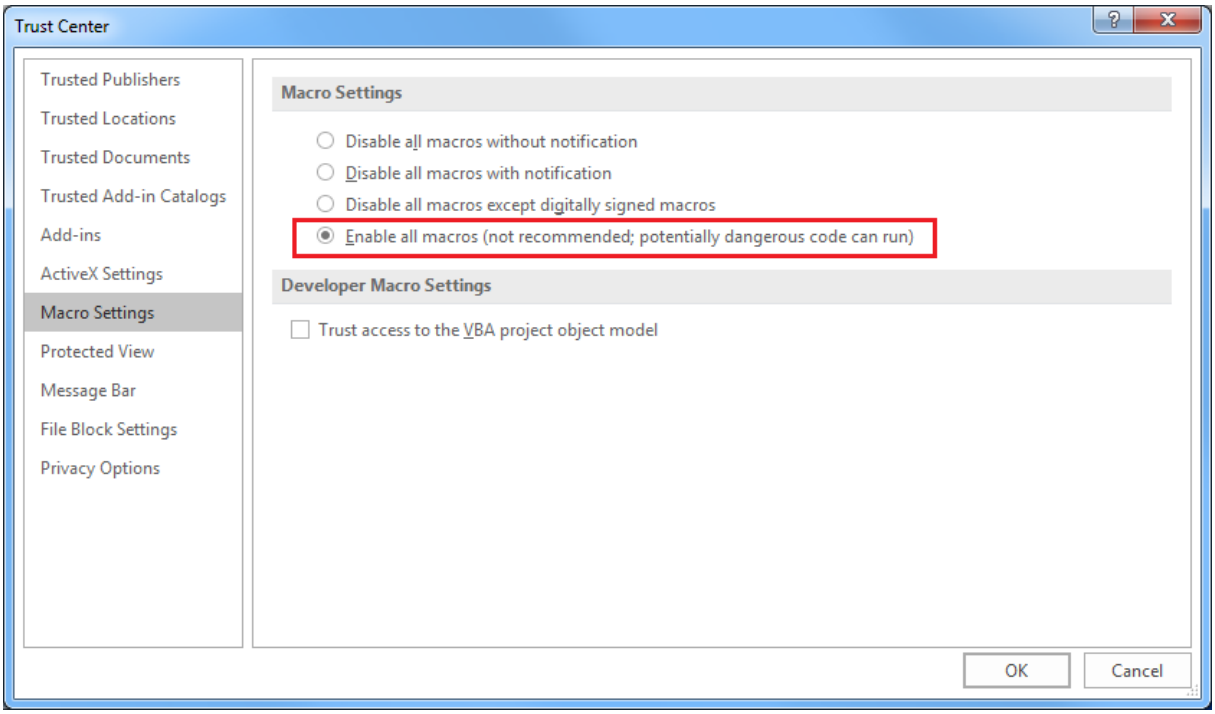
5. Select **Trust Center**.



6. Click **Trust Center Settings**.



7. Select **Enable all macros (not recommended; potentially dangerous code can run)**.
8. Click **OK**.
9. On the **Word Options** screen, click **OK**.

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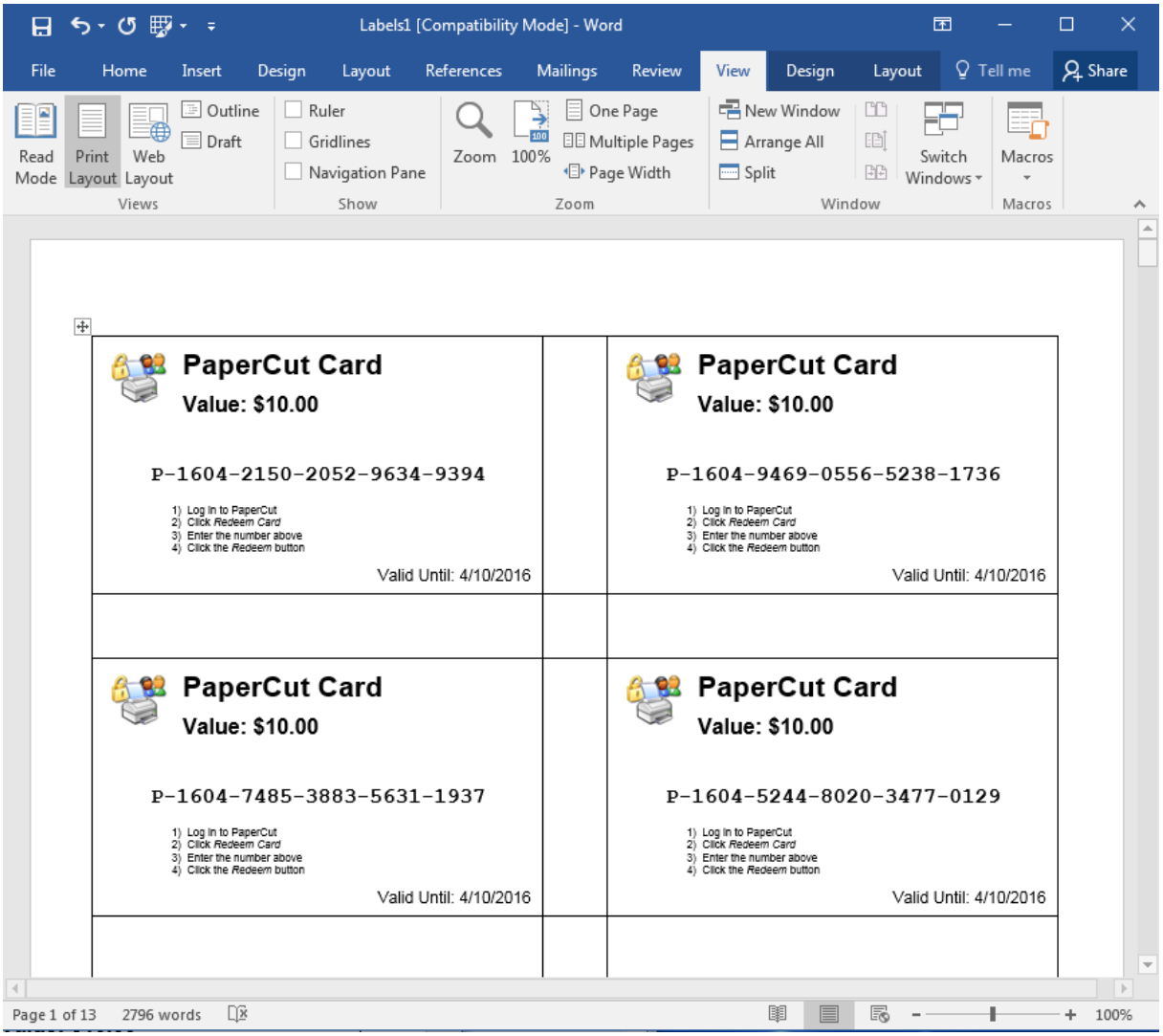
Step 8 - Printing cards

A new Microsoft Word document opens, listing all 100 cards. The cards are standard business card size suitable for printing on heavy paper and cutting with a paper cutter. For a professional look, consider forwarding a PDF version to your local printing shop. See TopUp/Pre-Paid Card Tips for more ideas.



Step 9 - Importing

The final step is to activate the cards by importing the *number definition file* in the PaperCut NG/MF Admin web interface.

1. Click the **Cards** tab.

   The **TopUp/PrePaid Card Management** page is displayed.

2. In the **Actions** menu, click **Import new cards**.

   The **Import Card Numbers** page is displayed.

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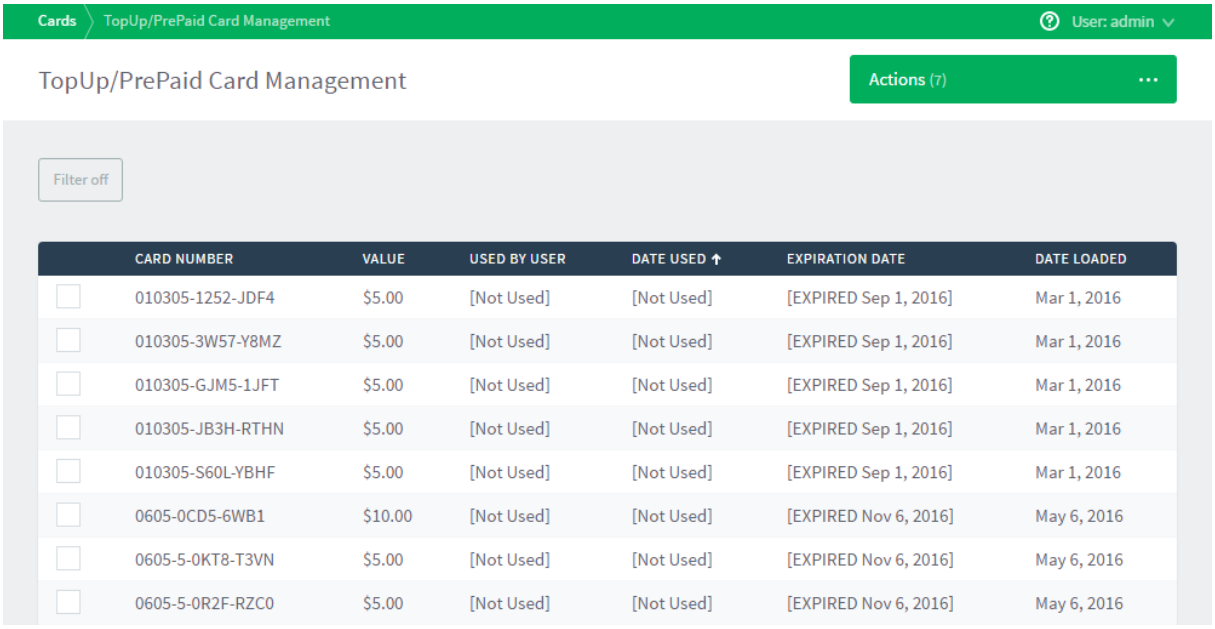
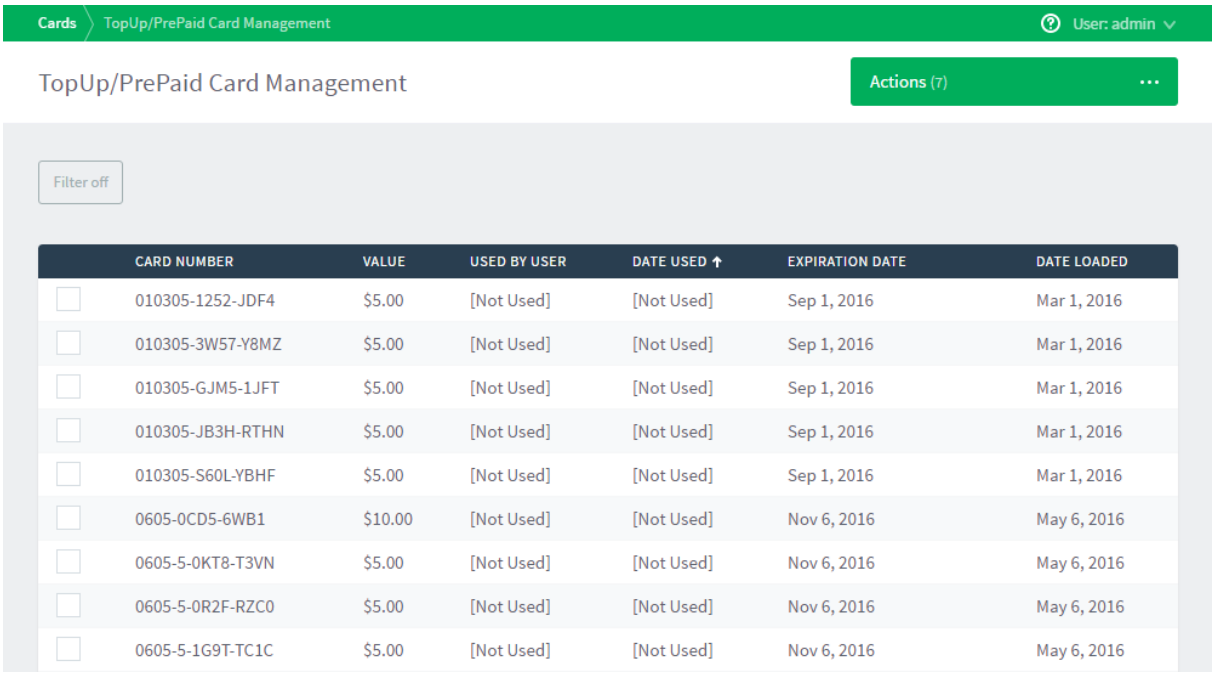


CARD NUMBER	VALUE	USED BY USER	DATE USED	EXPIRATION DATE	DATE LOADED
010305-1252-JDF4	$5.00	[Not Used]	[Not Used]	[EXPIRED Sep 1, 2016]	Mar 1, 2016
010305-3W57-Y8MZ	$5.00	[Not Used]	[Not Used]	[EXPIRED Sep 1, 2016]	Mar 1, 2016
010305-GJM5-1JFT	$5.00	[Not Used]	[Not Used]	[EXPIRED Sep 1, 2016]	Mar 1, 2016
010305-JB3H-RTHN	$5.00	[Not Used]	[Not Used]	[EXPIRED Sep 1, 2016]	Mar 1, 2016
010305-S60L-YBHF	$5.00	[Not Used]	[Not Used]	[EXPIRED Sep 1, 2016]	Mar 1, 2016
0605-0CD5-6WB1	$10.00	[Not Used]	[Not Used]	[EXPIRED Nov 6, 2016]	May 6, 2016
0605-5-0KT8-T3VN	$5.00	[Not Used]	[Not Used]	[EXPIRED Nov 6, 2016]	May 6, 2016
0605-5-0R2F-RZC0	$5.00	[Not Used]	[Not Used]	[EXPIRED Nov 6, 2016]	May 6, 2016

3. Click **Browse**; then locate the number definition file as saved in step 5 above.
4. Click **Upload**.



CARD NUMBER	VALUE	USED BY USER	DATE USED	EXPIRATION DATE	DATE LOADED
010305-1252-JDF4	$5.00	[Not Used]	[Not Used]	Sep 1, 2016	Mar 1, 2016
010305-3W57-Y8MZ	$5.00	[Not Used]	[Not Used]	Sep 1, 2016	Mar 1, 2016
010305-GJM5-1JFT	$5.00	[Not Used]	[Not Used]	Sep 1, 2016	Mar 1, 2016
010305-JB3H-RTHN	$5.00	[Not Used]	[Not Used]	Sep 1, 2016	Mar 1, 2016
010305-S60L-YBHF	$5.00	[Not Used]	[Not Used]	Sep 1, 2016	Mar 1, 2016
0605-0CD5-6WB1	$10.00	[Not Used]	[Not Used]	Nov 6, 2016	May 6, 2016
0605-5-0KT8-T3VN	$5.00	[Not Used]	[Not Used]	Nov 6, 2016	May 6, 2016
0605-5-0R2F-RZC0	$5.00	[Not Used]	[Not Used]	Nov 6, 2016	May 6, 2016
0605-5-1G9T-TC1C	$5.00	[Not Used]	[Not Used]	Nov 6, 2016	May 6, 2016

Step 10 - Testing

It is good practice to test the card process by using one of the cards on a test account (standard user level). Remember to destroy the spent card used for the test!

4.10.2.3. TopUp/Pre-Paid Card Tips

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Security

The PaperCut NG/MF card system is designed with security in mind. All fraudulent card redemption attempts are detected, trapped and logged. The number allocation system is highly secure and guessing a number is statistically impossible. With 1,000 cards in circulation, the chance of guessing a number is 1-in-10,000,000,000,000, or in non-mathematical terms, it would take over 300,000 years to guess a number if a person enters one number every second!

Like many IT security systems, the weakest link in the system is the human interface. Cards are a form of virtual currency. Take care to protect the cards from unauthorized access and disclosure.

- Ensure the generated Microsoft Word document is deleted or saved in a secure place after the cards are printed.
- Always delete the number definition file after importing the batch into PaperCut.
- Never leave the cards in an unsecured or visible location. Consider sealing cards in envelopes.
- Check the PaperCut NG/MF application event log on a weekly basis for security messages. PaperCut logs and traps unauthorized card use.
- Use the card log to track card redemption and allocation.
- Cancel/Expire lost or stolen cards by batch number as soon as the problem is reported.

Important:
The cards are similar to cash and should be treated with the same care. Make sure the cards are carefully secured.

Cards design

The **Edit Template** button in Step 4 of the card wizard opens the standard card template for editing. The card wizard is able to use any standard mail merge design. It's even possible to convert the template layout to letters rather than cards. Microsoft's mail merge support is designed for Word power users. Consider taking the step-by-step mail merge tutorial provided with Microsoft Word help if you do not have experience with Word's mail merge functionality.

Consider keeping your customizations initially simple and work up towards more complex configuration.

To change the logo graphic:

1. Click **Edit Template** in step 5.
2. Say **Yes** to **Enable Macros**.
3. Select the standard *PaperCut logo* on the *first* card; then click the *Delete* button on the keyboard.
4. Select **Insert > Picture > From File**.
5. Locate the desired logo; then click **Insert**.

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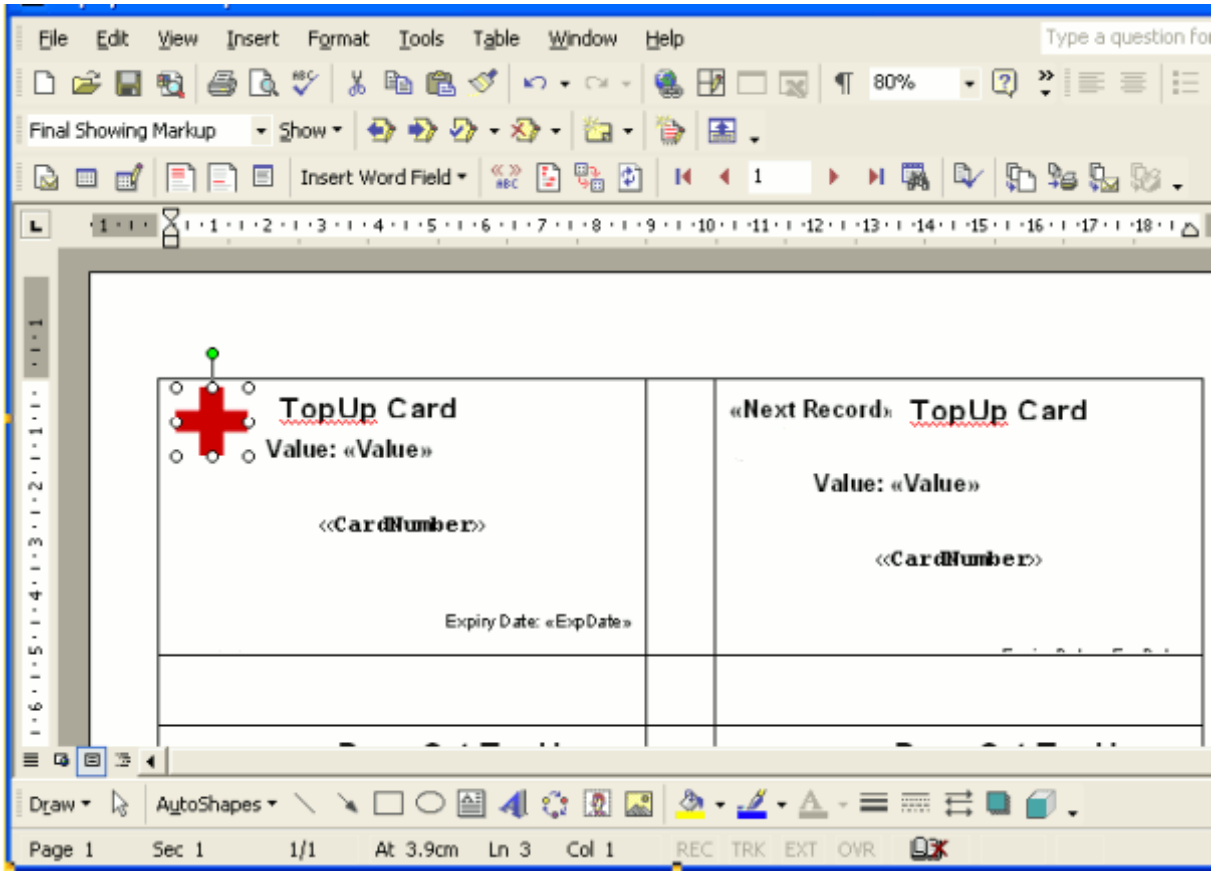
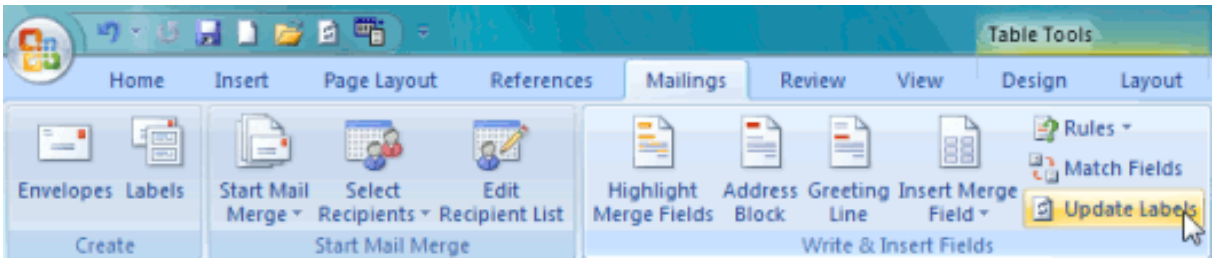


6. Click **Update Labels** on the Mailings tool bar.



7. Repeat the steps above to change other working and layout as required. Always change the first card then click **Update lables** to apply the changes to all cards. *IMPORTANT:* Do not accidently delete the special `<<Next Record>>` field as this cause the merge to move to the next card number before printing the next card. Removing this results in all cards displaying the same card number.
8. Click **File > Save**.
9. Save the file as `C:\Program Files (x86)\PaperCut MF Card Creation Wizard\templates\CardTemplate.doc`.
10. Test the template by running a batch in the card wizard.

Tip:

Design Recommendations:

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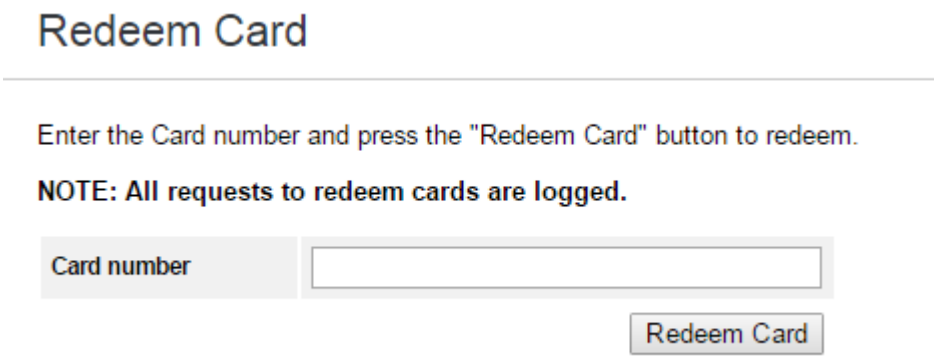
- Consider changing the logo and adding your organization name
- Change the URL reference to point to your intranet site or event your network/card policy page.
- Provide basic instructions on how to redeem the card or the location of an information page.

4.10.3. Redeem a card

Distribute the following information to end users - for example, via the "Print Policy" page on your organization's intranet site.

To redeem a TopUp/Pre-Paid Card:

1. Purchase a card from the appropriate person or place. The network administrator creates cards specific for your organization. In schools, cards are often sold at the library, general office or school cafeteria.
2. Open a web browser and navigate to the PaperCut NG/MF user login page. After logging in, your account status should display.
3. Click the **Redeem Card** link on the left-hand navigation bar.
4. Enter the *Card Number* in the **Card Number** box; then click **Redeem Card**. Take care to enter the number exactly as listed including any dashes (-).



5. If the card's number is valid, the credit as listed on the card is transferred to your account and this is displayed in your transaction history.

Tip:
To educate the users about redeeming their TopUp/Pre-Paid Card, administrators might find the Example 5: Adding credit using a TopUp/Pre-Paid Card helpful.

4.11. Reports

A report is a representation of data, often in a printable tabular format. PaperCut NG/MF provides a set of built-in reports. These include simple pre-built reports accessed via one-click, up to more advanced reports constructed using custom filters.

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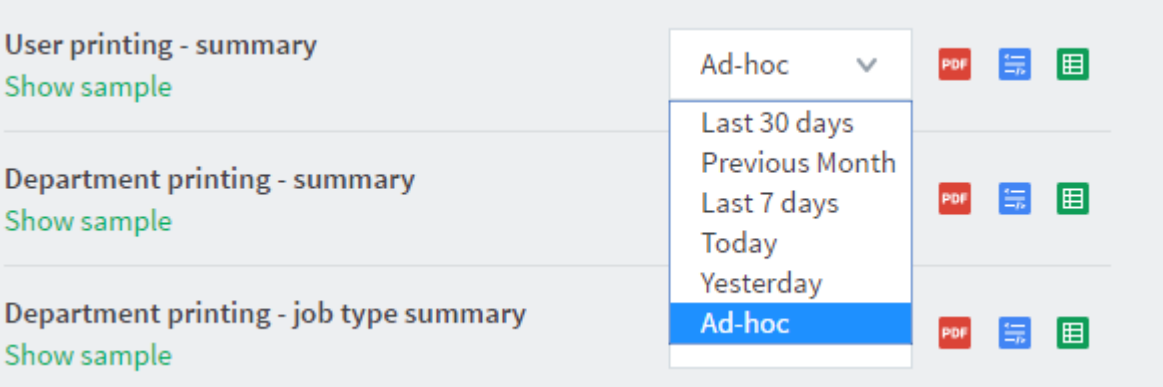
Tip:

PaperCut NG/MF is an open system. SysAdmins with database management experience might run the system on an external database system. 3rd party reporting tools can then be used to construct custom reports. The PaperCut Software Development team can also consult on custom report development.

PaperCut NG/MF reports are generated for a single Application Server. If your site has multiple Application Servers and you want consolidated reports, see Central Reports.

Reports are available on the **Reports** page.

You can produce reports by selecting the date range and then clicking one of the report format icons. You can select common date ranges, such as **Last 30 days**, **Yesterday** and **Previous Month** from the list.



Use the **Ad-hoc** option to generate the reports with custom date ranges and filters (e.g. generate a **User printing - summary**report limited to a particular department).

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Report Title

Enter the title of the report, or use the default title.

Report Title

User printing - summary

Parameters

Enter the report parameters to filter the report data as required.

From date : 30 Jan 2017 **Time:** 00:00

Include report data starting from this date.

To date : **Time:**

Include report data up to this date.

User name :

Limit to one user. Leave blank to include all users.

User group name :

Limit to one group. Leave blank to include all groups.

Department :

Limit data to users in a given department (or multiple comma-separated departments). Wild card '%' supported. E.g.: '%IT-dep-%'

Office :

Limit data to users in a given office (or multiple comma-separated offices). Wild card '%' supported. E.g.: '%IT-office-%'

Only show printing allocated to :

Choose whether to only show printing allocated to user or shared accounts.

Job Type :

Choose to show print or copy jobs only.

Single server name :

Limit to one print server.

Single printer name :

Limit to one printer.

Printers/Devices :

Limit to selected printers/devices. All printers/devices

Printer/Device group :

Limit to one printer/device group. Leave blank to include all printers and devices.

Show report parameters :

Enable this option to print report parameters on the report header.

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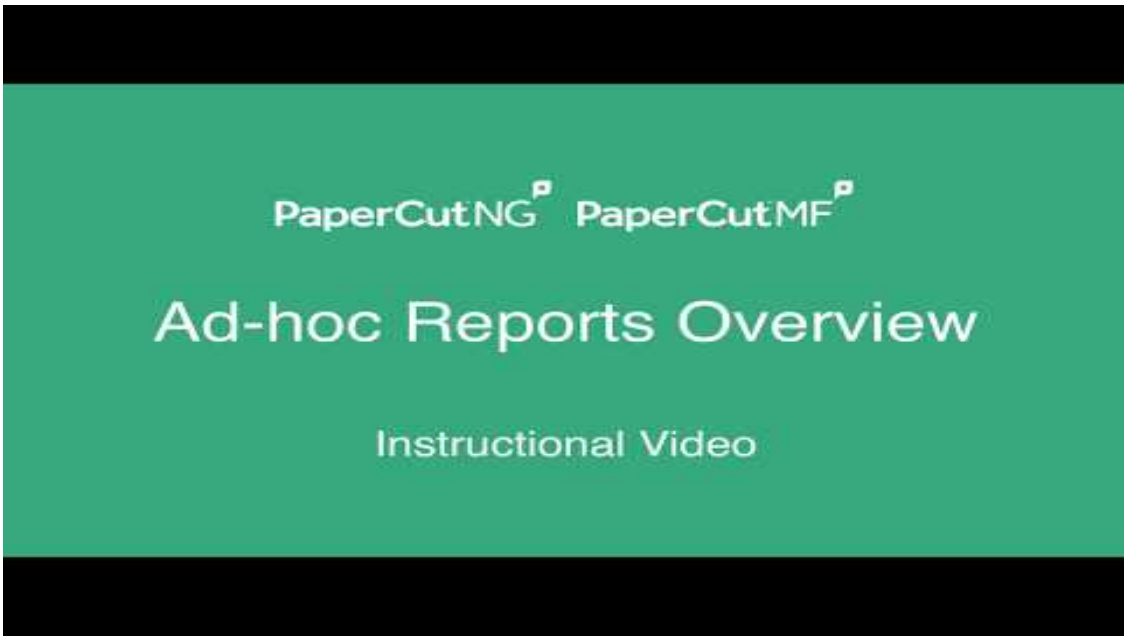
Report Format

You can see a sample of each report by clicking the **Show sample** link. A sample report gives an indication of what the final report will look like.



4.11.1. Report types

The following types of *one-click* reports are available on the **Reports** tab:

- **User reports**

  These are reports producing information about users. They range from a list of users, their names and current account balance, to detailed reports listing all print jobs printed by a user over a particular time-frame.

- **Printer reports**

  Printer reports produce information on printers including configuration, usage summaries and statistics.

  > **Note:**
  > If you are using Direct Printing, the information for each print queue linked to a printer is consolidated and presented as a summary for the printer.

- **Print Log reports**

  The print log is a detailed list of all printing performed on the network. The print log reports allow administrators to produce reports that list all jobs over a given date range with simple one-click

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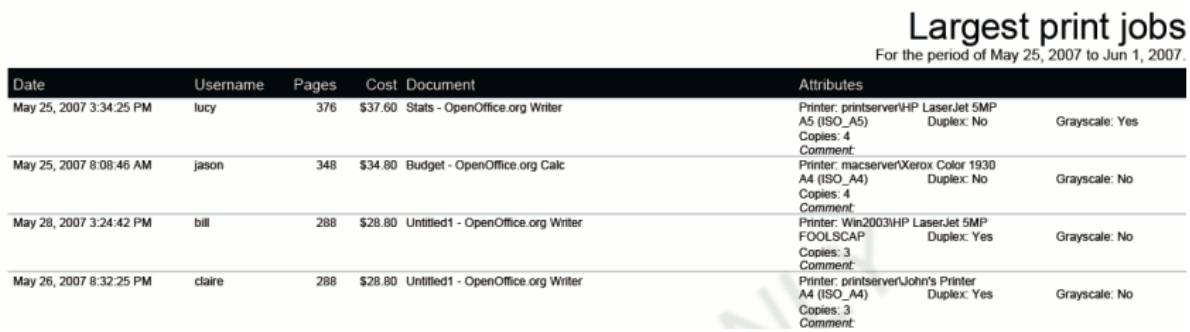
version for today's print jobs and largest print jobs.



Largest print jobs

For the period of May 25, 2007 to Jun 1, 2007.

Date	Username	Pages	Cost	Document	Attributes
May 25, 2007 3:34:25 PM	lucy	376	$37.60	Stats - OpenOffice.org Writer	Printer: printserver\HP LaserJet 5MP A5 (ISO_A5) Duplex: No Grayscale: Yes Copies: 4 Comment:
May 25, 2007 8:08:46 AM	jason	348	$34.80	Budget - OpenOffice.org Calc	Printer: macserver\Xerox Color 1930 A4 (ISO_A4) Duplex: No Grayscale: No Copies: 4 Comment:
May 28, 2007 3:24:42 PM	bill	288	$28.80	Untitled1 - OpenOffice.org Writer	Printer: Win2003\HP LaserJet 5MP FOOLSCAP Duplex: Yes Grayscale: No Copies: 3 Comment:
May 26, 2007 8:32:25 PM	claire	288	$28.80	Untitled1 - OpenOffice.org Writer	Printer: printserver\John's Printer A4 (ISO_A4) Duplex: Yes Grayscale: No Copies: 3 Comment:

- **Group reports**

  These reports group printer usage by network group allowing SysAdmins to determine which group of users performs the most prints. These reports are ideal for gaining a quick overview of printing costs performed by work area, department, floor, management level, etc.

- **Shared accounts reports**

  Administrators can use the shared account reports to track printing allocated to shared accounts via the popup.

- **Transaction reports**

  These provide a summary of the transactions / balance adjustments.

- **Environmental impact reports**

  These reports summarize the environment impact of printing.

- **Ratio reports**

  These reports compare relative printing usage.

- **Period comparison reports**

  These reports compare printing activity between two periods.

4.11.2. Report formats

All reports are available in three different formats. Access to all formats depends on the software installed on your system. Alternate formats are accessed via the three icons located next to the report period drop down list.

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User Printer Group Account Environment Transaction Schedule / Email Reports

User Reports

User focused reports providing information about users, their account balance and activity.

Additional reports for individual users are located under the user's transaction and activity history sections.

Most reports are available in PDF, HTML and Excel/CSV formats. TIP: Excel/CSV reports often contain extra fields.

User list Show sample		
Executive summary Show sample	Last 30 days	
Largest print users Show sample	Last 30 days	
User printing - summary Show sample	Ad-hoc	
User print/copy/scan/fax - breakdown Show sample	Last 30 days	
Department printing - summary Show sample	Last 30 days	
Department printing - job type summary Show sample	Last 30 days	
Department print/copy/scan/fax - breakdown Show sample	Last 30 days	
Office printing - summary Show sample	Last 30 days	
Office printing - job type summary Show sample	Last 30 days	
Office print/copy/scan/fax - breakdown Show sample	Last 30 days	
User printing - job type summary Show sample	Last 30 days	
User printing - printer summary Show sample	Last 30 days	
User printing - logs Show sample	Last 30 days	
Deleted user list Show sample		

Period Comparison Reports

Compares printing activity between two periods.

User printing - period comparison Show sample	Ad-hoc	

Configuration Reports

Gives information about user settings.

User configuration Show sample		

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There are three report formats available.

- **PDF reports**

  PDF is the most appropriate format for printing. To view these reports your computer must have a PDF viewer installed. Adobe Acrobat Reader is a free PDF viewer available from adobe.com.

- **HTML reports**

  HTML Reports work on all systems and don't require an external PDF viewer. These reports might not print or format as well as the PDF versions and are designed for either a quick review of data or for systems that don't have a PDF viewer.

- **CSV/Excel reports**

  Use the CSV/Excel reports to access the data in plain text format. The format is suitable for importing data into programs such as Microsoft Excel.

4.11.3. Generate filtered reports

All data list views in PaperCut NG/MF have export/print option linked at the bottom of the list. The **Export/Print** links run a report over the data currently displayed in the list. The lists column order and filter options are taken into consideration when generating the report data. Use this functionality to produce ad hoc or custom reports. This functionality is best described by example.

To run a report to see how much has been printed against a shared account over the month of May:

1. Click the **Accounts** tab.

   The **Shared Account List** page is displayed.
2. Select **an** account.

   The **Account Details** page is displayed.
3. Click **Transactions**.
4. Click the **edit** link next to **Filter on**.
5. In **From date**, select the 1st of May.
6. In **To date**, select the 31st of May.
7. Click **Apply Filter**.

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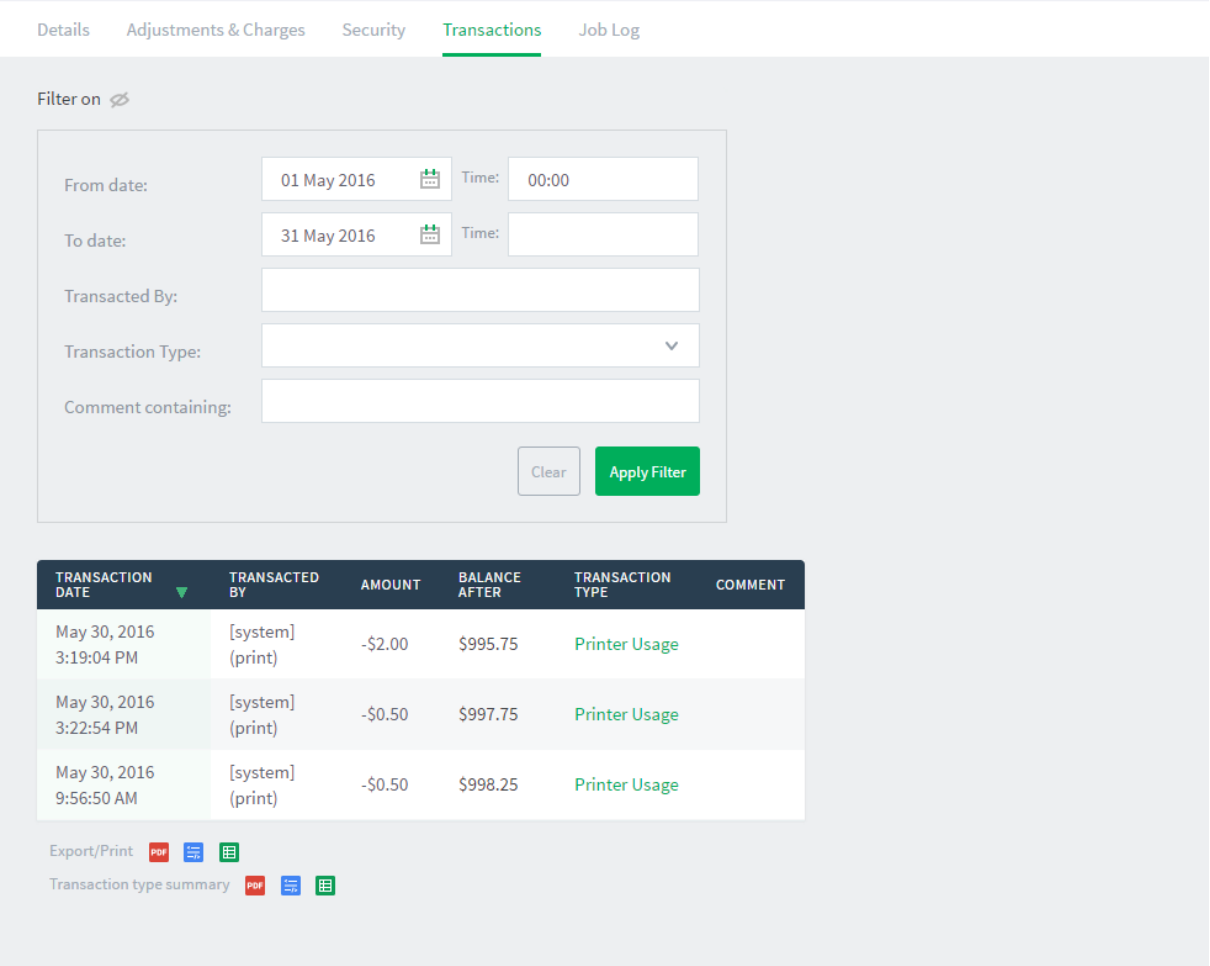

All print jobs printed against this shared account for the month of May are displayed in this list.

8. Click the **Export/Print** link to produce the PDF report.

To run a report listing all transactions issued against a user's account over the month of May ordered by transaction amount:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. Click **Transaction History**.
4. Click the **Show Filters** link.
5. In **From date**, select the 1st of May.
6. In **To date**, select the 31st of May.
7. Click **Apply Filter**.
8. Click the **Amount** column to order the data by amount value.

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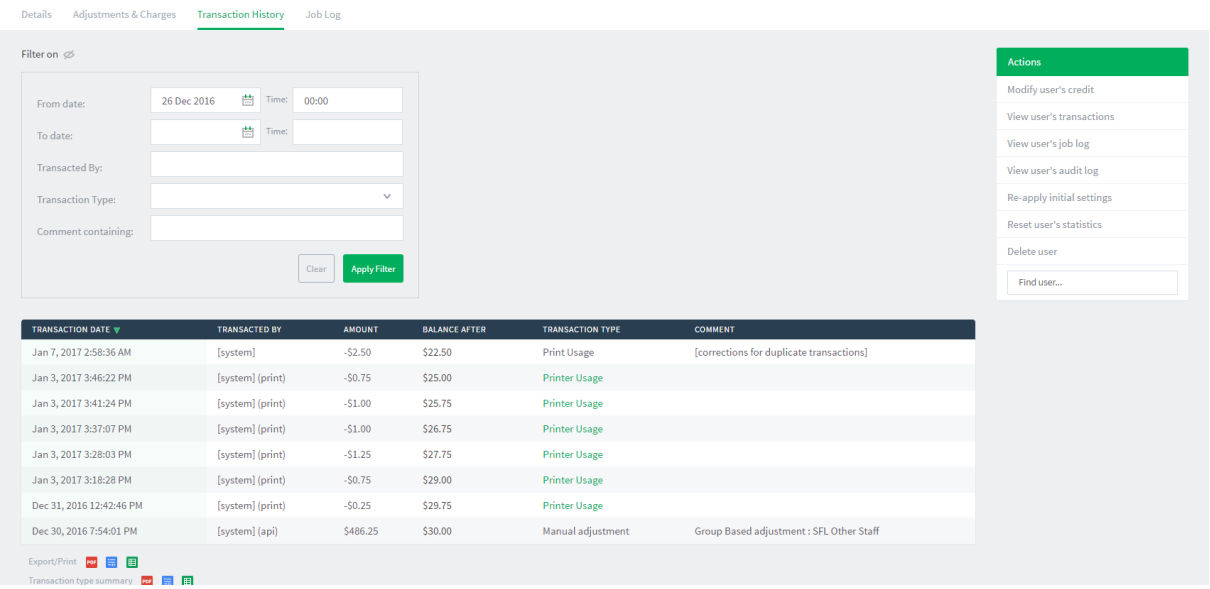

9. Click **Export/Print** at the bottom of the list to produce the report.

4.11.4. Schedule and email reports

The one-click reports in the PaperCut NG/MF web interface are good for finding important data fast, however, sometimes it is more convenient to have important data 'pushed' to interested parties. You can achieve this with *scheduled reports*.

PaperCut NG/MF can schedule reports to run periodically and have them automatically sent out via email or saved to a folder. You can schedule reports for a variety of purposes, for example:

- Sending a department manager a summary of the department staff's printing.
- Sending a teacher a summary of printing for each student in their class.
- Producing and using a CSV report saved to disk to import into an external system, such as an accounting package.
- Producing a regular report for billing or invoicing purposes.

Usage

To view the scheduled reports page:

1. Select **Reports > Schedule /Email Reports**.

   The **Schedule / Email Reports** page is displayed.

Important:
Before scheduled reports can be sent via email, PaperCut NG/MF needs to know where to find a SMTP server (outgoing email server). For information about how to configure email notifications, see Configure email.

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Schedule a Report

Reports can be scheduled for automatic delivery via email or can be saved to disk.

To schedule a report, fill in the details to the right and press 'Add'.

More Information...

Type
Group printing - user summary

Title
Group printing - user summary
An optional title to appear at the top of the report

Optional parameters

User group name :
Limit to one group. Leave blank to include all groups.

Only show printing allocated to :
Choose whether to only show printing allocated to user or shared accounts.

Job Type :
Choose to show print or copy jobs only.

Single server name :
Limit to one print server.

Single printer name :
Limit to one printer.

Printers/Devices :
Limit to selected printers/devices.
All printers/devices

Printer/Device group :
Limit to one printer/device group. Leave blank to include all printers and devices.

Show report parameters :
Enable this option to print report parameters on the report header.

Format
PDF

Report
Daily
The next report will run on Mar 02, 2017. Click on more information to view the advanced reporting options.

Delivery
By Email

Recipients
A comma separated list of email addresses, e.g.: joe@domain.org,bill@domain.org

Add

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To create a scheduled report, select the desired report options; then click **Add**. The process is best described by way of example:

Example 1: Faculty based reporting in education

Joe is head of the science faculty at a university. Faculty staff have the ability to charge printing back to the faculty. Joe wants to see, on a regular basis, how much printing each user charges to the faculty.

To do this:

1. Select **Reports > Schedule /Email Reports**.

   The **Schedule / Email Reports** page is displayed.
2. In **Type**, select **Shared account printing - user summary**.
3. Change the report title to "Science Faculty Account Printing".
4. In **Optional parameters > Shared account name**, enter Joe's faculty shared account name, *Science*.
5. Leave the report **Format** as **PDF**.
6. Make the report deliverable every week by setting **Report** to **Weekly**.
7. Set the **Delivery** to **By email**.
8. Enter Joe's email address under **Recipients**.
9. Click **Add**.

The report is now scheduled to run every week, and should now be shown in the table on the bottom of the page. Joe will receive an email every Sunday showing the previous week's printing in his faculty. To find out exactly when the report will be sent, see Details. To see an example of what the report will look like, click **[show example]** next to the report. To manually run the report (generate it and email to Joe now), click **[run now]**. The

The **[run now]** operation also provides a convenient way to resend the previous period's report if the original delivery failed or if the email was accidentally deleted.

Example 2: Division based reporting in business

Mary is head of the marketing division at a company. She wants to see which printers her staff use most, to make decisions about printer redistribution and purchasing. Also of interest are the sizes of paper being used, and how much color printing is being performed.

To do this:

1. Select **Reports > Schedule /Email Reports**.

   The **Schedule / Email Reports** page is displayed.
2. In **Type**, select **Group printing - printer summary**.
3. In **Optional parameters > Group name**, enter Mary's division group name, *Marketing*.
4. Leave the report **Format** as **PDF**.

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5. Make the report deliverable every fortnight by setting **Report** to **Fortnightly**.
6. Set the **Delivery** to **By email**.
7. Enter Mary's email under **Recipients**.
8. Click **Add**.

The report is now scheduled to run every fortnight, and should now be shown in the table below. Mary will receive an email every second Sunday showing the previous fortnight's printer usage by her division.

Example 3: Create reports to import into external system

John is the head of the accounting department in the organization and wants to charge his clients for invoiced printing allocated to their account. He wants that data in the external accounting system. He can schedule **shared account printing - summary** *report to be saved to disk so that he can access the same file periodically and import the data into his external system.*

1. Select **Reports > Schedule /Email Reports**.

   The **Schedule / Email Reports** page is displayed.
2. In **Type**, select **Shared account printing - summary** .
3. In **Optional parameters > Invoiced** , select **Invoiced**.
4. Change the report **Format** to **CSV**.
5. Make the report deliverable every week by setting **Report** to **Weekly**.
6. Set the **Delivery** to **To file**.
7. Enter a file name *client-summary*. This is the name under which the file is saved on the disk.
8. Click **Add**.

Tip:

Selecting **Append datestamp to file name** is optional. If the option is selected, then the report is saved with a unique name, including the date every time, otherwise the report is overwritten periodically.

The report is now scheduled to be written to disk every week, and should be shown in the table below. A new report is generated under the name of *client-summary.csv*, every week under `[app-path]/server/data/scheduled-reports`.

4.11.4.1. Details

Each report period, as specified in the **Report** field, determines when the report will run. If the report includes date based usage information (such as printing usage), the period also determines the date range of the data. The default report delivery times are described in the table below, however, you can change the date on which the first report (and therefore all subsequent reports) will be run using the Config Editor. Fore more information, see Advanced reporting options.

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Table 57: Scheduled reports delivery times

Period	Report Run Time	Report Date Range
Daily	Early every morning, about 12:55am.	The previous day.
Weekly	Every Sunday in the early morning, about 12:55am.	The previous week, from Sunday to Saturday
Fortnightly	Every second Sunday in the early morning, about 12:55am. Fortnightly reports are run on *even* weeks, i.e. the second week of the year, the fourth week of the year, etc.	The previous fortnight, from two Sundays ago to Saturday.
Monthly	Early morning on the first day of every month, about 12:55am.	The previous month.
Quarterly	Early morning on the first day of every quarter, about 12:55am. Each quarter of a year is 3 months long. For example: First quarter of the year is from 1st of January to 31st of March.	The previous quarter.
Yearly	Early morning on the first day of every year, about 12:55am	The previous year.

Tip:

- Reports scheduled to write to a file are always written to a folder on the server located at `[app-path]/server/data/scheduled-reports`. This is a local folder on the server where PaperCut NG/MF is installed. It is not possible to change this target location to point to a network share on another system. The reason for this is that PaperCut NG/MF runs as a system service/daemon with limited rights so it does not have access to other locations/servers. If the file needs to be accessible/consumed from another system, consider sharing the target folder, or using a scheduled task running as a privileged user (e.g. Windows Task or Cron job) to copy the file.
- If a user has their email address set in PaperCut NG/MF, you can enter their username in **Recipients** instead. For example, instead of entering **joe123@domain.org**, enter just **joe**.

4.11.5. Advanced reporting options

The table below describes the advanced reporting configuration keys that are available. To edit a configuration key:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.

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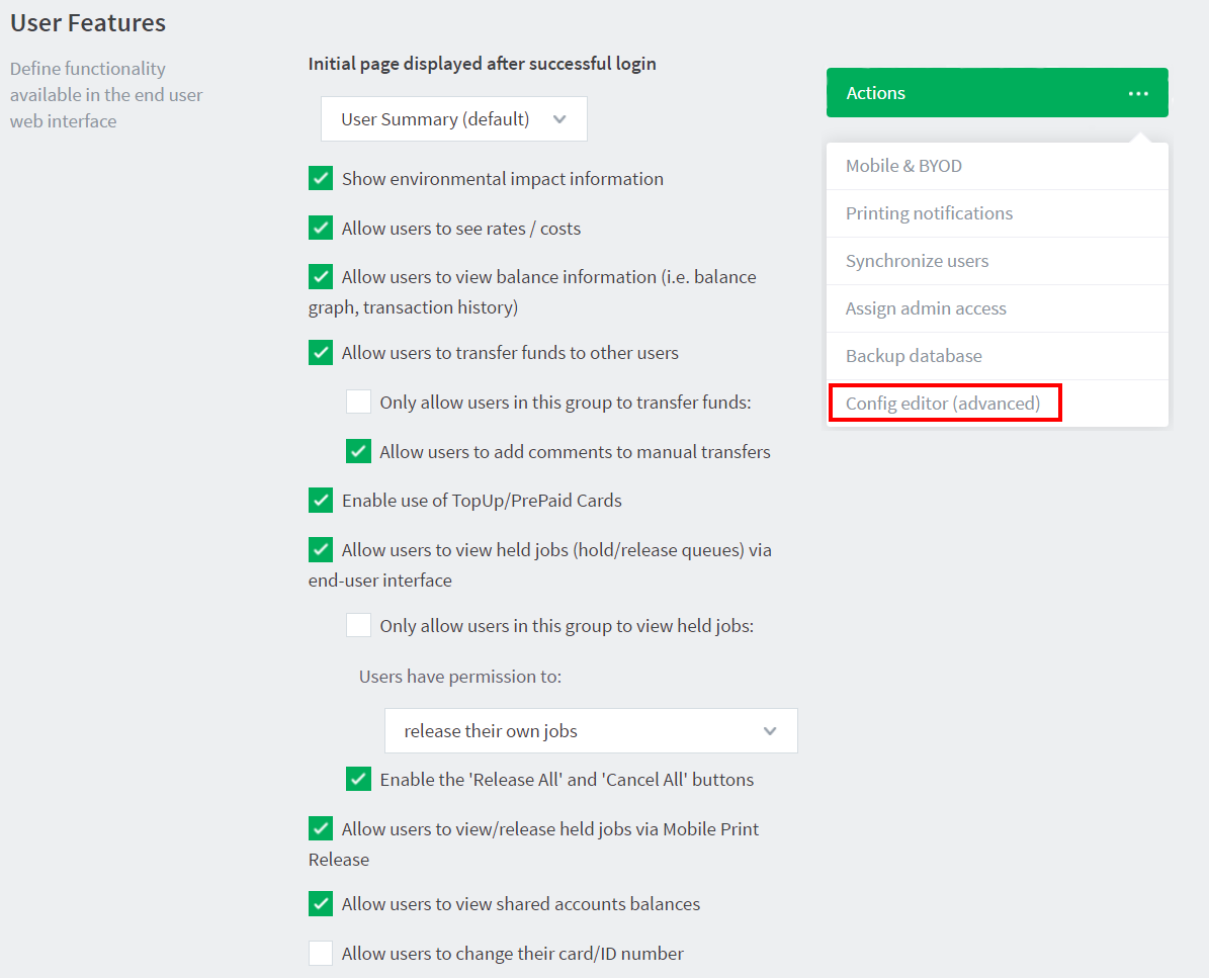

The **Config Editor** page is displayed.

Table 58: Advanced reporting config keys

Config name	Description
scheduled-reports.day-of-week	The day of the week when the weekly and fortnightly scheduled reports are run. By default, the weekly and fortnightly scheduled reports are set to run on Sunday (default value is `Sun`). The valid format for this value is DDD and includes Sun, Mon, Tue, Wed, Thu, Fri, Sat.
scheduled-reports.day-of-month	The day of the month when the monthly scheduled reports are run. By default, the monthly scheduled reports are set to run on the first day of the month (default value is `1`). Valid values include 1 to 28. For example, if you change the value to 5, the monthly reports will run on the 5th of every month, and will include data from the 5th of the previous month, to the 4th of the current month.
scheduled-reports.quarterly-start-month	The month in the first quarter when the quarterly scheduled reports are run. By default, the quarterly scheduled reports are set to run on the first day of January, April, July, and October (default value is `Jan`). The valid format for this value is MMM.

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Config name	Description
	For example, if you change the value to Nov, the quarterly reports will run on the first day in November, February, May, and August. The November quarterly report will include data from August 1st to October 31st.
scheduled-reports.yearly-date	The date in a year when the yearly scheduled reports are run. By default, the yearly scheduled reports are set to run on the first day of the year (default value is `Jan-01`). The valid format for this value is MMM-DD or MMM-D. For example, if you change the value to Jul-01, the yearly reports will run on at 12.55am on July 1st every year, and will include data from July 1st to June 30 the following year.
reports.max-rows	The maximum number of rows that a report produces. Once the number of rows in a report reaches this value, the data in the report is cut short (and the report will contain a message to indicate this has happened). This is a 'sanity limit', intended to avoid producing overly large reports by accident. The default value is `10000`.
reports.top-x-rows	The number of rows to display in 'top X' reports, such as the *Largest print users* report. The default value is `100`.
reports.csv-display-comment-headers	Determines whether to display the comment headers in CSV reports (e.g. The report name and report parameters in the first few rows of the file). You might want to remove the headers if the CSV files are to be post processed or imported into a 3rd party system, such as an accounts database. To display comment headers set the value to `Y`, to hide set the value to `N`.

For more information about how to change config keys, see Using the Advanced Config Editor

Note:
The `schedule.daily-maintenance` config key must have a valid value for the scheduled reports to run. The default value for this config key is `0 55 0 * * ?`, which runs at 12:55 am daily. For more information, see Change the schedule timing.

4.11.6. Central Reports

Organizations with multiple sites typically follow one of two deployment strategies: centralized or decentralized. This includes businesses with offices in multiple cities and education institutes with international campuses. Each model comes with its own pros and cons.

One advantage of the decentralized model is that a SysAdmin at one site can't inadvertently make changes that affect the other sites. Poor inter-site link reliability and simplified site administration are other motivators for adopting the decentralized model. The main *disadvantage* of decentralization is the difficulty of gaining a unified view of print data and reporting. Central Reports solves this problem.

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This section covers how Central Reports provides you with a consolidated data and reporting view across multiple primary/application servers (decentralized model). *If you are using a single Application Server (centralized model) this is not required as the regular reports provide the data you need - see* Reports.

A typical scenario is an organization with multiple sites and one Application Server per site. With Central Reports, organizations such as this can access consolidated reports for the entire organization.

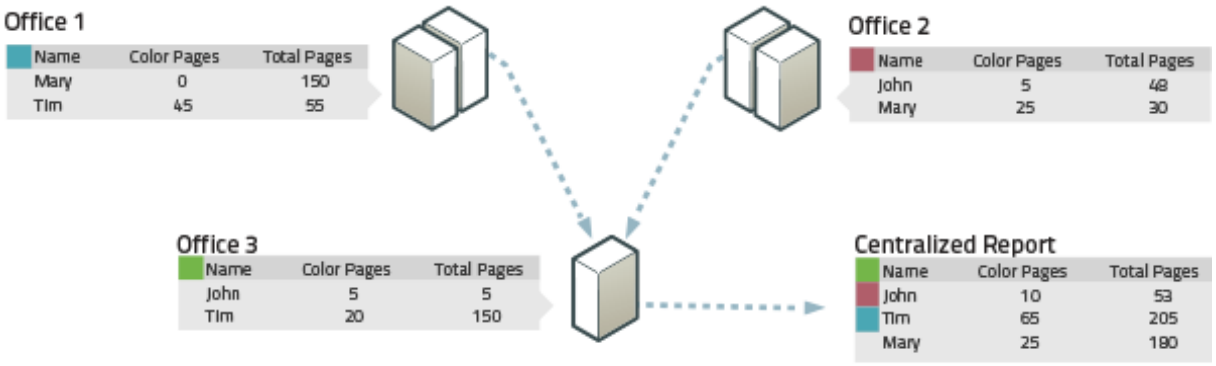

Figure 59: Central Reports across multiple Application Servers

Central Reports works by running the same SQL query on all remote PaperCut NG/MF databases and consolidating the result. This is done by first concatenating the result data from all databases, then grouping, sorting and aggregating as appropriate. For this purpose, entities such as users, groups, printers and accounts are matched by name. For example, if print usage records matching username "Mary" are received from multiple sites, they are all considered as coming from the same user and are aggregated. In other words, users (and some other entities) are considered to be unique across all sites.

Most reports that are suitable for aggregation across systems are available in Central Reports. This includes the Executive Summary report and most usage reports. Not included are configuration reports, transaction reports and print log reports.

You can schedule Central Reports for automatic generation and email distribution just like standard reports.

Tip:
Central Reports is not a centralized management system. Your multiple PaperCut NG/MF Application Servers must continue to be operated and managed independently. All configuration and balances remain local to each Application Server, including user and shared account configuration, admin rights and user balances.

4.11.6.1. Prerequisites for Central Reports

Your organization needs at least two production Application Servers to use Central Reports. You can configure Central Reports on one or both of these Application Servers. You can also configure Central Reports on a separate PaperCut NG/MF installation used solely for the Central Reports feature.

In addition:

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1. Each PaperCut NG/MF Application Server (including the reporting server) must be configured with an external database (see Deployment on an external database (RDBMS). This database must be accessible for read access from the central server by a nominated URL, user and password.

   Central Reports works by running SQL queries on the remote PaperCut NG/MF databases directly. It is therefore possible as an alternative approach to use other mechanisms to replicate the remote databases to your reporting server and run reports from the local read-only replicas. This manual, however, documents only the usual approach of accessing remote databases directly.
2. All databases must be of the same type. For example, if you use Microsoft SQL Server at one site, this database type must be used at all sites, including the site doing the reporting.
3. You should ensure the same PaperCut NG/MF version is installed at each location, including the central reporting location. More specifically, the databases at all sites must use the same database schema (which can change between PaperCut NG/MF versions).
4. By default, Central Reports do not generate reports if any remote databases are unavailable or return errors. It is often better to log these events as errors rather than generate potentially incomplete and misleading reports. Central Reports has a **Status** page that gives you a quick snapshot of the readiness of the system and flags any errors.

   You can instruct central reports to generate reports even if some remote databases are unavailable. To configure, see Server Configuration.

4.11.6.2. Set up Central Reports

Before setting up Central Reports, review the prerequisites in the previous section. If you have not yet set up your external databases at each site, including the reporting site, you must do this first by following the instructions in Upsize to an external database (RDBMS).

1. Select a server as your reporting server. This is the server on which you will configure and run Central Reports. You can choose which ever server is most convenient for you. In fact, you can configure several or all servers to be able to run Central Reports.
2. On the server, open the server config file `[app-path]/server/server.properties` in a text editor (e.g. Notepad).
3. At the bottom of the file, add `central-reports` configuration statements as documented in Server Configuration below and save the file
4. Log in to the PaperCut NG/MF Admin web interface to configure admin rights and email notifications:

   To grant Central Reports admin rights to users who need access:

   a. Select **Options > Admin Rights**.

      The **Admin Rights** page is displayed.

   b. Select the group you want to add Central Reports rights for; then click **Add Group**.

      Or if adding a single user, enter the user; then click **Add User**.

      By default the group or user you added will have access to all features.

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c. Click the **edit** link to the right of the group or user entry.

d. Select the specific rights you want to apply. In particular, ensure that **Access Central Reports** is selected.

e. Click **Apply**.

Enabling an email (SMTP) server allows scheduled Central Reports to be sent. Additionally, enabling email error notifications is recommended so that administrators are notified of any issues that would prevent Central Reports from running successfully). E.g. if a scheduled central report fails, this allows administrators to be notified by email rather than needing to log in to the Admin web interface and check the **App. Log** page.

To enable email notifications:

a. Select **Options > Notifications**.

The **Notifications** page is displayed.

b. Under **SMTP Server Options**, enter an SMTP server and other details so that PaperCut NG/MF can send emails.

c. Recommended: under **System Notifications**, select **Error level events**.

5. Log in to the Central Reports interface using the URL `https://[server-name]:9192/central-reports` and check the **Status** page for any errors. If this page is not available, check that you have added Central Reports admin rights to your login.
6. Select the **Central Reports** tab and run several reports to test. Verify that the reports run and that the results are as expected.

Server configuration

Central Reports is enabled by configuration statements in `[app-path]/server/server.properties`. Changes to the Central Reports related settings in this file do not require a restart of the PaperCut Application Server (although most other settings in this file do).

This file should include template examples for configuring Central Reports. If it does not then you can see the `[app-path]/server/server.properties.template` (which is kept up to date with every upgrade) and copy the Central Reports related settings into your `server.properties` file.

As an example, if using Microsoft SQL Server as the external database, the following statements configure a Melbourne Application Server to run consolidated reports across the Melbourne, Perth and Sydney sites:

```
central-reports.enabled=Y
central-reports.database.local.include=Y
central-reports.database.local.label=Melbourne HQ

central-reports.require-all-databases-online=Y
central-reports.database.1.label=Perth Branch
central-
reports.database.1.url=jdbc:jtds:sqlserver://per1.example.com/pap
ercut
```

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```
central-reports.database.1.username=admin central-
reports.database.1.password=xJf56gy
central-reports.database.2.label=Sydney Branch
central-
reports.database.2.url=jdbc:jtds:sqlserver://syd1.example.com/pap
ercut
central-reports.database.2.username=admin central-
reports.database.2.password=dF95FCd
```

Note that in this example the `server.properties` file is for the "Melbourne HQ" site, and it would contain configuration for its own SQL Server database above (as documented in Upsize to an external database (RDBMS)).

The database statements detailed below must be specified for each remote server. Where specified, *n* is a numeric ID (e.g: 1, 2, 3) used to associate statements for the same site, as per the example above.

Table 60: Central Reports statements in server.properties

Key	Description
`central-reports.enabled`	Central Reports is enabled (but not configured) by default. The purpose of this setting is to allow you to disable Central Reports if required. This results in users not being able to log in to the Central Reports interface, and scheduled Central Reports will not run. Values: Y or N. Default: Y.
`central-reports.database.local.include`	Specify whether to include the local server in the aggregated Central Reports. Values: Y or N. Default: Y. You would specify N if your local server was set up for running reports only and is not to be used as a PaperCut Application Server.
`central-reports.database.local.label`	Provide a meaningful name for the local site. Default: "Local Site".
`central-reports.require-all-databases-online`	This option configures whether or not all databases must be online to create reports. If set to N, reports are created even if some remote databases are not available, but the aggregated reports will not include data from those databases. Values: Y or N. Default: Y.
`central-reports.database.n.label`	A text label to identify the remote server *n*, in the Central Reports status page and reports.
`central-reports.database.n.url`	Specify the JBDC URL providing remote access to your database. This URL is specified in the same way as for the external database you have already configured on this system.
`central-reports.database.n.username`	A database username providing read access to the remote database.

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Key	Description
`central-reports.database.n.password`	A database password for the supplied username.

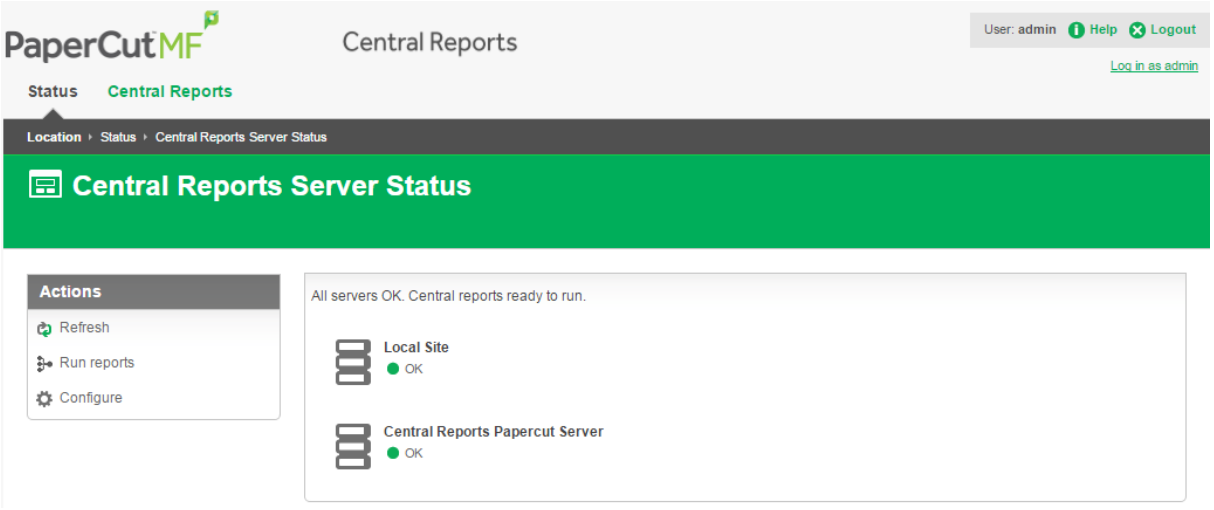
4.11.6.3. Run a Central Report

Access Central Reports at the URL `https://[server-name]:9192/central-reports`. The following tabs are displayed:

1. **Status** - check the remote server status and whether you are ready to run reports
2. **Reports** - generate on-demand and scheduled reports

Status tab

The **Status** tab shows the status of each configured remote server and displays any errors that prevent Central Reports from running.



Reports cannot be generated if any server has an error. Typical errors include:

1. Failing to connect to the database (incorrect authentication, firewall blocking access, configuration error).
2. Servers have mismatched application versions or database types.

Central Reports tab

The **Central Reports** tab shows the reports available under Central Reports and allows reports to be generated on demand or to be scheduled for email delivery. Central Reports provides a sub-set of the reports available in the Admin web interface Reports page, but the usage is the same. Refer to Reports for instructions on how to run reports and configure filters.

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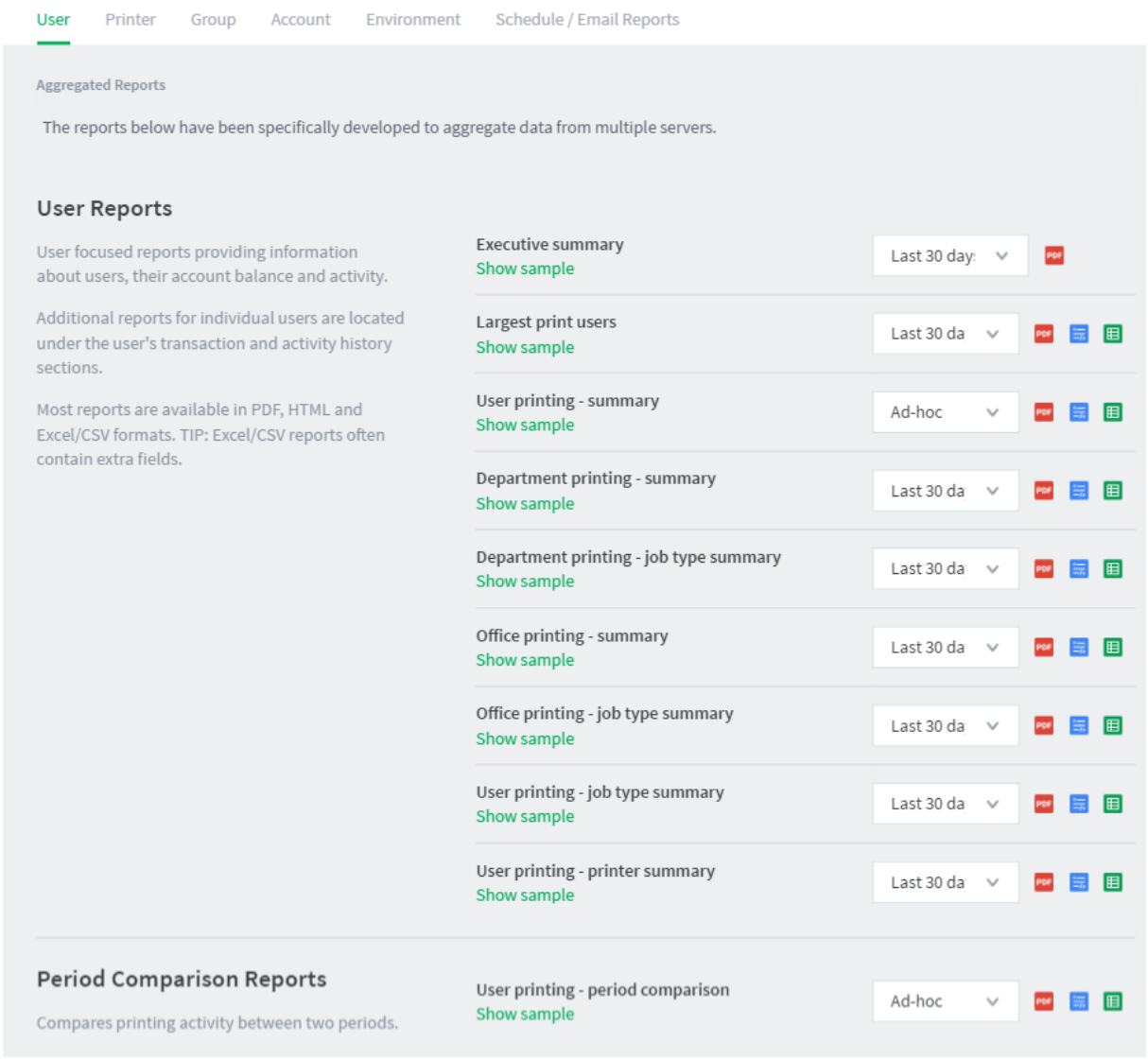

Select the **Schedule / Email Reports** tab to schedule Central Reports for periodic generation and automatically have them emailed to the appropriate people in your organization.

4.12. Advanced scripting (print scripting)

PaperCut NG/MF's advanced scripting interface is a powerful and flexible feature that you can use to define and fine tune your printing policy. While there are many features that you can enable by selecting check boxes and changing options in the Admin web interface, scripting your own behavior introduces a whole new level of customization.

The functionality made possible by scripting is varied and is constantly being extended based on customer demand. Some common uses include:

- Displaying a popup message if a user forgets to select duplex on large jobs.
- Showing a dialog that displays environmental impact statistics about a user's print job such as the amount of carbon dioxide equivalent greenhouse gases produced.
- Prompting the user to confirm large jobs before printing.
- Automatically routing large jobs to more efficient high volume printers.

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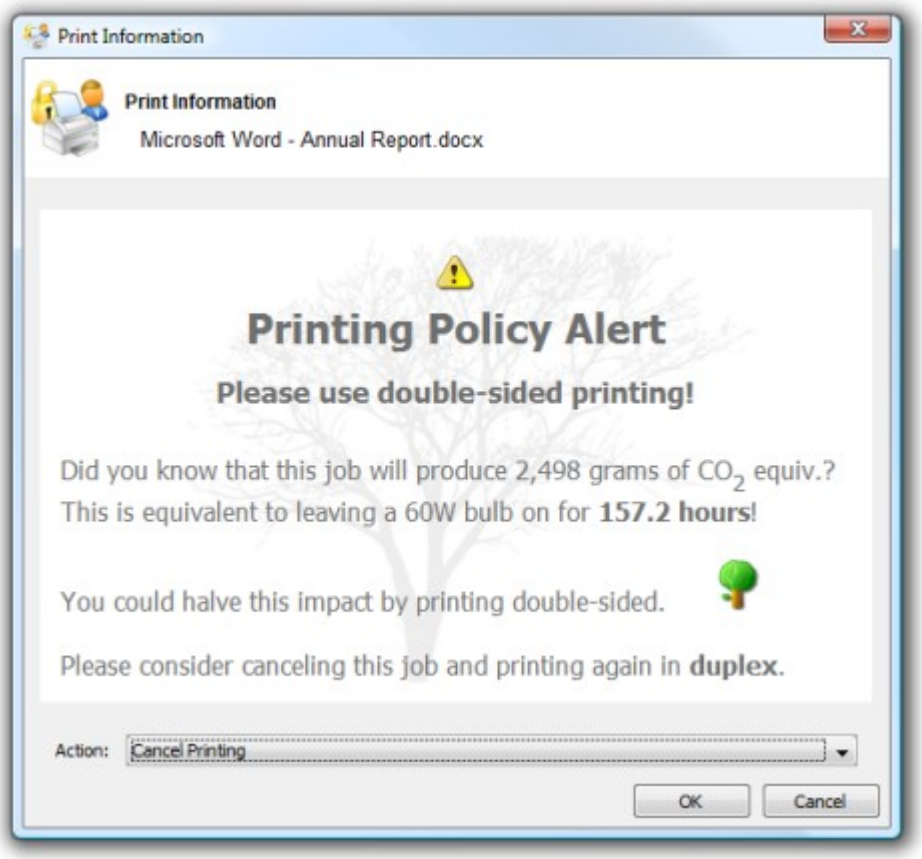
All of the above is possible by writing a small script directly into a code editor in the Admin web interface. In fact, the above functionality is a pre-built recipe ready to use.

Other usage examples include:

- Requesting job data/security classification.
- Giving discounts during off-peak times.
- Charging printing to departments during class-time.
- Displaying warning messages under selected conditions.
- and many, many more.

At a high level, advanced scripting provides the ability to:

- *Adapt* logic based on print job attributes such as cost, pages, document name, time, etc.
- *Modify* job attributes and behavior such as routing the job to another printer, influencing job cost and account charged, and appending metadata such as comments.
- *Interact* with end users via client messages and popups/dialog boxes.



Prerequisites

Writing print scripts brings many possibilities but also introduces the possibility that writing a buggy print script results in unexpected behavior. Previous experience with scripting or programming is

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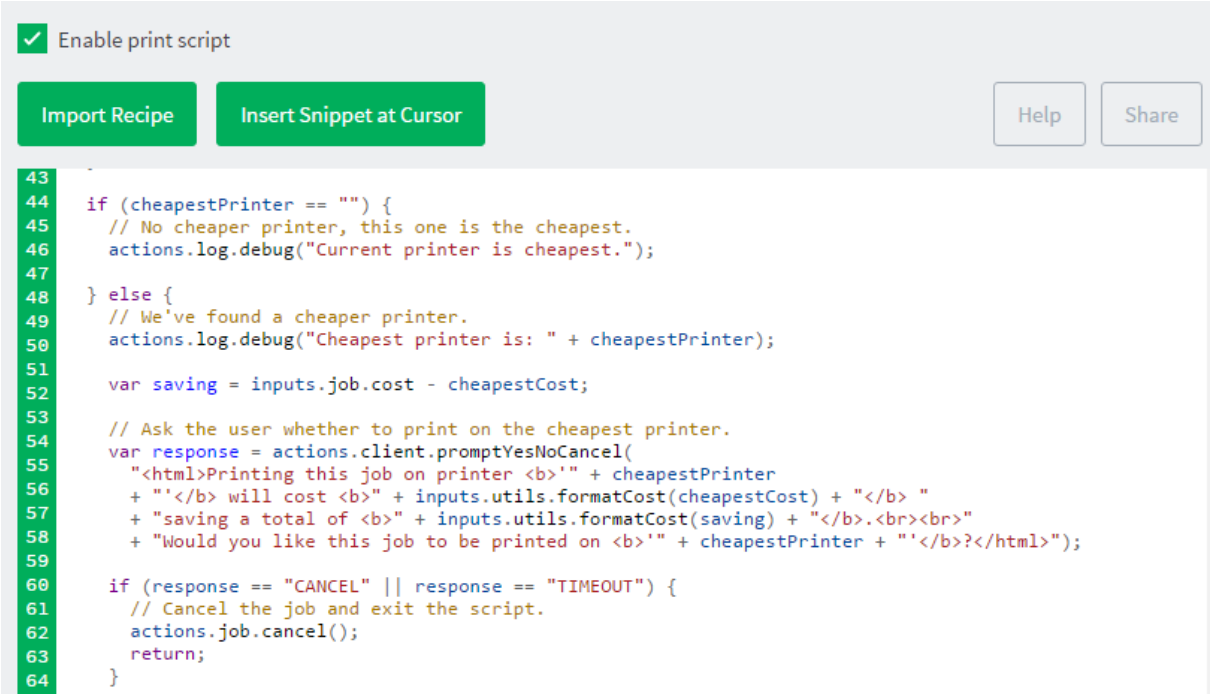
strongly recommended. PaperCut NG/MF does provide a number of tools to assist with script development, however, including:

- A mini JavaScript editor with basic error checking and syntax highlighting.
- Quick access to a code cookbook containing dozens of best-practice recipes.
- Pre-canned "code snippets" demonstrating the use of key functions.
- Simple debugging tools such as logging and runtime error reporting.



All of PaperCut NG/MF's advanced scripts are written using the world's most popular scripting language, JavaScript (also known as ECMA-262 ECMAScript... apparently ;).

Note:

Why JavaScript? JavaScript was selected as PaperCut NG/MF's scripting language after careful consultation with the existing user base. JavaScript was the language common to SysAdmins across all platforms (Windows, Mac and Linux). Its popularity in HTML programming also meant most administrators already had extensive exposure to the language. Internally PaperCut uses the Rhino scripting engine maintained by Mozilla.org, makers of the popular Firefox browser. It is highly performant and allows PaperCut NG/MF to leverage advanced scripting without compromising system scalability. This is done using advanced techniques such as just-in-time compilation.

Create a print script

Print scripts are segments of code that are run whenever a new print job arrives in the queue. The script is defined using the concept of a "hook". A hook is a JavaScript function (e.g. `function printJobHook(inputs, actions) { }`) that is called for each new job. Your print script defines this method, its behavior, and its actions.

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All scripts are defined on a per printer basis allowing each printer to have its own logic (although you can share/copy a common script between printers, see Copy printer settings).

To create a print script:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Click the **Scripting** tab.
4. Select the **Enable print script** checkbox.
5. Create your script in one of the following ways:
   - import a predefined recipe (script)
   - write your own script using snippets
6. Click **Apply**.

Tip:

One good way to experiment with print scripting is to apply your script initially on a test printer (or fake print queue, such as a print queue pointing to an unused LPT port). This allows you to test and experiment, and when the logic is right, copy/deploy across to other live printers.

Recipes

Recipes demonstrate best practice and should be considered as a starting point for development of your own scripts.

To use a recipe:

1. Click **Import Recipe**.

   A list of the predefined recipes is displayed. For example, the **Print Policy Enforcement (warnings & automatic conversion)** recipe:
   - discourages single-sided printing
   - discourages printing of emails in color
   - discourages printing of web pages in color
   - discourages printing of emails that have more than one page

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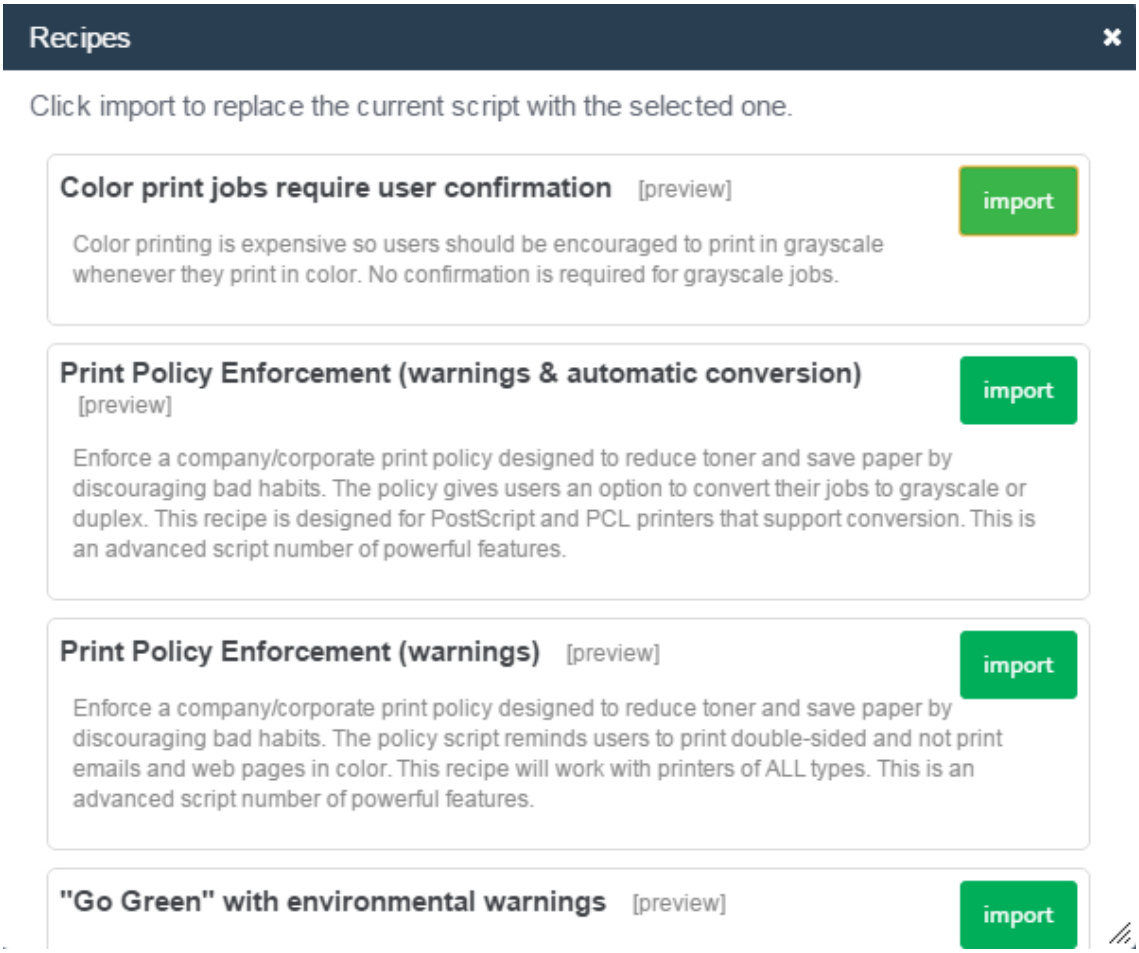

2. Click **Import** next to the recipe you want to use.

   A confirmation prompt is displayed.

3. Click **OK**.

   The recipe replaces what is currently in your script.

4. Click **Apply**.

Snippets

Code *snippets* are small code fragments that demonstrate how to use the scripting API (inputs, functions, and methods). Consider using snippets as a base for adding functionality to your script.

To use a snippet:

1. Place your cursor in the position you want to insert the snippet.
2. Click **Insert Snippet at Cursor**.

   A list of code snippets is displayed. For example, the **Test if job is color** snippet provides the code to check if a print job is being printed in color. This could be used as part of a script to perform an action on all color print jobs.

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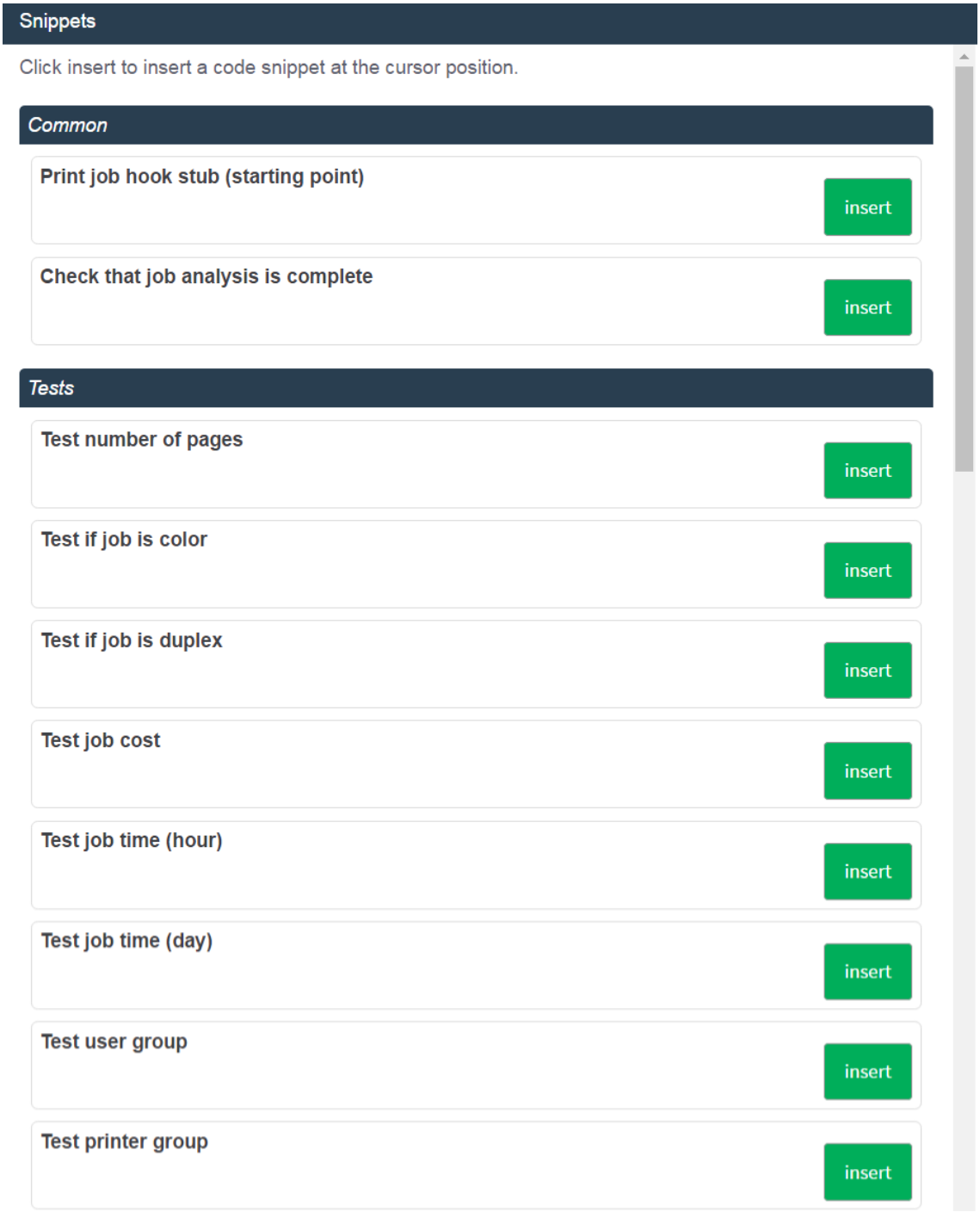

3. Click **insert** next to the snippet you want to use.

   A confirmation prompt is displayed.

4. Click **OK**.

   The snippet is added to your script.

5. If required, you can modify the code to suit your needs.
6. Click **Apply**.

Error messages

Error messages are classed into two groups:

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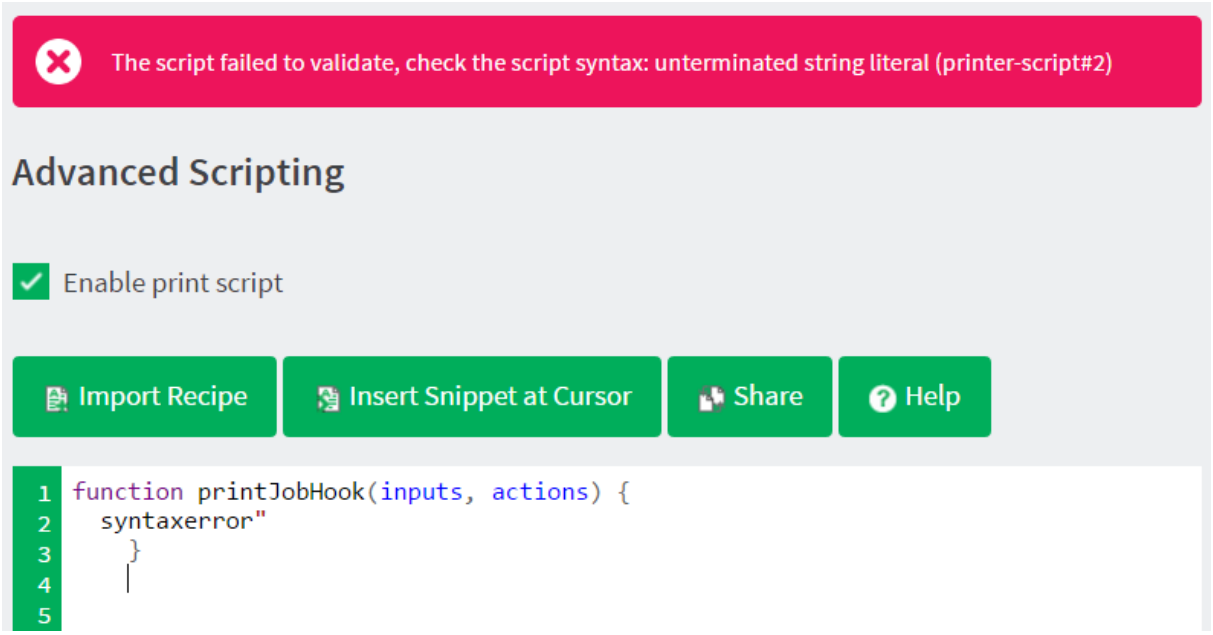
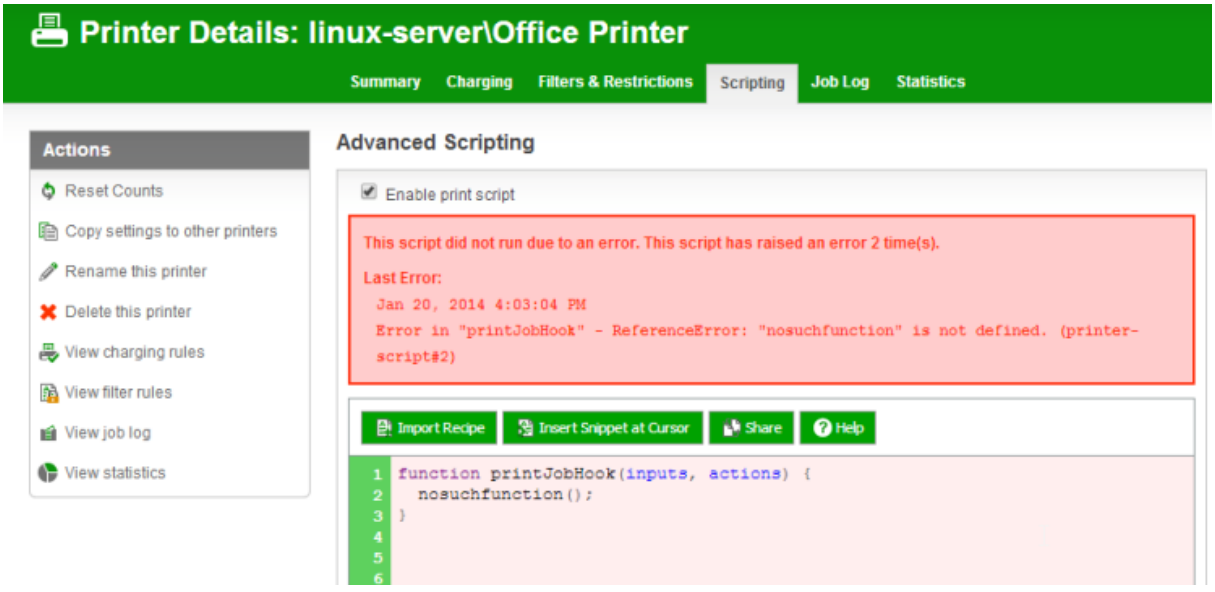
- **Syntax errors**—these are detected and displayed when a script is applied. The script does not save until all syntax errors are addressed.



- **Runtime errors**—these are errors that only occur when a script is executed for a print job. Runtime errors are also listed on the **Scripting** tab in red. Refresh the page to see runtime errors. Runtime errors are also logged and are displayed on the **App Log** tab.



Where possible the error message indicates the line number on which the error was found and the relevant line is highlighted.

4.12.1. Advanced print scripting - global include script

Large organizations with advanced print scripting requirements might need to share common code between different print scripts. Use advanced scripting techniques to build these common libraries.

Writing a common script allows reuse of JavaScript code and functions without needing to copy script code to all printers. Write the common script code in a file named `print-script-`

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`common.js` and save it in the `[install-path]/server/custom` directory. This script is included and executed automatically and functions created in this file are accessible from all print scripts.

Errors in the common print script are detected and displayed in the **Scripting** page. The error message contains the name of the common script file, the error, and the line number where the error occurred. Refresh the page to see these errors. These errors are also displayed on the **App. Log** page.

4.12.2. Tips for print scripts

1. Use snippets and/or recipes where possible. They are tested and demonstrate best practice.
2. Start out small and aim high. Don't try building your script all in one go. Write a bit, test, then move on. Large scripts written in one go are hard to debug.
3. Always test your scripts! Just because a script compiles does not mean it is bug free. Take time to test your script and exercise all logic paths. For example, if your script applies an action to jobs with more than 100 pages, test it by printing jobs that are both more and less than 100 pages.
4. Check all your scripts from time to time for runtime errors and/or enable error level event notifications to receive an email when errors occur (see Error level event notifications).
5. Take some time to explore the list of methods in the reference API documentation (see Print script API reference). Knowing what is possible can open up ideas.
6. Use `actions.log.debug()` or `actions.client.sendMessage()` to assist with "print line" style debugging.
7. If your scripts interact with end users, perform some usability testing to ensure they understand your messages and intentions.
8. Consider using HTML markup to pretty up your dialog messages (see the snippet titled **Show a dialog with HTML formatting**).

4.12.3. Print script API reference

Print scripts are segments of code that are run whenever a new print job arrives. The script is defined using the concept of a "hook". A hook is a JavaScript function that is defined by you, the script writer. It is also commonly referred to as an *entry point* or `method`. A number of print hooks (entry points) are available and each differ by the point in the print workflow when they are called. For example, a hook early in the workflow has the ability to influence behavior later in the flow, while scripts late will correspondingly have access to additional information that would not be available earlier. In most cases the generic main hook satisfies most requirements.

Note:

This API reference describing all the properties and functions available to print scripts. Many of these inputs and functions reference JavaScript objects (e.g. String, Boolean, Date etc.). A good JavaScript reference will assist with making use of and formatting these objects. For more information, see the Mozilla Developer Center here:

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https://developer.mozilla.org/en/JavaScript/Reference.

4.12.3.1. Script hooks (entry points)

The available print hooks are:

Table 61: Print workflow hooks

Hook	Description
`printJobHook(inputs, actions)`	This is the main multi-purpose hook and is suitable for most situations. *Point of Call:* Immediately before account selection popup displays. *Suitability:* Most situations as all print job inputs and most actions are available. *Limitations:* • Can't influence popup authentication behavior • End-user account selection information is not available
`printJobAfterAccountSelectionHook(inputs, actions)`	This hook should only be used to perform actions that use the result of the account selection popup (i.e. accesses `inputs.job.selectedSharedAccountName`). *Point of Call:* Immediately after account selection popup displays (or would display if enabled). *Suitability:* Only use when the result of the account selection is required. *Limitations:* • Can't influence account selection popup behavior or selected results (because it's already been completed) • Can't influence popup authentication behavior
`Other Hooks`	If you have the need for another hook (e.g. pre-authentication), explain your requirements to the support team. Your input can influence the development of future scripting features.

All print job hooks have access to job, printer and user information and can perform a variety of actions that affect the job processing. The scripts have access to these through the two function arguments:

- `inputs` - *Read-only* access to the print job, user and printer information.
- `actions` - Access to perform actions that can influence the job processing, e.g. to cancel a job or send a message to the client software.

`inputs` are read-only and any modification to variables do not affect the print job. All actions (also known as side-effects) must be performed via the available `actions`. All available `inputs` and `actions` are listed below.

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4.12.3.2. Script Inputs

Job Info (inputs.job)

Table 62: Job Info Script Reference (`inputs.job`)

Property/Method	Description
`inputs.job.date`	(date) The date/time the job was printed.
`inputs.job.username`	(string) The username of the user that printed the job.
`inputs.job.printerServerName`	(string) The name of the server the print queue is hosted on.
`inputs.job.printerName`	(string) The printer name.
`inputs.job.fullPrinterName`	(string) The full name of the printer including the server name, in the format `server-\printer`.
`inputs.job.documentName`	(string) The document name.
`inputs.job.isAnalysisComplete`	(boolean) Indicates that the print job has been completely analyzed. Before the job analysis is completed, only basic job information is available (e.g. date, username, printer, document name, client machine, etc). The detailed job information, such as page counts, paper size, costs, etc are only available after analysis is completed. If scripts require access to the detailed information, they should only access these once the job analysis is completed. This is achieved by placing the following snippet at the start of the print hook function: `if (!inputs.job.isAnalysisComplete) { return; }` This snippet exits the script if analysis is not complete. Once analysis is completed the script is called again and continue past this point.
`inputs.job.isWebPrintJob`	(boolean) Determines if the job was submitted by Web Print.
`inputs.job.isMobilityPrintJob`	(boolean) Determines if the job was submitted via Mobility Print.
`inputs.job.jobSourceName`	(string) The machine name of the client workstation where the job was printed, or the type of job if originating from Google Cloud Print (GOOGLE_CLOUD_PRINT), Web Print (WEB_

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Property/Method	Description
	PRINT) or Email to Print (EMAIL_PRINTING). Can be blank if the client machine name is not known.
`inputs.job.clientIP`	(string) The IP address of the client workstation where the job was printed. This might not be populated if the client IP address is not known.
`inputs.job.clientMachineOrIP`	(string) The machine name or IP address of the client workstation where the job was printed. If both the machine name and the IP address are known, the machine name are returned.
`inputs.job.selectedSharedAccountName`	(string) The full name of the selected shared account. If no shared account is selected the an empty string is returned ("") (available only after the account selection is completed. i.e. from within the `printJobAfterAccountSelectionHook` hook).
`inputs.job.totalPages`	(number) The total number of pages in the print job. (available only when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.totalSheets`	(number) The total number of sheets of paper produced by the job. (available only when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.totalColorPages`	(number) The total number of color pages in the print job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.totalGrayscalePages`	(number) The total number of grayscale pages in the print job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.isGrayscale`	(boolean) Determines if the job is grayscale (i.e. contains no color). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.isColor`	(boolean) Determines if the job is color (i.e. contains at least one color page). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)

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Property/Method	Description
`inputs.job.isDuplex`	(boolean) Determines if the job is duplex. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.cost`	(number) The cost of the job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.copies`	(number) The number of copies. The `totalPages` attribute already takes the copies into account. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.spoolSizeKB`	(number) The size of the spool size in kilobytes (KB). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.paperSizeName`	(string) The paper size name (e.g. Letter, Tabloid, A4, A3). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.printerLanguage`	(string) The printer language of the print job (e.g. PostScript, PCL5, etc). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.paperSizeHeightMM`	(number) The height of the paper size in millimetres (mm). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.paperSizeWidthMM`	(number) The width of the paper size in millimetres (mm). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.environmentBulbHours`	(number) The amount of energy used by this job in terms of the number of hours of use of a 60W light bulb. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.environmentTrees`	(number) The amount of paper used by this print job in terms of number of trees. (Only available

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Property/Method	Description
	when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.environmentGramsCO2`	(number) The amount of carbon dioxide (C02) produced by this print job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.calculateCostForPrinter(printerName)`	Calculates the cost of printing this job on another printer. Use this to determine the "Least cost route" for this job. This returns the cost of the job. Parameters: • `printerName` (string) - The name of the printer to calculate the cost of the job for. Enter this as `server\\printer` or without the server name. If the server name is ommitted it is assumed the printer is on the same print server as the current job. NOTE: The inputs.job.calculateCostForPrinter input requires the double \ character.

User Info (inputs.user)

Table 63: User Info Script Reference (inputs.user)

Property/Method	Description
`inputs.user.username`	(string) The username of the user that printed the job.
`inputs.user.fullName`	(string) The full name of the user that printed the job (if known).
`inputs.user.email`	(string) The email address of the user that printed the job (if known).
`inputs.user.office`	(string) The office of the user that printed the job (if known).
`inputs.user.department`	(string) The deparment of the user that printed the job (if known).
`inputs.user.restricted`	(boolean) Determines if the user is restricted. i.e. printing is denied when they have no credit.
`inputs.user.balance`	(number) The user's current account balance.
`inputs.user.getBalance(accountName)`	(number) The user's current account balance. Parameters: • `accountName` (string) - *This is only valid*

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Property/Method	Description
	when Multiple personal accounts *is enabled.* This is an optional parameter to specify the personal account name. If not specified, it retrieves the user's total account balance.
`inputs.user.isInGroup (groupName)`	Determines if the user belongs to the given group name (as defined on the **Groups** tab). Returns `true` if the user belongs to this group. Parameters: • `groupName` (string) - The name of the group to check. NOTE: The group name is case-sensitive.
`inputs.user.getProperty (propName)`	Return a value as a `string` associated with a persistent custom-defined property saved on the user, or `null` if there is no such value. Parameters: • `propName` (string) - The name/key of a user property to look-up. For more information using storage properties see User Defined Persistent Properties (Storage).
`inputs.user.getNumberProperty (propName)`	A convenience method to return a value as a `number` associated with a persistent custom-defined property saved on the user, or `null` if there is no such value. Parameters: • `propName` (string) - The name/key of a user property to look-up. For more information using storage properties see User Defined Persistent Properties (Storage).

Client Info (inputs.client)

Table 64: Client Info Script Reference (inputs.client)

Property/Method	Description
`inputs.client.isRunning`	(boolean) Determines if the user who printed the job is running the User Client software. The client is considered "running" if there was activity from that client within the last 5 minutes. Use this: • To adapt a script when the client is not running (e.g. to display an optional popup question using the `actions.client.prompt*` APIs) • *ONLY* when response to the client prompt is optional (e.g. the print job is allowed to continue uninterrupted, even when the client is inactive and does not respond to the prompt).

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Printer Info (inputs.printer)

Table 65: Printer Info Script Reference (inputs.printer)

Property/Method	Description
`inputs.printer.serverName`	(string) The name of the server where the printer is hosted.
`inputs.printer.printerName`	(string) The name of the printer.
`inputs.printer.fullPrinterName`	(string) The full name of the printer in format `server/printer`.
`inputs.printer.isVirtualQueue`	(boolean) Determines if this printer is a virtual queue.
`inputs.printer.isDisabled`	(boolean) Determines if this printer is currently disabled.
`inputs.printer.isStatusError`	(boolean) Determines if this printer is currently in an error state (e.g. paper jam, offline, etc.)
`inputs.printer.statusInErrorSince`	(date) The time when the printer went into this error state.
`inputs.printer.statusInErrorSeconds`	(number) The number of seconds the printer has been in error.
`inputs.printer.groups`	(Array) An array of all the printer groups that this printer is a member of.
`inputs.printer.isInGroup(groupName)`	(boolean) Determines if the printer belongs to a particular printer group. Returns `true` if the printer belongs to this group. Parameters: • `groupName` (string) - The name of the printer group to check.
`inputs.printer.getProperty (propName)`	Return a value as a `string` associated with a persistent custom-defined property saved on the printer, or `null` if there is no such value. Parameters: • `propName` (string) - The name/key of a printer property to look-up. For more information using storage properties see User Defined Persistent Properties (Storage).

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Property/Method	Description
`inputs.printer.getNumberProperty (propName)`	A convenience method to return a value as a `number` associated with a persistent custom-defined property saved on the printer, or `null` if there is no such value. Parameters: • `propName` (string - The name/key of a printer property to look-up. For more information using storage properties see User Defined Persistent Properties (Storage).

Utilities (inputs.utils)

Table 66: Utilities Script Reference (inputs.utils)

Method	Description
`inputs.utils.formatBalance (amount)`	Formats the balance amount based on the server currency settings. Returns a string. Parameters: • `amount` (number) - the amount to format.
`inputs.utils.formatCost (amount)`	Formats the cost amount (e.g. a job cost) based on the server currency settings. Returns a string. Parameters: • `amount` (number) - the amount to format.
`inputs.utils.formatNumber (amount, decimals)`	Formats a number with the given number of decimal places. Returns a string. Parameters: • `amount` (number) - the amount to format. • `decimals` (number) - The number of decimal places to format.
`inputs.utils.getProperty (propName)`	Return a value as a `string` associated with a persistent custom-defined global property, or `null` if there is no such value. Parameters: • `propName` (string) - The name/key of a global property to look-up.

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Method	Description
	For more information using storage properties see User Defined Persistent Properties (Storage).
`inputs.utils.getNumberProperty(propName)`	A conveneince method to return a value as a `number` associated with a persistent custom-defined global property, or `null` if there is no such value. Parameters: • `propName` (string) - The name/key of a global property to look-up. For more information using storage properties see User Defined Persistent Properties (Storage).

4.12.3.3. Script Actions

Job actions (actions.job)

Table 67: Job Actions Script Reference (actions.job)

Method	Description
`actions.job.addComment(comment)`	Appends a comment to the job. This is logged to the database and is available in the job logs and reports. If the job already has a comment (e.g. set by the user with the advanced client) then this appends to the existing comment. Parameters: • `comment` (string) - The comment to add to the print job.
`actions.job.setCost(cost)`	Sets the cost of the print job. NOTE: If there are other cost adjustments configured (e.g. user cost overrides), these can further modify the job cost later in the job processing. Parameters: • `cost` (number) - The cost of the job. Must be greater than or equal to 0.
`actions.job.cancel()`	Cancels the current print job so that it is not printed. It does not log the canceled job. To log the job use `actions.job.cancelAndLog`. The script should typically exit using `return` after cancelling the job.
`actions.job.cancelAndLog([comment])`	Cancels the current print job and logs it under job logs. It can also add a comment to the job, which

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Method	Description
	is then available in the job logs and reports. The script should typically exit using `return` after cancelling the job. Parameters: • `comment` (string) - An optional parameter to add a comment to the print job.
`action-s.job.chargeToPersonalAccount()`	Disables any client popups and account selection, and charges the job to the user's personal account. *NOTE: If you're using this in conjunction with e.g. inputs.job.jobSourceName to suppress popups when processing e.g. Google Cloud Print jobs, you'll need to remove the initial loop in the script that checks for inputs.job.isAnalysisComplete being true. If this action happens after the analysis completes, that might be too late to suppress the client popup.*
`action-s.job.chargeToSharedAccount(accountName)`	Disables any client popups and account selection, and charges the job to the specified shared account. Parameters: • `accountName` (string) - The name of the shared account. If the shared account is a sub-account then the account name must be provided in the format `parentName\\subName`. *NOTE 1: The action-s.job.chargeToSharedAccount action requires the double \ character. NOTE 2: If you're using this in conjunction with e.g. input-s.job.jobSourceName to suppress popups when processing e.g. Google Cloud Print jobs, you'll need to remove the initial loop in the script that checks for inputs.job.isAnalysisComplete being true. If this action happens after the analysis completes, that might be too late to suppress the client popup.*
`actions.job.redirect(printerName[, options])`	Schedules the job to be redirected to the given printer queue. The job is redirected after it has completed processing (e.g. after print popups are acknowledged, filters are run, and the job is released from the hold/release queue). *NOTE 1: Jobs should only be redirected between compatible printers (e.g. those that support the same printer language and features). For more inform-*

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Method	Description

	ation see Requirements for job redirection (load balancing or Find-Me printing). *NOTE 2: By default, once a job is redirected it is printed on the destination queue. You cannot run another script or use print popups at the destination queue. If you want the job to be held at the destination queue, you must specify the option: allowHoldAtTarget:true.* Parameters:
	• `printerName` (string) - The name of the printer to redirect to. Enter this as `server\printer` or without the server name. If the server name is omitted it is assumed the printer is on the same print server as the current job.
	• `options` (object/dictionary) - An optional parameter defining the additional options to the redirect command. Options include:
	◦ `allowHoldAtTarget` (boolean) - Determines whether the job holds in the destination printer's hold/release queue if present. Although the job is displayed in the destination's hold/release queue, it is not physically redirected until printed. Default: `false`.
	◦ `recalculateCost` (boolean) - Determines whether to recalculate the cost based on the settings of the destination printer. Default: `false`.
	Example 1: Redirect to a printer named "server-\Fast Printer".
	`actions.job.redirect ("server\\Fast Printer");`
	Example 2: Redirect to a virtual queue named "server\Utility Room". The job holds at the Release Station.
	`actions.job.redirect ("server\\Utility Room", {allowHoldAtTarget: true});`
	Example 3: Redirect to a virtual queue named

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Method	Description
	"server\Utility Room", recalculating the cost based on the cost settings of the destination printer. `actions.job.redirect ("server\\Utility Room", {allowHoldAtTarget: true, recalculateCost: true});` *NOTE 3: The actions.job.redirect() action requires the double \ character.*
`actions.job.bypassReleaseQueue()`	Allows this job to pass through the queue without being held in a hold/release queue.
`actions.job.holdInReleaseQueue([mode])`	Holds this job in a hold/release queue that it was printed to. If the `mode` argument is omitted the job is held in "User-release" mode. Parameters: • `mode` (string) - An optional parameter defining the Release Station mode. If set to `user-release`, the user can release the job. If set to `manager-release`, only an admin or print release manager can release the job. Default: `user-release`
`actions.job.bypassFilters()`	Allows this job to pass through the queue without being denied by the configured print filters/restrictions.
`actions.job.convertToGrayscale()`	Convert this job to grayscale (if it is not already grayscale). The job's cost is recalculated after conversion to grayscale. For more information and troubleshooting with job conversions, see Using Print filters: conversions and restrictions.
`actions.job.convertToDuplex()`	Convert this job to duplex (if it is not already duplex). The job's cost is recalculated after conversion to duplex. For more information and troubleshooting, see Using Print filters: conversions and restrictions.
`actions.job.changeNumberOfCopies(newCopies)`	Change the number of copies in this job. E.g. change to print 4 copies instead of 1 copy. This should only be used to increase the copy count from 1, not to reduce the count or change in other ways. The job's cost is recalculated after the number of copies is changed. This feature might not be available for all print drivers. For more

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Method	Description
	information and troubleshooting, see Using Print filters: conversions and restrictions. Parameters: • `newCopies` (number) - The new number of copies to print. Note: Changing the number of copies might not work on all devices. If you experience problems and the steps in Troubleshooting do not assist, please contact support for assistance.
`actions.job.changeDocumentName(documentName)`	Changes the name of the document that is logged in the database. Parameters: • `documentName` (string) - The new name of the document.
`actions.job.changeUser(username)`	Changes the user associated with the job (i.e. the user is logged as the user that printed the job). Parameters: • `username` (string) - The username of the user.
`actions.job.changePersonalAccountChargePriority(accountNames)`	Allows overriding which of a users' personal accounts to charge and in which order/priority. This is useful when a printer can only be used when credit is available in a particular subset of user personal accounts (e.g. department allocated quotas). Only those accounts listed are charged for the job. If credit isn't available in the listed accounts the jobs is denied. *NOTE: This is only valid when Multiple Personal Accounts is enabled. See* Multiple personal accounts. Parameters: • `accountNames` (array of strings) - the list of personal account names (as configured in **Options > Advanced**.) in the order they are charged. e.g. `["Default", "Cash"]`. When searching for the account names the case differences are ignored. If any of the accounts supplied to do not exist then an entry is written to the server log. If no valid accounts are found then the personal account charge priority is unchanged. Example: To allow the jobs to be only charge to the accounts "Science Department" and "Cash" (in that order)

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Method	Description
	`actions.job.changePersonalAccountChargePriority( ["Science Department", "Cash"]);`
`actions.job.disableArchiving()`	Disable print job archiving if it's been enabled for this job.
`actions.job.setWatermark(text)`	Sets the watermark text for this job. Watermarking allows text to be added on each printed page, e.g. the date and name of the user who printed the job. *NOTE: Using an empty string disables the watermark, overriding a queue-level setting. Example: actions.job.setWatermark("");* Parameters: • `text` (string) - the watermark text to add to each page of the job. The text can include replacement variables such as "%user%" (replaced with the username of the user who printed the job). An empty string disables watermarking for this job. For more information about watermarking and the replacement variables that you can use in `text` see Watermarking/job annotation.
`actions.job.setHoldReleaseTimeout(timeoutMins)`	Sets the timeout in minutes for a hold/release job, which overrides the system setting. Parameters: • `timeout` (number) - the time, in minutes, that a hold/release job is held in the queue before it is canceled. The minimum timeout is 5 minutes.

Client actions (actions.client)

The client actions allow a script to send messages to the User Client and prompt the user for a variety of questions. These require that the user is running the client software.

Table 68: Client Actions Script Reference (actions.client)

Method	Description
`actions.client.sendMessage(message)`	Sends a message to the user. This message is typically displayed as a task tray popup on Windows. Unlike the prompt actions, the user does not need to acknowledge the message to allow the job to print. Parameters:

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Method	Description
	• `message` (string) - the message to display to the user.
`actions.client.promptOK(message [, options])`	Prompts the user with the message dialog that displays an **OK** button. Returns a string: • `"OK"` - if the user clicks **OK**. • `"TIMEOUT"` - If the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Client Prompt Message Formatting. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options.
`actions.client.promptOKCancel (message[, options])`	Prompts the user with a message dialog that displays **OK** and **Cancel**. Returns a string: • `"OK"` - if the user clicks **OK**. • `"CANCEL"` - if the user clicks **CANCEL**. • `"TIMEOUT"` - If the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Client Prompt Message Formatting. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options.
`actions.client.promptPrintCancel (message[, options])`	Prompts the user with a message dialog that displays **Print** and **Cancel**. Returns a string: • `"PRINT"` - if the user clicks **PRINT**.

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Method	Description
	• `"CANCEL"` - if the user clicks **CANCEL**. • `"TIMEOUT"` - If the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Client Prompt Message Formatting. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options.
`actions.client.promptYesNo(message[, options])`	Prompts the user with a message dialog that displays **Yes** and **No**. Returns a string: • `"YES"` - if the user clicks **Yes**. • `"NO"` - if the user clicks **No**. • `"TIMEOUT"` - If the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Client Prompt Message Formatting. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options.
`actions.client.promptYesNoCancel(message[, options])`	Prompts the user with a message dialog that displays **Yes**, **No** and **Cancel**. Returns a string: • `"YES"` - if the user clicks **Yes**. • `"NO"` - if the user clicks **No**. • `"CANCEL"` - If the user clicks **Cancel**. • `"TIMEOUT"` - If the user does not respond within the timeout period.

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Method	Description
	Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Client Prompt Message Formatting. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options.
`actions.client.promptForText(message[, options])`	Prompts the user with a message dialog that prompts the user to enter text, and shows **OK** and **Cancel**. Returns a string: • `[user entered text]` - if the users enters text and clicks **OK**. • `"CANCEL"` - If the user clicks **Cancel**. • `"TIMEOUT"` - If the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Client Prompt Message Formatting. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options. Additional options include: ◦ `defaultText` (string) - The text that pre-populates the text entry field. ◦ `fieldLabel` (string) - The label displayed on the left side of the text field. By default no field label is displayed, and the text-box fills the full width of the dialog.
`actions.client.promptForPassword(message[, options])`	Prompts the user with a message dialog that prompts the user to enter a password, and shows **OK** and **Cancel**. User input is

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Method	Description

	masked. Note that this function masks user input - it does not perform any actual password authentication.
	Returns a string:
	• `[user entered text]` - if the users enters text and clicks **OK**.
	• `"CANCEL"` - If the user clicks **Cancel**.
	• `"TIMEOUT"` - If the user does not respond within the timeout period.
	Parameters:
	• `message` (string) - the message to display to the user. For information on formatting messages see Client Prompt Message Formatting.
	• `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options. Additional options include:
	  ◦ `defaultText` (string) - The text that pre-populates the text entry field.
	  ◦ `fieldLabel` (string) - The label displayed on the left side of the text field. By default no field label is displayed, and the text-box fills the full width of the dialog.

`actions.client.promptForChoice (message, choices[, options])`	Prompts the user with a message dialog to select from a list, and shows **OK** and **Cancel**. Returns a string: • `[user selected choice]` - The selected choice item. • `"CANCEL"` - If the user clicks **Cancel**. • `"TIMEOUT"` - If the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on

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Method	Description

	formatting messages see Client Prompt Message Formatting.
	• `choices` (array of strings) - the choices to display in the list. e.g. `["Unclassified", "Restricted", "Top secret"]`
	• `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options. Additional options include:
	  ◦ `defaultChoice` (string) - The default choice, which is pre-selected for the user. This must match one of the provided choices.
	  ◦ `fieldLabel` (string) - The label displayed on the left side of the drop down list. By default no field label is displayed, and the drop down fills the full width of the dialog.

`actions.client.promptForForm(htmlForm[, options])`	Prompts the user with a dialog containing a multiple input field form. The dialog also shows **OK** and **Cancel**. The input fields and layout are defined using HTML with form elements. The `htmlForm` parameter must contain valid HTML including at least one or more form elements such as <input>. When the user clicks **OK**, the form data is returned in a JavaScript object where the values can be retrieved using the field name. e.g. `response['fieldName']`: • `[JavaScript object containing form data]` - when the users enters text; then clickes OK. To retrieve the value of the `fieldName` field, use `response['fieldName']`. • `"CANCEL"` - If the user clicks **Cancel**.

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Method	Description
	• `"TIMEOUT"` - If the user does not respond within the timeout period. Parameters: • `htmlForm` (string) - the HTML form/message to display to the user. The HTML needs to include one or more HTML input elements - including text fields (normal, password or multi-line), radio boxes, check boxes and choice lists. Each form element must have a unique name that is used to identify the field when the user's input is returned to the server. For information on formatting messages see Client Prompt Message Formatting. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Client Prompt Standard Options. Use of `promptForForm` is demonstrated in a code snippet and in a recipe.

Client Prompt Standard Options

All the client prompt options have an `options` parameter to customize the prompt behavior. Some prompt types have additional options, but all prompt types have the following options:

- `dialogTitle` (string) - The title of the dialog.
- `dialogDesc` (string) - The brief one-line description to complement the dialog title.
- `hideJobDetails` (boolean) - Used to hide the job details from the user. e.g. document name, printer name, pages, cost, etc. Default: `false` - the job details are displayed.
- `timeoutSecs` (number) - The number of seconds to wait for a response from the user. Once this time elapses, the prompt method returns `"TIMEOUT"`. The default timeout is 5 minutes (300 seconds).
- `questionID` (string) - Uniquely identifies a question for a given print job and script. Once a user has responded to a prompt with a given `questionID`, the result is remembered and the user is not prompted again for this job. This is important as the print script can be called repeatedly if jobs are held awaiting prompts, popups or are held in a release queue. If the `questionID` is not provided, the question ID is automatically generated based on the prompt parameters (e.g. message, buttons, choices, etc).

  The `questionID` is rarely required, only in the following cases:

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- If the same prompt/question is required multiple times for a single script, and the user must answer each time. Assigning a different `questionID` to each prompt ensures that the user is re-prompted.
- If the message of a prompt changes with each call. e.g. if the message included the current time it would change each time the prompt was called. Another example is if the message includes the user's balance, this might change if they are printing multiple print jobs. Both of these would cause the multiple prompts to be displayed. Assigning a `questionID` avoids this re-prompting.
- When performing validation of user-entered text from a text prompt in a `while` loop. Assign a unique `questionID` with each loop iteration, otherwise the user will not be reprompted and an infinite loop will occur (PaperCut NG/MF detects this and cancel the script execution).

- `fastResponse` (boolean) - When set to `true`PaperCut enables fast response mode to retrieve the response to the client prompt more quickly. This is useful only when displaying a sequence of prompts, and causes the next prompt to display more quickly.

  Important:
  This setting is useful only when displaying a sequence of prompts. Take care when enabling this option as it can cause increased load on the server.

  You might also want to consider displaying a multi-input form instead of separate prompts. See `actions.client.promptForForm()` for details.

Client prompt message formatting

The client prompts allow the administrator to display a message to the user and ask for user input. The dialog messages provide a subset of the most useful HTML formatting options. You can use them to make your message stand out and grab the user's attention.

Plain text formatting:

To use plain text formatting, provide a standard JavaScript string as the `message` parameter. To start a new line, use the new line character `\n`. e.g.

```
actions.client.promptOK("First line\n\nSecond line");
```

HTML formatting:

The dialogs messages HTML formatting that provides a large subset of the most useful HTML formatting options. So you can get creative and make your message stand out and grab the user's attention.

To enable HTML formatting, surround the message text in `<html>` and `</html>` tags. Below is a very simple example that shows the word bold in bold.

```
actions.client.promptOK("<html>This is <b>bold</b></html>");
```

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The client dialogs support many of the commonly used HTML features/elements including:

- Bold text - `<b>`
- Colored text - `<span style='color: red'>`
- Images - `<img src='http://host.com/image.jpg'>`
- Line breaks - `<br>`
- Font sizes - `<span style='font: 14px'>`
- Bullet lists - `<ul> / <li>`
- Numbered lists - `<ol> / <li>`
- Horizontal rule - `<hr>`
- Text Field Input - `<input name="comment">` (only valid in `actions.client.promptForForm`)

The dialog below shows most of the formatting options outlined above. The code for this dialog is available in the "Show a dialog with HTML formatting" snippet.

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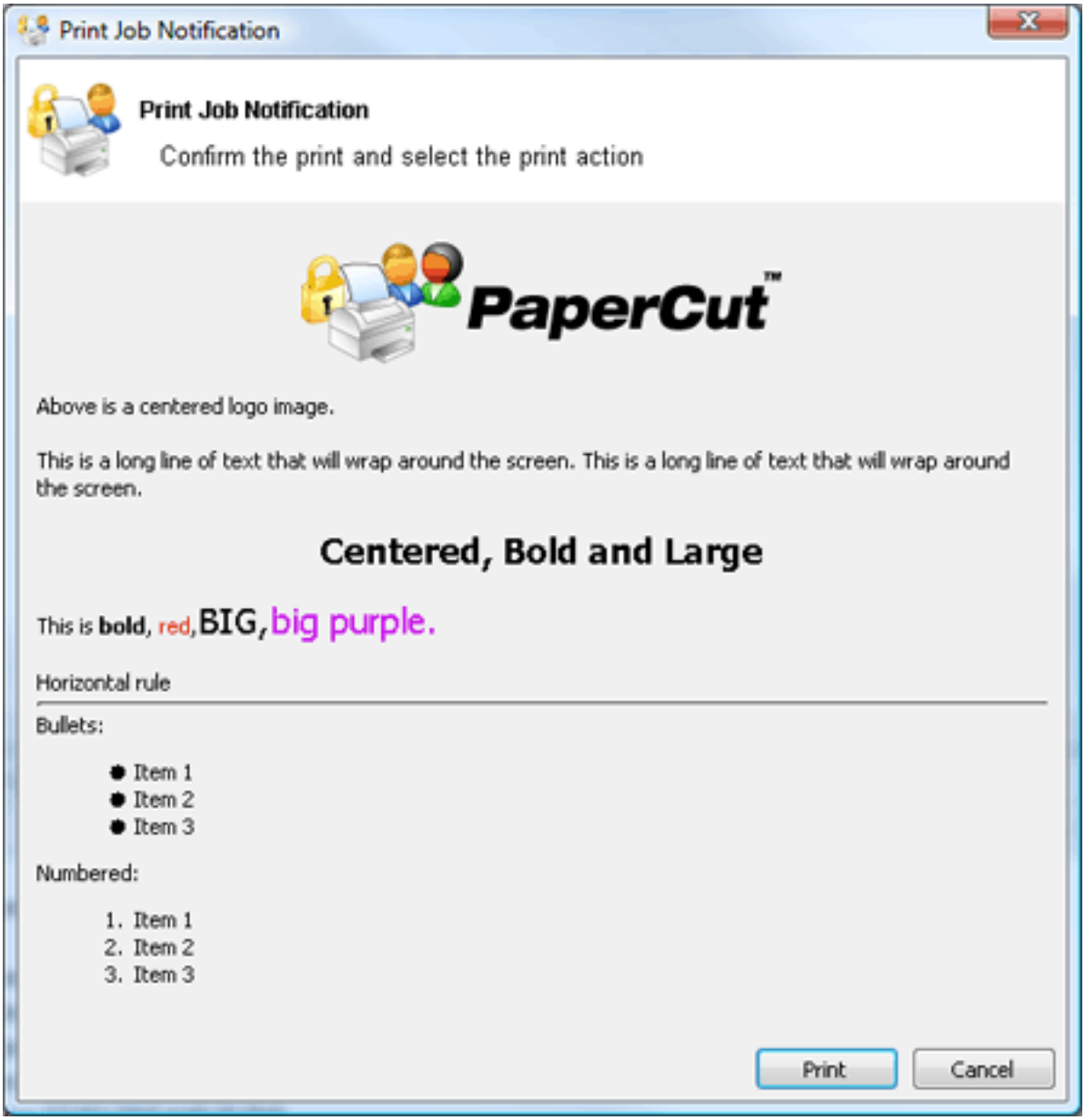

Tip:

To reference an image stored in the directory `[app-path]/server/custom/web/my-image.jpg` use the HTML:

```
<img src='http://%PC_SERVER%/custom/my-image.jpg'>
```

The special substitution variable `%PC_SERVER%` is expanded to the name and port of your active PaperCut server.

Log Actions (actions.log)

Table 69: Log Actions Script Reference (actions.log)

Method	Description
`actions.log.info`	Logs an informational message to the **App. Log**. Parameters:

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Method	Description
`(message)`	`message` (string) - the message to log.
`actions.log.warning (message)`	Logs an warning message to the **App. Log**. Parameters: `message` (string) - the message to log.
`actions.log.error (message)`	Logs an error message to the **App. Log**. Parameters: `message` (string) - the message to log.
`actions.log.debug (message)`	Logs a message to the server's text-based log file (`[app-path]/server/logs/server.log`). This is helpful to diagnose problems with print scripts. Parameters: `message` (string) - the message to log.

Utility actions (actions.utils)

Table 70: Utility Actions Script Reference (actions.utils)

Method	Description
`actions.utils.sendEmail(recipient, subject, body)`	Sends an email to an email address or username. Parameters: `recipient` (string) - either the email address or username of the email recipient. `subject` (string) - subject text of the email. `body` (string) - body text of the email.
`actions.utils.sendEmail(recipients, subject, body)`	Sends an email to one or many email addresses or usernames. Parameters: `recipients` (array of strings) - either the email addresses or usernames of the email recipients. `subject` (string) - subject text of the email. `body` (string) - body text of the email. Example: to send an email to many email addresses or usernames

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Method	Description
	`actions.utils.sendEmail( ["Administrator", "support-staff@myuniversity.edu"], "Oh no!", "we're out of print credit!");`
`actions.utils.onCompletionSaveProperty (propName, value[, options])`	Saves a global value as a `string` associated with a persistent custom-defined property. This operation is performed once the print script completes and the print-job is printed. Parameters: • `propName` (string) - the name/key of the property to set. • `value` (string) - the property value. Note: Numbers are converted to a string. • `options` (object/dictionary) - options to modify behavior of the command. ◦ `saveWhenCancelled` (boolean) - If set to `true`, the operation is performed even if the print job is canceled (eg. insufficient credit). By default, this is set to `false`. For more information using storage properties see User Defined Persistent Properties (Storage).
`actions.utils.onCompletionIncrementNumberProperty(propName,`	A convenience method to increment a global number value associated with a persistent custom-

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Method	Description
`value[, options])`	defined property. This operation is performed once the print script completes and the print-job is printed. Parameters: • `propName` (string) - the name/key of the property to set. • `value` (number) - the amount to increment by. A negative number will decrement. • `options` (object/dictionary) - options to modify behavior of the command. ◦ `saveWhenCancelled` (boolean) - If set to `true`, the operation is performed even if the print job is canceled (eg. insufficient credit). By default, this is set to `false`. For more information using storage properties see User Defined Persistent Properties (Storage).

User actions (actions.user)

Table 71: User Actions Script Reference (actions.user)

Method	Description
`actions.user.onCompletionSaveProperty (propName, value[, options])`	Saves a value on the user as a `string` associated with a persistent custom-defined property. This operation is performed once the print script completes and the print-job is printed. Parameters: • `propName` (string) - the name/key of the

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Method	Description
	property to set. - `value` (string) - the property value. Note: Numbers are converted to a string. - `options` (object/dictionary) - options to modify behavior of the command. - `saveWhenCancelled` (boolean) - If set to `true`, the operation is performed even if the print job is canceled (eg. insufficient credit). By default, this is set to `false`. For more information using storage properties see User Defined Persistent Properties (Storage).
`action-s.user.onCompletionIncrementNumberProperty(propName, value[, options])`	A convenience method to increment a number value on the user associated with a persistent custom-defined property. This operation is performed once the print script completes and the print-job is printed. Parameters: - `propName` (string) - the name/key of the property to set. - `value` (number) - the amount to increment by. A negative number will decrement.

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Method	Description
	• `options` (object/dictionary) - options to modify behavior of the command. ◦ `saveWhenCancelled` (boolean) - If set to `true`, the operation is performed even if the print job is canceled (eg. insufficient credit). By default, this is set to `false`. For more information using storage properties see User Defined Persistent Properties (Storage).

Printer actions (actions.printer)

Table 72: Printer Actions Script Reference (actions.printer)

Method	Description
`actions.printer.onCompletionSaveProperty (propName, value[, options])`	Saves a value on the printer as a `string` associated with a persistent custom-defined property. This operation is performed once the print script completes and the print-job is printed. Parameters: • `propName` (string) - the name/key of the property to set. • `value` (string) - the property value. Note: Numbers are converted to a string. • `options`

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Method	Description
	(object/dictionary) - options to modify behavior of the command. - `saveWhenCancelled` (boolean) - If set to `true`, the operation is performed even if the print job is canceled (eg. insufficient credit). By default, this is set to `false`. For more information using storage properties see User Defined Persistent Properties (Storage).
`action-s.print-er.onCompletionIncrementNumberProperty (propName, value[, options])`	A convenience method to increment a number value on the printer associated with a persistent custom-defined property. This operation is performed once the print script completes and the print-job is printed. Parameters: - `propName` (string) - the name/key of the property to set. - `value` (number) - the amount by which to increment. A negative number will decrement. - `options` (object/dictionary) - options to modify

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Method	Description
	behavior of the command. - `saveWhenCancelled` (boolean) - If set to `true`, the operation is performed even if the print job is canceled (eg. insufficient credit). By default, this is set to `false`. For more information using storage properties see User Defined Persistent Properties (Storage).

4.12.3.4. User Defined Persistent Properties (Storage)

Print scripts have the ability to store or save information between executions. They allow script authors to implement advanced logic that takes advantage of not just the current print event information, but any information that has been stored by previous script events. Properties can also be used to share data between different scripts. Some ideas that can be implemented with print script properties could include:

- Rate limits – knowledge of previous jobs in the given period need to be stored/known.
- Detecting duplicate events/situations over time.
- Detecting repeatable user behavior. e.g. how many times a user uses duplex in a row.
- Shared settings between scripts . e.g. Global defined configuration variables/settings.

Properties are key-value pair storage that are associated with a user or printer, or optionally can be global. Keys are Strings that uniquely define the property. Values are stored as strings and are any data that can be converted to and from a string. The maximum length of a key is 70 characters, and the value is 1,000 characters.

Working with properties

Properties are fetched via the `getProperty` call on the associated source. For example, to fetch a property stored on:

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- the user associated with the print job, use `inputs.user.getProperty("my-key")`
- the printer, use `inputs.printer.getProperty()`,
- global properties, use `inputs.utils.getProperty()`.

There is also a set of convenient methods called `getNumberProperty()` if dealing exclusively with a number.

By default, properties are only saved (to the database) after the print script completes and the job is printed (i.e. not canceled or denied). If saving/incrementing properties on job cancellation is required (e.g. the user has insufficient credit, or `actions.job.cancel` is called, use the `saveWhenCancelled` optional argument. For example, to set a property on the user, use:

```
actions.user.onCompletionSaveProperty("my-key", "my-value")
```

The same command with "save on cancellation" behavior enabled is:

```
actions.user.onCompletionSaveProperty("my-key", "my-value",
{'saveWhenCancelled' : true})
```

Tip:

Global properties:

Global properties are stored as PaperCut config settings so any priviledge SysAdmin can edit them. You can find your properties via **Options > Actions > Config editor (Advanced)**. All script properties are prefixed with `script.user-defined.` and are searchable by name. Global properties are a great way to define editable configuration values that are shared between scripts.

Tip:

Printer properties

Printer properties are stored as hidden PaperCut NG/MF config settings. They can be set or read using either the Server commands (server-command) or the The XML Web Services API. All script properties are prefixed with `script.user-defined`. Printer properties are a great way to define editable configuration values that are unique to specific printers (e.g. custom cost information) that can be used in printer scripts. To set a printer property use a server-command similar to:

```
server-command set-printer-property printsrv1 flatbed
advanced-config.script.user-defined.default-coverage 45
```

You can then use these properties in your printer script and update in the normal way. You can also use `get-printer-property` to read values.

Implementing Counters (Advanced)

There are two ways to implement a counter (e.g. a page number count). One approach is to get the current value, increment, then save. On high volume networks there exists the possibility of another

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event overwriting the value. Print scripts provide a convenient method that avoids this called `onCompletionIncrementNumberProperty()`. See the recipe "Prevent overuse of lab printers (rate limiting)" for an example.

4.12.3.5. Print script requirements (advanced)

These notes are intended for advanced developers "pushing the limits" of print script functionality. All print scripts must conform to the following technical requirements:

1. *Timeouts:* All scripts execution logic should complete within 5 seconds of CPU time. Failure to comply (for example, due to an infinite loop), results in the script terminating and raising a runtime error. Five seconds is adequate as even the most advanced example recipes complete within a few milliseconds.
2. *Reentrant and Idempotent:* All scripts should be reentrent - designed to be called multiple times for the same job, each time producing the same result/behavior. For example, your script is called multiple times at various stages of analysis and it's expected to provide the same output given the same input. Side-effects based off logic other than the `inputs` are not recommended. For example, logic based off the result of `Math.random()` would violate this principle.

4.12.3.6. Print Script Frequently Asked Questions

I'm getting multiple popups for questions I've already answered.

It's possible that the script has been written with multiple questions or has an issue with the syntax of the script itself. Consider creating a simpler script and working in additional complexity as you go.

If the data used in the popup changes, such as a users balance when releasing multiple jobs or printing multiple jobs, then the script triggers the popup again as the conditions have changed. You can avoid this by using the `questionID` option explained above in Client Prompt Standard Options.

Can I suppress the account selection pop-up and wait for my print job analysis to complete?

If your script allows users to cancel a job based on its content (such as the number of pages or whether or not it's in color), then in your script, `isAnalysisComplete` must equal `true`. Depending on the print job, this can sometimes take a few minutes.

When the script first runs, the analysis is not complete so you need to suppress the popup. This allows the decision to be deferred until the analysis is completed. To do this, you need to add `actions.job.chargeToPersonalAccount();` to the section where analysis is not complete.

See the script below:

```
function printJobHook(inputs, actions) {
if (!inputs.job.isAnalysisComplete) {
actions.job.chargeToPersonalAccount();
return;
}
```

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```
if (inputs.job.totalPages < 10) {
// Charge to the personal account
actions.job.chargeToPersonalAccount();
// Or maybe charge to a single shared account
}
// Account Selection will still show
}
```

For more information, see Advanced Scripting: Conditionally Suppress Pop-up.

4.13. Customization

PaperCut NG/MF is an important part of network infrastructure at many thousands of organizations. Having the ability to seamlessly integrate PaperCut NG/MF into an existing network is important. There are a number of ways to ensure end users see the system as part of the network rather than an add-on. These include:

- Implementing Web browser Single Sign-On (SSO) to integrate PaperCut NG/MF into your organization's Intranet portal.
- Customizing branding of the:
  - User Client
  - Login page
  - User web interface
  - Admin web interface
- Changing the URL or link on the User Client
- Using the PaperCut NG/MF back-end data in other procedures, such as custom reports

4.13.1. Customize the Login page

You can tailor the visual design of the Login page to make it fit in with the branding of your internet or intranet site.

1. Click the **Options** tab.

   The **General** page is displayed.
2. Scroll to the **Branding** > **Login page** section.

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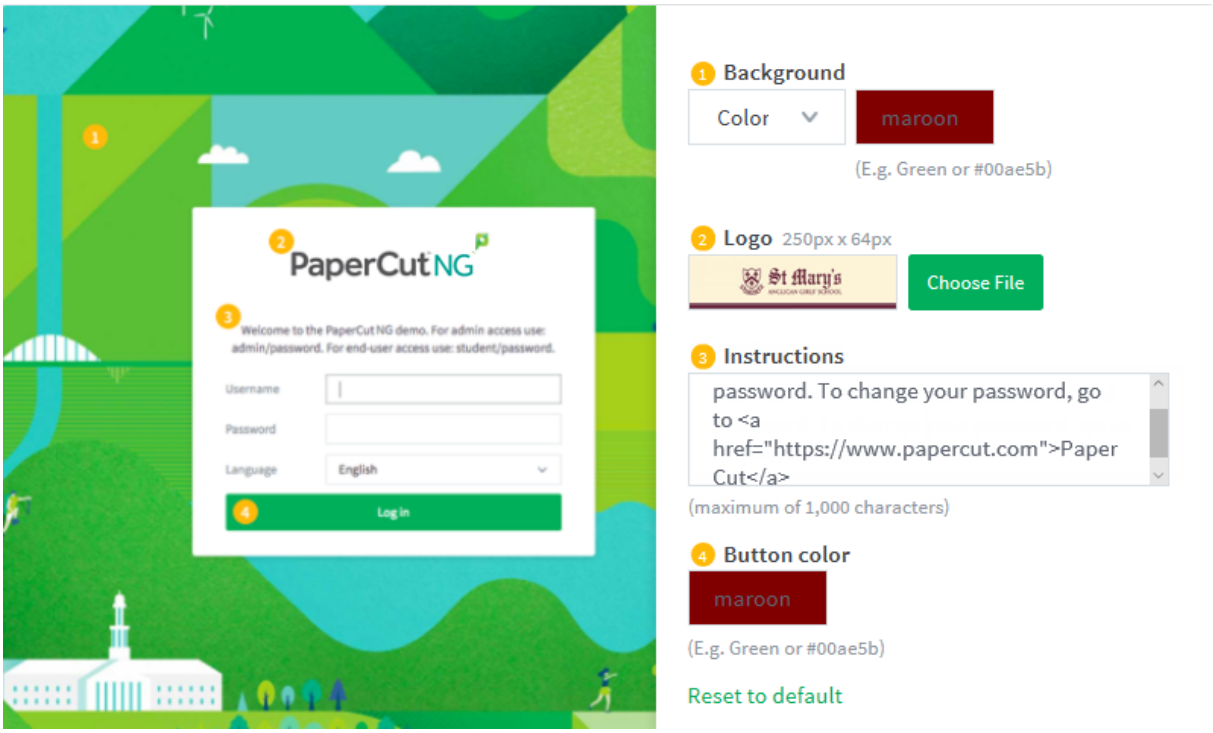
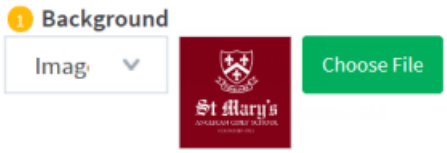


3. To use a color as the background:
    a. In **Background**, select **Color** from the drop-down list.
    b. In the text box , enter the name of the required color or its hexadecimal value `#RRGGBB`. e.g. green or `#00ae5b`.
4. To use an image as the background:
    a. In **Background**, select **Image** from the drop-down list.
    b. Click **Choose File**; then locate the image. The image must be in PNG or JPG format and for best results should be sized 1366px x 768px.



5. To change the logo:
    a. Click **Choose File** next to **Logo**; then locate the logo image file. The image must be in PNG or JPG format and for best results should be sized 250px x 64px.
6. To change the instructions displayed above the username and password fields:
    a. In **Instructions**, enter the text. You can use HTML tags to add links and formatting. Use this text to explain which username or password to use (if you have multiple logins at your organization). The maximum number of characters is 1,000.
7. To change the color of the login button:
    a. In **Button color**, enter the name of the required color or its hexadecimal value `#RRGGBB`. e.g. green or `#00ae5b`.
8. Click **Apply**.

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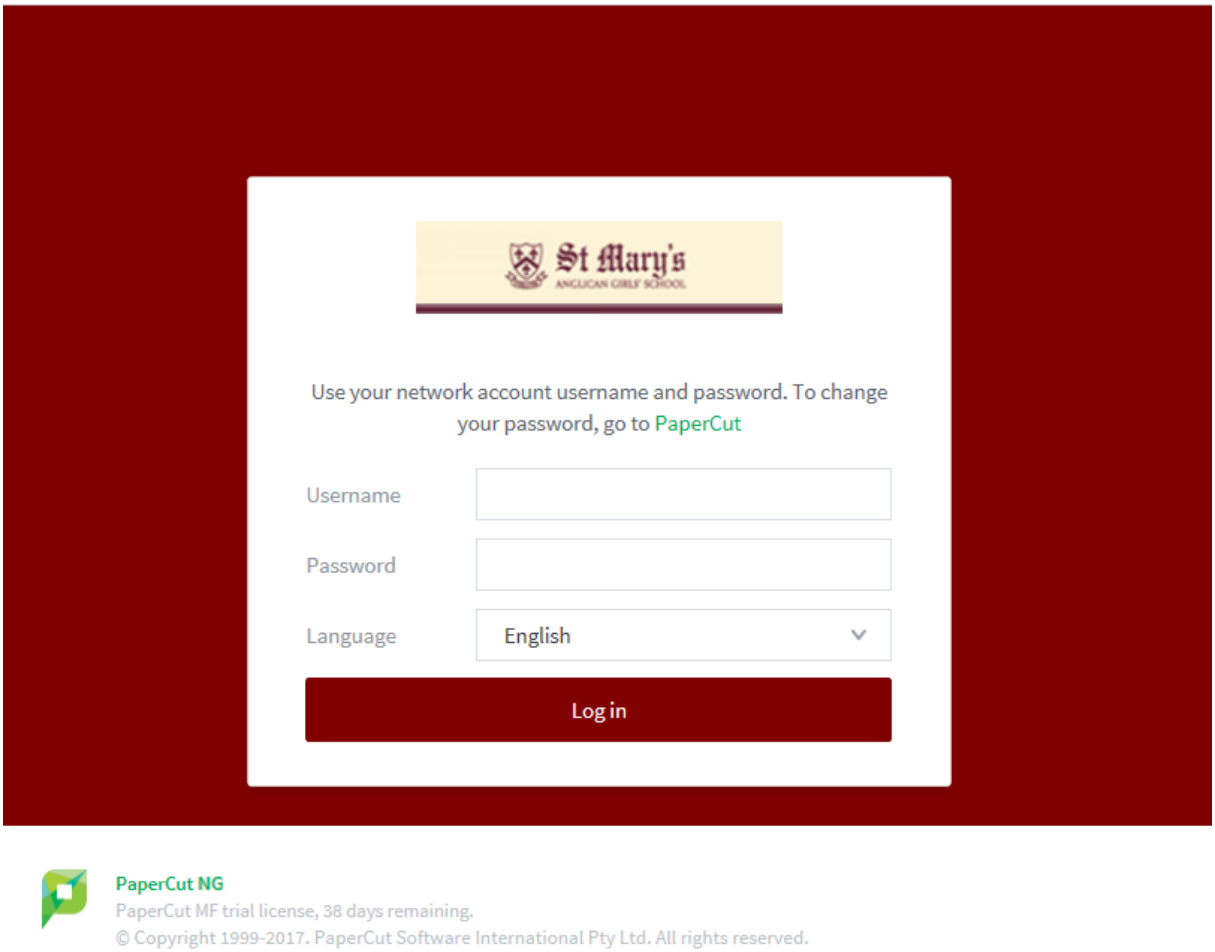
The changes are reflected on the Login page.

If you modify the **Background** or **Logo**, the Login page footer displays PaperCut Software International Pty. Ltd. co-branding.



Tip:
To undo the changes made and restore the default PaperCut NG/MF styling, click the **[Reset to default]** link.

The following config key allow you to customize the login page:

Config name	Description
auth.web-login.autocomplete	Specify Y to enable browser auto-completion of the login fields as a convenience to users. By default, the browser is requested to not use auto-completion.

See Using the Advanced Config Editor for more information about changing the value of config keys.

4.13.2. Customize the Admin web interface

You can tailor the visual design of the Admin web interface to make it fit in with the branding of your internet or intranet site.

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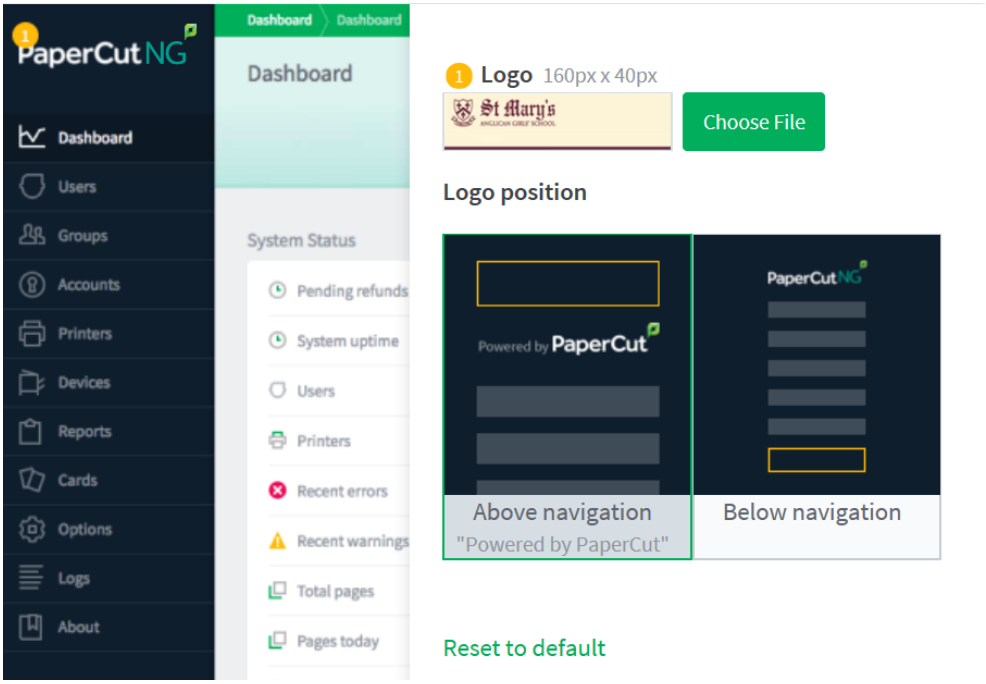
1. Click the **Options** tab.

   The **General** page is displayed.
2. Scroll to the **Branding** > **Admin web interface** section.



3. To change the left hand menu's logo:
   a. In **Logo**, click **Choose File**.
   b. Locate the logo image file. The image must be in PNG format and for best results should be sized 320px x 80px.

> **Tip:**
> Logos sit on a dark background so you should use a white variation of your logo.

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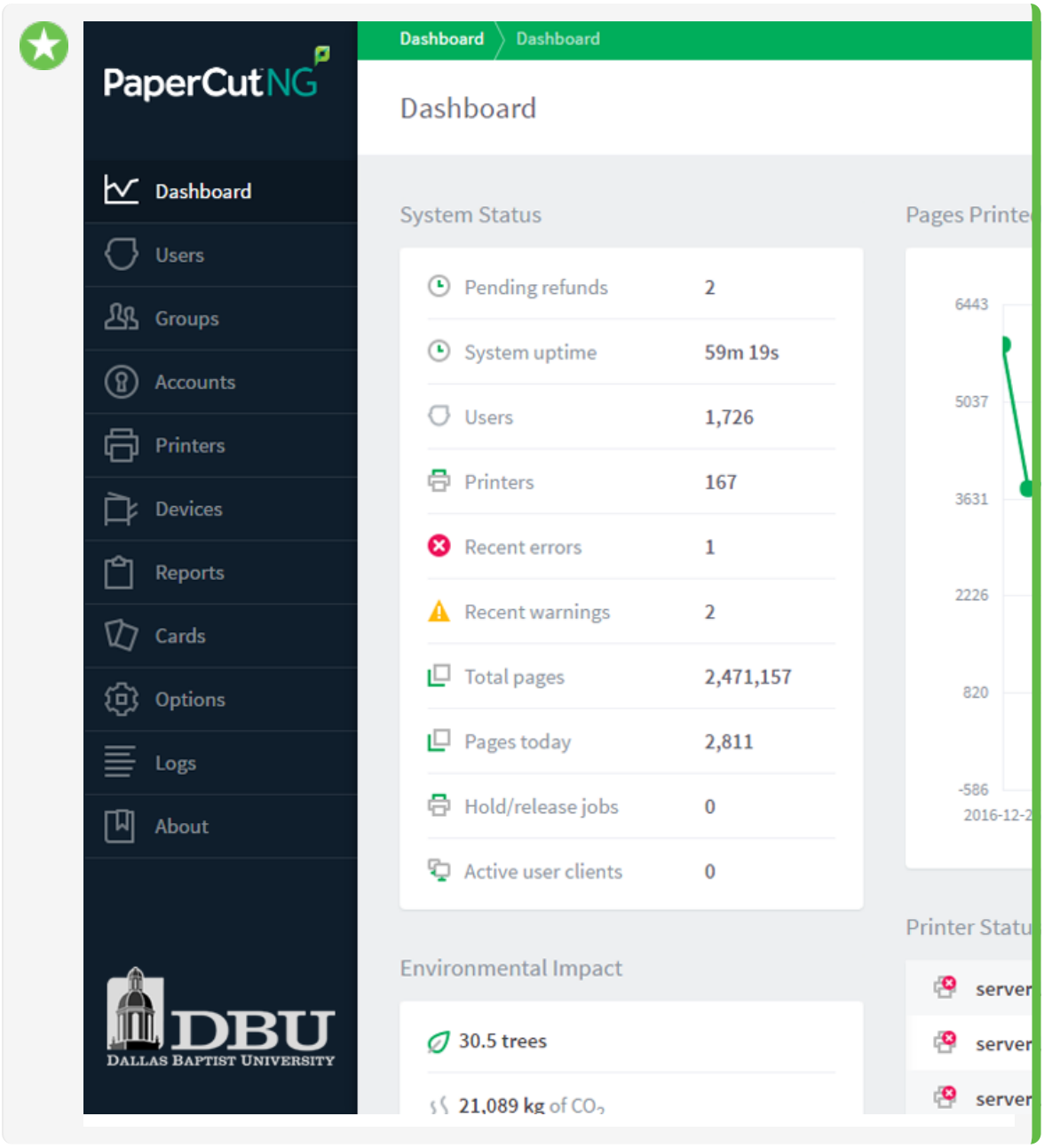

4. To change the **Logo position** of the logo on the left hand menu:
    a. Select **Above navigation** or **Below navigation**.
5. Click **Apply**.

The changes are reflected on the Admin web interface.

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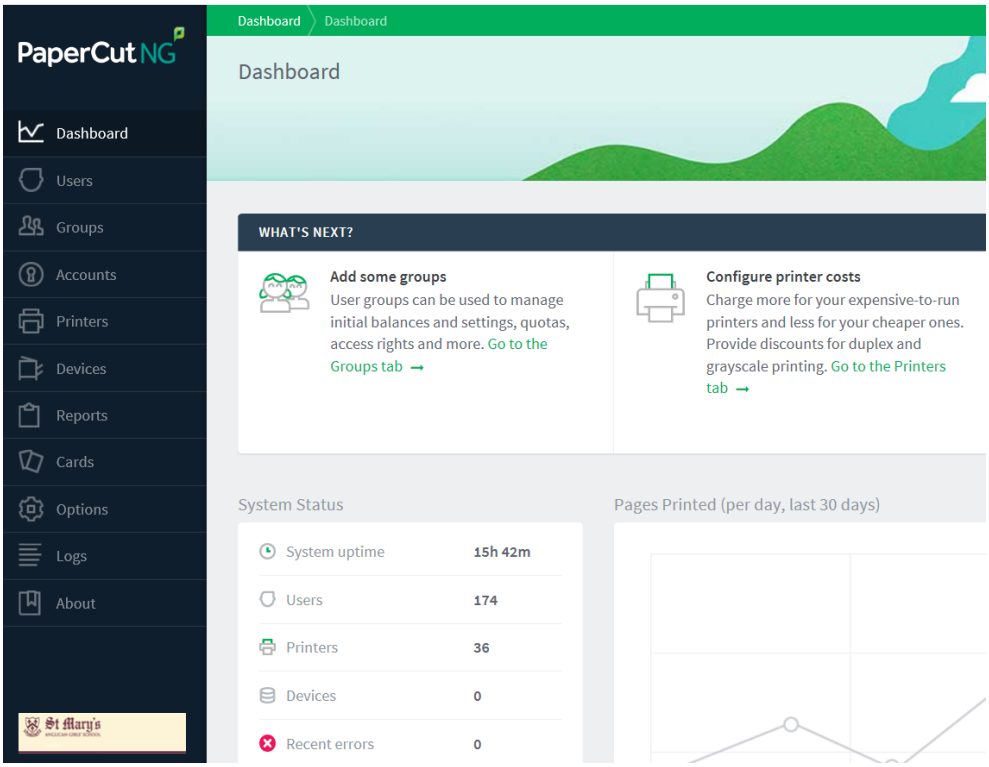

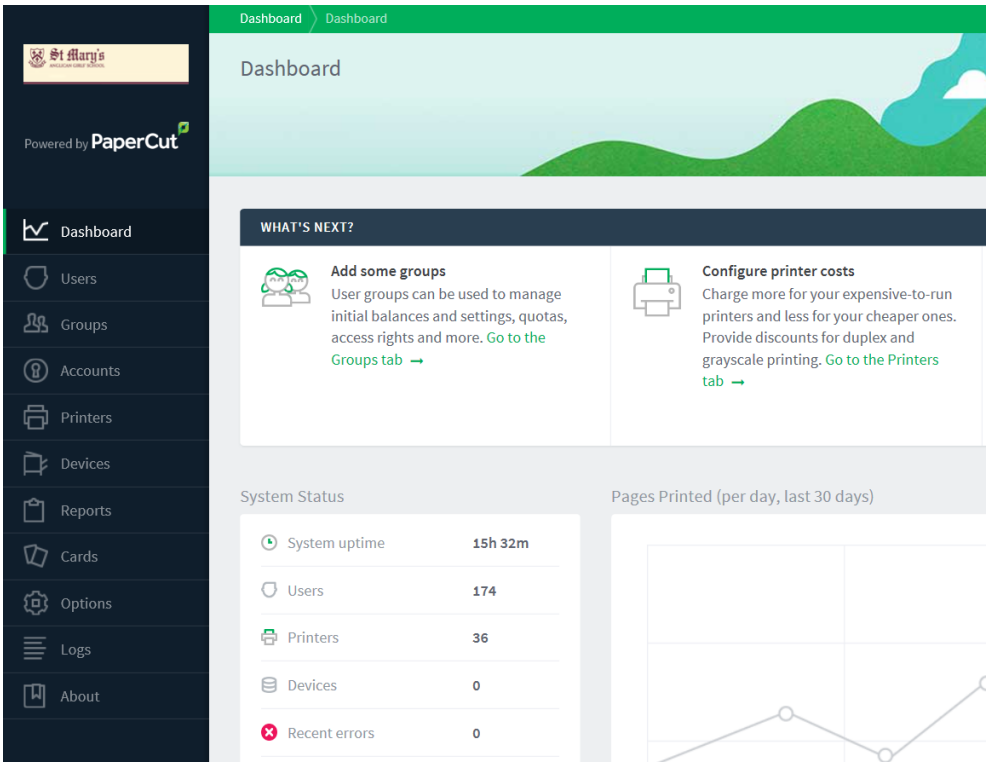

Tip:

To undo the changes made and restore the default PaperCut NG/MF styling, click the **[Reset to default]** link.

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Tip:

You can add your own content to the dashboard to display a short message for the attention of other administrators. Other examples might include:

- Guidelines for administering printers
- Policies for handing refunds
- Contact details for key people
- Or even your own widget that loads content from elsewhere

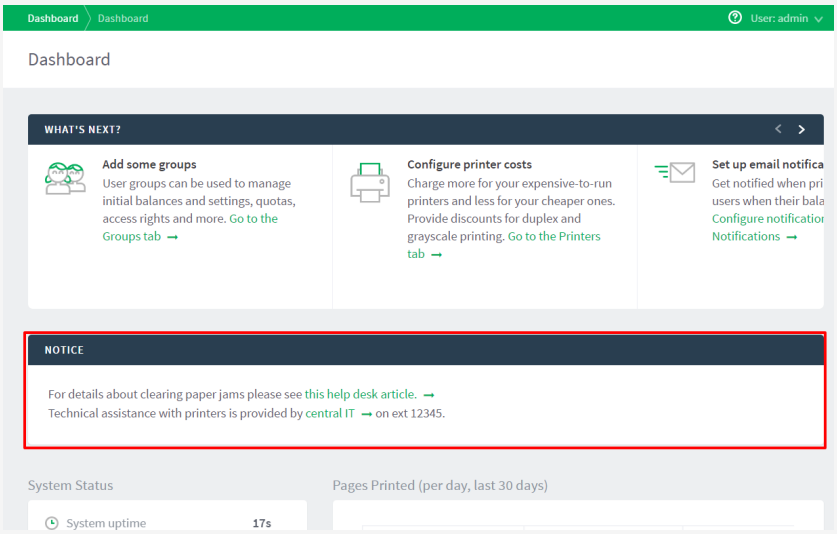

Table 73: Admin web interface customization files and config keys

Config name	Description
`dashboard-notice.inc`	HTML contained within this file is displayed on the administration dashboard page. Place it in `[app-path]/server/custom/web/`.
`dashboard.gadget.custom.title`	Change the title of the custom dashboard widget. For information about setting config keys, see Using the Advanced Config Editor.

4.13.3. Customize the User web interface

The User web interface displays information about the user's account and provides access to features such as TopUp/Pre-Paid Cards. You can tailor the visual design of these pages to make them fit into the *look and feel* of your internet or intranet site.

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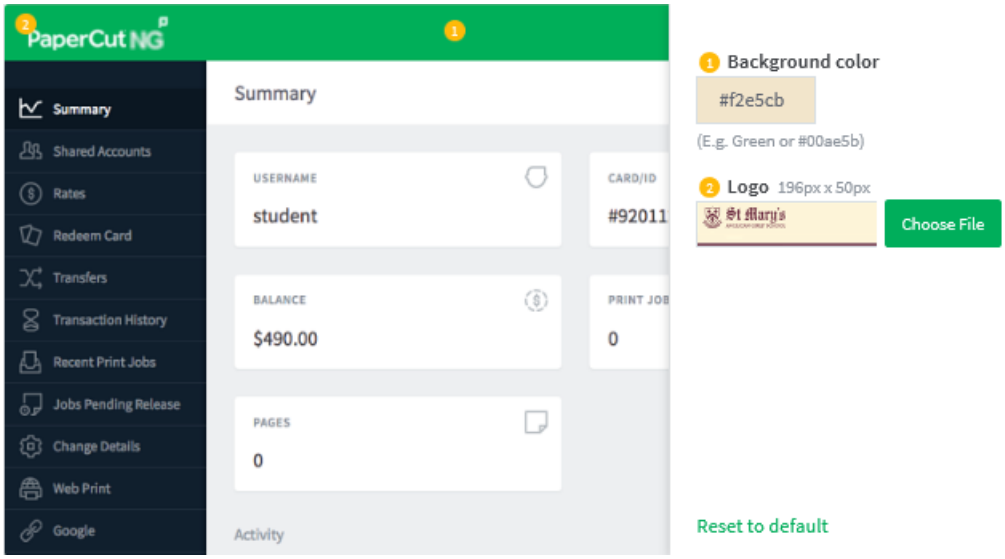
4.13.3.1. Change the branding of the User web interface

1. Click the **Options** tab.

   The **General** page is displayed.

2. Scroll to **Branding** > **User web interface** section.



3. To change the header's background color:
   a. In **Background color**, enter the name of the required color or its hexadecimal value `#RRGGBB`. e.g. green or `#00ae5b`.
4. To change the header logo:
   a. Click **Choose File** next to **Logo**; then locate the header logo image file. The image must be in PNG format and for best results should be sized 196px x 50px.
5. Click **Apply**.

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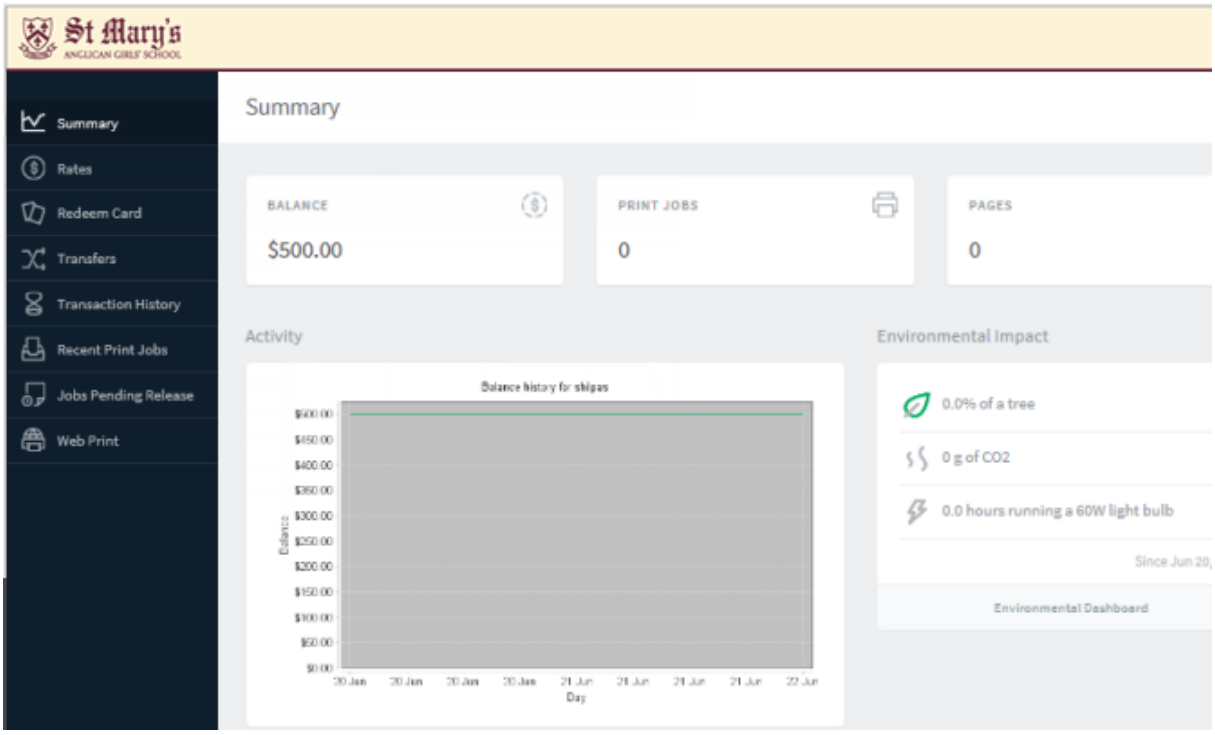
The changes are reflected on the User web interface.



Tip:
To undo the changes made and restore the default PaperCut NG/MF styling, click the **[Reset to default]** link.

Customize the CSS of the User web interface

The design of the User web interface is controlled via HTML "include" files for the header and footer areas of the page, with page styling controlled via Cascading Style Sheets (CSS). Placing the following files in the PaperCut NG/MF directory structure at `[app-path]/server/custom/web` supersedes **User web interface** customizations in the **Options > General > Branding** section of the Admin web interface.

Table 74: User web interface customization files

Filename	Description
`user3.css`	If this file exists, the contents of `user3.css` is included as an overriding stylesheet. Use the styles in this file to define fonts, colors and sizes. **Note:** The number in this file has been incremented from versions prior to 17.2.
`header3.inc`	If the header include file exists, the HTML in the header area of the pages is replaced with the contents of the file. Save this file in `UTF-8` encoding for international characters to be displayed correctly.

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Filename	Description
	Note: The number in this file has been incremented from versions prior to 17.2.
`footer3.inc`	If the footer include file exists, the HTML in the footer area of the page is replaced with the contents of the file. Save this file in `UTF-8` encoding for international characters to be displayed correctly. **Note:** The number in this file has been incremented from versions prior to 17.2.

Tip:
Any custom content placed in `[app-path]/server/custom/web/`, such as additional images, can be accessed via a URL beginning with `/custom/`. For example, if a file named `header.jpeg` is placed in `[app-path]/server/custom/web/`, you can access it via the URL `/custom/header.jpeg`.

Tip:
To save a file in UTF-8 encoding on Windows using Notepad, change the **Encoding** option to **UTF-8** on the **> Save As** dialog.

4.13.3.2. Additional links in the navigation menu

The navigation menu in the user web interface contains links for the PaperCut services that are enabled and available to the user. In some cases, you might want to add additional external links to this menu. Examples include:

- Linking to a print policy page on the organization's intranet.
- Linking to a page with key contact details.
- A link to return to the "main" intranet page/portal.

Custom links are displayed above the **Log Out** item.

Add a custom link

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **User Features area**, select the **Add custom links to the user web navigation menu** check box.
3. Click **Add link**.
4. Complete the following fields:

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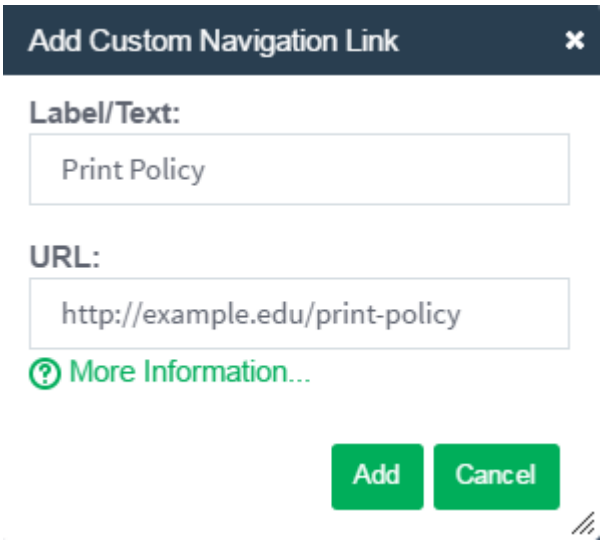
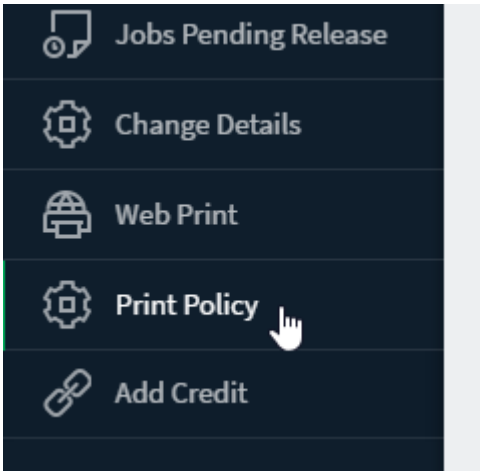
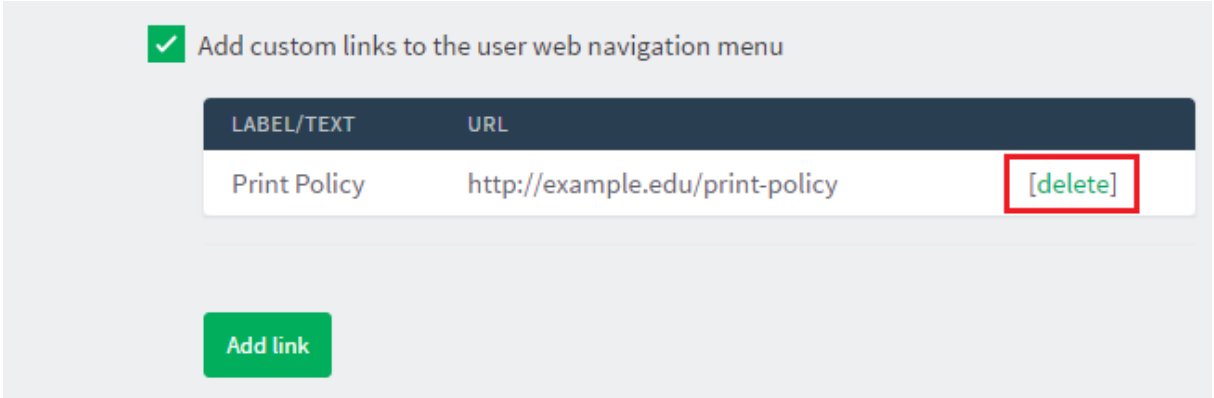
- **Label/Text**—the text that is displayed in the navigation menu.
- **URL**—the destination of the URL when clicked.



The link is now displayed in the User interface.



Existing custom links are displayed in the Admin web interface under the **Add custom links to the user web navigation menu** check box. To delete a link, click the **[delete]** link next to the relevant link.



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The URL in custom navigation links can also contain special replacement fields. E.g. the `%user%` in `http://example.edu/print-policy?u=%user%` is replaced with the logged in username to create a URL such as `http://example.edu/print-policy?u=tom`.

The available special replacement fields are as follows:

Table 75: Fields available for replacement in custom navigation links in the user web interface

Field	Description
%user%	The username of the logged in user.
%user_full_name%	The full name of the logged in user.
%user_id%	The id/card number of the logged in user.
%user_email%	The email address of the logged in user.
%user_office%	The office of the logged in user.
%user_department%	The department of the logged in user.
%return_url%	A URL that sends the user back to the user web interface. The user is sent back to the **Summary** page as if they had just logged in, assuming their session has not timed out.

4.13.3.3. Custom printer maps for Web Print

You can use a graphical map or other custom content instead of the default printer selection list in the Web Print wizard. For more information see Designing Printer Maps / Custom Printer Selection Lists.

4.13.4. Customize the User Client

The `pc-client.exe` program displays a small window highlighting the current logged in user's current account balance. This window contains two links. One called **Details** that takes the user to the **User Pages** login. The other defaults to the PaperCut Software website. You can replace the link to the PaperCut Software website. Some suggestions include linking to your organization's website or intranet site, or linking to a page containing your organization's network usage policy. The background color of the window and the logo used on the window can also be customized to suit your organization's branding. You can tailor the visual design of these pages to make them fit into the *look and feel* of your internet or intranet site.

Change the link on the User Client

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Client software** area, select the **Change link on client software** check box.

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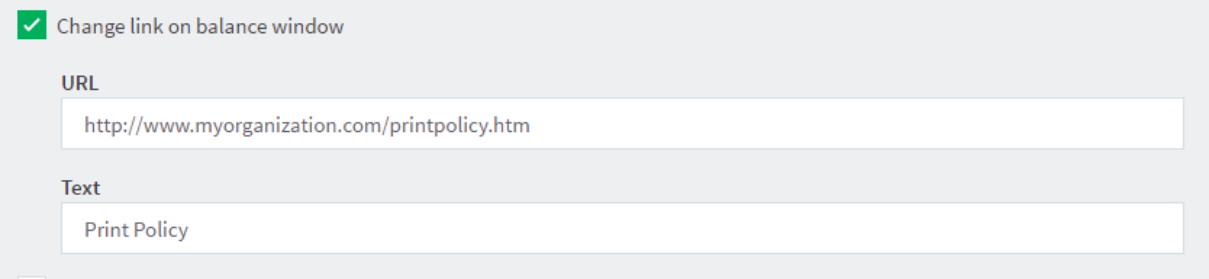
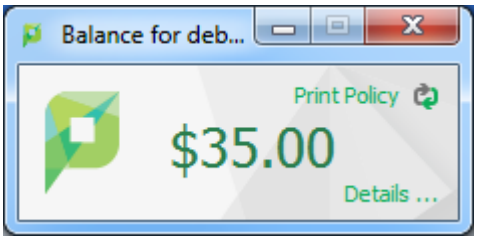


3. Enter a **Destination URL** pointing to your new destination. The link should be a complete URL including the `http://` component. e.g. `http://www.myorganization.com/printpolicy.htm`.
4. Under **Link text** enter the text to be displayed. e.g. `Print Policy`.
5. Click **Apply**.

   The next time the User Client is started on one of the workstations, the new link is displayed.



Tip:

There are other configuration keys that allow an administrator to customize the User Client for their organization. The table below outlines all of the client customization config keys available. You can update the value of these config keys using the Advanced Config Editor.

Table 76: User Client customization config keys

Config name	Description
client.config.show-link	Indicates whether the link at the top of the User Client is displayed. To display, set the value to `Y`. To hide, set the value to `N`.
client.config.show-details-link	Indicates whether the "Details" link that points to the user web interface is displayed. To display the link set the value to `Y`, to hide set the value to `N`.
client.config.show-document-cost	Determines whether to show the document cost to the user in print popup notifications. To show the cost set the value to `Y`, to hide set the value to `N`.
client.config.default-advanced-tab	The default tab to display when a user is configured with advanced account selection. Values: `DEFAULT (All Accounts),ALL`

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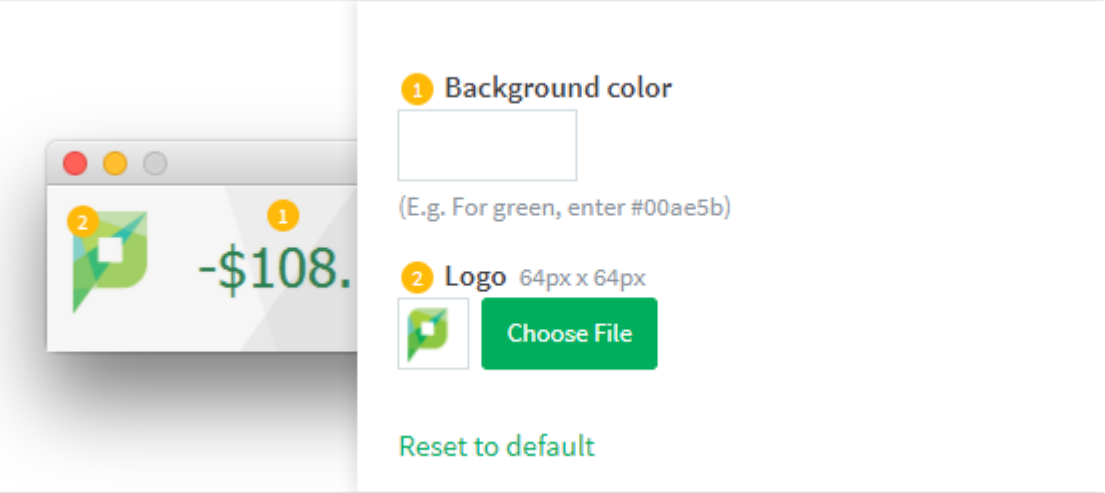
Config name	Description
	`(All Accounts)`, `PREFERRED` (Preferred List), `RECENT` (Recent Selections)

Tip: You can also configure the User Client by passing command-line parameters to the program. Fore more information, see Configure the User Client using the command-line.

Change the branding of the User Client

1. Click the **Options** tab.

   The **General** page is displayed.
2. Scroll to the **Client software** > **Balance window** section.



3. To change the background color:
   a. In **Background color**, enter the hexadecimal value `#RRGGBB` of the required color. e.g. for green, enter `#00ae5b`.
4. To change the logo:
   a. Click **Choose File** next to **Logo**; then locate the logo image file. The image must be in PNG format and for best results should be sized 64px x 64px.
5. Click **Apply**.

   The next time the User Client is started on one of the workstations, the new branding is

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displayed.

Tip:
To undo the changes made and restore the default PaperCut NG/MF styling, click the **[Reset to default]** link.

4.13.5. Customize Mobile Print Release

You can tailor the visual design of the Mobile Print Release—releasing print jobs using your mobile device by writing a custom Cascading Style Sheet (CSS) or creating custom images. Use this to change the colors of the header, footer and the header image. It is also possible to change the icon shown on the iOS home page. Placing the following files in the PaperCut NG/MF directory structure at `[app-path]/server/custom/web` to override the page layout and style.

Table 77: Files used to customize Mobile Print Release

File name	Description
mobile-release.css	If this file exists, the content of this file is included as an overriding stylesheet. Use the styles in this file to define the colors of the header and footer. You can customize the header image by placing your header image file under the custom directory and by defining the following rule in the CSS file. `#top-bar-logo { background-image: url('/custom/mobile-release-logo.png'); }` The header logo should be an image 130px wide and 25px high.
mobile-release-icon-114x114.png	If this file exists, you can replace the home page icon on iPad. The file should be a PNG that is 114px wide and 114px high.
mobile-release-icon-72x72.png	If this file exists, you can replace the home page icon on iPhone. The file should be a PNG that is 72px wide and 72px high.

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4.13.6. Customize report headers

You can replace the standard PaperCut NG/MF report header logo with an alternate image. Use this to include an organization logo and address for example, which is useful when attaching reports to customer invoices, or just to make reports look more professional.

To use a custom report header logo:

1. Click the **Options** tab.

   The **General** page is displayed.
2. Scroll to the **Branding** > **Customize report header** section.

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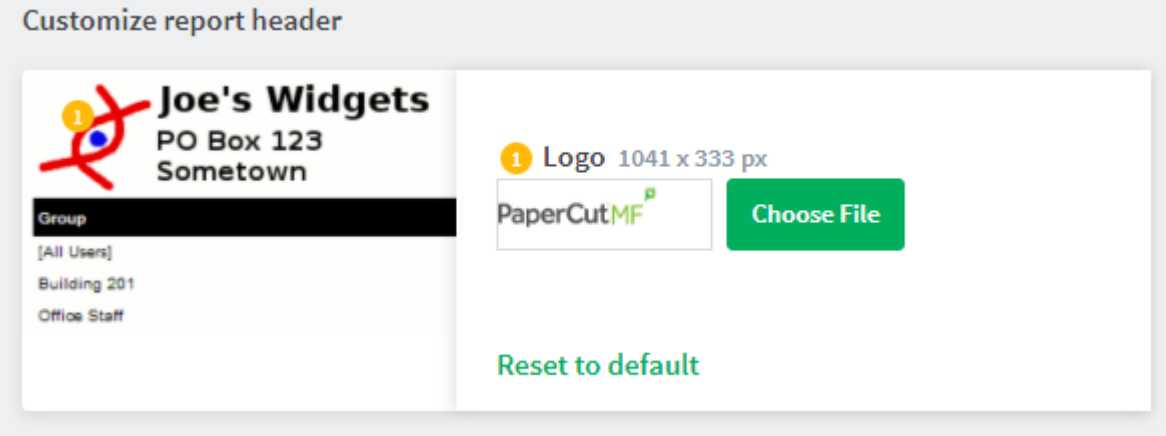

3. To change the logo:
    a. Click **Choose File** next to **Logo**; then locate the logo image file. The image must be in PNG format and for best results should be sized 1041px x 333px.
4. Click **Apply**.

    The next time a report is run, the new branding is displayed.

4.13.7. Limit the list of interface languages/translations

PaperCut NG/MF has been translated into a number of languages. Some of these translations are complete and done at an official level while others are partial and group sourced by PaperCut NG/MF users. Many of these languages might not be appropriate for your environment so you can limit the languages available for selection - users select the language from a list on the User interface login screen. Set the list of available languages by changing the config key `language.available` to a comma-separated list of ISO language codes. The list must be a subset of:

```
ca,cs,cy,da,de,es,es_ES,fi,fr,hr,hu,it,iw,ja,ko,lt,lv,nl,no,pl,
pt,pt_PT,ru,sl,sr,sv,tr,zh_CN,zh_HK,zh_TW
```

For example, setting `language.available` to `en,de` would limit the list to English and German only.

See Using the Advanced Config Editor to find out how to change config keys.

4.13.8. Data access and custom reports

The default, PaperCut NG/MF installation stores data in an internal database. The database is Apache Derby - an open source database written by IBM and based on their DB2 Cloudscape Database. The internal database is optimized for embedded use, is very robust, ACID compliant, and scales well. The internal database, however, is not designed for multi-application access. To access the data from an external source, such as a reporting program, consider running PaperCut NG/MF on an external database (RDBMS) designed for multi-user and multi-applicaiton user access. Common database solutions include Microsoft SQL Server, Oracle, PostgreSQL and MySQL. For more information see Deployment on an external database (RDBMS).

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The PaperCut NG/MF data structure is relatively simple and people with Crystal Reports, MS Access, or SQL experience should have no problems extracting data or writing custom reports. Report developers should keep in mind:

- Access the data only in read-only mode. Modifying data directly underneath the application can cause unpredictable behavior.
- Always test any custom reports after an upgrade as the underlying data format might have changed. PaperCut Software developers try to minimize data structure changes but they are expected to occur in major upgrades.

You can find a database schema diagram in the PaperCut NG/MF knowledge base located at Database Schema Diagrams.

4.13.8.1. Plain text print log

In addition to storing print log information in the database, a real-time, plain text log is also written into the directory:

```
[app-path]/server/logs/print-logs
```

The log file is in a tab delimited format and a new log is created for each day. Files are named with the format `printlog_yyyy_mm_dd.log` and files are archived for 30-days. The tab delimited file can be easily imported into programs, such as Microsoft Excel, Microsoft Access. or other databases.

Table 78: Text print log file format

Field	Description
Field 1	Date in format `yyyy-MM-dd\th:mm:ss a/p`
Field 2	Server Name
Field 3	Printer Name
Field 4	User who printed the document
Field 5	Account charged (usually the user's personal account but could be a shared account)
Field 6	Client/Workstation Name
Field 7	Document name
Field 8	Total number of pages
Field 9	Total number of color pages
Field 10	Number of copies (this has already been used to calculate the total pages).
Field 11	Cost
Field 12	Duplex status
Field 13	Grayscale status (Color mode)
Field 14	Paper Size (e.g. Letter, A4)
Field 15	Paper Height in Millimetres (divide by 24.5 for inches)

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Field	Description
Field 16	Paper Width in Millimetres (divide by 24.5 for inches)
Field 17	Print job size in KB
Field 18	Printer Language
Field 19	Cost Adjustments (comma separated)
Field 21	Job Type (PRINT)

4.13.9. Automation and scripting

PaperCut NG/MF provides a detailed set of server commands and Web Services API's. Use these services to automate common operations and management tasks. Some examples of where an administrator would use scripting/automation include:

- Automate tasks such as backups and domain user/group synchronization.
- Integrate account creation and management into existing scripts or processes.
- Manage account balances and transactions outside the application.

The automation and scripting tools are written for software and script developers. It is expected that readers intending on using these tools are comfortable with developing system management and server monitoring programs.

The `server-command` and Web Services API's are included as standard with PaperCut NG/MF. More information on using these tools is detailed in Tools - database, server-command scripting, and APIs (Advanced) in Server commands (server-command) and The XML Web Services API.

4.13.10. Custom user directory information providers

PaperCut NG/MF is a modern application designed with a modern architecture. It supports plug-ins and extensions at a number of different levels. One such layer is the User Directory source. Organizations with very complex domains, such as those seen in large universities, can use either with the standard options, or if the standard options are not sufficient, via a custom plug-in.

For example, a University might have multiple domains, one running Active Directory and the other LDAP/NIS. A custom plug-in could support this by first querying Domain A, and if the user is not found, the query Domain B via LDAP. The PaperCut NG/MF development team is happy to provide API documentation and sample source code to assist organizations with custom requirements.

For some working examples available in your current installation, look in:

```
[app-path]/server/bin/linux-x64/sambauserdir

[app-path]/server/bin/linux-x64/authsamba

[app-path]/server/bin/linux-x64/src/
```

4.13.11. Enable ports 80 (HTTP) and 443 (HTTPS)

By default, PaperCut NG/MF listens to ports 9191 and 9192 for HTTP and HTTPS communication respectively. These ports have been selected as they're generally unused by other applications.

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Because PaperCut NG/MF is a web application, you might want to have the interface available on the standard HTTP and HTTPS ports (80 and 443 respectively). One reason for doing so is to simplify URLs communicated verbally (as the user does not need to supply a port number).

The configuration procedure is different for each operating system. See below for instructions. *Important:* Before you begin, ensure no other applications (such as IIS, or Apache) are currently installed and using ports 80 or 443 on the server hosting PaperCut NG/MF.

Important:
The following directions detail how to enable port 80 in addition to port 9191. Enabling an additional port is recommended over changing the existing port. Port 9191 is also used for server-to-server and client-to-server communication so it's important that this port continue to be made available.

Also make sure you you enable the 80 and 443 firewall ports if users access PaperCut NG/MF across firewall devices.

4.13.11.1. Windows

1. Open the file: `[app-path]\server\server.properties`
2. Enable port 80 (and 443) by changing the appropriate settings from `N` to a `Y`. They should look like:

   ```
   server.enable-http-on-port-80=Y
   server.enable-https-on-port-443=Y
   ```

3. Change the server port in all providers installed on your network. The server port is set in the `print-provider.conf` file in the provider directory.
4. Change the server port in the User Client config file:

   `[app-path]\client\config.properties`.

   Important:
   If the client is installed locally on workstations, then change the config file on each workstation. On Linux/Unix systems, the server runs under the privilege of a non-root account. Some systems prevent non-root users from binding to ports lower than 1024. An alternate option is to use kernel level TCP port redirection (e.g. `iptables`).

5. Restart the Application Server. (See Stop and start the Application Server).
6. Test and ensure the web interface is working. e.g. `http://[myserver]/admin`

4.13.11.2. Linux

On Linux systems, only privileged programs that run as `root` can use ports under 1024. In line with security best practice PaperCut runs as a non-privileged user. To enable port 80 and 443, use `iptables` (or ipchains on old systems) to port-forward 80 to 9191. The following commands

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provide an example. Consult your distribution's documentation to see how to persist the `iptables` rules between system restarts:

```
/sbin/iptables -t nat -I PREROUTING --src 0/0 --dst <server_ip> \
-p tcp --dport 80 -j REDIRECT --to-ports 9191
/sbin/iptables -t nat -I PREROUTING --src 0/0 --dst <server_ip> \
-p tcp --dport 443 -j REDIRECT --to-ports 9192
```

(These commands would typically be placed in an `rc init` script or the iptables startup config script as provided by your distribution.)

When you are done, restart the Application Server. (See Stop and start the Application Server).

4.13.11.3. Mac

The approach on Mac systems is similar to Linux. With the release of Mac OS X 10.11 (El Capitan) and the inclusion of System Integrity Protection (SIP) modifications to /System/ are disabled by default and disabling this feature is not recommended. The following information works for Mac OS X 10.10. For Mac OS X 10.10 and later, the support for the IPFW firewall has been removed in favor of PF.

Mac OS X 10.10

From Mac OS X 10.10, you must use the `pfctl` command to modify the Mac firewall.

1. Create the anchor file:

   ```
   sudo vi /etc/pf.anchors/com.papercut
   ```

2. Modify the `/etc/pf.anchors/com.papercut` file by adding the following lines:

   ```
   rdr pass on lo0 inet proto tcp from any to self port 80 ->
   127.0.0.1 port 9191
   rdr pass on en0 inet proto tcp from any to any port 80 ->
   127.0.0.1 port 9191
   rdr pass on en1 inet proto tcp from any to any port 80 ->
   127.0.0.1 port 9191
   ```

3. Test the anchor file:

   ```
   sudo pfctl -vnf /etc/pf.anchors/com.papercut
   ```

4. Add the anchor file to the pf.conf file:

   ```
   sudo vi /etc/pf.conf
   ```

   Then add in the following lines under each corresponding section - e.g. the rdr-anchor line under the current rdr-anchor line, and the load anchor under the current load-anchor statement:

   ```
   rdr-anchor "port80"
   load anchor "port80" from "/etc/pf.anchors/com.papercut"
   ```

5. Load the pf.conf file automatically at startup by editing the current daemon for pf:

   ```
   sudo vi /System/Library/LaunchDaemons/com.apple.pfctl.plist
   ```

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Then within the section detailing the program arguments `<key>ProgramArguments</key>`, add in an extra string with -e, which enables the config, as per:

```
<string>pfctl</string>
<string>-e</string>
<string>-f</string>
<string>/etc/pf.conf</string>
```

Then save the file, exit and restart the server to test.

6. To test this method manually (no restart required) you can use the pfctl command:

```
sudo pfctl -ef /etc/pf.conf
```

This loads and enables the `pf.conf` file, which then calls the `com.papercut` anchor file.

7. Restart the Application Server. (See Stop and start the Application Server).

Mac OS X 10.9 and earlier

In Mac OS X 10.9 and earlier, one needs to use the `ipfw` command to modify the Mac firewall:

```
sudo /sbin/ipfw add 102 fwd 127.0.0.1,9191 tcp from any to any 80
in
```

See the `ipfw` man page for all the scary details!

4.14. Web Cashier

The Web Cashier is a simple web interface that provides a till/cashier to facilitate simple transactions using PaperCut NG/MF accounts. It's specially designed for non-technical staff in educational organizations. For example, the cashier user may:

- Charge end user accounts, or shared accounts, for ad-hoc services such as laminating, binding or library fines.
- Deposit funds to a user's personal printing account, usually after receiving a cash or electronic payment.

Although an administrator can perform account adjustments at any time, the Web Cashier interface is a simpler interface designed specifically for non-technical users such as office administration staff, library staff and service counter staff.

You can use Web Cashier in a variety of ways. Some examples:

- The library teacher can use Web Cashier to charge students for various services such as document binding, laminating, or library fees without handling cash. Services are charged to the user's balance and they receive an itemized transaction acknowledgment slip, which can be printed or automatically emailed if needed.
- Office staff can accept payments from users and then credit the user's balance using the simple Web Cashier **Deposit** screen (e.g. add extra quota or top-up an account over the counter). Web Cashier screens are simple and only present information tailored specifically to the cashier user's role. (Purchase, Deposit or Both). This approach is ideal for smaller organizations who

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do not have the transaction volumn to justify Pre-Paid TopUp cards or an online payment gateway (see TopUp/Pre-Paid cards).

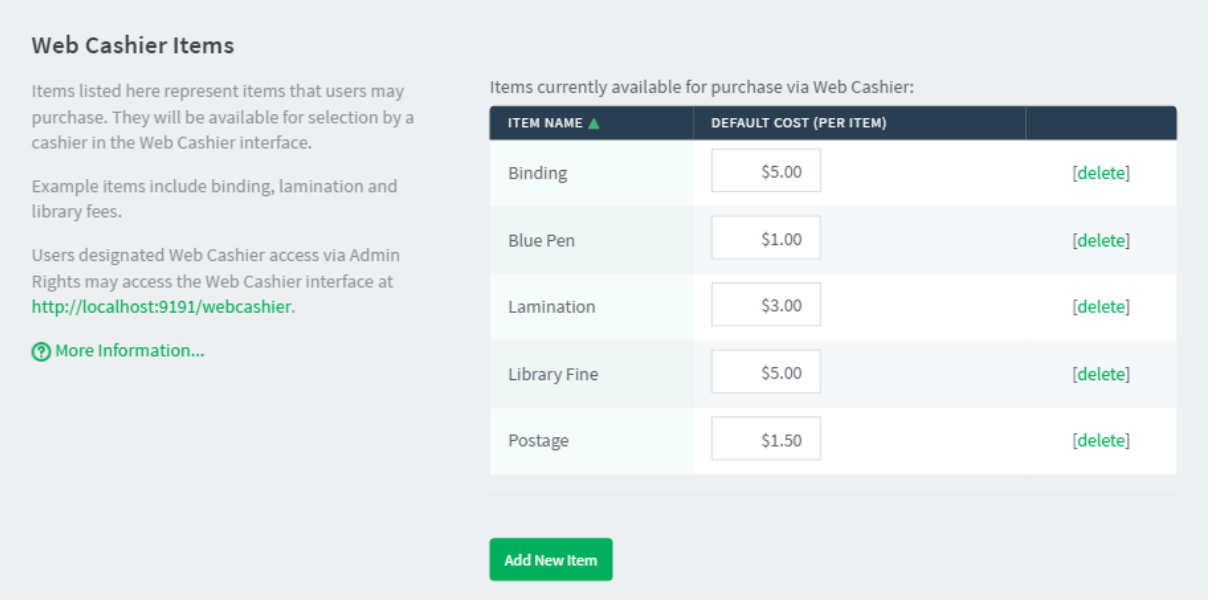
- When people leave an organization they can be provided with the balance of their account and the transaction can be recorded as a "refund" item, created by the PaperCut NG/MF administrator. The items are configurable and depend on the services the organization wants to provide.

4.14.1. Set up Web Cashier

Web Cashier is not enabled by default and must first be set up by the PaperCut NG/MF administrator. To set up Web Cashier:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Web Cashier** area, click **Enable and set up Web Cashier** .
3. To set up Web Cashier to sell ad-hoc services or products (items)you should first define them. To add an item:
   a. In the **Web Cashier Items** area, click **Add New Item**.
   b. In **Item Name**, enter a name or description for the item.
   c. In **Default Cost (per item)**, enter a default cost.
   d. Click **Add Item**.



> **Tip:**
> To delete an item click **delete**. You can change the default cost of the item later.

4. Optionally customize the text displayed on the **Purchase** and **Deposit**screens or header of acknowledgment slips. Examples are provided. For more configuration details see Customize the Web Cashier interface text.

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5. Access Web Cashier using the URL `http://[server-name]:9191/webcashier`. This is the URL you provide to your Web Cashier users later (e.g. Office/Admin/Service-desk staff).
6. Perform some test transactions and ensure Web Cashier is set up to your requirements.
7. Grant Web Cashier user privileges to the users who require access (i.e. teacher, office staff, librarian, etc.). To read more about assigning Web Cashier access to users or groups see Assign Web Cashier admin permissions

4.14.2. Assign Web Cashier admin permissions

Web Cashier users are administrator type users who usually have limited rights. For example, a Web Cashier user might be a service desk staff member and you grant them access to the Web Cashier option only and not other administrator rights.

To assign Web Cashier users:

1. Select **Options > Admin Rights**.

   The **Admin Rights** page is displayed.
2. Add a user/group as an administrator (for more information, see Assign administrator level access).
3. Click the **edit** link next to the user/group.

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4. If you only want to provide them access to the Web Cashier, clear all the other options and select only **Web Cashier user**.

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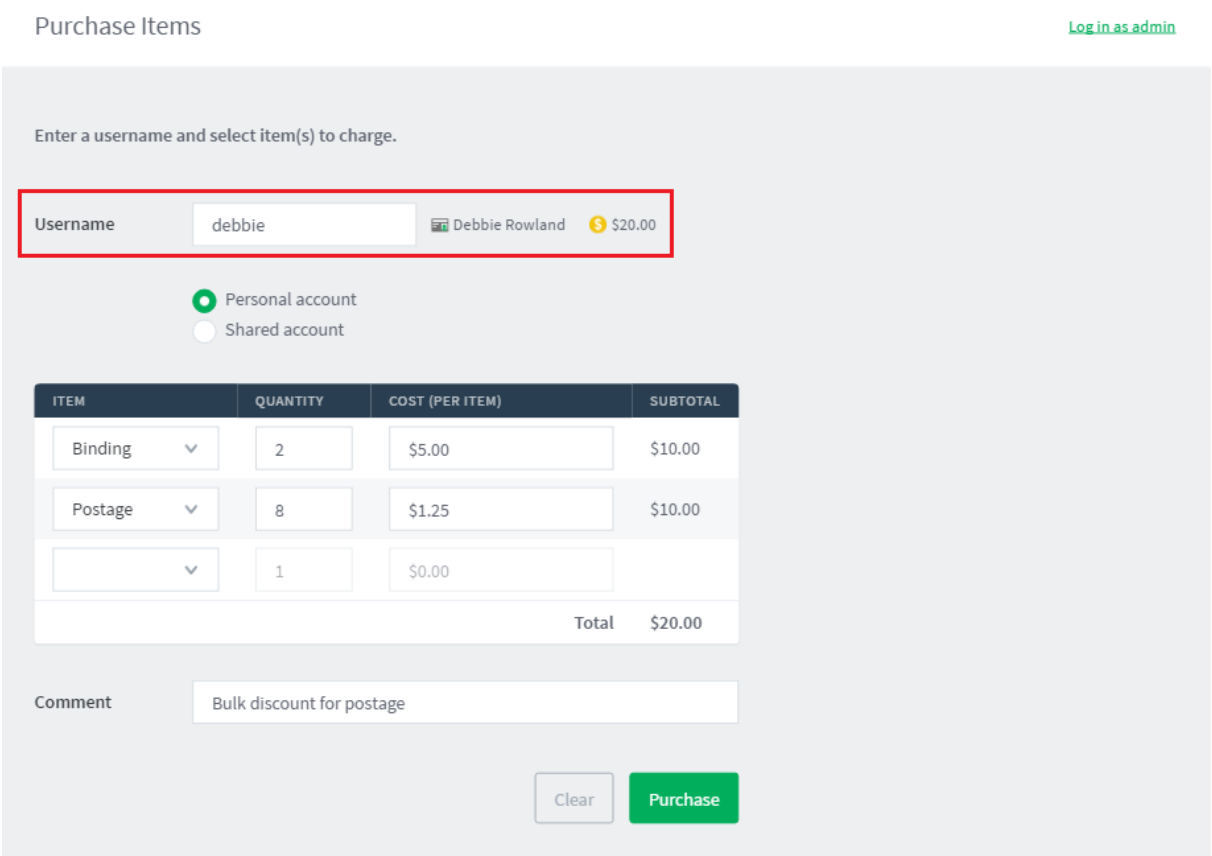
5. In **Allow user to perform**, select whether you want to allow the users to perform purchases only, deposits only, or both purchases and deposits. For example, library or print room staff might have rights to apply purchases (e.g. binding or bulk printing), while not being given access to deposit money onto accounts for security reasons.
6. Click **OK**.

Important:
Many Web Cashier users are non-technical staff. After setting up a new user as a Web Cashier user make sure you provider them with the browser access URL (i.e. `http://[server-name]:9191/webcashier`) and take a few moments to demonstrate common functionality such as performing a purchase/deposit.

4.14.3. Process purchases

To charge Tom's personal account for "Binding" and "Postage" (at a discounted price):

1. Log in to the PaperCut NG/MF Web Cashier using the URL `http://[server-name]:9191/webcashier`.
2. Enter your network credentials.
3. Search for the user by entering their username or full name. The user's full name and current balance are displayed on the left.



4. Select **Personal account**.
5. In **Item**, select **Binding**.

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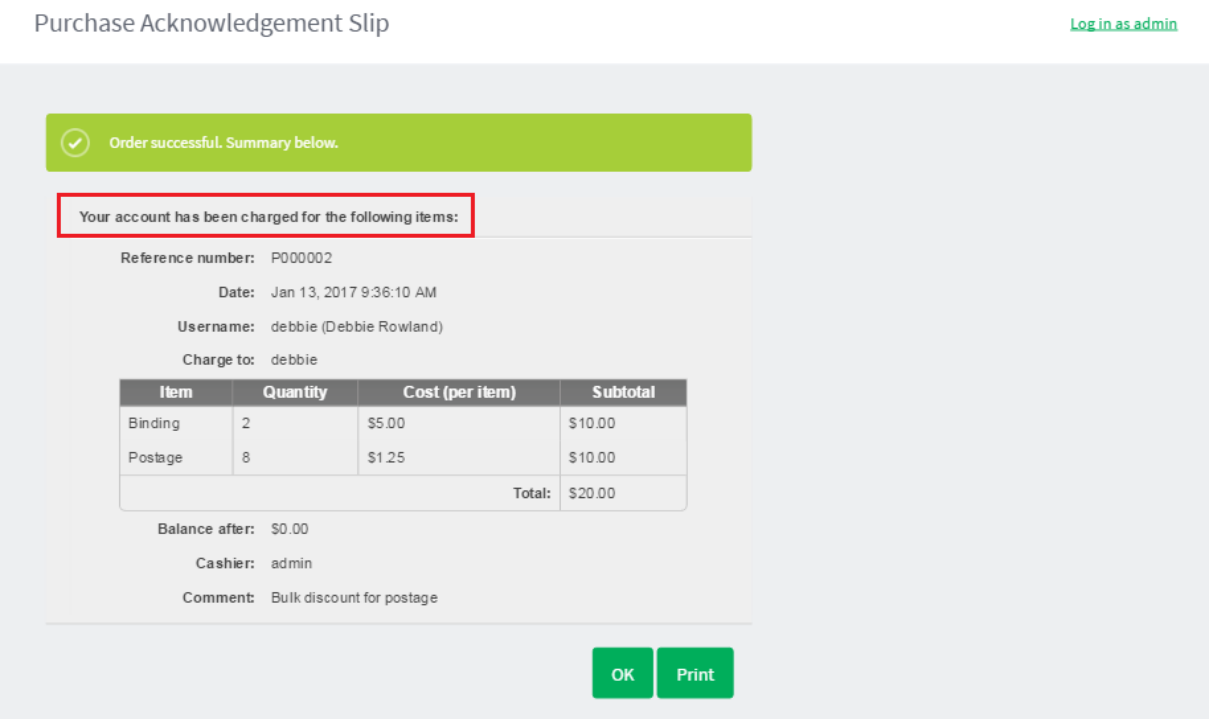
The default item price is visible when you select the item. You can modify this if needed. (e.g. give discount for teaching staff)

6. In **Quantity**, enter the number of items purchased.

   PaperCut NG/MF calculates the total item price.

7. In the next row, in **Item**, select **Postage**.
8. In **Quantity**, enter the number of items purchased.
9. In **Cost (per item)**, enter a discounted amount.
10. In **Comment**, enter an optional comment. For example, the reason for an exception/discount/charge.
11. Click **Purchase**. Tom's balance is debited with the transaction value and an entry is made in the account's transaction history.
12. An *Acknowledgement slip* is displayed on the screen. To print the Acknowledgement slip, click **Print**.

    The text displayed on the top of the acknowledgement slip is configurable. See Customize the Web Cashier interface text for more information.



If previoulsy configured by the PaperCut NG/MF SysAdmin, Tom is automatically emailed a copy of the acknowledgment slip. To set up a SMTP server, see Configure email.

4.14.4. Deposit funds in a Web Cashier account

Deposit $10.00 to a user's personal account.

1. Log in to PaperCut NG/MF Web Cashier using the URL `http://[server-name]:9191/webcashier`.
2. Enter your network credentials.

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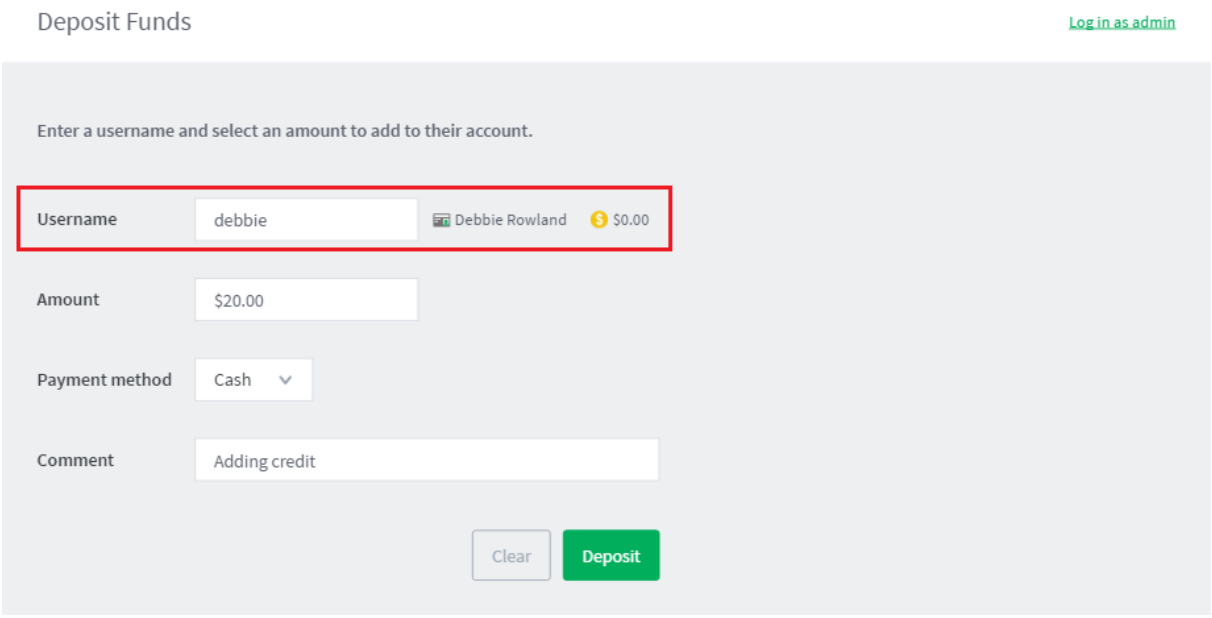
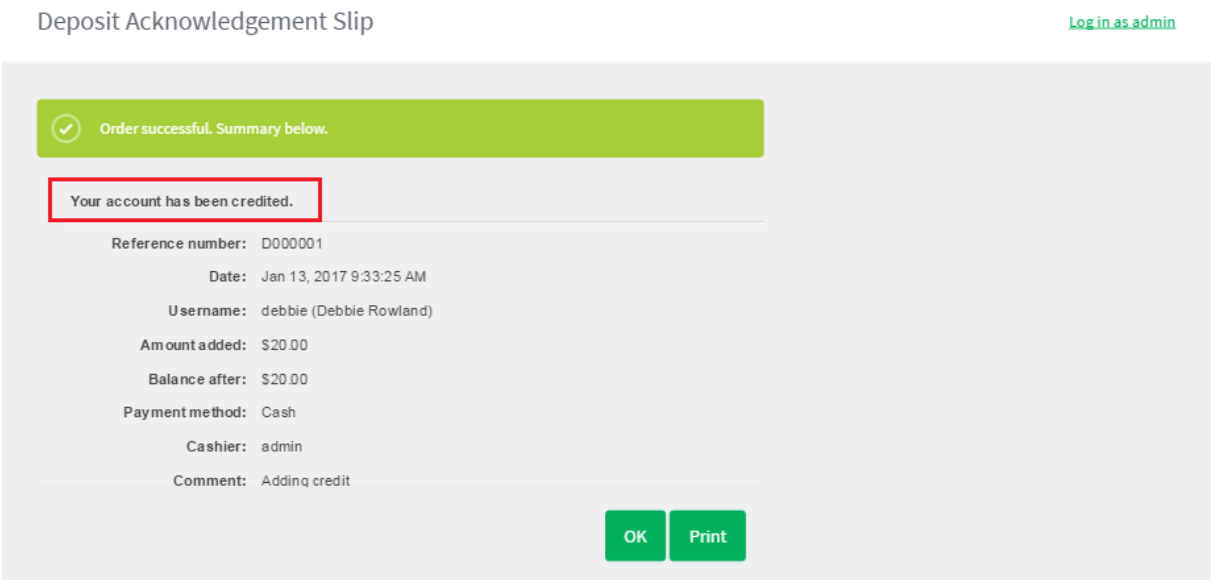
3. Click the **Deposit** tab.
4. Search for the user by entering their username or full name. The user's full name and current balance is displayed on the left.



5. Collect $10.00 cash from the user and enter $10.00.
6. Select one of the predefined payment methods. (i.e. Cash in this example)
7. Enter an optional comment.
8. Click **Deposit**. The user's personal balance is credited with $10.00.
9. An Acknowledgment slip is displayed on the screen. To print an Acknowledgment slip, click **Print**.

   The text displayed on the top of the acknowledgment slip is configurable. See Customize the Web Cashier interface text for more information.



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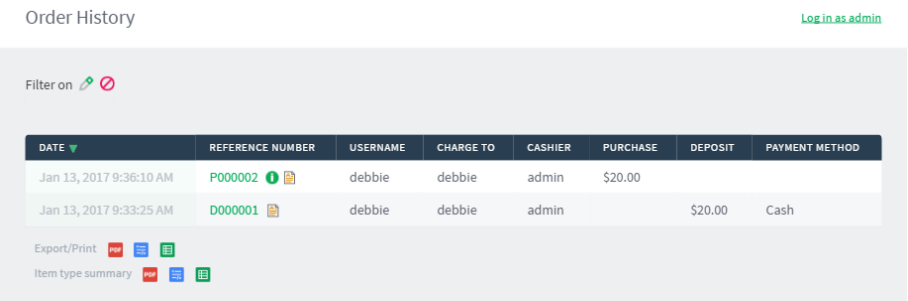
The user is automatically emailed a copy of the acknowledgment slip if configured, or it can be printed. $10.00 is immediately added to the user's account and is available for use.

4.14.5. View Web Cashier order history

A history of Web Cashier orders is displayed on the **Order History** tab.



This useful screen allows the Web Cashier to:

- Validate the existence of a transaction/order by searching (e.g. on a reference number).
- Bring up an order/transaction history for a given user or for a given account.
- Quickly review recent transaction.
- Access basic reports or export data.

You can view previous acknowledgement slips by clicking the reference number. You can also set up a filter. e.g. to view the transactions for a specific user. Export the list of orders using the **Export / Print** link.

You can access all Web Cashier reports via the PaperCut NG/MF Admin web interface:

1. Select **Reports > Transaction**.

   The **Transaction Reports** page is displayed.

   For more information, see Generate a Web Cashier report.

4.14.6. Customize the Web Cashier interface text

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the Web Cashier area, click Go to Web Cashier setup.

   The Web Cashier page is displayed.

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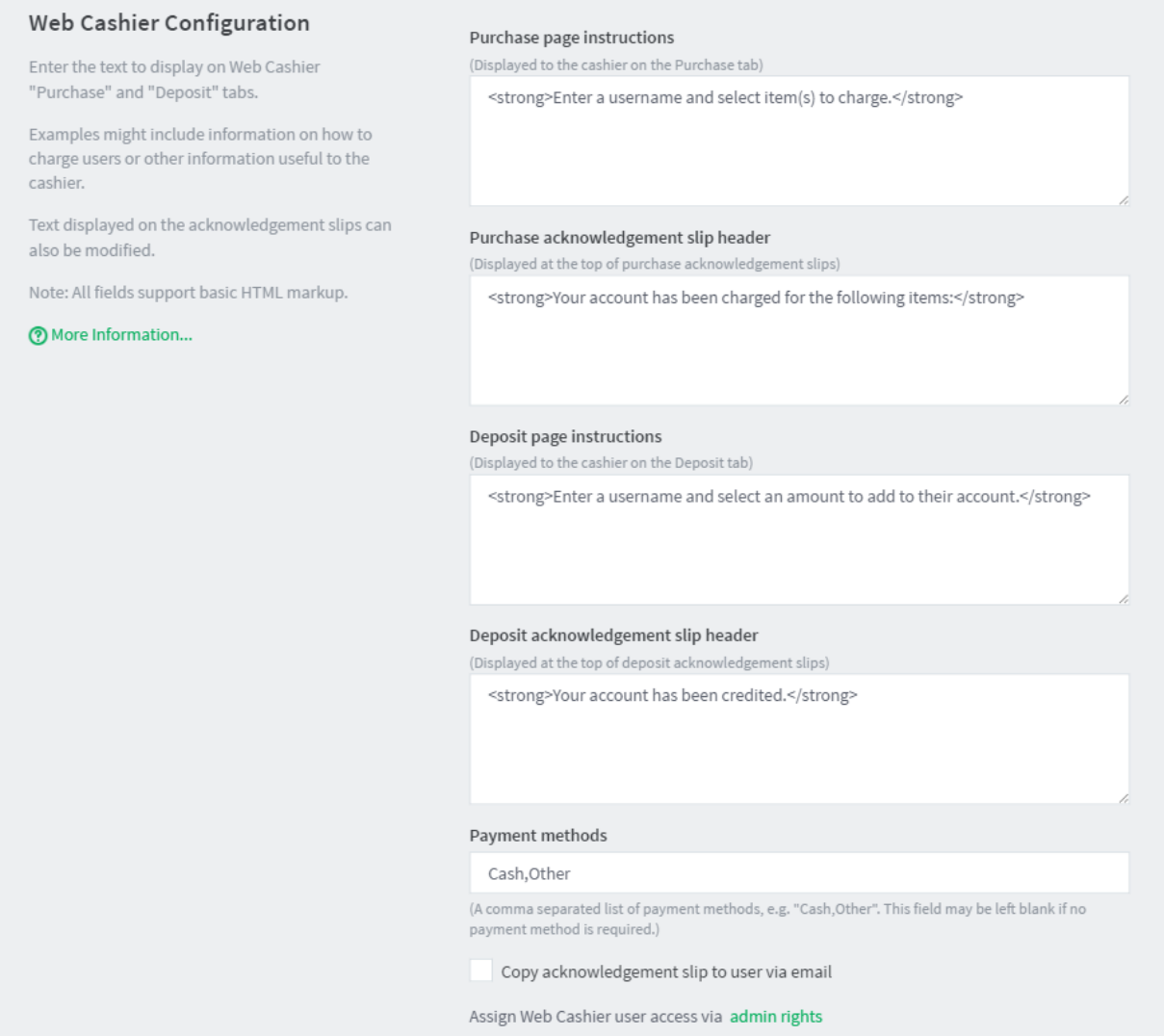

3. Configure the following configuration settings as required:
   - **Purchase page instructions**—This text is displayed on the Web Cashier **Purchase** tab. It might include information on how to charge users. It supports basic HTML markup.
   - **Purchase acknowledgment slip header**— This text is displayed on top of the Web Cashier **Purchase** acknowledgment slips. It supports basic HTML markup.
   - **Deposit page instructions**— This text is displayed on the Web Cashier **Deposit** tab. It might include information on how to charge users. It supports basic HTML markup.
   - **Deposit acknowledgment slip header**—This text is displayed on top of the Web Cashier **Deposit** acknowledgment slips. It supports basic HTML markup.
   - **Payment methods**—This is a comma separated list of user-defined payment methods used for crediting users' accounts. (i.e. Cash). It can be left blank.
   - **Copy acknowledgment slip to user via email**— Select this option to send acknowledgment slips to users via email. To set up an SMTP server, see Set up system notifications and emails.
4. Click **Apply**.

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Tip:
Most text configuration options supports HTML markup. For example, this allows custom font colors, size and reference images (e.g. logos). To bold text, surround the text with `<strong>` tags. If you are not familiar with HTML, your webmaster or website administrator can offer some advice.

4.14.7. Generate a Web Cashier report

1. Select **Reports > Transaction**.

   The **Transaction Reports** page is displayed.
2. In the **Web Cashier Transaction Reports** area, generate one or more of the following reports:
   - **Web Cashier orders** — It is a list of all the **Purchase** and **Deposit** orders sorted by date.
   - **Web Cashier purchases - details**— It gives detailed information for all purchases done via Web Cashier.
   - **Web Cashier items - summary**— It is a summary of all the items purchased within a certain period.

   Tip:
   To see a sample click **Show sample**.

For more information about reports, see Reports.

Tip:
You can schedule these reports to be automatically emailed via **Reports > Schedule** on a daily, weekly or monthly basis to designated staff as appropriate.

4.14.8. Advanced: Apply a regular expression to a card number

In Web Cashier, card/identity numbers can be used to access the user details. This can be done in the following ways:

- the Web Cashier administrator can enter the card number in the Web Cashier Username field
- automatically populated by a card reader

If you automatically populate the Username field from the card number, you can apply a regular expression on the card number.

For example, if you have stored only the last six characters of a card number in PaperCut NG/MF, you can apply a regular expression to the card number in Web Cashier so that only the last six characters are used to populate the username.

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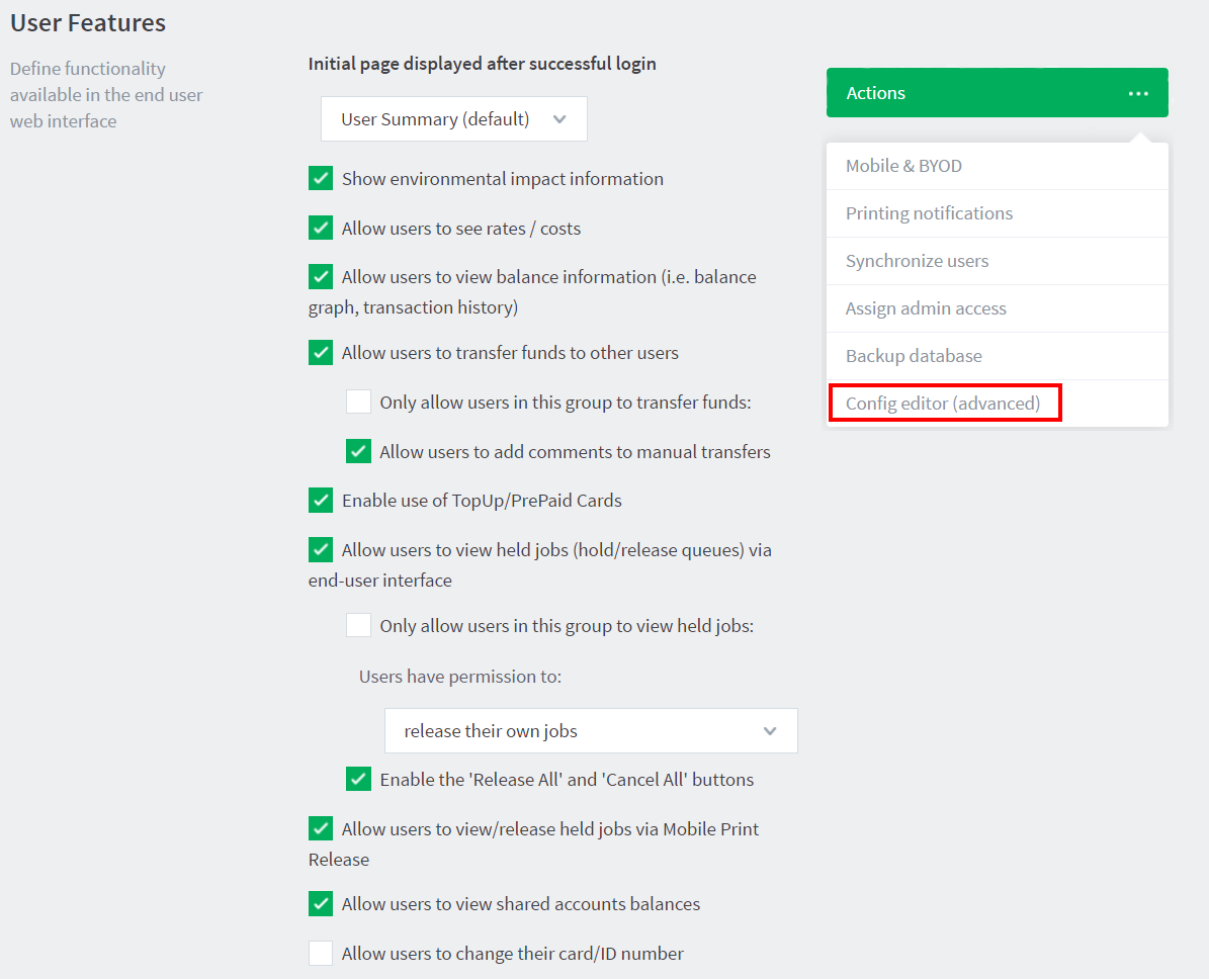
Config key	Description
auth.web-cashier-interface.card-id.card-regex	A regular expression that will be applied to a Web Cashier card/identity number when used to search for user details. By default, this value is empty. Ensure your regular expression is valid. For more information about regular expressions, see Regular Expression Language - Quick Reference.

To edit this config key:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.
3. Search for **auth.web-cashier-interface.card-id.card-regex**.
4. Enter the regular expression to apply to card numbers.
5. Click **Update**.
6. Check the Web Cashier usernames to ensure that the regular expression has been applied.

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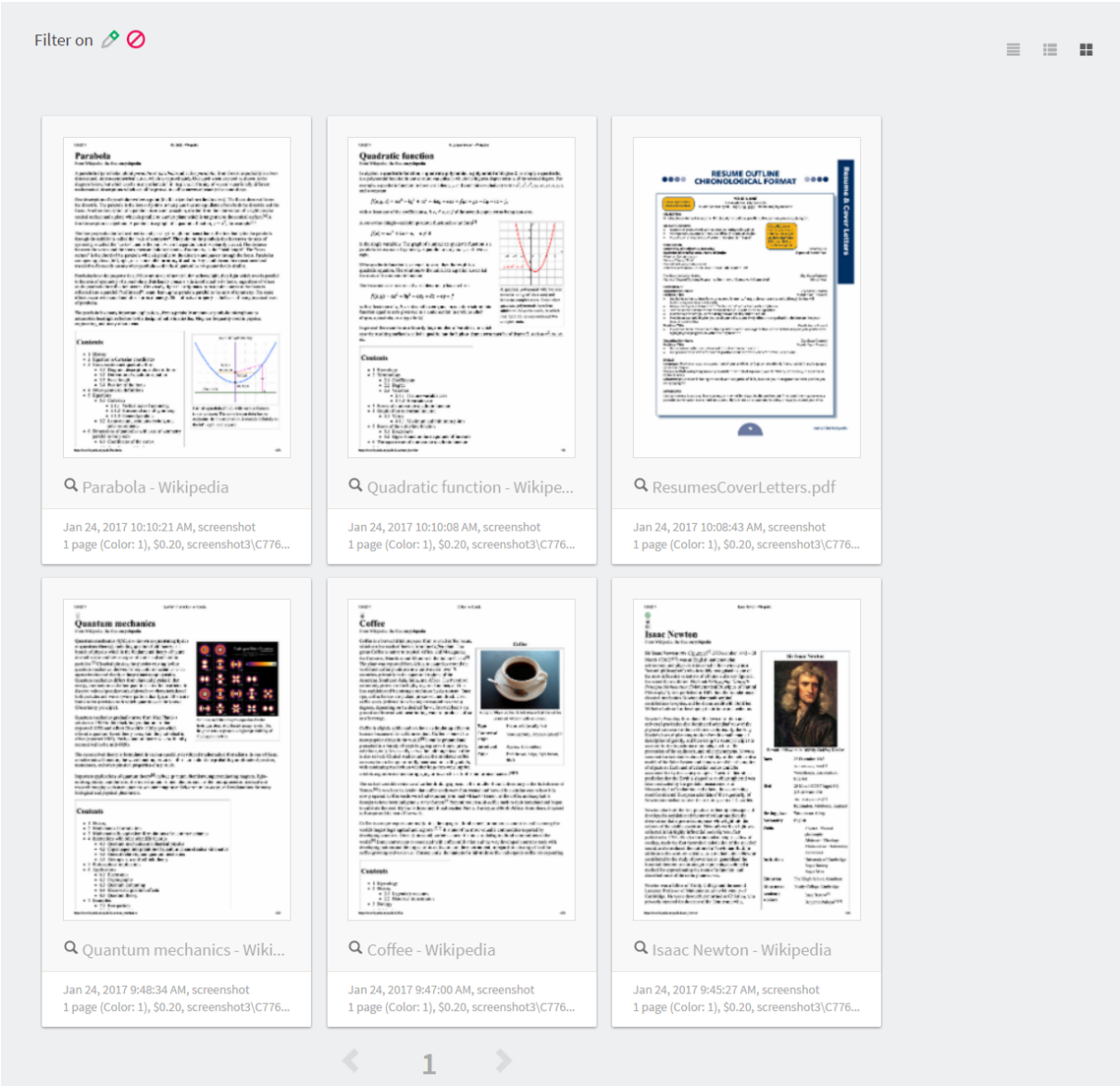
4.15. Print Archiving (viewing and content capture)

Print data is typically short-lived, the user prints the job and then the print job content is lost. PaperCut NG/MF's Print Archiving feature changes that. With Print Archiving, in addition to PaperCut's standard print job information logging, it is now possible to:

- Save and archive print jobs for a defined period of time
- Interactively view what has been printed

Note:
Print archiving is not available on direct print queues. To offer this service to your users, set up a server queue for this device/printer.

Print Archiving is a very visual feature and is best explained with a few screen shots.



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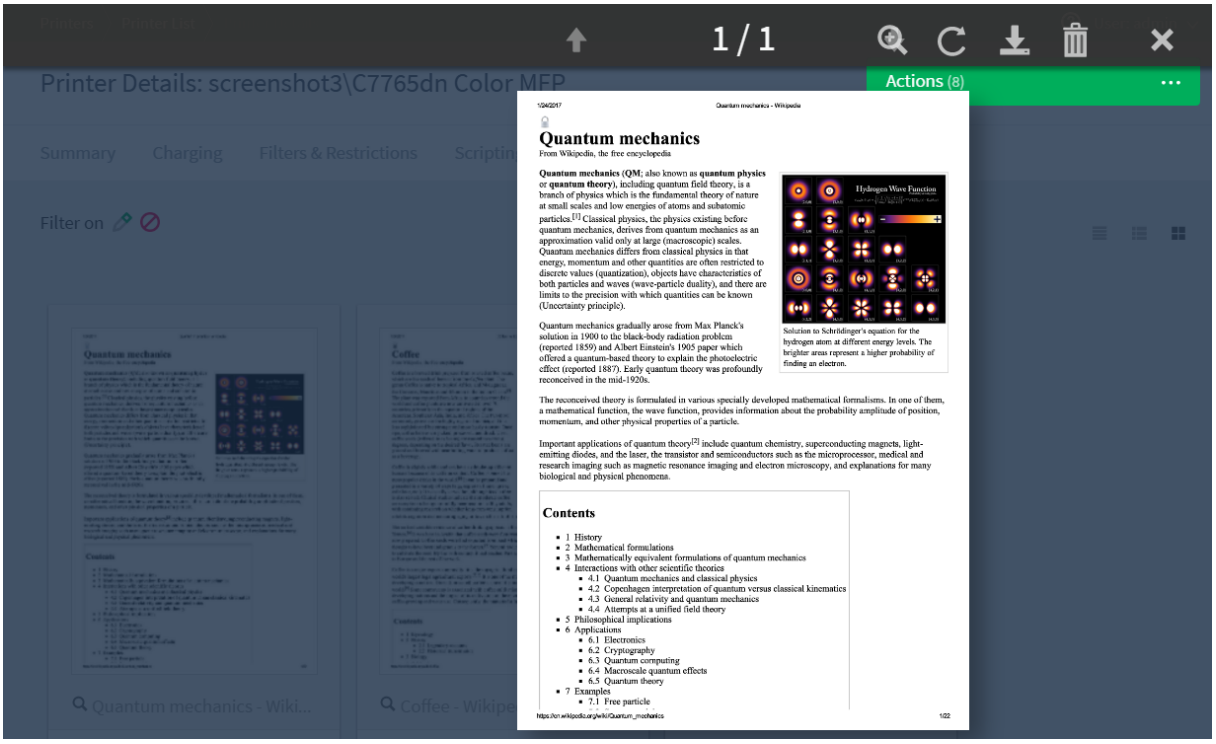

Print Archiving, including the ability to view previous print jobs, gives administrators a new set of tools to improve print management. Common uses include:

- ## Information Security, data retention and audit policies

  Many corporations now have defined data management objectives and specific policies around the tracking of data in emails, using thumb drives, cloud storage services, etc. This allows organizations to:

  - Comply with externally mandated and legal requirements such as Sarbanes-Oxley and best practice audit procedures.
  - Support an organization's needs to protect its customers' and own intellectual property.
  - Monitor inappropriate material and potential illegal activity.
  - Ensure business resources are being used appropriately and not being wasted.

  Print Archiving now allows organizations to extend these security policies to the printer fleet and closes a potentially big loophole in governance processes.

- ## Fleet Optimization

  Inspecting a sample of print jobs held by Print Archiving can help with key resource decision making questions. Is the inkjet photo printer being used for photos? Or should it be replaced with a more appropriate device for color text document output, such as a laser printer?

- ## Validating user refund requests

  In education environments, it is common for refund requests to be submitted via PaperCut NG/MF. The ability for administration staff to review the job via Print Archiving can greatly assist in this scenario. See Managing Refunds for more on this feature.

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Caution:
In the same way that email and server administrators have privileged access to a user's email and documents, a PaperCut NG/MF administrator can access the user's print job content. Treat a SysAdmin's privilege to view archived print jobs with the same professional caution as similar access privileges to a user's private data. PaperCut NG/MF has granular control on administrative rights so this can be managed. For more information, see Assigning Administrator Access to a User.

Feature Highlights

- Store an historic record of all printed content, limited only by available storage space.
- View past print jobs interactively in the browser.
- Control which administrators have access to view or remove archived content.
- Download the original spool file for 100% fidelity when reprinting.
- Remove archived data from the system and disk.
- Move older archives to external storage, such as offline backup or offsite cloud repository, for long term data retention.
- Enable or disable archiving on selected printers and users.

Viewing print logs

When Print Archiving is enabled, new options are available for viewing print logs (e.g. the global job log at **Logs > Job Log**, or the per-printer or per-user job logs).

- **Details view:**

This is the traditional text-only job log view and is best for finding and browsing by non-visual job log information.

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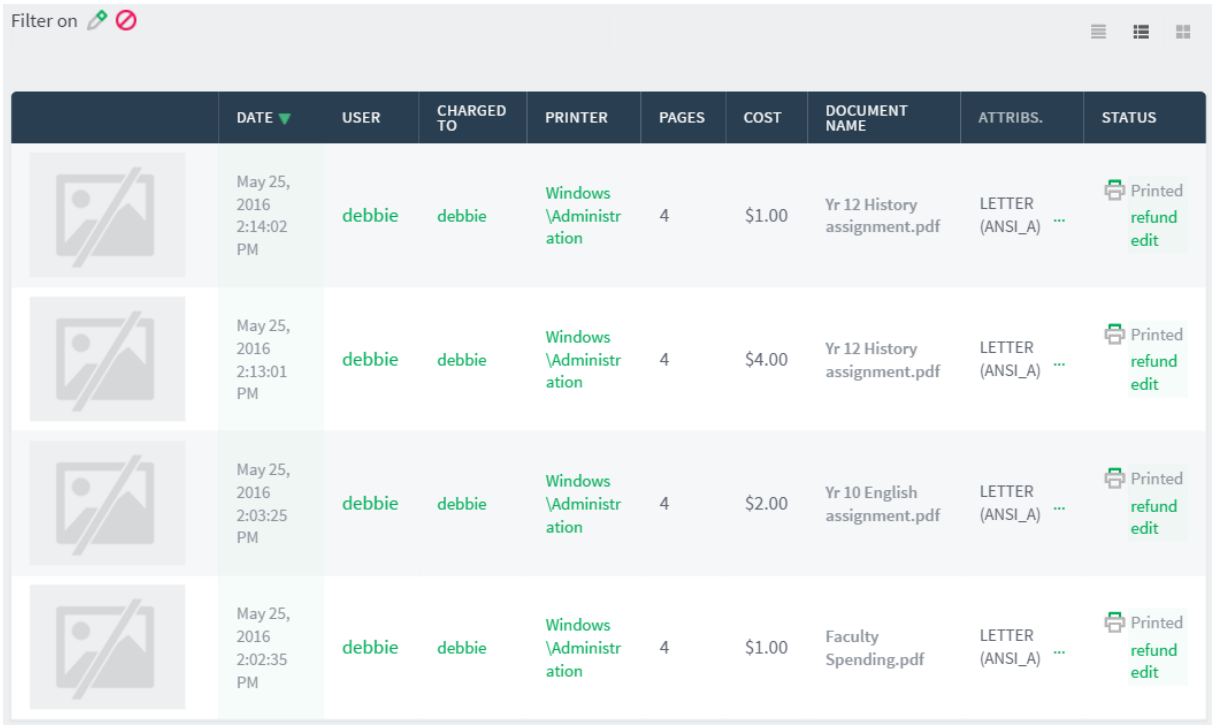
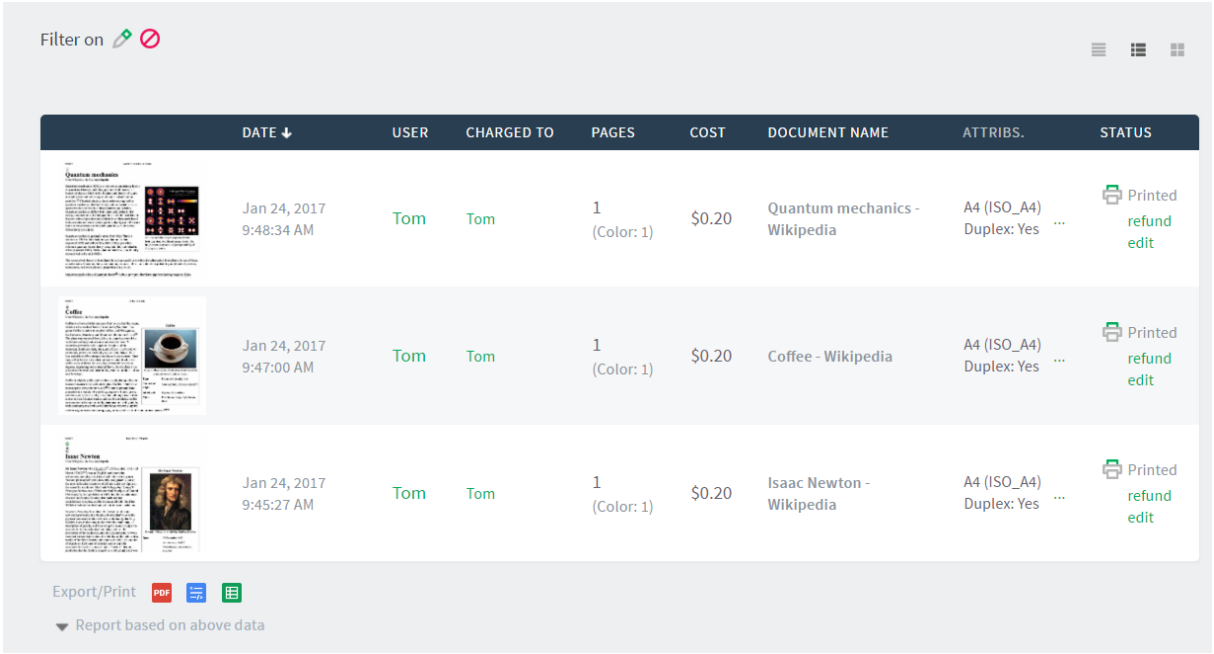


- **Hybrid view (thumbnails + details):**

The hybrid view is the most flexible view option. It adds a thumbnail column to the details view. This allows for easy filtering and sorting of the print logs table while also being able to view print logs visually.



- **Thumbnails / grid view:**

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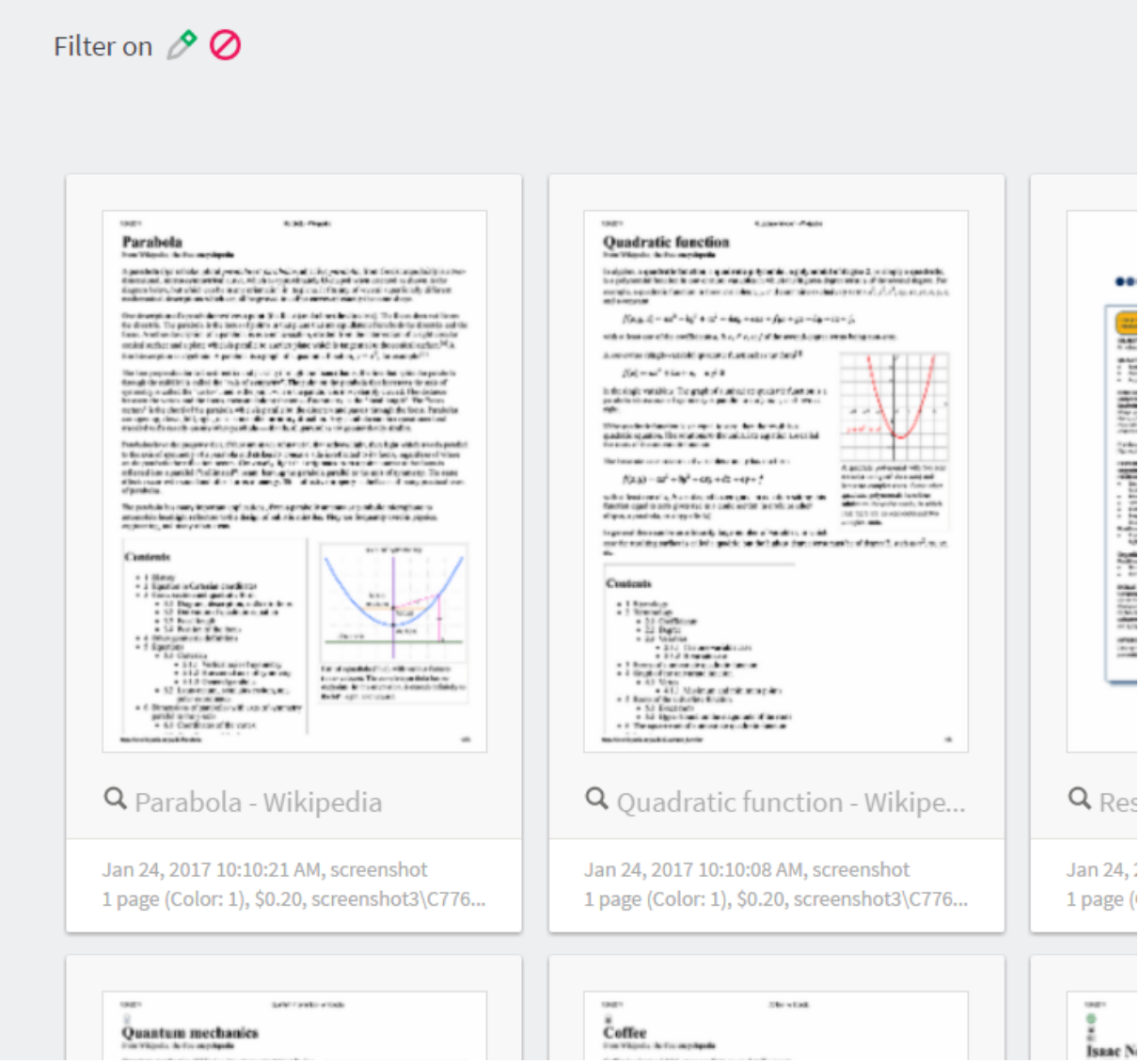
This view favors images over text and is the best view for visually scanning to identify documents of interest.



4.15.1. Technical overview: How does archiving work?

The Print Archiving system has three processes:

Process 1: The job archiving process

1. A user prints a job from a network device (desktop workstation, mobile, etc.).
2. The job is sent to the print server.
3. On the server, the job is intercepted and the job's spool file is copied into the archive. This is usually a file containing the print data in a Page Description Language (PDL) such as PostScript, PCL, EMF or XPS. The copy process is carried out while spooling takes place, with minimal impact on printing performance.
4. If the spool file is in a PDL format known to the system, images of the printed pages are created.

Process 2: Archive access and preview process

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1. The administrator logs into the PaperCut NG/MF Admin web interface.
2. In the print log, the archived jobs are displayed as thumbnails or icons.
3. If the job is in a supported PDL format, clicking the thumbnail brings up a viewer. From there you can page through and view the document.
4. As the administrator pages through a document, further images are generated as required.

Process 3: The overnight management process

At the set system maintenance time overnight, the archive is inspected for any content older that the **Keep jobs for up to: X days** option set by the administrator. Any content that matches is permanently removed from the archive.

4.15.2. Set up Print Archiving

Print Archiving is an optional feature disabled by default. Before enabling the SysAdmin should consider:

- Disk space implications.
- Privacy and data access.
- CPU load - particularly on low resourced Virtual Machines.
- The additional load on backup storage.

4.15.2.1. Step 1: Install print spool file viewer technology

To get the full benefit of Print Archiving, install additional software that assists with the conversion of selected printer language files, such as PostScript, into images. Install this software on the primary PaperCut server. PaperCut detects the software and automatically starts using it.

The recommended software:

Windows servers

Install *Ghost Trap* - a security-hardened PostScript and PDF-to-image converter.

Download:

Ghost Trap is a security hardened version of Ghostscript.

It's open source software supported by PaperCut Software.

It brings best-of-breed security to the popular PostScript and PDF conversion software by utilizing the same sandbox security technology used by the Google Chrome Browser. You can read more about this project here: *The Ghost Trap Project Page*.

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Note:
Ghost Trap is strongly recommended. An alternate option is to install the following components: *Ghostscript*, *GhostPCL*, and *GhostXPS* (v9.07).

Mac servers

Install the PostScript viewing software Ghostscript version 9.06. Richard Koch from the University of Oregon maintains a Mac version of Ghostscript. Download this *here*.

Note:
If you're using the *Homebrew* package manager, there is a `ghostscript` package available for install.

Linux and Novell OES servers

All major Linux distributions either come with Ghostscript automatically installed, or an option to install via the standard package manager. See your distribution's documentation for further details. You should ensure that the `gs` command is on the `PATH` (for the papercut user).

Ghostscript version 9.07 is recommended. We also recommend installing, *GhostPCL* and *GhostXPS*.

4.15.2.2. Step 2: Enable Print Archiving

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Print Archiving** area, select the **Enable Print Archiving** check box.
3. Click **Apply**.

Once enabled you should perform some testing across your printer fleet.

4.15.2.3. Step 3: Set the configuration options

SysAdmins should first familiarize themselves with the archive disk management options.

1. Click the **Options** tab.

   The **General** page is displayed.

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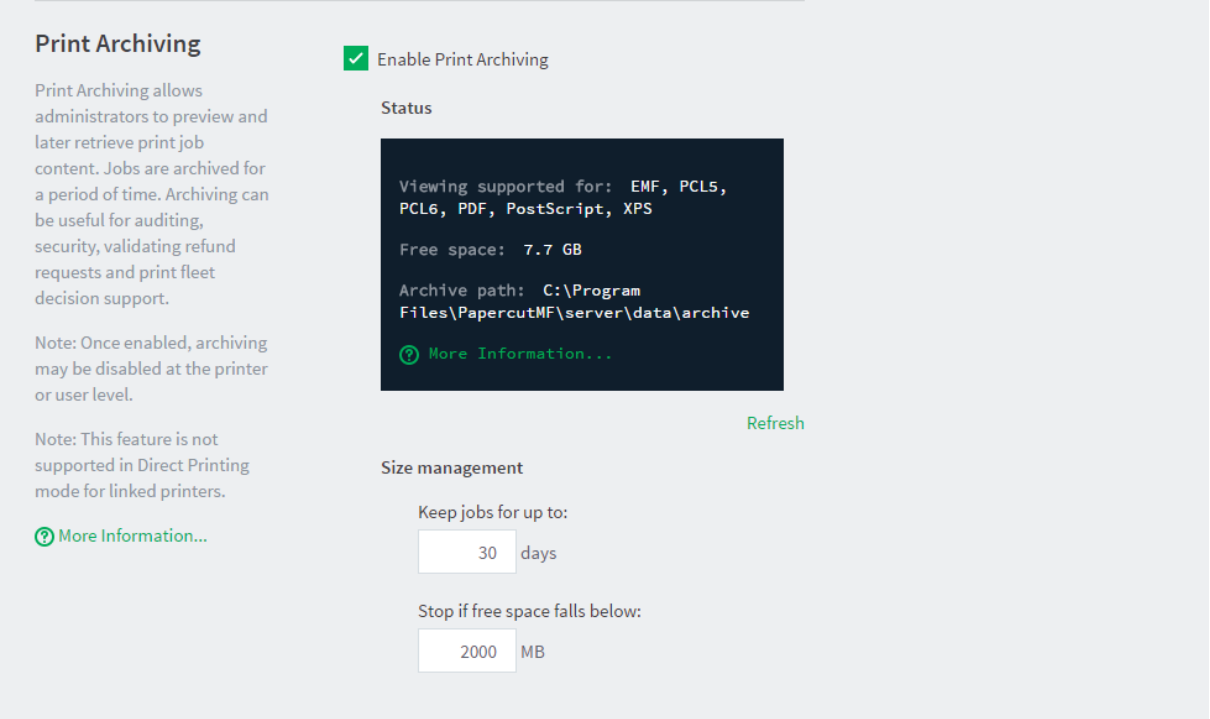
2. Scroll to the **Print Archiving** area.



The options are:

- **Keep jobs for up to**

  This option determines the number of days a job is kept in the archive. The default value is 30 days, with a minimum value of 1. If you are planning on setting a high value make sure you consider consumption of drive storage. It is advisable to monitor disk space growth during the first full week of usage and use this as a basis to extrapolate your storage requirements. For reference the default archive path is `[app-path]/server/data/archive` on the primary PaperCut server.

  Any change to the *Keep up to: X days* option is applied when archive maintenance is performed overnight.

- **Stop if free space falls below**

  This is an emergency stop option. If free disk space falls below the set value all archiving is immediately suspended. This ensures a growing archive will not take down a production server. The default value is 2GB. If the server runs other production software, you might want to increase this value. If email notifications are configured (see Configure email), administrators also automatically receive an error email alert when disk space drops to this limit.

> **Tip:**
> It is recommended that you proactively monitor disk space usage as a matter of course during your regular service maintenance and assessment procedures.

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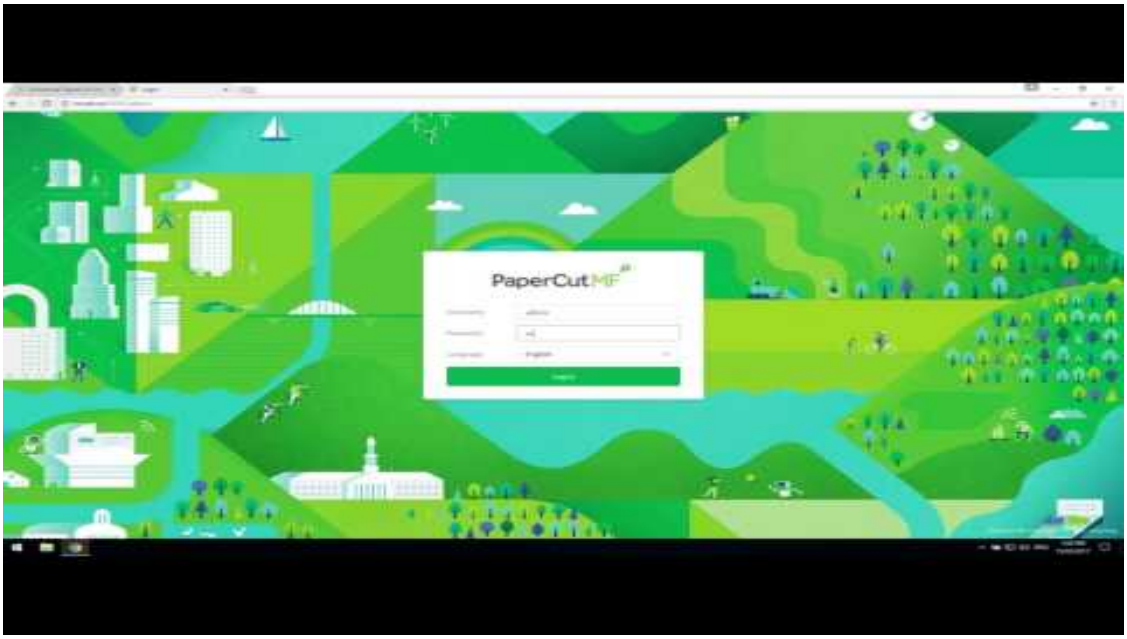
Turning off archiving on selected printers, users or groups

Once enabled, Print Archiving occurs on all queues for all users. You can, however, selectively disable archiving. Examples include:

- Tuning off archiving on selected users, such as human resources managers who routinely print sensitive information.
- Turning off archiving on printers that don't support interactive viewing - for example, a printer that only supports GDI drivers. Without imaging support, archiving is of reduced benefit as the only option to review the document is to reprint it.



Disable archiving on a specific printer

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Clear the **Enable Print Archiving** check box.
4. Click **OK**.

Disable archiving for a specific user

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. Select the **Override printer/device settings** check box.
4. Select the **Don't archive this user's jobs** check box.
5. Click **OK**.

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Disable archiving on a group of users

1. Click the **Groups** tab.

   The **Group List** page is displayed.
2. In the **Actions** menu, click **Bulk user actions**.

   The **Bulk User Operations** page is displayed.
3. Select the group to perform the change on.
4. In the **Change settings** area, select the **Change advanced user settings** check box.
5. Select the **Override printer/device settings** check box.
6. Select the **Don't archive this user's jobs** check box.
7. Click **OK**.

4.15.3. Advanced archiving options and features

4.15.3.1. Changing the archive storage directory

The default archive storage location is `[app-path]/server/data/archive`. Reasons for changing this location include:

- Allowing Site Servers and secondary print servers to archive to a common location.
- Storage restrictions on the drive where PaperCut is installed.
- You want to exclude the archive from your backups.

Note:
For performance and security reasons using a local disk on the primary server as the storage location is recommended. If a remote network location such as a SAN device is intended to be used, we'd recommend a low-level drive mount such as iSCSI or better if possible. The server must have a reliable connection to the storage. On a Windows server, if the desired location is accessible only via a UNC path, some additional security configuration is required. By default the `PaperCut Application Server` and the `PaperCut Print Provider` services run under the SYSTEM account. This account is restricted and does not have remote network drive access. Change the `Log On` account assigned *both* services to one that has full read/write access to the remote location. The change should only be considered and performed by an experienced Windows server administrator.

Phase 1: Move the central archive

Important:
If you have existing archived spool files you want to move to the new location, it is recommended to perform this process at a period of low printing activity.

To change the location:

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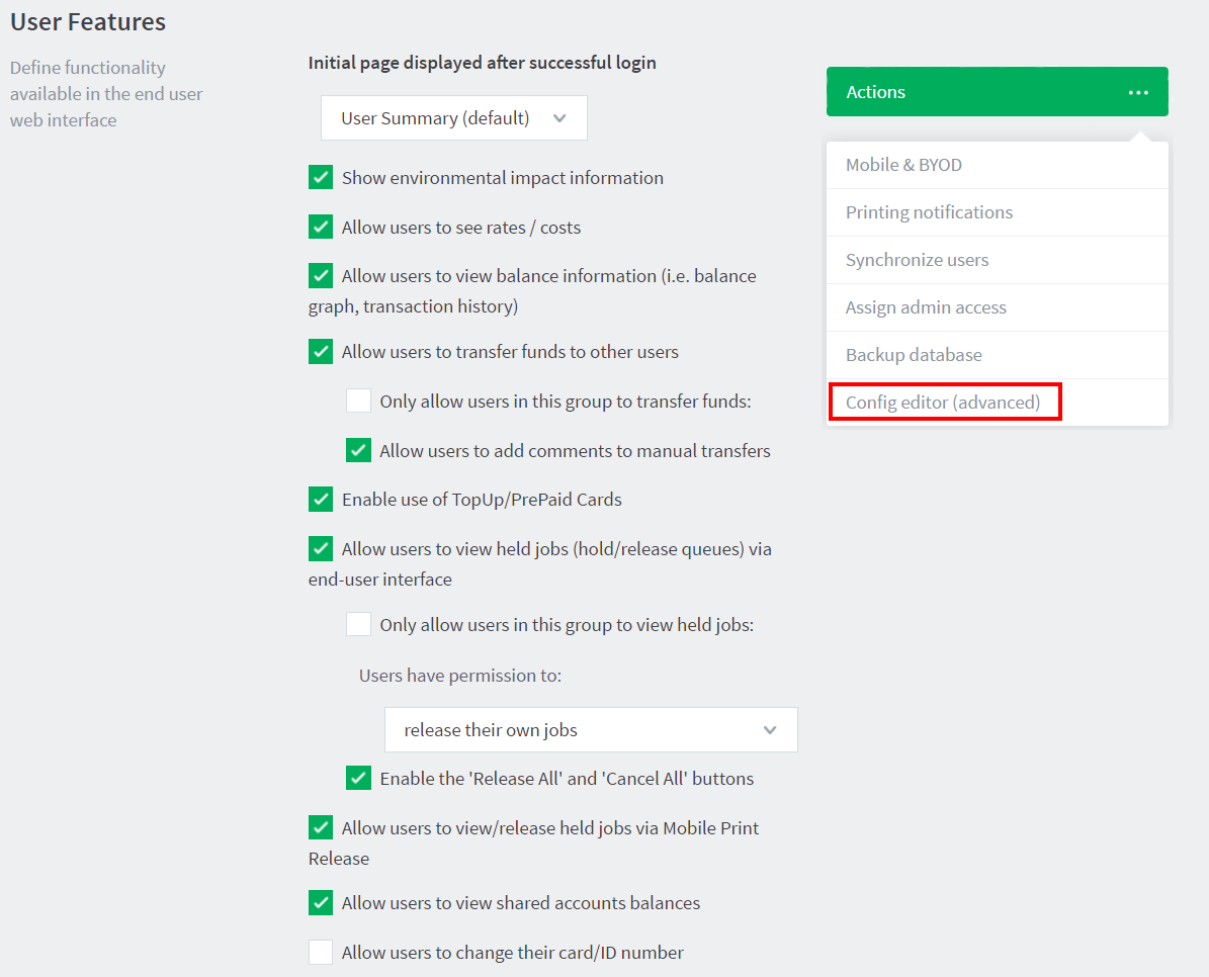
1. Create the new directory in the desired location, e.g. `D:\print-archive`. (If the PaperCut Application Server is running in a cluster this directory must be accessible by all cluster nodes. See Clustering and high availability.)
2. Ensure the `PaperCut Application Server` service has read and write access.
3. Log in to the PaperCut Admin web interface.
4. Click the **Options** tab.

   The **General** page is displayed.
5. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.
6. Search for the key `archiving.path`.
7. Enter the new path (e.g. `D:\print-archive`).
8. Click **Update** to the right of the value.
9. Navigate to the **Options** page and verify the Archive status.
10. A `README.txt` file is now in the top level of the location.
11. Consider copying any existing archived content from the previous archive location. If existing content is not copied, job previews are no longer be displayed for historical print jobs.

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Phase 2: Change Print Provider configuration

The Print Provider component needs to know the new location. To set this location:

1. Open Notepad (or your preferred text editor) with Administrator rights.
2. Open the file located at `[app-path]/providers/print/win/print-provider.conf`.
3. Locate the line:

   `ArchiveDir=`

   and change the value to point to the new location set up in Phase 1. For example:

   `ArchiveDir=D:\print-archive`

   Note: if you have upgraded from an older version you might need to add the `ArchiveDir=` option to the `print-provider.conf`.
4. Save the file.
5. Restart the Print Provider service.
6. Note: If you have multiple print servers, repeat this on any other secondary print server or Site Server, as outlined in Setting up secondary print servers or Site Servers.

4.15.3.2. Backup considerations

The print archive can potentially grow to a large size and this can have implications for your backup planning. You have various options around archive backup:

- You can fully backup the directory using your backup solution of choice, provided you have sufficient capacity.
- You can choose to not backup the directory at all. PaperCut is resilient to a restoration with an empty archive directory.
- You can back up part of the directory. For example, the current month only. PaperCut is resilient to a restoration with a partially constructed archive directory. There is a `README.txt` in the archive directory that explains more about partial backups and the directory structure layout.

4.15.3.3. Setting up secondary print servers or Site Servers

Introduction

The setup described previously was for the common case where the PaperCut application is installed on a single server. The secondary print server (or a Site Server's print server), as explained in Configuring secondary print servers and locally attached printers, is responsible for managing the contents of the print jobs printed via a server other than the primary server. If Print Archiving is enabled, the secondary server must also participate and facilitate archiving.

In larger print environments it is common to have multiple PaperCut secondary servers located on various machines across the network. In this case Print Archiving can still be used, however, this is an advanced setup procedure and requires additional planning and implementation time.

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To support the central tracking and viewing of print archives, transfer all spool files across to the primary Application Server's central archive directory. Each secondary server needs to be correctly configured with write access to this central archive directory. This require running the `PaperCut Print Provider` service under an account with write access to this directory.

One consequence of this approach, designed to simplify the management of archives, is that it increases bandwidth requirements because all print archives are transferred across the network to the Application Server. The impact of this depends on your specific environment, e.g. number of print jobs, network setup, PDL used, etc. As such you might need to monitor and experiment before a large scale deployment of this feature.

The setup process

The process to set up a secondary server under Print Archiving involves four key phases. Before undertaking this process you should ensure that the secondary print server or Site Server is operating correctly for standard print tracking. The following section documents configuring secondary servers on the Windows operating system.

Phase 1: Creating domain service account

By default the `PaperCut Print Provider` service running on the secondary server(s) operates under a limited rights account called SYSTEM. This account does not have access to network resources and, therefore, can't access the file system on the primary PaperCut server. Create a new service account and set the service to Log On as this account:

1. Create a new domain account with access to the share on the primary server and full management rights of print spooler on the local machine. An appropriate name might be `svc-papercut`.
2. Set the new account's password to never expire.

Phase 2: Sharing the central archive directory

The secondary server needs the ability to copy print jobs into the central archive. You must first share the central archive folder. On Windows, assuming the archive directory is the default, the procedure would be:

1. Open Explorer and navigate to `[app-path]/server/data/`.
2. Right-click the `archive` directory; then select **Properties > Sharing**.
3. Share the directory with a name `print-archive`.
4. Ensure the service account created in Phase 1 has full read/write access.
5. Ensure all other non-Administrator users do not have any access.
6. Click **OK**.

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Phase 3: Change the configured archive path on the secondary server

The secondary server needs to know the location of the recently shared central archive directory. To set this location:

1. Log on to the secondary print server or Site Server as an administrator.
2. Open Notepad (or your preferred text editor) with Administrator rights.
3. Open the file located at `[app-path]/providers/print/win/print-provider.conf`.
4. Locate the line:

   `ArchiveDir=`

   and change the value to point to the UNC share name set up in Phase 2.For example:

   `ArchiveDir=\\my-primary-server\print-archive`

   > **Note:**
   > If you have upgraded from a previous version, add the `ArchiveDir=`option to the`print-provider.conf`.

5. Save the file.

Phase 4: Assigning rights to the service account

The `PaperCut Print Provider` service (service responsible for monitoring the print queues and transferring print job spool files to the central archive) needs to be able to access the directory shared in Phase 3. Assign the service account set up in Phase 1 to the `PaperCut Print Provider` service as follows:

1. Open **Control Panel > Administrative Tools > Services**
2. Double-click the `PaperCut Print Provider` service.
3. Select the **Log On** tab.
4. Click **This account**.
5. Enter the username and password for the service account set up in Phase 1.
6. Click **OK**.
7. Restart the service and manually check the file `[app-path]/providers/print/print-provider.log` for any error messages at end.

Phase 5: Test

Take some time now to perform some testing and ensure any jobs printed on a print queue on this secondary server are correctly archived.

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Important:
Archived files are partitioned based on the date and time of the print job. In order for the print archives to be displayed in a consistent manner it is important that all secondary print servers and Site Servers share a common time synchronization. An inconsistent time between servers of more than one hour can cause an error.

Troubleshooting secondary server setup

Here is a list of common issues leading to problems with Print Archiving and secondary server setups:

- Incorrect paths: It's important that all secondary servers are configured to point to the shared central archive directory. Double-check the value entered in `ArchiveDir`. See Phase 2: Changing Print Provider Configuration:.
- System Services can't access user mapped drives. On Windows it's important that you use a UNC path rather than a mapped drive letter.
- Ensure that all secondary servers have full write access to the central archive. Take time to double-check permissions.

4.15.3.4. Advanced configuration keys

The print archiving configuration keys are listed in the table below. To set the configuration keys:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.

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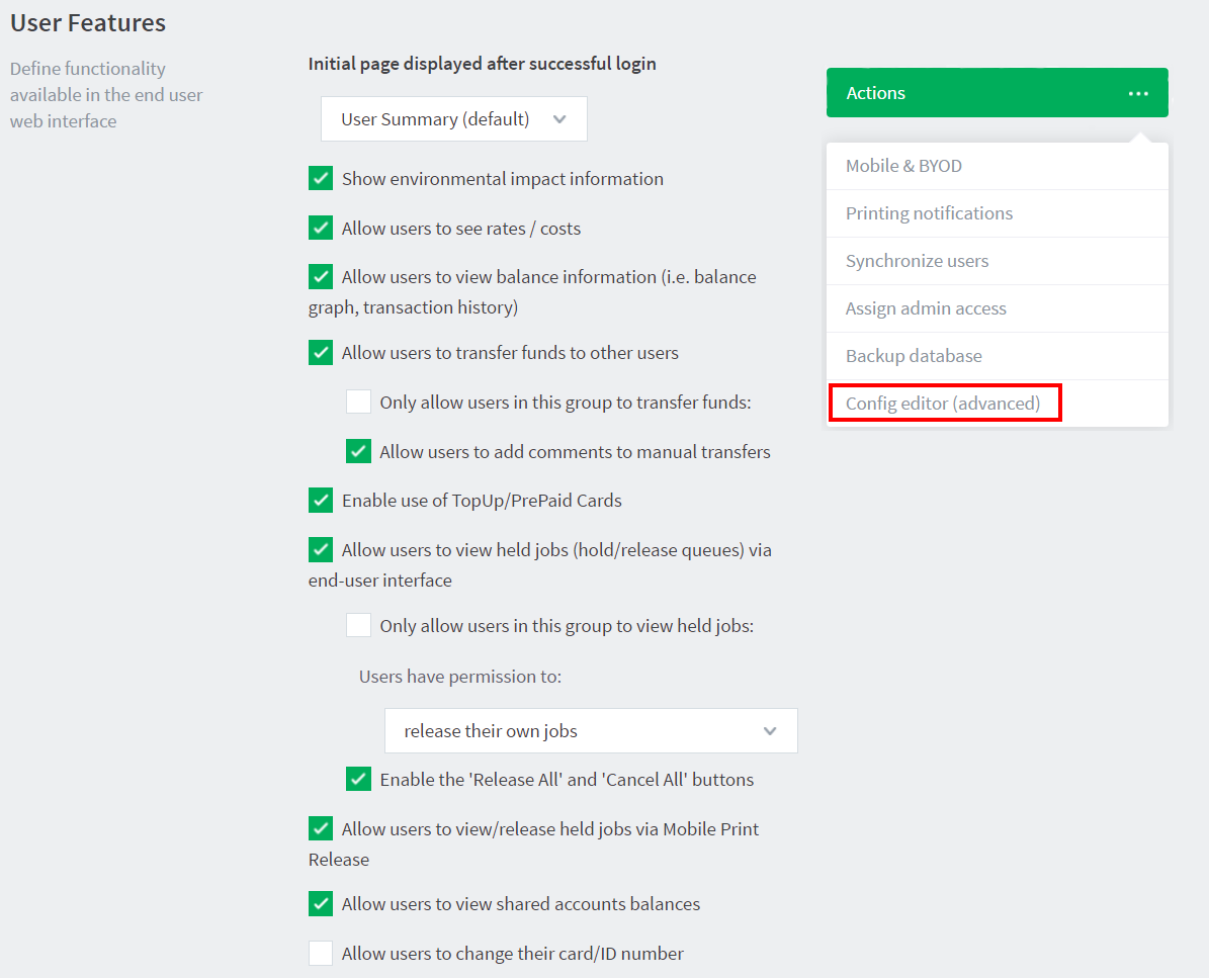

The **Config Editor** page is displayed.

Table 79: Print Archiving Advanced Config Keys

Key	Description
`archiving.images.creator.non-interactive.max-concurrent`	This value determines the maximum number of image creator processes used to process new print jobs in the background. The system can use this maximum number when it is under high load. The default value is `1`. Sites running on fast multiprocessor servers might choose to increase this number. As a guide, this value should not exceed the number of available processor cores. NOTE: The Application Server must be restarted after changing this setting.
`archiving.images.creator.interactive.max-`	This value determines the

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Key	Description
`concurrent`	maximum number of image creator processes that can be used to support interactive viewing of print jobs in the Admin web interface. The default value is `2`. Sites running on fast multiprocessor servers might increase this number. NOTE: The Application Server must be restarted after changing this setting.
`archiving.images.creator.pages-to-initially-image`	This value determines the number of pages that are imaged (pre-rendered) when a print job first arrives. Pre-generation of images speeds up viewing. The default value is `4`.
`archiving.images.viewer.max-pages`	The maximum pages into a document that can be explored.

4.15.3.5. Downloading PDL / spool files for reprinting

Along with image previews, Print Archiving stores a copy of the print job's PDL / spool file. This can be downloaded and reprinted later. Common reasons for reprinting a job include:

- To produce another hard copy of the print job (e.g. if the original was lost).
- To view, when image previews are not available (such as when the printer is using a proprietary / GDI print language).
- To help diagnose or reproduce printing problems.

To download a job's PDL / spool file:

1. Find the job of interest in the job log
2. Click the job's thumbnail to open the job viewer (full page view)
3. Click the download icon in the toolbar at the top left (see below)
4. Save the PDL file to your computer

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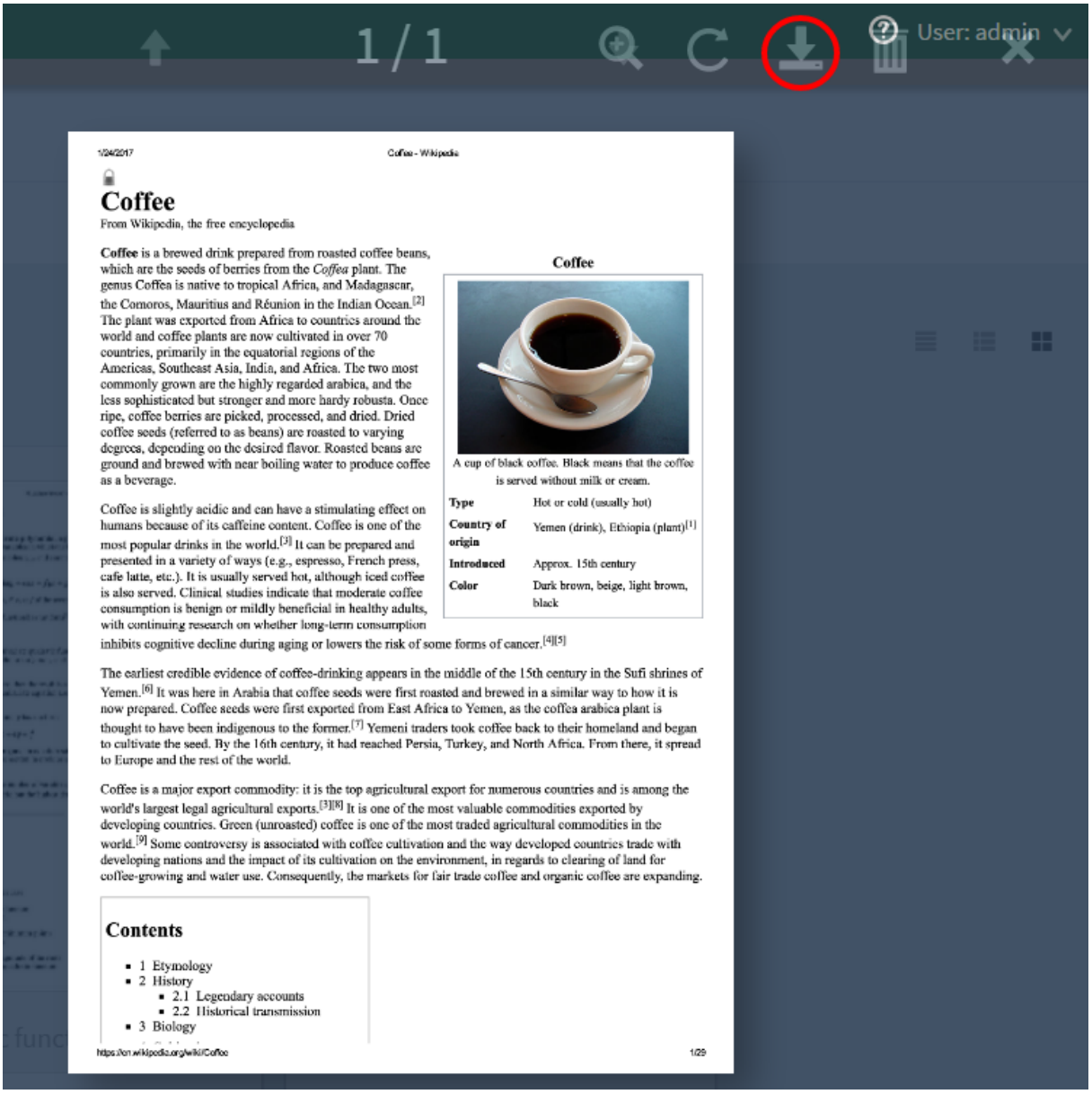

For information about how to print a PDL file once it is downloaded, see Troubleshooting and technical FAQs.

4.15.3.6. Remove archived data

You can permanently remove archived data by clicking the remove icon or pressing the **delete** key in the archive viewer.

Removal is available when the user has the administrator right "remove archived jobs" assigned.

To remove archived data:

1. Find the job of interest in the job log
2. Click the job's thumbnail to open the job viewer (full page view).
3. Click the delete icon in the toolbar at the top left (see below) or press the **delete** key.
4. Confirm deletion.

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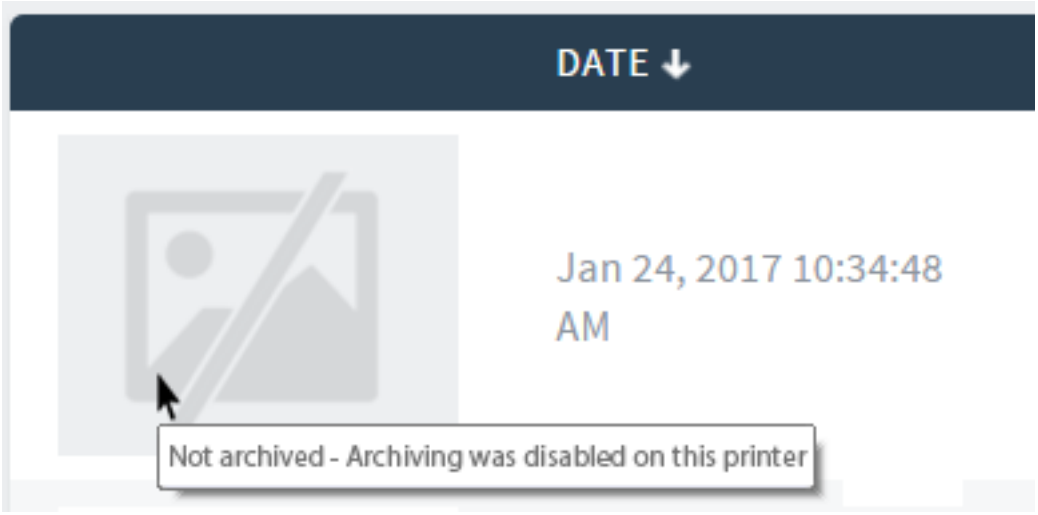
4.15.4. Troubleshooting and known limitations

4.15.4.1. No preview image available

In some cases print jobs do not have a preview image available. This can be for two possible reasons:

1. **Archiving was disabled**



   Disable/override archiving in the following ways:
   - Printer-level override (disable archiving for a printer)
   - User-level override (disable archiving for a user)
   - Print scripting (archiving disabled per-job from within a script)
2. **A preview could not be produced for the archived job**

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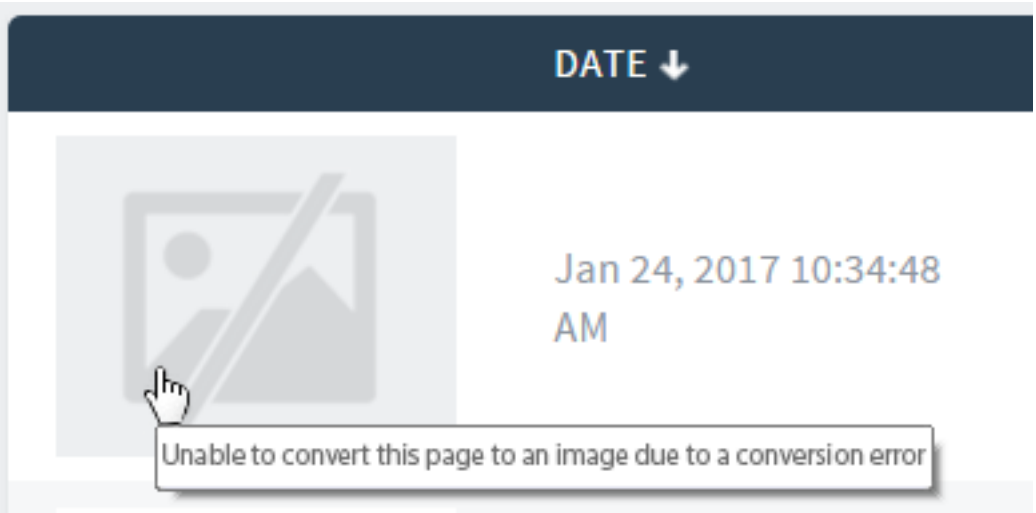

There are several reasons why image previews could not be produced:

- The print driver is using a proprietary or GDI / unsupported print language (see GDI Printers (GDI Print Description Language))
- The print driver might be using vendor-specific language extensions (see There can be issues viewing some print jobs).
- A component to convert the PDL / spool file into images is missing (see Step 1: Install print spool file viewer technology).
- The archived PDL / spool file is corrupt or partially copied.
- The conversion software (e.g. Ghostscript) does not produce a preview (e.g. for a complicated document).

In this case, the PDL / spool file for the job can still be downloaded for reprinting (see Downloading PDL / spool files for reprinting).

4.15.4.2. GDI printers (GDI print description language)

GDI printers produce spool files that are proprietary binary format files and currently there is no standard technology or tools to allow the visual display of printed content, however, you can reprint GDI print jobs by downloading the spool file (see Downloading PDL / spool files for reprinting). PaperCut Software hopes to approach printer vendors in the future to address this limitation.

4.15.4.3. There can be issues viewing some print jobs

Because of its flexibility some PostScript drivers can create spool files that cannot be rendered with the standard viewer. If you find a consistent issue with a particular printer, first see if there is an alternate driver format available (i.e.. another PDL language). If the issue persists after trying other drivers, please contact PaperCut support. We might be able to address the issue in a future release.

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4.15.4.4. Preview images can differ slightly from the printed document

Depending on the print driver used, certain attributes of preview images generated might differ slightly from those of the actual document (e.g. in some cases a color print-job can have a black-and-white preview image). This is also the case when using Using Print filters: conversions and restrictions.

4.15.4.5. No watermarking in preview images

Document watermarks applied by PaperCut's watermarking feature do not display in preview images.

4.15.4.6. Latest information

New printers and print drivers are being released every week. For the most up to date information as well as a detailed explanation of known issues, see this article in the PaperCut Software knowledge base: *Known Issues*

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5. Administration

This section provides information about the system administrative and management functionality in PaperCut NG/MF. This section assumes the reader has a technical background.

5.1. System management

This section discusses various options and features to assist the administrator manage and configure the application. PaperCut NG/MF is designed to work with minimal initial configuration and is self-maintaining once set up. This section outlines some of the options available to the administrator, including:

- Monitoring the system activity and status of devices and users.
- Configuring the synchronization of users and groups
- Managing backups
- Configuring user notifications
- Exporting/import the data
- Defining security options
- Disabling features in the user web interface
- Display options (like whether to display the currency sign).

5.1.1. The dashboard

The Dashboard tab is the first page displayed in the PaperCut NG/MF Admin web interface. It provides an overview of system activity from the past and in real-time for devices and users. It does this by using a collection of gadgets that are described below.

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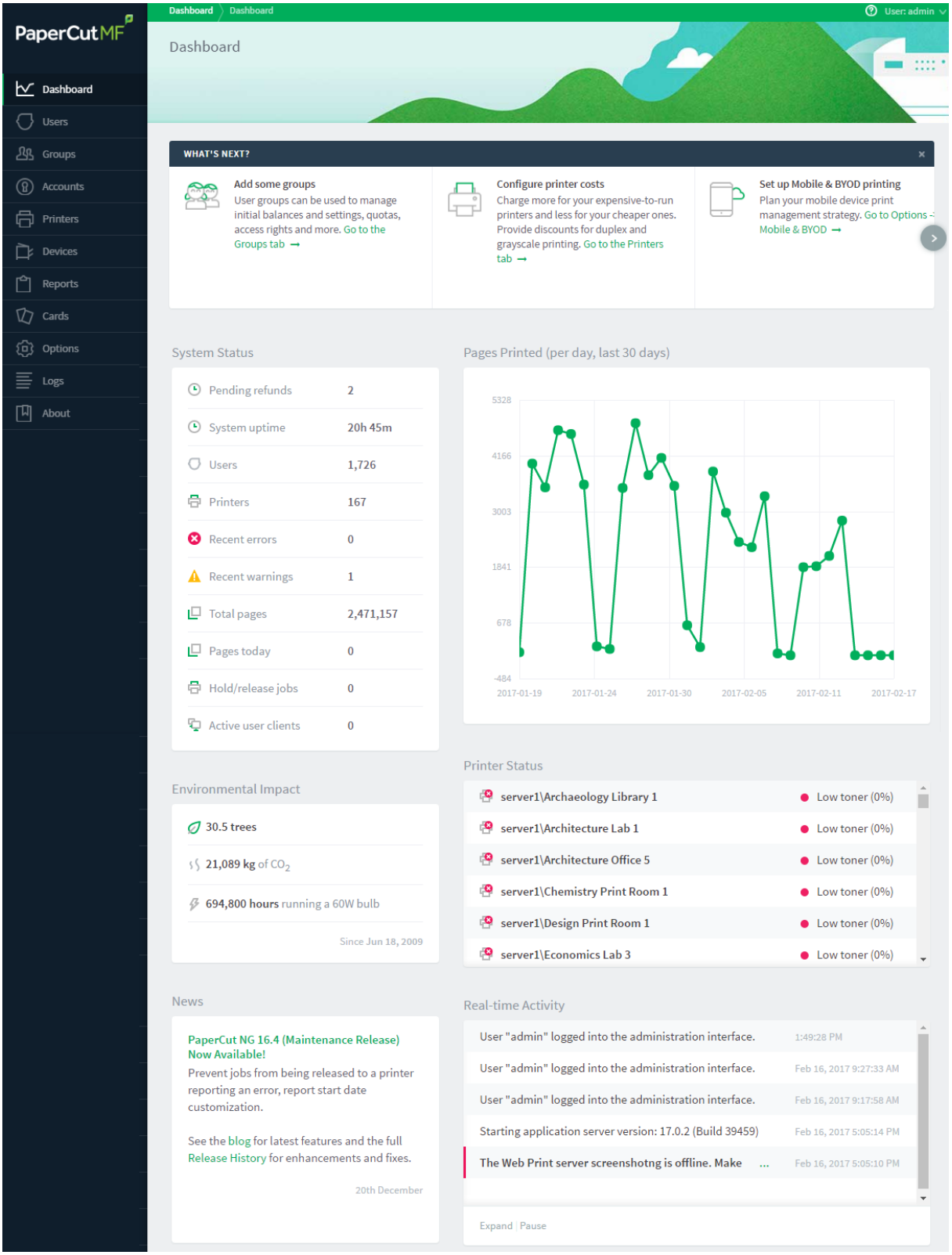

What's Next gadget

At the top of the page is the What's Next gadget. It gives a list of hints that are particularly useful for first-time administrators of PaperCut NG/MF. They give descriptions of useful tasks to do in PaperCut NG/MF with links to other Admin web interface or help pages. This gadget can be

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closed for more experienced administrators who no longer need it. You can permanently hide this gadget by clicking the close icon in the top right corner.

- **System Status gadget**

  The System Status gadget provides a list of system level statistics. They provide an overview of system information including any warnings or errors that need attention.

- **Pages Printed gadget**

  The Pages Printed gadget provides a graph showing the trends in printing volume over the last 30 days. The graph displays after three days of data has been accumulated. When upgrading from a version of PaperCut NG/MF prior to a version supporting the Dashboard feature, the data from the previous version is not displayed.

- *Environmental Impact gadget*

  The Environmental Impact gadget provides overall environmental impact statistics in terms of trees, carbon and energy. For more information on Environmental Impact, see Change the environmental impact reference values.

- **Printer Status gadget**

  The Printer Status gadget provides a status overview of the printers managed by PaperCut NG/MF. The information displayed includes the daily number of pages printed and device alerts such as low toner levels or printer jams. Alerts for printer errors and low toner levels are also available via System Notifications. Refer to Set up system notifications and emails for additional information.

  Important:
  This feature is available using SNMPv1/v2c only.

- **News gadget**

  The News gadget ensures you're kept up to date with relevant release and development activity regarding PaperCut NG/MF.

- **Real-time Activity gadget**

  The Real-time Activity gadget shows a list of current events in real-time. It shows activities such as print jobs arriving, users logging in, exceeding print quotas, print job status, a variety of errors and much more. This tool is designed to help administrators monitor activity and diagnose problems. The events are updated as the occur and errors are highlighted in red. The events are described in a one line summary, but can be expanded by clicking the link to the right of the message. Expand the gadget by clicking the **Expand** item at the bottom of the gadget to display more events. Refreshing the browser page reverses the expansion. Use the Pause item at the bottom of the gadget if the number of events being reported makes viewing difficult.

  Tip:
  You can configure PaperCut NG/MF to display an alert log in the Dashboard's **Real-**

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time Activity gadget, when the User Client is detected as being unavailable (either because users are not running it or it has not been deployed and installed). This is useful in environments where users are configured with Account Selection options that require user interaction that can ONLY be done via the User Client and not at the printing device (the ability to assign accounts at the printing device is available). For more information see User Client

5.1.2. Synchronize user and group details

One of the most important tasks when managing PaperCut NG/MF is to configure the User and Group synchronization options. PaperCut NG/MF synchronizes user and group information from a source such as Windows Active Directory (Windows domains) and Google Cloud Directory. This simplifies the administration of the system because you don't need to manage a separate database of users and groups. If a user is added to the domain or is removed from a group, then PaperCut NG/MF automatically synchronizes this information without any intervention from the administrator. For example:

- Jason configures PaperCut NG/MF to assign an initial credit of $10 to users who are members of the "Students" windows security group.
- At the start of the new school year Jason has just added 100 new students to the Windows Active Directory.
- Jason also adds all the users to the "Students" Windows security group.
- When PaperCut NG/MF next synchronizes with Active Directory, the 100 new users are added to PaperCut NG/MF and automatically assigned the $10 initial credit. This is done automatically without any additional work by Jason.

Important:
Usernames are stored in PaperCut NG/MF as all lower case, regardless of the capitalization of the username in the source directory. Entry of a username by an end user, however, is not case sensitive as it is converted to lowercase before the account is validated.

You can synchronize with the following user directories:

- **Windows Active Directory**
- **Windows Standard** (local users and groups for workgroup environments)
- **Google Cloud Directory** (for organizations that use G Suite Education, G Suite Enterprise for Education, G Suite Enterprise, or Cloud Identify Premium)
- **Azure AD Secure LDAP**
- **LDAP** (Apple OpenDirectory, Novell eDirectory, OpenLDAP, etc.)
- **Samba**
- **Unix Standard** (local users and groups / NIS / POSIX)

For more information, see:

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- Synchronize user and group details with Active Directory
- Synchronize user and group details with LDAP
- Synchronize user and group details with Google Cloud Directory
- Manually synchronize with a user directory
- On demand user creation

Tip:
By default, PaperCut NG/MF automatically syncs user and group information with your directory each night. However, you can perform additional full user/group syncs by scheduling a script to run the appropriate `server-command` command. For more information on using the `server-command`, see Tools - database, server-command scripting, and APIs (Advanced).

5.1.2.1. Synchronize user and group details with Active Directory

If the PaperCut server is a member of an Active Directory domain, you should use the **Windows Active Directory** option. The advantages over the **Windows Standard** option include:

- Allows use of Active Directory organizational units.
- Supports nested groups for simplified user management.
- Allows importing users from other trusted Active Directory domains.

PaperCut NG/MF's Active Directory integration is performed at a native level and supports advanced features, such as nested groups and OU's.

To synchronize your user data with Active Directory:

- Set the primary sync source
- Add card/identity numbers
- Set the secondary sync source (optional)
- Set the sync options

Set the primary sync source

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.

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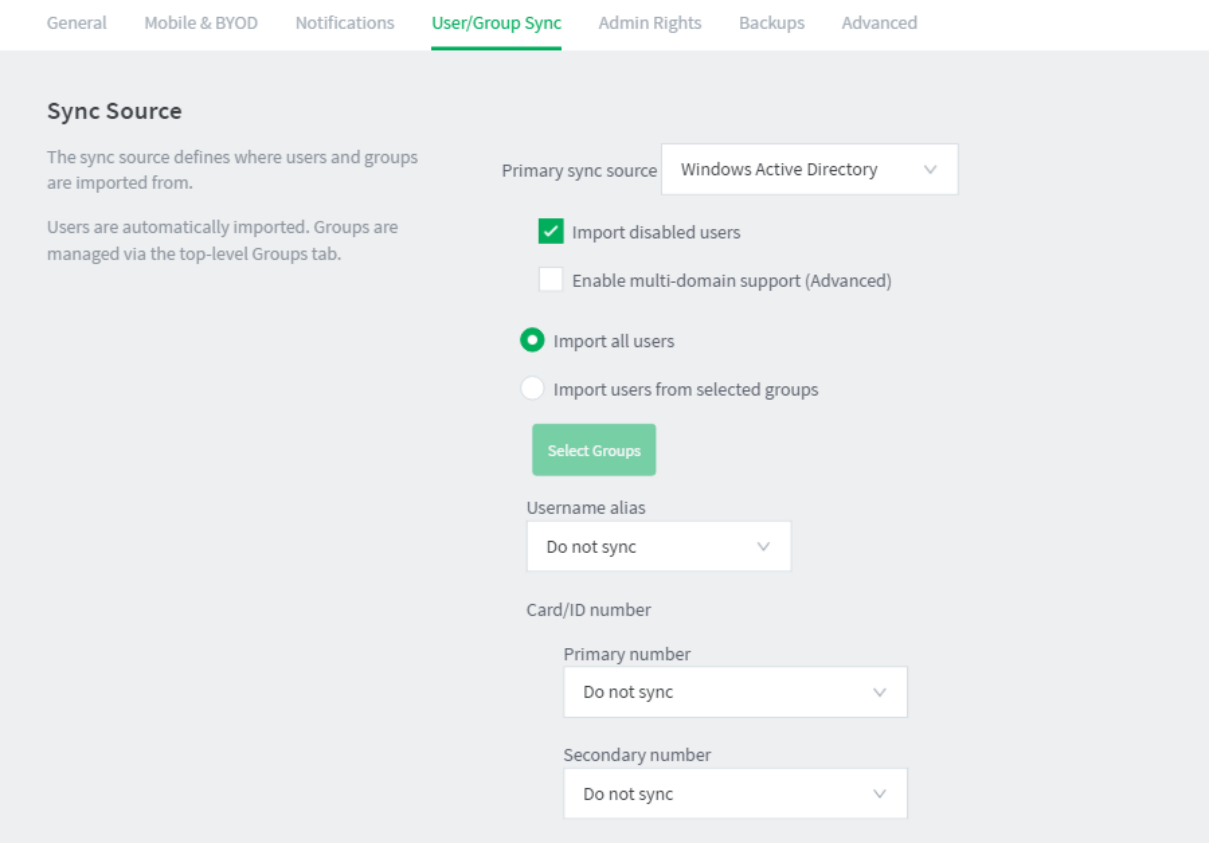

2. In the **Sync Source** area, in **Primary sync source**, select **Windows Active Directory**.
3. Complete the following fields as required:
   - **Import disabled users**—If set, all users, including disabled accounts are imported from the domain. In an education environment, select this option as student accounts are sometimes disabled for disciplinary actions, so removing the account from PaperCut NG/MF is not appropriate.
   - **Enable multi-domain support**—Select this option for larger sites running multiple trusted domains. For example, in an education environment it is common to have separate domains for students and staff/teachers with a one-way trust relationship. This option can bring in groups, OU's, and users from both domains.

     The list of domains is semicolon separated (`;`). This list should contain the name of the domains in DNS dot notation, and should include the name of the current domain if you want to import from this domain.

     Trust domain relationships are a complex area. Click **Test** to verify that the settings result in the desired behavior. The total number of user accounts is a good measure.
4. Select the users to import:
   - **Import all users**
   - **Import users from selected groups**—If you select the option, click **Select Groups**; then select the groups/OUs you want to import. This option is useful if the domain contains old users or users who do not print.

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Note:

The following Config keys are available for Active Directory synchronization:

- `user-source.ad.user-pin-field`—import a user's PIN from a custom field. This must be only digits.
- `user-source.ad.other-emails-field`—import a user's other (secondary) email addresses from a custom field.
- `user-source.ad.email-address-field`—use a custom attribute for the primary email address instead of the `mail` attribute.
- `user-source.ad.group-ou-filter`—if you have a long list of groups, use this config key to display groups only under a certain organizational unit. For example, if you set it to "myorganization.local/Import OU/Sub Import OU" then it displays only groups under "Sub Import OU".

Card/identity numbers sync

Card and ID numbers are used as an alternative to usernames/passwords for authentication at software Release Stations, or at hardware terminals attached to photocopiers. The card/ID number can also be searched in the user quick-find in the **User List** page. See User card and ID numbers for more information.

In PaperCut NG/MF, you can associate one or two unique card/ID numbers with each user. These are known as the primary and secondary card/ID number. You can automatically import or generate these card/ID numbers for each user.

Often card/ID numbers are already assigned by other systems, in which case you must import these numbers into PaperCut NG/MF from Active Directory or LDAP. Unlike other fields, such as full-name and email address, there is no standard field used exclusively for card numbers. For this reason PaperCut NG/MF allows specifying the field from which to import the card/ID number.

You can either:

- Generate random card/ID numbers
- Import card/identitiy numbers from Active Directory
- Extract the card/id number from an LDAP/AD field using a regular expression

Generate random card/ID numbers

PaperCut also allows you to generate a random card/ID number for either the primary or secondary card/ID number. To auto-generate card numbers:

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1. In the **Sync Source** area, complete the following fields:
   - **Primary number**—select **Auto-generate random ID (if blank)**.
   - **Length**—enter the number of digits.

     Short numbers are easier to remember and faster to key in, but it is also easier to guess someone else's number. If your number is too short, PaperCut cannot generate sufficient numbers to cover all your users.
2. Click **Apply**.

Important:
The card/ID number must uniquely identify a user, so you should ensure that no two users have the same card/ID number. Make sure the card/ID numbers you have defined in your user source are unique. If PaperCut NG/MF finds a non-unique card/ID number it does not update the user's details, and displays a warning in the synchronization results. When generating card/ID numbers, you are asked to specify the length or number of digits you require in the generated numbers.

Import the card/identity number from Active Directory

Active Directory has a number of user fields that can store the user's card/ID number. Some of these fields are editable in the user's properties in the **Active Directory Users and Computer** tool, but others can be updated only with other tools.

Note:
In the **Sync Options** area, ensure the **Update users' full-name, email, home directory, department and office when synchronizing** check box is selected to import card/Id numbers.

1. In **Primary number**, select **Sync from AD/LDAP field**.
2. In **AD/LDAP field name**, enter the name of the field containing the card/ID numbers. By default, PaperCut NG/MF imports the primary card/ID number from the user's pager number field (i.e. the `pager` field). This field was chosen because it is rarely used and is also editable in the Windows user interface. If this field is not suitable, you can choose any valid Active Directory user field.

   Tip:
   The list of standard Active Directory user fields is on the Microsoft web site here: http://msdn2.microsoft.com/en-us/library/ms683980.aspx. The field name entered in PaperCut NG/MF must be in the LDAP display name format. For example, if you want to use the `Employee-Number` field, then the field name entered into PaperCut NG/MF should be `employeeNumber` as shown on the `Employee-Number` attribute page here: http://msdn2.microsoft.com/en-

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us/library/ms675662.aspx

3. If required, import the secondary Card/ID numbers.
    a. In **Secondary number**, select **Sync from AD/LDAP field**.
    b. In **AD/LDAP field name**, enter the name of the field containing the card/ID numbers.

Important:
If you enter the field name incorrectly, the synchronization will fail. It is therefore important to test your configuration changes. To test the changes, click **Test Settings**. If the card number is retrieved correctly, then it is the 4th user field in the test output.

Extract the card/id number from an LDAP/AD field using a regular expression

The vast majority of sites store the full card number in a single field in AD/LDAP. In this situation, you do not need to use a regular expression (regex) to extract the card number. A regular expression is required only under some specific circumstances, including:

- The field contains more then just the card number. For example, if the field contained a card number and student number separated by a comma (e.g. 12345678,0003456).
- The multi-valued LDAP/AD field contains multiple values and only one representing the card number. e.g. Some third party authentication management systems store external IDs (like card numbers) in a single multi-valued LDAP field.

Note:
For multi-value fields, PaperCut imports all the field values separated by TABs. Use the regex to extract the required portion of the field.

To use a regular expression to extract the card/id number:

1. In the **Sync Source** area, select the **Apply regular expression to extract primary/secondary card number from AD/LDAP** check box .
2. Enter the regular expression used to extract the card number. The regular expression must contain a capture group (represented by parentheses), that represents the part of the field that the card number is extracted from.

The simplest way to create a regular expression is to start with one of the following examples.

Table 80: Example regular expressions to extract card numbers

Regular Expression	Description
`([\d]+)`	Extracts the first sequence of digits. e.g. if the field contains `12345678,005678` then `12345678` is extracted.
`([\d]{5})`	Extracts the first sequence of 5 digits. e.g. if the field contains `12345678` then

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Regular Expression	Description
	`12345` is extracted.
`=([\d]+)`	Extracts the sequence of digits after the = character. e.g. if the field contains `12345678=56789"` then `56789` is extracted.
`([\d]+)::abc`	Extracts the sequence of digits preceding the text `::abc`. This is a common notation when storing identities in a multi-valued field in LDAP. The `::abc` notation is used to indicate the different identity types. In this example, if the field contains `1234::xyz 5678:qrs 9876::abc` then `9876` is extracted.

For more information on regular expressions and a test tool, see http://www.fileformat.info/tool/regex.htm. If you need assistance, please contact support.

Set the secondary sync source (optional)

Enabling a secondary sync source allows PaperCut to merge the results from two independent sources. Examples of where this is useful include:

- A school with an Active Directory domain for the majority of users and a separate LDAP server that is used and managed by one department.
- An organization with a new LDAP server and an old legacy LDAP server with separate but unique users who have not been migrated to the new server.
- A university with an Active Directory for the Windows student workstations and an Open Directory for the staff Mac workstations.

When enabled, PaperCut queries both sources to find users and groups. Usernames are treated as globally unique, so the same username existing in both sources is treated as the same user (in this case, the details for the user are merged, with the primary sync source taking priority). If there is an error connecting to or synchronizing against either source then no actions takes place.

To set a secondary sync source:

1. In the **Secondary Sync Source (Advanced)** area, select the **Enable secondary sync source** check box.
2. Complete the secondary sync source details as described above. These fields are the same as those for the primary sync source.

Set the sync options

The options listed in the **Sync Options** area control how the synchronization will take place.

1. In the **Sync Options** area, select any of the following options as appropriate:
   - **Update users' full-name, email, department and office when synchronizing**—if a user's details in PaperCut do not match those in the synchronization source, update the

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details in PaperCut NG/MF.

- **Import new users and update details overnight**—synchronization automatically occurs each night at approximately 12:55am. This option never deletes users from PaperCut.
- **Delete users that do not exist in the selected source**—deletes users from PaperCut if they no longer exist in the selected synchronization source.

  This option affects only users added via the synchronization source (e.g. the domain) and does *not* delete Guest and anonymous user management. Users that do not exist in the Sync source are deleted only when you manually synchronize (click **Synchronize Now**).

  This option does not delete users when automatically synchronizing overnight.

2. To test the operation, click **Test Settings**.

   A **Testing sync settings** popup dialog box displays the details of users and user groups that will be modified (updated, added or deleted) when the actual sync operation is run.

   > **Tip:** You can configure the maximum number of deletion candidates that are displayed in the **Testing sync settings** popup dialog box, via the config key `user-source.test-sync.max-pending-deletion-entries-displayed`.
   >
   > By default a maximum of 100 deletion candidates are displayed.
   >
   > For information about setting config keys, see Using the Advanced Config Editor.

3. Click **Apply**.

5.1.2.2. Synchronize user and group details with LDAP

LDAP (Lightweight Directory Access Protocol) directories usually store information about user and groups in an organization. One of the most common uses of LDAP is to provide single sign-on on a network that comprises multiple platforms and applications. When a network consists of only Windows computers, then you can use an Active Directory domain. But when there is a mix of Windows, Apple and Linux machines then LDAP can provided the single source of user, group and authentication information. (It is worth noting that both Active Directory and Novell eDirectory implement the LDAP protocol).

PaperCut NG/MF can use an LDAP directory for user authentication and as a source of user and group information. LDAP can either be enabled at installation time, or by changing the user source option after installation. When enabling LDAP, a number of configuration settings must be specified to allow the application to connect to the LDAP server.

To synchronize your user data with LDAP:

- Set the primary sync source
- Add card/identity numbers
- Set the secondary sync source (optional)
- Set the sync options

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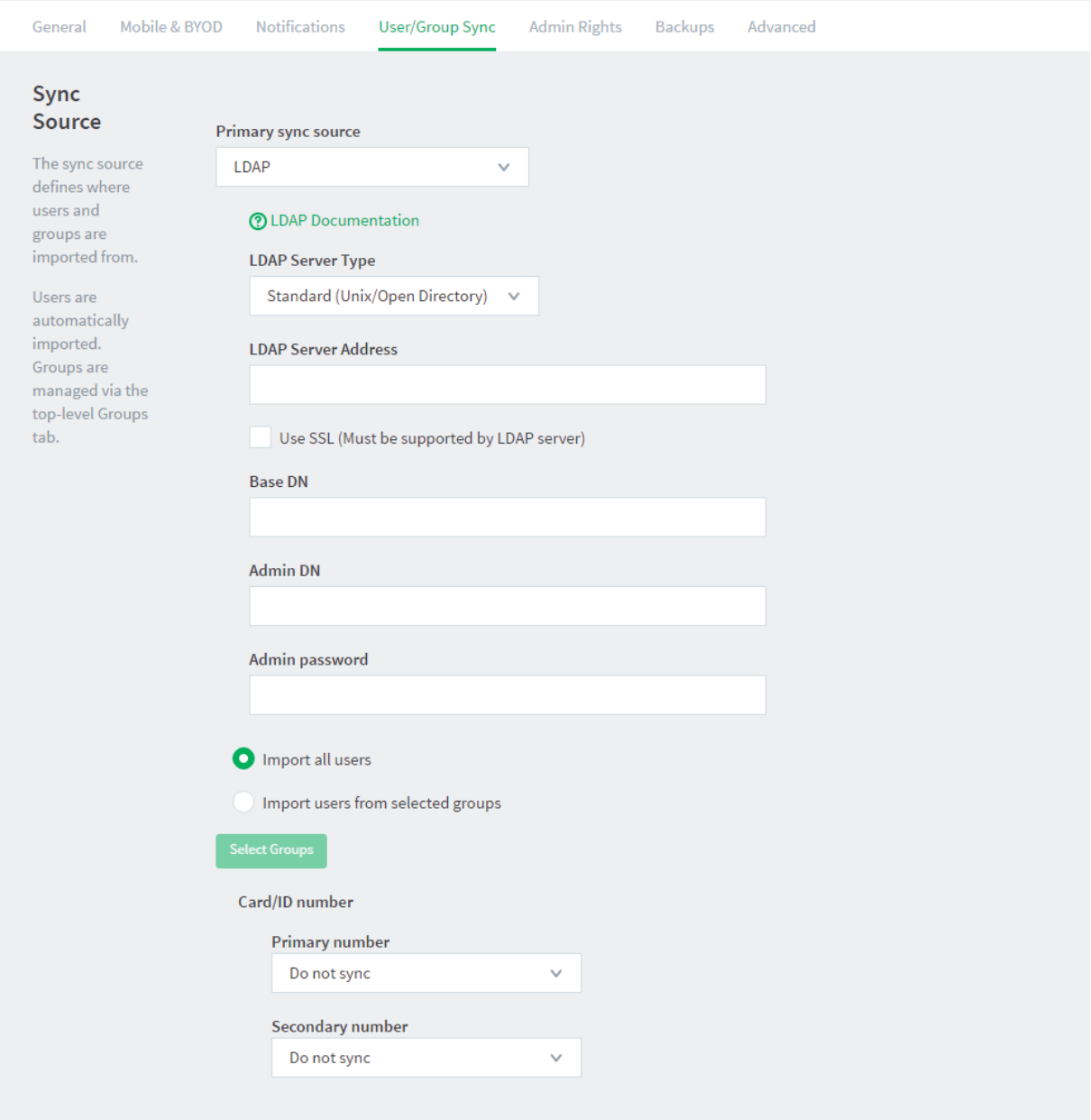
Set the primary sync source

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.



2. In the **Sync Source** area, in **Primary sync source**, select **LDAP**.
3. Complete the following fields as required:
   - **LDAP Server Type**—Determines which LDAP fields are used to get user and group information. PaperCut NG/MF supports the following server types:
     - Unix / Open Directory
     - Microsoft Active Directory
     - Novell eDirectory

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However, it is easy to support other server types by adjusting the LDAP fields PaperCut NG/MF searches. For more information, see Advanced LDAP configuration.

- **LDAP Server Address**—The hostname or IP address of the LDAP server.
- **Use SSL**—Indicates if an encrypted SSL connection is used to connect to the LDAP server. The LDAP server requires SSL support to be enabled and should accept connections on the standard LDAPS port 636.
- **Base DN**—The Base DN of the LDAP server. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations require a blank Base DN to operate. Some examples:

  ```
  DC=myschool,DC=edu,DC=au DC=myorganization,DC=com
  OU=OrgUnit,DC=domain,DC=com DC=local
  ```

- **Admin DN**—The DN of the user who has permission to connect to and query the LDAP server. This is typically an administrative user, although it can be a user that only has read-only access to the LDAP server. An example of the DN of the Administrator user on a Windows AD domain "domain.com", would be `CN=Administrator,CN=Users,DC=domain,DC=com`. The exact format of the DN depends on the LDAP server. Some examples:
  - Windows Active Directory: `CN=Administrator,CN=Users,DC=domain,DC=com`
  - Windows Active Directory (in organizational unit): `CN=administrator,OU=OrgUnit,DC=domain,DC=com`
  - Mac Open Directory: `uid=diradmin,CN=users,DC=domain,DC=com`
  - Unix Open LDAP: `uid=root,DC=domain,DC=com`, or `uid=ldapadmin,DC=domain,DC=com`
  - Novell eDirectory: `CN=root,DC=domain,DC=com`, or `CN=ldapadmin,OU=users,DC=domain,DC=com`.

  The Admin DN and password is optional if your LDAP server allows anonymous binds for querying.
- **Admin password**—The password for the above user.

> **Tip:**
> Some LDAP servers are configured to allow 'anonymous' LDAP query access. In these situations, you can leave **Admin DN** and **Admin password** blank.

4. Select the users to import:

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- **Import all users**
- **Import users from selected groups**—If you select the option, click **Select Groups**; then select the groups/OUs you want to import. This option is useful if the domain contains old users or users who do not print.

Tip:
Advanced features, such as Nested Groups and OU are supported by the Windows Active Directory sync option. See Synchronize user and group details with Active Directory.

Add card/identity numbers

Card and ID numbers are used as an alternative to usernames/passwords for authentication at software Release Stations, or at hardware terminals attached to photocopiers. The card/ID number can also be searched in the user quick-find in the **User List** page. See User card and ID numbers for more information.

In PaperCut NG/MF, you can associate one or two unique card/ID numbers with each user. These are known as the primary and secondary card/ID number. You can automatically import or generate these card/ID numbers for each user.

Often card/ID numbers are already assigned by other systems, in which case you must import these numbers into PaperCut NG/MF from Active Directory or LDAP. Unlike other fields, such as full-name and email address, there is no standard field used exclusively for card numbers. For this reason PaperCut NG/MF allows specifying the field from which to import the card/ID number.

You can add card/identity numbers in the following ways:

- Import the card/identity numbers from LDAP
- Extract the card/id number from an LDAP/AD field using a regular expression

Generate random card/ID numbers

PaperCut also allows you to generate a random card/ID number for either the primary or secondary card/ID number. To auto-generate card numbers:

1. In the **Sync Source** area, complete the following fields:
   - **Primary number**—select **Auto-generate random ID (if blank)**.
   - **Length**—enter the number of digits.

     Short numbers are easier to remember and faster to key in, but it is also easier to guess someone else's number. If your number is too short, PaperCut cannot generate sufficient numbers to cover all your users.
2. Click **Apply**.

Important:
The card/ID number must uniquely identify a user, so you should ensure that no two users

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have the same card/ID number. Make sure the card/ID numbers you have defined in your user source are unique. If PaperCut NG/MF finds a non-unique card/ID number it does not update the user's details, and displays a warning in the synchronization results. When generating card/ID numbers, you are asked to specify the length or number of digits you require in the generated numbers.

Import the card/identity number from LDAP

LDAP provides a very flexible way to store user related information. The fields available depend on LDAP server being used and how that is configured. Many LDAP servers also allow administrators to create custom fields to store additional custom user information. You should consult your LDAP server's documentation or talk to your LDAP administrator to understand which LDAP field stores the user card/ID number.

Note:
In the **Sync Options** area, ensure the **Update users' full-name, email, home directory, department and office when synchronizing** check box is selected to import card/Id numbers.

1. In **Primary number**, select **Sync from AD/LDAP field**.
2. In **AD/LDAP field name**, enter the name of the field containing the card/ID numbers. By default, PaperCut NG/MF uses the `employeeNumber` field to retrieve the primary card number. This is a standard LDAP field, but if this is not suitable, you can choose any valid LDAP user field.
3. If required, import the secondary Card/ID numbers.
    a. In **Secondary number**, select **Sync from AD/LDAP field**.
    b. In **AD/LDAP field name**, enter the name of the field containing the card/ID numbers.

    Note:
    If defined, then the same regular expression that is applied to the first card number is applied to the second card as well.

Important:
It is important to test that the card numbers are being retrieved correctly. To test the changes, click **Test Settings**. If the card number is retrieved correctly, they are listed as the 4th user field in the test output.

Extract the card/id number from an LDAP/AD field using a regular expression

The vast majority of sites store the full card number in a single field in AD/LDAP. In this situation, you do not need to use a regular expression (regex) to extract the card number. A regular expression is required only under some specific circumstances, including:

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- The field contains more then just the card number. For example, if the field contained a card number and student number separated by a comma (e.g. 12345678,0003456).
- The multi-valued LDAP/AD field contains multiple values and only one representing the card number. e.g. Some third party authentication management systems store external IDs (like card numbers) in a single multi-valued LDAP field.

> **Note:**
> For multi-value fields, PaperCut imports all the field values separated by TABs. Use the regex to extract the required portion of the field.

To use a regular expression to extract the card/id number:

1. In the **Sync Source** area, select the **Apply regular expression to extract primary/secondary card number from AD/LDAP** check box .
2. Enter the regular expression used to extract the card number. The regular expression must contain a capture group (represented by parentheses), that represents the part of the field that the card number is extracted from.

The simplest way to create a regular expression is to start with one of the following examples.

Table 81: Example regular expressions to extract card numbers

Regular Expression	Description
`([\d]+)`	Extracts the first sequence of digits. e.g. if the field contains `12345678,005678` then `12345678` is extracted.
`([\d]{5})`	Extracts the first sequence of 5 digits. e.g. if the field contains `12345678` then `12345` is extracted.
`=([\d]+)`	Extracts the sequence of digits after the = character. e.g. if the field contains `12345678=56789"` then `56789` is extracted.
`([\d]+)::abc`	Extracts the sequence of digits preceding the text `::abc`. This is a common notation when storing identities in a multi-valued field in LDAP. The `::abc` notation is used to indicate the different identity types. In this example, if the field contains `1234::xyz 5678:qrs 9876::abc` then `9876` is extracted.

For more information on regular expressions and a test tool, see http://www.fileformat.info/tool/regex.htm. If you need assistance, please contact support.

Set the secondary sync source (optional)

Enabling a secondary sync source allows PaperCut to merge the results from two independent sources. Examples of where this is useful include:

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- A school with an Active Directory domain for the majority of users and a separate LDAP server that is used and managed by one department.
- An organization with a new LDAP server and an old legacy LDAP server with separate but unique users who have not been migrated to the new server.
- A university with an Active Directory for the Windows student workstations and an Open Directory for the staff Mac workstations.

When enabled, PaperCut queries both sources to find users and groups. Usernames are treated as globally unique, so the same username existing in both sources is treated as the same user (in this case, the details for the user are merged, with the primary sync source taking priority). If there is an error connecting to or synchronizing against either source then no actions takes place.

To set a secondary sync source:

1. In the **Secondary Sync Source (Advanced)** area, select the **Enable secondary sync source** check box.
2. Complete the secondary sync source details as described above. These fields are the same as those for the primary sync source.

Set the sync options

The options listed in the **Sync Options** area control how the synchronization will take place.

1. In the **Sync Options** area, select any of the following options as appropriate:
   - **Update users' full-name, email, department and office when synchronizing**—if a user's details in PaperCut do not match those in the synchronization source, update the details in PaperCut NG/MF.
   - **Import new users and update details overnight**—synchronization automatically occurs each night at approximately 12:55am. This option never deletes users from PaperCut.
   - **Delete users that do not exist in the selected source**—deletes users from PaperCut if they no longer exist in the selected synchronization source.

     This option affects only users added via the synchronization source (e.g. the domain) and does *not* delete Guest and anonymous user management. Users that do not exist in the Sync source are deleted only when you manually synchronize (click **Synchronize Now**).

     This option does not delete users when automatically synchronizing overnight.
2. To test the operation, click **Test Settings**.

   A **Testing sync settings** popup dialog box displays the details of users and user groups that will be modified (updated, added or deleted) when the actual sync operation is run.

   Tip: You can configure the maximum number of deletion candidates that are displayed in the **Testing sync settings** popup dialog box, via the config key `user-source.test-sync.max-`

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`pending-deletion-entries-displayed`.

By default a maximum of 100 deletion candidates are displayed.

For information about setting config keys, see Using the Advanced Config Editor.

3. Click **Apply**.

5.1.2.3. Synchronize user and group details with Azure AD Secure LDAP

PaperCut NG/MF can authenticate users against Azure AD using Secure LDAP. This means you do not need an on-site Active Directory server; you can use directory services hosted in the cloud. LDAP (Lightweight Directory Access Protocol) directories usually store information about user and groups in an organization. Microsoft's LDAP interface has been hardened to support authentication across less secured networks, such as the internet.

To synchronize your user data with Azure AD Secure LDAP:

- Before you begin
- Enable Secure LDAP
- Set the primary sync source
- Add card/identity numbers
- Set the secondary sync source (optional)
- Set the sync options

Before you begin

You will need:

- A current Azure AD subscription that has AD Domain Services enabled.
- A certificate to enable secure communication:
  - Use PKCS#12 (PFX in Microsoft terms). For more information on PKCS#12 certificates, see PKCS 12
  - 2048-bit is recommended
  - Password protected (i.e. includes the private key)
- Users and groups in Azure.
- AAD DC Administrator log in credentials for the domain to sync.

Enable Secure LDAP

1. Log in to Azure as an AAD DC Administrator.
2. In the Search bar, search for and select Azure AD Domain Services. The **Azure AD Domain Services** page is displayed listing your managed domain.
3. Select the service you want to synchronize.
4. In the navigation pane, under **Manage**, select **Secure LDAP**.

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5. In **Secure LDAP**, select **Enable**.
6. In **Allow Secure LDAP access over the internet**, select **Enable**.
7. Click the folder icon next to **.PFX file with secure LDAP certificate**. Specify the path to the PFX file with the certificate for secure LDAP access to the managed domain.
8. Enter the **Password to decrypt the .PFX file**. Provide the same password you used when exporting the certificate to the PFX file.
9. Click **Save**.

> **Note:**
> It takes about 10 to 15 minutes to enable secure LDAP for your managed domain. If the provided secure LDAP certificate does not match the required criteria, secure LDAP is not enabled for your directory and you see a failure. For example, the domain name is incorrect, the certificate has already expired or expires soon. In this case, retry with a valid certificate.

10. In the navigation pane, under **Manage**, select **Properties**.
11. Copy the **Secure LDAP external IP address**.

For more information, see Configure secure LDAP (LDAPS) for an Azure AD Domain Services managed domain.

5.1.2.4. Set the primary sync source

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.

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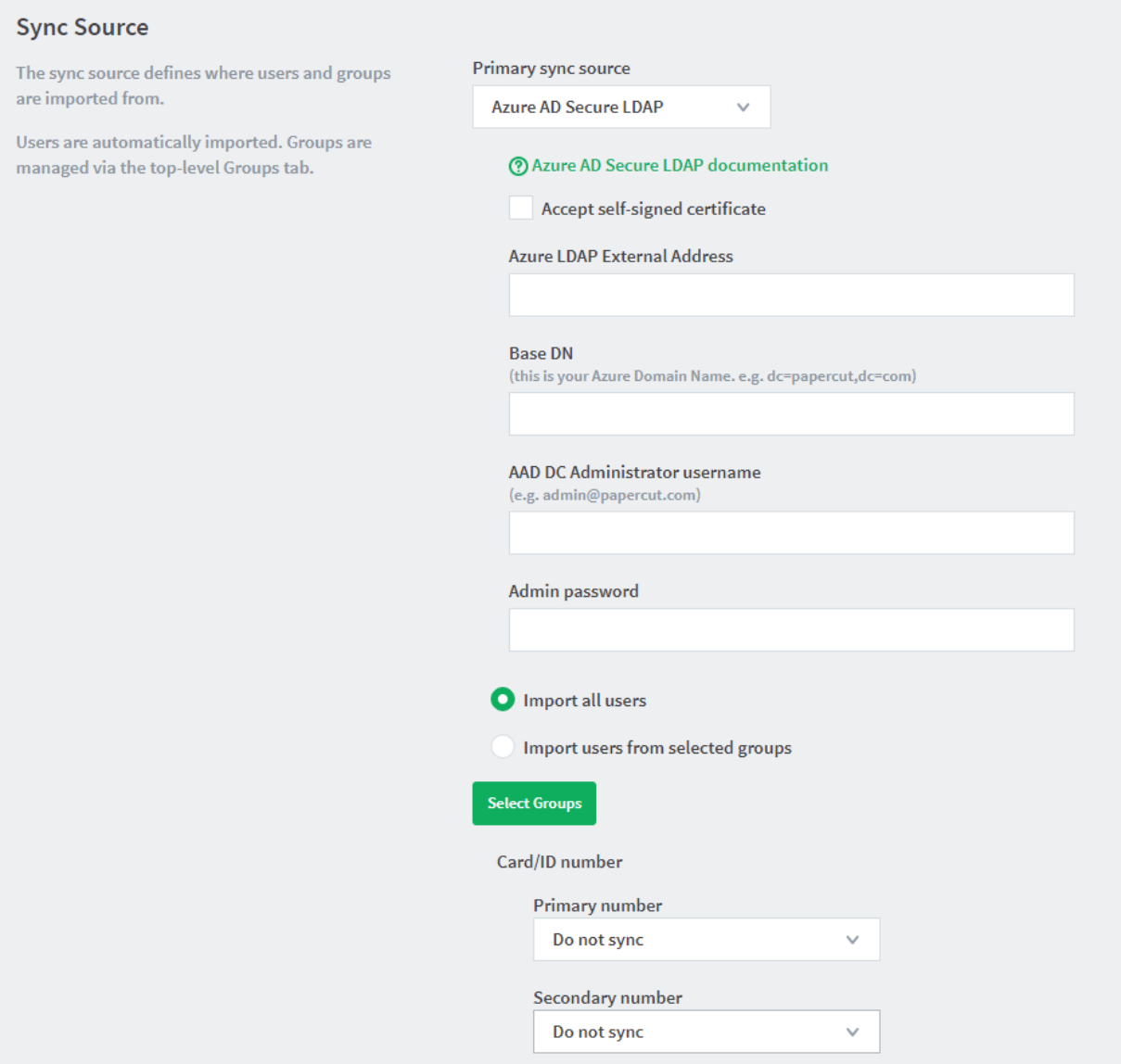

2. In the **Sync Source** area, in **Primary sync source**, select **Azure AD Secure LDAP**.
3. Complete the following fields as required:
   - **Accept self-signed certificate**—Select this check box if you are using a self-signed certificate that does not need to be validated. If you are using a certificate signed by a trusted authority, clear this checkbox.
   - **Azure LDAP External Address**—Your LDAP external address copied above from Azure AD Secure LDAP.
   - **Base DN**—Your Azure DNS Domain Name. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com", then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations require a blank Base DN to operate. Some examples:

     ```
     DC=myschool,DC=edu,DC=au DC=myorganization,DC=com
     OU=OrgUnit,DC=domain,DC=com DC=local
     ```

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- **AAD DC Administrator username**—The Azure Active Directory DC administrator username. For example, admin@papercut.com.

> **Note:**
> The Administrator username and password are optional if your LDAP server allows anonymous binds for querying.

- **Admin password**—The password for the above user.

> **Tip:**
> Some LDAP servers are configured to allow 'anonymous' LDAP query access. In these situations, you can leave **Admin DN** and **Admin password** blank.

4. Select the users to import:
   - **Import all users**
   - **Import users from selected groups**—If you select the option, click **Select Groups**; then select the groups/OUs you want to import. This option is useful if the domain contains old users or users who do not print.

Add card/identity numbers

Card and ID numbers are used as an alternative to usernames/passwords for authentication at software Release Stations, or at hardware terminals attached to photocopiers. The card/ID number can also be searched in the user quick-find in the **User List** page. See User card and ID numbers for more information.

In PaperCut NG/MF, you can associate one or two unique card/ID numbers with each user. These are known as the primary and secondary card/ID number. You can automatically import or generate these card/ID numbers for each user.

Often card/ID numbers are already assigned by other systems, in which case you must import these numbers into PaperCut NG/MF from Active Directory or LDAP. Unlike other fields, such as full-name and email address, there is no standard field used exclusively for card numbers. For this reason PaperCut NG/MF allows specifying the field from which to import the card/ID number.

You can add card/identity numbers in the following ways:

- Generate random card/ID numbers
- Import the card/identity numbers from LDAP
- Extract the card/id number from an LDAP/AD field using a regular expression

Generate random card/ID numbers

PaperCut also allows you to generate a random card/ID number for either the primary or secondary card/ID number. To auto-generate card numbers:

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1. In the **Sync Source** area, complete the following fields:
   - **Primary number**—select **Auto-generate random ID (if blank)**.
   - **Length**—enter the number of digits.

     Short numbers are easier to remember and faster to key in, but it is also easier to guess someone else's number. If your number is too short, PaperCut cannot generate sufficient numbers to cover all your users.
2. Click **Apply**.

Important:
The card/ID number must uniquely identify a user, so you should ensure that no two users have the same card/ID number. Make sure the card/ID numbers you have defined in your user source are unique. If PaperCut NG/MF finds a non-unique card/ID number it does not update the user's details, and displays a warning in the synchronization results. When generating card/ID numbers, you are asked to specify the length or number of digits you require in the generated numbers.

Import the card/identity number from LDAP

LDAP provides a very flexible way to store user related information. The fields available depend on LDAP server being used and how that is configured. Many LDAP servers also allow administrators to create custom fields to store additional custom user information. You should consult your LDAP server's documentation or talk to your LDAP administrator to understand which LDAP field stores the user card/ID number.

Note:
In the **Sync Options** area, ensure the **Update users' full-name, email, home directory, department and office when synchronizing** check box is selected to import card/Id numbers.

1. In **Primary number**, select **Sync from AD/LDAP field**.
2. In **AD/LDAP field name**, enter the name of the field containing the card/ID numbers. By default, PaperCut NG/MF uses the `employeeNumber` field to retrieve the primary card number. This is a standard LDAP field, but if this is not suitable, you can choose any valid LDAP user field.
3. If required, import the secondary Card/ID numbers.
   a. In **Secondary number**, select **Sync from AD/LDAP field**.
   b. In **AD/LDAP field name**, enter the name of the field containing the card/ID numbers.

   Note:
   If defined, then the same regular expression that is applied to the first card number is applied to the second card as well.

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Important:
It is important to test that the card numbers are being retrieved correctly. To test the changes, click **Test Settings**. If the card number is retrieved correctly, they are listed as the 4th user field in the test output.

Extract the card/id number from an LDAP/AD field using a regular expression

The vast majority of sites store the full card number in a single field in AD/LDAP. In this situation, you do not need to use a regular expression (regex) to extract the card number. A regular expression is required only under some specific circumstances, including:

- The field contains more then just the card number. For example, if the field contained a card number and student number separated by a comma (e.g. 12345678,0003456).
- The multi-valued LDAP/AD field contains multiple values and only one representing the card number. e.g. Some third party authentication management systems store external IDs (like card numbers) in a single multi-valued LDAP field.

Note:
For multi-value fields, PaperCut imports all the field values separated by TABs. Use the regex to extract the required portion of the field.

To use a regular expression to extract the card/id number:

1. In the **Sync Source** area, select the **Apply regular expression to extract primary/secondary card number from AD/LDAP** check box .
2. Enter the regular expression used to extract the card number. The regular expression must contain a capture group (represented by parentheses), that represents the part of the field that the card number is extracted from.

The simplest way to create a regular expression is to start with one of the following examples.

Table 82: Example regular expressions to extract card numbers

Regular Expression	Description
`([\d]+)`	Extracts the first sequence of digits. e.g. if the field contains `12345678,005678` then `12345678` is extracted.
`([\d]{5})`	Extracts the first sequence of 5 digits. e.g. if the field contains `12345678` then `12345` is extracted.
`=([\d]+)`	Extracts the sequence of digits after the = character. e.g. if the field contains `12345678=56789"` then `56789` is extracted.
`([\d]+)::abc`	Extracts the sequence of digits preceding the text `::abc`. This is a common notation when storing identities in a multi-valued field in LDAP. The `::abc` notation is

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Regular Expression	Description
	used to indicate the different identity types. In this example, if the field contains `1234::xyz 5678:qrs 9876::abc` then `9876` is extracted.

For more information on regular expressions and a test tool, see http://www.fileformat.info/tool/regex.htm. If you need assistance, please contact support.

Set the secondary sync source (optional)

Enabling a secondary sync source allows PaperCut to merge the results from two independent sources. Examples of where this is useful include:

- A school with an Active Directory domain for the majority of users and a separate LDAP server that is used and managed by one department.
- An organization with a new LDAP server and an old legacy LDAP server with separate but unique users who have not been migrated to the new server.
- A university with an Active Directory for the Windows student workstations and an Open Directory for the staff Mac workstations.

When enabled, PaperCut queries both sources to find users and groups. Usernames are treated as globally unique, so the same username existing in both sources is treated as the same user (in this case, the details for the user are merged, with the primary sync source taking priority). If there is an error connecting to or synchronizing against either source then no actions takes place.

To set a secondary sync source:

1. In the **Secondary Sync Source (Advanced)** area, select the **Enable secondary sync source** check box.
2. Complete the secondary sync source details as described above. These fields are the same as those for the primary sync source.

Set the sync options

The options listed in the **Sync Options** area control how the synchronization will take place.

1. In the **Sync Options** area, select any of the following options as appropriate:
   - **Update users' full-name, email, department and office when synchronizing**—if a user's details in PaperCut do not match those in the synchronization source, update the details in PaperCut NG/MF.
   - **Import new users and update details overnight**—synchronization automatically occurs each night at approximately 12:55am. This option never deletes users from PaperCut.
   - **Delete users that do not exist in the selected source**—deletes users from PaperCut if they no longer exist in the selected synchronization source.

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This option affects only users added via the synchronization source (e.g. the domain) and does *not* delete Guest and anonymous user management. Users that do not exist in the Sync source are deleted only when you manually synchronize (click **Synchronize Now**).

This option does not delete users when automatically synchronizing overnight.

2. To test the operation, click **Test Settings**.

   A **Testing sync settings** popup dialog box displays the details of users and user groups that will be modified (updated, added or deleted) when the actual sync operation is run.

   Tip: You can configure the maximum number of deletion candidates that are displayed in the **Testing sync settings** popup dialog box, via the config key `user-source.test-sync.max-pending-deletion-entries-displayed`.

   By default a maximum of 100 deletion candidates are displayed.

   For information about setting config keys, see Using the Advanced Config Editor.

3. Click **Apply**.

5.1.2.5. Synchronize user and group details with Google Cloud Directory

Note:
This functionality is available for organizations using:

- G Suite Education
- G Suite Enterprise for Education

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- G Suite Enterprise
- Cloud Identity Premium.

This topic describes how to:

- set up user/group synchronization and user authentication with Google Cloud Directory
- set up Google Single sign on for Chromebooks, Admin, and User web interfaces (optional).
- connect your PaperCut NG/MF Application Server to Google Cloud Directory.

Note:
Both G Suite and Google Cloud Identity use Google Cloud Directory to synchronize users and groups.

Environments with Google Cloud Directory as a user sync source are cost effective and quick to implement because they use Mobility Print and PaperCut NG/MF for end-to-end print requirements, including authentication, reporting, filters, and restrictions.

All you need to do is make sure users can access your WiFi. There's no need to set up or manage a domain (for example Active Directory) or deal with the complexities inherent in managing multiple printer drivers (OSs, multiple vendors, multiple models, etc.).

If you don't want users to access your network, Google Cloud Directory still works with Web print, Email to print and Google Cloud print.

Examples of Google Cloud Directory environments

A pure Google Cloud Directory environment

Install PaperCut NG/MF in a pure, G Suite-only environment.

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An existing directory is going to be replaced with G Suite

If your current environment uses an on-premises directory, for example Active Directory (AD), and you want to replace it completely with Google Cloud Directory, then you first need to migrate all users from your current directory into G Suite. If you prefer, you can do this in stages over a period of time and run a hybrid environment until the full migration is finished. Keep the original directory until you've completed and tested the entire new Google Cloud Directory setup.

An existing directory and new Google Cloud Directory are both going to be synced with PaperCut NG/MF

You can sync PaperCut NG/MF with two user directory sources, one being a traditional directory such as Active Directory and one being a new Google Cloud Directory. You can even sync directories from two Google Cloud Directories. You set up one directory as the primary sync source and one as the secondary sync source.

Important:
If the username for an internal user is the same as a Google Cloud Directory username (without the domain part), then PaperCut NG/MF will convert the existing internal user to a standard PaperCut NG/MF user and merge the data. If there are discrepancies in the data in the existing internal account and Google Cloud Directory, the Google Cloud Directory information will override the existing internal user information.

Set up at a glance

The high-level process to set up Google Cloud Directory authentication is as follows:

1. In Google, Set up your G Suite or Google Cloud Identity users.
2. If not already done, set up your printing solution.

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3. Set up LDAP access and permissions for G Suite or Google Cloud Identity.

> **Note:**
> Depending on the size of your organization, it can take up to 24 hours for Google Cloud Directory changes to apply.

4. Set up G Suite or Google Cloud Identity sync in PaperCut NG/MF:
    a. Set up the primary sync source.
    b. (Optional) Set up the secondary sync source
    c. Set up the Sync Options.
    d. Test your new print environment.
5. (Optional) Set up Google Single sign on
    - (Optional) Manage Google Single sign on for Chromebooks
    - (Optional) Set up Google Single sign on for Admin and User web interfaces.

Step 1: Set up your G Suite or Google Cloud Identity users

In Google, depending on your planned environment:

- add users into G Suite
- migrate users into G Suite
- create Cloud Identity user accounts.

Step 2: If not already done, set up your printing solution

If you haven't already set up a printing solution, select and set up the solution that best suits your environment:

- Mobility Print
- Google Cloud Print
- Native Print

Step 3: Set up LDAP access and permissions for G Suite or Google Cloud Identity

> **Note:**
> Remember, this functionality is available for organizations using G Suite Education, G Suite Enterprise for Education, G Suite Enterprise, and Cloud Identity Premium.

> **Important:**
> Before you start, make sure you can log in to Google as a Super Admin.

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1. Log in to admin.google.com using your Super Admin user login details. The **Google Admin console** is displayed.
2. Click the **Apps** tile. The **Apps** screen is displayed.
3. Click the **LDAP** tile. The LDAP screen is displayed.
4. Click **ADD CLIENT**.
5. Type a name for the LDAP client connection you'll be configuring to use for PaperCut NG/MF (for example, "PaperCut MF"), and optionally type a description; then click **CONTINUE**. The **Access permissions** screen is displayed.

   Note:
   This adds PaperCut NG/MF to the list of permitted LDAP clients. You can find more information about configuring access permissions from Google.

6. In the **Verify user credentials** section, select either:
   - **Entire domain <domain name>**
   - **Selected organizational units**; then click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
7. In the **Read user information** section, select either
   - **Entire domain <domain name>**
   - **Selected organizational units**; then either click **Copy from Verify user credentials** or click **Add** and select the units from the list. (Use this to limit syncing to users in a subset of groups.)
8. In the **Read group information** section, click the switch to set it to **On**; then click **ADD LDAP CLIENT**. Google displays a confirmation message and information about downloading the certificate.
9. On the same screen, click **Download certificate**; then save the downloaded certificate (which is a PDF file) in a secure location.
10. Click **CONTINUE TO CLIENT DETAILS**. The **Settings for <LDAP client name>** screen is displayed.

    Note:
    The service status, displayed at the top right of the screen, is initially set to **OFF**.

11. Click anywhere in the **Service Status** box. The **Service Status** screen is displayed.
12. Select **On for everyone**. The service status is updated for everyone.
13. Click **SAVE**.

    Note:
    Depending on the size of your organization, it can take up to 24 hours for Google

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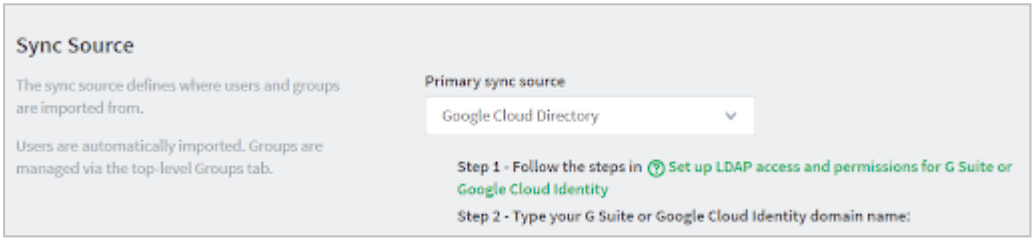
Cloud Directory changes to apply.

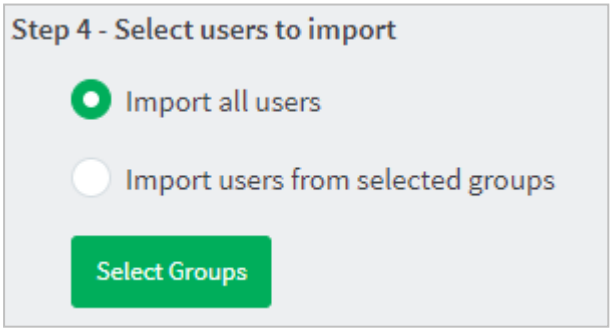
Step 4: Set up G Suite or Google Cloud Identity sync in PaperCut NG/MF

Set up the primary sync source

1. Log in to the PaperCut NG/MF Admin interface.
2. Select **Options > User/Group Sync**.
3. In the **Sync Source** area, in **Primary sync source**, select **Google Cloud Directory**.



4. If you haven't already downloaded your LDAP certificate, follow the steps in Set up LDAP access and permissions for G Suite or Google Cloud Identity.
5. Type your Google Cloud Directory Domain name, for example, **melbourneschoolzones.com**.
6. Click **Choose file** and select the Google-generated certificate zip file that you downloaded earlier; then click **Install Certificate**. If installation is successful, the message 'The certificate has been installed. It will expire on <day month year>.' is displayed.
7. Select which users to import.



   - **Import all users**.
   - **Import users from selected groups**. This option is useful if the domain contains groups of users, where certain groups contain the users who you want to allow to print:
     a. Click **Select Groups**.
     b. Select the groups you want to import. You can filter the list to find the groups you're after.

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Note:

- The groups' names are displayed.
- In Google Admin, the members of groups are listed in **Advanced Group Settings**. PaperCut NG/MF syncs users whose names are listed as a link. If a name is listed as an email address or is in any other format, it is not synced.

- Nested (sub) groups are not currently supported.

8. (Optional) Add card/ID numbers.

   Card and ID numbers are used as an alternative to usernames/passwords for authentication at software Release Stations, or at hardware terminals attached to photocopiers. The card/ID number can also be searched in the user quick-find in the User List page. For more information, see User card and ID numbers.

   In PaperCut NG/MF, you can associate one or two unique card/ID numbers with each user. These are known as the primary and secondary card/ID number. PaperCut NG/MF automatically generate these card/ID numbers for each user.

   Note:

   - Sys Admins can use the number to search for users on the User List page. For more information refer to User card and ID numbers.
   - Syncing a card ID from a specific Google Cloud Directory field is currently not supported. Please contact us so we can update you if this becomes available.

   To add card/ID numbers:

   a. In **Primary number**, select **Auto-generate random ID**. The **Length** field is displayed.

   b. Type the number of digits you want the card/ID number to be.

   Tip:

   - Short numbers are easy for users to remember and fast

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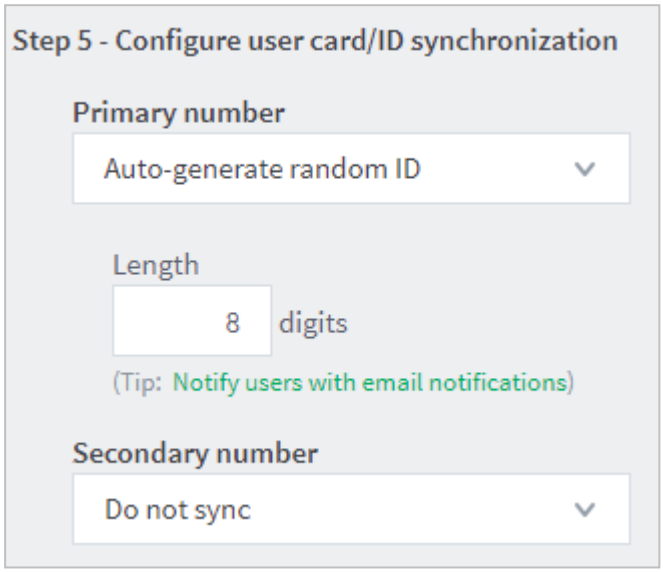
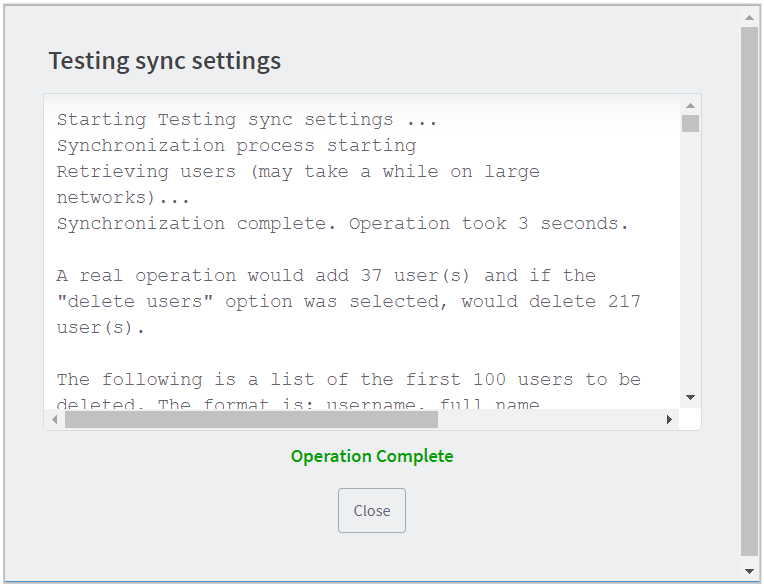
to key in, but are also easier for someone to guess.

- Make the **Length** long enough to generate numbers for all of your users.

c. If you require a secondary card/ID number for each user, repeat the above two steps for **Secondary number**.



9. Scroll down and click **Test Settings**.(It is gray but you can still click on it.) PaperCut NG/MF displays progress and the results in the **Testing sync settings** popup.



10. Review the results to make sure all the expected users are there, and then click **Close**.
11. Click **Apply**.
12. If you:

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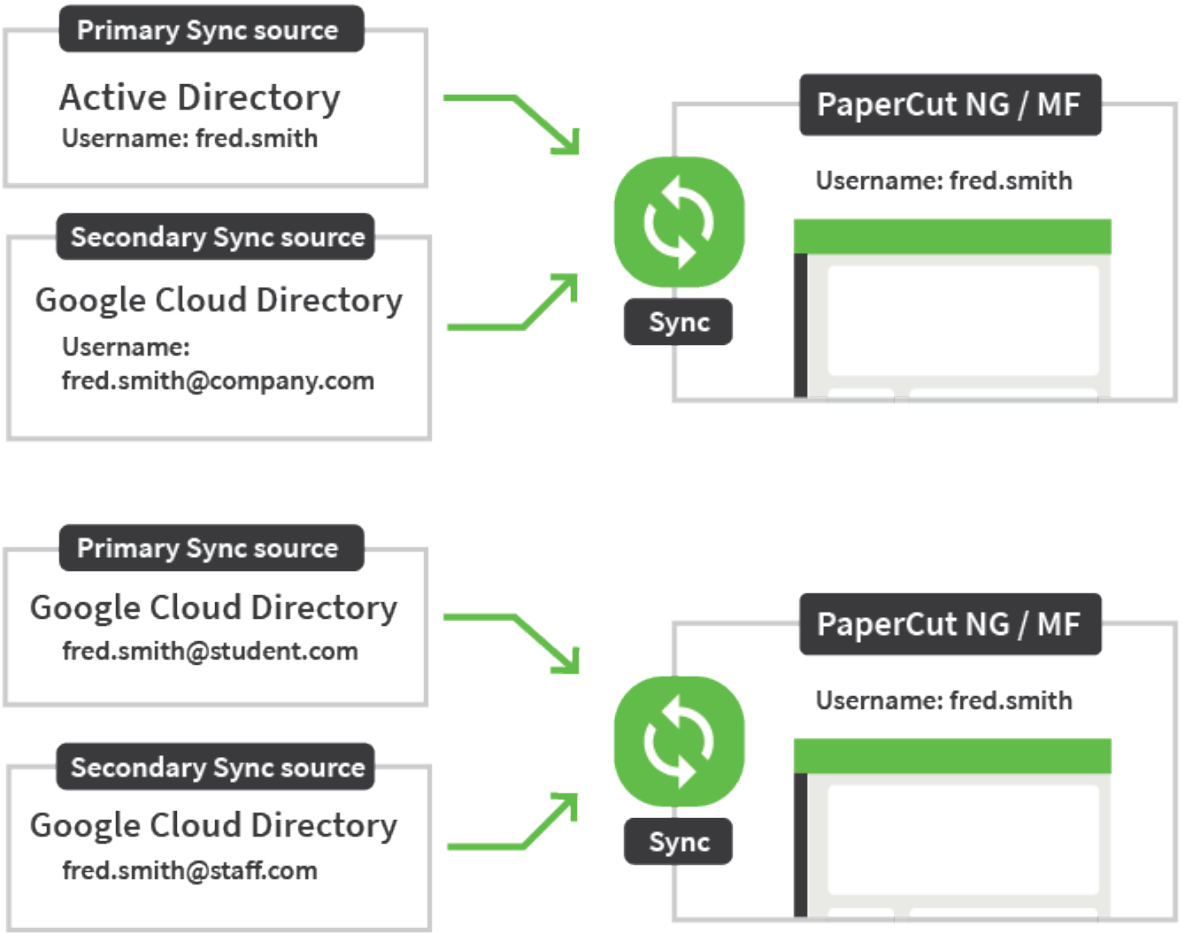
- have a secondary sync source you need to set up, continue below.
- do not have a secondary sync source, go to Set up the Sync Options.

(Optional) Set up the secondary sync source

How usernames are handled when syncing from two sources

A secondary sync source allows you to import users and groups from a second independent external directory source into PaperCut NG/MF.

PaperCut NG/MF treats Google Cloud Directory usernames as globally unique—if the same username exists in both the primary and secondary sync sources, it generates only a single user. When PaperCut NG/MF merges the user's details from both sync sources, it prioritizes the primary sync source details, and then adds any additional details that are in the secondary source.



The priority that PaperCut NG/MF enters details into the **Card/Identity Numbers** and **Other Details** fields for the Primary and Secondary fields is:

- **Priority 1**—The primary sync source details.
- **Priority 2**—The secondary sync source details.
- **Priority 3**—The PaperCut NG/MF existing details in the **Users > Other Details** section.

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When you sync, the source details always overwrite what's already inPaperCut NG/MF. PaperCut NG/MF will retain the details in the fields that are not changed in the sync source. If at a later time you stop using the primary or secondary sync source, or if a G Suite or Google Cloud Identity field becomes blank, PaperCut NG/MF will still retain the details in the fields.

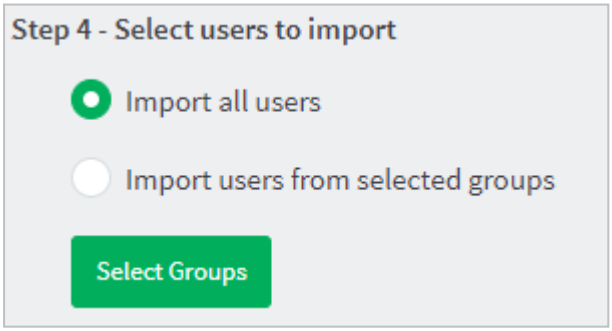
Set up the secondary sync source

1. Set up a second LDAP connection and generate a second certificate for the second sync source. Refer to Set up LDAP access and permissions for G Suite or Google Cloud Identity.
2. On the **User/Group Sync** page, in the **Secondary Sync Source (Advanced)** area, select the **Enable secondary sync source** check box.
3. If the secondary sync source is a second Google Cloud Directory, go to the next step to complete the secondary sync source details.

   For all other directory sources, refer to:

   - Synchronize user and group details with Active Directory
   - Synchronize user and group details with LDAP
   - Synchronize user and group details with Azure AD Secure LDAP
4. Type your G Suite or Google Cloud Identity Domain name, for example, **melbourneschoolzones.com**.
5. Click **Choose file** and select the LDAP certificate zip file that you downloaded earlier; then click **Install certificate**.

   If installation is successful, the message 'The certificate has been installed. It will expire on <day month year>.' is displayed.
6. Select which users to import.



   - **Import all users**.
   - **Import users from selected groups**. This option is useful if the domain contains groups of users, where certain groups contain the users who you want to allow to print:
     a. Click **Select Groups**.
     b. Select the groups you want to import. You can filter the list to find the groups you're after.

> **Note:**
> - The groups' names are displayed.

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- In Google Admin, the members of groups are listed in **Advanced Group Settings**. PaperCut NG/MF syncs users whose names are listed as a link. If a name is listed as an email address or is in any other format, it is not synced.

Name	Email address
trace.gleichner@schoolname.region.edu	trace.gleichner@schoolname.region.edu
Aaron Smith	aaron.smith@schoolname.region.edu

- Nested (sub) groups are not currently supported.

7. (Optional) Add card/ID numbers.

   Card and ID numbers are used as an alternative to usernames/passwords for authentication at software Release Stations, or at hardware terminals attached to photocopiers. The card/ID number can also be searched in the user quick-find in the User List page. See User card and ID numbers for more information.

   In PaperCut NG/MF, you can associate one or two unique card/ID numbers with each user. These are known as the primary and secondary card/ID number. You can automatically generate these card/ID numbers for each user.

   Note:
   Syncing a card ID from a Google Cloud Directory field is currently not supported. Please contact us so we can update you if this becomes available.

   To add card/ID numbers:

   a. In **Primary number**, select **Auto-generate random ID**. The **Length** field is displayed.
   b. Type the number of digits you want the card/ID number to be.

      Tip:
      - Short numbers are easy for users to remember and fast to key in, but are also easier for someone to guess.
      - Make the **Length** long enough to generate numbers for all of your users.

   c. If you require a secondary card/ID number for each user, repeat the previous two steps

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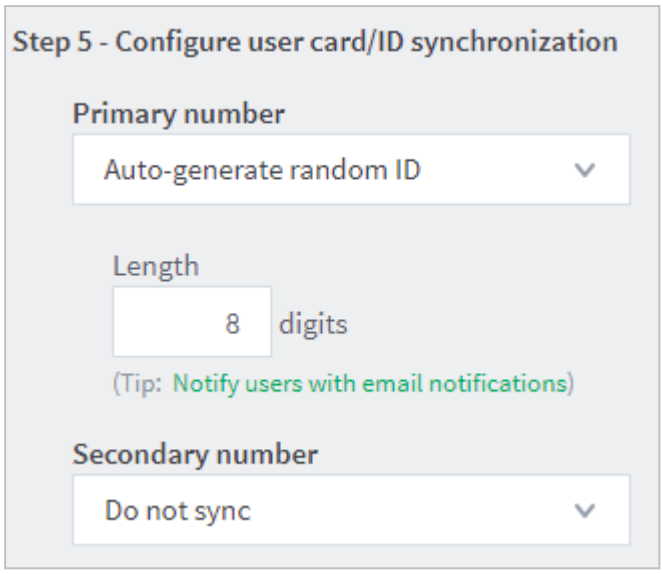
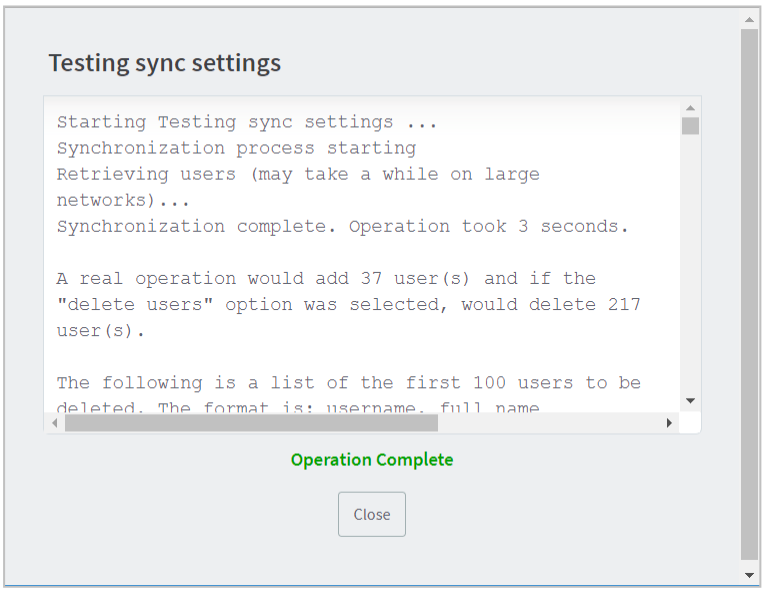
for **Secondary number.**



> **Note:**
> Sys Admins can use the number to search for users on the **User List** page. For more information refer to User card and ID numbers.

8. Scroll down and click **Test Settings**. PaperCut NG/MF displays the progress of the test and the results in the **Testing sync settings** popup.



9. Review the results to make sure all the expected users are there; then click **Close**.
10. Click **Apply**.

Set up the Sync Options

Whereas the sync source(s) you specified above determine where PaperCut NG/MF imports users from, the **Sync Options** section lets you make choices about what happens during the sync itself.

The options you select in this section:

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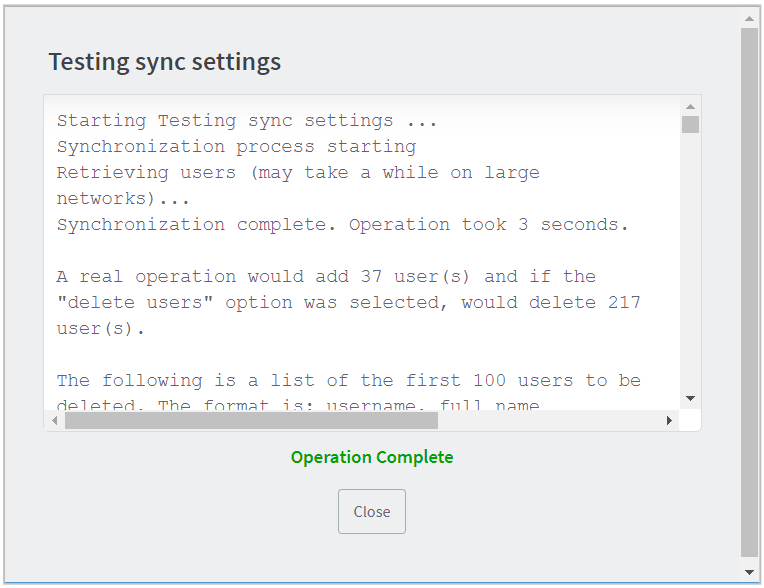
- affect only users added via the synchronization source
- do not delete users in the PaperCut NG/MF database during the overnight automatic synchronizing
- do not delete users added via Guest and anonymous user management. To delete users that do not exist in the Sync source, you must manually synchronize (click **Synchronize Now**).

1. In the **Sync Options** area, select what's appropriate for your environment:
   - **Update users' full-name, email, department and office when synchronizing**

     If a user's details in PaperCut NG/MF do not match those in the synchronization source, update the details in PaperCut NG/MF with the details from the sync source.
   - **Import new users and update details overnight**

     Synchronization automatically occurs overnight at approximately 12:55am. PaperCut NG/MF imports all new and changed user details. No users are deleted during this sync.
2. Click **Test Settings**.

   A **Testing sync settings** popup is displayed, the test runs, and the details of users and user groups that will be modified (updated, added, or deleted) when the actual sync operation runs are displayed. By default a maximum of 100 users are displayed.



> **Tip:**
> You can configure the maximum number of deletion candidates that are displayed in the **Testing sync settings** popup. Use the config key `user-source.test-sync.max-pending-deletion-entries-displayed`.

   For information about setting config keys, see Using the Advanced Config Editor.
3. Confirm that the number of users being added and, optionally, being deleted, matches your expectations.
4. Click **Apply**.

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5. Click **Synchronise Now**. PaperCut NG/MF syncs with Google Cloud Directory. You can view the users in the **User List**.
6. After the sync, in **Users > User List**, select a username. The **Details** screen is displayed.
7. In the **Other Details** section, check and confirm the Card/Identity Numbers fields show the correct details.

Test your new print environment

Test the end-to-end printing experience on all interfaces to make sure it matches what you intended.

> **Tip:**
> Work with real users and get their feedback on their experience.

If you are not going to set up Google Single sign on, then that's it!

Step 5: (Optional) Set up Google Single sign on

(Optional) Manage Google Single sign on for Chromebooks

By default there will be a **Sign in with Google** button on Chromebooks so users do not have to re-enter their credentials to log in to PaperCut NG/MF.

If in your environment there are user accounts that do not have Gmail email addresses or Gmail accounts, you might want to consider turning off Single sign on. If you don't, these users might click the **Sign in with Google** button and not be logged in because their account won't be registered in PaperCut NG/MF.

To turn off Single sign on for Chromebooks:

1. Select **Options > Mobile/BYOD**.
2. In the **Mobility print** section, set up Mobility Print.
3. Click **Apply**.

(Optional) Set up Google Single sign on for Admin and User web interfaces

G Suite users can always log in to Chromebooks or PaperCut NG/MF Admin or User web interfaces by typing their Google credentials in the **Username** and **Password** fields.

However, if you set up Google Single sign on, users who have already logged in to their Chromebook or Google account in a browser will not need to re-enter their credentials to log in toPaperCut NG/MF. The **Username** and **Password** fields will still show on the login screen, but there will also be a **Sign in with Google** button for users to click instead.

Create the client secret JSON file in G Suite

1. Ensure your PaperCut NG/MF system environment is ready before you start to set up users to login to PaperCut NG/MF using their Google credentials.
    a. Ensure your organization owns a top-level, public fully qualified domain name (FQDN), for example:

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- schoolname.region.edu
- campusname.school.region.edu

b. We highly recommend you use a secure browser connection, so ensure that:

- user and admin access to the system is restricted to be only via SSL
- HSTS is turned on.

Refer to Forcing use of HTTPS/SSL only.

2. Log in to the G Suite Developer's API console. The Google APIs Dashboard screen is displayed.
3. In the title bar, next to the **Google APIs** heading, click the dropdown list showing a project name. The **Select from** popup is displayed.

4. Do one of the following:
   - If a project is already set up for synchronization withPaperCut NG/MF, click the project's name. The **API Dashboard** is displayed with the project name in the title bar. Go to the next step.
   - If a project is not set up yet, create a new project:
     a. At the top right of the popup, click **NEW PROJECT**. The **New Project** screen is displayed.
     b. In the **Project name** field, type a name that identifies the project you'll use for PaperCut NG/MF, for example, PaperCut NG/MF Authorise.
     c. Click **Create**. The **Credentials** screen is displayed.
     d. In the title bar, next to the **Google APIs** heading, click the project name drop-down. The **Select from** popup is displayed.
     e. Click the new project's name. The **Google APIs** main screen is displayed with the project name in the title bar, and the **APIs Credentials** popup is displayed.

5. Select the **OAuth consent screen** tab. The **OAuth consent screen** is displayed.

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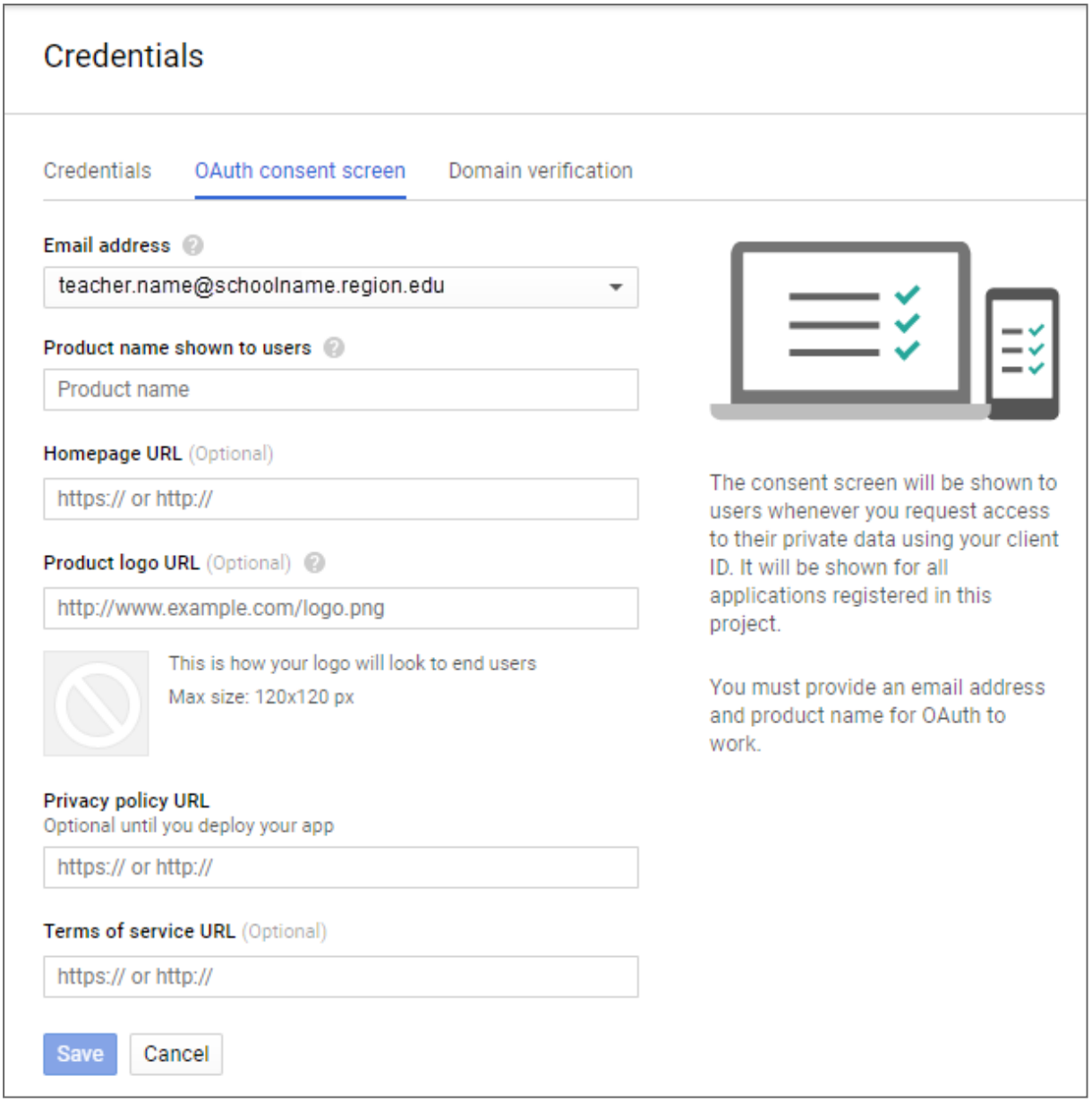

6. Type the details you want users to see when users log in to PaperCut NG/MF Admin or the User Web interface.

> **Note:**
> If the PaperCut NG/MF Application Server isn't available on the internet, the Homepage URL will fail to validate on the OAuth consent screen and the message "Request contains an invalid argument" is displayed.

7. Click **Save**. The **Credentials** screen is displayed.
8. Click **Create credentials**; then select **OAuth client ID**.

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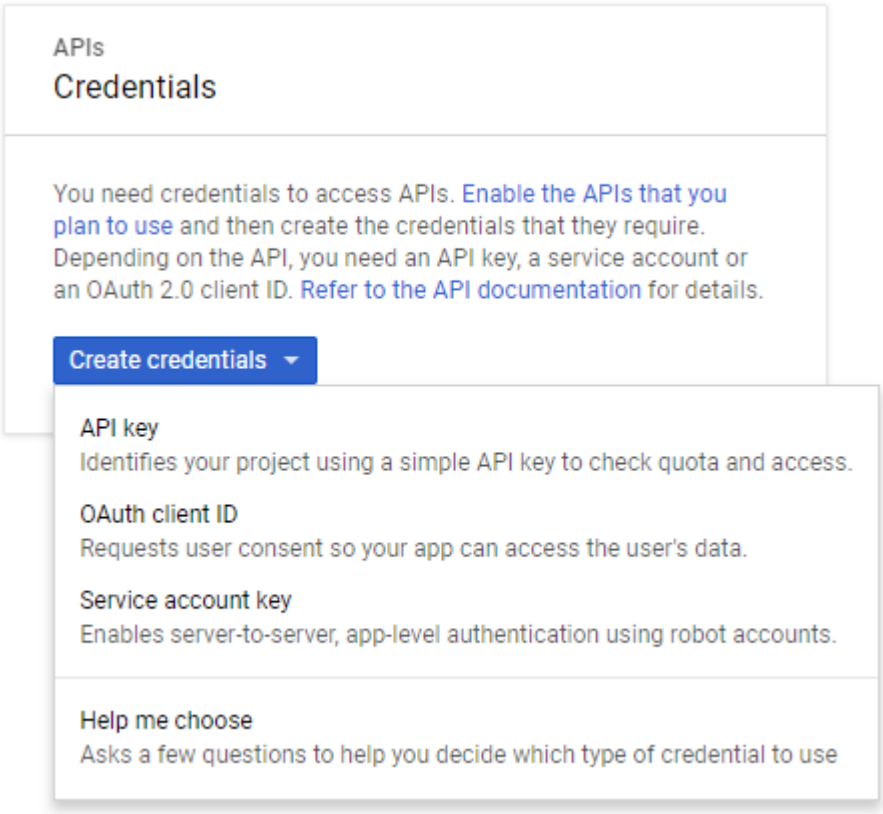
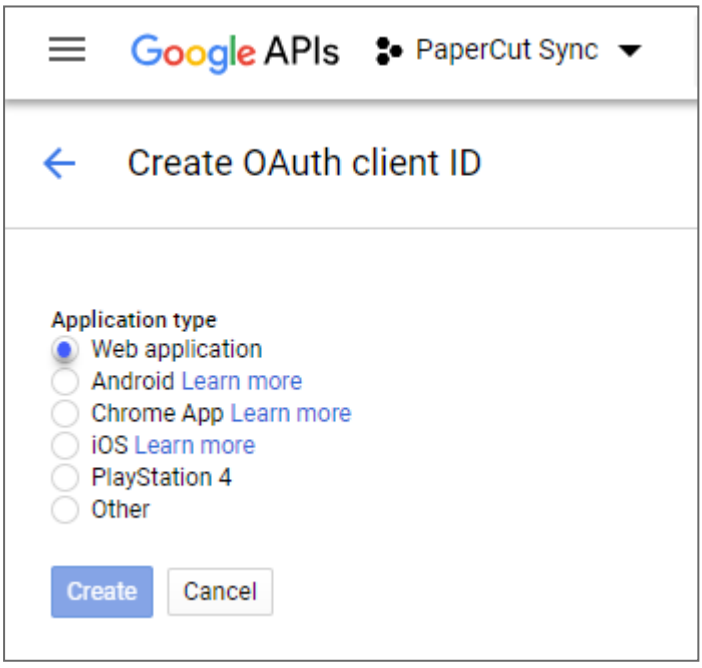


The **Create OAuth client ID** screen is displayed.



9. Select **Web application**. Additional fields are displayed.

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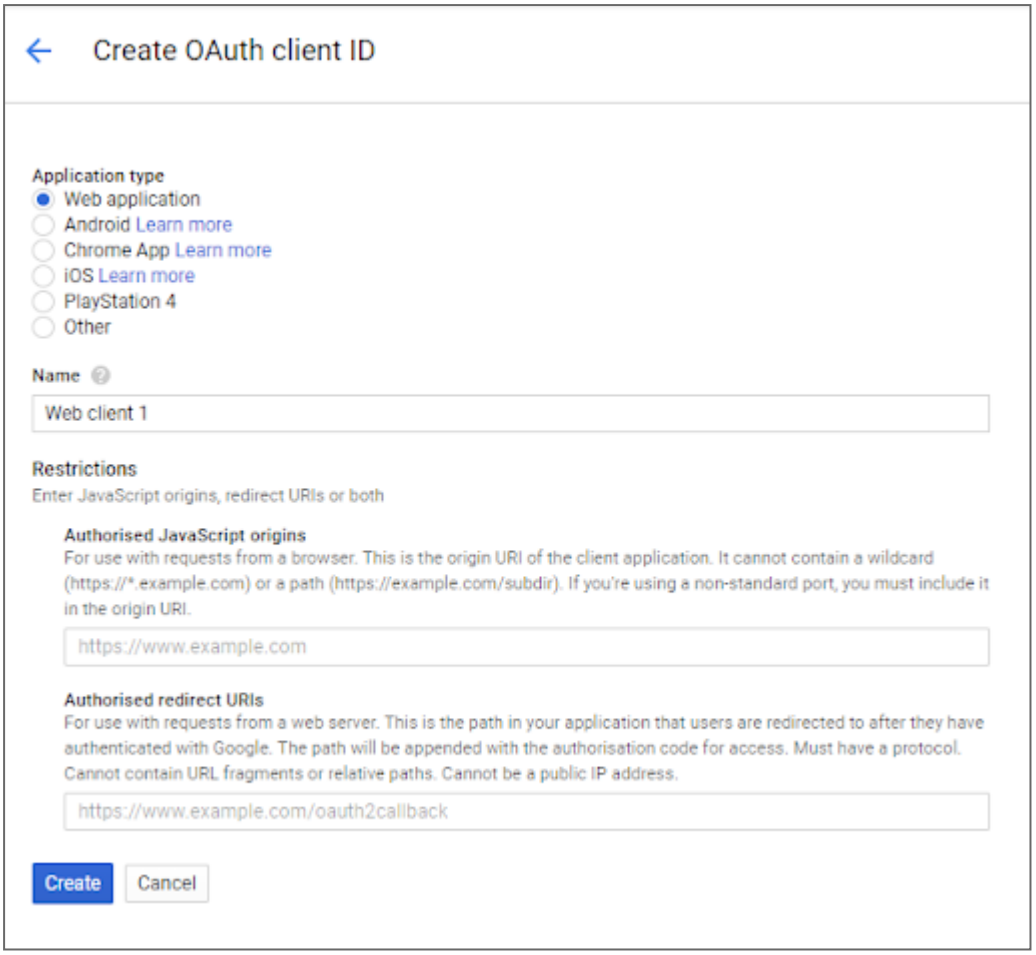

10. In the **Name** field, type the name for your OAuth Client ID.

> **Note:**
> This is the name that PaperCut NG/MF will use to identify itself to Google when authorizing/authenticating users. A good example here is PaperCut MF OAuth Client ID.

11. In the **Authorised redirect URIs** field, type the full URI of your PaperCut NG/MF Application Server, for example:

    `https://papercut.schoolname.region.edu:9192/api/oauth2callback`

> **Note:**
> Unlike the Authorised JavaScript origins URI, this field requires the full URI. Make sure you include the trailing path.

12. Click **Create**. The **OAuth client** popup displays your client ID and client secret. You will use these credentials when you set up the sync source in PaperCut NG/MF.

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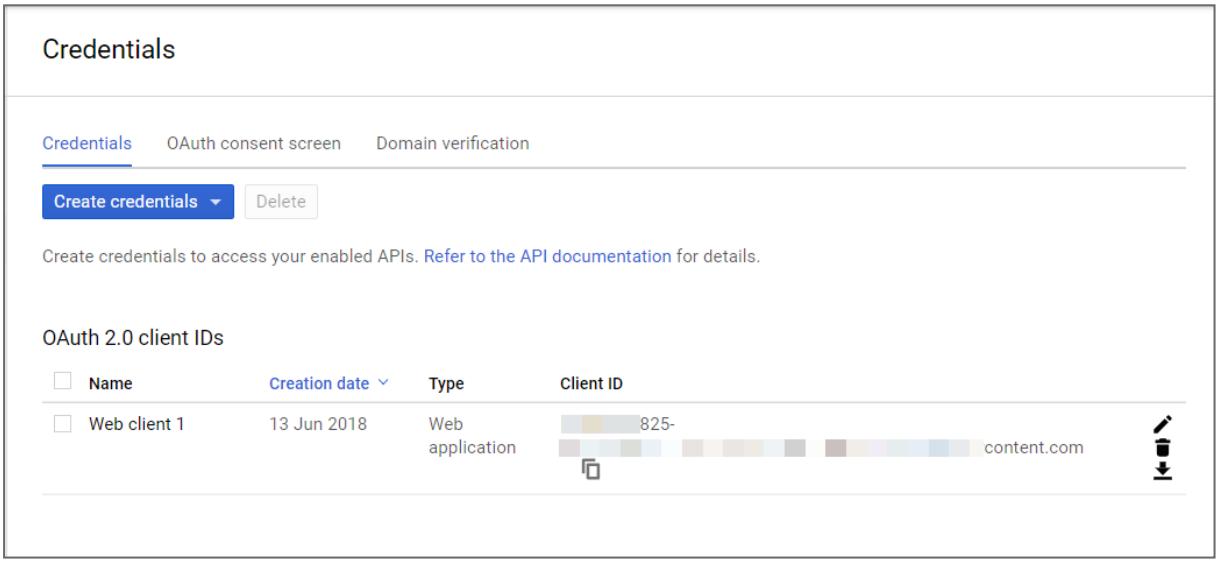
13. Click **OK**. The **Credentials** screen is displayed. No need to save the credentials from here because you'll download them in a few steps.



14. Click ⬇ to download the credentials as a JSON file.

> **Note:**
> The file is called client_secret_<your Client ID>.JSON. This is the client secret JSON file you need to be able to authorize PaperCut NG/MF to sync with Google.

15. Close the browser window.

Set up Google Single sign on in PaperCut NG/MF

This part of the interface is for setting up Single sign on to the PaperCut NG/MFAdmin web interface and User Web interface. You set up Single sign on for Mobility Printvia the link at the bottom of this section.

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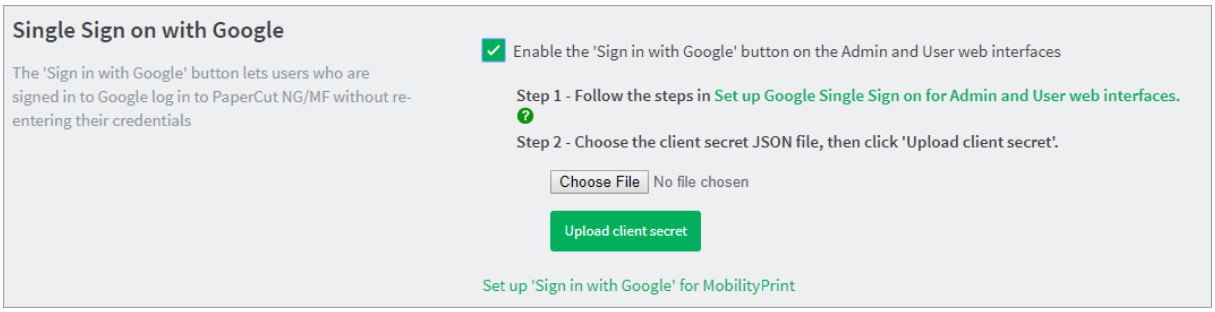
1. Sign in to PaperCut NG/MF.

> **Note:**
> Ensure the URI for the Admin interface you log in to is exactly the same as the URI specified you entered when setting up G Suite (on the Create OAuth client ID screen, in the Authorized JavaScript origins field).

   For example: `https://papercut.schoolname.region.edu:9192/admin`

2. In the Admin web interface, select **Options > User/Group Sync**; then scroll to the **Single Sign on with Google** section.
3. Select the **Enable the "Sign in with Google" button on the Admin and User web interfaces** checkbox.



4. Click **Choose file** and select the JSON file you downloaded.
5. Click **Upload client secret**. The file is uploaded.
6. Test with real users to confirm the **Sign in with Google** button is visible on the PaperCut NG/MF login screen and works as expected.
7. If your environment uses Mobility Print, click **Set up 'Sign in with Google' for Mobility Print** and follow the instructions in Mobility Print.

Google Cloud Directory: Education scenario

> **Note:**
> This functionality is available for organizations using:
>
> - G Suite Education
> - G Suite Enterprise for Education
> - G Suite Enterprise
> - Cloud Identity Premium.

Goal

The part-time System Administrator of a school with 350 students is putting in place various measures to reduce IT costs. One measure is to stop using Active Directory (AD) for staff

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authentication (the students are already authenticated using G Suite for Education) and phase out the Active Directory infrastructure altogether. In its place they plan to use:

- PaperCut NG/MF Mobility Print to advertise print queues
- Google Cloud Directory to authenticate all print, scan, and copy jobs for both staff and students.

Staff will be able to use any laptop, and all students will use school supplied Chromebooks or BYOD.

During the transition there is to be minimal, if any, disruption to users, and afterwards there needs to be minimal change management effort required to move staff over to authenticate using their G Suite credentials.

Benefits of adopting Mobility Print backed by Google Cloud Directory authentication for all users

- Reduced IT costs.
- Faster and simpler deployment of print queues to end users.
- Continued support for native printing from local applications, for example Learning Management Software or Microsoft Office.
- Reduced system administration overheads, such as maintaining an additional Active Directory environment.
- Opportunity to re-use existing hardware.
- User details (for example, username and email address) are easily synced from Google Cloud Directory to PaperCut NG/MF.

Changes to the system setup

5.1.3. Current setup

Staff:

- use laptops on premises that authenticate using AD
- copy, scan, and print jobs using their AD username and password.

Students:

- use Google Cloud Print (GCP) to print
- copy, scan, and print jobs using their student ID number and PIN.

5.1.4. Future setup

Staff:

- continue to use their current laptops
- can choose to use BYOD with Mobility Print
- copy, scan, and print jobs using their Google credentials and Mobility Print

Students:

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- use Mobility Print to print from their Chromebooks and BYOD
- use Sign in with Google on Chromebooks

Implementation

This scenario assumes that the WiFi network is relatively simple and does not block Bonjour/mDNS. If your network is more complex, for example you have multiple subnets, refer to the Mobility Print Help Center.

This scenario also assumes that you have users and groups already set up in G Suite.

1. Set up Mobility Print. Be sure to install it on a existing print server that can be reached by users on either the Staff or Student WiFi.
2. In the Admin web interface, select the **Options > Mobile & BYOD > Mobility Print > Allow users to sign in with their Google account** checkbox.

   This enables Chromebook users to click **Sign in with Google** when printing so they don't need to re-type their username and password every time.
3. You will then need to deploy the Mobility Print client for any Windows, Android or Chromebook devices, or provide instructions for staff and students to do it themselves.

   > **Note:**
   > MacOS and iOS devices should pick up the print queues automatically.

4. Use Google Cloud Directory Sync to migrate all of your AD users (staff) into your G Suite account, in their own group.
5. Review the information in Synchronize user and group details with Google Cloud Directory, then set up a Secondary sync source for Google Cloud Directory. (Your Primary sync source remains AD for now.)

   > **Tip:**
   > Before you sync all users, first set up a test group in your G Suite account with a test user. In the sync options, choose "Import users from selected groups" and choose your test group.

   Staff and Students with G Suite logins can now use Mobility Print from their Chromebooks or their chosen BYOD.

   When you've finished deprecating your on-premise Active Directory, you're ready to switch over to Google Cloud Directory for good.
6. In **Options > User/Group Sync**, change the Primary sync source to Google Cloud Directory, and then disable the Secondary sync source.

Woo hoo! All of the staff and students can now use their Google credentials with PaperCut NG/MF on all platforms and you can start enjoying the benefits of your new environment!

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5.1.4.1. Manually synchronize with a user directory

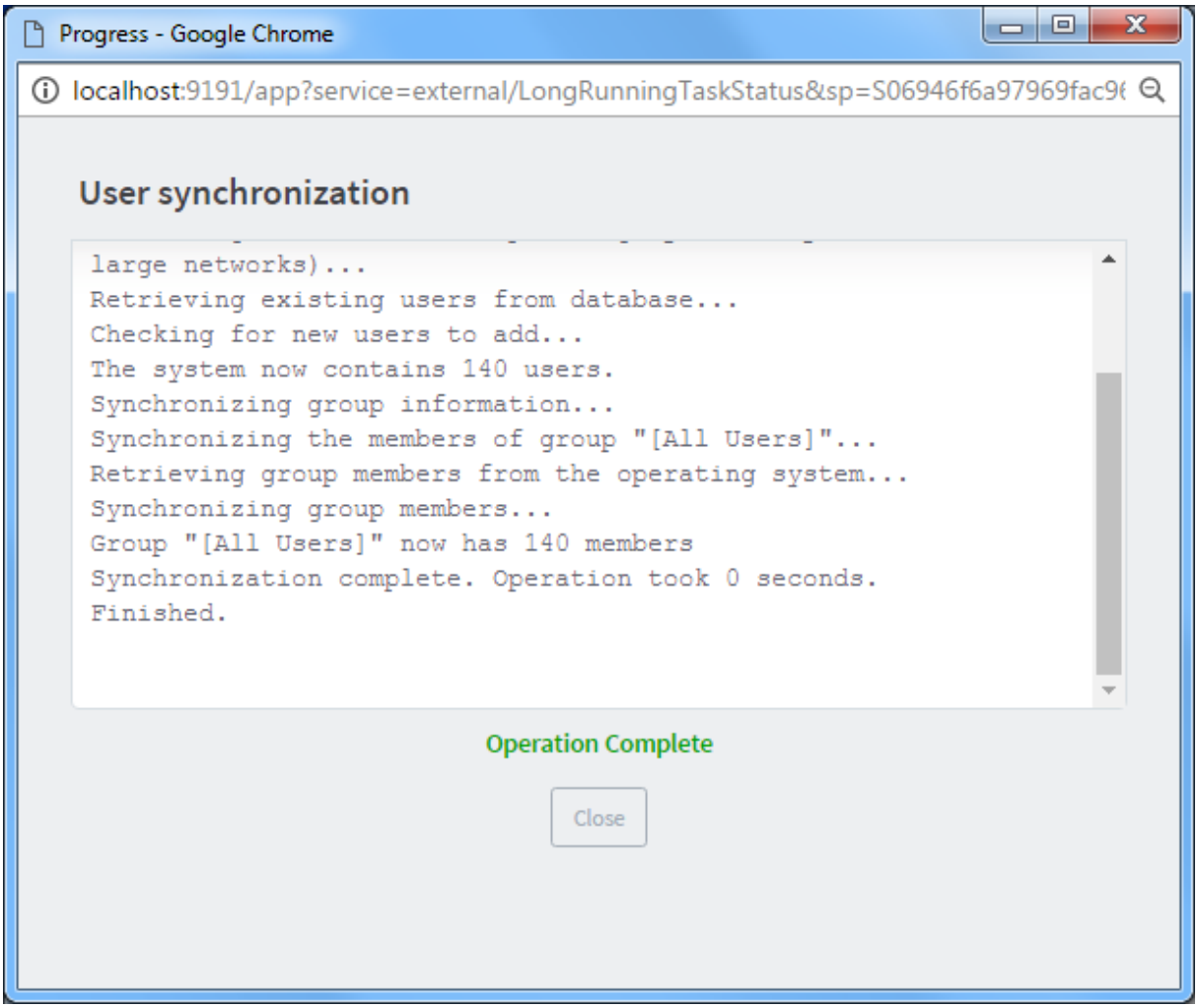
By default, PaperCut NG/MF automatically synchronize the user and group information each night, however, the sync process can also be initiated manually. To initiate a manual sync:

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.

2. Click **Synchronize Now**.

   The sync process starts and a status window is displayed showing the status of the sync process.



5.1.4.2. On demand user creation

The **On Demand User Creation** setting defines if and when PaperCut NG/MF creates new users. The settings applied to newly created users are defined by their group membership (for more information, see Set new user creation rules). By default, new users are created automatically when they print for the first time, authenticate via the User Client, or log in to the User web interface. This makes administration much easier, as there is no need to manually create accounts; users can use PaperCut NG/MF straight away.

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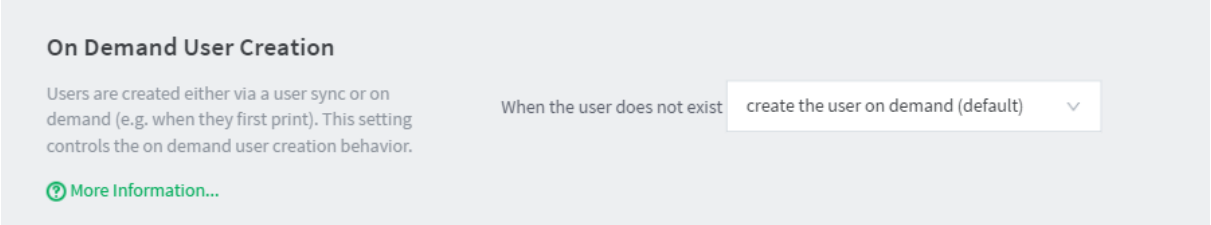
In some situations you might want to change the way new users are treated. For example, when just one department is being tracked, but there are other departments using the same printers, you might want to allow the other departments' users to print, but not to track them using PaperCut NG/MF.

To set the on demand user creation rules:

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.
2. In the **On Demand User Creation** area, select one of the following options:
   - **create the user on demand (default)**—users are created when they interact with PaperCut NG/MF for the first time, for example, when they print for the first time.
   - **do not create the user and allow usage**—users without a PaperCut NG/MF account will not have an account created, but can print. Their usage is not logged.
   - **do not create the user and deny usage**—users without a PaperCut NG/MF account will not have an account created and cannot print.



3. Click **Apply**.

5.1.5. Assign administrator level access

PaperCut NG/MF sets up one administrator account called admin. This is the master administrator account, with access to all features, whose password is assigned during the configuration wizard. In large organizations it is likely that administrator level access is granted to more than one person. One solution is to give all persons the master password; however, the recommended approach is to assign administrator rights to these individual's network user accounts. The advantages of this approach are:

- They can access the administration pages using their own username and password (they don't have to remember another password!).
- You can assign different levels of administrator access to the user. PaperCut NG/MF includes an advanced Access Control List (ACL) allowing different administrators access to different functions and areas of the application.
- Most activity is audited so changes can be sourced to an individual.

You can assign administrator access at the group or user level. Assigning admin access to a group is convenient for giving the same permissions to multiple users. Assigning admin access to a user is useful when specific permissions are required. See the following sections for more detail.

Tip:
Administrative users should login via `http://servername:9191/admin` rather

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than `http://servername:9191/`, `http://servername:9191/app` or `http://servername:9191/user` so that they are directed to the correct interface.

Important:

PaperCut NG/MF allows different levels of administrator access to be defined via access control list. The access list is presented as a series of check boxes enabling or disabling access to selected features or application areas. For security reasons it is advisable to:

- Grant the user's own accounts administrator level rights rather than have them use the general built-in `admin` account.
- Grant the administrator the minimum level rights need for them to perform their job.
- ACL configuration can be complex. Always test that the ACL rights assigned work as expected by asking the administrator to log in and verify that they can access the required program functions, and only those functions.

Caution:

Granting permission to **Access users section > Perform bulk changes** allows the selected admin to change several user attributes including:

- **Edit credit balance**—adjust or set users' account balances.
- **Change settings**—change restrictions, change overdraft limits, change account selection settings, override printer/device settings, enable delegated print release, change unauthenticated user status, and enable/disable user printing.
- **Generate new card/ID numbers**—generate primary and secondary card/ID numbers.
- **Reset statistics**—reset users count statistics back to zero.
- **Delete users**—permanently delete users.

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Assigning administrator access to a group

Assigning administrator access to a group is useful when many users all require access to the same functionality. For example, the `Administrators` group might be assigned access to reporting functionality only.

Groups in PaperCut NG/MF are mirrored from the domain / directory server. Before you can use a group, you must add it to PaperCut NG/MF (see Groups in PaperCut NG/MF for more information). By default PaperCut NG/MF synchronizes users' group membership with the domain / directory server overnight. If a user has been added to a group in the domain / directory and requires group level admin access on the same day, run a manual synchronization. See Synchronize user and group details for more information.

Example: assigning the `Administrators` group access to reporting features:

1. Log in to the system as the built in `admin` user.
2. Ensure that the `Administrators` group has been imported into PaperCut NG/MF (see Groups in PaperCut NG/MF for more information).
3. Select **Options > Admin Rights**.

   The **Admin Rights** page is displayed.
4. In **Assign administrator access to this group**, select the `Administrators` group from the list; then click **Add Group**.

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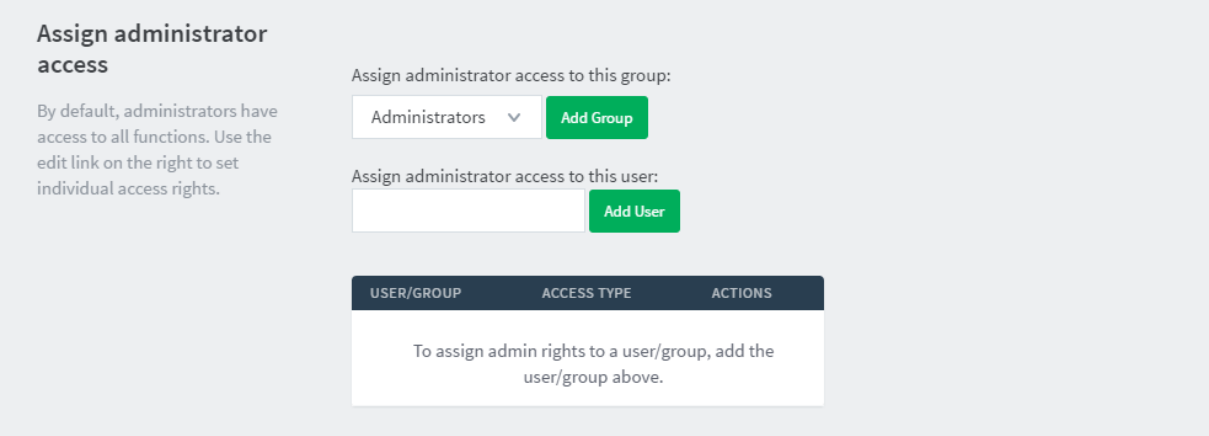

5. By default the `Administrators` group has access to all features. To change this, click the **edit** link to the right of the `Administrators` entry or the name of the group itself.
6. Click **Clear All**.

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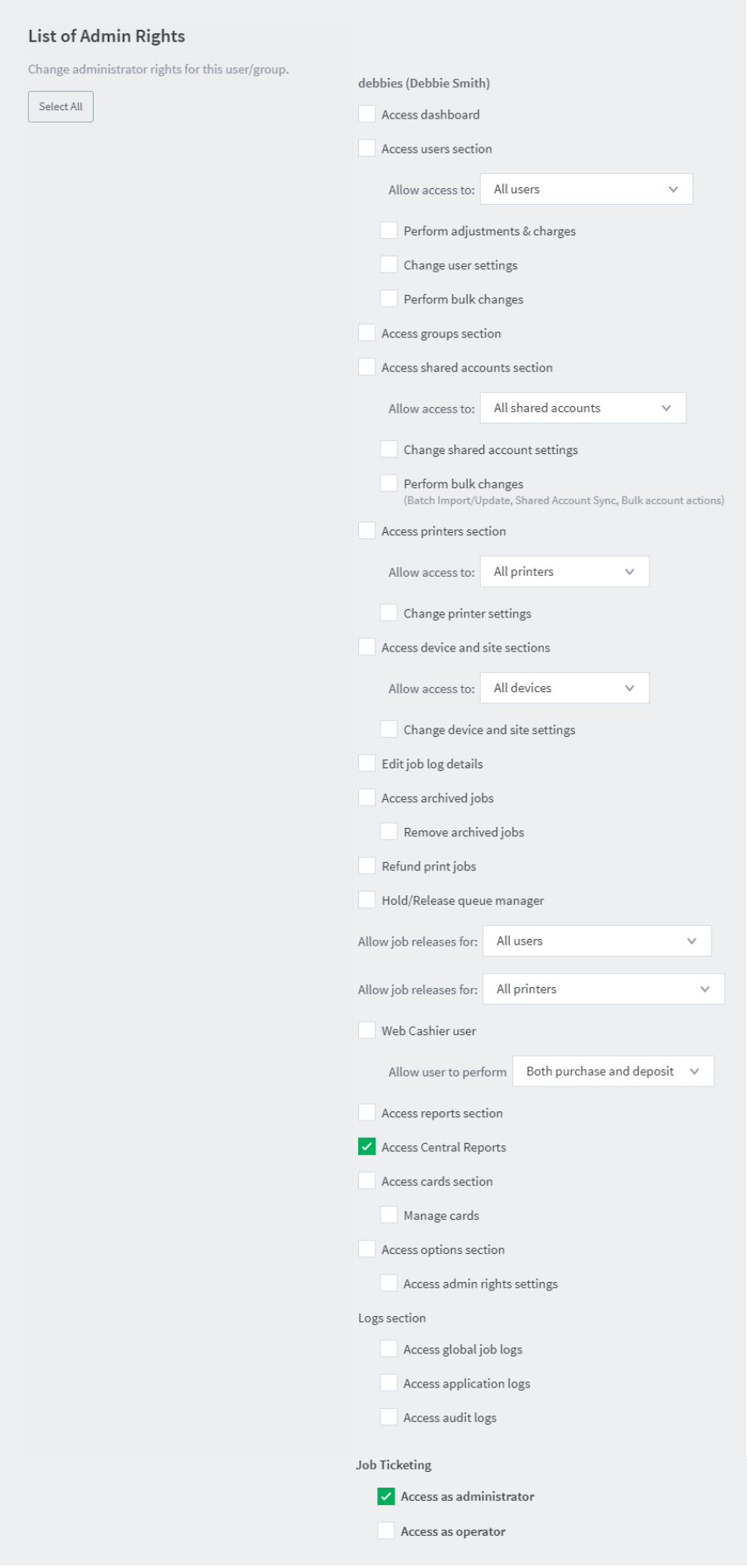

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7. Select the **Access reports section** check box.
8. Click **Apply**.
9. Test by logging into the Admin web interface as a user in the **Administrators** group, and checking that access is allowed just to the **Reports** area.

Tip:
The *scheduled reports* feature can automatically deliver selected reports via email to interested parties. See Schedule and email reports for more information.

Assigning administrator access to a user

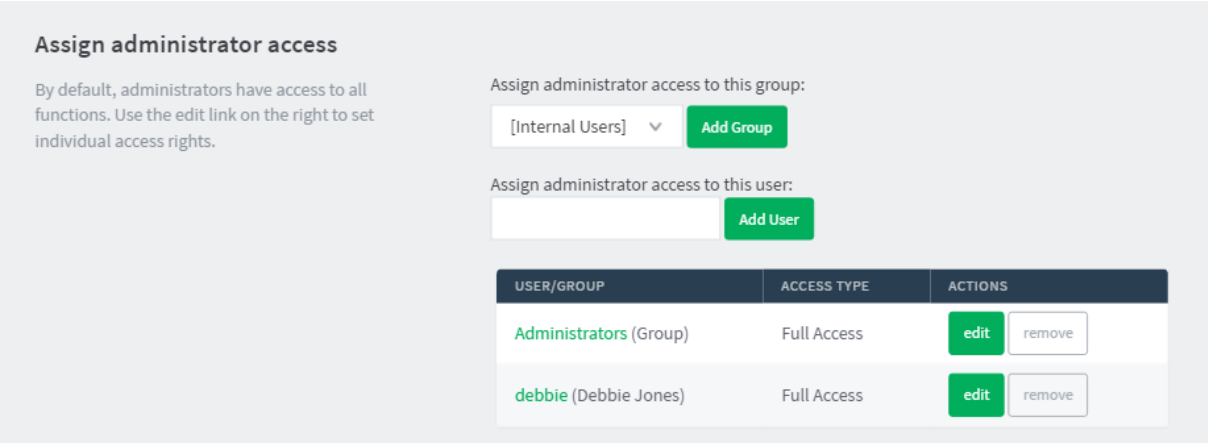
Assigning access to an individual user is suitable when the access rights are specific to that user. For example, the junior SysAdmin `mary` might be assigned access to all functionality except the ability to grant administrator rights to other users.

Assigning the user with login name `mary` all admin rights except the ability to grant admin rights to other users:

1. Select **Options > Admin Rights**.

   The **Admin Rights** page is displayed.
2. In **Assign administrator access to this user**, enter `mary`; then click **Add User**.

   By default `mary` has access to all features. To change this, click the **edit** link to the right of `mary`'s entry or the name of the user.
3. Clear the **Access admin rights settings** check box.
4. Click **Apply**.
5. Verify that Mary can now log in to the Admin web interface, but is unable to access the **Admin Rights** page.



5.1.6. Set up system notifications and emails

This section describes the available notifications and how to configure them. PaperCut NG/MF includes built-in notifications to alert users and administrators of important information. Examples of

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these notifications include:

- Alerting a user when their account balance drops below a given balance.
- Displaying a message explaining why a print job was denied (e.g. not enough credit; the printer is disabled; the print job contains too many pages).
- Alerting administrators or key IT support staff to problems such as printer jams, or application errors.

You can customize the message that is delivered to the user. For example, if the user is denied printing for some reason, you might want to direct the user to the intranet page that discusses printing policies and guidelines.

Important:
Notifications are important to your users because they let them know why their print jobs were denied. If notifications are not enabled, users print jobs might be deleted without them knowing and they will not understand what happened. They might then contact the Administrator or Help Desk for assistance. If they received a notification, then this situation is avoided.

System notifications can be delivered to the user in a number of ways, and the administrator can decide the preferred option. The delivery options available include:

- **Email**— messages are delivered by email, to the email address defined in the system. This is a good alternative for "low balance warning" messages but is not recommended for real-time messages, such as when printing is denied.
- **Winpopup** (or "net send")—this is useful in a Windows network but workstations running other operating systems might not receive these messages. If your PaperCut Application Server is running on Windows 7 or above, see the following PaperCut Knowledge Base articles:
  - Using a domain administrator service account (Windows)
  - Working with popup messages
- **User Client**—messages are sent to users running the PaperCut NG/MF User Client. This option is guaranteed to work in all environments where the user runs the user client.

To set up system notifications you need to:

- Configure email
- Configure system notifications

5.1.6.1. Configure email

To send email notifications, you need to:

- Configure an SMTP server
- Configure email addresses

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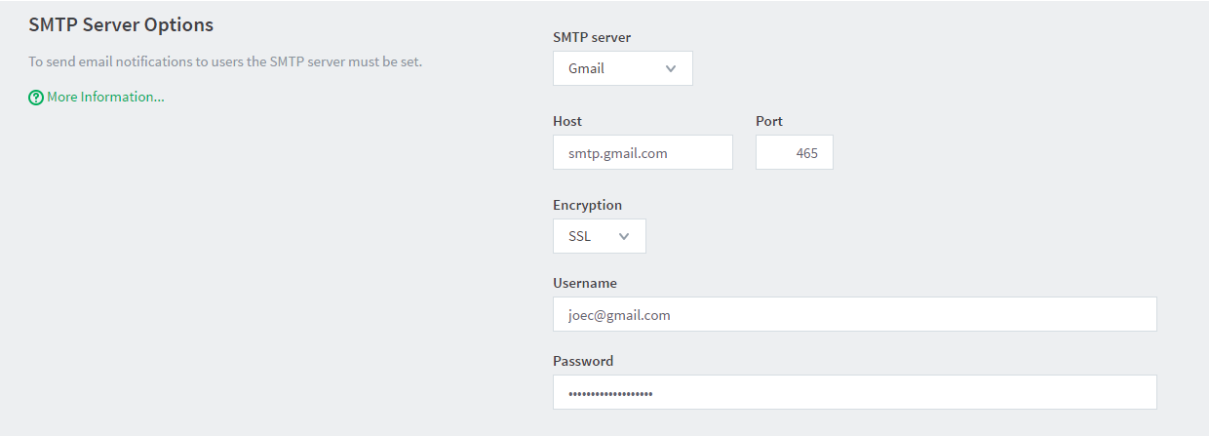
Configure an SMTP server

Before sending notifications via email, the system needs to know about the SMTP server that is sending the emails. The SMTP server can be internal or external to your organization, however, it must allow forwarding of emails to your users. The SMTP server is typically the same server that users set in their email application to send email.

Tip:
PaperCut comes with the a number of popular SMTP services preconfigured to simplify the configuration process. If these are used, you need to provide only the login credentials of the SMTP server.



To set the SMTP server:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. In the **SMTP Server Options** area, select either:
   a. a preconfigured SMTP server.
   b. **Custom** to configure a custom SMTP server. For custom configuration, see Custom SMTP Server Setup.
3. Enter the username and password for that service.
4. Click **Apply**.

Important:
Anti-virus software running on the PaperCut server can block/disallow SMTP connections because it attempts to block spam sent by viruses and trojans. Ensure that any anti-virus software is configured to allow PaperCut to make SMTP connections (e.g. add an exception or disable the SMTP blocking). When anti-virus is blocking email delivery, PaperCut NG/MF logs errors, such as: `Mail server connection failed. Software caused connection abort.`. These errors are displayed in the application log or on-screen when performing email notification tests. If there are other SMTP connection problems, you should check that your firewall allows SMTP

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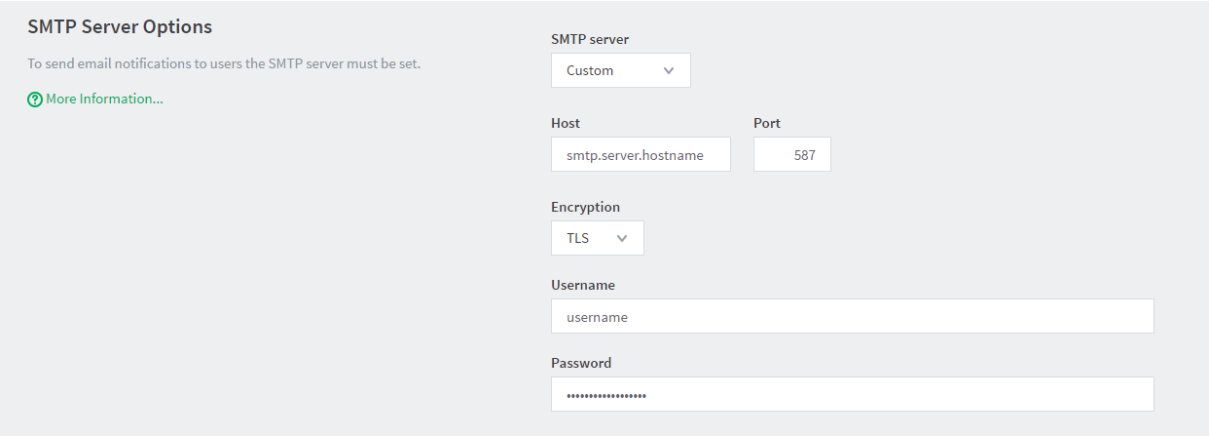
connections, and that your SMTP server is configured to accept connections from the PaperCut server.

Custom SMTP server setup



If your SMTP server is not listed in the preconfigured SMTP server list, you can configure the SMTP server manually by providing the following details:

Table 83: Custom SMTP server fields

Field Name	Description
`Host`	Your SMTP server hostname.
`Port`	The port to connect to on the SMTP server. Common ports include **25** or **587** for TLS, and **465** for SMTPS(SSL).
`Encryption`	Choose between **None**, **SSL** and **TLS**.
`Username`	Username for SMTP authentication. Typically an email address.
`Password`	Password for SMTP authentication.

Tip:
If debugging a custom SMTP setup, you should set the Application Server to produce extra logs related to the SMTP feature. To do this, set the **notify.smtp.debug** to **Y** in the Config Editor(see Using the Advanced Config Editor).

Configure email addresses

To send notification messages to users via email, an email address needs to be defined for the user. Enter user email addresses in the **User Details** screen. However, if all email addresses match the pattern `[username]@yourdomain.com`, then you can define the email address globally using the global email suffix. An example of how this works is as follows:

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1. An email notification needs to be sent to user `brian`.
2. No email address has been defined in Brian's user details, but a global email suffix of `@myschool.com` is defined in the **Email Options** area.
3. To generate Brian's email address, the username (`brian`) and suffix (`@myschool.com`) are combined to form the email address `brian@myschool.com`.

To define the global email suffix:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. In the **Email Options** area, select the **Use email suffix to build user email addresses** check box.
3. Enter the **Email Address Suffix**.
4. Click **Apply**.

To confirm that the email suffix is working as expected:

1. Click the **Users** tab.

   The **User List** page is displayed.
2. Select a user.

   The **User Details** page is displayed.
3. Select the **Use global email suffix** check box. The email field contains the address constructed from the username and suffix.

5.1.6.2. Configure system notifications

PaperCut NG/MF provides flexible options for configuring the various notifications. The administrator can:

- enable/disable each of the notification types
- change the notification message
- choose the delivery method for each notification type.

You can modify notification text to suit your organization's requirements. The notification text is a template that can include fields that are replaced with predefined text when the message is sent. Use these fields to provide more detailed information to the user. These fields are surrounded by percent characters (`%`).

The default notification text includes a variety of examples using these fields. For a list of the fields available in each type of notification, see the following sections covering each notification type in more detail.

The following types of notifications are available:

- Printing notifications
- Low balance notification

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- System notifications (for administrators)
- Card/ID Number Notification

Printing notifications

To change printing notification options:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. In the **Actions** menu, click **Notification options**.

   The **Notification options** page is displayed.

Table 84: Fields available in printing notifications

Field	Description
%user%	The username of the user receiving the message.
%full_name%	The full name of the user receiving the message.
%date%	The date/time that the message was sent.
%balance%	The user's current balance.
%cost%	The cost of the print job.
%printer%	The full printer name (including the server name) the job was printed to. e.g. `server-name\printer-name`
%printer-server%	The server name of the printer the job was printed to.
%printer-queue%	The queue name of the printer the job was printed to (i.e. without the server name).
%document%	The name of the document printed.
%pages%	The total number of pages in the print job.
%copies%	The number of copies of the document printed.
%paper-size%	The size of the paper used to print the document.
%id_num%	The primary Card/Identity Number of the user receiving the message.

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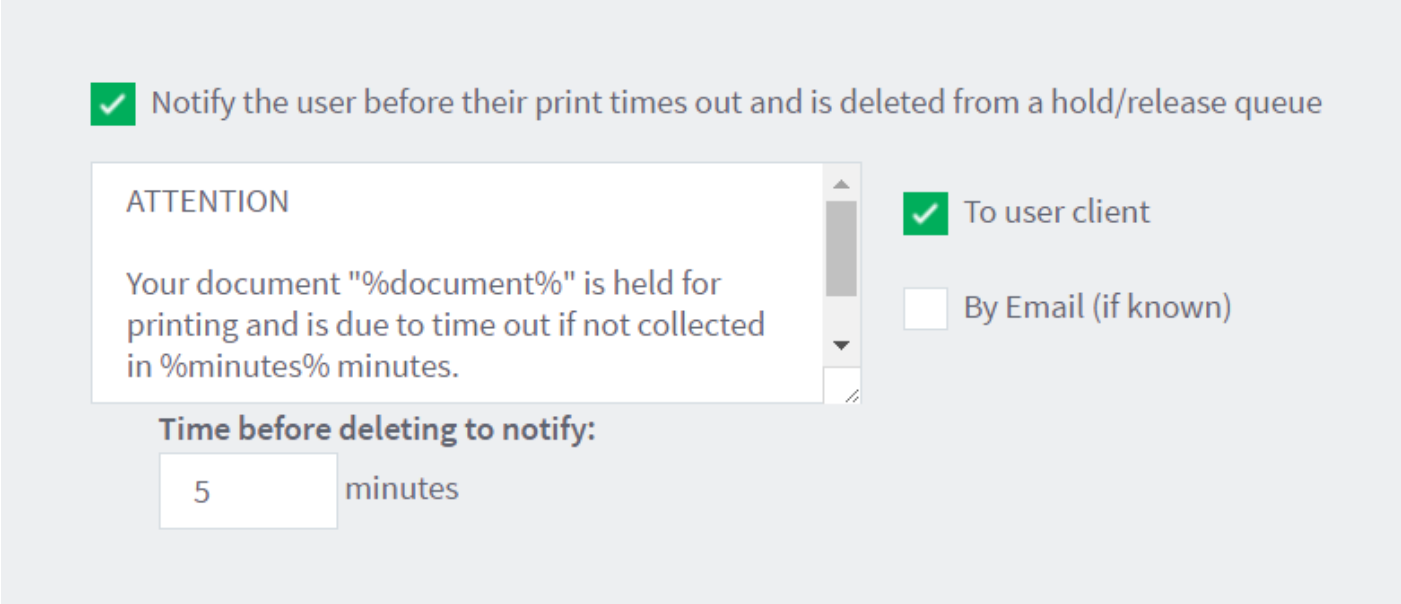
Notify the user before their print times out and is deleted from a hold/release queue



This notification option contains the following additional replacements.

Table 85: Fields only available in notification sent before deleting the held job

Field	Description
%minutes%	Minutes from now until the job is timed out and deleted. Minimum of 2 minutes.

For more information about hold/release queue timeout see Job timeout.

Low balance notification

To change low balance notification options:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. In the **Low Balance Notification** area, change any of the following options:
   - **Notify restricted users when their credit drops below**—the credit balance that triggers the notification.
   - **Enable notification**—enable the low balance notification.
   - Notification text—the notification text.
   - Delivery options:
     - **To user client**—notification is displayed in the User interface.
     - **By Winpopup**—the notification is displayed in a Winpopup message. For more information on running the PaperCut Application Server and configuring system

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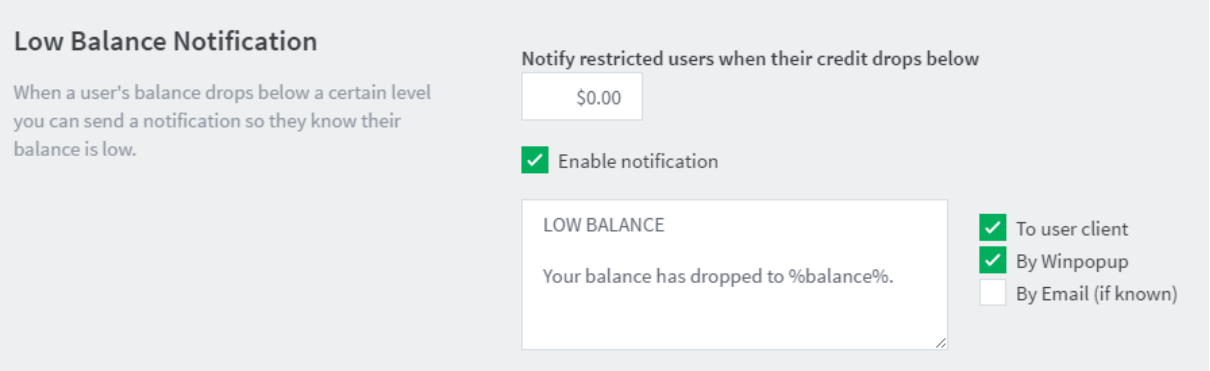
notifications on different versions of the Windows OS, see the articles Using a domain administrator service account (Windows) and Working with popup messages in the PaperCut Knowledge Base.

- **By Email (if known)**—notification is sent via email.



3. Click **Apply**.

Table 86: Fields available in low balance notifications

Field	Description
%balance%	The user's current balance.

Important:
This low balance notification is only sent to users who are restricted.

Card/ID number notification

To change card/ID number notification options:

1. Select **Options > Notifications**.
   The **Notifications** page is displayed.
2. In the **Card/ID Number Notification** area, select the **Notify users when their card/ID**

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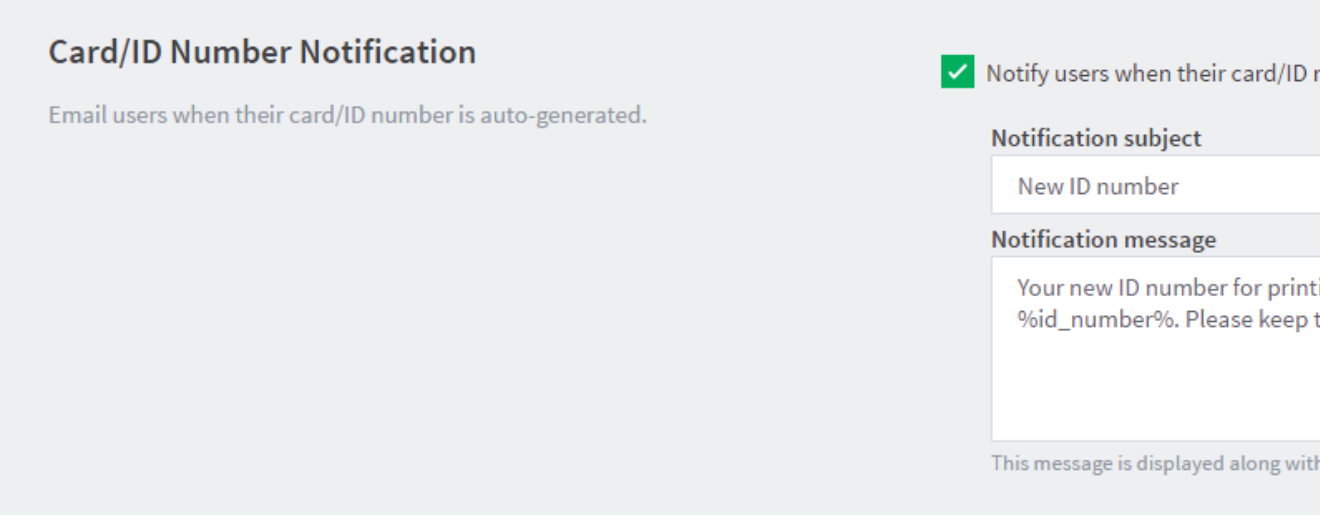
number is auto-generated check box.



This notification option emails the user with their updated ID number. You can change the notification subject and message to suit your environment.

Table 87: Fields available Card/ID number notification

Field	Description
%id_number%	The user's Card/ID number

Important:
This notification sends an email to user's primary email address.

System notifications (for administrators)

PaperCut NG/MF's system notifications feature helps to minimize disruption by notifying key staff of important events. For example, when there is a paper jam, it might take several hours before an annoyed user reports the problem as most users just use another printer.

The following notification types are available:

- **Printer errors**—Notify when a printer enters an error state for a selected period of time.
- **Low Toner warnings**—Notify when a printer runs low on toner (for supported printers).
- **Application errors**—Notify if a application error is detected. This option allows administrators to proactively act on errors raised in the **Application Log** page.
- **License errors**—Notify on important license events such as exceeding the licensed user limit.
- **Pending refund request**—Notify when there is a pending refund request.

Tip:
Consider SMS alerts: system notifications are often important and require urgent attention. Many organizations use an email-to-SMS gateway service to ensure technical staff can receive urgent messages from anywhere in the building via the text message service on

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their cell/mobile phones.

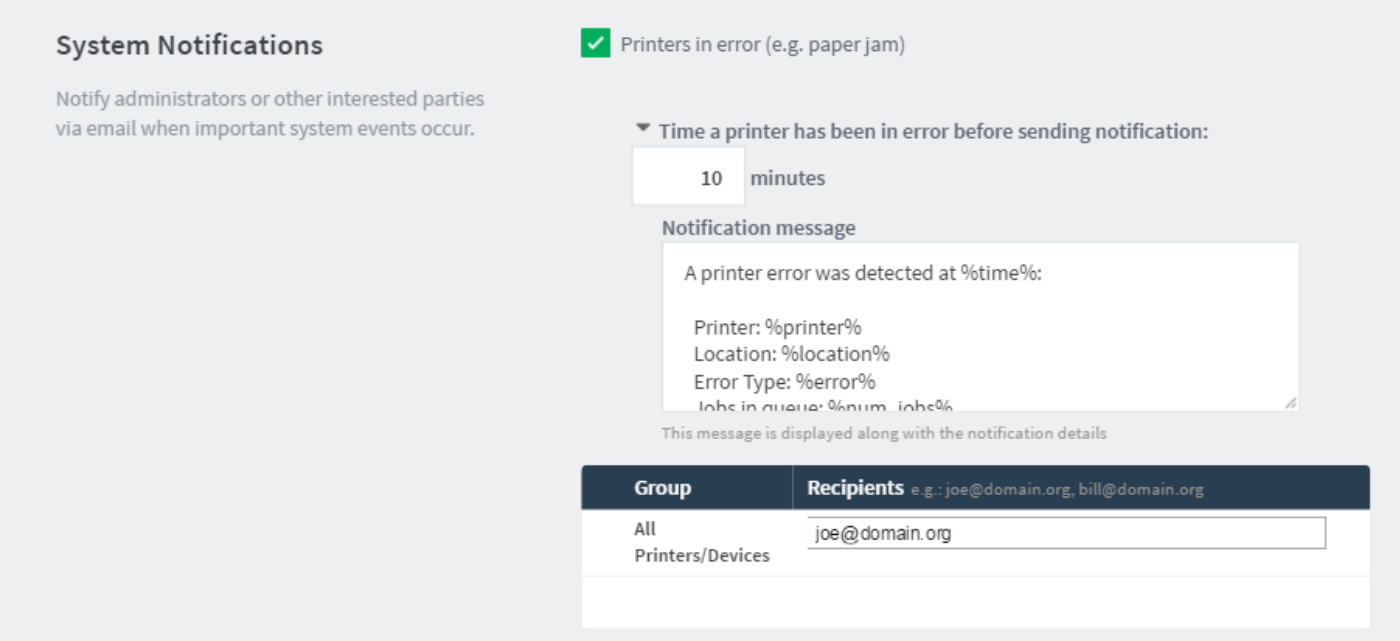
Printer error notifications

Printer error notifications give advance warning when printers go into an error state.

PaperCut NG/MF detects a printer error if either the print queue or the job at the top of the print queue are in an error state. This is the same as clicking the print queue from the operating system and checking its status.

Important:
This feature is available using SNMPv1/v2c only.

Errors that might be seen on print queues or jobs include: `paper jam`, `out of paper`, `out of toner`, `out of memory`, `device is offline`, `device door is open`, or a generic error. The actual errors reported depend on the printer driver and which ones it supports.



Use the setting **Time a printer has been in error before sending notification** to decide how soon a notification is sent after a printer goes into error. For example, if there is a paper jam the user might be able to fix it themselves, and raising an immediate notification is unnecessary. The suggested default is 10 minutes as problems lasting longer than this are probably more serious and need technical intervention.

The message can include information such as the name and location of the printer, the reason for the error, and how many jobs are pending in the queue (an indication of the impact).

You can use the following special fields in printer error event notifications:

Table 88: Fields available in printer error notifications

Field	Description
%time%	The time the printer error was first reported.

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Field	Description
%printer%	The name of the errored printer.
%printer-server%	The server name of the errored printer.
%printer-queue%	The queue name of the errored printer (i.e. without the server name).
%make-or-model%	The make or model name of the errored printer. This is also referred to as **Type/Model**.
%serial-number%	The serial number of the errored printer.
%physical-id%	The name used by the operating system to identify the errored printer (e.g. net://office-printer).
%location%	The location of the errored printer.
%error%	The error message detail (e.g. `Paper jam`).
%num_jobs%	The number of print jobs currently in the queue. Use this information as a guide to judge the severity of the error. For example, if a printer goes into error while there are 30 jobs in the queue, there are probably quite a few people waiting.

You can specify a set of email recipients to receive notifications for all printers and devices. You can enter multiple email addresses by separating them with a comma, for example, `joe@domain.org, bill@domain.org`.

Alternatively, you can specify a different recipient list for each printer group. This is particularly useful for organizations where different people are responsible for the maintenance of different groups of printers. To achieve this, you must first include each printer in a printer group that identifies the team responsible for managing it, for example, assigning printers based their physical location. For more information, see Manage printer groups.

Tip:

It is recommended that you configure at least one recipient for all printer related notifications so notifications are not lost due to misconfiguration, such as if a printer is not in a printer group. This is because notifications for printers without any printer group are only sent to those on the **All Printers/Devices** recipients list.

Note:

If you are using Direct Printing, and there is a printer error that affects all print queues linked to a printer, then only a single notification is sent.

To enable and configure printer error notifications:

1. Set up printer groups based on each service team's responsibility. For more information, see Manage printer groups.

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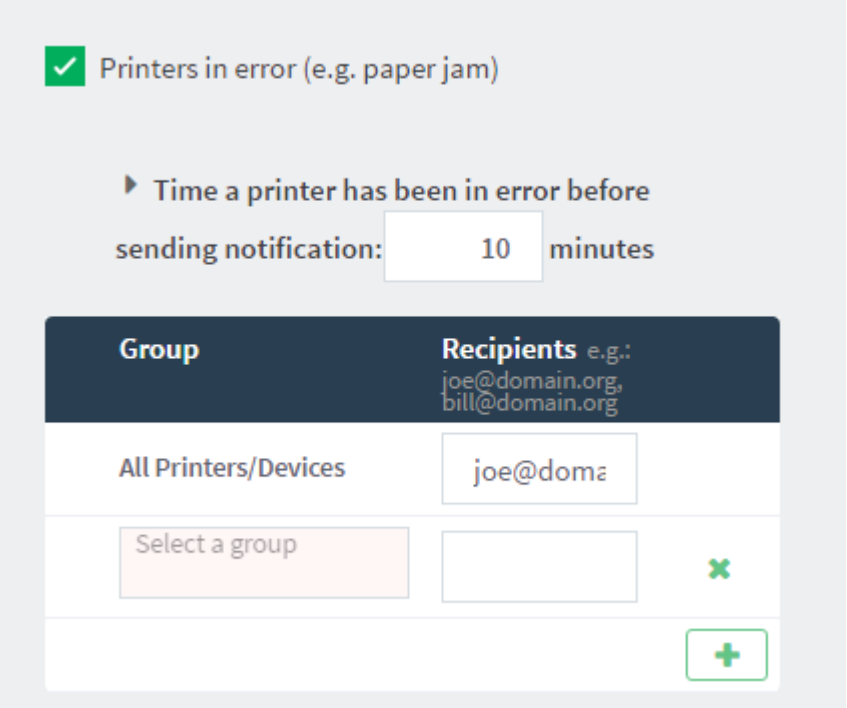
2. Select **Options > Notifications**.

   The **Notifications** page is displayed.
3. Check that the SMTP server settings have been configured correctly.
4. Select the **Printers in error** check box.
5. To customize the notification message:
   a. Click the arrow icon below the **Printers in error** check box.
   b. In **Notification Message**, change the message text.
6. In **All Printers/Devices**, enter the recipients that need to receive notifications for all printers. Enter each recipient's email address separated by a comma.
7. To configure notifications to be sent to a list of recipients if it relates to a printer in a specific printer group:
   a. Click the plus icon in the lower right corner of this area. A new entry is displayed.



   b. Select a printer group.

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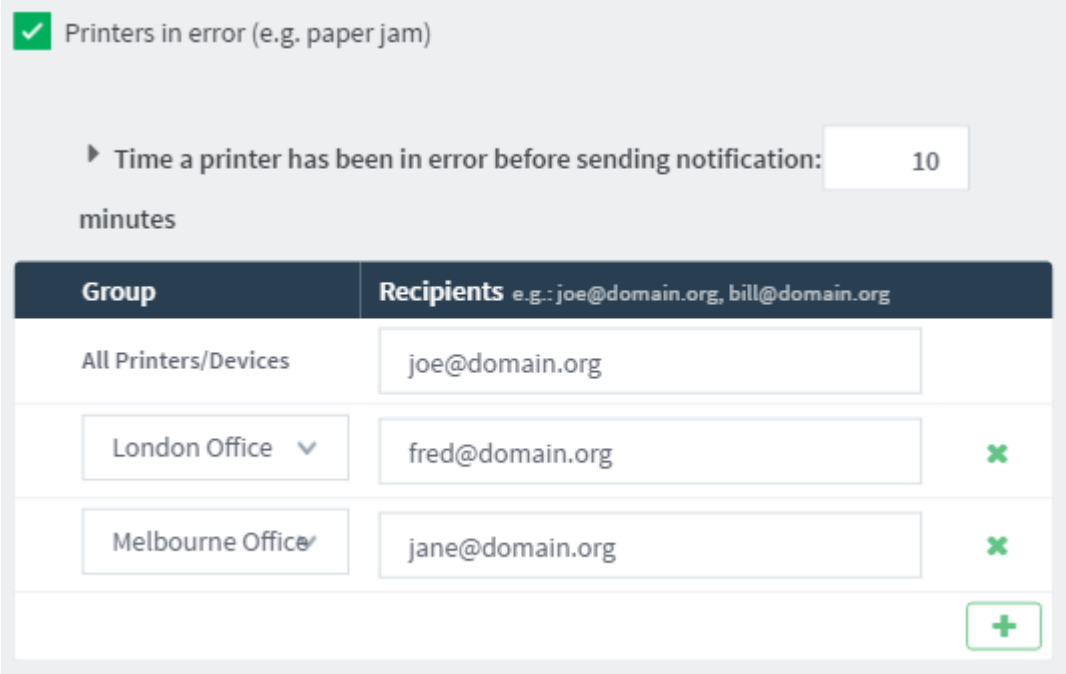
c. Enter each recipient's email address separated by a comma.



8. Repeat step 6 for each relevant printer group.
9. Click **Apply**.

Low printer toner notifications

Low printer toner notifications are used to give advance warning when printers are running low on toner. This allows administrators to ensure that printers never run out of toner and improves printer uptime.

The low toner notifications are available only for supported network printers. The toner information is retrieved from the printer using SNMP over the network. To use low toner notifications, ensure that SNMP is enabled on your printer and that your network/firewalls/switches allow the PaperCut NG/MF server to send SNMP requests to the printers. For more information see Retrieve toner levels (for supported printers).

By default, a notification is sent out as soon as low toner is detected on a printer. You can, however, change the frequency of these notifications by selecting the **Low printer toner Frequency** in the **System Notifications** area on the **Options > Notifications** page. You can select from:

- Hourly
- Daily
- Custom (available only if `notify.toner-level.schedule` Config key has been set)
- Notification for each low toner alert

Low toner notification emails are sent on the first incident where low toner is detected. The next notification is sent only when the toner level goes above and then below the configured threshold.

By default, toner levels are retrieved from the printer at least every 4 hours and also during the scheduled daily maintenance tasks. In most cases, this frequency should be sufficient, however, you

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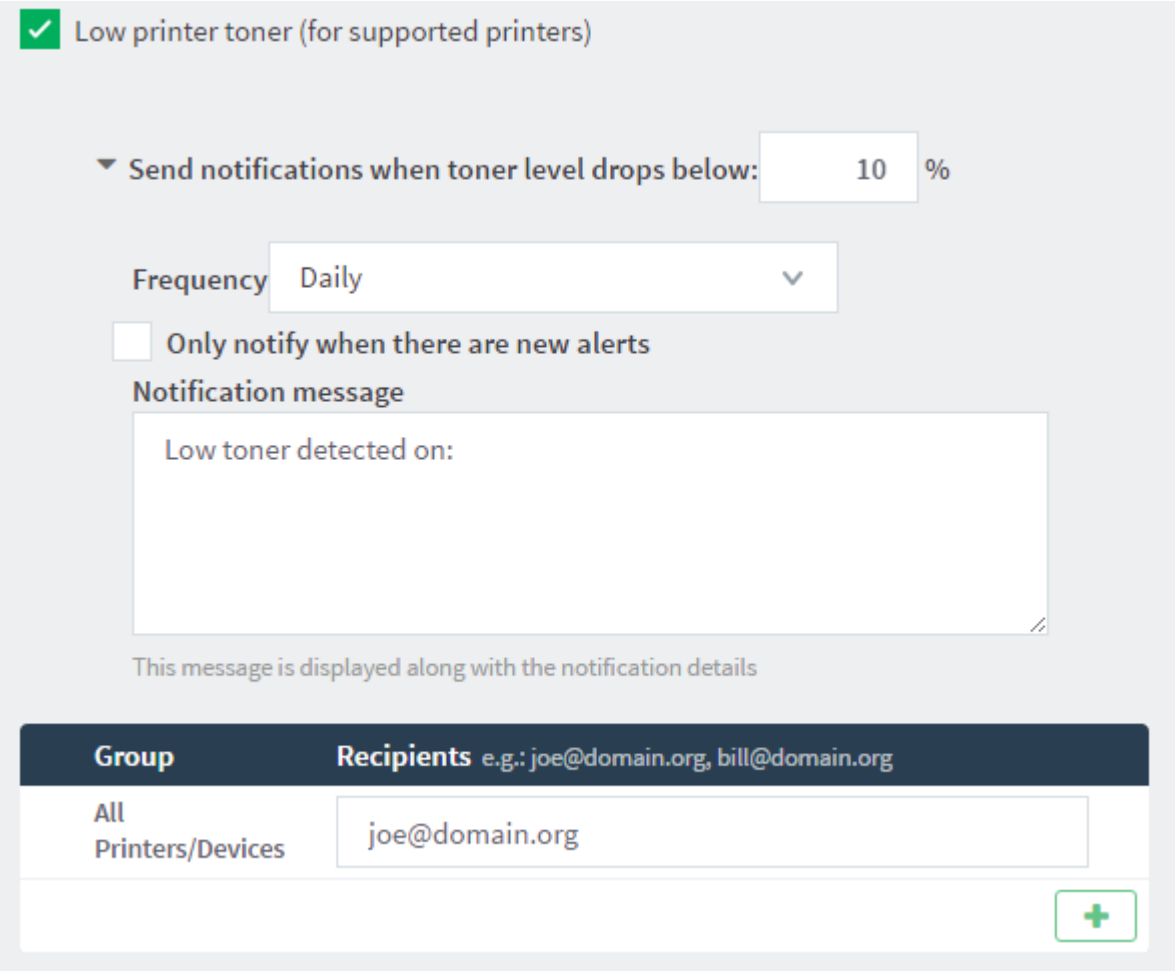
can change this rate using the config key `toner.minimum-check-period-mins`. Note: Changing this can significantly affect network traffic.



The notification message lists all print queues that are related to the same physical printer and includes toner levels for all the printer's toner cartridges. The location of the printer and the server it's hosted on is also included in the message by default.

You can specify a set of email recipients to receive notifications for all printers and devices. You can enter multiple email addresses by separating them with a comma, for example, `joe@domain.org, bill@domain.org`.

Alternatively, you can specify a different recipient list for each printer group. This is particularly useful for organizations where different people are responsible for the maintenance of different groups of printers. To achieve this, you must first include each printer in a printer group that identifies the team responsible for managing it, for example, assigning printers based their physical location. For more information, see Manage printer groups.

Tip:

It is recommended that you configure at least one recipient for all printer related notifications so notifications are not lost due to misconfiguration, such as if a printer is not in a printer group. This is because notifications for printers without any printer group are sent only to those on the **All Printers/Devices** recipients list.

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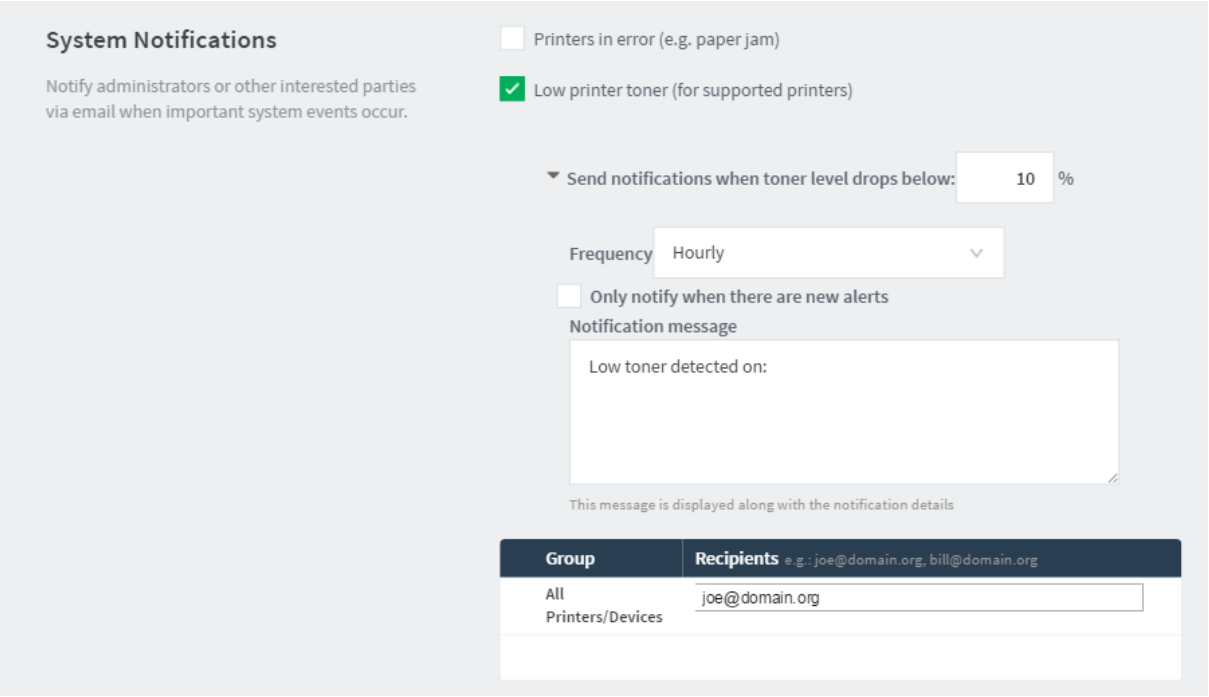
Note:
If you are using Direct Printing, and there is a low printer toner notification that affects all print queues linked to a printer, then only a single notification is sent.

To enable and configure low printer toner notifications:

1. Set up printer groups based on each service team's responsibility. For more information, see Manage printer groups.
2. Select **Options > Notifications**.

   The **Notifications** page is displayed.
3. Check that the SMTP server settings have been configured correctly.
4. Select the **Low printer toner** check box.
5. To customize the notification message:
   a. Click the arrow icon below the **Low printer toner** check box.
   b. In **Notification Message**, change the message text.
6. In **All Printers/Devices**, enter the recipients that need to receive notifications for all printers. Enter each recipient's email address separated by a comma.
7. To configure notifications to be sent to a list of recipients if it relates to a printer in a specific printer group:
   a. Click the plus icon in the lower right corner of this area. A new entry is displayed.



   b. Select a printer group.

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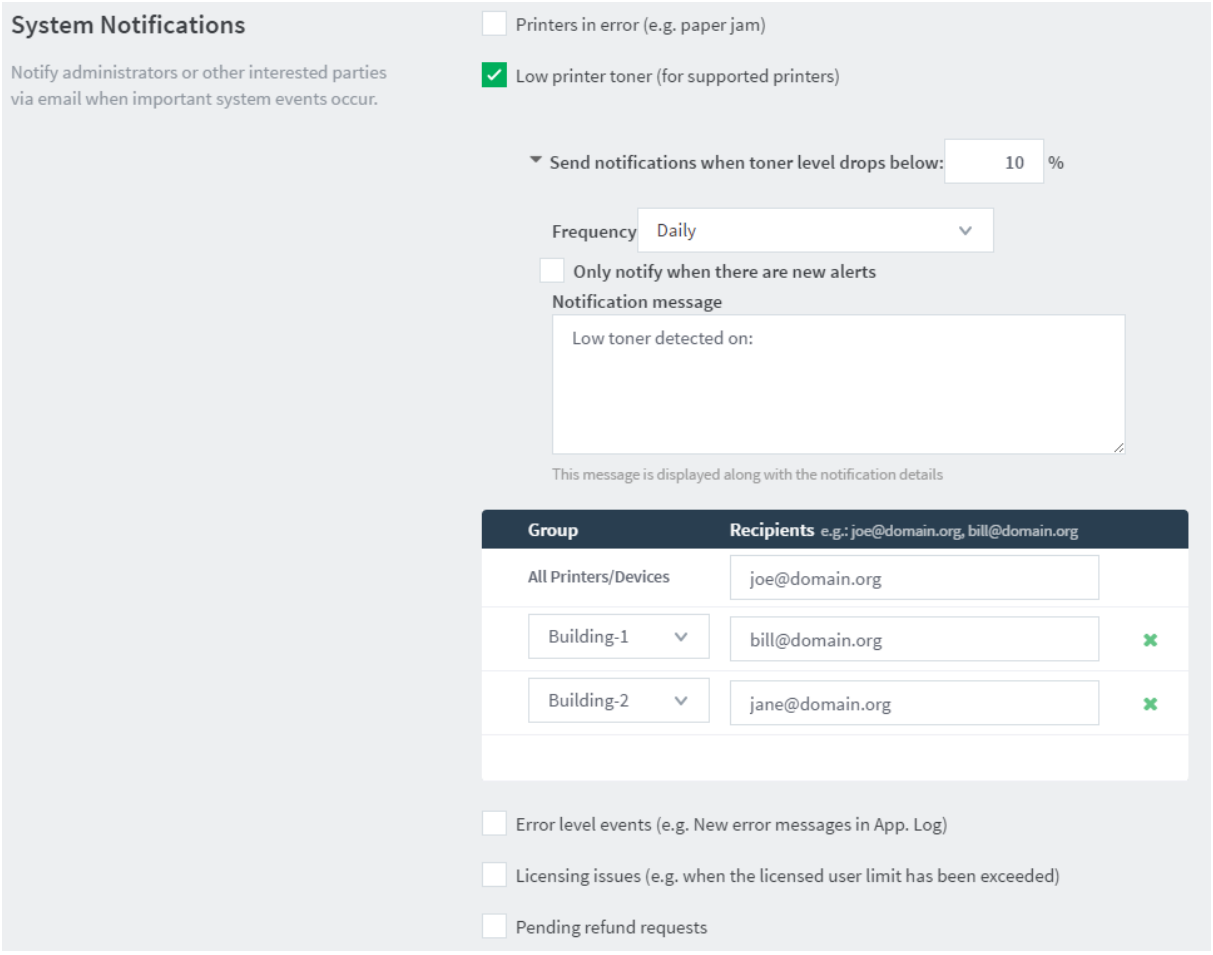
c. Enter each recipient's email address separated by a comma.



8. Repeat step 6 for each relevant printer group.
9. Click **Apply**.

Error level event notifications

Error level event notifications help to draw the attention of the administrator to any errors that might occur. This could involve events such as problems contacting a directory server, software crashes, or processing problems.

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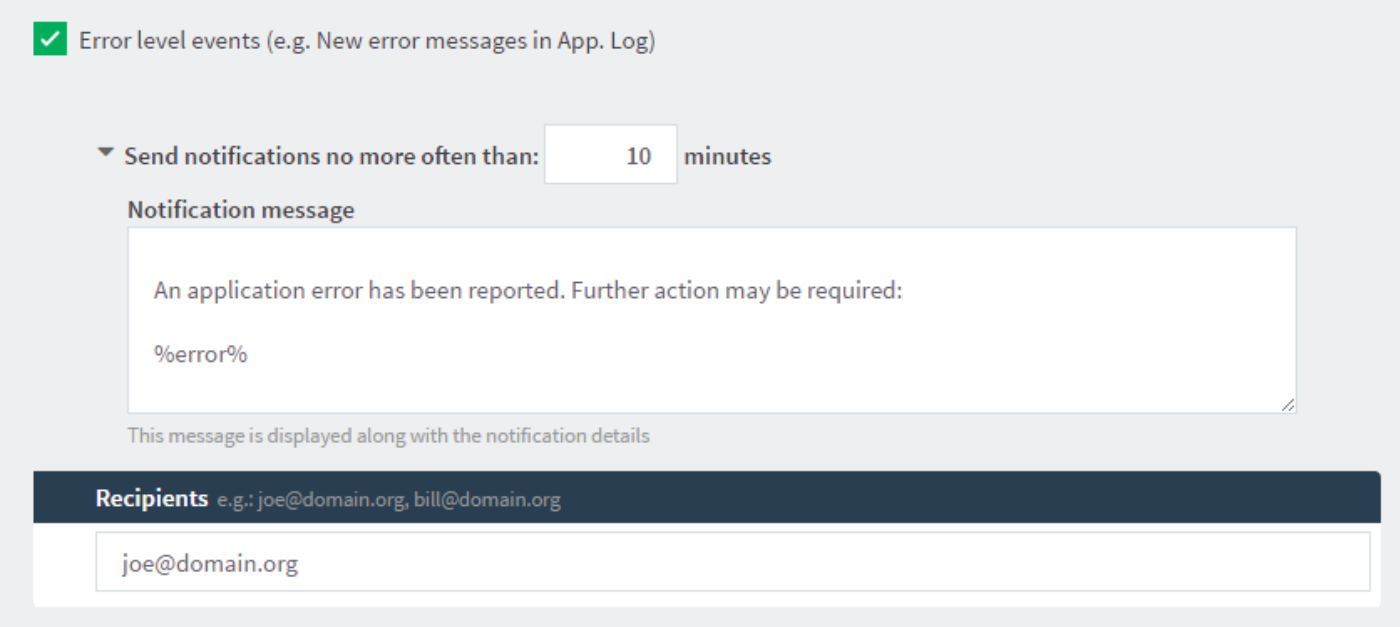

Some system states produce a lot of errors in the App Log in quick succession. This could cause numerous emails relating to the same issue, to be sent in a short period of time. If you do not want this to occur, you can limit the rate at which the App Log error emails are sent. By default, the frequency is set to 10 minutes, meaning that no notifications are sent within the 10 minute window after the last notification was sent. You can shorten or lengthen this window, however, the default should be suitable for most installations.

You can use the following special fields in error level event notifications:

Table 89: Fields available in error level event notifications

Field	Description
%error%	The error message detail.

You can specify a set of email recipients to receive notifications for all printers and devices. You can enter multiple email addresses by separating them with a comma, for example, `joe@domain.org, bill@domain.org`.

To enable and configure error level event notifications:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. Check that the SMTP server settings have been configured correctly.
3. Select the **Error level events** check box.
4. To customize the notification message:
   a. Click the arrow icon below the **Error level events** check box.
   b. In **Notification Message**, change the message text.
5. In **Recipients**, enter each recipients email address separated by a comma.

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Licensing issues notifications

Licensing issues notifications draw the administrator's attention to events where the licensing restrictions have been, or are about to be, exceeded. For example, a notification would be sent if the user limit is exceeded.

You can specify a set of email recipients to receive notifications for all printers and devices. You can enter multiple email addresses by separating them with a comma, for example, `joe@domain.org, bill@domain.org`.

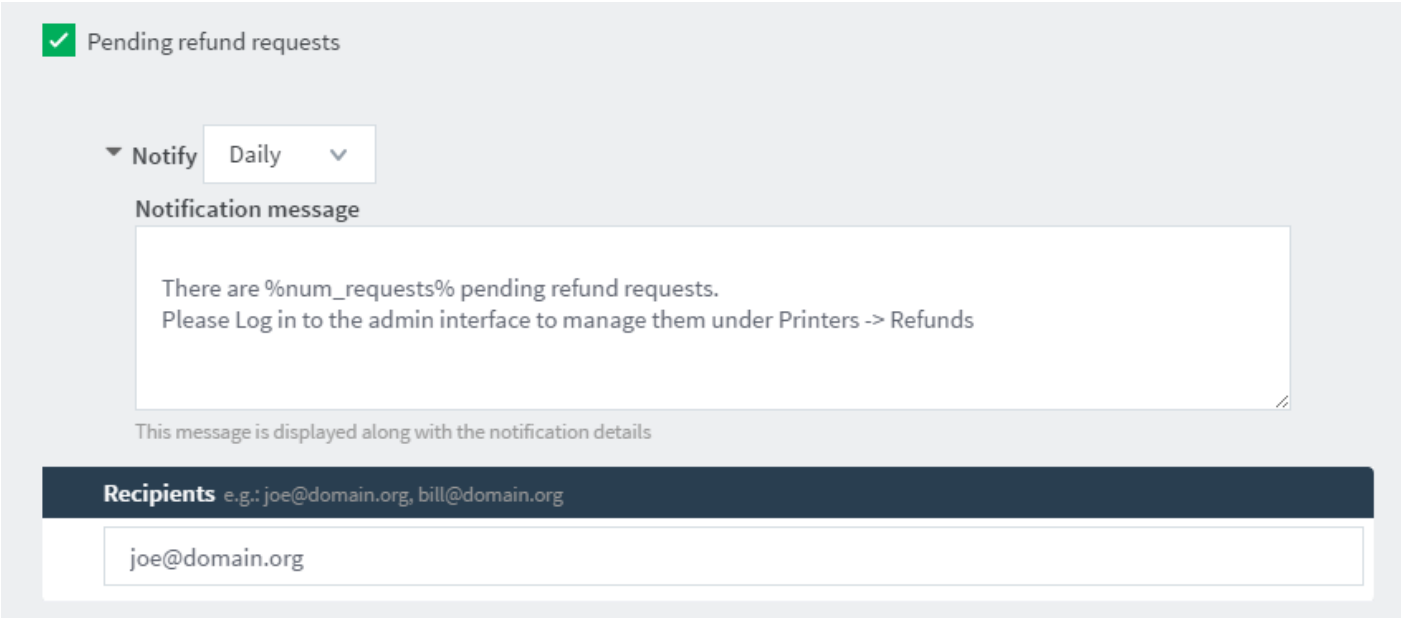
To enable and configure licensing issues notifications:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. Check that the SMTP server settings have been configured correctly.
3. Select the **Licensing issues** check box.
4. In **Recipients**, enter each recipients email address separated by a comma.

Pending refund request notifications

Pending refund requests notifications draw the administrator's attention to pending refund requests. By default, daily notification messages are sent at 7 a.m.



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By default pending refund request notifications are sent once per day. If there are no pending refund requests, the notification is not sent. If responsiveness to refund requests is important to you, you could change the frequency of these emails so that a notification is sent every hour.

You can use the following special fields in pending refund request notifications:

Table 90: Fields available in pending refund request notifications

Field	Description
%num_requests%	The number of pending refund requests.

You can specify a set of email recipients to receive notifications for all printers and devices. You can enter multiple email addresses by separating them with a comma, for example, `joe@domain.org, bill@domain.org`.

To enable and configure pending refund request notifications:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. Check that the SMTP server settings have been configured correctly.
3. Select the **Pending refund requests** check box.
4. To customize the notification message:
   a. Click the arrow icon below the **Pending refund requests** check box.
   b. In **Notification Message**, change the message text.
5. In **Recipients**, enter each recipients email address separated by a comma.

Testing notification methods

Once the system notifications are configured, test that messages can be delivered. PaperCut NG/MF provides a function to send test messages to users. This allows you to verify that notifications are working without having to try to produce notifications artificially. To send a test notification:

1. Select **Options > Notifications**.

   The **Notifications** page is displayed.
2. In the **Test Notifications** area, enter the username of the user to send the message to.
3. Select the delivery method to use.
4. Enter the notification message to send.
5. Click **Send Test Notification**.
6. Verify that the notification was received.

5.1.7. Manage system backups

As with any application, it is important to ensure that backups are performed regularly. PaperCut NG/MF includes a built-in database export that saves the state of the database to a file. This functionality is designed to complement (not replace) a good system-wide backup process. The export is stored in the industry standard XML format and compressed using the standard ZIP format

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to reduce disk-space on the server and your backup medium. The use of these open standards ensures that your data is always available and accessible.

As PaperCut NG/MF is centrally managed, the only database that requires backup is on the Application Server. Secondary print servers and Site Servers do not require a database backup.

PaperCut NG/MF makes the process of managing export backups simple by automatically performing a weekly export. Export backup files are placed in the following directory:

```
[app-path]\server\data\backups
```

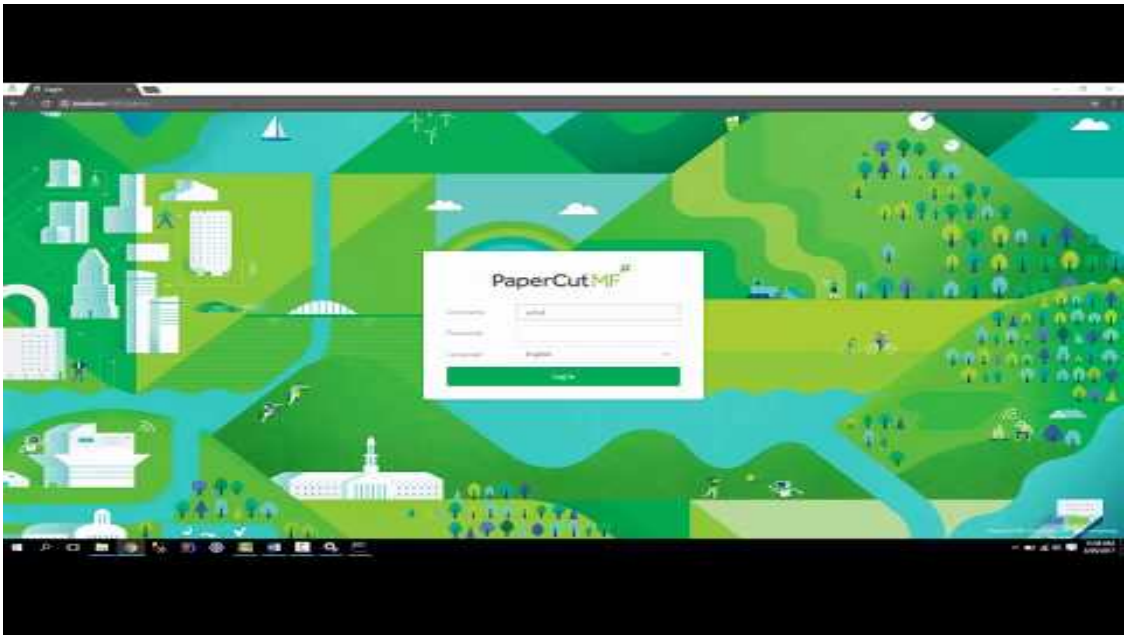
The weekly exports are performed at 20 minutes past midnight on Sunday morning (or as otherwise defined by the `schedule.weekly` config key. See Using the Advanced Config Editor to find out how to change config keys.)

Tip:

In accordance with backup best practice, back up the above directory regularly to offline media (e.g. tape, CD or remote server). This allows the data to be restored in the case the server hard-drive is corrupted. An example backup script called `copy-backups-to-remote-server.bat` found at `[app-path]/server/examples/scripting/batch/` can help administrators automate the process of maintaining an off-disk copy.

On larger networks, you might want to perform export backups more frequently than the in-built once a week period. Use the `server-command` tool to execute the export task at other times. Simply write a script (e.g. batch file) to execute `server-command perform-online-backup`. Schedule the script to run at the desired intervals. More information on `server-command` is available in Server commands (server-command).

5.1.7.1. Performing an online backup



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In addition to the automated weekly exports, it is also possible to manually initiate a database export. This might be useful to back up the system database before performing an upgrade. To perform a manual export:

1. Select **Options > Backups**.

   The **Backups** page is displayed.
2. Click **Export Now**.

   A window is displayed showing the export progress and the location where the export file is saved.

5.1.7.2. Restoring an export backup

There are a number of situations when it might be necessary to restore a database, including:

- Hardware or system failure requires you to rebuild the server and reinstall PaperCut NG/MF.
- A new print server was purchased and PaperCut NG/MF is being moved to a new server.
- To import data into an external RDBMS (See Deployment on an external database (RDBMS)).

To restore from an export file:

1. Locate a previous export file.
2. Shutdown the Application Server (See Stop and start the Application Server). The database cannot be in-use when performing the restore, so the Application Server needs to be stopped first.
3. Open a command prompt. On Windows 7 and Server 2008 systems, this might need to be specifically elevated to run with administrator privileges, even if you are already logged in with an administrator account. Change to the server binaries directory. On a Windows system the directory location is `[app-path]\server\bin\win\`.

   Tip:
   You must run the command prompt as an Administrator. In the Windows **Start** menu, right-click **Command Prompt**; then select **Run as administrator**.
4. Re-initialize the database back to an empty state by typing the following:

   ```
   db-tools init-db -f
   ```
5. Run the import process by executing the following:

   ```
   db-tools import-db -f "C:\path\to\backup\backup-file-name.zip"
   ```

   (Or, `./db-tools` on some systems. See Database tool (db-tools) for more information on using `db-tools`) NOTE: On Mac/Linux ensure proper permissions for access to the file, e.g.

   ```
   chown papercut:admin \path\to\backup\backup-file-name.zip
   ```
6. The import asks if the existing database data should be deleted before proceeding.
7. Once the import has completed, restart the Application Server (See Stop and start the Application Server).

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5.1.7.3. Performing an offline backup

Performing an online backup (as discussed above) is a simple and convenient process, but it is sometimes necessary to perform a backup when the Application Server is not running. For example:

- To integrate into your existing backup procedures, it might be necessary to write a script or batch file to perform a backup at a known point in time.
- When it is necessary to guarantee that the backup captures all the data. Performing an online export while the system is in use can modify data after the export is complete.

To perform an offline backup:

1. Stop the Application Server (See Stop and start the Application Server). To ensure all data is captured, the Application Server must be stopped to perform an offline backup.
2. Open a command prompt. On a Windows system change to the following directory: `[app-path]\server\bin\win\`
3. Run the database export process by executing:

   ```
   db-tools export-db
   ```

   (This create an export file in the system backups directory and the filename named with a timestamp).

   The export command has additional options that allows you to specify a different directory or filename. See export-db Command for more details.

5.1.7.4. Export file retention

Export files in

```
[app-path]\server\data\backups
```

are retained for 30 days and then deleted. You can change the number of days on the **Options > Backups** page under "Keep exports for ... days". This period is automatically extended should exports not be performed on a regular basis, i.e. when automatic exports have been temporarily disabled for a time or when skipping scheduled exports due to a system outage. Older export files are not deleted unless a number of new exports have been performed. At the very least the latest export file is always retained regardless of its age.

5.1.7.5. Backup print archive files

By default the print archive is stored in

```
[app-path]\server\data\archive
```

It is not included in the database exports detailed above. It is recommended that you consider backing up part or all of the print archive with your existing backup processes. As PaperCut is resilient to partial restoration of the Print Archive you might want to backup only a month or two worth of archives. There is a `README.txt` in the archive directory that explains more about partial backups and the directory structure layout.

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5.1.8. Set system security options

The default installation of PaperCut NG/MF is configured to be secure. You can, however, modify the following default security settings:

- Change the Application Server ports
- Enforce HTTPS communication
- Restrict access to the Application Server
- Change the web session inactivity timeout

5.1.8.1. Change the Application Server ports

By default PaperCut NG/MF runs an internal web server on port 9191 (HTTP) and 9192 (HTTPS).

You can change the Application Server port from 9191/9192 to any other value, such as 80/ 443. For more information, see Enable ports 80 (HTTP) and 443 (HTTPS).

Important:
If you change the Application Server port, you must also change the port number in the applications that connect to the server. i.e, the Print Provider and the User Client.

Application Server connections

The following components connect to and from the Application Server:

- Admin web interface
- User web interface
- Web Cashier
- Payment Gateway Module
- Site Servers
- MFD/printer (port 9193 for device RPC—used only for embedded copier/MFP solutions)

The following components connect to the Application Server:

- Print Provider (secondary server)
- Standard Release Station
- User Client
- Mobility Print server

The Application Server connects to:

- User directories

All of the above clients need to be able to access this port on the server from across the entire network. If your organization uses firewalls between departments or campuses, then allow inbound HTTP and HTTPS connections on the designated ports to the PaperCut NG/MF Application Server.

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5.1.8.2. Enforce HTTPS communication

You can connect to PaperCut NG/MF using either HTTP or HTTPS, however, you can enforce the use of HTTPS in one of the following ways:

- **Redirect to HTTPS/SSL if available**—Redirect HTTP connections to HTTPS. The redirect is performed every time a user attempts to access PaperCut via HTTP, which can allow some vulnerability around man-in-the-middle attacks.
- **Use HTTP Strict Transport Security (HSTS)**—HSTS instructs the browser to only connect via HTTPS and not HTTP for a configured timeout period. The redirect is performed only once in the timeout period when the user first logs in rather than every time the interface is accessed. This minimizes the chance of man-in-the-middle attacks.

Important:

- You must use a signed SSL certificate to enforce HTTPS, otherwise users will not be able to access PaperCut NG/MF. For more information, see Generate SSL/HTTPS keys.
- HSTS instructs the browser to connect on port 443 only. Before enabling HSTS, test the connection to PaperCut on port 443.

To enforce HTTPS communication:

1. Test the connection to PaperCut NG/MF on port 443:
   a. In a browser, connect to `https://<Application Server address>`.
   b. Check that the URL does not include "`:9192`" at the end.
2. Select **Options > Advanced**.
   The **Advanced** page is displayed.
3. In the **Security** area:

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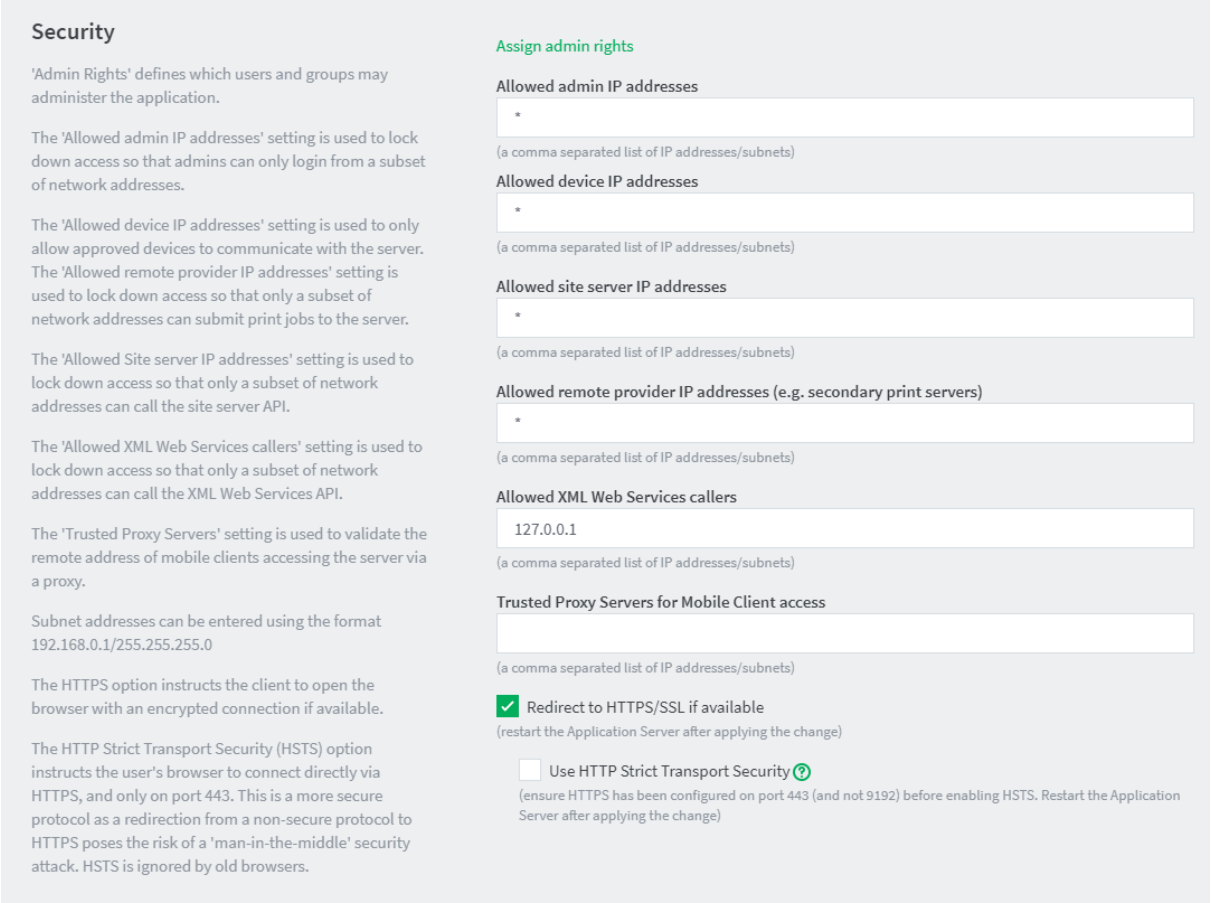
a. Select the **Redirect to HTTPS/SSL if available** check box.



b. If you want to connect using HSTS, select the **Use HTTP Strict Transport Security** check box.

> **Important:**
> If you select this option, you must use port 443. For more information about changing the port, see Enable ports 80 (HTTP) and 443 (HTTPS).

4. Click **Apply**.
5. Restart the Application Server. (See Stop and start the Application Server).
6. Perform a test print job to test all MFDs/printers to ensure they can still submit information to the Application Server.

> **Note:**
> If you cannot connect to the Application Server after enabling HSTS, it is likely due to either:
>
> - an invalid SSL certificate
> - the Application Server is running on a port other than 443
>
> You should roll back your changes:

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a. Log in to the server running the PaperCut NG/MF Application Server.

b. Connect to the PaperCut NG/MF Application Server web interface using localhost, for example, `http://localhost:9191`. Non-secure HTTP connections are allowed when connecting from localhost.

c. Clear the **Redirect to HTTPS/SSL** and **Use HTTP Strict Transport Security** check boxes.

d. Restart the Application Server.

5.1.8.3. Restrict access to the Application Server

You can restrict access to the Application Server by the following components:

- Restrict access to the Application Server by SysAdmins
- Restrict access to the Application Server by MFDs
- Set up trusted proxy servers for Mobile Client access
- Restrict access to the XML Web Services
- Restrict access to the Application Server by print servers
- Restrict access to the Application Server by Release Stations
- Restrict access to the Application Server by Site Servers

Restrict access to the Application Server by SysAdmins

After initial installation only the `admin` user, defined during the setup process, is permitted to administer the system. To allow additional users to administer PaperCut NG/MF follow the instructions defined in Assigning administrator level access.

You can also lock down access to the Admin web interface so that admins can log in only from a subset of network addresses.

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Security** area, in **Allowed admin IP addresses**, enter the list of IP addresses or subnet masks to allow. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the address and Y the subnet mask).
3. Click **Apply**.
4. Test that admins can access the Application Server Admin interface from the allowed network addresses.

Restrict access to the Application Server by MFDs

You can restrict the devices that can to communicate with the Application Server.

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Security** area, in **Allowed device IP addresses**, enter the list of IP addresses or

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subnet masks to allow. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the address and Y the subnet mask).

3. Click **Apply**.
4. Perform a test login or print job release from each MFD to ensure they can still communicate to the Application Server.

Restrict access to the Application Server by Site Servers

The PaperCut NG/MF architecture (see Architecture Overview and Print monitoring architecture) involves having a central Application Server and possibly multiple Site Servers sending data back to the Application Server to process.

PaperCut NG/MF supports an unlimited number of Site Servers and they can be located anywhere on the network. By default, PaperCut NG/MF allows these Site Servers to connect from any machine on the network. You can restrict this to a reduced set of machines by specifying a list of IP addresses or subnets that are allowed to submit information to the Application Server. You can set this using any one of the following methods:

From the Options > Advanced > Security area:

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Security** area, in **Allowed site server IP addresses (eg. secondary print servers)**, enter the list of IP addresses or subnet masks to allow. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the address and Y the subnet mask).
3. Click **Apply**.
4. Test all Site Servers to ensure that they can still submit information to the Application Server. To test the Site Server, perform a test print job to the Site Server that the provider is running on.

Using the Advanced Config Editor:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.

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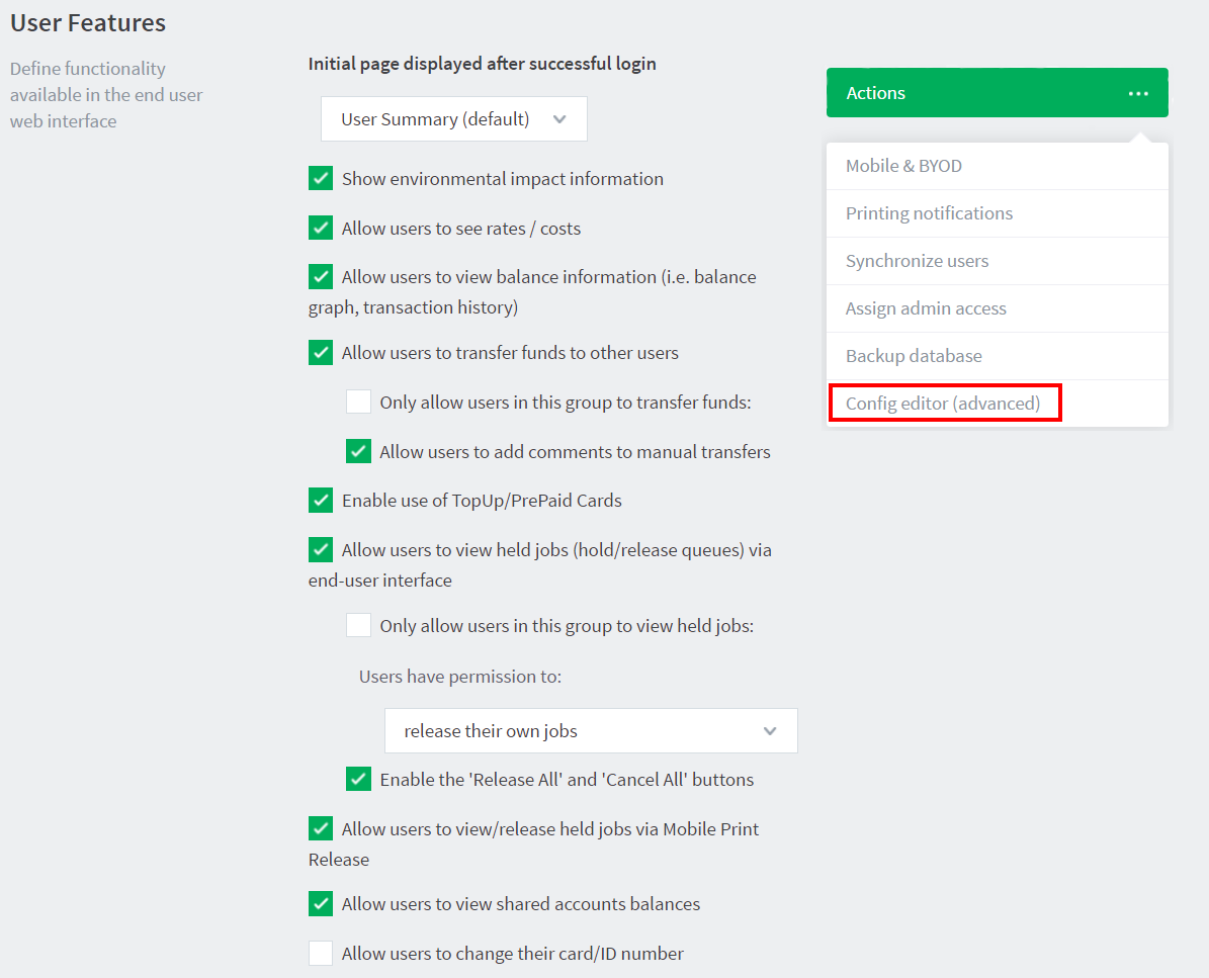

The **Config Editor** page is displayed.

3. Edit the following config key:

Config name	Description
`auth.site.allowed-addresses`	Enter a comma separated list of IP addresses to allow.

4. Click **Apply**.
5. Test all Site Servers to ensure that they can still submit information to the Application Server. To test the Site Server, perform a test print job to the Site Server that the provider is running on.

Restrict access to the Application Server by print servers

The PaperCut NG/MF architecture (see Architecture Overview and Print monitoring architecture) involves having a central Application Server and possibly multiple print servers sending data back to the Application Server to process. The PaperCut NG/MF components on the print server that are responsible for sending this data back to the Application Server include Print Providers and Mobility Print.

PaperCut NG/MF supports an unlimited number of information providers and they can be located anywhere on the network. By default, PaperCut NG/MF allows these providers to connect from any

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machine on the network. You can restrict this to a reduced set of machines by specifying a list of IP addresses or subnets that are allowed to submit information to the Application Server.

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Security** area, in **Allowed remote provider IP addresses (eg. secondary print servers)**, enter the list of IP addresses or subnet masks to allow. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the address and Y the subnet mask).
3. Click **Apply**.
4. Test all providers to ensure that they can still submit information to the Application Server. To test the Print Provider, perform a test print job to the server that the provider is running on.

Restrict access to the XML Web Services

You can lock down access so that only a subset of network addresses can call the XML Web Services API.

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Security** area, in **Allowed XML Web Services callers**, enter the list of IP addresses or subnet masks to allow access to the XML Web Services API. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the address and Y the subnet mask).
3. Click **Apply**.
4. Perform a test XML Web Services call from the allowed network addresses.

Set up trusted proxy servers for Mobile Client access

The PaperCut NG/MF Mobile Client (iPhone/iPad App) uses the originating IP address to identify the user when printing from an iPhone or iPad. If you are accessing the PaperCut NG/MF server via a proxy server, the originating IP address may be obscured by the proxy. As a result, no jobs are displayed in the iPhone/iPad App.

Most proxy servers do retain the originating source address in an X-Forwarded-For HTTP header. This header lists the originating source address plus the address of each proxy server forwarding the message.

For security reasons, PaperCut NG/MF by default does not trust the X-Forwarding-For header. To make use of this header and get your mobile clients to work via a proxy server, you must first add your proxy servers to PaperCut NG/MF's list of trusted proxy servers. PaperCut NG/MF will use the remote IP address provided by the X-Forwarding-For header only if all hops are through a trusted proxy server and the final proxy server matches the source address of the message.

You can set up trusted proxy servers for Mobile Client access.

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.

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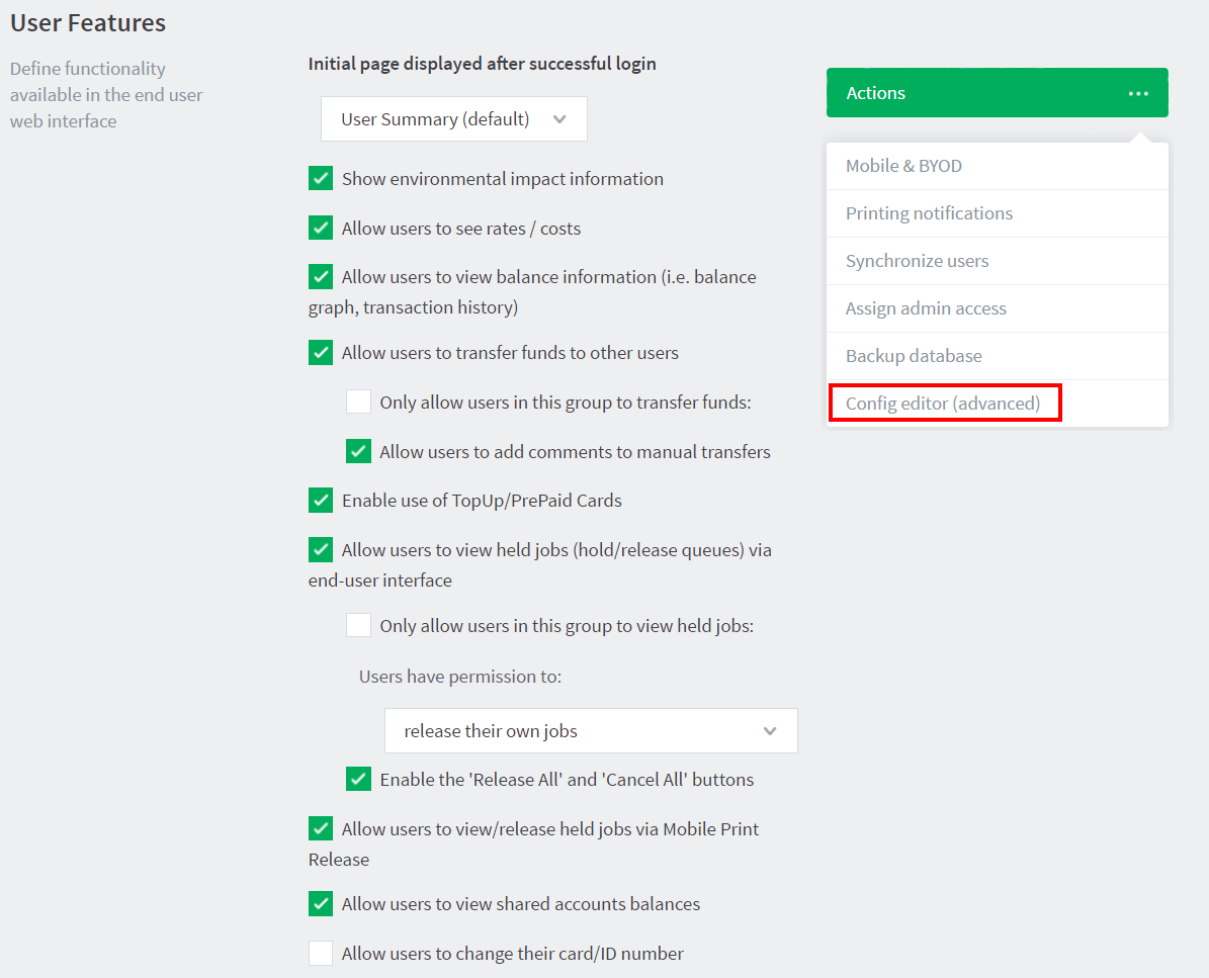
2. In the **Security** area, in **Trusted Proxy Servers for Mobile Client access**, enter the list of IP addresses or subnet masks to allow access to the server via a proxy. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the address and Y the subnet mask).
3. Click **Apply**.
4. Test access from the Mobile Client from all network addresses.

Restrict access to the Application Server by Release Stations

You can restrict the address ranges from which standard Release Stations (see Standard Release Station) access the Application Server. This measure only applies to standard Release Stations and does not affect print release at an embedded device or from a web browser.

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.



   The **Config Editor** page is displayed.
3. Search for the config key: `auth.release-station.allowed-addresses`
4. Enter the list of IP addresses or subnet masks to allow. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the

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address and Y the subnet mask).

5. Click **Update**.
6. Test all standard Release Stations to ensure they can still successfully start-up and connect to the Application Server.

5.1.8.4. Change the web session inactivity timeout

For security reasons all the web sessions log out (timeout) after periods of inactivity. Clicking a link or refreshing a page resets the inactivity timer. Closing the browser window/tab also ends the session (i.e. the session cookies are not persistent). The default timeout periods for different login types are described in the table below:

Table 91: Default Web Session Inactivity Timeout Values

Login Type	Default value
Admin web interface	1440 minutes (24 hours)
Web based Release Station	1440 minutes (24 hours)
Web Cashier	1440 minutes (24 hours)
User web interface	60 minutes (1 hour)

These timeout values (a period given in minutes) are configurable via the config keys below. A value of `0` indicates that the session never times out. The special value **DEFAULT** indicates that the PaperCut NG/MF defaults (in the above table) are used (the PaperCut NG/MF defaults might change in future versions).

Table 92: Timeout Web Session Config Keys

Config name	Description
web-login.admin.session-timeout-mins	Inactivity timeout for the admin web interface.
web-login.web-cashier.session-timeout-mins	Inactivity timeout for Web Cashier.
web-login.release.session-timeout-mins	Inactivity timeout for the web based Release Station.
web-login.user.session-timeout-mins	Inactivity timeout for the user web interface.

See Using the Advanced Config Editor for information about changing config keys.

Changing the inactivity timeout values take effect the next time users log in. Note that some pages periodically refresh the page (or data on the page), such as the dashboard and the web based Release Station. A session does not time out if a browser is left on these pages, as it is considered active.

5.1.9. Change the environmental impact reference values

One of the primary aims of PaperCut NG/MF is to reduce printing levels by changing a user's printing behavior. Implementing monitoring, quotas and charging are a good way of drawing a user's attention to their habits. The topic of the environment, global warming, and waste management is

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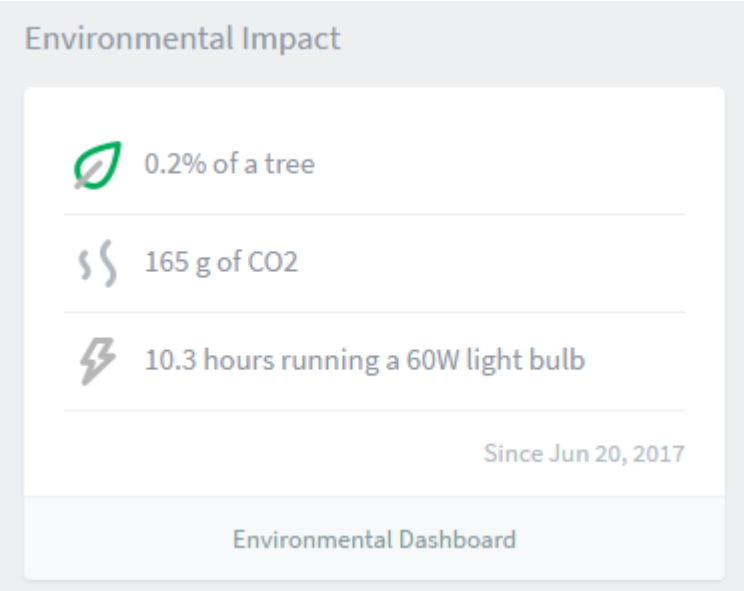
currently an area of debate and interest to many. Highlighting the environmental aspects of their activities is another good way of modifying a user's behavior.



The *Environmental Impact* area is available to end users on the User web interface summary page (See Environmental Impact for more details). Administrators can view the impact of a user and a printer via the details pages in the Admin web interface.

The meaning of the reported values and how they are calculated are detailed below:

Table 93: Environmental Impact Reporting

Field	Description
Trees	This value corresponds to percentage of a tree that has gone into making the paper. The value assumes the user is printing on standard A4 or Letter sheets and 8,333 sheets make up a tree. **Note:** A single tree can produce about 8,333 sheets of paper according to Tom Soder's study and reported in Claudia Thompson's book *Recycled Papers: The Essential Guide*, Cambridge: The MIT Press, 1992. This value is set by the config key: `environment.sheets-per-tree`
Carbon	This value corresponds to greenhouse gases released in the production of the paper (CO_2 equivalent). The value assumes that the user is printing on standard A4 or Letter sheets and one sheet equals 12.7g CO_2. This amount is equal to 2.5 metric tons of CO_2 carbon equivalents per metric ton of paper. **Note:** Environmental impact estimates were made using the

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Field	Description
	Environmental Paper Network Paper Calculator Version 3.2. For more information visit www.papercalculator.org. The *Conservatree* organization indicates that there are about 200,000 paper sheets in a ton, http://conservatree.org/learn/EnviroIssues/TreeStats.shtml, retrieved April 2015. . The default value takes in account CO_2 produced as a byproduct of the paper production only. It does not take into account the power consumed by the printer or power associated with the ink / toner use and production. Finding referenced figures on these values is difficult, and one could argue that the printer power consumption is not a function of the user's usage as the printer would be there consuming power even if they do not use the device. This value is set by the config key: `environment.co2-grams-per-sheet`
Energy	This value represents the manufacturing energy used to produce the paper minus an energy credit created by burning the paper. The energy value is represented by relating it to the equivalent energy consumed by a standard light bulb. This provides users with a real world understanding of the value. This value assumes the user is printing a standard A4 or Letter sheet and that the manufacturing cost per sheet is 48Wh. **Note:** This is an appropriate amount for virgin office paper. 32Wh is more appropriate for 100% recycled paper. This value is set by the config key: `environment.watt-hours-per-sheet`

Change the environmental impact reference values

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.

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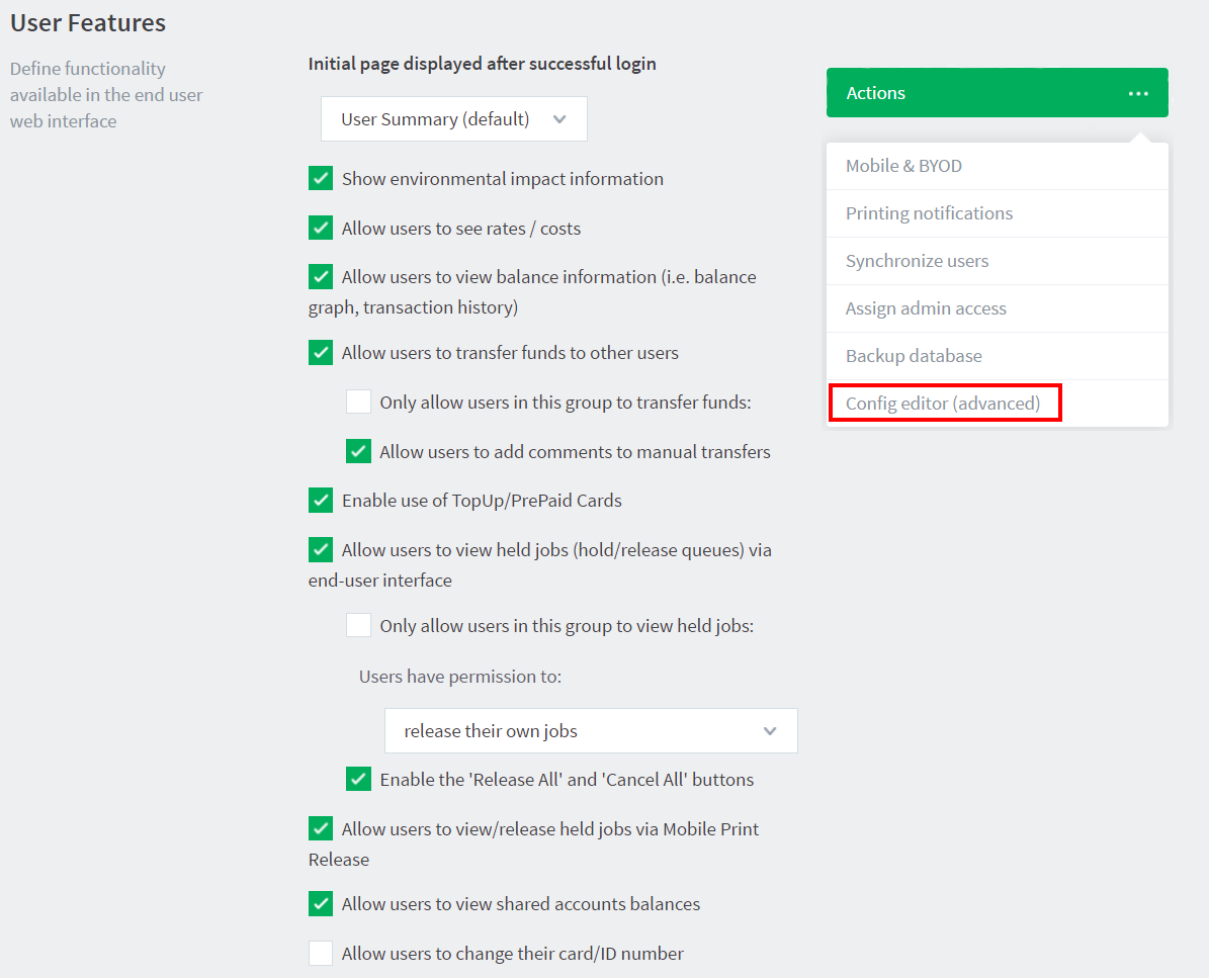

The **Config Editor** page is displayed.

3. Edit the value for any of the config keys described in the above table.

5.1.10. Set privacy options

As a print tracking system, most organizations and users expect PaperCut NG/MF to record all printing activity. For organizations concerned that users might require more privacy than the default level of tracking affords, you can enable or disable features to suit. E.g. if the content of documents should not be viewed by PaperCut NG/MF administrators, or disabling the Print Archiving feature. You can enable and disable many features at **Options > General** .

Set the privacy options

1. Click the **Options** tab.

   The **General** page is displayed.

2. In the **Privacy Options** area, select any of the following options as required:
   - **Omit document names from the Job Log**—Select this option if you do not want to include the document name of print jobs in the logs. Document names can include identifying information about a user or the nature of their print job.
   - **Remove document information from the Job Log after**—Select this option if you

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want document-identifying data elements of jobs that are older than a set time period (default: 6 months) to be permanently removed (redacted) from the Job Logs page. If selected and configured, this is included in the daily scheduled maintenance routine. The document-identifying data elements that are impacted by this include:

- *date* – (optional) the time stamp in the job date is changed to 11:00:00 AM.

  > **Note:**
  > To change the job time stamp to 11am, set the `job.privacy.redact-timestamp.enabled` config key to `Y`. For more information about editing config keys, see Using the Advanced Config Editor.

- *print archives* – thumbnail previews are no longer displayed and cannot be clicked to view the document or to download the spool file.
- *document name* – are displayed as being redacted by the system, with the redact time stamp, instead of the actual name of the document.
- *job size* – the size of the job is displayed as 0KB.
- *client machine* – the machine from which the job was printed is displayed as being redacted by the system.
- *comments* – comments that have been added to the log are no longer displayed.
- *watermarking signature* – digital signatures that have been applied using watermarking are displayed as being redacted by the system, with the redact time stamp, instead of the actual document name.

For more information on redacting other document-identifying data elements using server commands, see Server commands (server-command)

> **Note:**
> All departmental, group, and personal reports will still reflect the relevant printer usage.

- **Anonymize jobs (don't link jobs with users)**—Select this option to delete any links in the database between a user and a print job after a print job has been processed.

  This anonymization is achieved by re-assigning the job to a different, specified user once the job has completed. The default and recommended approach is to assign jobs to a user called `anonymous`. If this user does not exist at the time the feature is enabled then a new internal (non-domain) user with the configured name is created (this user has no password, so cannot be used to log in).

  Viewing the Job Log for this anonymous user shows all jobs in the system. The transactions (charging) for jobs are still applied to the original user, however, so that features such as print quotas continue to work as expected. Transaction times and job log times could be cross-referenced to potentially determine a link, as they will be close

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together in time. If this is a concern, then use the options at **Options > Backups > Automatic Backups** to delete transaction logs older than a given age.

Selecting this option means that any functionality requiring a link between a user and a job (once the job has completed) is no longer available. This includes user-based reporting and job refunds. It is recommended that this option is only enabled if strictly required.

3. Click **Apply**.

5.1.11. Using the Advanced Config Editor

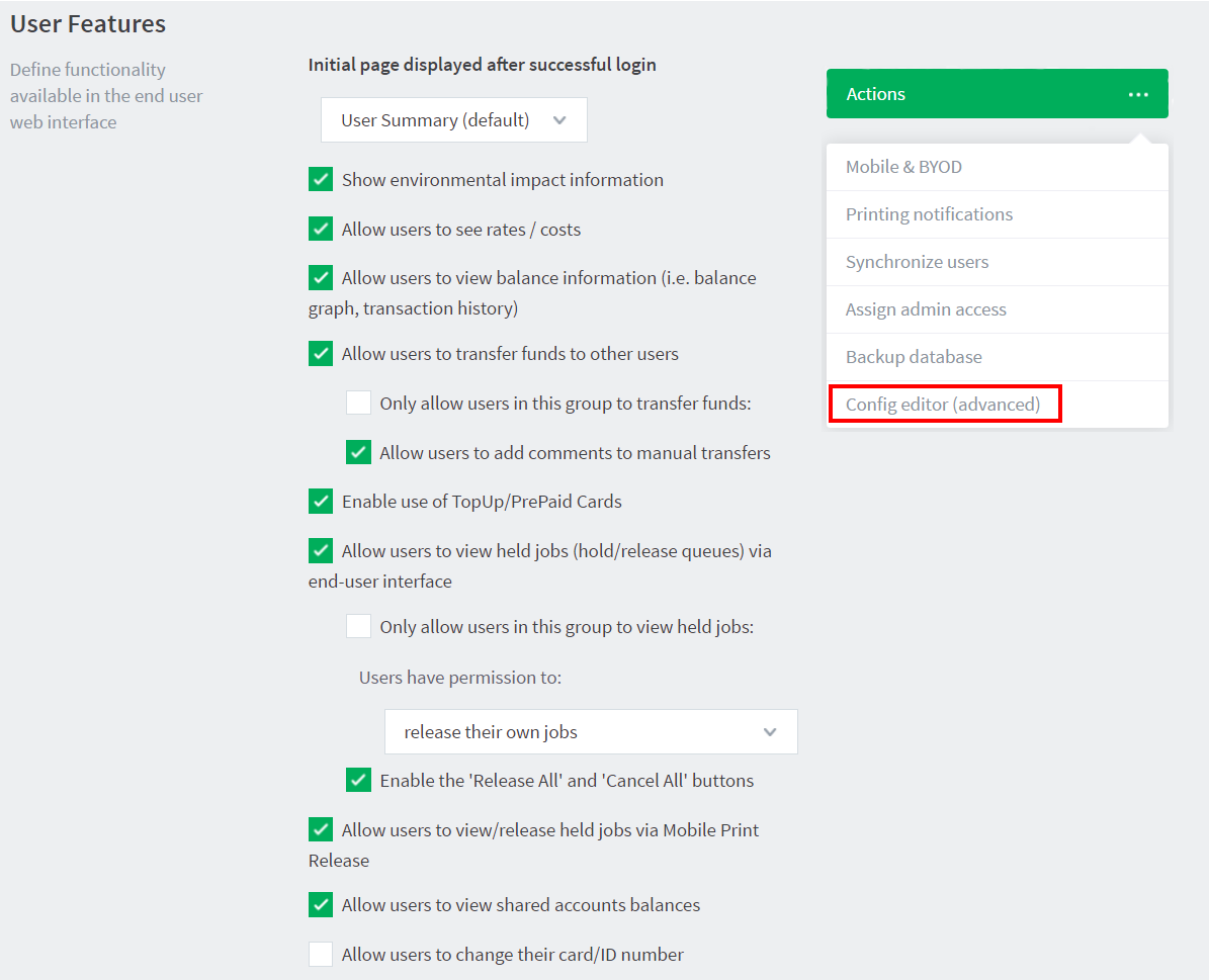
Most of the settings in PaperCut NG/MF are easily accessible via the main Admin web interface (e.g. the Options tab). Some advanced settings are, however, only accessible via the Advanced Config Editor. The Advanced Config Editor stores keys or information used by PaperCut NG/MF to configure various options and functions. This is very similar to the Windows System Registry database.

Administrator can edit config keys using the following procedure:

1. Click the **Options** tab.

   The **General** page is displayed.

2. In the **Actions** menu, click **Config editor (advanced)**.



The **Config Editor** page is displayed.

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3. In **Quick find**, enter the config key name; then click **Go**.
4. Locate the required key and enter a new value.
5. Click **Update** to apply the change.

Example of some keys that are often changed by administrators include:

- **client.config.show-link** - Indicates whether or not the link at the top of the User Client is displayed.
- **client.config.show-details-link** - Indicates whether or not the "Details" link that points to the user web interface is displayed.
- **display.login-instruction** - Used to display login instructions on the user/password screen.

Important:
Take care when using the Advanced Config Editor. If you use the Advanced Config Editor incorrectly, you can cause serious problems that can only be fixed by reinstalling the application.

5.1.12. Add third-party integrations

PaperCut NG/MF has one of the biggest collections of third-party integrations around. They're all tried and tested with our customers, so give them a whirl to take your PaperCut NG/MF solution to the next level. To view the available third-party integrations:

1. Select **Options > Tools**.

   The **Tools** page is displayed.

This page provides information about the following types of 3rd party integrations:

- accounting
- payment
- miscellaneous

Note:
You can hide the Tools tab by changing the `web.product-integrations.enabled` config key to **N**. For more information about config keys, see Using the Advanced Config Editor.

5.1.13. Logging

PaperCut NG/MF has two types of logging within the Administration pages; Application and Audit logging. Both log views are accessible via the Logs tab for users with sufficient administrative rights to view these. In both cases, there are some minor configuration changes an administrator might want to tune.

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5.1.13.1. Application Logs

The Application Log retains a complete history of system events (errors, notifications, alerts, etc), unless configured otherwise.

Table 94: Application Log Configuration Keys

Config key	Description
`delete.app-log.days`	The number of days to retain the application logging. A value of -1 indicates no limit

5.1.13.2. Audit Logs

The Audit Log retains a complete history of administration changes to a user, unless configured otherwise.

You can disable this if a customer does not want to retain this information via **Options > Advanced > Diagnostics > Enable audit logging**

Additional config options exist in the Config Editor :

Table 95: Application Log Configuration Keys

Config key	Description
`logging.audit-logging-max-days`	The number of days to retain the audit logging.

5.2. Server management

This section contains advanced configuration related to PaperCut NG/MF's internal web server (powered by Apache Jetty). The configuration options mentioned here should generally only be used as a reference for specific requirements, as some changes could negatively impact on system functionality.

5.2.1. Change the server address

5.2.1.1. Change the server address presented to users

Some features in PaperCut require being able to create a link or address for the Application Server. One example of this is when using Email to Print - the verification email sent to users contains a link that they must click. This link must resolve to the PaperCut server both from the internet and from the local network.

The default address presented in these cases is an automatically detected IP address. In some cases this might not be suitable, for example, where it needs to be resolved from the internet.

The recommended approach is to configure a DNS name for your PaperCut server that can be resolved and accessed wherever your users require it. This can involve creating a public/external DNS name and opening the appropriate ports in your firewall. After the name is configured:

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1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Server Address** area, select **DNS name (or other IP)**.
3. Enter your chosen (fully qualified) name.
4. Click **Apply**.

Change the server port presented to users

In some circumstances, you might also need to customize the server HTTP port presented to users. An example scenario is when a reverse proxy server for WebAuth or Shibboleth SSO is placed in front of the PaperCut NG/MF server. For this situation, PaperCut provides two advanced config keys to allow the user facing server port to be customized: `system.network-port-http.user-facing` and `system.network-port-https.user-facing`. (See Using the Advanced Config Editor for instructions on using the Config Editor.)

5.2.1.2. Change the server address presented to external components

In some cases PaperCut publishes its address to external components (e.g. MFDs) to allow them to establish a connection back to the server. The published address is an automatically detected IP address by default. If your server has multiple IP addresses then the detected IP might not be suitable and could cause components to fail to connect.

To resolve this you can configure the network address (e.g. DNS name or IP address) that PaperCut publishes to these external components. To do this use the Config Editor (see Using the Advanced Config Editor) to change the `system.network-address` to your chosen address.

This is configured separately from the **Server address presented to users** to provide the option to use an IP address for components and a DNS name for users (for example, to avoid DNS lookups on devices that do not cache the result).

PaperCut Site Servers can have their published network address configured by navigating to **Sites > (site name) > Configuration > Network address used by devices** .

5.2.2. Change the network interface that PaperCut NG/MF listens on

PaperCut NG/MF listens on all available network interfaces by default. If your server has multiple IP addresses (i.e. is multi-homed), PaperCut NG/MF accepts connections to all these addresses. Alternatively, you can configure it to listen on a single, defined interface. To configure PaperCut NG/MF to listen on a single network interface:

1. Open `[app-path]/server/server.properties` in a text editor.

   Add a new line:

   ```
   server.listen-interface=1.2.3.4
   ```
2. where `1.2.3.4` is the (static) IP address of the network interface for PaperCut NG/MF to listen on.

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3. Restart the service **PaperCut NG/MF Application Server**

5.2.3. Override the "host" header for redirects

PaperCut NG/MF's web server requires the ability to redirect users to new pages. When performing a redirect, the target location is based on the *Host* header that the web browser requested. If the host header is omitted (e.g. by manually crafting an HTTP request), the target location is based on the server's own hostname or IP address. In a NAT environment this might not be ideal if the server's IP address is considered private.

This can also apply if security audit software reports *Web Server HTTP Header Internal IP Disclosure* or similar.

Configure PaperCut NG/MF to always forward to a specified host

1. In a text editor, open `[app-path]/server/server.properties`.

   Add a new line:

   ```
   server.force-host-header=printing.uni.edu
   ```

   where `printing.uni.edu` is the fully qualified host name on which all users will access PaperCut NG/MF.
2. Restart the service **PaperCut NG/MF Application Server**
3. Test access to the web interface (using both HTTP and HTTPS if applicable).

Note that when this option is used, PaperCut NG/MF should not be accessed using any hostname other than the one configured. Doing so can cause problems.

5.3. Tools - database, server-command scripting, and APIs (Advanced)

This section outlines the command line tools and advanced programming tools that come with PaperCut NG/MF. Using these tools is discussed throughout this manual, however, this provides a reference guide to these tools and their use.

Caution:

The advanced tools provided with PaperCut NG/MF are very powerful and offer opportunities for all manner of customizations and enhancements. However, if used incorrectly, these tools could lead to unexpected results. Many of the advanced tools are written for software and script developers. It is expected that readers intending to use advanced tools are comfortable with using the command-prompt, and developing system management and server monitoring programs.

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5.3.1. Server commands (server-command)

The `server-command` tool provides access to dozens of server operations ranging from user management, system maintenance, account manipulation and printer control. The `server-command` tool is ideal for controlling the PaperCut NG/MF *Application Server* via the command-line or automating via scripts.

Some examples of how an Administrator might use the `server-command` tool:

- Scheduling of online backups and data snapshots.
- Scheduling user and/or group synchronization tasks.
- Automating the addition of new users after the accounts are added to the network.
- Performing account transactions such as adding funds/quota to user accounts.
- Automating user account creation using custom scripts.
- Disabling/Enabling printers.
- Disabling/Enabling printing for users.
- Controlling user restriction levels.
- Managing shared accounts.
- Disabling/Enabling SNMPV3 on printers and devices.

The `server-command` program is a command-line tool. It accepts the commands as arguments and outputs the results of the command on the console (standard-out). For security reasons only users with read access to the `server.properties` (normally only the `Administrators` group) have rights to execute the commands.

Typical use on a Windows system:

Add $10.00 to a user named 'testuser':

```
C:\> cd [app-path]\server\bin\win
C:\> server-command adjust-user-account-balance "testuser" 10.00
\ "Added $10.00 to your account"
```

Note:
Backslash indicates text should be on the same line.

5.3.1.1. Accessing server commands remotely

Server commands can also be called remotely using standard remote command tools.

On Windows

Use PsExec - a remote command program provided by the Sysinternals team at Microsoft. For example, (all on one line):

```
psexec.exe \\remoteserver \
"C:\Program Files\PaperCut NG/MF\server\bin\win\server-
command.exe" \
```

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```
disable-printer printsrv1 labprinter -1
```

On Linux/Novell/Mac

Use SSH - a secure remote command/shell program. You can run SSH non-interactively in scripts with the use of an authorized public key added under the papercut account's ~/.ssh/authorized_keys list. For example, (all on one line):

```
ssh papercut@remoteserver \
"/home/papercut/server/bin/linux-x64/server-command \
disable-printer printsrv1 labprinter -1"
```

5.3.1.2. Available commands

A full list of commands is available via `server-command --help`.

```
Usage: server-command COMMAND [ARGS...]
COMMAND : The server command name.
ARGS : A list of arguments to supply to the command.

COMMANDS:
user-exists <username>
    Test to see if a user exists.
    <username> - the username to test.

get-user-account-balance <username> [<account>]
    Get a user's current account balance.
    <username> - the user's username.
    [<account>] - Optional personal account name. Used only when
        multiple personal accounts are enabled. Leave blank for
        a total balance.

get-user-property <username> <property>
    Gets a user property.
    <username> - the name of the user.
    <property> - the name of the property to get. Valid
        properties include:
        account-selection.mode - the user's current account
            selection mode
        account-selection.can-charge-personal - whether or not
            the user can charge to their personal account
        account-selection.can-charge-shared-from-list - whether
            or not the user can charge to a shared account,
            selected from a list
        account-selection.can-charge-shared-by-pin - whether or
            not the user can charge to a shared account,
            selected by PIN
        auto-release-jobs - whether or not the user's jobs will
            always be released on device log in
        auto-shared-account - the user's automatically selected
            shared account name
```

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```
            balance - the user's current account balance
            card-pin - the user's card pin number
            default-shared-account - the user's default shared
                account name
            department - the user's department
            disabled-net - whether or not the user's internet access
                is currently disabled (deprecated)
            disabled-print - whether or not the user's printing is
                currently disabled
            dont-apply-printer-filter-rules - whether or not the
                printer’s filter settings are applied to the user's
                jobs
            dont-archive - whether or not the user's jobs will be
                archived
            dont-hold-jobs-in-release-station - whether or not the
                user's job will bypass release queues
            email - the user's email
            full-name - the user's full name
            home - the user's home folder (a double-quoted UNC path)
            net-stats.data-mb - the internet data (in MB) used by
                the user (deprecated)
            net-stats.time-hours - the internet time (in hours) used
                by the user (deprecated)
            notes - notes for the user
            office - the user's office
            other-emails - the user's other emails
            overdraft-amount - for restricted users, the user’s
                overdraft limit
            primary-card-number - the user's primary card number
            print-stats.job-count - the total print job count for
                the user
            print-stats.page-count - the total printed page count
                for the user
            printer-cost-adjustment-rate-percent - percentage rate
                by which to adjust the user's job cost.
            restricted - whether or not the user is currently
                restricted
            secondary-card-number - the user's secondary card number
            unauthenticated - whether or not the user is an
                unauthenticated user
            username - alias - the user's alias. Only used when
                username aliasing is enabled.

    set-user-property <username> <property> <value>
        Sets a user property.
        <username> - the name of the user.
        <property> - the name of the property to set. Valid
            properties and values include:
```

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auto-release-jobs - whether or not the user's jobs will always be released on device log in (TRUE or FALSE). **Note:** If you set this property and the Override printer/device settings check box on the User Details page is not selected in the Admin web interface, all settings below Override printer/device settings will be removed, and only this setting will apply.
balance - the user's current account balance (a decimal number)
card-pin - the user's card pin number (any text)
default-shared-account - the user's default shared account name
department - the user's department (any text)
disabled-net - whether or not the user's internet access is currently disabled (TRUE or FALSE)(deprecated)
disabled-print - whether or not the user's printing is currently disabled (TRUE or FALSE)
dont-apply-printer-filter-rules - whether or not to apply the printer's filter settings to the user's jobs(TRUE or FALSE). **Note:** If you set this property and the Override printer/device settings check box on the User Details page is not selected in the Admin web interface, all settings below Override printer/device settings will be removed, and only this setting will apply.
dont-archive - whether or not the user's jobs will be archived (TRUE or FALSE).**Note:** If you set this property and the Override printer/device settings check box on the User Details page is not selected in the Admin web interface, all settings below Override printer/device settings will be removed, and only this setting will apply.
dont-hold-jobs-in-release-station - whether or not the user's job will bypass release queues (TRUE or FALSE).**Note:** If you set this property and the Override printer/device settings check box on the User Details page is not selected in the Admin web interface, all settings below Override printer/device settings will be removed, and only this setting will apply.
email - the user's email (an email address, or any text)
full-name - the user's full name (any text)
home - the user's home folder (a double-quoted UNC path)
notes - notes for the user (any text)
office - the user's office (any text)
other-emails - the user's other emails (a comma separated list). Use blank to clear all other emails

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```
            overdraft-amount - for restricted users with an
                overdraft mode of "INDIVIDUAL", the user's overdraft
                limit(a decimal number)
            password - the user's password (for internal users only)
                (any text)
            primary-card-number - the user's card number (any text)
            printer-cost-adjustment-rate-percent - percentage rate
                by which to adjust the user's job cost. If equal to
                or above 0, sets the percentage to <number>. If less
                than 0 or not a number, display an error. If
                <number> is blank (""), turn off the "Multiply job
                costs by" flag. Note: If you set this property and
                the Override printer/device settings check box on
                the User Details page is not selected in the Admin
                web interface, all settings below Override
                printer/device settings will be removed, and only
                this setting will apply.
            restricted - whether or not the user is currently
                restricted (TRUE or FALSE)
            secondary-card-number - the user's secondary card number
                (any text)
            unauthenticated - whether or not the user is an
                unauthenticated user (TRUE or FALSE)
            username-alias - the user's alias. Only used when
                username aliasing is enabled.
        <value> - the value to set (see <property> for valid values).

    clear-user-advanced-printer-settings <username>
        Clear the Override printer/device settings check box and all
            settings under it on the User Details page.
            Note: This behavior differs from the Admin web
                interface, in that in the Admin web interface, when
                you clear the Override printer/device setting check
                box, all of the settings under it remain.
        <username> - the name of the user.

    adjust-user-account-balance <username> <adjustment> <comment>
    [<account>]
        Adjust a user's account balance.
        <username> - the user's username.
        <adjustment> - the adjustment amount as a number. +ve or -ve.
        <comment> - a comment to be associated with the transaction.
        [<account>] - Optional personal account name. Only used when
            multiple personal accounts are enabled.

    adjust-user-account-balance-if-available <username> <adjustment>
    \
            <comment> [<account>]
```

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```
    Adjust a user's account balance if there is enough credit
        available.
    <username> - the user's username.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when
        multiple personal accounts are enabled.

adjust-user-account-balance-if-available-leave-remaining
<username> \
        <adjustment> <leave-remaining> <comment> [<account>]
    Adjust a user's account balance if there is enough credit
        available
    to leave the given amount available in the account.
    <username> - the user's username.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <leave-remaining> - the amount to leave in the account.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when
        multiple personal accounts are enabled.

adjust-user-account-balance-by-group <group> <adjustment>
<comment> \
        [<account>]
    Adjust the account balance for all users in a group. This
        process happens in the background.
    <group> - the group for which all users' accounts are to be
        adjusted.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when
        multiple personal accounts are enabled.

adjust-user-account-balance-by-group-up-to <group> <adjustment>
<limit>
        <comment> [<account>]
    Adjust the account balance for all users in a group, but
        don't increase user balance beyond the given limit. This
        process happens in the background.
    <group> - the group for which all users' accounts are to be
        adjusted.
    <adjustment> - the adjustment amount as a number. Must be
        +ve.
    <limit> - don't increase user balance beyond this limit.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when
        multiple personal accounts are enabled.
```

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```
set-user-account-balance <username> <balance> <comment>
[<account>]
    Set a user's account balance to a set value.
    <username> - the user's username.
    <balance> - set the account to this value. +ve or -ve.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when
        multiple personal accounts are enabled.

set-user-account-balance-by-group <group> <balance> <comment>
[<account>]
    Set the balance for each member of a group to the given
        value. This process happens in the background.
    <group> - the group for which all users' balance is to be
        set.
    <balance> - the value to set all users' balance to. +ve or -
        ve.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when
        multiple personal accounts are enabled.

get-user-overdraft-mode <username> <overdraft-mode>
    Get a restricted user's overdraft mode.
    <username> - the restricted user's username.
    <overdraft-mode> - the restricted user’s overdraft mode.
        Valid values are:
        DEFAULT - use the default overdraft limit that is
            applied to all users and shared accounts.
        INDIVIDUAL - use an individual overdraft limit that is
            specific to the user.

set-user-overdraft-mode <username> <overdraft-mode>
    Set a restricted user's overdraft mode.
    <username> - the restricted user's username.
    <overdraft-mode> - set the user’s overdraft mode. Valid
        values are:
        DEFAULT - use the default overdraft limit that is
            applied to all users and shared accounts.
        INDIVIDUAL - use an individual overdraft limit that is
            specific to the user.

reset-user-counts <username> <reset_by>
    Reset the page and job counts associated with a user.
    <username> - the user's username.
    <reset_by> - name of the user/script/process resetting the
        counts.

re-apply-initial-user-settings <username>
```

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```
    Re-applies initial settings on the user. Initial user
        settings are based on group membership.
    <username> - the user's username.

disable-printing-for-user <username> <minutes_disabled>
    Disable printing for a user for a set period of time.
    <username> - the name of the user to disable printing for.
    <minutes_disabled> - the time in minutes to disable. -1
        indicates forever.

add-new-user <username>
    Trigger the process of adding a new user account. Assuming
        the user exists in the OS/Network/Domain user directory,
        the account is created with the correct initial settings
        as defined by the rules set up in the Admin web
        interface on the Groups tab.
    <username> - the user's system username.

rename-user <current_username> <new_username>
    Rename the given existing user. Use this method with care.
        Renaming a user should be performed in conjunction with
        renaming the user in the OS/Network/Domain.
    <current_username> - the name of the user to rename.
    <new_username> - the user's new name.

export-user-data-history <username> <savelocation>
    To comply with the EU General Data Protection Regulation
        (GDPR) Right to Access, export user data from the
        following reports into five CSV files:
        User list
        User printing - logs
        Shared account security access
        User environmental impact - summary
        Transaction logs
        Note: The files will be owned by the system account
            running the PaperCut NG/MF process. The output
            folder must also have write permissions for this
            user.
        Note: Personal data from the Scan to Cloud application
            needs to be requested separately by sending an email
            to privacy@papercut.com.
    <username> - the user's system username.
    <savelocation> - the storage location for the five CSV files.
        This can be a relative path or an absolute path under
        the home directory of the Application Server's install
        location. e.g. <home>/server/tmp

delete-existing-user <username> [<flags>]
```

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```
        Delete a user account from the system. Use this with care as
            this is a one-way operation that cannot be undone.
            Calling this permanently deletes the user account from
            the user list (print history records remain).
        <username> - the user's system username.
        [<flags>] - Available flags include:
            permanently-redact-user-data - permanently removes
                (redact) identifiable user information to comply
                with the EU General Data Protection Regulation
                (GDPR) Right to be Forgotten.
            The Application Log in the Admin web interface displays
                the redact event associated with the user.
            Data identifying the user (user name, account, document
                name, document size, client machine, comments,
                digital signature) is displayed as redacted in the
                following places:
```

User Details in the Admin web interface

Job Logs in the Admin web interface

Reports

Data identifying the user is no longer displayed in the following places:

User environmental impact - summary report of the redacted user

```
            In addition, all Audit Log events associated with the
                user are removed.
            Note: This does not redact email addresses of the
                redacted user not specified in the User Details in
                the Admin web interface (for example, Scan to Email
                addresses).
            Note: Redaction of personal data from the Scan to Cloud
                application needs to be requested separately by
                sending an email to privacy@papercut.com.

    add-new-internal-user <username> <password> <full_name> <email>
    <card-id>
            <pin>
            Create a new internal user. Username and password are
                required. You can omit other properties. Properties
                can be changed after creation using 'set-user-
                property'. For more information about internal
                users, see the user manual section 'Internal users'.
            <username> - (required) the username of the new internal
                user.
            <password> - (required) user's password.
            <full_name> - (optional) user's full name.
            <email> - (optional) user's email address.
            <card-id> - the user's card or identity number.
```

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```
            <pin> - the user's card/id PIN.

    look-up-user-name-by-id-no <id-no>
            Looks up the user with the given user id number and
                prints out their user name. If no match was found an
                empty line is printed out.
            <id-no> - The user id number to look up.

    look-up-user-name-by-card-no <card-no>
        Looks up the user with the given user card number and prints
            out their user name. If no match was found an empty line
            is printed out.
        <card-no> - The user card number to look up.

    add-user-to-group <username> <group>
        Add a user to the specified group. It changes the group
            membership within the application not in the
            OS/Network/Domain user directory.
        <username> - the name of the user.
        <group> - the name of the group to which the user needs to be
            added.

    remove-user-from-group <username> <group>
        Remove a user from the specified group. It changes the group
            membership within the application not in the
            OS/Network/Domain user directory.
        <username> - the name of the user.
        <group> - the name of the group from which the user needs to
            be removed.

    add-admin-access-user <username>
        Add a user as an admin with default admin rights.
        <username> - the name of the user.

    remove-admin-access-user <username>
        Remove an admin user from the list of admins.
        <username> - the name of the user.

    add-admin-access-group <groupname>
        Add a group as an admin group with default admin rights.
        <groupname> - the name of the group.

    remove-admin-access-group <groupname>
        Remove a group from the list of admin groups.
        <groupname> - the name of the group.

    set-user-account-selection-auto-select-shared-account
            <username>
            <account_name>
            <charge_personal>
```

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```
    Sets a user's account selection to charge to a single shared
        account.
    <username> - the name of the user.
    <account_name> - Full name of the shared account to charge
        to.
    <charge_personal> - whether or not the user's personal
        account will be charged. (TRUE or FALSE)

set-user-account-selection-auto-charge-personal <username>
[<withPopup>]
    Sets a user's account selection to automatically charge to
        their personal account.
    <username> - the name of the user.
    [<withPopup>] - (optional) whether or not a confirmation
        popup is displayed. (TRUE or FALSE). Default FALSE.

set-user-account-selection-standard-popup
        <username>
        <allow_personal>
        <allow_list_selection>
        <allow_pin_code>
        <allow_printing_as_another_user>
        <charge_to_personal>
        [<default_shared_account>]
    Sets a user's account selection to standard account selection
        popup.
    <username> - the name of the user.
    <allow_personal> - allow user to charge to personal account.
    <allow_list_selection> - allow user to select a shared
        account from list. (TRUE or FALSE) <allow_pin_code> -
        allow user to select a shared account using pin.
    <allow_printing_as_another_user> - allow user to print as
        another user.
    <charge_to_personal> - when shared account is selected charge
        to personal account. (TRUE or FALSE)
    [<default_shared_account>] - Optional default shared account

list-user-accounts
    List the names of all the user accounts in the system, sorted
        by username, one per line.

get-total-users
    Gets a count of all the users in the system.

list-shared-accounts
    List the names of all the shared accounts in the system,
        sorted by shared account name, one per line.

list-user-shared-accounts <username> [<ignoreAccountMode>]
```

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```
        List the names of all the shared accounts accessible by the
            given user sorted by account name, one per line.
        <username> - User for which to list accounts
        [<ignoreAccountMode>] - Optional. Specify TRUE to ignore
            user's account selection mode. (TRUE or FAKE)

    shared-account-exists <account_name>
        Test to see if a shared account exists.
        <account_name> - the shared account name to test.

    get-shared-account-account-balance <account_name>
        Get shared account's current account balance.
        <account_name> - the shared account's full name.

    get-shared-account-overdraft-mode <shared_account_name>
    <overdraft-mode>
        Get a restricted shared account's overdraft mode.
        <shared_account_name> - the restricted shared account's full
            name.
        <overdraft-mode> - the restricted shared account’s overdraft
            mode. Valid values are:
            DEFAULT - the default overdraft limit that is applied to
                all restricted users and shared accounts.
            INDIVIDUAL - an individual overdraft limit that is
                specific to the restricted shared account.

    get-shared-account-property <account_name> <property>
        Gets a shared account property.
        <account_name> - the name of the shared account.
        <property> - the name of the property to get. Valid
            properties include:
            access-groups - the shared account's access groups (a
                comma separated list). Use blank to clear all groups
            access-users - the shared account's access users (a
                comma separated list). Use blank to clear all users
            balance - the shared account's current balance
            comment-option - the shared account's commenting option
            disabled - whether or not the shared account is
                currently disabled
            invoice-option - the shared account's invoicing option
            notes - notes for the shared account
            overdraft-amount - for restricted accounts with an
                overdraft mode of “INDIVIDUAL”, the shared account’s
                overdraft limit
            pin - the shared account's PIN
            restricted - whether or not the shared account is
                currently restricted

    set-shared-account-property <account_name> <property> <value>
    Sets a shared account property.
```

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```
        <account_name> - the name of the shared account.
        <property> - the name of the property to set. Valid
            properties and values include:
            access-groups - the shared account's access groups) (a
                comma separated list)
            access-users - the shared account's access users (a
                comma separated list)
            balance - the shared account's current balance (a
                decimal number)
            comment-option - the shared account's commenting option.
                One of:
```

NO_COMMENT - no comment can be entered

COMMENT_REQUIRED - a comment must be entered

COMMENT_OPTIONAL - the user can enter a comment or not

```
            disabled - whether or not the shared account is
                currently disabled (TRUE or FALSE)
            invoice-option - the shared account's invoicing option.
                One of:
```

ALWAYS_INVOICE - print jobs are be invoiced

NEVER_INVOICE - print jobs are never invoiced

USER_CHOICE_ON - the user can choose (default on/yes)

USER_CHOICE_OFF - the user can choose (default off/no)

```
            notes - notes for the shared account (any text)
            overdraft-amount - for restricted accounts with an
                overdraft mode of “Individual”, the shared account’s
                overdraft limit(a decimal number)
            pin - the shared account's PIN (any text, must be
                unique)
            restricted - whether or not the shared account is
                currently
            restricted (TRUE or FALSE)
        <value> - the value to set (see <property> for valid values).

    adjust-shared-account-account-balance <account_name> <adjustment>
    <comment>
        Adjust a shared account's account balance.
        <account_name> - the shared account's full name.
        <adjustment> - the adjustment amount as a number. +ve or -ve.
        <comment> - a comment to be associated with the transaction.

    set-shared-account-account-balance <account_name> <balance>
    <comment>
        Set a shared account's balance to a set value.
        <account_name> - the shared account's full name.
```

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```
    <balance> - set the account to this value. +ve or -ve.
    <comment> - a comment to be associated with the transaction.
set-shared-account-overdraft-mode <account_name> <overdraft-mode>
    Set a restricted shared account's overdraft mode.
    <account_name> - the restricted shared account's full name.
    <overdraft-mode> - set the restricted shared account’s
        overdraft mode. Valid values are:
        DEFAULT - the default overdraft limit that is applied to
            all restricted users and shared accounts.
        INDIVIDUAL - an individual overdraft limit that is
            specific to the restricted shared account.

add-new-shared-account <shared_account_name>
    Add a new shared account.
    <shared_account_name> - the name of the shared account.

rename-shared-account <curr_shared_account_name> <new_shared_
account_name>
    Rename an existing shared account.
    <curr_shared_account_name> - Current shared account name. Use
        a '\' to denote a subaccount e.g.: 'parent\sub'
    <new_shared_account_name> - New shared account name.

delete-existing-shared-account <shared_account_name>
    Delete a shared account from the system. Use this method with
        care. Calling this permanently deletes it from the
        shared account list (print history records remain).
    <shared_account_name> - the name of the shared account to
        delete.

add-shared-account-access-user <shared_account_name> <username>
    Allow the given user access to the given shared account
        without using a pin.
    <shared_account_name> - the name of the shared account to
        allow access to.
    <username> - the name of the user to give access to.

add-shared-account-access-group <shared_account_name> <group_
name>
    Allow the given group access to the given shared account
        without using a pin.
    <shared_account_name> - the name of the shared account to
        allow access to.
    <group_name> - the name of the group to give access to.

remove-shared-account-access-user <shared_account_name>
<username>
    Revoke the given user'- access to the given shared account.
```

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```
        <shared_account_name> - the name of the shared account to
            revoke access to. <username> - the name of the user to
            revoke access for.

    remove-shared-account-access-group <shared_account_name> <group_
    name>
        Revoke the given group's access to the given shared account.
        <shared_account_name> - the name of the shared account to
            revoke access to.
        <group_name> - the name of the group to revoke access for.

    get-printer-property <server_name> <printer_name> <property>
        Gets a printer property.
        <server_name> - the server name as listed in the Printers
            page in the Admin interface.
        <printer_name> - the name of the printer.
        <property> - the name of the property to get. For a list of
            valid properties, see Get Set Advanced Printer
            Properties.

    set-printer-property <server_name> <printer_name> <property>
    <value>
        Sets a printer property.
        <server_name> - the server name as listed in the Printers
            page in the Admin interface.
        <printer_name> - the name of the printer.
        <property> - the name of the property to set. For a list of
            valid properties, see Get Set Advanced Printer
            Properties.
        <value> - the value to set.

    list-printers
        List the names of all the printers in the system, sorted by
            printer name, one per line.

    generate-printer-qr-codes <https_on> <server> <port> <dir>
        Generates a QR code for each printer and saves them in <dir>.
        These QR codes can be used from the Mobile Print Release app
            to release a job without the need to log in to a device.
        <https_on> - Indicates whether encoded URLs should use HTTP
            or HTTPS (either TRUE or FALSE)
        <server> - public IP address or hostname of the PaperCut
            MF/NG Application Server
        <port> - Port number used by PaperCut MF/NG application
            server, usually 9191 (HTTP) or 9192 (HTTPS)
        <dir> - The absolute or relative path from the NG/MF install
            directory, to the folder in which the generated QR codes
            are saved.
```

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```
set-printer-cost-simple <server_name> <printer_name> <cost_per_
page>
    Sets the printer's page cost (using SIMPLE charging model).
    <server_name> - the server name as listed in the Printers
        page in the Admin interface.
    <printer_name> - the name of the printer.
    <cost_per_page> - the cost per page (simple charging model)

get-printer-cost-simple <server_name> <printer_name>
    Get the printer's page cost (using SIMPLE charging model).
    <server_name> - the server name as listed in the Printers
        page in the Admin interface.
    <printer_name> - the name of the printer.

reset-printer-counts <server_name> <printer_name> <reset_by>
    Reset the page and job counts associated with a printer.
    <server_name> - the server name as listed in the Printers
        page in the Admin interface.
    <printer_name> - the printer's name.
    <reset_by> - name of the user/script/process resetting the
        counts.

add-printer-group <server_name> <printer_name> <printer_group_
name>
    Add a printer to a single printer group in addition to
        existing printer group membership.
    <server_name> - the server name as listed in the Printers
        page in the Admin interface.
    <printer_name> - the printer's name.
    <printer_group_name> - name of a printer group.

set-printer-groups <server_name> <printer_name> <printer_group_
names>
    Set the printer groups a printer belongs to, overwriting any
        existing group membership.
    <server_name> - the server name as listed in the Printers
        page in the Admin interface.
    <printer_name> - the printer's name.
    <printer_group_names> - a comma separated list of printer
        group names. To clear all group association set to "".

enable-printer <server_name> <printer_name>
    Enable a printer.
    <server_name> - the server name as listed in the Printers
        page in the Admin interface.
    <printer_name> - the printer's name.

disable-printer <server_name> <printer_name> <minutes_disabled>
    Disable a printer for a set period of time.
```

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```
        <server_name> - the server name as listed in the Printers
            page in the Admin interface.
        <printer_name> - the printer's name.
        <minutes_disabled> - the time in minutes to disable. -1
            indicates forever.

    delete-printer <server_name> <printer_name>
        Delete a printer.
        <server_name> - the server name as listed in the Printers
            page in the Admin interface.
        <printer_name> - the printer's name. Use "[All Printers]" to
            delete all printers on the specified server.

    rename-printer <server_name> <printer_name> <new_server_name>
            <new_printer_name>
        Rename a printer. This is useful after migrating a print
            queue or print server (i.e. the printer retains its
            history and settings under the new name). Note that in
            some cases case sensitivity is important, so take care
            to enter the name exactly as it is displayed in the OS.
        <server_name> - the existing server name as listed in the
            Printers page in the Admin interface.
        <printer_name> - the existing printer's queue name.
        <new_server_name> - the new printer's server name.
        <new_printer_name> - the new printer's queue name.

    add-printer-access-group <server_name> <printer_name> <group_
    name>
        Adds the user group to the printer's access group list.
        <server_name> - the server name as listed in the Printers
            page in the Admin interface.
        <printer_name> - the printer's queue name.
        <group_name> - the name of the user group that needs to be
            added.

    remove-printer-access-group <server_name> <printer_name> <group_
    name>
        Removes the user group from the printer's access group list.
        <server_name> - the server name as listed in the Printers
            page in the Admin interface.
        <printer_name> - the printer's queue name.
        <group_name> - the name of the user group that needs to be
            removed.

    add-new-group <group_name>
        Add a new group to the system's group list. The group should
            already exist in network directory.
        <group_name> - The name of the group to add.
```

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```
sync-group <group_name>
    Syncs an existing group with the configured directory server,
        updates group membership in the system.
    <group_name> - The name of the group to sync.

remove-group <group_name>
    Removes the group.
    <group_name> - The name of the group to remove.

get-user-groups <user_name>
    Retrieves all groups a single user belongs to.
    <user_name> - The name of the user to query.

list-user-groups
    List the names of all the user groups in the system, sorted
        by groupname, one per line.

group-exists <group_name>
    Test to see if a group exists.
    <group_name> - the group name to test.

set-group-quota <group_name> <quota_amount> <period> <quota_max_
accum>
    <group_name> - the name of the group to set.
    <quota_amount> - the quota amount.
    <period> - the schedule period (i.e. DAILY, WEEKLY, MONTHLY).
    <quota_max_accum> - the quota maximum accumulation amount.
        Set to 0.0 to have no limit.

get-group-quota <group_name>
    Get the group quota allocation settings on a given group.
    Returns the quota amount, the schedule period and the quota
        maximumn accumulation amount.
    <group_name> - the name of the group to get.

use-card <user_name> <card_number>
    Redeem a card and place the credit on the user's account.
    <user_name> - the name of the user with the account to
        credit.
    <card_number> - the number of the card to use.

perform-online-backup
    Start an online backup. The back file is written to
        ~/server/data/backups. as a dated, zipped XML file. This
        process happens in the background.

perform-group-sync
    Start the process of synchronizing the system's group
        membership with the OS/Network/Domain's group
```

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```
        membership. A call to this method starts the sync
        process and the operation completes in the background.

perform-user-and-group-sync
    Start a full user and group synchronization. This is
        equivalent to clicking "Synchronize Now" in the Admin
        web interface. No existing users are removed. Whether or
        not full details for existing users are updated depends
        on the current user/group sync settings as defined in
        the Admin web interface. A call to this method starts
        the sync process and the operation completes in the
        background.

perform-user-and-group-sync-advanced <delete_old_users> <update_
details>
    An advanced version of the user and group synchronization
        process providing control over the sync settings. A call
        to this method starts the sync process and the operation
        completes in the background.
    <delete_old_users> - set to TRUE remove old users, else
        FALSE.
    <update_details> - set to TRUE if existing users details
        (e.g. email, full-name, etc) are to be updated.

add-new-users
    Calling this method starts a specialized user and group
        synchronization process optimized for tracking down
        adding any new users who exist in the OS/Network/Domain
        user directory and not in the system. Any existing user
        accounts are not modified. A group synchronization is
        performed only if new users are actually added to the
        system.

is-task-complete
    Returns TRUE if a long running task such as perform-group-
        sync, perform-user-and-group-sync, or add-new-users has
        completed.

get-task-status
    Returns status information such as progress, completion
        status and, error messages, on the current or last run
        long running task such as perform-group-sync, perform-
        user-and-group-sync, or add-new-users.

batch-import-shared-accounts <import_file> <test><delete_non_
existent_accounts>
    Import the shared accounts contained in the given tab-
        delimited import file. For example, server-command.exe
```

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```
        batch-import-shared-accounts "c:\program files\PaperCut
        MF\folder\papercut.txt" FALSE TRUE
    <import_file> - the import file location.
    <test> -(TRUE or FALSE) If TRUE, perform a test only. The
        printed statistics show what would have occurred if
        testing wasn't enabled. No accounts are modified.
    <delete_non_existent_accounts> - (TRUE or FALSE) If TRUE,
        accounts that do not exist in the import file but exist
        in the system are deleted. If FALSE, they are ignored.

batch-import-users <import_file> <create_new_users>
    Import the users contained in the given tab-delimited import
        file. See the user manual section 'Batch User Data
        Import and Update' for a description of the file format.
    <import_file> - the import file location.
    <create_new_users>
        If TRUE, users only existing in the import file are
            newly created, otherwise ignored.

batch-import-internal-users <import_file> <overwrite_existing_
passwords>
<overwrite_existing_pins>
    Import the internal users contained in the given tab-
        delimited import file. See the user manual section
        section 'Batch internal user import file format' for a
        description of the file format.
    <import_file> - the import file location.
    <overwrite_existing_passwords> (optional, default TRUE) -
        (TRUE or FALSE) If TRUE, passwords from the import file
        overwrite existing passwords where a user already has a
        has a password set. If FALSE, existing passwords are not
        changed.
    <overwrite_existing_pins> (optional, default TRUE) - (TRUE or
        FALSE). If TRUE, PINs from the import file overwrite
        existing PINs where a user already has a has a PIN set.
        If FALSE, existing PINs are not changed.

batch-import-user-card-id-numbers <import_file> <overwrite_
existing_pins>
    Import the user card/ID numbers and PINs contained in the
        given tab-delimited import file. See the user manual
        section 'Advanced User Management' for a description of
        the file format).
    <import_file> - the import file location.
    <overwrite_existing_pins> (optional, default TRUE) - (TRUE or
        FALSE). If TRUE, PINs from the import file overwrites
        existing PINs where a user already has a has a PIN set.
        If FALSE, existing PINs are not changed.
```

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```
create-user-client-accounts-file
    Saves a file containing shared accounts data for the User
        Client. See the manual for more information on how you
        can use this feature. The file is saved on the server to
        the location:
        [app-path]\server\data\client\client-accounts.dat
        If this file already exists it is over-written.

get-config <config-name>
    Gets the value of the given config value printing the result.
        If the config value does not exist, a blank string is
        displayed.
    <config-name> - the name of the config value to get.

set-config <config-name> <config-value>
    Sets the value of the give config item.
    NOTE: Take care updating config values. You might cause
        serious problems that can be fixed only by
        reinstallation of the application. Use the set-config
        command at your own risk.
    <config-name> - the name of the config value to set.
    <config-value> - the value to set.

process-job <job-details>
    Takes the details of a job and logs and charges as if it were
        a "real" job. Jobs processed via this method are not
        susceptible to filters, popups, hold/release queues
        etc., they are logged. See the user manual section
        "Importing Job Details" for more information and the
        format of <job-details>.
    <job-details> - the details of the job to log.

run-command command-name [command args]
    Runs a custom command on the server. By default the server
        does not include any custom commands. The command
        arguments depend on the custom command being run.
```

Tip:

- `server-command` is ideal for scripting via batch files or shell scripts. You can find some example scripts at `[app-path]/server/examples/scripting/`. Administrators wanting to control PaperCut NG/MF using a programming language such as C#, Java, Visual Basic, Perl, Ruby or Python should consider the XML Web Services APIs. All commands available via

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the `server-command` tool are also accessible via calls to the Web Services layer. More information on the XML Web Services API is available in The XML Web Services API.

- Checking for errors: generally `server-command` returns an exit value of 0. When writing your script you should check the string value that `server-command` prints on standard output instead. `server-command` return a non-zero return value if it detects an error with the parameters passed on the command line.
- Some commands (e.g. `batch-import-internal-users`) expect values that are `true` or `false`. In this case the command parameter is compared to the value `true` using a case insensitive compare, all other values are assumed to be `false`.
- If you need to use PaperCut NG/MF's built-in group's name (i.e. "All users" group) in a server command, then use the group name exactly as it is displayed in the Admin web interface. (e.g. `remove-user-from-group guest-user "[Internal Users]"`)

enable-printer-snmpv3 <server_name> <printer_name>

```
<context_name> <user_name>
    <auth_password> <privacy_password>
    <auth_protocol> <privacy_protocol>
>Enables SNMP V3 for the printer for printer status and
    Toner Information
<server_name> - the printer's server name
<printer_name> - the printer's queue name.
Use "[All Printers]" to enable all printers on the
    specified server.
<context_name> - the SNMP v3 context name
<user_name> - the SNMP v3 authentication user name
<auth_password> - the SNMP v3 authentication password
<auth_protocol> - the SNMP v3 authentication protocol
<privacy_protocol> - the SNMP v3 privacy/encryption
    protocol.
```

disable-printer-snmpv3 <server_name> <printer_name>

```
Disables SNMP V3 for the printer for printer status and
    Toner information
Any SNMP requests will revert to SNMP V1
<server_name> - the printer's server name
<printer_name> - the printer's queue name.
```

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```
        Use "[All Printers]" to disable SNMP V3 on all printers
            on the specified server.
```

get-printer-snmpv3 <server_name> <printer_name>

```
        Get SNMP V3 printer configuration settings
        <server_name> - the printer's server name
        <printer_name> - the printer's queue name.
        Use "[All Printers]" to retrieve SNMP V3 on all printers
            on the specified server.
```

enable-device-snmpv3 <device_name>

```
        <context_name> <user_name>
        <auth_password> <privacy_password>
        <auth_protocol> <privacy_protocol>
        Enables SNMP V3 for the device for blocking errors or
            configuration
        <device_name> - the device name
        Use "[All Devices]" to enable SNMP V3 on all devices.
        <context_name> - the SNMP v3 context name
        <user_name> - the SNMP v3 authentication user name
        <auth_password> - the SNMP v3 authentication password
        <auth_protocol> - the SNMP v3 authentication protocol
        <privacy_protocol> - the SNMP v3 privacy/encryption
            protocol.
        disable-device-snmpv3 <device_name>
```

Disables SNMP V3 for the device for blocking errors or configuration

```
        Any SNMP requests will revert to SNMP V1 or V2 as
            appropriate
        <device_name> - the device name.
        Use "[All Devices]" to disable SNMP V3 on all devices.
```

get-device-snmpv3 <device_name>

```
        Get SNMP V3 device configuration settings
        <device_name> - the device name.
        Use "[All Devices]" to get SNMP V3 info on all devices.
```

5.3.2. Database tool (db-tools)

The `db-tools` command-line tool provides a variety of functionality manipulating the PaperCut NG/MF database and data. The tool is located in `[app-path]/server/bin/<platform>/` and needs to be executed from a command prompt. The syntax of the command is:

```
db-tools command [options]
```

The valid commands are:

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- `export-db` - export/backup the database data
- `import-db` - import/restore the database data
- `init-db` - create tables and initial data in a new database
- `delete-old-logs` - delete old log data (transaction, print, app log, etc)

`db-tools` is a command-line application accessed via the Command Prompt on Windows, or a Command Shell (e.g. bash or a terminal) on Linux and Mac. On Linux or Mac the command must be run as the `papercut` user. Example use on the Apple Mac:

```
sudo su - papercut
db-tools import-db -f /Users/bob/papercut-backup.zip
```

A Windows example is:

```
cd "C:\Program Files\PaperCut NG/MF\server\bin\win\"
db-tools delete-old-logs 90
```

An Apple Mac example is:

```
sudo su - papercut
cd "/Applications/PaperCut NG/MF/server/bin/mac/"
db-tools import-db /Users/bob/papercut-backup.zip
```

`db-tools` needs exclusive access to the database. It is important that any PaperCut NG/MF services and processes are stopped before executing any commands. Failure to do so results in a "database in use" error message. The `db-tools` command is a powerful low-level utility so carefully consider its use on a production system. The available commands are discussed in detail below.

5.3.2.1. export-db command

The export-db command exports the data from the database. The Application Server must be stopped before performing the export. The syntax and options for the `export-db` command are:

Tip:
If you want to perform an online backup without stopping the Application Server you can use the inbuilt `perform-online-backup` server command. More information on the server commands is available in Server commands (server-command).

```
usage: db-tools export-db [options]
-d,--dir <dir> Exports the database to the given directory.
-f,--file <file> Exports the database to the given file.
-h,--help Displays this help.
```

If no options are specified then the database export file is created in the `[app-path]\server\data\backups` directory and the file is named `export-[date-time].zip`.

The `--dir` option is used to override the default backup directory. The filename will still be named `export-[date-time].zip`.

The `--file` option is used to specify the full path and filename where the backup is saved.

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Caution:
If the directory or filename parameters contains space, then the argument needs to be quoted.

5.3.2.2. import-db command

The `import-db` command imports the data (from a previous export) into the database. The Application Server must be stopped to perform the import. The syntax and options for the `import-db` command are:

```
usage: db-tools import-db [options] import-file
-f,--force Deletes any existing data before loading the data.
-h,--help Displays this help.
```

The `--force` option is required when the data is loaded into a database that already contains data. In this situation, the force option indicates that existing data is deleted first.

Caution:
If the import-file contains spaces, quote this argument.

5.3.2.3. init-db command

The `init-db` command initializes a database, creating the required tables and initial data. The Application Server must be stopped before you initialize the database. The syntax and options for the `init-db` command are:

```
usage: db-tools init-db [options]
-f,--force Re-initializes the database even if it already exists.
-h,--help Displays this help.
```

The `--force` option is required to initialize a database that already contains the tables and data. In this case, the force option drops the existing tables before recreating the tables.

5.3.2.4. delete-old-logs command

The `delete-old-logs` is used to delete old log data from the system. This command permanently deletes the following data.

- Printer usage logs - Record all print history and statistics
- Account transactions - Record all adjustments to user and shared accounts
- Application logs - Record application status and error messages

```
usage: db-tools delete-old-logs [options] delete-older-than-days
-n,--non-interactive Perform deletion without confirmation.
-h,--help Displays this help.
```

The `--non-interactive` option performs the deletion without confirmation from the user. This is useful when automating this deletion through a scheduled task or cron job.

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The `delete-older-than-days` option determines what data is deleted. If `delete-older-than-days` is 90, then all log data more than 90 days old is deleted. A value of zero (0) removes *all* historical log data from the system.

5.3.3. The XML Web Services API

Any quality software product comes with a comprehensive API for deep integration, and PaperCut NG/MF is no exception! Our industry standard Web Services API allows you to integrate with PaperCut NG/MF with a programming language of your choice. Web Services data is transmitted over standard HTTP or HTTPS and uses standardized XML mark-up.

Our Web Services API uses XML-RPC (Remote Procedure Call). XML-RPC is a lightweight web services implementation and has good support for all major programming and scripting languages such as C#, Java, Visual Basic, Perl, Ruby and Python.

API methods are accessed by the URL `http://[server_name]:9191/rpc/api/xmlrpc`, or `https://[server_name]:9192/rpc/api/xmlrpc` for secure connections. Ensure you are making your API call from an authorized address. More information on API usage is provided below.

Table 96: XML Web Services Methods

Method	Description
`api.isUserExists`	Test to see if a user exists in the system/database.
`api.getUserAccountBalance`	Get the user's current account balance.
`api.getUserProperty`	Gets a user property. Properties include the user's full name, department, email, home folder, notes, office and restriction status among others.
`api.getUserProperties`	Get multiple user properties at once. Properties include the user's full name, department, email, home folder, notes, office and restriction status among others.
`api.setUserProperty`	Sets a user property. Properties include the user's full name, department, email, home folder, notes, office, password (for internal users) and restriction status among others.
`api.setUserProperties`	Set multiple user properties at once. Properties include the user's full name, department,

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Method	Description
	email, home folder, notes, office, password (for internal users) and restriction status among others.
`api.adjustUserAccountBalance`	Adjust a user's account balance by an adjustment amount. An adjustment can be positive (add to the user's account) or negative (subtract from the account).
`api.adjustUserAccountBalanceIfAvailable`	Adjust a user's account balance if there is enough credit available.
`api.-adjustUser-AccountBalanceIfAvailableLeaveRemaining`	Adjust a user's account balance if there is enough credit available to leave the given amount available in the account.
`api.adjustUserAccountBalanceByGroup`	Adjust the account balance for all users in a group by an adjustment amount. An adjustment can be positive (add to the user's account) or negative (subtract from the account).
`api.adjustUserAccountBalanceByGroupUpTo`	Adjust the account balance for all users in a group by an adjustment amount, but not above the given limit. An adjustment can be positive (add to the user's account) or negative (subtract from the account).
`api.setUserAccountBalance`	Set the balance on a user's account to a set value. This is conducted as a transaction.
`api.setUserAccountBalanceByGroup`	Set the balance for each member of a group to the given value.
`api.setUserOverdraftMode`	Set a restricted user's overdraft mode to either “DEFAULT” (same amount is applied to all users) or “INDIVIDUAL” (the user has their own individual overdraft amount).
`api.getUserOverdraftMode`	Get a restricted user's overdraft mode. The mode can be either “DEFAULT” (same amount is applied to all users) or “INDIVIDUAL” (the user has their

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Method	Description
	own individual overdraft amount).
`api.resetUserCounts`	Reset the counts (pages and job counts) associated with a user account.
`api.reapplyInitialUserSettings`	Re-applies initial settings on the user. Initial user settings are based on group membership.
`api.disablePrintingForUser`	Disable printing for a user for selected period of time.
`api.addNewUser`	Triggers the process of adding a new user account defined by a given `username`. Assuming the user exists in the OS/Network/Domain user directory, the account is created with the correct initial settings as defined by the rules set up in the Admin web interface on the Groups page. Calling this method is equivalent to triggering the "new user" event when a new user performs printing for the first time.
`api.renameUserAccount`	Rename a user account. Useful when the user has been renamed in the domain / directory, so that usage history can be maintained for the new username. Perform this in conjunction with a rename of the user in the domain / user directory, as all future usage and authentication uses the new username.
`api.getUserGroups`	Retrieves all groups a single user is a member of.
`api.deleteExistingUser`	Delete/remove an existing user from the user list. Use this method with care. Calling this permanently deletes the user account from the user list (print and transaction history records remain). **Note:** To comply with the EU General Data Protection Regulation (GDPR) Right to be

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Method	Description
	Forgotten, the `permanently-redact-user-data` flag permanently removes (redacts) identifiable user information (user name, account, document name, document size, client machine, comments, digital signature).
`api.exportUserDataHistory`	To comply with the EU General Data Protection Regulation (GDPR) Right to Access, export user data from reports into CSV files. **Note:** The files will be owned by the system account running the PaperCut NG/MF process. The output folder must also have write permissions for this user.
`api.addNewInternalUser`	Creates and sets up a new internal user account. In PaperCut NG/MF all internal usernames must contain only characters that can be printed (e.g. *not* `newline`) and must not contain `/`, `\` or `@`.
`api.lookUpUserNameByIDNo`	Looks up the user with the given user id number and returns their user name. If no match was found an empty string is returned.
`api.lookUpUserNameByCardNo`	Looks up the user with the given user card number and returns their user name. If no match was found an empty string is returned.
`api.addAdminAccessUser`	Add a user as an admin with default admin rights.
`api.removeAdminAccessUser`	Remove an admin user from the list of admins.
`api.addAdminAccessGroup`	Add a group as an admin group with default admin rights.
`api.removeAdminAccessGroup`	Remove a group from the list of admin groups.
`api.-setUser-AccountSelectionAutoSelectSharedAccount`	Sets a user's account selection to charge to a single shared account.

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Method	Description
`api.setUserAccountSelectionAutoChargePersonal`	Sets a user's account selection to automatically charge to personal account.
`api.setUserAccountSelectionStandardPopup`	Sets a user's account selection to standard account selection popup.

`api.listUserAccounts`	List all user accounts (sorted by username) starting at `offset` and ending at `limit`. Use this to enumerate all user accounts in 'pages'. When retrieving a list of all user accounts, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing. E.g.:
	`listUserAccounts ("authToken", 0, 1000) - returns users 0 through 999`
	`listUserAccounts ("authToken", 1000, 1000) - returns users 1000 through 1999`
	`listUserAccounts ("authToken", 2000, 1000) - returns users 2000 through 2999`

`api.getTotalUsers`	Gets a count of all the users in the system.
`api.listSharedAccounts`	List all shared accounts (sorted by account name) starting at `offset` and ending at `limit`. Use this to enumerate all shared accounts in 'pages'. When retrieving a list of all accounts, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing. E.g.:

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Method	Description
	`listSharedAccounts ("authToken", 0, 1000)` - returns shared accounts 0 through 999 `listSharedAccounts ("authToken", 1000, 1000)` - returns shared accounts 1000 through 1999 `listSharedAccounts ("authToken", 2000, 1000)` - returns shared accounts 2000 through 2999
`api.listUserSharedAccounts`	List all shared accounts the user has access to (sorted by account name), starting at `offset` and ending at `limit`. Use this to enumerate the accounts in 'pages'. When retrieving a list of all accounts, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing. You can optionally specify `TRUE` to list accounts even if the user is currently not configured to charge to a shared account. E.g.: `listUserSharedAccounts("authToken", "username", 0, 1000)` - returns shared accounts 0 through 999 `listUserSharedAccounts("authToken", "username", 1000, 1000)` -

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Method	Description
	returns shared accounts 1000 through 1999 listUserSharedAccounts("authToken", "username", 2000, 1000) - returns shared accounts 2000 through 2999 listUserSharedAccounts("authToken", "username", 0, 1000, TRUE) - returns shared accounts 0 through 999 even if "username" is not configured to charge to a shared account.
api.isSharedAccountExists	Test to see if a shared account exists in the system/database.
api.setSharedAccountAccountBalance	Sets a shared account's current account balance.
api.getSharedAccountAccountBalance	Gets a shared account's current account balance.
api.setSharedAccountProperty	Sets a shared account property. Properties include access groups, balance, comment options, disabled status, notes, pin and restriction status among others.
api.setSharedAccountProperties	Sets multiple shared account properties at once. Properties include access groups, balance, comment options, disabled status, notes, pin and restriction status among others.
api.getSharedAccountProperty	Gets a shared account property. Properties include access groups, balance, comment options, dis-

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Method	Description
	abled status, notes, pin and restriction status among others.
`api.getSharedAccountProperties`	Gets multiple shared account properties at once. Properties include access groups, balance, comment options, disabled status, notes, pin and restriction status among others.
`api.adjustSharedAccountAccountBalance`	Adjust a shared account's account balance by an adjustment amount. An adjustment can be positive (add to the account) or negative (subtract from the account).
`api.setSharedAccountAccountBalance`	Set the balance on a shared account to a set value. This is conducted as a transaction.
`api.setSharedAccountOverdraftMode`	Set a shared account's overdraft mode to either “DEFAULT” (same amount is applied to all users) or “INDIVIDUAL” (the user has their own individual overdraft amount).
`api.getSharedAccountOverdraftMode`	Get a shared account's overdraft mode. This mode can be either “DEFAULT” (same amount is applied to all users) or “INDIVIDUAL” (the user has their own individual overdraft amount).
`api.addNewSharedAccount`	Create a new shared account with the given name.
`api.deleteExistingSharedAccount`	Delete a shared account from the system. Use this method with care. Deleting a shared account permanently deletes it from the shared account list (print history records remain).
`api.addSharedAccountAccessUser`	Allow the given user access to the given shared account without using a pin.
`api.renameSharedAccount`	Rename an existing shared account.
`api.deleteExistingSharedAccount`	Delete a shared account from the

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Method	Description
	system. Use this method with care. Calling this permanently deletes it from the shared account list.
`api.addSharedAccountAccessGroup`	Allow the given group access to the given shared account without using a pin.
`api.removeSharedAccountAccessUser`	Revoke the given user's access to the given shared account.
`api.removeSharedAccountAccessGroup`	Revoke the given group's access to the given shared account.
`api.disableSharedAccount`	Disables a shared account for a selected period of time.
`api.getPrinterProperty`	Gets a printer property.
`api.setPrinterProperty`	Sets a printer property.

`api.listPrinters`	List all printers (sorted by printer name), starting at `offset` and ending at `limit`. Use this to enumerate the printers in 'pages'. When retrieving a list of all printers, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing. E.g.:
	`listPrinters ("authToken", 0, 1000) - returns printers 0 through 999`
	`listPrinters ("authToken", 1000, 1000) - returns printers 1000 through 1999`
	`listPrinters ("authToken", 2000, 1000) - returns printers 2000 through 2999`

`api.setPrinterCostSimple`	Set a page cost using the Simple Charging Model.

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Method	Description
`api.getPrinterCostSimple`	Get the page cost if, and only if, the printer is using the Simple Charging Model.
`api.resetPrinterCounts`	Reset the counts (pages and job counts) associated with a printer.
`api.addPrinterGroup`	Add a printer to a single printer group.
`api.setPrinterGroups`	Set the printer groups a printer belongs to, overwriting any existing group.
`api.enablePrinter`	Enables a printer.
`api.disablePrinter`	Disable a printer for select period of time.
`api.deletePrinter`	Delete a printer. Use the special text "[All Printers]" to delete all printers on the specified server.
`api.renamePrinter`	Rename a printer. This is useful after migrating a print queue or print server (i.e. the printer retains its history and settings under the new name). Note that in some cases case sensitivity is important, so take care to enter the name exactly as it is displayed in the OS.
`api.addPrinterAccessGroup`	Add a user group to the printer's access group list.
`api.removePrinterAccessGroup`	Remove a user group from the printer's access group list.
`api.addNewGroup`	Add a new group to system's group list.
`api.RemoveGroup`	Remove a group.
`api.listUserGroups`	List all groups (sorted by group name), starting at `offset` and ending at `limit`. Use this to enumerate the groups in 'pages'. When retrieving a list of all groups, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient

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Method	Description
	transfer and processing. E.g.: `listUserGroups ("authToken", 0, 1000)` - returns groups 0 through 999 `listUserGroups ("authToken", 1000, 1000)` - returns groups 1000 through 1999 `listUserGroups ("authToken", 2000, 1000)` - returns groups 2000 through 2999
`api.isGroupExists`	Test to see if a group exists in the system.
`api.addUserToGroup`	Adds a user to a specified group. Changes the group membership within the application, not in the OS/Network/Domain user directory.
`api.removeUserFromGroup`	Removes a user from a specified group. Changes the group membership within the application, not in the OS/Network/Domain user directory.
`api.setGroupQuota`	Set the group quota allocation settings on a given group.
`api.getGroupQuota`	Get the group quota allocation settings on a given group.
`api.useCard`	Redeem a card and place the credit on the user's account.
`api.performOnlineBackup`	Instigate an online backup. This process is equivalent to clicking **Manual Backup** in the web based Admin web interface. The data is exported into the server-/data/backups directory as a timestamped, zipped XML file.
`api.performGroupSync`	Start the process of synchronizing the system's group membership

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Method	Description
	with the OS/Network/Domain's group membership. A call to this method starts the sync process and the operation completes in the background.
`api.performUserAndGroupSync`	Start a full user and group synchronization. This is equivalent to clicking **Synchronize Now** in the Admin web interface. No existing users are removed. Whether or not full details for existing users are updated depends on the current user/group sync settings as defined in the Admin web interface. A call to this method starts the sync process and the operation completes in the background.
`api.performUserAndGroupSyncAdvanced`	An advanced version of the user and group synchronization process providing control over the sync settings. A call to this method starts the sync process and the operation completes in the background.
`api.addNewUsers`	Calling this method starts a specialized user and group synchronization process optimized for tracking down and adding any new users who exist in the OS/Network/Domain user directory and not in the system. Any existing user accounts are not modified. A group synchronization is be performed only if new users are actually added to the system.
`api.getTaskStatus`	Return the status (completed flag and a status message) associated with a backgrounded task such as a sync operation started by the performGroupSync API. This method returns a struct (hashtable/map) containing elements with keys `completed`

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Method	Description
	and `message`. You can poll this method can be polled to determine if a sync has completed.
`api.batchImportSharedAccounts`	Import the shared accounts contained in the given tab separated import file (located on the server).
`api.batchImportUsers`	Import the users contained in the given tab-delimited import file (located on the server). See Batch import and update user data for a description of the file format.
`api.batchImportInternalUsers`	Import the internal users contained in the given tab-delimited import file (located on the server). See Batch internal user import and update for details of the required file format.
`api.batchImportUserCardIdNumbers`	Import the user card/ID numbers and PINs contained in the given tab-delimited import file.
`api.createUserClientAccountsFile`	Saves a file containing shared accounts data for the User Client. See the manual for more information on how you can use this feature. The file is saved on the server to the location: `[app-path]\server-\data\client\client-accounts.dat` If this file already exists it is over-written.
`api.getConfigValue`	Gets the value of a configuration settings.
`api.setConfigValue`	Sets the value of a configuration setting. NOTE: Take care updating config values. You can cause serious problems which can only be fixed by reinstallation of the application. Use the setConfigValue API at your own risk.
`api.processJob`	Takes the details of a job and logs and charges as if it were a "real" job. Jobs processed via this

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Method	Description
	method are not susceptible to filters, popups, hold/release queues etc., they are only logged. See the user manual section "Importing Print Job Details" for more information and the format.

5.3.3.1. Web Services Example Code

The best way to demonstrate how to use the Web Services interface is using example code. PaperCut NG/MF ships with example code for Java, C#, Python and Ruby located in:

```
[app-path]/server/examples/webservices/
```

The C# and Java examples also include a full documented Proxy class - a proxy is a common program design pattern. The Proxy wraps and exposes the Web Services methods as standard methods. The setup and use of the underlying XML-RPC library is all handled in the proxy class meaning you can just focus on calling the methods.

See the `README.txt` files in the examples directories for more information. The Java example includes full JavaDoc style documentation under

```
[app-path]/server/examples/webservices/java/docs/api
```

.

Developers using other languages, such as Perl or Python need to use an XML-RPC library to call the methods directly. All methods are exposed via the URL `http://[server_name]:9191/rpc/api/xmlrpc`.

Tip:

- All the XML Web Services commands are also accessible via the `server-command` program. An alternative to using a full programming environment to automate PaperCut NG/MF via Web Services is to use the `server-command` program to call the commands via a script such as a batch file or shell script. This is a simpler solution for common automation tasks such as scheduling a User/Group synchronization each night. For more information on the `server-command` program, see Server commands (server-command).
- Programmers often report that they get an error message "`ERROR: java.lang.NoSuchMethodException:`" and this is frequently because they are calling the API method with the wrong number or type of parameters. Consult the Javadoc API documentation (see above) for information on what parameters to use.

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5.3.3.2. Security

The Web Services API's provide full access to the system's internals so must be secured. PaperCut NG/MF secures access using two security layers:

1. IP address level security
2. Authentication tokens - required for each method call

The IP address level security is used to control which systems, denoted by IP address, are allowed to connect to the server and call the API's. By default this is restricted to `localhost` (127.0.0.1) only. If the program/script making use of the API's resides on another system, then add this system's IP address to the list of approved addresses under **Options > Advanced > Allowed XML Web Services callers** .

The first argument to all method calls is an authentication token (`authToken`). In the default setup, the authentication token is the built-in `admin` user's password (This is password defined for the SysAdmin during the initial configuration wizard).

Important:

We recommend you define an alternative web service authentication token via configuration (see below). This token *must* be supplied with all method calls. Using the admin password could be a security risk if the password leaks. The admin password is also approximately 10 time slower because the auth token must be processed on each call.

You can specify an alternative web service authentication token to avoid using/sharing the built-in `admin` user's password:

1. Click the **Options** tab.

   The **General** page is displayed.
2. In the **Actions** menu, click **Config editor (advanced)**.

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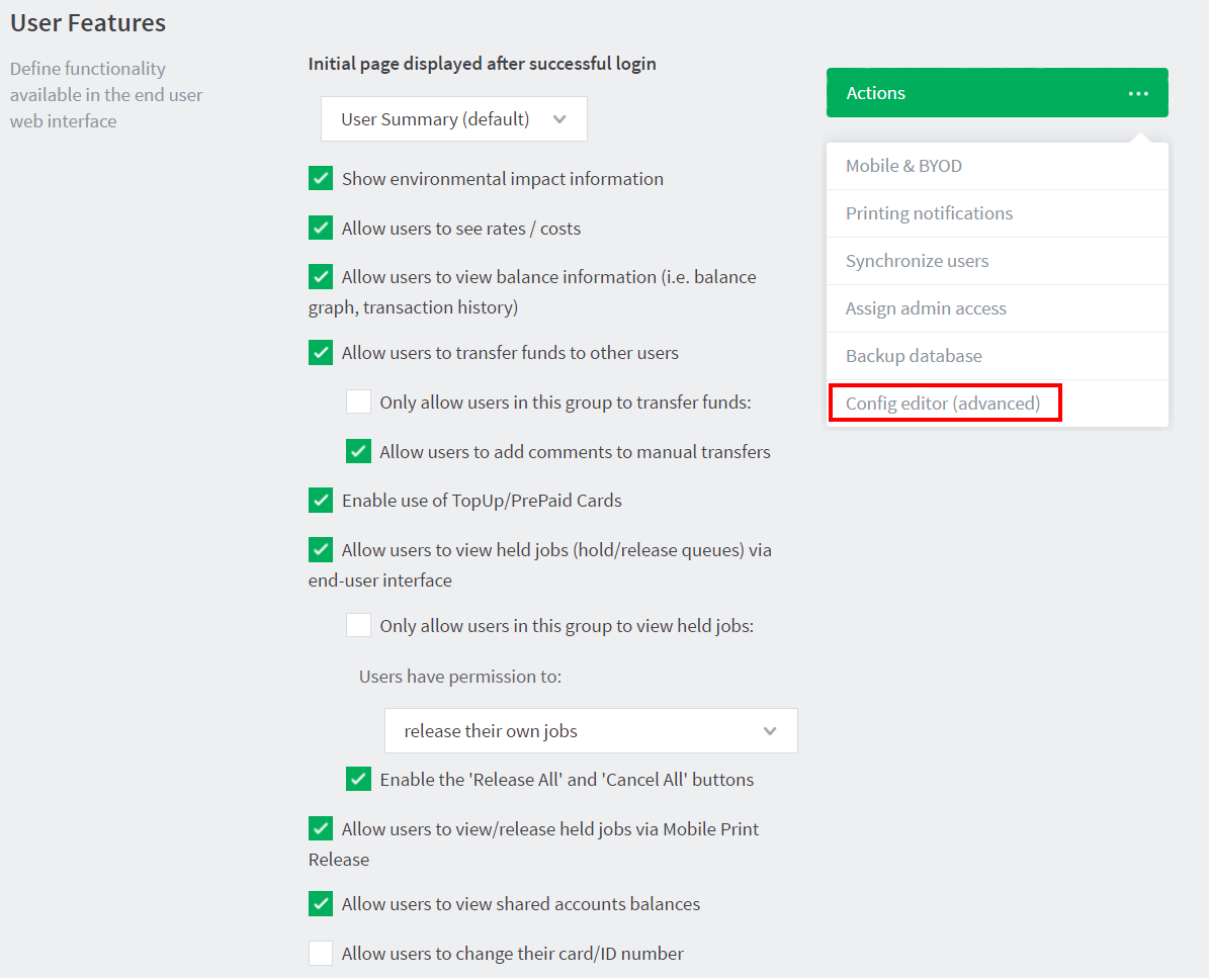

The **Config Editor** page is displayed.

3. Find the `auth.webservices.auth-token` config setting.
4. Enter a new value that is the new web services authentication token.
5. Click **Update** to the right to apply the change.
6. This authentication token can now be used in addition to the built-in admin user's password.

5.3.4. Generate SSL/HTTPS keys

During the install process, PaperCut NG/MF generates self-signed keys/ certificates with default attributes, which can also be customized further. For more information, see Use the PaperCut NG/MF self-signed certificate.

While these self-signed certificates provide good security, the following warnings are still displayed when users access HTTPS sites using a fully-qualified domain name:

- Domain mismatch
- The security certificate presented by this website was not issued by a trusted certificate authority

You can, however, eliminate these warnings to provide a smoother experience for users.

To avoid the:

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- "Domain mismatch" warning—Use the PaperCut NG/MF self-signed certificate to use the machine's fully qualified domain name (FQDN).
- "The security certificate presented by this website was not issued by a trusted certificate authority" and the "Domain mismatch" warning—Use a trusted certificate.

Note:
This is a technically complex area and there is an assumed level of experience with SSL certificates in general.

5.3.4.1. Use the PaperCut NG/MF self-signed certificate

During the install process, PaperCut NG/MF generates self-signed keys/ certificates with default attributes. You also have the option of changing these attributes and generating customized self-signed certificates.

To generate customized self-signed certificates:

1. In a command line, navigate to the `create-ssl-keystore` tool:

   ```
   cd [app-path]/server/bin/win
   ```

2. Run the following `create-ssl-keystore` command after specifying values for relevant arguments:

   ```
   create-ssl-keystore -f -k <keystore location> -sig
   <signature> -keystorepass <keystore password> -
   keystorekeypass <keystore key password> -bcCA <SYSTEM-NAME>
   ```

   Note: While the table below outlines some arguments of the `create-ssl-keystore` command, the `--help` command line option lists all the available arguments.

`create-ssl-keystore` command arguments	Description and values
-f	(force) Overwrites any existing keystore file(s).
-k <keystore location>	Specify the location of keystore for the PaperCut NG/MF key/ certificate that is being generated. If you don't specify this value, the default location `[app-path]/server/data/default-ssl-keystore` is used.
-sig <signature>	Specify the certificate signing algorithm that is used by the PaperCut NG/MF key/ certificate that is being generated into the keystore. Valid values: `[sha256 | sha1]`. If you don't specify this value, the standard algorithm

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create-ssl-keystore command arguments	Description and values
	`sha1` is used. This ensures backwards compatibility with 3rd party systems. For more information, see Can I use other algorithms such as SHA2/SHA256?
-keystorepass <keystore password>	Specify the password required to access the keystore. If you don't specify this value, the keystore password is `default`.
-keystorekeypass <keystore key password>	Specify the password required to access the PaperCut NG/MF key/ certificate that is being generated into the keystore. If you don't specify this value, the keystore key password is `default`.
-bcCa	Add the X.509 Basic Constraints CA extension.
<SYSTEM-NAME>	Specify the name of the computer/ server that is being used to create the keystore. If you don't specify this value, the current computer name is used. **Note:** To eliminate the "Domain mismatch warning" that is displayed when users access HTTPS sites using a fully-qualified domain name, specify the fully-qualified domain (FQDN). For example, `"myserver.fullname.com"`

Important:
To generate more than one customized self-signed PaperCut NG/MF key/ certificate, run the customized `create-ssl-keystore` command individually, each time. Every time you run this command, ensure that the `-keystorekeypass <keystore key password>` value is always the same.

3. If you specified the `-k`, `-keystorepass`, or `-keystorekeypass` arguments:
   a. Open the file `[app-path]/server/server.properties` with a text editor (e.g. Notepad).
   b. Locate the section titled `SSL Key/Certificate`.

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c. Remove the # (hash) comment marker from the lines starting with:

```
server.ssl.keystore=
server.ssl.keystore-password=
server.ssl.key-password=
```

d. Define the following properties:

server.properties value	Description
server.ssl.keystore=	The location of your keystore. This must match the value specified by `-k` in `create-ssl-keystore`. If you did not specify this value in `create-ssl-keystore`, leave it as default in the `server.properties` file.
server.ssl.keystore-password=	The keystore password. This must match the value specified by `-keystorepass` in create-ssl-keystore. If you did not specify this value in `create-ssl-keystore`, leave it as default in the `server.properties` file.
server.ssl.key-password=	The keystore key password. This must match the value specified by `-keystorekeypass` in create-ssl-keystore. If you did not specify this value in `create-ssl-keystore`, leave it as default in the `server.properties` file.

e. Save the file.

Note: On Mac OS, for `server.ssl.keystore`, specify the FULL path to your keystore. For example, `/Applications/PaperCut NG/MF/server/custom/my-ssl-keystore`

4. Restart the Application Server.

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5.3.4.2. Use a trusted certificate

While self-signed certificates provide good security, the following warnings are still displayed when users access HTTPS sites using a fully-qualified domain name:

- Domain mismatch
- The security certificate presented by this website was not issued by a trusted certificate authority

These warnings are eliminated by using any one of the following types of trusted certificates:

- certificates signed by a commercial certificate authority (CA) that is recognized by all popular web browsers. A complete list is in Windows under **Control Panel > Internet Options > Content > Certificates > Trusted Root Certification Authorities**.
- certificates created by an organization that operates its own certificate authority that is recognized by their users' web browsers by way of a root certificate that is installed into all users' web browsers.

PaperCut NG/MF allows you to:

- Purchase and install a new trusted certificate
- Use an existing trusted PaperCut NG/MFcertificate
- Use an existing trusted IIS certificate

Note:
This is a technically complex area and there is an assumed level of experience with SSL certificates in general.

Purchase and install a new trusted certificate

If you do not already have a certificate signed by a trusted authority, and you would like to use one, you need to purchase the signed certificate and then install it on PaperCut NG/MF

Tip:
If you have a Windows machine, there is an easy way to install your SSL certificate. For more information, take at a look at our step-by-step guide and video on generating and importing a certificate with KeyStore Explorer. Alternatively you can follow the command line steps below to get your certificate up and running.

To purchase and install a signed SSL certificate:

- Create the SSL keystore and create the private key
- Submit the Certificate Signing Request (CSR)
- Install the certificate(s)
- Configure the PaperCut NG/MF keystore

If you already have a signed SSL key and certificate for the domain name of the PaperCut Application Server, see Importing an existing SSL key.

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Step 1: Create the SSL keystore and create the private key

1. Open a command prompt window and change to the directory `[app-path]/runtime/jre/bin`.
2. Delete any existing files called 'my-ssl-keystore' in this directory, as they are likely leftovers from previous attempts.
3. Enter the following command to produce the SSL key:

```
keytool -keystore [app-path]\server\custom\my-ssl-keystore -alias jetty -genkeypair -keyalg RSA
```

> **Caution:**
> This process creates a 'my-ssl-keystore' file. Don't lose this file! You need it when adding the public key later. We recommend making a copy of this 'my-ssl-keystore' and keeping it in a safe place. If it is lost or changed, your certificate needs to be re-issued, often resulting in costs from your Certificate Authority. If you are renewing your SSL certificate, review Renewing your SSL certificate

> **Note:**
> Some organizations require larger key sizes than the default 1024 bit. In this case add the "-keysize 2048" or "-keysize 4096" parameter to the end of the above command line.

You will be asked a series of questions.

4. Answer the questions asked by the tool:
   - For *keystore password*, choose 'password' or another simple password, as it is not important. Enter the same password again later when asked for a *key password*.
   - for **first and last name**, enter the exact fully-qualified domain name of the PaperCut NG/MF Application Server. The server name must be the exact one that users will enter into their browsers to access PaperCut NG/MF's web interface, e.g. 'printing.myschool.edu'.
   - Depending on the certification authority's requirements, you might also need to fill in some of the other fields.

```
Enter keystore password: password
What is your first and last name?
[Unknown]: printing.myschool.edu
What is the name of your organizational unit?
[Unknown]:
What is the name of your organization?
[Unknown]:
What is the name of your City or Locality?
[Unknown]:
What is the name of your State or Province?
```

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```
[Unknown]:
What is the two-letter country code for this unit?
[Unknown]:
Is CN=printing.myschool.edu, OU=Unknown, O=Unknown,
L=Unknown, ST=Unknown, C=Unknown correct?
[no]: yes
Enter key password for <jetty>
(RETURN if same as keystore password): password
```

Step 2: Submit the Certificate Signing Request (CSR)

1. Prepare your new SSL key for certification by the certificate authority:

   ```
   keytool -certreq -alias jetty -keystore [app-
   path]\server\custom\my-ssl-keystore
   -file [app-path]\server\custom\jetty.csr
   ```

2. Paste the contents of the resulting `jetty.csr` into the online order forms of commercial certificate authorities or pass them to your organization's own certificate authority.

   When the certification process has completed, the authority provides you with a certificate file that you can download from the authority's web site. The filename usually ends in `.crt`, `.cer` or `.cert`. The contents of the file should look something like this:

   ```
   -----BEGIN CERTIFICATE-----
   MIIDLTCCApagAwIBAgIQJc/MOTjAW0HrPI/4rGtDCDANBgkqhkiG9w0BAQUF
   ADCB

   hzELMAkGA1UEBhMCWkExIjAgBgNVBAgTGUZPUiBURVNUSU5HIFBVUlBPU0VT
   IE9O
    ... more here ...
   Awjhfz9EfxN2l1UYP15xZZyNO4DO3X/LliCG9pdFf4hUHl8tRnhQBvRR1F0v
   9UHB
   PC6L9jNjMbQUoQ9NG/S8Nn7ZcSHNy+P53ntIBaEfTv7+qvXNWvSb5wj4pd05
   wGF1
   Bw== -----
   END CERTIFICATE-----
   ```

3. Save the file as `jetty.crt`.

> **Caution:**
> If you have not already, take the opportunity now to backup your `my-ssl-keystore` at this time.

Step 3: Install the certificate(s)

1. Before you can make use of your newly obtained certificate, you might have to import the certificate authorities "root certificate". PaperCut comes with a number of root certificates pre-

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installed that you can list using the following command (from the directory `[app-path]/runtime/jre/bin`):

```
keytool -keystore ../lib/security/cacerts -storepass changeit -list
```

Add the option "-v" at the end to obtain the same list with more details, such as expiration dates.

If your certificate authority is not listed there, or you have been notified that they have recently started using new root certificates, first import the certificate authority's root certificate into your keystore before importing your newly obtained own certificate. The CA's root certificate is available for download on the CA's web site as a file ending on `.pem` or `.crt`. Save the file using a filename indicative of the CA's name, e.g. `globaltrust.pem`. Import the root certificate using this command, specifying an `alias` that is indicative of the CA's name (type this all in one line):

```
keytool -keystore [app-path]\server\custom\my-ssl-keystore -importcert -alias globaltrustroot -file globaltrustroot.pem
```

When asked whether to trust this certificate, answer yes:

```
Trust this certificate? [no]: yes
```

Some certificate authorities also provide additional "intermediate certificates" that must be imported the same way as the root certificate. You should use a different `alias` each time. For example:

```
keytool -keystore [app-path]\server\custom\my-ssl-keystore -importcert -alias globaltrustinter -file globaltrustinter.pem
```

2. Import your own certificate previously saved as `jetty.crt` (type this all in one line):

```
keytool -keystore [app-path]\server\custom\my-ssl-keystore -import -alias jetty -file jetty.crt -trustcacerts
```

Your new keystore file `my-ssl-keystore` is now ready.

> **Caution:**
> The 'my-ssl-keystore' in the above command is the original my-ssl-keystore you created earlier.

3. Ensure the keystore file is in `[app-path]/server/custom/`.

Step 4: Configure the PaperCut NG/MF keystore

To configure the PaperCut Application Server to use the new key/certificate:

1. Copy your signed keystore onto the server running the PaperCut NG/MF Application Server. The suggested location is `[app-path]/server/custom/my-ssl-keystore`
2. Open the file `[app-path]/server/server.properties` with a text editor (e.g.

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Notepad).

3. Locate the section titled `SSL Key/Certificate`.
4. Remove the # (hash) comment marker from all lines starting with:

   ```
   server.ssl.keystore=
   server.ssl.keystore-password=
   server.ssl.key-password=
   ```

5. Define the following:

server.properties value	Description
server.ssl.keystore	The location of your keystore. This must match the value specified by `-k` in `create-ssl-keystore`. If you did not specify this value in `create-ssl-keystore`, leave it as default.
server.ssl.keystore-password	The keystore password. This must match the value specified by `-keystorepass` in create-ssl-keystore. If you did not specify this value in `create-ssl-keystore`, leave it as default.
server.ssl.key-password	The keystore key password. This must match the value specified by `-keystorekeypass` in create-ssl-keystore. If you did not specify this value in `create-ssl-keystore`, leave it as default.

6. Save the file.

> **Note:** On Mac OS, for `server.ssl.keystore`, specify the FULL path to your keystore. For example, `/Applications/PaperCut NG/MF/server/custom/my-ssl-keystore`

7. Restart the PaperCut NG/MF Application Server.

Use an existing trusted PaperCut NG/MFcertificate

If you have an existing trusted PaperCut NG/MF certificate, then based on the type of certificate, you can import it into the PaperCut NG/MF keystore:

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- On Windows, a certificate with an attached private key stored in either:
  - the Windows certificate store
  - a PKCS#12 file (`*.p12`/`*.pfx`)
- On Linux, separate 'PEM encoded' key and certificate files.

To use existing trusted PaperCut NG/MF certificate:

- Export the existing trusted certificate and key
- Import the existing trusted certificate into the PaperCut NG/MF keystore
- Configure the PaperCut NG/MF keystore

Step 1: Export the existing trusted certificate and key

> **Note:**
> If you already have a PKCS#12 file, you do not need to perform this step.

The way in which you export your existing trusted certificate and key depends on where it is stored. One common method of exporting is via the Windows Certificate Store:

1. Open the **Windows Control Panel**; then select **Internet Options**.
2. On the **Content** tab, click **Certificates**.
3. On the **Personal** tab, select the certificate; then click **Export**.
4. Click **Next** at the initial screen.
5. Select **Yes, export the private key**; then click **Next**.
   If you selected the last option correctly, you can export only as a `.PFX` file.
6. Select the **Include all the certificates in the certification path if possible** check box.
7. Clear the **Enable strong protection** check box.
8. Clear the **Delete the private key if the export is successful** check box.
9. Type a password for the PFX file. This is only used temporarily.
10. Save the PFX file with the extension `.pfx`. (This is just temporary, you MUST delete this file later on.)
11. Finish the wizard to export the certificate.

Step 2: Import the existing trusted certificate into the Paper-Cut NG/MF keystore

The way in which you import your trusted certificate into the PaperCut NG/MF keystore depends on the type of certificate you have:

PEM/CERT/CER file

1. In a command line, navigate to the `create-ssl-keystore` tool:

```
cd [app-path]/server/bin/win
```

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2. Run the following `create-ssl-keystore` command after specifying values for relevant arguments:

```
create-ssl-keystore -f -k <keystore location> -cert
<certificate file path> -key <key file path> -sig
<signature> -keypass <keyfile password> -keystorepass
<keystore password> -keystorekeypass <keystore key password>
-certCA <certificate files> -bcCA "<SYSTEM-NAME>"
```

Example:
For example, to create a keystore with a password from a key that has a password:

```
create-ssl-keystore -f -cert "path/to/pem-
certificate.pem" -key "path/to/pem-key.pem" -keypass
"password" -keystorepass "password"
```

Note: While the table below outlines some arguments of the `create-ssl-keystore` command, the `--help` command line option lists all the available arguments.

`create-ssl-keystore` command arguments	Description and values
-f	(optional) Overwrites any existing keystore file(s).
-k <keystore location>	Specify the location of keystore in to which the existing trusted PaperCut NG/MF key/ certificate is being imported. If you don't specify this value, the default location `[app-path]/server/data/default-ssl-keystore` is used.
-cert <certificate file path>	(required) Specify the file name and location of the existing trusted PaperCut NG/MF certificate that is being imported into the keystore. In conjunction with `-key`, this creates the keystore.
-key <key file path>	(required) Specify the file name and location of the existing trusted PaperCut NG/MF key that is being imported into the keystore. In conjunction with `-cert`, this creates the keystore.
-sig <signature>	(optional) Specify the certificate signing algorithm that is used by the existing trusted PaperCut NG/MF key/ certificate that is being imported into the keystore.

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create-ssl-keystore command arguments	Description and values
	Valid values: `[sha256 | sha1]`. If you don't specify this value, the standard algorithm `sha1` is used. This ensures backwards compatibility with 3rd party systems. For more information, see Can I use other algorithms such as SHA2/SHA256?
-keypass <keyfile password>	(required if the existing key already has a password) Specify the existing password of the existing PaperCut NG/MF key/ certificate that is being imported into the keystore.
-keystorepass <keystore password>	(optional) Specify the password required to access the keystore. If you don't specify this value, the keystore password is `default`.
-keystorekeypass <keystore key password>	(optional) Specify the password required to access the existing trusted PaperCut NG/MF key/ certificate that is being imported into the keystore. If you don't specify this value, the keystore key password is `default`.
-certCA	(optional) Specify the name of the certificate authority that has issued the existing trusted PaperCut NG/MF key/ certificate that is being imported into the keystore.
-bcCa	(optional) Add the X.509 Basic Constraints CA extension.
<SYSTEM-NAME>	Specify the name of the computer/ server that is being used to create the keystore. If you don't specify this value, the current computer name is used.

PFX/PKCS#12 file

1. In a command line, navigate to the `create-ssl-keystore` tool:

   ```
   cd [app-path]/server/bin/win
   ```

2. Run the following `create-ssl-keystore` command after specifying values for relevant arguments

   ```
   create-ssl-keystore -f -k <keystore location> -p12
   <PKCS12/PFX certificate file path> -p12pass <password for
   the PKCS12/PFX certificate file> -sig <signature> -
   keystorepass <keystore password> -keystorekeypass <keystore
   key password> -certCA <certificate files> -bcCA "<SYSTEM-
   NAME>"
   ```

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Example:
For example, to create a keystore with a password from a key that has a password:

```
create-ssl-keystore -f -p12 "path/to/pfx.pfx" -p12pass
“password” -k "path/to/custom/folder/my-ssl-keystore"
-keystorepass “password”
```

Note: While the table below outlines some arguments of the `create-ssl-keystore` command, the `--help` command line option lists all the available arguments.

`create-ssl-keystore` command arguments	Description and values
-f	(optional) Overwrites any existing keystore file(s).
-k <keystore location>	Specify the location of keystore in to which the existing trusted PaperCut NG/MF key/ certificate is being imported. If you don’t specify this value, the default location `[app-path]/server/data/default-ssl-keystore` is used.
-p12 <PKCS12/PFX certificate file path>	(required) Specify the file name and location of the existing trusted PaperCut NG/MF certificate that is being imported into the keystore.
-p12pass <password for the PKCS12/PFX certificate file>	(required if the existing certificate already has a password) Specify the existing password of the existing PaperCut NG/MF key/ certificate that is being imported into the keystore.
-sig <signature>	(optional) Specify the certificate signing algorithm that is used by the existing trusted PaperCut NG/MF key/ certificate that is being imported into the keystore. Valid values: `[sha256 | sha1]`. If you don’t specify this value, the standard algorithm `sha1` is used. This ensures backwards compatibility with 3rd party systems. For more information, see Can I use other algorithms such as SHA2/SHA256?
-keystorepass <keystore password>	(optional) Specify the password required to access the keystore. If you don’t specify this value, the keystore password is `default`.

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create-ssl-keystore command arguments	Description and values
-keystorekeypass <keystore key password>	(optional) Specify the password required to access the existing trusted PaperCut NG/MF key/ certificate that is being imported into the keystore. If you don't specify this value, the keystore key password is `default`.
-certCA	(optional) Specify the name of the certificate authority that has issued the existing trusted PaperCut NG/MF key/ certificate that is being imported into the keystore.
-bcCa	(optional) Add the X.509 Basic Constraints CA extension.
<SYSTEM-NAME>	Specify the name of the computer/ server that is being used to create the keystore. If you don't specify this value, the current computer name is used.

Step 3: Configure the PaperCut NG/MF keystore

To configure the PaperCut Application Server to use the new key/certificate:

1. Copy your signed keystore onto the server running the PaperCut NG/MF Application Server. The suggested location is `[app-path]/server/custom/my-ssl-keystore`
2. Open the file `[app-path]/server/server.properties` with a text editor (e.g. Notepad).
3. Locate the section titled `SSL Key/Certificate`.
4. Remove the `#` (hash) comment marker from all lines starting with:

   ```
   server.ssl.keystore=
   server.ssl.keystore-password=
   server.ssl.key-password=
   ```

5. Define the following:

server.properties value	Description
server.ssl.keystore	The location of your keystore. This must match the value specified by `-k` in `create-ssl-keystore`. If you did not specify this value in `create-ssl-keystore`, leave it as default.
server.ssl.keystore-password	The keystore password. This must match the value specified by `-keystorepass` in create-ssl-keystore.

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server.properties value	Description
	If you did not specify this value in `create-ssl-keystore`, leave it as default.
server.ssl.key-password	The keystore key password. This must match the value specified by –`keystorekeypass` in create-ssl-keystore. If you did not specify this value in `create-ssl-keystore`, leave it as default.

6. Save the file.

> **Note:** On Mac OS, for `server.ssl.keystore`, specify the FULL path to your keystore. For example, `/Applications/PaperCut NG/MF/server/custom/my-ssl-keystore`

7. Restart the PaperCut NG/MF Application Server.

Use an existing trusted IIS certificate

If your organization's intranet is served by Internet Information Server (Windows), Apache (Linux), or another web server, you might be able to use the trusted IIS certificate for PaperCut NG/MF.

You can use an existing trusted IIS certificate if either:

- your intranet server and PaperCut NG/MF Application server run on the same server, that is, they have the same server name and address
- you have a wild-card certificate that allows arbitrary subdomains under the domain name (for example, `myschool.edu`) for which it was issued

To use existing trusted IIS certificate:

- Export the existing trusted IIS certificate
- Import the existing trusted IIS certificate into the PaperCut NG/MF keystore
- Configure the PaperCut NG/MF keystore

Step 1: Export the existing trusted IIS certificate

To export your trusted certificate:

1. Open the Windows management console.
2. Select your IIS server.
3. Navigate to the Windows Start menu.
4. Right-click the **Command Prompt**.

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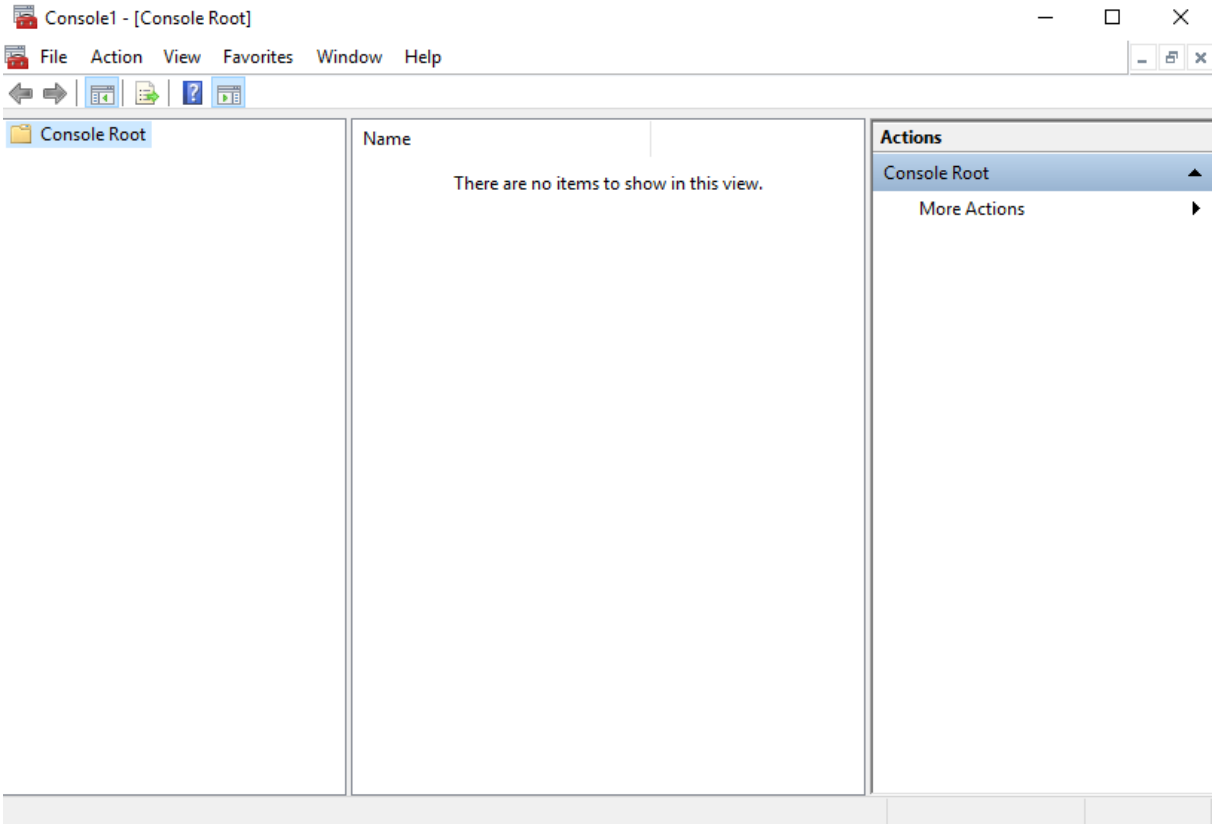
5. Select **Run as administrator**.
6. Run the following command:

   ```
   MMC
   ```

7. Verify that the **Console Root** screen is displayed:



8. On the **Console Root** screen, press the keyboard shortcut **Ctrl+M**.
9. Verify that the **Add or Remove Snap-ins** screen is displayed:

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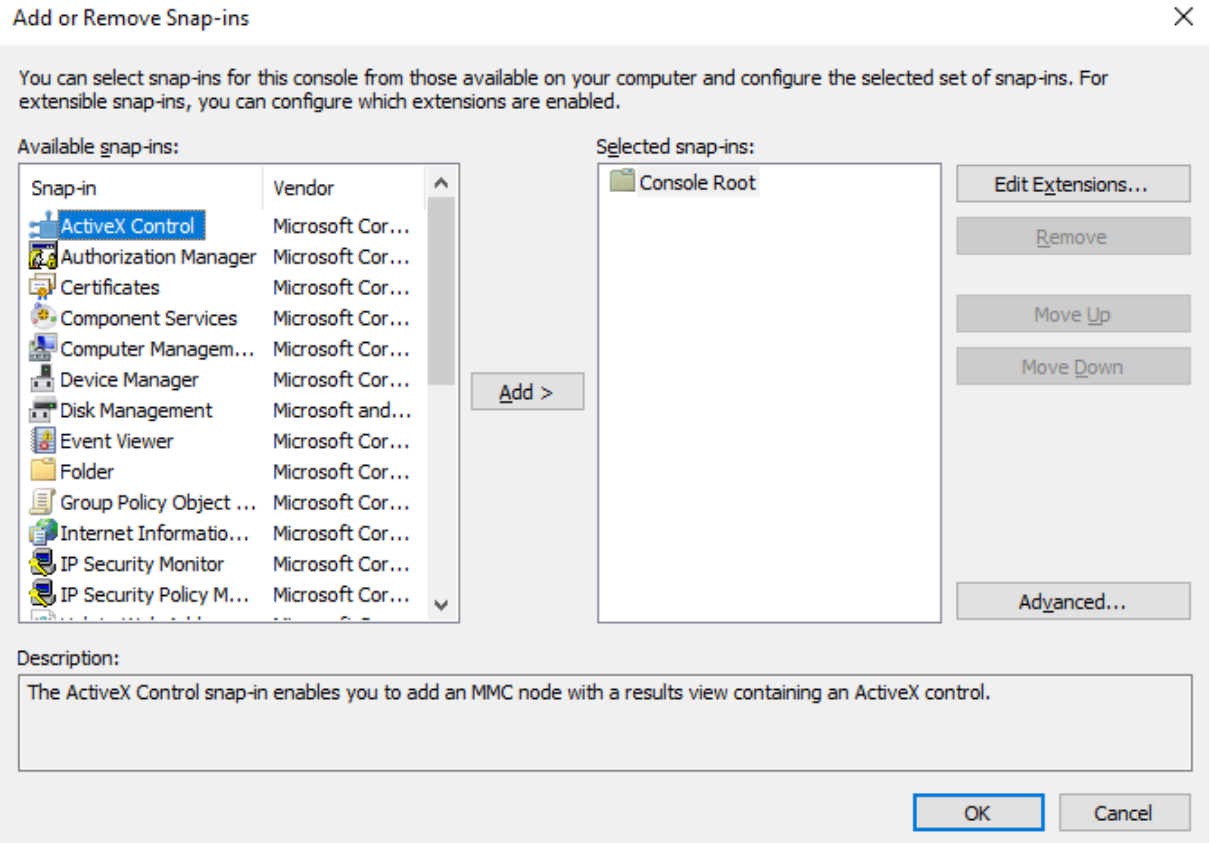

10. On the **Add or Remove Snap-ins** screen's **Available snap-ins** list, select **Certificates**; click **Add**:

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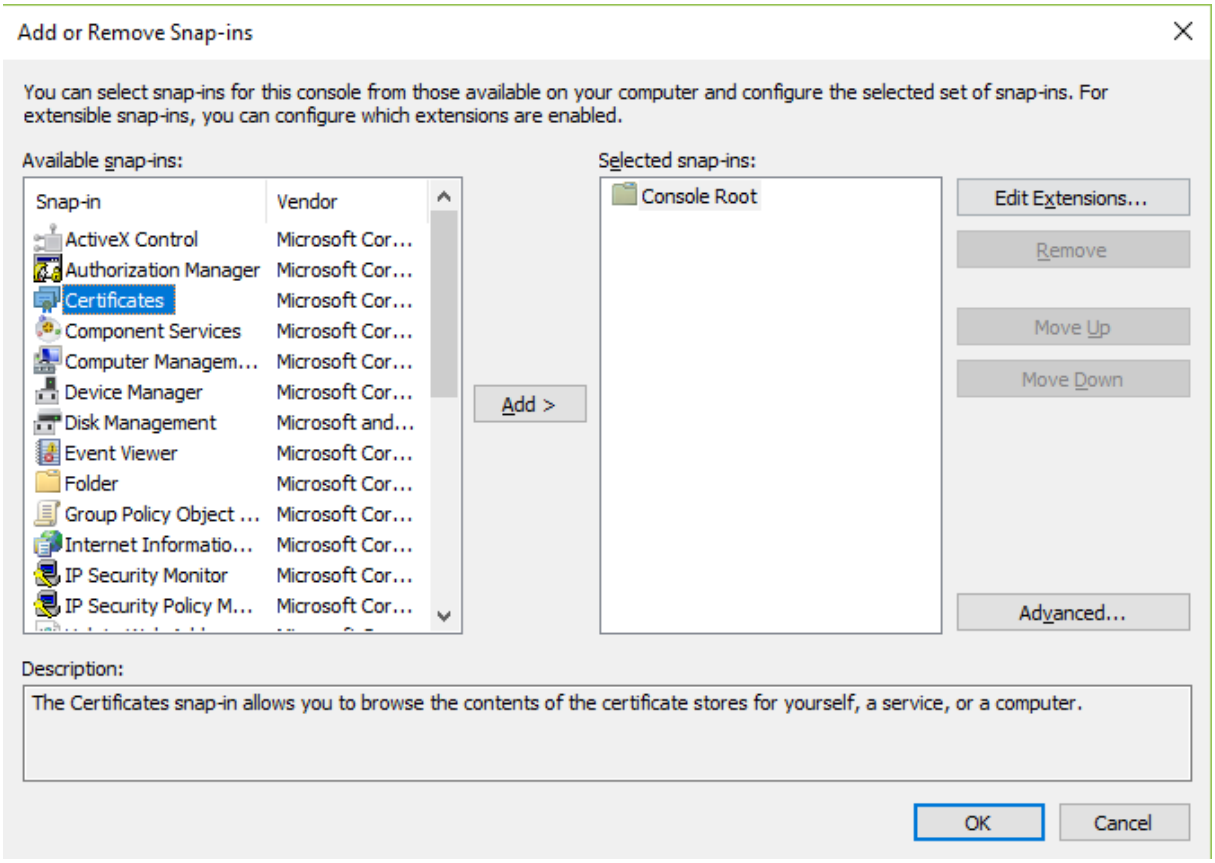
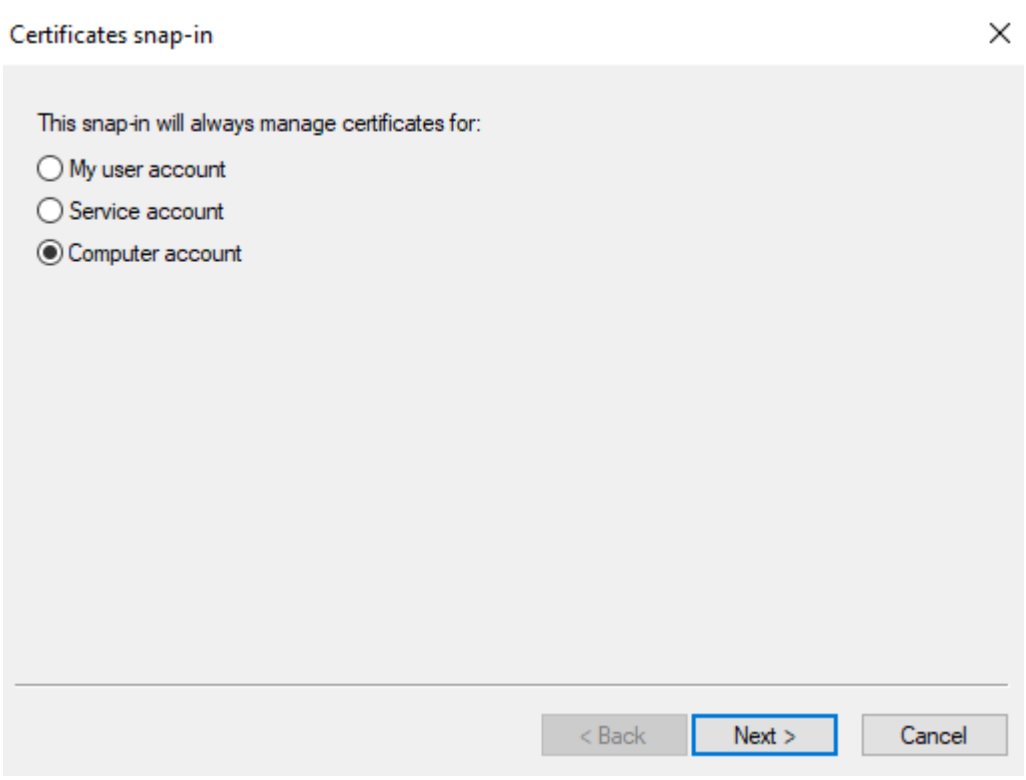


11. From the **Certificates snap-in** screen, select **Computer account**; click **Next>**:



12. Click **Finish**:

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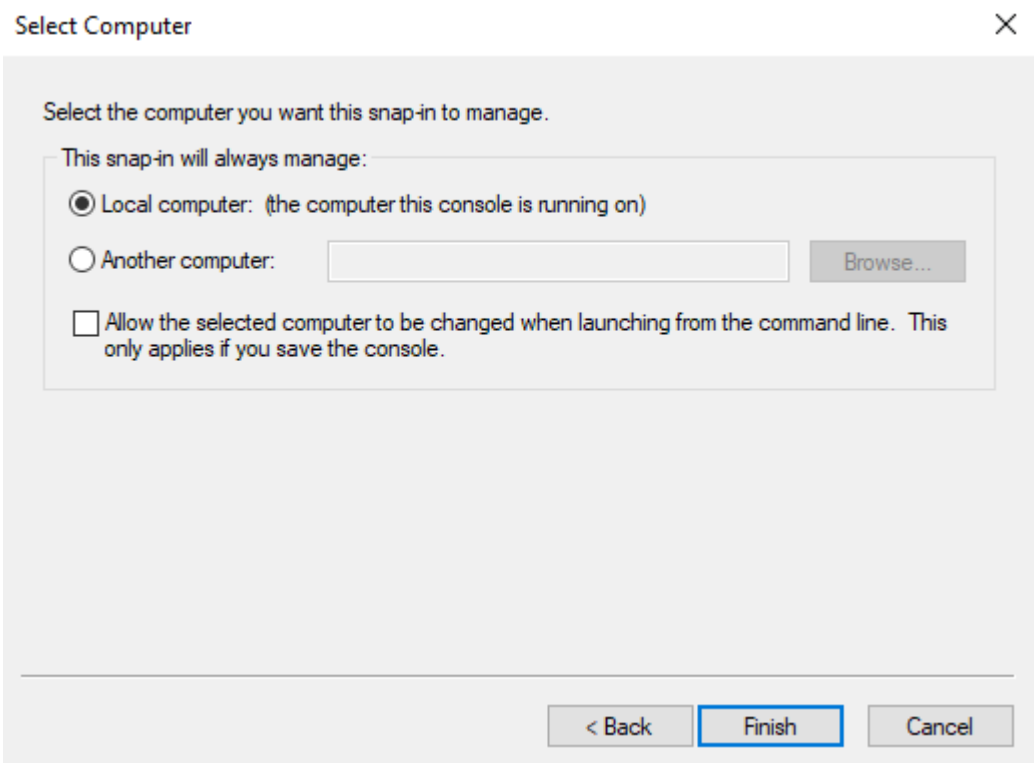
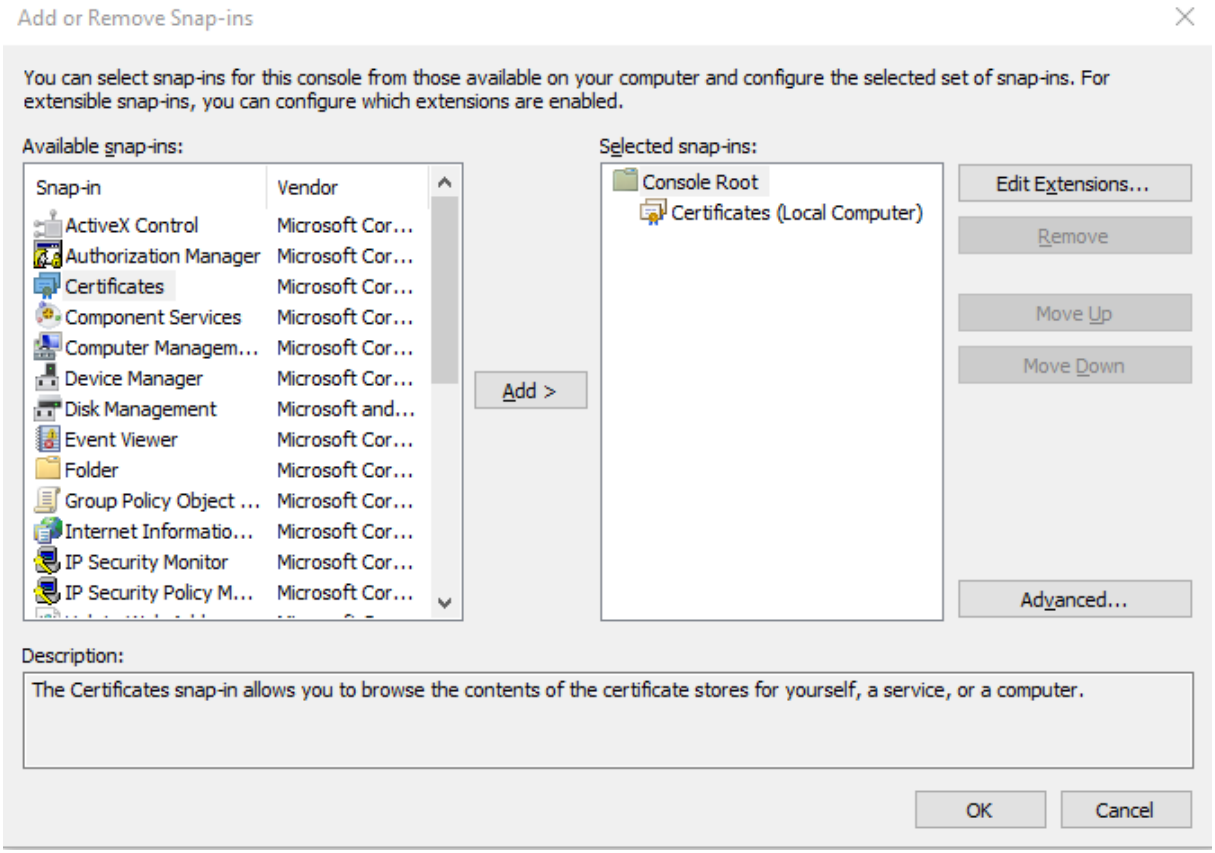


13. Verify that on the **Add or Remove Snap-ins** screen's **Selected snap-ins** list, **Console Root > Certificates** is displayed:



14. Click **OK**.

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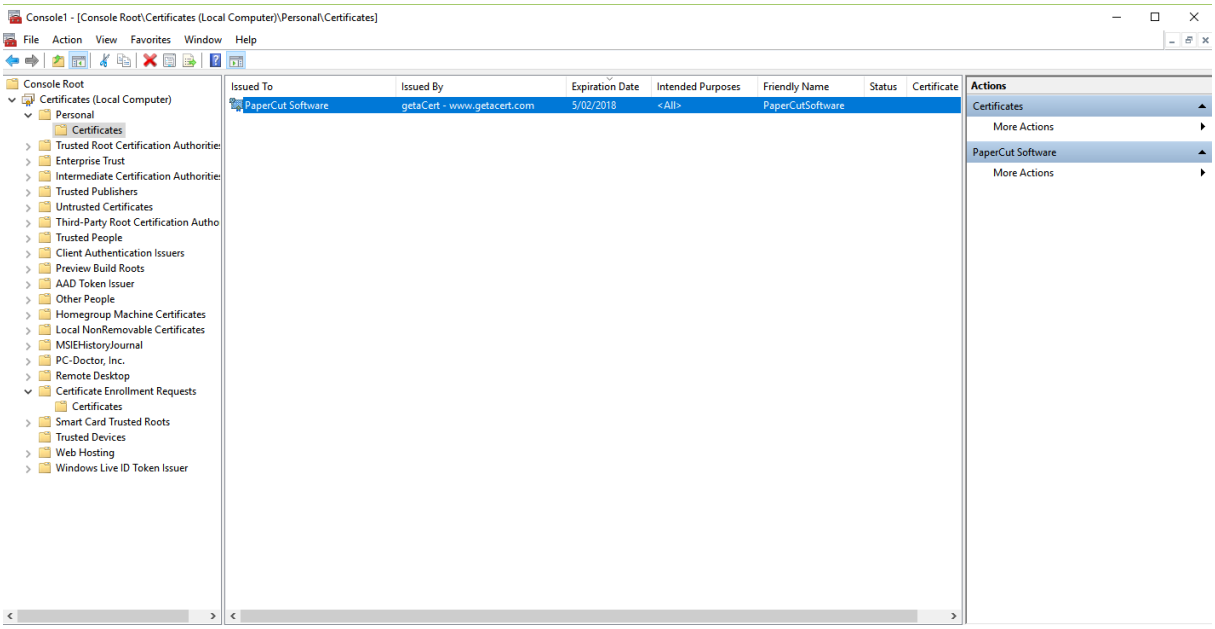
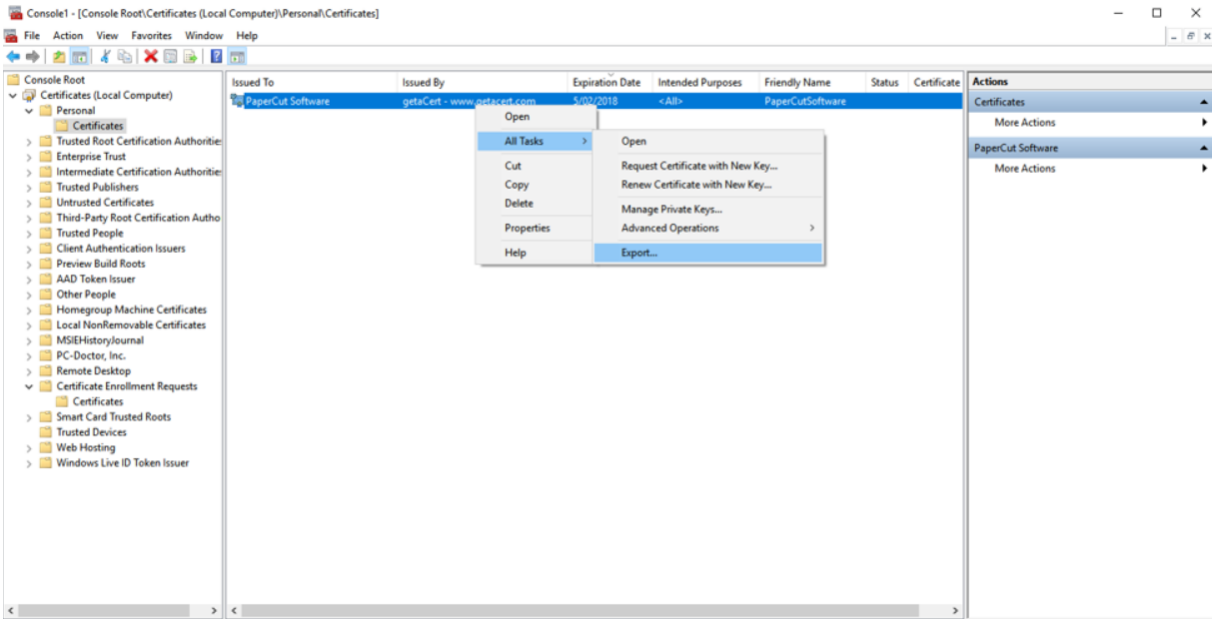
15. On the **Console Root** screen, navigate to: **Console Root > Certificates > Personal > Certificates**:



16. Right click the certificate and navigate to: **All Tasks > Export…**:



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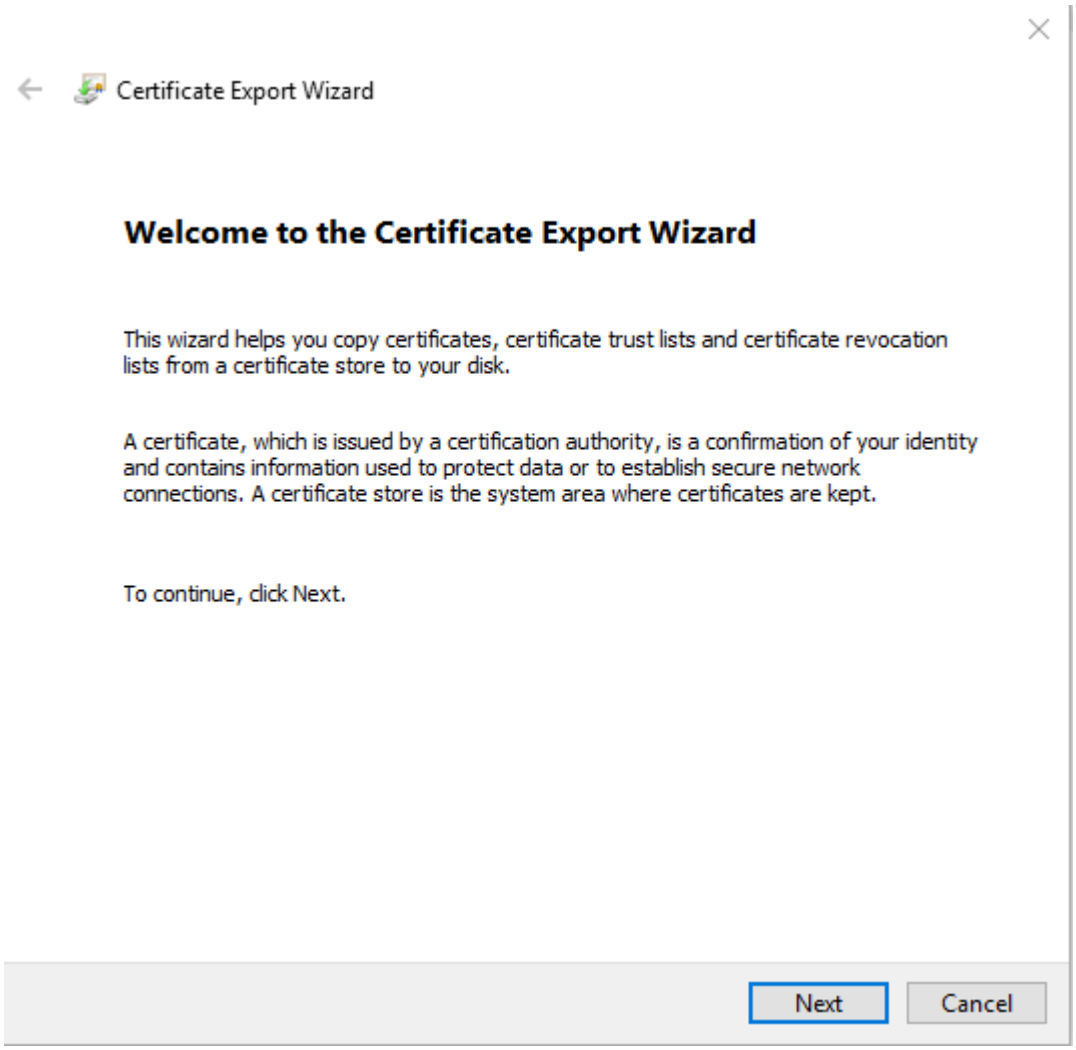
17. Follow the **Certificate Export Wizard's** prompts:
    a. Click **Next**:



    b. Select **Yes, export the private key**; click **Next**:

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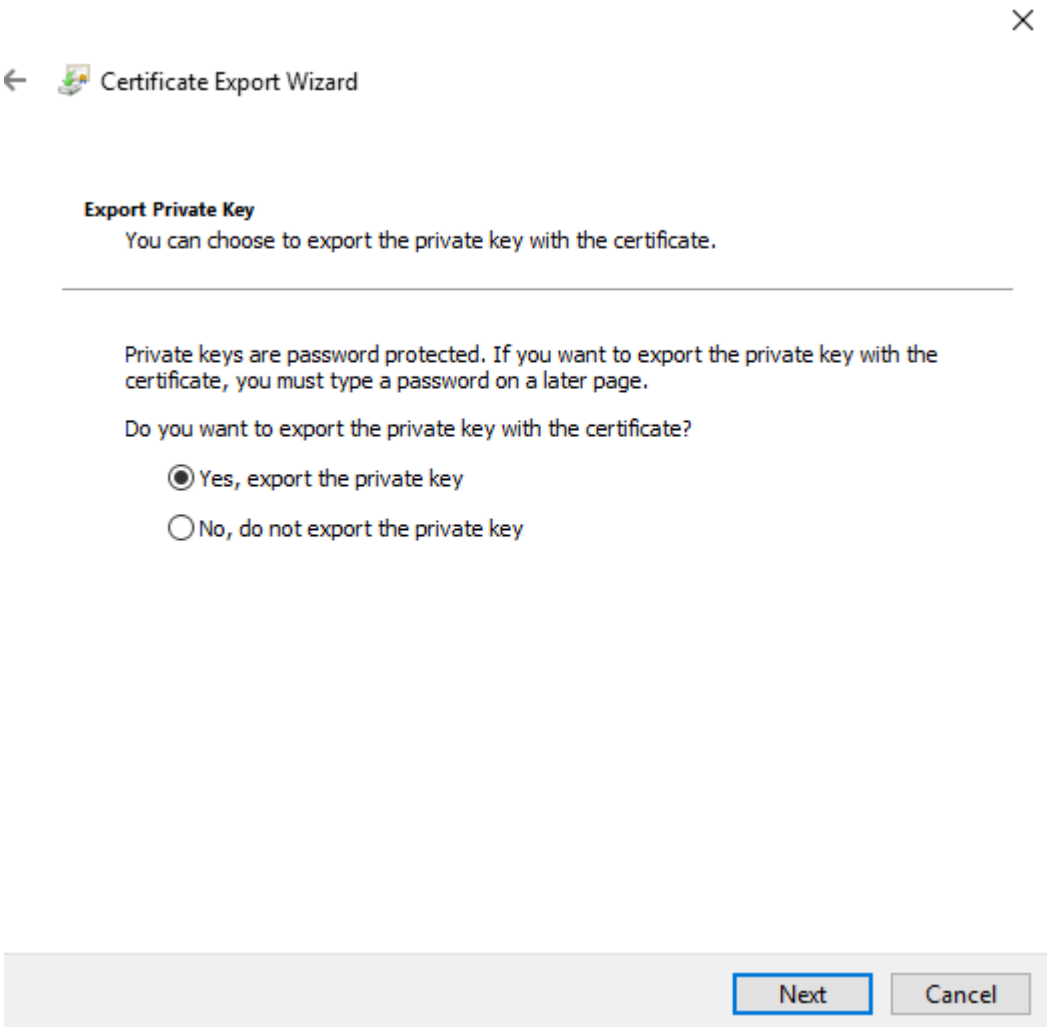

c. Select **Personal Information Exchange**, **Include all certificates in the certification path if possible** and **Enable certificate privacy**; click **Next**:

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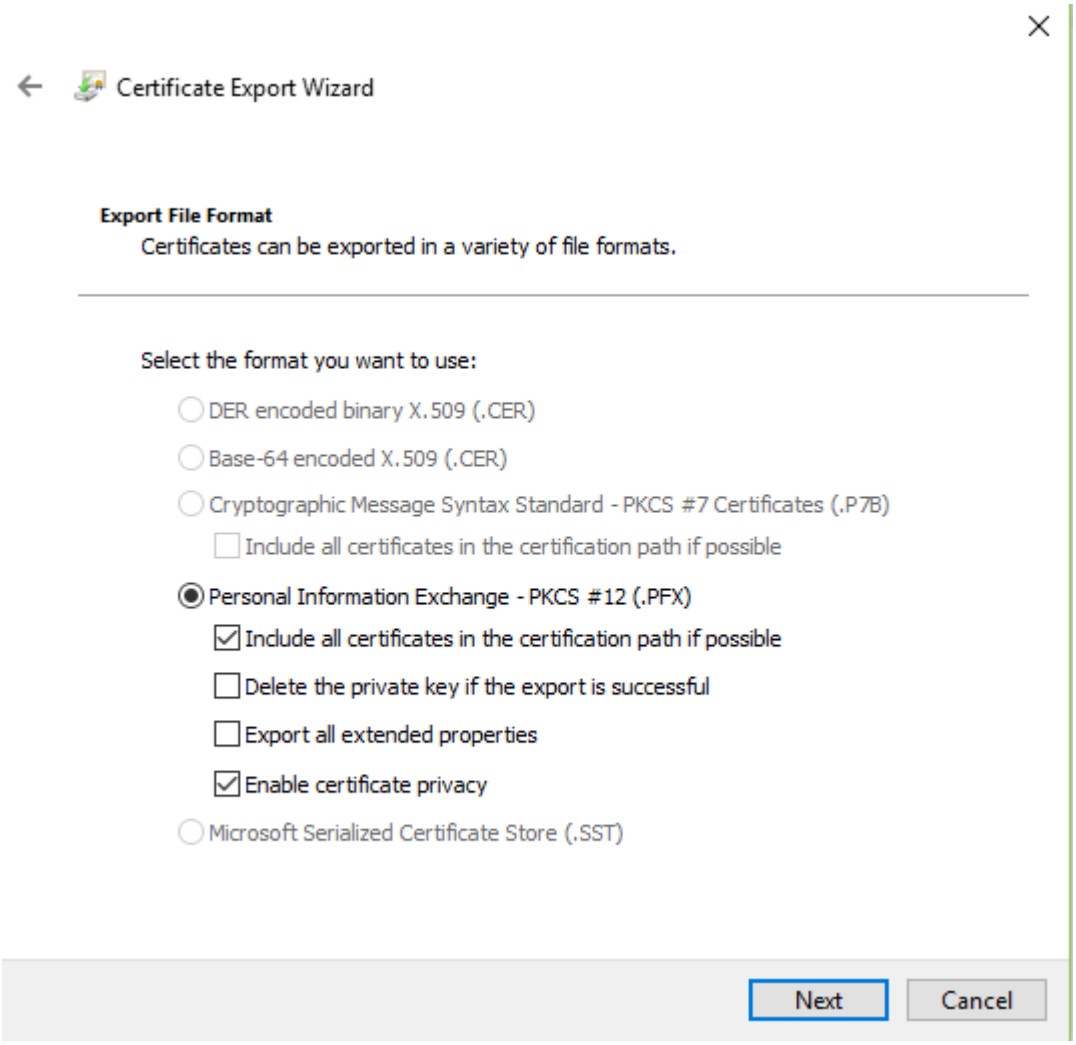

d. Select **Password**; then enter the export password; then click **Next**.

> **Important:** When importing the certificate use this same password as the `source keystore password`.

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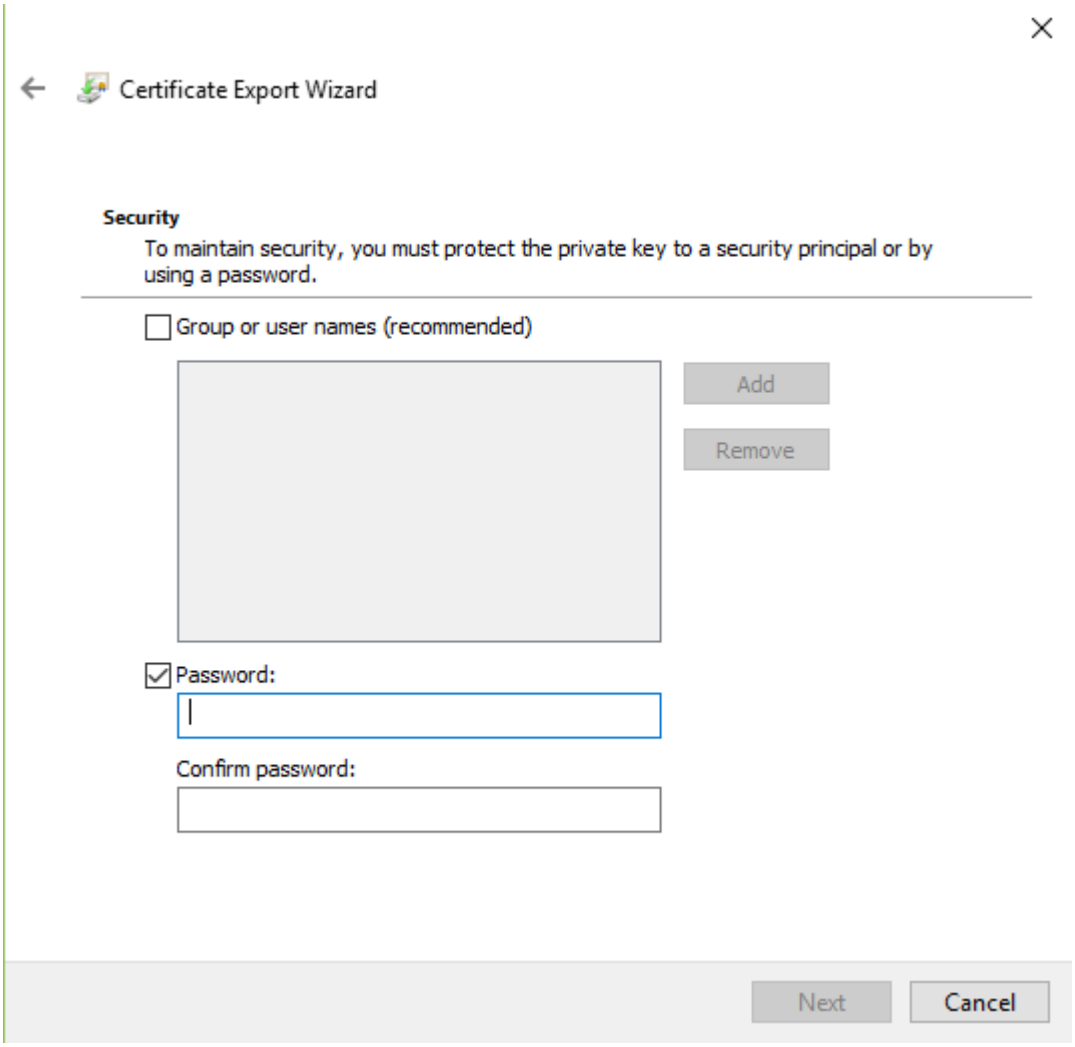

e. Click **Browse**:

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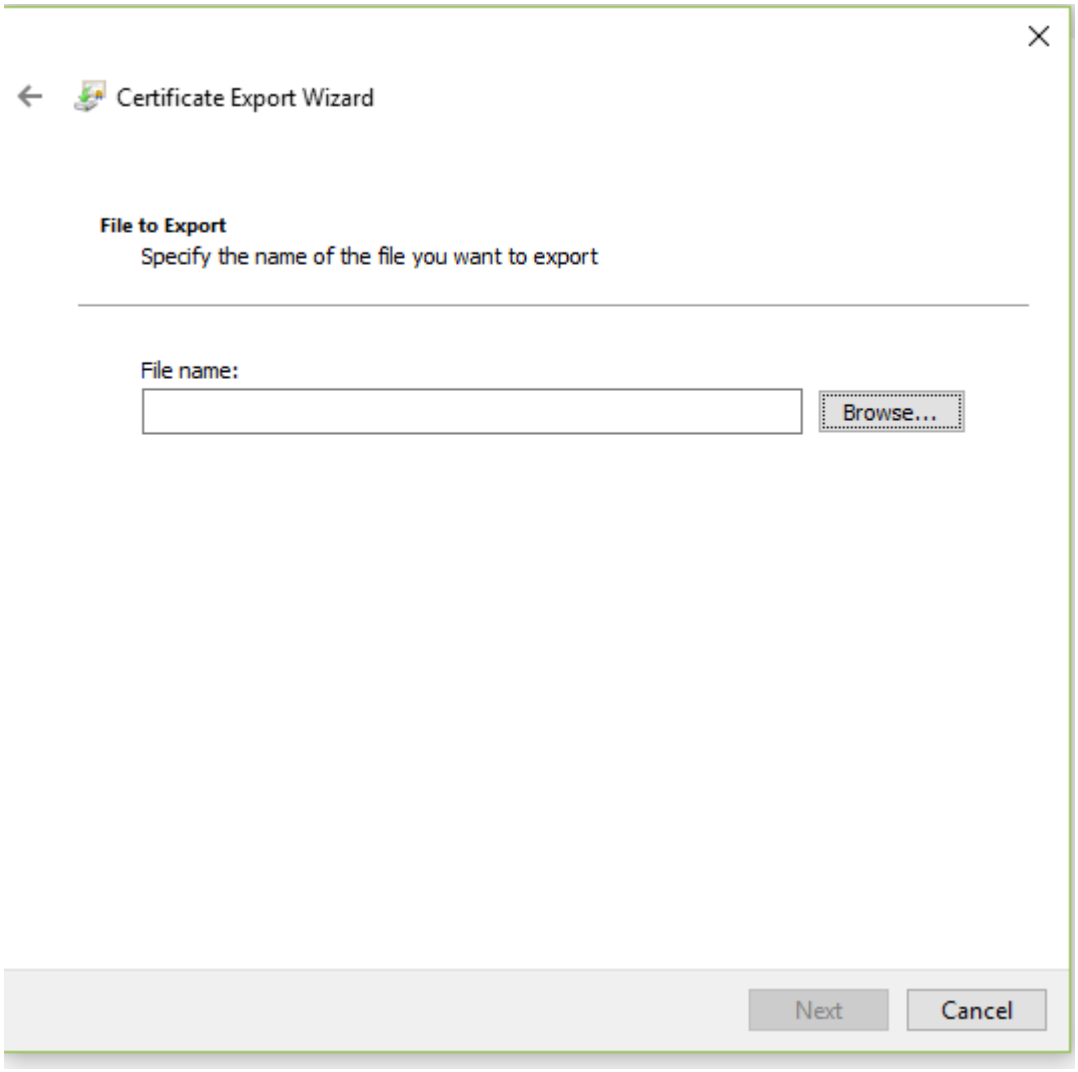
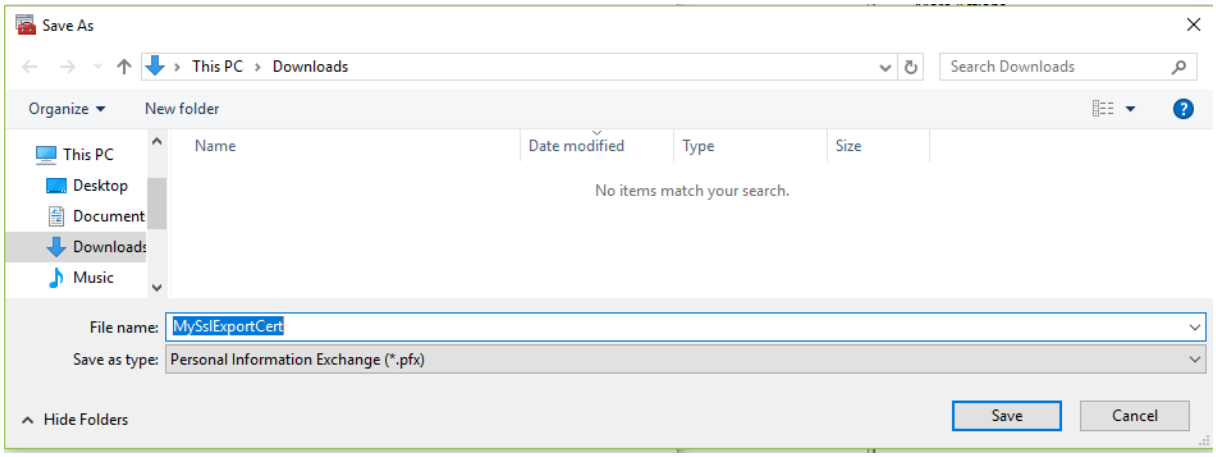


f. Select the directory in which the certificate will be exported to:



g. Enter the **File name** that the certificate will be exported as, in the directory you selected; click **Save**:

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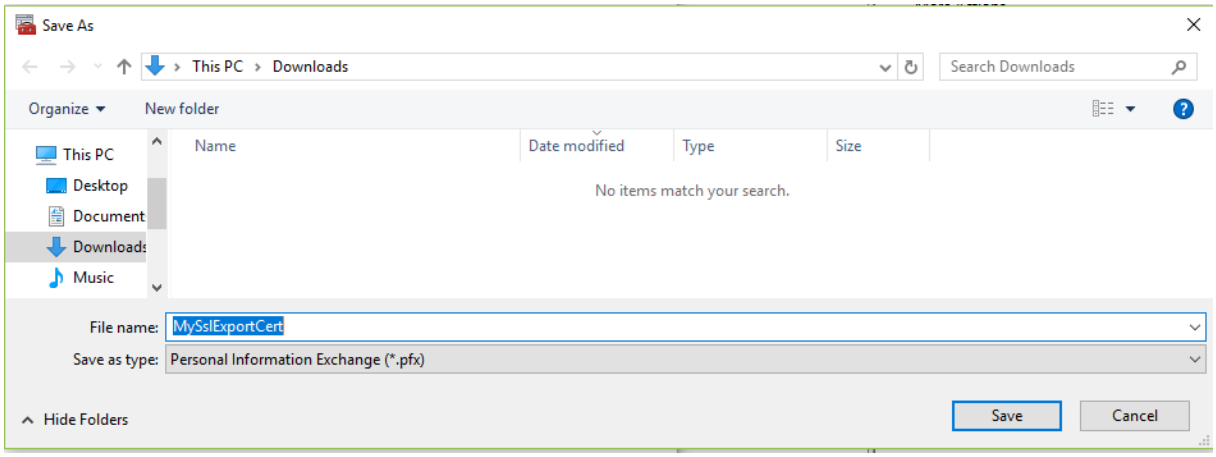
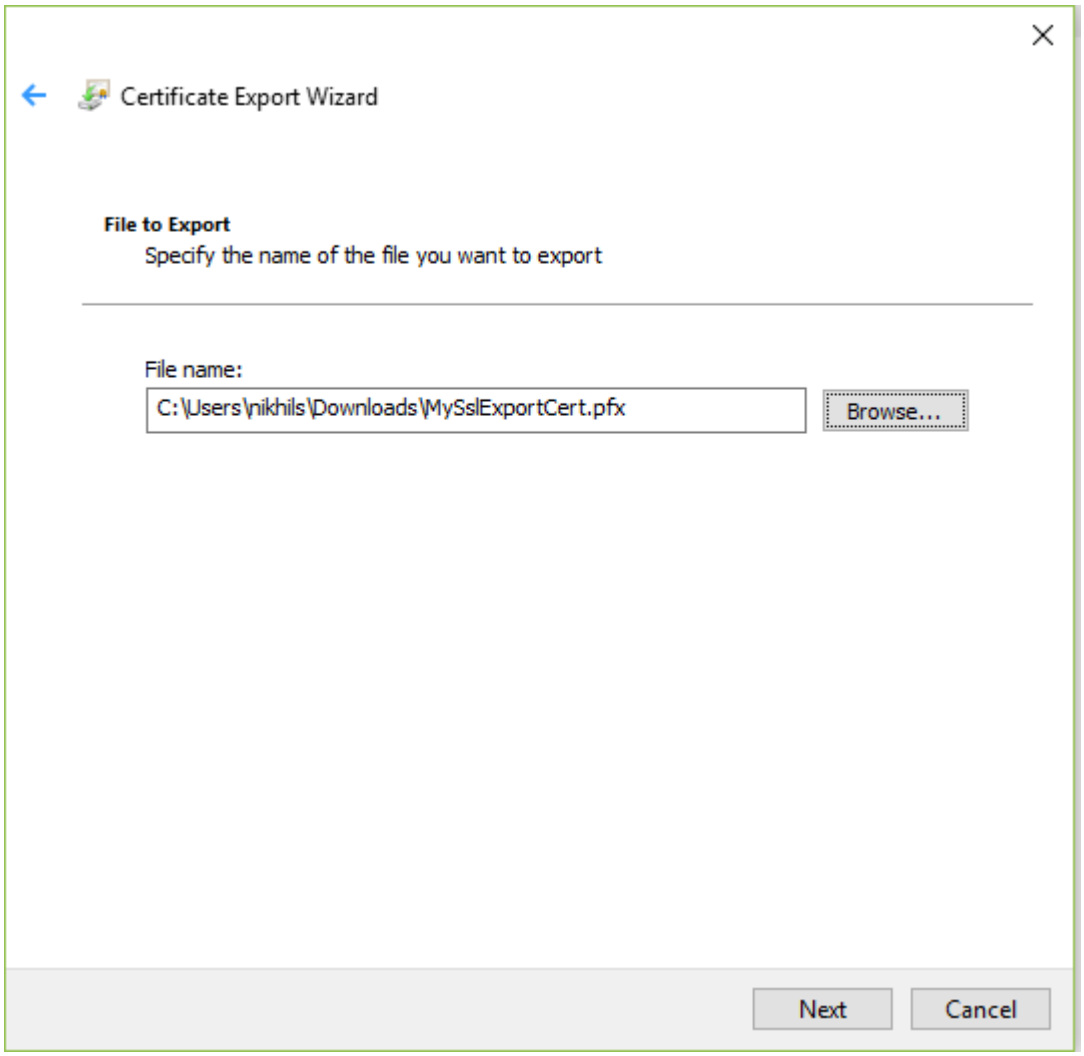


h. Verify that the **File name** displays the path of directory you selected and the file name of the certificate that you specified; click **Next**:



i. Click **Finish**:

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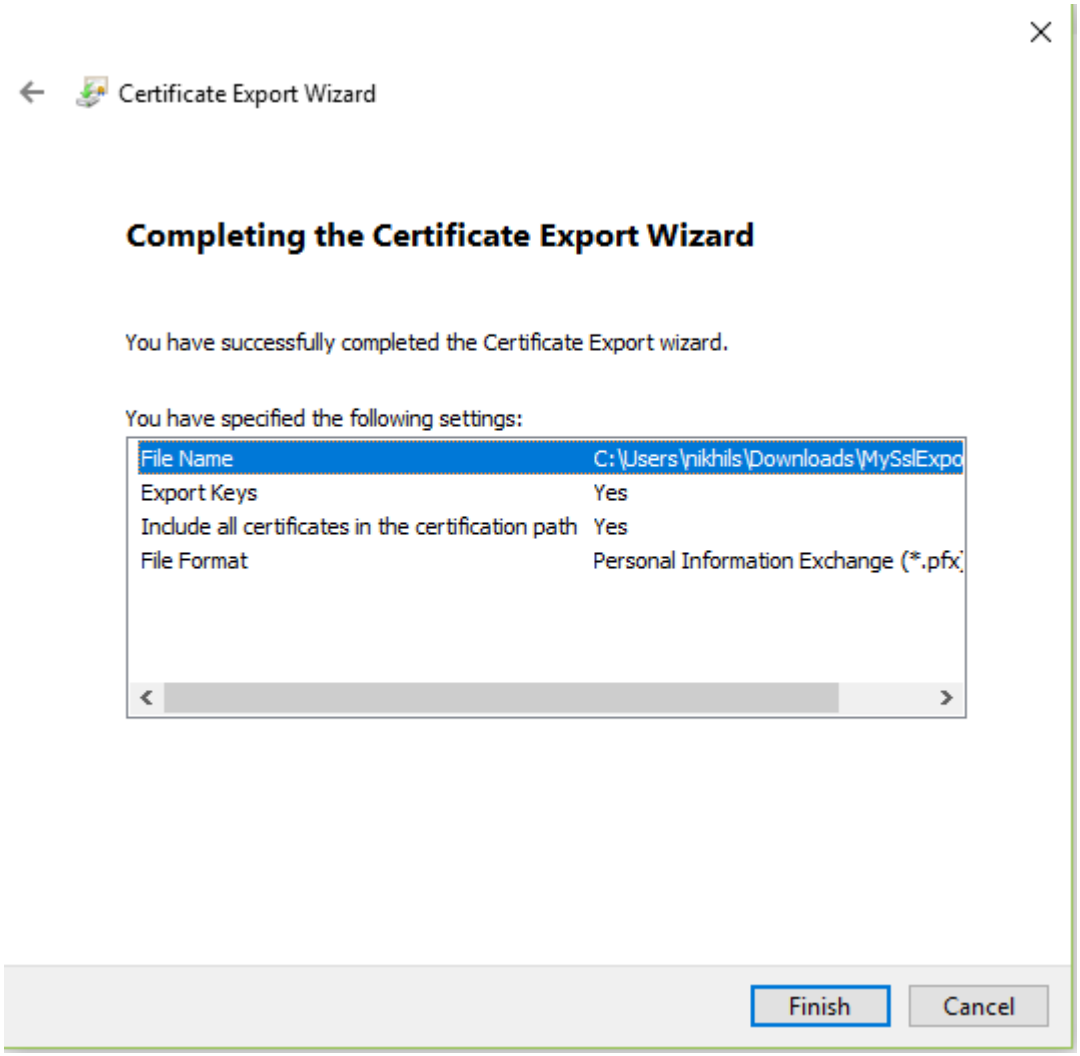

j. Click **OK**:

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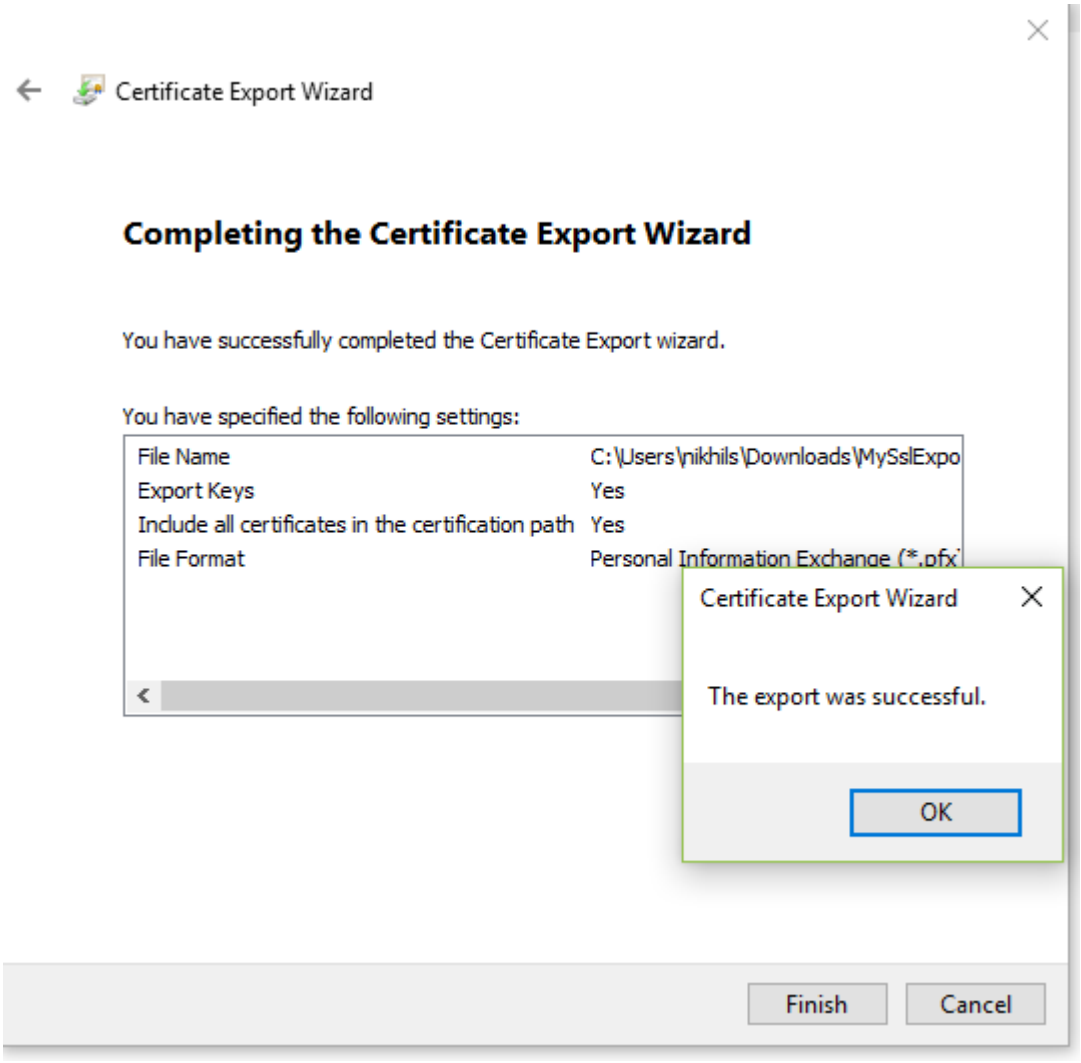
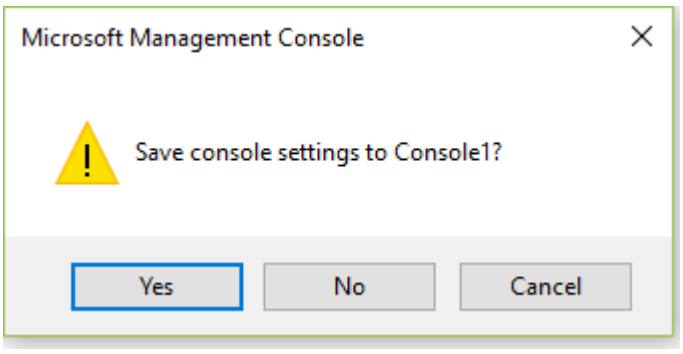


18. Close the **Find Certificates** screen.
19. Close the **Console Root** screen.
20. Click **No**:



Step 2: Import the existing trusted IIS certificate into the PaperCut NG/MF keystore

To import your trusted certificate into the PaperCut NG/MF keystore:

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1. Navigate to the directory where your exported certificate is saved and copy the certificate.
2. Navigate to the following path on your PaperCut NG/MF Application Server and paste the certificate in this path:

   `[app-path]\server\custom\`
3. Right-click the **Command Prompt**.
4. Select **Run as administrator**.
5. Run the following command:

   `[app-path]/runtime/jre/bin`
6. On the directory, delete any existing files with the following name:

   `my-ssl-keystore`
7. On the **Command Prompt**, run the following command:

   ```
   keytool -importkeystore -srckeystore "[app-path]\server\custom\MySslExportCert.pfx" -srcstoretype pkcs12 -destkeystore "[app-path]\server\custom\my-ssl-keystore"
   ```
8. Enter the following responses to the SSL key:

   `Enter destination keystore password:` Enter keystore password.

   `Re-enter new password:` Re-enter the same keystore password.

   `Enter source keystore password:` Enter the same password as entered while exporting the certificate on the **Certificate Export Password** screen.

   For example:

   ```
   keytool -importkeystore -srckeystore "c:\Program Files\PaperCut NG/MF\server\custom\MySslExportCert.pfx" -srcstoretype pkcs12 -destkeystore "c:\Program Files\PaperCut NG/MF\server\custom\my-ssl-keystore"
   ```

Step 3: Configure the PaperCut NG/MF keystore

To configure the PaperCut Application Server to use the new key/certificate:

1. Copy your signed keystore onto the server running the PaperCut NG/MF Application Server. The suggested location is `[app-path]/server/custom/my-ssl-keystore`
2. Open the file `[app-path]/server/server.properties` with a text editor (e.g. Notepad).
3. Locate the section titled `SSL Key/Certificate`.
4. Remove the `#` (hash) comment marker from all lines starting with:

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```
server.ssl.keystore=
server.ssl.keystore-password=
server.ssl.key-password=
```

5. Define the following:

server.properties value	Description
server.ssl.keystore	The location of your keystore. This must match the value specified by `-k` in `create-ssl-keystore`. If you did not specify this value in `create-ssl-keystore`, leave it as default.
server.ssl.keystore-password	The keystore password. This must match the value specified by `-keystorepass` in create-ssl-keystore. If you did not specify this value in `create-ssl-keystore`, leave it as default.
server.ssl.key-password	The keystore key password. This must match the value specified by `-keystorekeypass` in create-ssl-keystore. If you did not specify this value in `create-ssl-keystore`, leave it as default.

6. Save the file.

> **Note:** On Mac OS, for `server.ssl.keystore`, specify the FULL path to your keystore. For example, `/Applications/PaperCut NG/MF/server/custom/my-ssl-keystore`

7. Restart the PaperCut NG/MF Application Server.

5.3.4.3. Renew an SSL certificate

To ensure that the trust mechanisms in SSL are adhered to, SSL certificates are designed to expire so that your environment is kept up-to-date. To renew your SSL certificate you need to retrace your steps when originally creating a new SSL certificate. See: Generate SSL/HTTPS keys. However, the exact steps depend on your Certificate Authority as some require you to submit a brand new CSR, some allow you to just request a new SSL certificate.

The easiest way to do this is to use a new keystore, e.g. you substitute `my-ssl-keystore` with `my-ssl-keystore-20151217`

The new `my-ssl-keystore-20151217` is put into production only after you've modified the `server.properties` as per Use the PaperCut NG/MF self-signed certificate and have

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restarted the PaperCut NG/MF Application Server. This means you have time to create the private key, complete the CSR and receive the signed certificate before using the new keystore. If there is an issue with the new certificate or setup, you can quickly revert back to the original `my-ssl-keystore`.

For example, the SSL key generation command originally was

```
keytool -keystore [app-path]\server\custom\my-ssl-keystore -alias
jetty -genkeypair
-keyalg RSA
```

and it becomes

```
keytool -keystore [app-path]\server\custom\my-ssl-keystore-
20151217 -alias jetty -genkeypair
-keyalg RSA
```

5.3.4.4. Advanced customization

Extended keytool.exe usage

This documentation provides the more common scenarios around keytool.exe usage. If you require further customization, review the documentation available from Oracle:

1. PaperCut NG/MF version 15.2 and newer: Java 8 (1.8) keytool Documentation
2. PaperCut NG/MF version 14.0 and newer: Java 7 (1.7) keytool Documentation
3. PaperCut NG/MF version 13.5 and older: Java 6 (1.6) keytool Documentation

Can I have more than one hostname / FQDN?

One of the benefits of using an SSL certificate is making sure that the URL matches the certificate, preventing a 3rd party from masquerading as you. If you have more than one URL or Fully Qualified Domain Name (FQDN) that PaperCut NG/MF is available from, then you have two main options:

1. Obtain a "wildcard" certificate from your Certificate Authority. Contact your Certificate Authority for further details as to this service.
2. Use a "Subject Alternative Name" or "SAN" when creating the SSL certificate. This should require no special action from your Certificate Authority as this is done as part of the certificate generation process with keytool.exe.

   Note:
   You require keytool.exe for PaperCut NG/MF version 14.0 and newer.

   An example is:

   ```
   keytool.exe -keystore "[app-path]/server/custom/my-ssl-
   keystore" -alias jetty -genkeypair -keyal RSA -ext
   san=dns:external.company.com
   ```

   Then, when asked for your "first and last name", enter the other FQDN:

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```
What is your first and last name?
[Unknown]: internal.company.lan
```

Confirm that the information is correct. You will see similar to:

```
Is CN=internal.company.lan, OU=Unknown, O=Unknown,
L=Unknown, ST=Unknown, C=Unknown correct?
```

Once you have received your certificate from your Certificate Authority you can confirm your "Subject" and "Subject Alternative Name" are valid. Make sure that you test the new certificate with multiple operating systems, browsers and hardware environments including laptops, mobile devices and printers/copiers.

Can I use other algorithms, such as SHA2/SHA256?

Yes. As we use keytool.exe, you can use the documentation above in Extended keytool.exe usage.

For example, generating the private SSL key:

```
keytool -genkey -alias server -keyalg rsa -sigalg sha256withrsa -
keysize 2048 -keystore sha256
```

and generating the CSR:

```
keytool -certreq -alias server -keystore sha256 -file 256.csr -
sigalg sha256withrsa
```

5.3.4.5. Troubleshoot SSL/HTTPS key generation

Verify certificate path in Windows

If you are getting errors with your new SSL certificate one of the first things to check is that the intermediary certificates have been loaded correctly. You can do this via Internet Explorer, and every other modern web browser, the steps differ slightly.

Load Internet Explorer and visit the HTTPs URL for your PaperCut NG/MF server then click the padlock near the URL bar as below.

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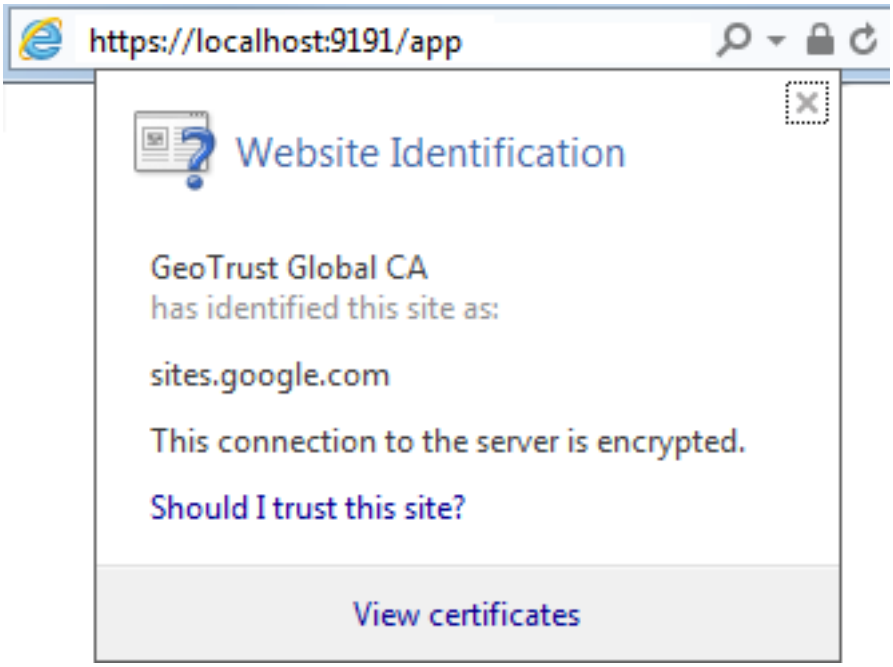

Then click **View Certificates** and navigate to the Certificate Path and verify it is correct.

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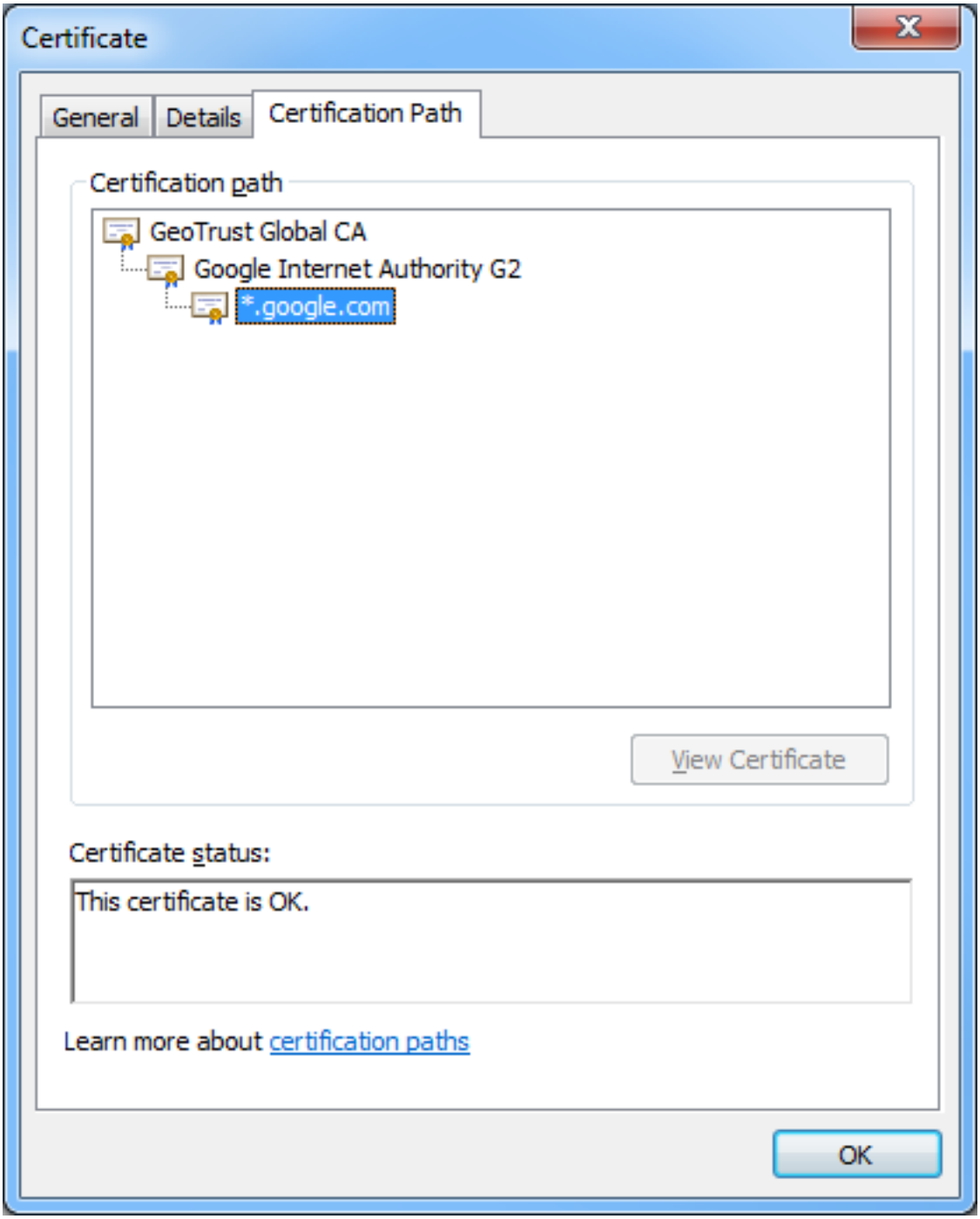

If the path is invalid, confirm that you have correctly inserted the required intermediary certificates. See Creating and installing a purchased SSL Certificate

Verify certificate path via command line with OpenSSL

A quick way to easily validate the chain output by the server. This requires either Linux or Cygwin with openssl's packages installed:

```
openssl s_client -connect [server]:[port] -crlf
```

Once the text has been output, type in:

```
QUIT
```

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For example, a self-signed certificate looks like this:

```
openssl s_client -connect localhost:9192 -crlf
CONNECTED(00000003)
depth=0 C = Unknown, ST = Unknown, L = Unknown, O = Unknown, OU =
Unknown, CN = print-server
verify error:num=18:self signed certificate
verify return:1
depth=0 C = Unknown, ST = Unknown, L = Unknown, O = Unknown, OU =
Unknown, CN = print-server
verify return:1
--- Certificate chain
0
s:/C=Unknown/ST=Unknown/L=Unknown/O=Unknown/OU=Unknown/CN=print-
server
i:/C=Unknown/ST=Unknown/L=Unknown/O=Unknown/OU=Unknown/CN=print-
server
---
```

An example of a certificate that uses a chain, note the 0, 1, 2 and how the i: (issuer) matches with the s:(subject): of the next certificate.

```
$ openssl s_client -connect www.google.com:443 -crlf
CONNECTED(00000003)
depth=2 C = US, O = GeoTrust Inc., CN = GeoTrust Global CA
verify error:num=20:unable to get local issuer certificate
---
Certificate chain
0 s:/C=US/ST=California/L=Mountain View/O=Google
Inc/CN=www.google.com
i:/C=US/O=Google Inc/CN=Google Internet Authority G2
1 s:/C=US/O=Google Inc/CN=Google Internet Authority G2
i:/C=US/O=GeoTrust Inc./CN=GeoTrust Global CA
2 s:/C=US/O=GeoTrust Inc./CN=GeoTrust Global CA
i:/C=US/O=Equifax/OU=Equifax Secure Certificate Authority ---
```

ERR_SSL_VERSION_OR_CIPHER_MISMATCH & SSLHandshakeException: no cipher suites in common

If you receive an error message of ERR_SSL_VERSION_OR_CIPHER_MISMATCH in your web browser or notice SSLHandshakeException: no cipher suites in common in the `[app-path]\server\logs\server.log` it is likely that the certificate chain is not complete or the SSL certificate is in the wrong alias in the key-store. See Check that the correct Alias has been used in the keystore to confirm the correct alias is in use.

Check that the correct Alias has been used in the keystore

PaperCut NG/MF is configured to use the alias "jetty". If your SSL certificate is installed into another alias it will not load correctly. To confirm run the following command:

```
keytool -list -v -keystore my-ssl-keystore-20151217
Enter keystore password: [password]
```

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```
Keystore type: JKS
Keystore provider: SUN

Your keystore contains 1 entry

Alias name: jetty
Creation date: 17/12/2015
Entry type: PrivateKeyEntry
```

The `PrivateKeyEntry` needs to be present in the `jetty` Alias. If it has been imported into another alias, you can use keytool.exe to rename it. See Extended keytool.exe usage

5.3.5. Configure the User Client using the command-line

The User Client is used to display user balances, system notifications, and request information from the users. This is discussed in more detail in User Client. The User Client implements a number of command-line options that change its behavior.

5.3.5.1. Command-line options

Note: The command-line arguments listed below are usually used in the area/method used to start the client - a login script, shortcut, or the relevant registry key in `HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Run\`.

Table 97: User Client command-line options

Option	Description
`--silent`	The silent option tells the client not to report errors if it has problems connecting to the server. If the server is unavailable at time of startup (e.g. the client is not connected to the network), or if the user does not currently exist in the database, the client sleeps, waiting for the condition to change. This option can also be set by adding a `silent=Y` line to the client `config.properties`.
`--debug`	The debug option tells the client to log activity to a file called `user-client.log`, which is created in the user's home directory. This option can also be set by adding a `debug=Y` line to the client `config.properties`.
`--minimized`	The minimized option tells the client to start minimized. On Windows, the client is minimized to the task tray. On a Mac, the balance window is hidden and the Status menu displays the PaperCut menulet. This option is recommended if the user's balance is not important to the

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Option	Description
	user. For example, if a user is only allowed to assign print jobs to a shared account, then their personal balance is of little importance, so the User Client should be minimized. This option can also be set by adding a `minimized=Y` line to the client `config.properties`.
`--noquit`	Stops the user from closing or quitting the client where possible. This option can also be set by adding a `noquit=Y` line to the client `config.properties`.
`--disabletasktrayicon`	The option tells the client to hide the task tray icon. This option can also be set by adding a `disabletasktrayicon=Y` line to the client `config.properties`.
`--disable-toast-notifications`	This option instructs the client to display messages in notification area balloon tips (if enabled) rather than messages in Toast notification popups. (Windows only) This option can also be set by adding a `disable-toast-notifications=Y` line to the client `config.properties`.
`--disable-balloon-tips`	This option instructs the client to display messages in Toast notification popups (if enabled) rather than notification area balloon tips. (Windows only) This option can also be set by adding a `disable-balloon-tips=Y` line to the client `config.properties`.
`--hide-balance`	This option instructs the client to hide the user balance. On Windows, the balance window is not displayed. On other platforms, the balance is hidden from the balance window. This option can also be set by adding a `hide-balance=Y` line to the client `config.properties`.
`--user <username>`	The user option allows the client to be run using a different username. This is useful if the user is logged into a machine with a username different to the username authenticated with the server/printers. For example, if a user is using a laptop that is not a part of the domain. This option can also be set by adding a `user=<username>` line to the client `config.properties`.
`--cache <cache directory>`	This argument is actioned by `pc-client-local-cache.exe`. It defines the location of the globally writable cache directory on the system's local hard drive. The cache is used to minimize network traffic on future launches. The default location is `C:\Cache`. Standard users need *WRITE* and *READ* access to this directory. You can also use system variables, such as `--cache %TEMP%` to write to e.g. `C:\Users\[username]\AppData\Local\Temp`, in order to minimize potential permissions issues for non admin users writing to the C: drive.
`--nev-`	The client uses the username of the logged-in user to identify itself

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Option	Description
`errequestidentity`	with the server. In a domain environment, users always log in using their network identity and the names always match. However, on non-domain systems where local accounts are used (e.g. laptops), these names might not match. The client displays a popup requesting the user to confirm their identity. This option suppresses this dialog. This option can also be set by adding a `nev-errequestidentity=Y` line to the client `con-fig.properties`.
`--windowposition <position>`	Specify where the client window should be displayed. The valid options include `top-left`, `top-right`, `bottom-left` or `bottom-right`. In addition to the above set of fixed positions, coordinates of the window can also be specified by setting the `<pos-ition>` parameter to `XY<x>,<y>`. The `<x>` value sets the x-coordinate of the window (if negative, the value indicates the distance from the right of screen). The `<y>` value sets the y-coordinate of the window (if negative, the value indicates the distance from the bottom of screen). Some examples include: • `XY100,100` - position the window 100 pixels from the left and 100 pixels from the top of the screen. • `XY-50,100` - position the window 50 pixels from the right and 50 pixels from the top of the screen. • `XY50,-100` - position the window 50 pixels from the left and 100 pixels from the bottom of the screen. The window position can also be set by adding a `win-dowposition=<position>` line to the client `con-fig.properties`.
`--windowtitle <title>`	Allows the window title to be customized. If the `<title>` includes `{0}` then this is replaced by the user's username. The window title can also be set by adding a `windowtitle=<title>` line to the client `config.properties`.
`--background-color <color>`	Changes the background color of the client's balance window. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wikipedia.org/wiki/Web_colors for an explanation). E.g. to set the background color to red, use: `--background-color=FF0000` The balance window background color can also be set by adding a `background-color=<color>` line to the client `con-fig.properties`.
`--text-color <color>`	Changes the text color of the client's balance window. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wiki-

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Option	Description
	pedia.org/wiki/Web_colors for an explanation). E.g. to set the text color to blue, use: `--text-color=0000FF` The balance window text color can also be set by adding a `text-color=<color>` line to the client `config.properties`.
`--link-color <color>`	Changes the color of the link on the client's balance window. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wikipedia.org/wiki/Web_colors for an explanation). E.g. to set the link color to a dark gray, use: `--link-color=333333` The balance window link color can also be set by adding a `link-color=<color>` line to the client `config.properties`.
`--link-hover-color <color>`	Changes the color of the mouseover link on the client's balance window. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wikipedia.org/wiki/Web_colors for an explanation). E.g. to set the link color to a black, use: `--link-hover-color=000000` The balance window mouseover link color can also be set by adding a `link-hover-color=<color>` line to the client `config.properties`.
`--negative-balance-color <color>`	Changes the color of the credit balance when it is negative. By default this is red. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wikipedia.org/wiki/Web_colors for an explanation). E.g. to set negative balance color to black, use: `--negative-balance-color=000000` The negative balance color can also be set by adding or enabling the `negative-balance-color=<color>` line in the client `config.properties` file.
`--default-selection <option>`	Specifies the default selected option on the account selection popup. Use this option to save mouse clicks / keyboard presses by setting the default selected option to the one that is most commonly used. Options include: • `charge-personal` - The "Charge to my personal account" option is selected. • `charge-account-list` - The "Charge to shared account" option is selected. • `charge-account-pin` - The "Charge to shared account using PIN / Code" option is selected. • `print-as-user` - The "Perform print as user" option is selected. For example, applying a default selection of `charge-`

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Option	Description
	`account-list` ensures that the option **Charge to shared account** is selected, and the list of accounts is highlighted. This allows the user to begin navigating the list of shared accounts immediately via the keyboard, and saves them having to select the option first. This option can also be set by adding or enabling the `default-selection=<option>` line in the client `config.properties` file.
`--default-account <option>`	Specifies the default selected account on the account selection popup. Use this option to save mouse clicks / keyboard presses by setting the default selected account to the one that is most commonly used. NOTE: The default shared account can also be set on the user's account selection options. See Account selection. For example, setting the default account to "sales\invoices" results in this account being selected when the account selection popup shows. This allows the user to quickly confirm the selection by just clicking OK when the print should be charged to this account. The selection can still be changed if the print should not be charged to this account. This option can also be set by adding or enabling the `default-account=<option>` line in the client `config.properties` file. If set, this overrides the default account setting on the user's account selection options.
`--default-account-pin <option>`	Specifies the default account PIN entered on the account selection popup. Use this option to save typing by setting the default account PIN to the one that is most commonly used. Without this option, the account PIN field on the account selection popup shows the account PIN last entered in this field. If the option is specified but left blank (`--default-account-pin ""`), the account PIN field is blank on every popup. You can also specify this option by adding or enabling the `default-account-pin=<option>` line in the client `config.properties` file.
`--accounts-file <account-file-path>`	Specifies the location of the local accounts file to load. For more information, see Manage large client billing databases.
`--auth-ttl-values <ttl-value-mins>`	Comma-separated list of authentication time-to-live values in minutes. This overrides the values configured on the server. See Popup authentication. This option can also be set by adding or enabling the `auth-ttl-values=` line in the client `config.properties` file.
`--auth-ttl-default <default-mins>`	The default time-to-live value automatically selected when the login authentication window displays. This overrides the value configured on the server. This option can also be set by adding or enabling the `auth-ttl-default=` line in the client `config.properties` file.

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Option	Description
`--lockdir <lockdir>`	Define an alternate lock directory location.
`--disable-auth-by-id-number`	Reverts user authentication method to user/password instead of ID Number and PIN.

5.3.5.2. Configuration properties file

The command-line arguments can also be set in the `config.properties` file. This is particularly helpful on Apple Mac systems where command-line arguments are difficult to implement. The `config.properties` file is located in the same directory as the client executable on Linux and Windows. On the Mac it is located at:

```
[app-path]/PCClient.app/Contents/Resources/config.properties
```

Additionally, you can change the settings at the user-level by placing a file in the user's Library Preferences folder located at:

```
~/Library/Preferences/PCClient/config.properties
```

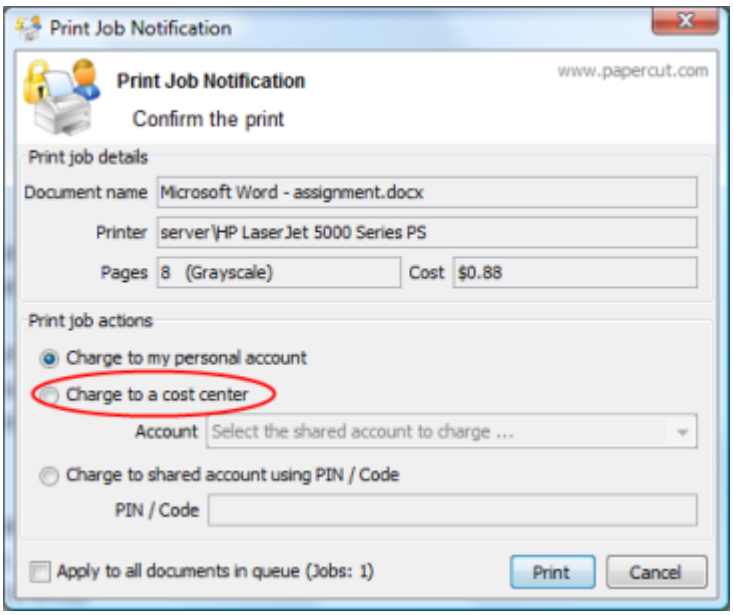
The file should contain the options in a properties file form like:

```
user=mary
minimized=Y
windowposition=top-left
windowtitle=Print Balance: {0}
```

Other options allow text in the Print Job Notification window to be customized. For example:

```
account-from-list-text=Charge to a cost center
```

makes the Print Job Notification window look like the image below after the client is restarted. The full set of options is defined in the `config.properties.tmpl` file in the client directory above.



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5.3.6. Stop and start the Application Server

Most of the time you will not need to stop or start the server; however, there are some circumstances where this is required:

- Performing an offline backup
- Upsizing the database to an external database
- Upgrading the application

The procedure for stopping the server depends on the platform the server is run on.

> **Important:**
> When you start the Application Server, wait approximately 15-20 seconds for the service to start before accessing the Admin web interface. This gives the system time to initialize.

5.3.6.1. Stopping and starting the Application Server on Windows

The PaperCut NG/MF Application Server runs as a Windows service when installed on Windows. You can stop or start it using the Services control panel applet. To stop/start/restart the Application Server in Windows 10:

1. In the Windows Search box on the taskbar, type **control panel**; then select **Control Panel**.
2. Select **Administrative Tools > Services**.
3. Find the service named **PaperCut Application Server**.
4. Right-click the service.
5. Select the option you want to perform (e.g. Stop/Start/Restart).

An alternative to using the services applet is to run the batch files located in the directory `[app-path]\server\bin\win`. Using the batch files might be more convenient when the process

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needs to be automated (like scripting a database backup). The batch files to stop/start the server are called:

- `start-server.bat` - starts the service
- `stop-server.bat` - stops the service

5.3.6.2. Stopping and starting the Application Server on Mac

You can stop or start the PaperCut NG/MF Application Server on Mac by using the following scripts found at `[app-path]/server/bin/mac/`:

- `start-server.command` - starts the Application Server
- `stop-server.command` - stops the Application Server

5.3.6.3. Stopping and starting the Application Server on Linux and Novell

You can start or stop the PaperCut NG/MF Application Server on Linux and Novell by using the following scripts found at `[app-path]/server/bin/linux-x64/`:

- `start-server` - starts the Application Server
- `stop-server` - stops the Application Server

5.3.7. Automate installation on Windows

You can streamline the installation of PaperCut NG/MF or a particular PaperCut NG/MF component for automating deployment. For example, when installing on many secondary print servers, or installing the User Client locally on many desktops (although the recommended installation procedure is the "zero install" strategy - see User Client).

The installer command-line options provide the ability to pre-select the installer options; there is no need to click through them when installing. The options in the table below are valid for the Windows installers having those options available for PaperCut NG/MF (the main installer), the User Client and the card wizard.

Table 98: Windows installer command-line options

Option	Description
`/SILENT` or `/VERYSILENT`	Instructs the installer to be 'silent' or 'very silent'. When silent the installation begins immediately, and only the progress window is displayed. When very silent, installation begins immediately with nothing displayed. If any errors are encountered, the error messages are still displayed with either option.
`/DIR="x:\dirname"`	Overrides the default installation directory. Use this to install PaperCut NG/MF to a different directory than the default.
`/TYPE=secondary_print`	Selects the install type/options: Server installer: - `full` - The PaperCut NG/MF server. The default option.

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Option	Description
	• `secondary_print` - Install option to set up a secondary print server. Only installs the Print Provider component. • `secondary_web_print` - Only install the Web Print component.
`/GROUP="folder name"`	Overrides the default Start menu group / folder into which PaperCut NG/MF is installed.
`/NOICONS`	Disables the creation of a Start menu group / folder.
`/LANG=language`	Specifies the language to use during installation. By default this is automatically detected based on your language settings, but can be overridden by specifying a language. The available languages are: • `de` - German • `en` - English • `es` - Spanish • `fi` - Finnish • `fr` - French • `it` - Italian • `nl` - Dutch • `pt` - Portuguese • `pt_BR` - Brazilian Portuguese • `zh_CN` - Chinese (Simplified) • `zh_HK` - Chinese (Traditional) *Note:* This option only specifies the language during installation. More languages and regional options are available in PaperCut NG/MF once installed, which are configured separately.

5.3.8. Import print job details

You can import print jobs that have been tracked by external or third party systems into PaperCut NG/MF. This could be because the external system is not easily tracked directly, or to import data that was previously tracked for logging and reporting purposes.

Job details can be imported using the `server-command` scripting tool (`process-job` command, see Server commands (server-command)) or using the web services API (`api.processJob` call, see The XML Web Services API). To import multiple jobs in a batch, run the command/call multiples times (e.g. via a script or program).

The server-command and web services call accept a single argument (string) containing all the job details. Each field is specified as a name-value pair separated by an equals sign (i.e. `name=value`), and fields are separated by commas.

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For example, to process a job and specify the user, printer server and printer name (the minimum required details):

```
user=bob,server=papercut,printer=My Printer
```

If any fields contain a comma, surround the name-value pair with quotation marks ("). E.g. for a printer named `Library, rear`:

```
user=bob,server=papercut,"printer=Library, rear"
```

Spreadsheet applications such as Excel with automatically add quotation marks as above when saving a document in CSV format.

If any fields contain quotation marks, escape them by adding another quotation mark, i.e. two in a row. E.g. for a printer named `"John Smith" Library`:

```
user=bob,server=papercut,printer=""John Smith"" Library
```

The names of all the available fields are listed in the table below.

Table 99: Fields for Importing Print Job Details

Field	Required	Description	Default
user	Yes	The username of the user associated with the job.	N/A
server	Yes	The name of the server the job was submitted to.	N/A
printer	Yes	The name of the printer or print queue the job was submitted to.	N/A
time	No	The time the job was submitted/printed. This is formatted as an ISO8601 simple date-time: yyyyMMddTHHmmss. E.g. "20091224T133602" represents the 24th of December 2009 at 13:36:02 (1:36 pm, local time).	(current time)
cost	No	The cost of the job. If the cost is not set it is automatically calculated as for a normal job (based on the job details and configuration of the printer, user etc.).	(auto)
total-pages	No	The total number of pages in the job.	1
total-color-pages	No	The total number of color pages in the job.	(same as total-pages)
copies	No	The number of copies in the job.	1
document-name	No	The document name.	(empty)
duplex	No	TRUE or FALSE to indicate if the job is duplex (printed on both sides)	FALSE
grayscale	No	TRUE or FALSE to indicate if the job is grayscale (no color)	FALSE
job-type	No	The type of job to import. Options include: COPY, FAX, PRINT, SCAN.	PRINT

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Field	Required	Description	Default
paper-size-name	No	The name of a standard paper size, e.g. "Letter" or "A4".	(empty)
paper-width-mm	No	The width of the paper in millimeters. Determined automatically if using paper-size-name.	(empty)
paper-height-mm	No	The height of the paper in millimeters. Determined automatically if using paper-size-name.	(empty)
document-size-kb	No	The size of the document's spool file in kilobytes.	0
invoice	No	`TRUE` to mark the job as invoiced, `FALSE` to mark as not invoiced. The default value is determined automatically, as for a regular job.	(auto)
comment	No	A comment to be associated with the job.	(empty)
client-machine	No	The hostname of the client machine the job was submitted from.	(empty)
client-ip	No	The IP address of the client machine the job was submitted from.	(empty)
shared-account	No	The name of the shared account to charge this job to. Sub-accounts can be selected using a backslash, i.e. "parent\child".	(empty)

5.3.9. Monitor print system health

Printing is an essential service in your business that is often overlooked until it is not working. You might find that much of your time is taken up firefighting urgent issues, such as:

- in a business all printers in a branch going offline, or
- in a school, the Administration Department printer is not working when exams need to be printed.

Imagine if you could not only receive real-time alerts as soon as any part of your print environment is not working, but also be able to anticipate potential issues and avoid the outages all together.

Best practices in print system health monitoring recommend the following:

- an application should not monitor itself
- use your existing monitoring tool to monitor all of your applications
- be proactive to avoid print system down time rather than reactive when you receive a support call

You might already be monitoring the status of your printers and servers (for example, using SNMP), which can help a lot, but often does not tell the whole story. It's not just about monitoring individual components, but also the overall system usage. The key benefits of using the PaperCut NG/MF System Health interface are:

- you can monitor the end-to-end health of your entire print environment, not just your printers
- it is easier than SNMP to set up in a multi-device type environment.

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- more detailed information than whether a printer or device is offline, for example, it provides real-time insights into printing behavior

We have worked with Universities around the globe, and have come up with the essential aspects we believe you should monitor. These key factors have been wrapped up into a single overall status measure that you can set up in minutes in your existing monitoring tool, regardless of your skill level. Alternatively, the System Health interface also provides a wide range of endpoints for more detailed analysis. You can choose what you want to monitor.

Next steps

For more information about monitoring PaperCut NG/MF's system health, see:

- PaperCut NG/MF system health monitoring overview
- Examples: Monitoring print system health
- Configure PaperCut NG/MF system health monitoring
- Discover the System Health interface authorization key
- Discover the printer and device status URLs
- PaperCut NG/MF System Health interface reference

5.3.9.1. PaperCut NG/MF system health monitoring overview

The PaperCut NG/MF System Health interface exposes endpoints that allow you to monitor the health of PaperCut NG/MF and its connected infrastructure, using monitoring tools, such as PRTG, Zabbix, and Nagios. Your monitoring tool does not have to be expensive or complicated, and as long as it has the capability to check whether a web page is up, you can configure it to monitor your print environment using PaperCut NG/MF System Health interface. The interface also exposes detailed system health information in JSON format for more advanced monitoring tools and scripts.

You can use this information to:

- **Trigger alarms for urgent print outages**

  You can monitor and trigger alarms for the overall system status, as well as the status of individual components (such as printers or devices). Triggering a notification as soon as events occurs rather than waiting for someone to contact you, allows you to address the issue immediately thus reducing downtime.

- **Monitor real-time activity**

  View real-time measurements of the number of print jobs, held jobs, errors, and warnings. Every print environment has it's own heartbeat, for example, when to expect peak times and how many errors are deemed normal. By creating a real-time dashboard of your environment, you'll get to know the heartbeat of your organization's printing and know when to respond to changes.

- **Plan future printing resource requirements**

  You can plan for expansion and preemptively manage your printing environment to address bottlenecks before they occur. For example, you might want to view a graph of user license usage over time, so you can anticipate when you are likely to run out and ensure that does not happen.

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- **Monitor printer and device inactivity**

  Changes in print usage can indicate that there is a problem with a printer, even if the printer is online. For example, if there has been no print activity on a frequently used printer for a long period of time, this could indicate that there is a problem, such as a card reader not working, or the door to the print room being locked. Standard status alarms do not highlight these problems. PaperCut NG/MF System Health interface allows you to monitor real-time activity to identify changes in printing behavior.

Your level of monitoring can be as simple as creating a single alarm for the overall PaperCut NG/MF system health, or as comprehensive as providing alarms for individual components (such as a specific printer) and generating graphs that show trends in printing patterns and resource usage over time. This allows you to quickly confirm that your printing environment is available, functioning as expected, and also anticipate any events that could impact your printing environment in the future.

The PaperCut NG/MF System Health interface retrieves a wide range of information relating to the status of:

- **Site Servers**—details of any Site Servers that are offline. Use this information to trigger alarms, such as an email notification.
- **Print Providers**—details of any Print Providers that are offline. Use this information to trigger alarms, such as an email notification.
- **Database**—details of database connections. Use this information to monitor the status of the database load and availability.
- **Devices**—details of devices in error and devices that have not processed a job for a defined period of time.
- **Printers**—details of printers in error and printers that have not processed a job for a defined period of time.
- **Application Server**—system information and resource metrics, such as the amount of hard disk space available and the amount of memory used. Use this information for preemptive resource planning so you can address any potential issues before they impact your printing service delivery.
- **License**—licensing details. Use this information for capacity planning to ensure you have sufficient user and device licenses to support an expanding organization. This will prevent downtime due to over user limit license limitations.
- **Statistics**—system level statistics to help you track trends in your printing environment, including the number of print jobs, held jobs, errors, and warnings.

5.3.9.2. Examples: Monitoring print system health

The examples below show how you can use the PaperCut NG/MF Print System Health interface. These examples use only a handful of the endpoints. The PaperCut NG/MF system health interface provides many more endpoints than described in these examples. For more information, see PaperCut NG/MF System Health interface reference.

- Example 1: Overall print system health monitoring— A simple starting point to monitor the overall print system health using an HTTP response status code.

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- Example 2: Printer health monitoring—Explains the common endpoints you can use to monitor individual printers or devices.
- Example 3: Advanced system health monitoring—A more comprehensive example, showing how you can use the JSON attributes within the endpoints to provide detailed information about your printing environment.

5. Example 1: Overall print system health monitoring

Fast River School is a small school with approximately 200 students. They have a single print server and 5 printers. They would like to monitor the status of PaperCut NG/MF to minimize outages to their printing services. Fast River do not have their own IT support so would like to enlist an IT consultant to set up a basic monitoring system that will track PaperCut NG/MF's health. The IT consultants they have hired have their own monitoring tool that can consume only HTTP response codes.

The IT consultant has recommended setting up the following:

- **Requirement 1: Immediate notification when PaperCut NG/MF is not functioning correctly**

  The IT consultant wants to receive an immediate email notification when PaperCut NG/MF has an issue preventing it from working. This will allow them to address any outages immediately rather than waiting for someone to report the issue.

  Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/status`
Event to trigger alarm state	`HTTP response status code = 500`
Event to trigger notification	alarm state = 10 minutes
Polling interval	60 seconds
Period during which alarm is triggered	7am – 10pm

  This URL returns an HTTP response status code of 500 when one or more of the following occurs:

  - The Application server cannot connect to the database
  - the number of active database connections is greater than 90%
  - less than 1 GB available disk space
  - an invalid license is in use
  - Site Server is offline

  The monitoring tool would trigger an email alert and display a visual representation of the alarm on the dashboard. An example below shows this endpoint in error.

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Note:
For more information about how to configure this example using some of the common monitoring tools, see How to monitor PaperCut System Health.

5. Example 2: Printer health monitoring

Fast River School have been monitoring their overall print system health for a while now, and would like to add some extra endpoints to monitor the status of their printers. They would like to be notified when the following occurs:

- the library printer is offline for more than 10 minutes
- two or more printers have been offline for more than 10 minutes

Note:
For more information about how to configure this example using some of the common monitoring tools, see How to monitor PaperCut System Health.

- **Requirement 1: Email notification when the library printer is offline**

  The main printer used at Fast River School is the printer in the school library (printer Id is "library". If this printer goes offline, it will have a big impact on the students. They would like the IT consultant to be advised as soon as this printer is offline. They would like the email notification to be sent when the printer has been offline for 10 minutes, as they would like to allow a bit of time for someone to fix the issue. For example, if the printer is out of paper, they want to allow enough time for someone to replace the paper.

  Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/printers/library/status`
Event to trigger alarm state	`HTTP response status code = 500`
Event to trigger notification	alarm state = 10 minutes

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Setting	Value
Polling interval	60 seconds
Period during which alarm is triggered	7am – 10pm

If the library printer is online, the monitoring tool dashboard will display a visual representation similar to the following. In the example below, the printer is online, so the gauge is green.

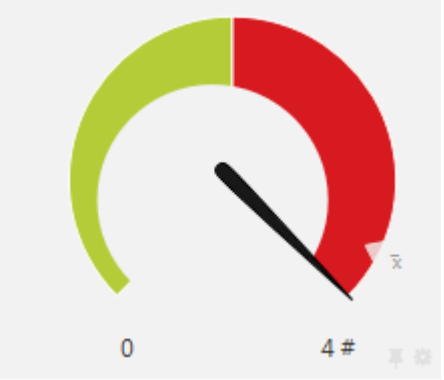
- **Requirement 2: Email notification when two or more printers are offline at a time**

  Fast River School has only 5 printers. They can easily work around one printer being offline, but would like to receive an email notification when two or more printers are offline. They would like the email notification to be sent when each printer has been offline for 10 minutes, as they would like to allow a bit of time for someone to fix the issues. For example, if the printer is out of paper, they want to allow enough time for someone to replace the paper.

  Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/printers/status?threshold=2`
Event to trigger alarm state	`HTTP response status code = 500`
Event to trigger notification	alarm state = 10 minutes
Polling interval	60 seconds
Period during which alarm is triggered	7am – 10pm

  If the number of offline printers exceeds the defined threshold, the monitoring tool dashboard would display a visual representation similar to the following. In the example below, the threshold is set to two (green). The pointer indicates that the number of printers currently offline is four, which is above the threshold (red).



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5. Example 3: Advanced system health monitoring

SandComp is a large manufacturing company consisting of 3000 employees. They have a head office with an Application Server and three distributed branches, each with a Site Server. All sites are connected via a fast Wide Area Network (WAN). Printers are hosted on local servers.

Sandcomp would like to set up the following monitoring activities:

- Immediate notification when the database is not connecting to the Application Server
- Immediate notification when a Site Server is offline
- Notification when any printer is in error for more than 10 minutes
- Notification when the Administration Department printer has not had a print job for more than 60 minutes during business hours
- Notification when the number of user licenses falls below a threshold
- Real-time graphical presentation of the number of pages printed over time

Note:
For more information about how to configure this example using some of the common monitoring tools, see How to monitor PaperCut System Health.

- **Requirement 1: Immediate notification when the database is not connecting to the Application Server**

  Sandcomp want an immediate email notification when the Application Server cannot connect to the database.

  Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/database/status`
Event to trigger alarm state	`HTTP response status code = 500`
Event to trigger notification	immediate on alarm state
Polling interval	60 seconds
Period during which alarm is triggered	7am – 10pm

  The monitoring tool would trigger an email alert and display a visual representation of the alarm on the dashboard. The following example shows that the HTTP response status code for the endpoint is 200 (OK) as it is green.

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- **Requirement 2: Immediate notification when a Site Server is offline**

  Sandcomp would like to generate an email when any of the Site Servers is offline. This will allow them to resolve any issues immediately rather than waiting for the issue to be reported.

  The following image is an example of an error indicator on a monitoring tool dashboard. This example indicates that there is an error (red) and a Site Server is offline.

You can set up this notification in a couple of different ways, depending on the capabilities of your monitoring tool.

Option 1:

If your monitoring tool cannot consume JSON text, you can use the HTTP response status code for the following URL. This endpoint indicates whether any Site Servers are offline, but does not indicate which Site Server.

Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/site-servers/status`
Event to trigger alarm state	`HTTP response status code = 500`
Event to trigger notification	immediate on alarm state
Polling interval	60 seconds
Period during which alarm is triggered	Always

Option 2:

If your monitoring tool can consume JSON data, you can set up an alarm for each individual Site Server.

Configure the following in your monitoring tool:

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Setting	Value
URL	`/api/health/site-servers/`
Key	`siteServers/onlinestatus`
Event to trigger alarm state	key = `false`
Event to trigger notification	immediate on alarm state
Polling interval	60 seconds
Period during which alarm is triggered	Always

This endpoint indicates whether a specific Site Server is offline. Use the sensor name to indicate the Site Server to which the sensor applies.

- **Requirement 3: Immediate notification when any printer is in error**

  Sandcomp would like to know if any printer has a problem for more than 10 minutes, such as being offline or out of paper . You do not want to trigger an immediate alarm as you want to allow time for someone to fix the problem, for example, refill the paper. The time period to wait before the alarm is triggered is set up in your monitoring tool.

  You can set up this notification in a couple of different ways, depending on the capabilities of your monitoring tool.

  The following image is an example of an error indicator on a monitoring tool dashboard. This example indicates that there is an error (red), which means the printer is offline.

Option 1:

If you just want to know the number of printers that are offline, configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/`
Key	`printers/inErrorCount`
Event to trigger alarm state	key = `>0`
Event to trigger notification	alarm state = 10 minutes
Polling interval	60 seconds
Period during which alarm is triggered	Always

This endpoint does not indicate which printers are offline.

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Option 2:

If you want to know which printer is offline, set up an alarm for every printer using the HTTP response status code for the following URLs. This endpoint indicates whether or not a specific printer (identified by the printer Id) is offline.

Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/printers/[printer Id]/status/`
Event to trigger alarm state	`HTTP response status code = 500`
Event to trigger notification	alarm state = 10 minutes
Polling interval	60 seconds
Period during which alarm is triggered	Always

- **Requirement 4: Notification when the administration printer has not had a print job for more than 60 minutes during business hours**

  Sometimes a printer might not be available for reasons other than the printer being offline or in error, for example, the card reader might be broken. At Sandcomp, the Administration Department printer is used constantly so if there is no print job in a 60 minute period, there is a high chance of there being a problem with the printer. Sandcomp would like to be notified if a printer has not had a print job for more than 60 minutes between 8am and 6pm. You need to specify the time period of 8am to 6pm in your monitoring tool.

  Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/printers/[printer Id]/has-recent-jobs?minutes=60`
Event to trigger alarm state	`HTTP response status code = 500`
Event to trigger notification	alarm state
Polling interval	60 seconds
Period during which alarm is triggered	7am – 10pm

  If the Administration Department printer is online, the monitoring tool dashboard would display a visual representation similar to the following. In the example below, the printer is online, so the gauge is green.

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- **Requirement 5: Notification when the number of user licenses falls below a threshold**

  Sandcomp is growing rapidly and would like to avoid the situation where new employees start, but cannot print as there are insufficient user licenses. They would like to receive an email notification when they have only 10 user licenses remaining.

  Configure the following in your monitoring tool:

Setting	Value
URL	`/api/health/`
Key	`license/user/remaining`
Event to trigger alarm state	key = `10`
Event to trigger notification	immediate on alarm state
Polling interval	60 seconds
Period during which alarm is triggered	Always

  The image below shows what this alarm might look like on a monitoring tool dashboard. This example indicates that there are fewer than 10 user licenses remaining, so the alarm has been triggered (red).

- **Requirement 6: Real-time graphical presentation of the number of pages printed over time**

  Plot a real time graph of the number of pages printed every 30 minutes. This allows Sandcomp to monitor spikes or dips in printing use, so that they can respond appropriately when these trends are out of the norm.

  Configure the following in your monitoring tool:

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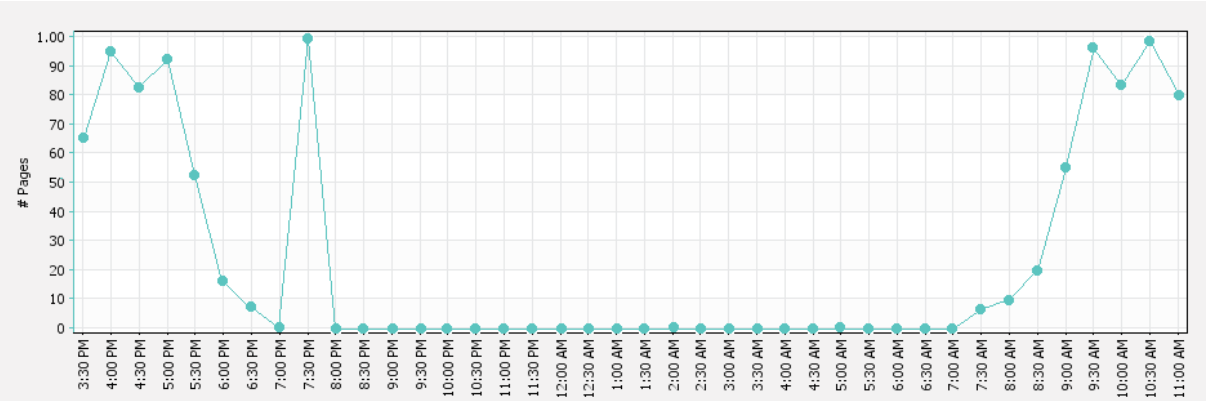
Setting	Value
URL	`/api/stats/recent-pages-count?minutes=30`
Key	`recentPagesCount`
Polling interval	60 seconds
Period during which alarm is triggered	Always

The following graph shows an example of this attribute in a monitoring tool. In the example below, there was a peak at approximately 7.30pm, which is after business hours, so you might want to watch if this becomes a pattern.



5.3.9.3. Configure PaperCut NG/MF system health monitoring

There is an enormous range of open source and enterprise level monitoring tools available (such as PRTG, Zabbix and Nagios). However, they all have a common purpose of keeping you informed of the state of your servers, applications, services, and infrastructure. You can use data collected by these tools in a variety of ways. For example, the data could be graphed to allow analysis of ongoing system performance and reliability, so that informed decisions can be made about resourcing. For more immediate feedback about PaperCut NG/MF, you can also configure alarms that are triggered by status changes. For example, a log entry could be recorded when a server's CPU utilization passes a certain threshold, or an incident ticket could be opened when network bandwidth becomes saturated, or perhaps an email could be sent when a particular application becomes unavailable.

The PaperCut NG/MF System Health JSON REST API endpoint is accessible via HTTP. Your monitoring tool can retrieve the values collected by this interface and consume the data in a user friendly way.

The way in which you configure your monitoring system to use the PaperCut NG/MF System Health interface data is dependent on the tool you are using, however, the high-level steps are the same:

To configure a monitoring tool to perform a PaperCut NG/MF system health check:

1. Discover the printer and device status URLs in the PaperCut NG/MF Application Server.
2. If you want to monitor the status of individual printers or devices, export a list of printer and/or device status URLs.
3. Install the monitoring tool on a server that can access the PaperCut NG/MF Application Server.

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4. In your monitoring tool, authorize access to the secure System Health interface: `http://[primary_server]:[port]/api/health/` in one of the following ways. The way in which this is done is dependent on the monitoring tool.
   - **send an HTTP GET request**

     Send an HTTP GET request to the following URL: `http://[primary_server]:[port]/api/health?Authorization=[authorization key]`.
   - **add the authorization key to the HTTP header**

     For example, the HTTP header is `Authorization:4hZiSw8S1dbWFQ8XFmizf7r76Xqwy1kE`.

     > **Note:**
     > This method is not as secure as sending an HTTP GET request from the monitoring tool.

5. In the monitoring tool, add the endpoints that you want to monitor. For more information about the available endpoints, see PaperCut NG/MF System Health interface reference.

   > **Note:**
   > For each endpoint, configure all attributes, such as the polling interval, the event to trigger an alarm, the event to trigger a notification and so on.

6. If required, configure alarm notifications in the monitoring tool.
7. Test the PaperCut NG/MF System Health interface integration.

Check out the list of monitoring tools we've used with the Print System Health Interface—see Supported Third Party Monitoring Tools.

5.3.9.4. Discover the System Health interface authorization key

Before you configure your monitoring tool to display PaperCut NG/MF data, you need to discover your authentication key to be able to access the System Health interface data.

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. Scroll to the **System Health Monitoring** area.

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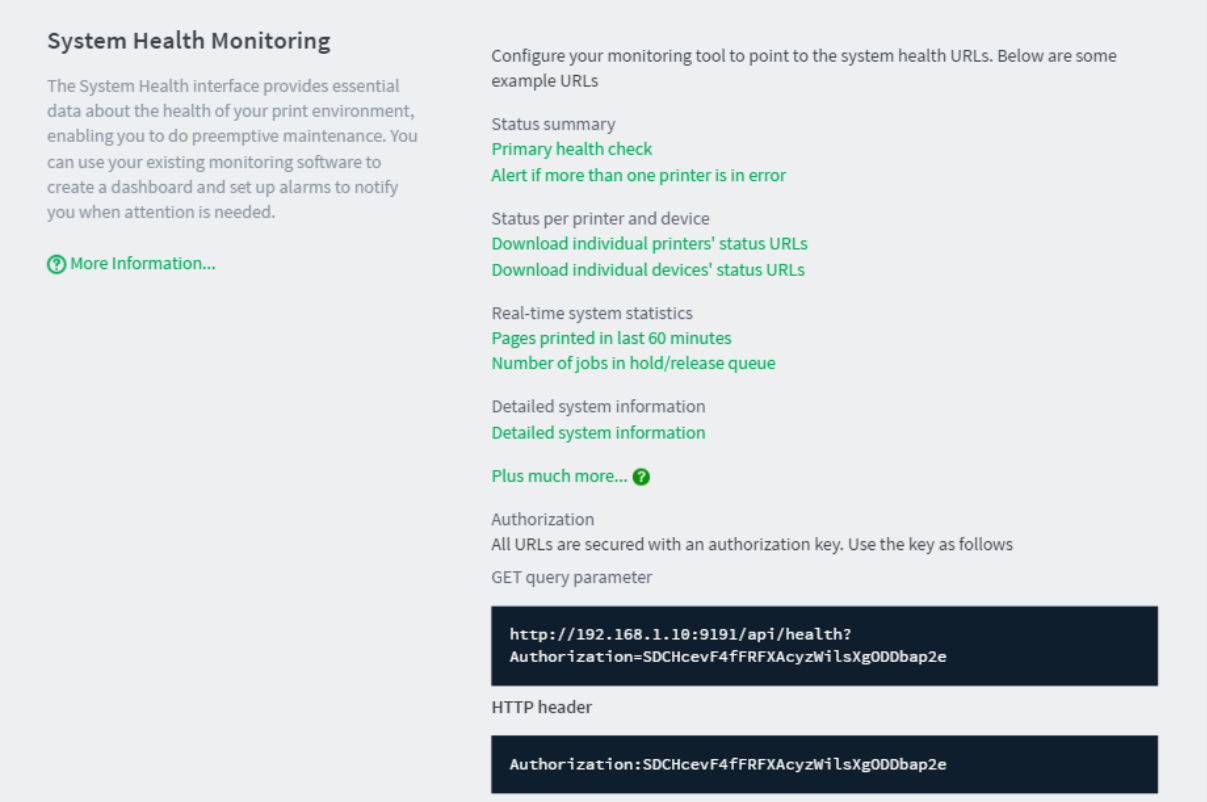

This area displays the System Health interface authorization key. You need this key to authorize the PaperCut NG/MF System Health interface before you can retrieve PaperCut NG/MF data. For more information about how to configure the PaperCut NG/MF system health monitoring, see Configure PaperCut NG/MF system health monitoring

5.3.9.5. Discover the printer and device status URLs

You can use the System Health interface to monitor the status of individual printers and devices. To monitor individual printers or devices, you need to know the System Health URLs for the specific printer. You can export this information from the Admin web interface.

The following status information is available for each printer and device:

- whether the printer/device is online or offline (`/api/health/printers/[printerId]/status`)
- whether any jobs have been submitted within a defined period of time (`/api/health/printers/[printerId]/has-recent-jobs`)

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. Scroll to the **System Health Monitoring** area.

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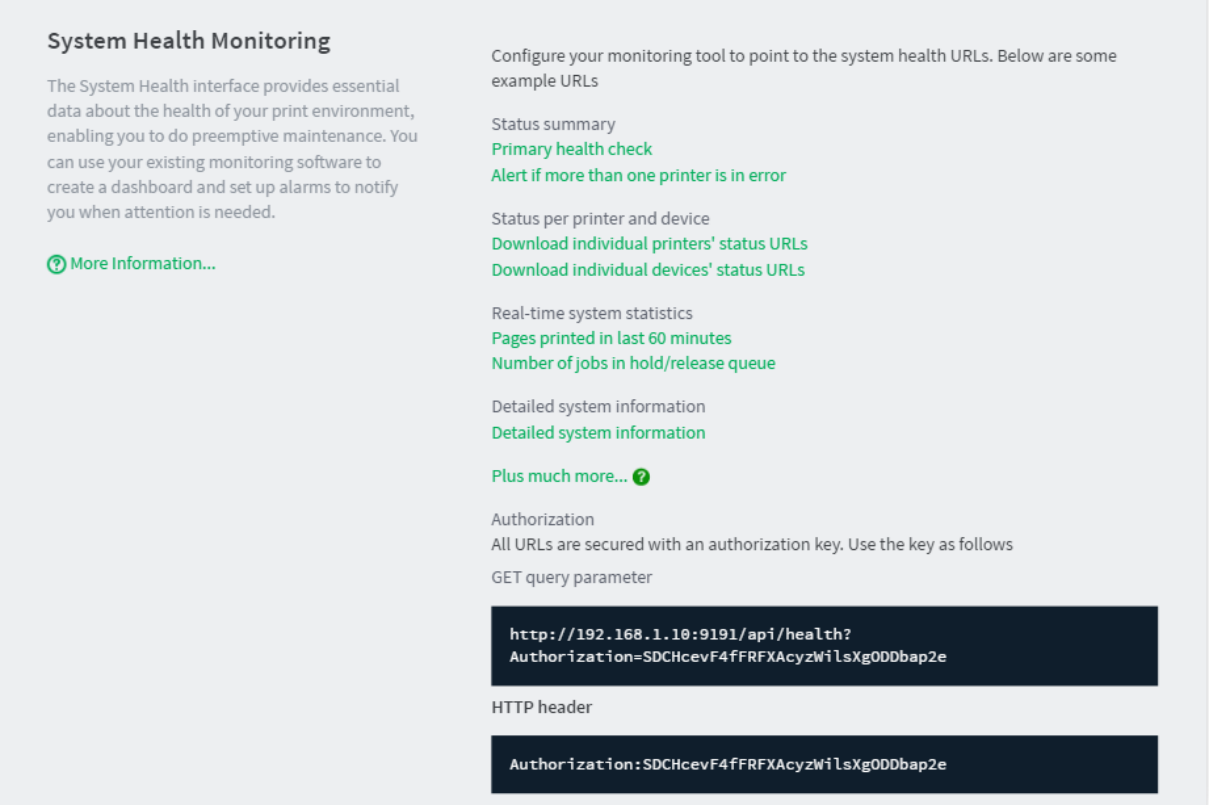

3. Click one of the following links:
   - URLs for individual printer status
   - URLs for individual device status

   A CSV file is generated that contains the following information for all printers or all devices:
   - Printer/Device name
   - Location (if specified on the **Printer Details** page)
   - Status Monitoring Url (200 OK - 500 ERROR)
   - 60 min Recent Job Monitoring Url (200 OK - 500 ERROR)

   For more information about these URLs, see PaperCut NG/MF System Health interface reference.

5.3.9.6. PaperCut NG/MF System Health interface reference

The PaperCut NG/MF System Health interface provides URL endpoints that your monitoring tool can retrieve. The way in which this is done is dependent on the tool you are using.

The PaperCut NG/MF System Health interface has multiple layers of URLs, each containing different types of information. The following types of URLs are provided:

- Status summary URLs
- Status per printer and per device URLs
- Status per Web Print application
- Advanced system statistics URLs
- Advanced system URLs

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Important:
The advanced information URLs can be used only with monitoring tools that support JSON. The status URLs are simple OK/Error status indicators, so you can use either the HTTP response codes or the JSON attribute.

5. Status summary URLs

The summary status URLs provide status indicators for the various components (such as printers or devices) in your PaperCut NG/MF implementation. You can use either the JSON attribute on each of these URLs, or the HTTP response codes depending on the capabilities of your monitoring tool.

These URLs provide the following HTTP response codes that can be consumed by most monitoring tools:

- 200—Success
- 500—Error

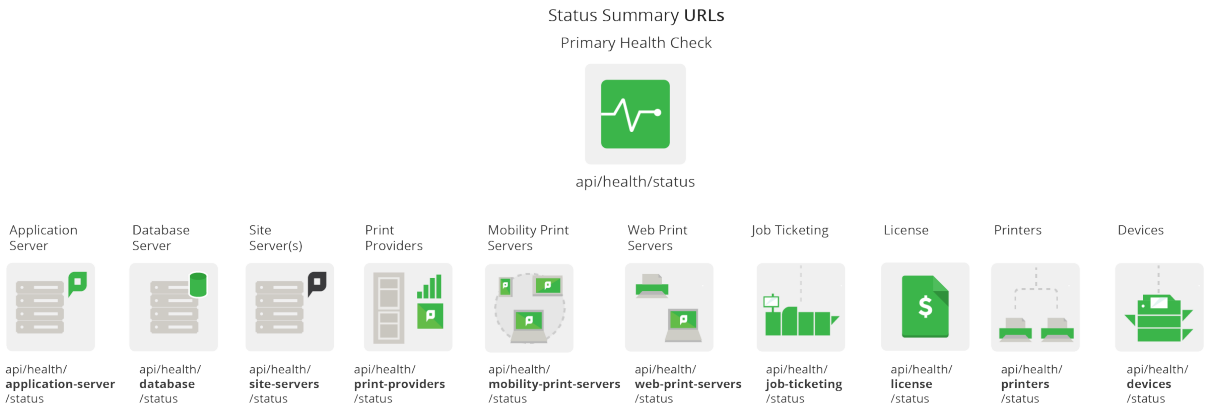
For example, if a Site Server is offline, the `/api/health/site-servers/status` URL will return a status code of 500 (Error).

If you use the JSON attribute in the URL, more detailed status information is available when the status is not OK, for example, “Invalid license status: EXPIRED”.

Example:

```
{
  "status": "OK",
  "comment": "'license' URL returns HTTP status code 200 if license is in valid s
}
```

The following status summary URLs are available.



URL	Attribute	Description
/status	status	A summary status of the PaperCut NG/MF system health. This is either OK or an error message is

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URL	Attribute	Description
		displayed. An error is displayed when one or more of the following conditions occur: • The Application server cannot connect to the database • The number of active database connections is greater than 90% • Less than 1 GB available disk space • An invalid license is in use • Site Server is offline • The Job Ticketing service is offline
	message	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tool.
/application-server/status?disk-threshold-mb=1024	status	Indicates whether or not the available hard disk space on the Application Server is below a predefined threshold. By default, the threshold for this value is 1,024 MB. You can change this threshold by changing the `?disk-threshold-mb=1024` value. This is either OK or an error message is displayed.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
/site-servers/status	status	Indicates whether or not any Site Servers are offline. This is either OK or an error message is displayed.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
/print-providers/status	status	Indicates whether or not any Print Providers are offline. This is either OK or an error message is displayed.
	comment	A description of the URL.

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URL	Attribute	Description
		Note: This key is for informational purposes only and should not be consumed by a monitoring tools.
/web-print/status?servers-in-error-threshold=0	status	Indicates whether or not a predefined number of Web Print servers are offline. By default, the threshold for this key is 0, which means, it will be in error if any Web Print servers are offline. You can change this threshold by changing the `?servers-in-error-threshold=0` value. This is either OK or ERROR.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
	message	A description of the status.
/job-ticketing/status	status	Indicates whether or not the Job Ticketing can connect with the Application Server. The status is either OK or ERROR. An error is returned when: • Job Ticketing is first installed, but has not yet received a call from the Job Ticketing service. • The PaperCut NG/MF server has restarted, but has not yet received a call from the Job Ticketing service. • Job Ticketing is installed, but has not contacted the PaperCut NG/MF server in the last 6 minutes.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
	message	A description of the status.
/license/status	status	Indicates whether or not any licenses are invalid. The system health interface checks the following license

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URL	Attribute	Description
		types: • User • Site Server • Payment Gateway • Advanced Client • Devices This is either OK or an error message is displayed.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
/database/status?connections-threshold-percentage=90	status	Indicates whether or not the Application Server can connect to the database. By default, the threshold for this key is 90, which means, it will be in error if less than 90% of the connections from the Application Server to the database are working. You can change this threshold by changing the `?threshold-percentage=90` value. This is either OK or an error message is displayed.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
/web-print/status?servers-in-error-threshold=0	status	Indicates whether or not a predefined number of Web Print servers are offline. By default, the threshold for this key is 0, which means, it will be in error if any Web Print servers are offline. You can change this threshold by changing the `?servers-in-error-threshold=0` value. This is either OK or ERROR.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.

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URL	Attribute	Description
	message	A description of the status.
/printers/status?in-error-threshold=0	status	Indicates whether or not a predefined number of printers are offline. By default, the threshold for this key is 0, which means, it will be in error if any printers are offline. You can change this threshold by changing the `?in-error-threshold=0` value. This is either OK or an error message is displayed.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
	message	A description of the status.

5. Status per printer and per device URLs

In addition to the summary status URLs for printers and devices, PaperCut NG/MF provides URLs for every printer and every device. You can use either the JSON attribute on each of these URLs, or the HTTP response codes depending on the capabilities of your monitoring tool.

These URLs provide the following simple HTTP response codes that can be consumed by most monitoring tools:

- 200—Success
- 500—Error

For example, if a printer is offline, the `/api/health/printers/[printer Id]/status` URL will return a status code of 500 (Error).

If you use the JSON attribute, more detailed status information is available when the status is not OK, for example, “Printer is out of toner”.

Example:

```
{
  "status": "PAPER_OUT"
}
```

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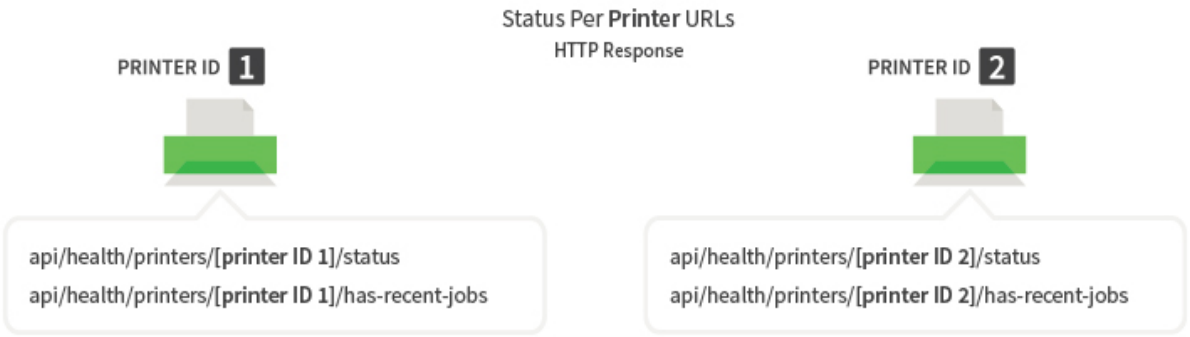
Per printer URLs

The printer URLs are located below:

```
http://[primary_server]:[port]/api/health/printers/[printer Id]
```

Tip:
You can generate a list of printer Ids from the **System Health Monitoring** area on the **Options > Advanced** page.

This following URLs are provided per printer.



URL	Attribute	Description
/status	status	The status of the printer. This is either OK or an error message is displayed.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
/has-recent-jobs?minutes=60	status	Indicates whether or not a job has been sent to the printer in a defined period of time. The default time period is 60 minutes, however, you can change this to a value up to 240 minutes by changing the `?minutes=60` value.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.

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5. Status per Web Print application

In addition to the summary status URLs for Web Print servers, PaperCut NG/MF provides URLs to monitor the number of Web Print servers supporting a specific file type (for example, Microsoft Word) are online. You can set a threshold for the minimum number of servers supporting a particular file type that need to be available before an alarm is triggered. You can use either the JSON attribute on each of these URLs, or the HTTP response codes depending on the capabilities of your monitoring tool.

These URLs provide the following simple HTTP response codes that can be consumed by most monitoring tools:

- 200—Success
- 500—Error

For example, if more than the acceptable number of Web Print servers supporting Microsoft Word documents are offline, the `/api/health/web-print/supports-format/ms-word` URL will return a status code of 500 (Error).

If you use the JSON attribute, more detailed status information is available, for example, *"0 server(s) support ms-word files, servers-count-threshold: 1"*. This means that the number of available servers is less than the specified threshold of 1.

Example:

```
{
  "status": "ERROR",
  "comment": "This URL returns HTTP status code 200 if the number of servers that can print ms-word files is equal t
  "message": "0 server(s) support ms-word files, servers-count-threshold: 1",
}
```

The Web Print server URLs are located below:

```
http://[primary_server]:[port]/api/health/web-print/supports-format/
```

This following URLs are provided:

- `http://[primary_server]:[port]/api/health/web-print/supports-format/image?servers-count-threshold=2`
- `http://[primary_server]:[port]/api/health/web-print/supports-format/pdf?servers-count-threshold=2`
- `http://[primary_server]:[port]/api/health/web-print/supports-format/ms-word?servers-count-threshold=2`
- `http://[primary_server]:[port]/api/health/web-print-servers/supports-format/ms-powerpoint?servers-count-threshold=2`
- `http://[primary_server]:[port]/api/health/web-print/supports-format/ms-excel?servers-count-threshold=2`

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- `http://[primary_server]:[port]/api/health/web-print/supports-format/xps?servers-count-threshold=2`

URL	Attribute	Description
/status	status	The status of the Web Print server. This is either OK or an error message is displayed.
	comment	A description of the URL. **Note:** This key is for informational purposes only and should not be consumed by a monitoring tools.
	message	A description of the status.

5. Advanced system statistics URLs

The statistics URLs provide status indicators about events, such as error and warnings, that have occurred in a predefined period of time. These URLs contain JSON attributes so can be used only by monitoring tools that support JSON.

Note:
HTTP response codes are not available for these URLs.

The statistics URLs are located below:

```
http://[primary_server]:[port]/api/stats
```

Example:

```
{
  "recentPagesCount": 21
}
```

The following statistics URLs are available:

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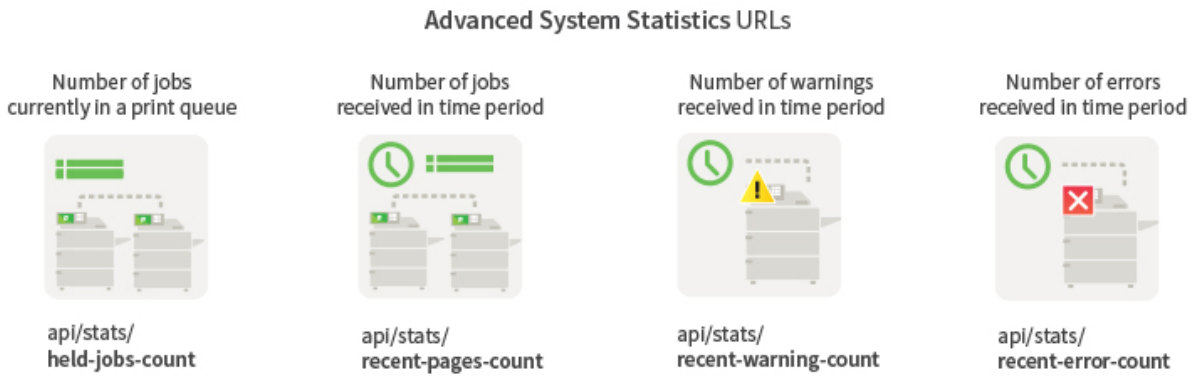

URL	Attribute	Description
/held-jobs-count	status	The number of jobs currently held in any print queue. This value is updated every 10 seconds. Use this data to graph your hold\release print queue load to see trends over time and identify possible issues.
/recent-pages-count?minutes=1	status	The number of pages printed from all printers in a defined period of time. The default time period is 1 minute, however, you can change this to a value up to 240 minutes by changing the `?minutes=240` value. Use this data to graph your printing output to see trends over time and identify possible issues.
/recent-errors-count?minutes=10	status	The number of errors that have occurred on all printers in a defined period of time. The default time period is 10 minutes, however, you can change this to a value up to 240 minutes by changing the `?minutes=10` value. Use this data to graph the error frequency to see trends over time and identify possible issues.
/recent-warnings-count?minutes=10	status	The number of warnings that have occurred on all printers in a defined period of time. The default time period is 10 minutes, however, you can change this to a value up to 240 minutes by changing the `?minutes=10` value. Use this data to graph the error frequency to see trends over time and identify possible issues.

5. Advanced system URLs

PaperCut NG/MF provides a number of URLs for advanced system health monitoring. These URLs contain JSON attributes so can be used only by monitoring tools that support JSON.

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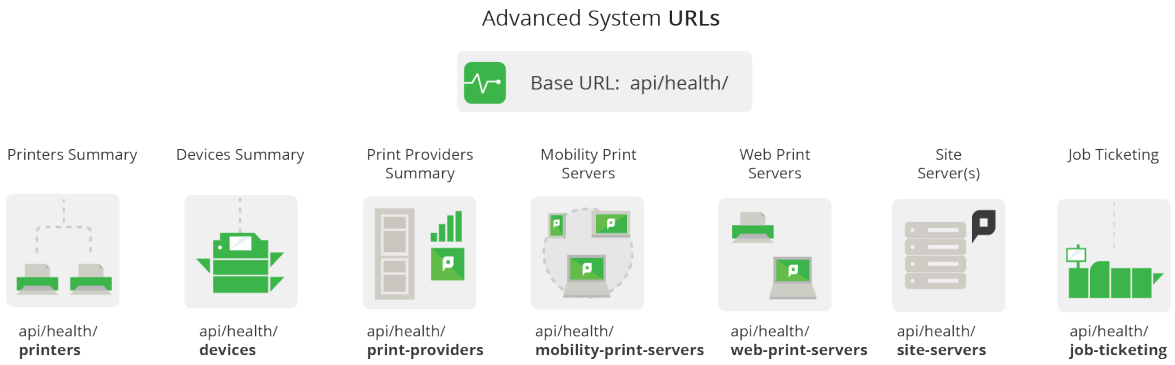

The following types of advanced URLs are provided:

- Component summary URLs
- Base system health URL

Component summary URLs

You can monitor each type of physical component (such as printers or devices) in your PaperCut NG/MF implementation. The following summary URLs are provided:

- Printers URL
- Print Providers URL
- Mobility Print servers URL
- Web Print URL
- Site Servers URL
- Job Ticketing URL

Printers URL

The printers URL is:

```
http://[primary_server]:[port]/api/health/printers
```

Example:

```
{
  "printers": [{
    "name": "hostname2\\Kyocera TASKalfa 250ci",
    "status": "PAPER_OUT",
    "heldJobsCount": 0
  }, {
    "name": "hostname2\\kyocera5551ci",
    "status": "OK",
    "heldJobsCount": 0
  }, {
```

This URL provides the following JSON attributes:

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Object	Attribute	Description
printers	name	The name of the printer.
	status	The status of the printer. Valid values are: • OK • PAPER_JAM • PAPER_OUT • PAPER_PROBLEM • OUTPUT_BIN_FULL • NOT_AVAILABLE • NO_TONER • OUT_OF_MEMORY • OFFLINE • DOOR_OPEN • USER_INTERVENTION • ERROR • UNKNOWN
	heldJobsCount	The number of jobs currently held in the print queue, including jobs waiting on account selection. This value is updated every 10 seconds.

Print Providers URL

The Print Providers (secondary print server) URL is:

```
http://[primary_server]:[port]/api/health/print-providers
```

Example:

```
{
  "printProviders": [{
    "host": "espressocontinu",
    "IP": "127.0.0.1",
    "lastContactSeconds": 20
  }]
}
```

This URL provides the following JSON attributes:

Object	Attribute	Description
printProviders	host	Details of the Print Providers that are offline.
	IP	The IP address of the print server.
	lastContactSeconds	The number of seconds since the Print Provider was last contacted by the Application Server.

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Mobility Print servers URL

The Mobility Print servers URL is:

```
http://[primary_server]:[port]/api/health/mobility-print-servers
```

Example:


```
{
  "mobilityPrintServers": [{
    "host": "PaperCutMobilityPrintServer_2",
    "lastContactSeconds": 107,
    "status": "ERROR",
    "adminLink": "http://PaperCutMobilityPrintServer_2:9163/admin"
  }, {
    "host": "PaperCutMobilityPrintServer_3",
    "lastContactSeconds": 93,
    "status": "OFFLINE",
    "adminLink": "http://PaperCutMobilityPrintServer_3:9163/admin"
  }, {
    "host": "PaperCutMobilityPrintServer_1",
    "lastContactSeconds": 122,
    "status": "OK",
    "adminLink": "http://PaperCutMobilityPrintServer_1:9163/admin"
  }]
}
```


Web Print URL

The Web Print server URL is:

```
http://[primary_server]:[port]/api/health/web-print
```

Example:


```
{
  "servers": [{
    "host": "WEB PRINT SERVER 1",
    "status": "OK",
    "uptimeHours": 0.54,
    "lastContactSeconds": 8,
    "version": "16.2.0.37378",
    "supportedFileTypes": ["image", "pdf"]
  }, {
    "host": "ESP-TEST-2008R2",
    "status": "ERROR",
    "uptimeHours": 0.02,
    "version": "16.2.0.37361",
    "supportedFileTypes": []
  }]
}
```


This URL provides the following JSON attributes:

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Object	Attribute	Description
servers	host	The host name of the Site Server.
	status	The status of the Web Print server.
	upTimeHours	The number of hours since the Web Print server was started.
	lastActivitySeconds	The number of seconds since the Web Print server was last contacted by the Application Server.
	version	The version and build number of the Web Print server application.
	supportedFileTypes	The file types supported by the server: • image • pdf • ms-pwerpoint • ms-word • ms-excel • xps

Site Servers URL

The Site Servers URL is:

```
http://[primary_server]:[port]/api/health/site-servers
```

Example:

```
{
  "siteServers": [{
    "serverName": "hostname-vm.papercut.com",
    "host": "hostname-vm.papercut.com",
    "online": true,
    "lastContactSeconds": 0,
    "devicesHosted": 0,
    "version": "16.1.35541"
  }]
}
```

This URL provides the following JSON attributes:

Object	Attribute	Description
siteServers	serverName	The server name of the Site Server.
	host	The host name of the Site Server.
	online	Whether the Site Server is online (true) or offline (false).
	lastContactSeconds	The number of seconds since the Site Server was last contacted by the Application server.

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Object	Attribute	Description
	devicesHosted	The number of devices hosted by the Site Server.
	version	The version of the Site Server application.

Job Ticketing URL

The Job Ticketing URL is:

```
http://[primary_server]:[port]/api/health/job-ticketing
```

Example:

```
{
  "status": {
    "status": "OK",
    "adminLink": "http://10.100.66.28:9191/job-ticketing/operator/room
  }
}
```

This URL provides the following JSON attributes:

Object	Attribute	Description
status	/ status	The status of the Job Ticketing service. Valid values are ERROR and OK.
	/ adminLink	If Job Ticketing is installed, the URL of the Manage Rooms page (`/<PaperCut NG/MF install path>/-job-ticketing/operator/rooms`).
	/ message	A description of the Job Ticketing service status when the status is ERROR.

Base system health URL

The base system health URL is:

```
http://[primary_server]:[port]/api/health/
```

This URL provides JSON attributes for the following components in your PaperCut NG/MF implementation:

- Application Server
- Database
- Printers
- License
- Job Ticketing
- Print Providers

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- Mobility Print servers
- Site Servers
- Web Print servers

Example:

For an example of this URL, click the image below:

```
{
  "applicationServer": {
    "systemInfo": {
      "version": "16.1.35541",
      "operatingSystem": "Windows Server 2008 R2 - 6.1 (Service Pack 1)",
      "processors": 2,
      "architecture": "amd64"
    },
    "systemMetrics": {
      "diskSpaceFreeMB": 7526,
      "diskSpaceTotalMB": 81817,
      "diskSpaceUsedPercentage": 90.80,
      "jvmMemoryMaxMB": 834,
      "jvmMemoryUsedMB": 555,
      "jvmMemoryUsedPercentage": 66.55,
      "uptimeHours": 0.00,
      "processCpuLoadPercentage": 0.00,
      "systemCpuLoadPercentage": 50.00,
      "gcTimeMilliseconds": 2409,
      "gcExecutions": 28,
      "threadCount": 111
    }
  },
  "database": {
    "totalConnections": 14,
    "activeConnections": 0,
    "maxConnections": 500,
    "timeToConnectMilliseconds": 31,
    "timeToQueryMilliseconds": 0,
    "status": "OK"
  },
  "devices": {
    "count": 0,
    "inErrorCount": 0,
    "inErrorPercentage": 0,
    "inError": []
  },
  "license": {
    "valid": true,
    "users": {
      "used": 12,
      "licensed": 100000,
      "remaining": 99988
    },
```


This URL provides the following JSON attributes:

Object	Attribute	Description
applicationServer	systemInfo	
	/ version	The PaperCut NG/MF release number, build number, and the date on which the build was created.

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Object	Attribute	Description
	/ operatingSystem	The full name and version number of the operating system on the Application Server.
	/ processors	The number of servers on the Application Server.
	/ architecture	The type of Application Server processor.
	systemMetrics	
	/ diskSpaceFreeMB	The number of Megabytes (MB) of available disk space on the Application Server.
	/ diskSpaceTotalMB	The total number of Megabytes (MB) on the Application Server.
	/ diskSpaceUsedPercentage	The percentage of the Application Server disk space that has been used.
	/ jvmMemoryMaxMB	The number of Megabytes (MB) of Java Virtual Machine (JVM) memory on the Application Server.
	/ jvmMemoryUsedMB	The number of Megabytes (MB) of Java Virtual Machine (JVM) memory on the Application Server that is currently in use.
	/ jvmMemoryUsedPercentage	The percentage of the available Megabytes (MB) of Java Virtual Machine (JVM) memory on the Application Server that is currently in use.
	/ uptimeHours	The number of hours since the Application Server was started.
	/ processCpuLoadPercentage	The percentage of the Application CPU load used to run processes.
	/ systemCpuLoadPercentage	The current Application Server CPU load as a percentage.
	/ gcTimeMilliseconds	The number of milliseconds spent performing Java garbage collection since the Application Server was started.
	/ gcExecutions	The number of Java garbage collections since the Application Server was started.
	/ threadCount	The current total number of active threads in the Java Virtual Machine (JVM) process.
database	totalConnections	The total number of available connections to the Application Server database.
	activeConnections	The number of connections to the Application Server database currently being used.
	timeToConnectMilliseconds	The average time (in milliseconds) to connect to the Application Server database.
	timeToQueryMilliseconds	The average time (in milliseconds) to query

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Object	Attribute	Description
		the Application Server database.
	status	The status of the database connection.
printers	inErrorCount	The number of printers in error.
	inErrorPercentage	The percentage of printers in error.
	count	The total number of printers in the fleet.
	inError	
	/ name	The name of the printer in error.
	/ status	The status of the printer in error. The Printers URL provides more detail about each device.
	/ hostingServer	Available only if the printer is hosted by a Site Server. The name of the server hosting the device.
	heldJobsCountTotal	The total number of jobs currently held in all print queues, including jobs waiting on account selection.
	heldJobsCountMax	The maximum number of jobs currently held in any print queue, including jobs waiting on account selection.
	heldJobsCountAverage	The average number of jobs that are currently held in print queues, including jobs waiting on account selection.
job-ticketing	status	
	/ status	The status of the Job Ticketing service.
	/ adminLink	If Job Ticketing is installed, the URL of the Manage Rooms page (`/<PaperCut NG/MF install path>/job-ticketing/operator/rooms`).
	/ message	A description of the Job Ticketing service status when it is offline.
license	valid	Whether or not the Application Server license is valid.
	licenseRemainingDays	The number of days remaining before the current Application Server license expires.
	users	
	/ used	The number of user licenses currently in use.
	/ licensed	The total number of user licenses purchased.
	/ remaining	The number of user licenses currently available. This is equal to the licensed value

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Object	Attribute	Description
		less the used value.
	siteServers	
	/ used	The number of Site Server licenses currently in use.
	/ licensed	The total number of Site Server licenses purchased.
	/ remaining	The number of Site Server licenses currently available. This is equal to the licensed value less the used value.
	advancedClient	
	/ used	The number of advanced client licenses currently in use.
	/ licensed	The total number of advanced client licenses purchased.
	/ remaining	The number of advanced client licenses currently available. This is equal to the licensed value less the used value.
	devices	
	/ used	The number of device licenses currently in use.
	/ licensed	The total number of device licenses purchased.
	/ remaining	The number of device licenses currently available. This is equal to the licensed value less the used value.
	paymentGateway	
	/ used	The number of Payment Gateway licenses currently in use.
	/ licensed	The total number of Payment Gateway licenses purchased.
	/ remaining	The number of Payment Gateway licenses currently available. This is equal to the licensed value less the used value.
printProviders	count	The total number of Print Providers installed. **Note:** Print Provider monitoring is not available for Print Providers installed on Windows desktops.
	offlineCount	The number of Print Providers that are currently offline. A Print Provider is

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Object	Attribute	Description
		considered offline when it has been offline for 2 minutes or more. **Note:** Print Provider monitoring is not available for Print Providers installed on Windows desktops.
	offlinePercentage	The percent of Print Providers that are currently offline. **Note:** Print Provider monitoring is not available for Print Providers installed on Windows desktops.
	offline	
	/ host	Details of the Print Providers that are offline. **Note:** Print Provider monitoring is not available for Print Providers installed on Windows desktops.
	/ IP	The IP address of the print server. **Note:** Print Provider monitoring is not available for Print Providers installed on Windows desktops.
	/ lastContactSeconds	The number of seconds since the Print Provider was last contacted by the Application Server. **Note:** Print Provider monitoring is not available for Print Providers installed on Windows desktops.
mobilityPrintServers	count	The total number of Mobility Print servers.
	offlineCount	The number of Mobility Print servers that are currently offline. A Mobility Print server is considered offline when it has been offline for 130 seconds or more.
	offlinePercentage	The percent of Mobility Print servers that are currently offline.

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Object	Attribute	Description
	offline	
	/ host	Details of the Mobility Print server that are offline.
	/ lastContactSeconds	The number of seconds since the Mobility Print server was last contacted by the Application Server.
	/ status	The status of the Mobility Print server. Valid statuses are: • *OK*—the Mobility Print server is functioning as expected. • *ERROR*—the Mobility Print server is in error. • *WARNING*—the Mobility Print server has a warning, for example, Ghost trap is missing. • *OFFLINE*—the Mobility Print server has not been contactable for 130 seconds or more.
	/ adminLink	The URL of the Mobility Print server Admin interface.
siteServers	count	The total number of Print Providers installed.
	offlineCount	The number of Print Providers that are currently offline.
	offlinePercentage	The percent of Print Providers that are currently offline.
	offline	
	/ serverName	The server name of the offline Print Providers.
	/ host	The host name of the offline Print Providers.
	/ lastContactSeconds	The number of seconds since the Print Provider was last contacted by the Application server.
webPrint	count	The total number of Web Print servers.
	offlineCount	The number of Web Print servers that are currently offline.
	offlinePercentage	The percent of Web Print servers that are currently offline.
	offline	
	/ host	The host name of the offline Web Print server.
	/ status	The status of the Web Print server. Valid statuses are: • *OK*—the Web Print server is functioning

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Object	Attribute	Description
		as expected. • *ERROR*—the Web Print server is in error. • *STOPPED*—the Web Print server has been stopped by a SysAdmin.
	/ uptimeHours	The number of hours since the Web Print server was started.
	/ version	The version and build number of the Web Print server application.
	/ supportedFileTypes	The file types supported by the server: • image • pdf • ms-pwerpoint • ms-word • ms-excel • xps
	jobsPending	The number of jobs currently in the Web Print queue.

5.4. PDL transform language

Note:
PDL Transforms are an advanced PaperCut NG/MF feature. You need an understanding of printer description languages, and a basic knowledge of scripting.

A transform is a process that defines how to convert an input into a different output. In PaperCut NG/MF, transforms are defined as simple scripts. There are a number of reasons for performing transforms on a print job. These include:

Extending compatibility

The output produced by one driver (such as PostScript) might not work on other printer brands without modification. For example, "TRAY = 1" on one printer might map to "TRAY = UPPER" on another. Use transforms to automatically make this adjustment to a print job. This is particularly important in a Find-Me printing environment where a job rendered by one driver cannot print correctly on another printer type without modifying the print job.

Modify behaviour/output

Much is possible with the power of transforms. Maybe it's always enabling the "eco print" mode when an email is printed, or automatically removing the "stapling" option if accidently selected on a printer

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the does not support stapling. Another use-case is "virtual stationery". Legacy reports could, for example, have a logo automatically added to each page.

Of note, PaperCut performs page analysis before transforms are applied. As such, a color logo added to a grayscale page, are recorded in PaperCut as grayscale.

5.4.1. Definitions

Before covering the details of the transform language, it's important to understand the following terms:

Page Description Language (PDL)

A language used to describe the appearance of a printed page e.g. PostScript, Printer Control Language (PCL).

Printer Job Language (PJL) Header

Attributes in a PJL header define print job characteristics such as duplex, color, paper sizes, or media trays. Many printers rely on a PJL header, though many attributes are printer/manufacturer specific.

Transform script

A transform script defines a transform process to apply to a print job's PDL. Transform scripts are written in a very simple scripting Domain Specific Language (DSL).

Source & target

The transform process refers to source and target print queues. A desired transform is applied when a job is transferred from a specific source queue (a global queue) to a specific target queue.

5.4.2. Writing a transform

Transforms are text files placed in a location (directory structure) that determines when the script applies. The file's name and location must conform to the following path:

```
[install-path]/providers/print/[platform]/transforms/custom/
[language]/[source]/[target].transform
```

- `language` - the PDL language of the print job (e.g. Postscript).
- `source` - the name of the queue that first received the print job (e.g. a global queue).
- `target` - the name of the queue the job is being transferred to print to.

For example, to apply a transform when a job is transferred from the queue named "Global Queue" to "Printer A", the transform file should be located at:

```
[install-path]/providers/print/
[platform]/transforms/custom/postscript/global queue/printer
a.transform
```

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Matching rules for running a transform script

The following steps select the transform script to run for a redirection from printer type *source* to printer type *destination*, which both use printer language *language*.

1. Look first in the the *custom* directory then in the *system* directory.
2. Find the subdirectory whose name matches *language* e.g. if *language* is *PostScript* then look in *custom/postscript*.
3. Find the subdirectory whose name matches *source*. e.g. if *source* is *PaperCut Global PostScript* then look in *custom/postscript/pc-win*. (NOTE: On PaperCut NG/MF systems, *pc-win* is an alias that matches printer type *PaperCut Global PostScript*).
4. Find the file whose name matches *destination*. e.g. if *destination* is *HP Color LaserJet* then look for *custom/postscript/pc-win/hp.color.laserjet.transform*. This does not exist so backtrack.
5. Backtracking takes you to *custom/postscript/pc-win/default.transform*, which does not exist, then *custom/postscript/default.transform*, which does not exist, then *system/postscript/pc-win/hp.color.laserjet.type.transform*, which does exist. (NOTE: printer type is matched against *.type.transform and printer name is matched agaist *.name.transform before printer type and name are matched against *.transform*)
6. Thus *system/postscript/pc-win/hp.color.laserjet.transform* is selected.

5.4.3. Examples

There are two example sources that script authors might find useful as starting points or reference:

```
[install-path]/providers/print/[platform]/transforms/examples
[install-path]/providers/print/[platform]/transforms/system
```

Important:
Transforms in the system directory are used by the PaperCut Global Print Driver. They are system provided. Do not place your own scripts in the system directory. Place your own scripts in the custom directory. Any changes made in the system directory are overwritten in an upgrade.

5.4.4. Transform language functions & specification

Table 100: PDL transform command functions

Command	Description
var = expression	Evaluate the **expression** and assign the variable **var** with the result.
IF condition THEN statement	Evaluate the **condition** expression, and if true execute the **statement**.
FIND pattern [options]	Find the **pattern** in the spool file, and assign **$0**, **$1**, ... with the regular expression capture group.
FIND pattern REPLACE	**FIND** as above, then replace the string matched by the **pattern** with **text**.

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Command	Description
text [options]	
STRIP_HEADER	Strip any PJL, XPIF, PostScript or other header in the spool file.
DELETE_UNTIL text	Delete from the start of the spool file up to but not including the first occurrence of **text**.
INSERT ofs len text	Insert the string **text** at the spool file offset **ofs**, after deleting **len** bytes.
DELETE ofs, len	Delete **len** bytes from the spool file, starting at the offset **ofs**.
REPEAT_ALL num_copies	Make **num_copies** of the input spool file in the output spool file after applying all other modifications.

Assignment

var = expression

e.g. *x = 1*

Evaluate the **expression** and assign the variable **var** with the result. If the **expression** contains any `$[N]` and/or *%variable%* tokens, they are replaced with their current values. To prevent variable substitution, include *__no_replace__* in the variable name e.g. __no_replace__template.

IF THEN

IF condition THEN statement

e.g.

```
IF duplex THEN pjl_duplex = "ON"
```

Evaluate the **condition** expression, and if true execute the **statement**.

Rules for evaluating expressions

1. A number **x** is true if **x != 0**.
2. A string **pattern** is true if it can be found in the spool file using the rules in the **FIND pattern [options]** below. Strings can be regular expressions or plain strings, and have two optional attributes **FIRST | LAST** and a search distance. **FIRST | LAST** does not affect logical evaluation. Search distance does. e.g.

   ```
   /<<.*?\/ProcessColorModel\s*\/
   (DeviceCMYK|DeviceGray).*?>>\s*setpagedevice/ 10000
   ```

   is true if this regular expression is matched in the first 10,000 bytes of the spool file.
3. Compare numbers with ==, !=, <, >, <= and >=.
4. Compare strings with == and !=. These comparisons are case insensitive and do not perform the searches in rule 2 above.

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5. You can combine logical expressions, such as the results of 1-4 above, with **NOT**, **AND**, **OR**, **XOR**, and `(...)` parentheses. e.g. `x == 1 AND NOT (y > 2 OR z <= 3)`

FIND

FIND pattern [options]

where the **pattern** is a regular expression (regex) or string.

FIND /regex/ [REPLACE text] [options]

FIND "string" [REPLACE text] [options]

FIND searches for the **pattern** (a string or a regex) in the spool file and assigns `$0`, `$1`, ... from the resulting regular expression capture groups. If the **pattern** is a string, then only `$0` is assigned.

e.g

```
FIND /<<.*?\/ProcessColorModel\s*\/
(DeviceCMYK|DeviceGray).*?>>\s*setpagedevice/
```

could set $0 to "<< /ProcessColorModel /DeviceCMYK >> setpagedevice" and $1 to "DeviceCMYK" on a match.

Options

- *FIRST*: Return the first match in the spool file. This is the default
- *LAST*: Return the last match in the spool file.
- **n**: Any positive integer. Search **n** bytes of the spool file. The default is to search one megabyte. A value of zero (0) searches through the entire spool file.

FIND REPLACE

FIND pattern REPLACE text [options]

where the **pattern** is a regular expression (regex) or string.

e.g

```
FIND "Letter" REPLACE "A4"
FIND /(\w+)\s=\sGrayscale/ REPLACE "$1 = BlackAndWhite"
FIND /MODE = \w+/ REPLACE "MODE = %my_var%"
FIND /MODE = \w+/ REPLACE "MODE = %my_var%" 2000
```

The **FIND** works as described above. Then **REPLACE** substitutes all the `$[N]` and `%variable%` values in the **text**, before replacing the string matched in the spool file with the substituted **text**.

ADD_HEADER

ADD_HEADER text

e.g.

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```
ADD_HEADER my_header
```

Insert the string **text** as a header in the spool file.

STRIP_HEADER

STRIP_HEADER

Strip any PJL, XPIF, PostScript or other header (that our developers know about) from the spool file.

DELETE_UNTIL

DELETE_UNTIL text

e.g

```
DELETE_UNTIL "%!PS-Adobe-3.0"
```

Delete from the start of the spool file up to but not including the first occurrence of **text**.

REPEAT_ALL

REPEAT_ALL num_copies

e.g

```
REPEAT_ALL 3
```

Make **num_copies** of the input spool file in the output spool file after applying all other modifications.

Use this option for printers that don't support spool files copies commands, typically printers without hard disks. You usually detect the copies command in the source spool file then use **REPEAT_ALL** to repeat the source spool files the same number of copies.

Important:
Changes to the number of copies of a printed made here are not reflected in the Job Log.

INSERT

INSERT ofs len text

e.g

```
INSERT regex_ofs regex_len my_replacement
```

Insert the string **text** at the spool file offset **ofs**, after deleting **len** bytes.

Setting **ofs** to `-1` appends **text** to the end of the spool file. In general, setting **ofs** to `-n` inserts **text** `n - 1` bytes before the end of the spool file.

DELETE

DELETE ofs len

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e.g

```
DELETE regex_ofs regex_len
```

Delete **len** bytes from the spool file, starting at offset **ofs**.

It is equivalent to:

INSERT ofs len ""

Pre-populated variables

Table 101: Pre-populated PDL transform script variables

Variable	Description	Example	Type
pc_pages	Number of pages in the spool file	*11*	*number*
pc_copies	Number of copies in copies command in spool file, if one is detected. 1 otherwise.	*1*	*number*
pc_page_width_mm	Page width in mm	*210*	*number*
pc_page_height_mm	Page height in mm	*297*	*number*
pc_paper_name	Paper size name	*"A4"*	*string*
pc_grayscale	Is the document grayscale?	*True*	*boolean*
pc_duplex	Is the document duplex?	*False*	*boolean*
pc_tumble	Is the back side of a duplex job rotatated 180 degrees?	*False*	*boolean*
pc_docname	Name of the document	*"Homework.doc"*	*string*
pc_user	Name of the user	*"Josh"*	*string*
pc_server	Print server name	*"Server1"*	*string*
pc_printer	Printer name	*"Hall printer"*	*string*
pc_driver	Name of the printer driver	*"HP Color LaserJet CM4540 MFP PCL 6 (0.3.1545.9108)"*	*string*
pc_iso_date	Current date in ISO format	*"2014-08-15"*	*string*
pc_uid	A randomly generated ID	*"580459f0-2d19-11e4-b70a-f8b156c33bc3"*	*string*
*pc_docname_*	'Cleaned' version of *pc_docname*. All character that will prevent display in PostScript, PJL or XML	*"Homework.doc"*	*string*

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Variable	Description	Example	Type
_clean__	removed.		
pc_user__clean__	'Cleaned' version of *pc_user*.	*"Josh"*	*string*

5.4.5. Test mode

Test mode is designed to accelerate the development, testing and debugging of transform scripts. Test mode is enabled by adding the following line to a transform script:

```
ENABLE_TEST_MODE
```

or by setting

```
EnableTransformTestMode=on
```

in the print-provider.conf file. The test mode option should only be enabled while developing scripts.

Test mode causes the system to output additional log files to assist in developing and validating transforms. These files are located at:

```
[install-path]/providers/print/[platform]/transforms/logs/
```

The test mode files created are:

Table 102: PDL transform test mode output files

`[job-id].log`	This file contains logging information to help you understand the transform script's state and variables.
`[job-id].-before`	The print job spool file BEFORE transformation.
`[job-id].after`	The print job spool file AFTER transformation.

Tip:
Consider using a "visual diff" program to help compare before and after files.

Important:
Always disable test mode after developing your transform script. Test mode adds a considerable performance overhead and should not be used in a production environment.

5.4.6. Tips & tricks

- Develop your scripts in TEST_MODE to help compare script behavior.
- Use existing examples as starting points.
- Print the same documents from source and destination printer drivers, and diff the resulting spool files. In most cases the things you need to modify are in the diff. e.g. One file has a header

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and the other does not, or one file sets color/grayscale with one string and the other file uses a different string.

- Look at a PostScript Printer Description (PPD) file of the destination printer, and copy PostScript snippets into a transform.

5.5. Upgrading

5.5.1. Upgrade from a previous version

This section describes the PaperCut NG/MF standard upgrade procedure. PaperCut NG/MF supports upgrades using a simple *install-over-the-top* procedure. Review all steps prior to commencing the upgrade procedure.

Before you start

1. A PaperCut NG/MF system might comprise many software components, such as secondary servers, locally installed User Clients and Release Stations. It is generally not required to upgrade these components along with an Application Server upgrade. However, we do recommend that you upgrade all components as best practice.

   By contrast, all Site Servers *must* normally be upgraded at the same time as your Application Server.
2. Check the release notes to determine if a database schema upgrade is to be performed. If the release does require a database schema upgrade, allow extra time for the upgrade process.

The recommended upgrade procedure

1. Download the PaperCut NG/MF installer for your platform. In accordance with best practice, archive your install programs just in case you need to reinstall in the future or roll back to a previous version.
2. Download the PaperCut NG/MF installer for your platform. In accordance with best practice, archive your install programs just in case you need to reinstall in the future or roll back to a previous version. Take some time to read the release notes for this version as they highlight considerations during upgrades.
3. Schedule approximately 10 minutes downtime. Select a time of day with minimal network activity. If there is a large volume of data in the system (for example, if the system has been running for more than a year, or there are more than 5,000 users) the upgrade takes longer. With very large installations, schedule an hour or more of downtime.
4. Take a point-in-time backup of the data by clicking **Backup Now** located under **Options > Backups** . This ensures you have a copy of the important data.
5. As a precaution on very large systems, back up the whole PaperCut NG/MF directory.

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Existing overnight backups might have taken care of this task, however, take a few moments to grab an up-to-date backup now. For example, create a zip archive of the directory:

```
C:\Program Files\PaperCut NG/MF\
```

or the equivalent path on Linux or Mac.

6. Run the installer downloaded in step 1 and install into the *same* location as the existing install.
7. When the install is complete, allow a few minutes before accessing the system. The system might perform a database upgrade and this is done in the background. If you try to access the application while a database upgrade is in progress a message displaying the upgrade status is displayed. *IMPORTANT: Do not shutdown the application while an upgrade is in progress. Wait for the upgrade to complete.*
8. After the install is complete, log in to the system and perform some tests to ensure all is working as expected and the system is monitoring user activity as expected. Sites running on Novell OES Linux are advised to restart their iPrint Print Manager.

   Administrators might find the post upgrade test plan useful.

5.5.2. Upgrade from PaperCut NG/MF Quota

This section describes the process for moving from PaperCut Quota to PaperCut NG/MF, and includes instruction of importing user balances and restriction settings from the old PaperCut Quota installation.

These instructions assume that PaperCut NG/MF is installed on the same machine as PaperCut Quota, however, the instructions can also be applied when PaperCut NG/MF is installed on a new machine.

5.5.2.1. Step 1 - Stop and disable PaperCut Quota

Firstly, stop the PaperCut Quota services to ensure they do not interfere with PaperCut NG/MF. Do not uninstall PaperCut Quota at this stage because you need the user database to import user balances into PaperCut NG/MF.

To stop and disable the PaperCut Quota services:

1. Open the Windows services manager (**Start > Control Panel > Administrative Tools > Services**).
2. Find the *PaperCut Print Charging* service.
3. Right-click the server; then select the **Properties** menu.
4. In **Startup Type**, select **Disabled**.
5. Click **Stop** to stop the service.
6. Click **OK**.

5.5.2.2. Step 2 - Install PaperCut NG/MF

Install PaperCut NG/MF. For more information, see Installation.

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During the setup wizard, it is recommended that the user import settings be set up in the same way as was configured in PaperCut Quota. For example, if you import users from the full Active Directory domain in PaperCut Quota, also set this up in PaperCut NG/MF.

Check that the users have been imported correctly. To adjust the user import settings and re-perform the user synchronization process, go to the **Options > User/Group Sync** screen. This is similar to the *Tune-up* function in PaperCut Quota.

Once installed it is recommended that the groups are set up in the same way as in PaperCut Quota. Groups are used to determine the default settings for new users and also how quotas are allocated. For more information on groups see Groups in PaperCut NG/MF.

5.5.2.3. Step 3 - Configure and test printers

The next step is to set up the printers in PaperCut NG/MF to reflect the require page costs and print restrictions. To do this:

1. Click the **Printers** tab.

   The **Printer List** page is displayed.
2. Select a printer.

   The **Printer Details** page is displayed showing the **Summary** tab contents.
3. Enter the cost and filter settings.
4. Click **OK**.

For a detailed explanation of setting printer costs and restrictions, see Printer management.

Tip:

- If all your printers are configured with similar costs and filters, copy the settings from one printer to the other printers. For more information, see Copy printer settings.
- It is recommended that the administrator set up the `[template printer]`. This printer is used as a template when new printers are added to the system. For more information about the template printer, see The template printer.

To ensure that the printers are setup correctly, perform a test print to one of the configured printers. Once printed, check the print log (**Printers > Print Log**) that the job was recorded and the correct cost calculated.

5.5.2.4. Step 4 - Import the existing user balances

In Professional (Client Billing) installations, this step is optional because shared accounts are used instead of user account balances. If you do not want to import user balances, skip to the next step.

Moving the user balances and restricted status from PaperCut Quota to PaperCut NG/MF is a simple process. If the server is running Windows then:

1. Click the **Users** tab.

   The **User List** page is displayed.

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2. In the **Actions** menu, click **Batch import**.

   The **Batch User Import and Update** page is displayed.
3. Click **Choose File**; then locate the PaperCut Quota user database (`PCUserDB.mdb`). This is typically located at: `C:\Program Files\PaperCut\Database\PCUserDB.mdb`
4. Click **Import**.

   The number of users updated and created are displayed.
5. Perform some checks of the user balances and restricted statuses to ensure they are set to the values from PaperCut Quota.

If the PaperCut NG/MF server is not running on Windows, you can run the PaperCut Quota database converter manually on a Windows system, and the resulting text file can then be imported in a process similar to the above. To convert the PaperCut Quota user database manually:

1. Copy the `[app-path]/server/bin/win/PCQuotaExport.exe` file from the server (running the non-windows OS), to the Windows machine running PaperCut Quota. Copy the exporter to the PaperCut Quota database directory (usually `c:\Program Files\PaperCut\Database`).
2. Open the command prompt, by running `cmd.exe` from **Start > Run**.
3. Change to the PaperCut Quota database directory. e.g.

   ```
   cd "c:\Program Files\PaperCut\Database"
   ```
4. Run the converter, with the location of the `PCUserDB.mdb` as the argument. For example:

   ```
   PCQuotaExport.exe "PCUserDB.mdb" > user-export.txt
   ```

   If running the exporter from a different directory to the database, provide the full path to the database.

   This command creates a text file called `user-export.txt` that contains the user data from PaperCut Quota.
5. Open the file in a text editor to review the contents. The file can then be imported into PaperCut NG/MF.
6. Log in to PaperCut NG/MF.
7. Click the **Users** tab.

   The **User List** page is displayed.
8. In the **Actions** menu, click **Batch import**.

   The **Batch User Import and Update** page is displayed.
9. Click **Choose File**; then locate the `user-export.txt` file, created in the above step.
10. Click **Import**.

    The number of users updated and created are displayed.
11. Perform some checks of the user balances and restricted statuses to ensure they are set to the values from PaperCut Quota.

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5.5.2.5. Step 4b - Import the existing accounts

Moving the accounts and their settings from PaperCut Quota to PaperCut NG/MF is a simple process, that is described in detail below. This is particularly important in a Professional (Client Billing) installation where shared accounts are used to charge print jobs to client accounts. If this is not important in your environment then skip this step.

Tip:

When accounts are imported they inherit the access control settings from the `Template Account`. By default the `Template Account` is configured to allow all users access to the account. If you do not want all users to have access the imported accounts, change the security settings on the `Template Account` before importing.

To import the accounts when the server is running Windows:

1. Select **Accounts > Batch Import / Update**.

   The **Batch Import/ Update** page is displayed.
2. Click **Choose File** and locate the PaperCut Quota database (`PCUserDB.mdb`). This is typically located at: `C:\Program Files\PaperCut\Database\PCUserDB.mdb`. This database contains all of the accounts.
3. Click **Import**.

   When finished, the number of users updated and created is displayed.
4. Perform some checks of the accounts and settings to ensure they are set to the values from PaperCut Quota.

If the PaperCut NG/MF server is not running on Windows, run the PaperCut Quota database converter manually on a Windows system, and then import the resulting text file.

To convert the PaperCut Quota user database manually:

1. Copy the `[app-path]/server/bin/win/PCCBAccountExport.exe` file from the server (running the non-windows OS), to the Windows machine running PaperCut Quota. Copy the exporter to the PaperCut Quota database directory (usually `c:\Program Files\PaperCut\Database`).
2. Open the command prompt, by running `cmd.exe` from **Start > Run**.
3. Change to the PaperCut Quota database directory. e.g.

   ```
   cd "c:\Program Files\PaperCut\Database"
   ```
4. Run the converter, with the location of the `PCUserDB.mdb` as the argument. For example:

   ```
   PCCBAccountExport.exe "PCUserDB.mdb" > account-export.txt
   ```

   If running the exporter from a different directory to the database, provide the full path to the database.

   The above command creates a text file called `account-export.txt` that contains the user data from PaperCut Quota.

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5. Open the file in a text editor to review the contents. You can then import the file into PaperCut NG/MF.
6. Log in to PaperCut NG/MF.
7. Select **Accounts > Batch Import / Update**.

   The **Batch Import/ Update** page is displayed.
8. Click **Choose File** and locate the `account-export.txt` file, created in the above step.
9. Click **Import**.

   When finished, the number of accounts updated and created is displayed.
10. Perform some checks of the accounts and settings to ensure they are set to the values from the previous version.

5.5.2.6. Step 5 - Upgrade User Client software

The old PaperCut Quota client software is not compatible with PaperCut NG/MF. The old client software must be uninstalled off all workstations and the new client software deployed. The zero-install deployment method can greatly assist with this process. More information on the client deployment is detailed in User Client.

> **Note:**
> It is not 100% accurate to claim that the old client software must be removed. Once the old server-side software is disabled, the old client sits in an inactive state and does no harm. It does, however, consume some system resources on the workstations so we recommend that you uninstall it.

5.5.2.7. Step 6 - Uninstall PaperCut Quota (optional)

Once the PaperCut NG/MF installation is completed and tested you can optionally uninstall PaperCut Quota. If you want to view historical print data, keep the old application installed so you can view the historical data. If this is not important, then uninstall the application.

To uninstall:

1. On the Windows server running PaperCut Quota, go to: **Start > Control Panel > Add or Remove Programs**).
2. Select PaperCut Quota in the list of installed programs.
3. Click **Remove** to start the uninstall process.

5.6. Troubleshooting and technical FAQs

There are a number of problems you might encounter in the course of installing and using PaperCut NG/MF. Many are resolved once you get a better idea of how PaperCut NG/MF works, while others might require you to dig deeper into the application's workings.

In addition to this section, some platform specific FAQs are available at Linux FAQ.

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I am running PaperCut NG/MF in a workgroup environment (that is, not as part of a domain). What do I need to consider?

See Running in a Workgroup environment.

PaperCut NG/MF is not detecting jobs printed from a network clients. How can I fix this?

There are two main causes of this problem:

- Users are not correctly logging on to your network domain or computer. If the domain server does *NOT* authorize users, PaperCut NG/MF has no way of knowing who submitted the print job. With system policies, you can make login to the domain mandatory, eliminating this problem. Alternatively, you can set printer permissions on the print server to ensure only valid users can print to the printers.
- Alternatively, you can configure the client computer to print directly to the network interface printer. Ensure all network clients are configured as outlined in the PaperCut NG/MF installation guide. All print jobs must pass through the print server running PaperCut NG/MF.

PaperCut NG/MF is not counting/detecting pages correctly. What's causing this?

PaperCut NG/MF currently supports about 90% of printers on the market. If a printer's language is not recognized, PaperCut NG/MF cannot detect any pages and record the print job as a zero page count. This is usually accompanied with an error message in the Application Event Log. We recommend you try the following problem resolution actions:

1. Many printers come with a variety of driver options. Install the *Postscript* drivers if one is available for the printer. Do this on both the print server and all network clients.
2. Try the drivers included with the Windows CD. PaperCut NG/MF supports the majority of drivers distributed with recent Windows releases.
3. Try turning **Enable advanced printing features** as follows:
    a. On the *print server*, select **Start > Settings > Printers**.
    b. *Right-click* the printer; then select **Properties**
    c. Select the **Advanced Tab**.
    d. Turn *off* (disable) the **Enable advanced printing features**.

    For more information, see Knowledge Base.
4. If you're still having problems, email PaperCut Software support. We might be able to recommend a suitable set up or even supply a recent update supporting your hardware.
5. Specific information on printer compatibility is available in the PaperCut NG/MF Knowledge Base. Information here might be of assistance.

How do I ignore (not monitor or delete) a printer?

Configure the *Print Provider* via its configuration to ignore a printer. For more information see Add and remove/delete/ignore printers.

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The system is not displaying the correct currency sign.

PaperCut NG/MF formats the currency based off the operating system's default regional settings. If the default regional settings are incorrect, you can change the format by defining your location under **Options > General > Display Settings > Location** .

I've setup a secondary print server. The printers on this server are not listed and not being monitored. What's wrong?

There are a number of possible explanations. The first step is to open the Print Provider's log file on the secondary server. This file often contains error messages indicating the cause or type of error. On a Windows system the log file is located at: `[app-path]\providers\print\win\print-provider.log` Open this file from any text editor such as Notepad.

Some common issues are:

1. Verify that the secondary server's name is correctly defined in the `print-provider.conf` file. Open a command prompt on the secondary server and use the `ping` command to verify that the server can be contacted under this name. A server restart (or a manual restart of the PaperCut NG/MF Print Provider service) is required for any changes to the file to take effect.
2. Ensure that firewall software on the primary server is not preventing the secondary server from connecting on port 9191. Configure your firewalls to allow all local network traffic on this particular port.

   A quick way to see if the secondary server can connect to the primary server is to use the command-line `telnet` program. Simply type: `telnet servername 9191` at a command prompt.

   - If you receive an error such as `Could not open connection to host`, then there is probably a network/firewall issue not letting the connection through.
   - If the screen goes blank then the connection was established successfully. Press `Ctrl+]` then type `quit` to close the telnet session.
3. Check that the *Print Provider* process/service is in fact installed and running. On a Windows system this is located under: **Start > Control Panel > Administrative Tools > Services**

The client software is not displaying the user's account balance and is displaying a network error. How do I fix this?

The client software needs to contact the Application Server. For the technical readers, the client makes an XML web services request to the server on port 9191. Most problems relate to either firewalls blocking access or the Application Server's name is not correctly defined. Ensure that:

1. Any firewalling software on the server allows local network access to port 9191.
2. The `client.properties` file (a text file) lists the correct server name or IP address of the server. If you've used the zero-install deployment option, this file is located on the server in the directory: `[app-path]/client/client.properties`

How do I change the built-in `admin` user's password?

The `admin` user's password is set up on initial install during the configuration wizard. You can

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change this password post-install:

1. Select **Options > Advanced**.

   The **Advanced** page is displayed.
2. In the **Reset admin password** area, select the **Change internal admin password** check box.

If you have forgotten the internal admin password, you can reset it by editing the `admin.password` property in the following text file:

```
[app_dir]/server/server.properties
```

I run a small peer-to-peer network and my users don't log onto the workstations. Can I still use PaperCut NG/MF?

PaperCut NG/MF is primarily designed for networks managed under a domain and/or authenticated environments. Peer-to-peer networks or Workgroups are, however, supported. The first option to consider is requiring users to log onto the workstations using their username and password. If this is not possible, an alternate option is to set up the user accounts on system hosting the printers (system running the PaperCut NG/MF server software) and configuring the account selection popup with the **Charge to other users option selected**. Users can then enter their username and password in the popup that displays each time they print.

I want to start the user inquiry tool (client software) with the window minimized. Is this possible?

Yes. You can start the client software minimized by executing the program with a command-line switch `-minimized`. See Configure the User Client using the command-line.

How do I stop users from closing/shutting down the client software?

If the user running the client software is configured to either:

- select shared accounts
- confirm the print job via a popup

the client software must be running at all times. If the user is configured in either of these modes, the client software's exit option is disabled. *Note:* Restart the client software to pick up this option after the user's options have been changed.

Why does PaperCut NG/MF cache the group membership?

PaperCut NG/MF caches group membership by replicating the user/group relationship structure internally in the system. Typically network group membership is relatively static, and is usually set up when a user account is initially created. PaperCut NG/MF tries to be a good network application by avoiding common no-no's such as flooding domain controllers with group lookup requests. This is achieved by caching. Operations such as **Bulk user operations**, quota allocations, group reports and group filtering all need to do group membership lookups. Caching speeds up these operations and prevents excessive callouts to the domain servers.

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The downside to caching is that group membership changes are not immediately reflected inside PaperCut NG/MF. To force PaperCut NG/MF to detect the change, perform a user/group synchronization:

1. Select **Options > User/Group Sync**.

   The **User/Group Sync** page is displayed.
2. Click **Synchronize Now**.

   The system also automatically refreshes group membership overnight during low network activity.

I have noticed a lot of extra options available under the Config Editor (Advanced) area. Can I change these?

The config area contains all of the PaperCut NG/MF system wide settings. You can change some of these via the normal options interface while others are designed for internal developer use and tuning and are only accessible via the Config Editor. Take care with any changes made in the Config Editor as an invalid entry might require you to reinstall the system!

I want to write some custom extensions. Do you support this?

One of the business objectives of PaperCut NG/MF was openness. The development team actually encourages this and can assist with detailed API documentation. If you want feedback on your ideas, please email our support team. They would be more than happy to offer advice.

What external databases are supported?

Running PaperCut NG/MF on top of an external database is an advanced option. For more information, see Deployment on an external database (RDBMS).

What is the internal database format?

PaperCut NG/MF's internal database is Apache Derby - an open source database written by IBM and based on IBM's DB2 Cloudscape database system. The internal database has proven to scale very well and is suitable for networks of all sizes.

What language is PaperCut NG/MF developed in?

PaperCut NG/MF is developed under a number of languages and development environments. The printer monitoring component and other native operating system interfaces such as user authentication are written in C/C++. The Application Server and web services are written in server-side Java.

I want to investigate server cluster support?

The PaperCut NG/MF is designed as a cluster compatible application and supports clustering at all layers of the application. For more information on configuring PaperCut NG/MF in a Microsoft Cluster environment, see Clustering and high availability. If you want to investigate clustering options on other platforms (Linux), contact our support team.

How do I print a spool file?

If you're utilizing the Print Archiving feature (see Print Archiving (viewing and content capture)), or

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have otherwise captured a spool file for debugging purposes - you can print this document by copying it to a printer, using it's full network path.

Windows:

```
copy /B my-spool-file.pcl6 \\servername\printer
```

MacOS and Linux:

```
lp -h servername -d printer -o raw my-spool-file.pcl6
```

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Glossary

A

active monitoring

Active monitoring is a control mode that allows you to track your print jobs and also enforce print policies, such as duplex printing. Active monitoring also allows the use of popups to interact with users.

advanced account selection popup

The advanced account selection popup is a mode for the desktop client that caters for professional businesses with a large number of accounts. It provides powerful features that allow users to quickly assign printing to accounts selected from a large list of clients or projects, such as keyword search, recently selected accounts, and preferred accounts. You can also apply cost adjustments to a print job at time of print.

alternate ID

An alternate name for printers that normally provides more descriptive information about the location of the printer.

anonymous printing

Anonymous printing provides the ability for guest users to print anonymously using Email to Print. Anonymous email printing can be implemented in three ways: 1. Direct Print—Guests can send their job directly to the anonymous email defined for a physical printer. This is the most convenient way to provide printing access for guests or visitors. 2. Managed Release—Guest users send their job to the printer's anonymous email address where it is held in a hold/release queue. Jobs are released by the receptionist or a trusted person in the organization. Jobs sent by different guests are identified by the guest's email address, which is appended to the document name. 3. Guest Self-Release—Guest users send their job to the printer's anonymous email address where it is held in a hold/release queue. Guests are provided with a common username and password to log in to the MFD and release their job. Jobs are identified by their email address appended to the document name.

API

Application Programming Interface (API) is a set of routines, protocols, and tools for building software and applications. An API expresses a software component in terms of its operations, inputs, outputs, and underlying types, defining functionalities that are independent of their respective implementations, which allows definitions and implementations to vary without compromising the interface.

application log

The application log retains a complete history of system events, such as security errors (such as incorrect password attempts), user logins, backup times and scheduled tasks, any system errors or warning.

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Application Server

An Application Server is the primary server program responsible for providing the PaperCut user interface, storing data, and providing services to users. PaperCut uses the Application Server to manage user and account information, manage printers, calculate print costs, provide a web browser interface to administrators and end users, and much more.

audit log

The audit log retains a history of administration changes to users, such as a user's balance, the email address of a user, the value (if any) of the overdraft for this user, discounts for a user, the user's card numbers and PIN numbers.

B

Bonjour

Bonjour is Apple's implementation of zero-configuration networking (zeroconf), a group of technologies that includes service discovery, address assignment, and hostname resolution. Bonjour locates devices such as printers, other computers, and the services that those devices offer on a local network using multicast Domain Name System (mDNS) service records.

C

card wizard

The Card Wizard is a Microsoft Windows application that integrates with Microsoft Word used to create Top-up/Prepaid cards.

Central Reports

Central Reports provide a consolidated data and reporting view across multiple Application Servers. Central Reports provide a large subset of the same reports that provided by the standard PaperCut reporting feature.

client/server

Client software is a small program that runs on each desktop and communicates with a server. The printing process on most networks works on a client/server model with clients (desktops) submitting jobs to a server. PaperCut also uses the client/server model in the optional client software to communicate with end-users.

clustering

Clustering allows your organisation to ensure your services are not affected if anything should happen to your main server. PaperCut is a cluster compatible application and is supported under Windows (Microsoft Cluster Server / MSCS, Microsoft Failover Cluster Manager / MSFCM, Vetitas Cluster Server / VCS) and Linux (Novell Cluster Services / NCS, Linux-HA) at all levels of the application, including: clustering at the print spooler service layer by integrating with clustering services, failover based clustering at the Application Server layer using clustering services, and at the database layer by utilising cluster aware databases such as Microsoft SQL Server, PostgreSQL, or Oracle.

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Config Editor

The Config Editor stores information used by PaperCut to configure advanced options and functions. This information is stored in config keys, which are editable by an administrator.

config key

A config key stores information about a specific advanced setting in PaperCut. Config keys are editable by an administrator in the Config Editor.

control mode

The control mode defines how PaperCut interacts with the end-users and controls their usage. The control modes available listed in order of impact are: Silent monitoring (no control, only monitoring), Active monitoring (enforcement of print policies), Quota system, and Up-front payment.

conversions

Conversions are a type of print filter that changes something about the print job, for example, from color to grayscale, or convert to duplex.

CUPS

Common User Printing System (CUPS) is a printing system for Unix operating systems that allows a computer to act as a print server. A computer running CUPS is a host that can accept print jobs from client computers, process them, and send them to the appropriate printer.

D

debug mode

Debug mode causes PaperCut to produce a detailed text log of activity. The log allows our developers to inspect the internal workings of the PaperCut application and pinpoint the cause of problems.

device group

Device groups allow administrators to tag or group devices by attributes. Group names are user definable and can represent any attribute appropriate for device management. For example, you can group devices by device type, location, make, function, owner, age, and so on. You can report by device group and also send notifications per device group.

differential charging

Differential charging allows you to charge different amounts for different types of documents or for different types of printers. You can use this feature to discourage users from using a particular printer for certain types of print jobs.For example, an inkjet color printer is ideal for photos or the occasional color page but should not be used print 1000-page black and white documents when the heavy duty laser printer is located just down the corridor. You can apply differential charging based on the print job settings. For example, you can charge more for color printing than black and white, more for simplex than duplex, or more for A3 than A4.

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digital signature

Digital signatures allow you to include metadata, such as the origin, author, time of print, and other details of print jobs, on print jobs (usually the footer). This helps organizations track documents and encourages employees to be responsible with sensitive information. Digital signatures use either a cryptographically secure HMAC or a Bates number.

Direct Print Monitor

The Direct Print Monitor is the Direct Printing component that tracks jobs between desktops and an MFD.

Direct Printing

Direct Printing allows you to print directly from a desktop to a printer, without the need for a print server.

E

Email to Print

Email to Print allows any device to print documents by sending an email to your network's print devices.

endpoint

An endpoint is a connection point where HTML files or active server pages are exposed and can be accessed by an external application. Endpoints provide information that can be consumed by an external monitoring tool.

Environmental Dashboard

The Environmental Dashboard is a desktop widget that presents data from PaperCut about the environmental impact of printing at both an individual user and organization level. This widget draws a user's attention to their printing impact and allows them to compare their usage to a benchmark.

escrow

An escrow is the amount of credit that is temporarily transferred from a PaperCut account to the terminal device. This credit is then used during the copier session and the unused proportion is transferred back into PaperCut at the end of the session. An escrow defines the maximum amount of copying that can be performed in a single session.

F

failure mode

Failure mode allows you to control the behaviour under error conditions, such as connections problems between the Application Server and secondary server.

Fast Release

Fast Release is a print release (Secure/Find-Me Printing) solution that uses off-the-shelf card readers available from multiple manufacturers. A Fast Release terminal is connected to the network (not the printer) allowing it to be used with any printer. A USB card reader

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is connected to the the Fast Release terminal and users use their proximity card to authenticate. PaperCut releases the users held print jobs to the printer assosiated with the Fast Release terminal.

filters

Filters allow you to control attributes of the print settings by either forcing a particular attribute or denying a a print job that does not meet specific criteria. There are two types of print filters: conversions and restrictions.

Find-Me printing

Find-Me printing allows users to print to a single global print queue without selecting a printer, and then release the print job at any printer (via a Release Station).

G

GDI printer

A GDI printer is a printer that has built-in support for Windows Graphical Device Interface (GDI). GDI is used by most Windows applications to display images on a monitor, so when printing from a Windows application to a GDI printer, there is no need to convert the output to another format such as PostScript or PCL. GDI printers are sometimes called host-based printers because they rely on the host computer to rasterize pages.

Global Print Driver

The PaperCut Global Print Driver is a print driver that works across multiple brands of MFPs. Use the Global Print Driver if your organization has a mix of printer brands. The Global Print Driver is a brand independent, maximum compatibility, signed print driver. It is designed to work on the widest possible range of printers out of the box and supports all main print features (duplex, color, paper size and tray selection).

Google Cloud Print

Google Cloud Print is a technology that allows you to print to any printer from any web connected device, such as a phone. Google Cloud Print works on a phone, tablet, Chromebook, PC, and any other web-connected device you want to print from.

guest user account

Guest user accounts are accounts for users who do not have a domain login and will print only on an adhoc or short term basis. Guest user accounts can be either Internal Users, shared or generic users, or anonymous printing. Internal users are added directly to PaperCut and are not synced with an external user directory. Internal users may be added by a PaperCut administrator or self-registered. Shared or generic users have a shared username and password for guests to allow them to login and print using company equipment. All guest jobs are logged in against this generic user. Anonymous Printing is for guests not registered in PaperCut are permitted to send jobs to a special email address for printing. Jobs are logged against a single internal guest user.

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H

hardware page count

Hardware page counts allow PaperCut to determine the actual number of pages printed rather than just the page count from the spool file. The hardware page count is used when jobs do not print completely, for example, the print job is canceled. These checks are performed at the hardware-level by communicating with the printer via SNMP (Simple Network Management Protocol).

High-availability clusters

High-availability clusters (HAC) improve application availability by failing or switching them over in a group of systems—as opposed to high-performance clusters, which improve application performance by running them on multiple systems simultaneously.

Hold/release queue

A Hold/release queue is a queue of print jobs on the Release Station that have been placed on hold and are waiting release. A Hold/release queue is a print queue that does not print a job immediately; an action is required to force the job to start. Hold/release queues are available via: Standard Release Station, Mobile print release, End-user web-based Release Station (Web Print only), Web-based Release Station within the administrative UI, Manager-mode web-based Release Station (Release Manager), Fast Release, the MFD, and a hardware terminal connected to the MFD.

HP JetDirect/Socket

HP JetDirect Socket describes the process in which the printer is connected to the server-/system. A JetDirect Socket means that the server communicates with the printer via a standard TCP socket connection over the network. This method of connection is often called a Standard TCP/IP Port in other non-HP brands, and the process is commonly refereed to as setting up a “networked printer”. The TCP port used for communication is port 9100.

HSTS

HTTP Strict Transport Security (HSTS) is a web security policy mechanism which helps to protect websites against protocol downgrade attacks and cookie hijacking. It allows web servers to declare that web browsers should only interact with it using
secure HTTPS connections, and never via the insecure HTTP protocol.

I

Integrated Scanning

Integrated Scanning provides a secure, consistent, and easy way for users to scan documents to: their own email address, their own home folders, or other authorized email and folder destinations.

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internal user account

Internal users are user accounts that exist only inside PaperCut and are independent of the domain, network, or operating system. Internal user accounts can be self-registered, manually managed, or for non-domain Windows workgroups. Self-registered accounts are created by the user. These are suitable when there are a large number of guest users, for example, a public library. Manually managed accounts are created by the PaperCut administrator. These are suitable when there are only a small number of guest accounts and the administrator wants to control these accounts. Suitable in an environment with a small number of guests.

IP Printing

IP Printing is a generic term used to describe a number of print protocols that are used to exchange print documents between a computer, a server queue, or a physical printer.

IPP

The Internet Printing Protocol (IPP) is an Internet protocol for communication between a print server and its clients. It allows clients to send one or more print jobs to the server and perform administration such as querying the status of a printer, obtaining the status of print jobs, or cancelling individual print jobs. IPP can run locally or over the Internet. Unlike other printing protocols, IPP also supports access control, authentication, and encryption, making it a much more capable and secure printing mechanism than older ones.

iPrint

iPrint is a technology developed by Novell that allows users to install printer-drivers from a web browser and to submit print jobs over the Internet or a local network through the standard Internet Printing Protocol (IPP). Common desktop operating systems such as Windows, Linux, and Mac support iPrint.

J

job log

The job log retains a history of all print jobs including the following details: the user who printed (ie. their network user ID), the time of the print event, the number of pages, document attributes such as color, duplex, grayscale, paper size, document area, paper length, where the print job originated from (the workstation name or IP address), and the document name and type (for example, a Word document's file name).

job redirection

Job redirection is transferring a print job from one print queue to another. Both Find-Me printing and load balancing involve job redirection.

L

LDAP

The Lightweight Directory Access Protocol (LDAP) is a directory service protocol that runs on a layer above the TCP/IP stack. It provides a mechanism used to connect to,

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search, and modify Internet directories. The LDAP directory service is based on a client-server model.

load balancing

Printer load balancing automatically distributes print jobs between two or more printers. Load balancing is generally used to equally distribute print jobs across a pool of printers saving valuable time in document output for the user and at the same time balancing the wear and tear among printer devices.

LPD

The Line Printer Daemon protocol (LPD) is a network protocol for submitting print jobs to a remote printer. A server for the LPD/LPR protocol listens for requests on TCP port 515. A request begins with a byte containing the request code, followed by the arguments to the request, and is terminated by an ASCII LF character. An LPD printer is identified by the IP address of the server machine and the queue name on that machine. Many different queue names may exist in one LPD server, with each queue having unique settings. The LPD software is stored on the printer or print server.

LPD service

The PaperCut Line Printer Daemon (LPD) service allows continued use of the LPD protocol (Print Services for UNIX, TCP/IP Print Server, LPD Print Service and more) now that Microsoft has removed the LDP protocol from Windows Server 2012 onwards.

LPR

The Line Printer Remote protocol (LPR) is a network protocol for submitting print jobs to a remote printer. A server for the LPD/LPR protocol listens for requests on TCP port 515. A request begins with a byte containing the request code, followed by the arguments to the request, and is terminated by an ASCII LF character. An LPD printer is identified by the IP address of the server machine and the queue name on that machine. Many different queue names may exist in one LPD server, with each queue having unique settings. The LPR software is installed on the client device.

M

man-in-the-middle attack

A security attack where the attacker secretly relays and possibly alters the communication between two parties who believe they are directly communicating with each other.

manager mode popup

The manager mode popup is a mode of the account selection popup that allows a user to charge printing to any user or shared account. It also allows the user to apply adjustments to the job costs (for example, additional charge for special paper, binding, etc). The manager mode popup is often used in print rooms where staff perform printing on behalf of other users.

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Microsoft Cluster Server (MSCS)

Microsoft Cluster Service (MSCS) is a service that provides high availability for applications such as databases, messaging and file and print services. MSCS attempts to minimize the effect of failure on the system as any node (a server in the cluster) fails or is taken offline.

Microsoft Failover Cluster Manager (MSFCM)

The Microsoft Failover Cluster Manager (MSFCM) snap-in validates failover cluster configurations, creates and manages failover clusters, and migrates some resource settings to a cluster running Windows Server 2008 R2.

Mobile Print Release

Mobile Print Release allows users to release held jobs directly from their mobile device (smartphone or tablet).

N

Novell eDirectory

Also called Netware Directory Services, Novell eDirectory is directory service software that is used to centrally managing access to resources on multiple servers and computers within a network. The eDirectory software is part of the Novell Compliance Management Platform.

O

offline policies

Offline Policies allow an Administrator to define PaperCut's behaviour when there is an outage that disrupts PaperCut normal operations. Offline policies include account selection policy (the default account to charge (default is "Offline account")), offline credit policy (whether to assume credit is available or to deny the job when the Application Server is unavailable), user authentication policy (the behavior in offline mode where PaperCut cannot validate the owner of the job), and User Password Authentication (whether user authentication is attempted during a network outage).

on demand user creation

By default, new users are created automatically when they print for the first time, authenticate via the User Client tool, or log in to the user web tools.

P

page-level color detection

If page-level color detection is enabled, PaperCut charges the color rate only for pages that actually contain color. For example, if a print job has 5 color pages (at 50c per page) and 5 Black and White pages (at 20c per page), then the user is charged $3.50. If page-level color detection is not enabled, the user would be charged 50c per page for all pages, whether they are color or Black and White.

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payment gateway

A Payment Gateway is an additional PaperCut component that allows users to transfer funds from an external source into their personal PaperCut account. Funds can be transferred from a wide variety of online payment sources, such as PayPal, Authorize.Net, RBS WorldPay or CyberSource, and many more. Alternatively, education organizations can use the payment gateway module to allow students to transfer small amounts of credit into their print account.

PDL transform

A Page Description Language (PDL) is a language used to describe the appearance of a printed page, for example, PostScript, Printer Control Language (PCL). A PDL transform is a process that defines how to convert an input into a different output. In PaperCut, transforms are defined as simple scripts

personal accounts

A personal account is the individual user's account that is charged by default. Each user has their own personal account.

physical identifier

A physical identifier is a network address or host name that identifies a printer's physical location.

PJL header

Attributes in a Printer Job Language (PJL) header define print job characteristics, such as duplex, color, paper sizes, or media trays. Many printers rely on a PJL header, though many attributes are printer/manufacturer specific.

popup authentication

Popup authentication involves matching the source IP address of the print job with the user confirmed to be operating from the popup client IP address. Authentication is provided by the PaperCut NG/MF client software in the form of a popup dialog requesting a username and password. To print with popup authentication the client software must be running on the workstations or laptops.

prepaid cards

A prepaid card is a card with a monetary value (for example, $5, $10, or $20) that can be purchased by users or distributed by administrators. The value of the card can then be loaded into a user's account for printing or purchases through Web Cashier. Prepaid cards are also known as Top-up cards, and are most commonly used in a school or university environment.

Print Archiving

PaperCut's Print Archiving stores an historic record of all printed content. This allows approved administrators to browse and review the content of past print jobs within their environment.

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print logger

Print Logger is a free print logging application for Windows systems designed to provide real-time activity logs detailing all printer use. Information tracked includes: the time of print, the name of the user who printed, the total number of pages, document names and titles, other print job attributes such as paper size, color mode and more.

print policy

Print policies allow you to remind users via popup to print duplex, route large jobs to dedicated high-volume printers, discourage users from printing emails, discourage printing web pages in color, and print policies can be implemented in PaperCut using advanced scripting.

Print Provider

A Print Provider is a monitoring service installed on a secondary print server to allow PaperCut to control and track printers. This monitoring component intercepts the local printing and reports the use back to the primary Application Server.

print queue

A print queue displays information about documents that are waiting to be printed, such as the printing status, document owner, and number of pages to print. You can use the print queue to view, pause, resume, restart, and cancel print jobs.

print server

A print server is a system responsible for hosting print queues and sharing printer resources to desktops. Users submit print jobs to a print server rather then directly to the printer itself. A print server can be a dedicated server but on many networks this server also performs other tasks, such as file serving

printer driver

A printer driver or a print processor is a piece of software that converts the data to be printed to the form specific to a printer. The purpose of printer drivers is to allow applications to do printing without being aware of the technical details of each printer model.

printer group

Printer groups allow administrators to tag or group printers by attributes. Group names are user definable and can represent any attribute appropriate for printer management. For example, you can group printers by printer type, location, make, function, owner, age, and so on. You can report by printer group and also send notifications per printer group.

Q

quota system

The quota system is a control mode that allows you to assign a “budget” on either a daily, weekly or monthly basis to user accounts. It is then the user’s responsibility to manage their own usage to stay within their allocated allowance. When the allowance is exceeded, access to the printing resources is denied. Some organizations allow users to request addi-

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tional quota with management approval, or to sell buy additional credit using TopUp Cards.

R

RDBMS

A Relational database management system (RDBMS) is a program that lets you create, update, and administer a relational database. Most commercial RDBMS's use the Structured Query Language (SQL) to access the database, although SQL was invented after the development of the relational model and is not necessary for its use.

Release Station

Print Release Stations place a print job on hold and allow users to release it when required. Often a Release Station is a dedicated PC terminal located next to the printers, however, Release Stations can take other forms such as a web browser based interface. Some common examples where Release Stations can be used include secure printing, approved printing, and authentication. In a secure printing environment jobs are only printed when the user arrives at the print area and confirms his or her identity. This ensures the user is there to collect the job and other users can't "accidentally" collect the document. In some organizations it may be appropriate to hold jobs until they are approved by selected individuals. A good example would be a teacher approving printing on an expensive color printer. Hold/Release queues can be used as a form of authentication in an unauthenticated environment. Users must authenticate prior to releasing their jobs allowing PaperCut NG/MF to confirm their identity.

restricted users

Restricted users are not allowed to print when their balance reaches zero, or if they have an overdraft, when the overdraft limit is reached.

restrictions

Restrictions are a type of print filter that ensures jobs meet certain criteria (denying those that don't). For example, you can restrict access to one or more printer, define a maximum number of pages allowed in a single job, or allow only duplex.

S

Samba

Samba is a Windows interoperability suite of programs for Linux and Unix. It is used to integrate Linux/Unix servers and desktops into Active Directory environments. It can function as both a domain controller or as a regular domain member.

secondary server

A PaperCut secondary server is a system that directly hosts a printer, that is, a print server with a Print Provider installed. A secondary server can be a server style system hosting many printers, a desktop style system hosting printer(s) also shared to other network users, or a desktop style system with the printer used only for local users (not shared).

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secure print release

Secure print release places print jobs in a holding state until the user authenticates and releases the job at the printer. This means sensitive print jobs will not sit uncollected on the printer.

server-command tool

The server-command program is a command line tool that accepts commands as arguments, and outputs the results of the command on the console (standard-out). This tool provides access to dozens of server operations ranging from user management, system maintenance, account manipulation and printer control. The server-command tool is ideal for controlling the Application Server via the command-line or for automation via scripts.

shared account

A shared account is an account that is shared by multiple users. For example, in business, shared accounts can be used to track printing costs by business unit, project, or client. Organizations like legal firms, engineering firms, or accounting offices often have long lists of accounts, projects, clients, or matters. In a school or university, shared accounts can be used to track printing by departments, classes, or subjects.

silent monitoring

In silent monitoring mode, all users have unrestricted privilege so printing access is never denied. Papercut silently collects statistics on activity and its associated cost. All data is reportable and available in the Admin interface. Silent monitoring mode is popular in a business environment where management needs information on user activity.

Site Server

Site Servers take over the role of a Primary Application Server in the event of network outages. Key roles taken over include authentication, copy and print tracking and Find-Me printing. Site Servers ensure continuous availability of printing resources to support key business functions over unreliable network links or during unplanned network disruptions.

SMTP

Simple Mail Transfer Protocol (SMTP) is the mechanism by which an email client program sends emails to an outgoing mail server (SMTP server) for delivery to the intended email address.

SNMP

Simple Network Management Protocol (SNMP) is a component of the Internet Protocol Suite as defined by the Internet Engineering Task Force (IETF). It consists of a set of standards for network management, including an application layer protocol, a database schema, and a set of data objects. Devices that typically support SNMP include routers, switches, servers, workstations, printers, modem racks and more.

spool file

A print spool file is generated when a user sends a document to a printer. The print spool stores the print job information, and sits in a print queue until it is retrieved and printed by a printer.

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SQL

Structured Query Language (SQL) is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS).

SSL

Secure Sockets Layer (SSL) is the standard security technology for establishing an encrypted link between a web server and a browser. This link ensures that all data passed between the web server and browsers remain private and integral. The protocol uses a third party, a Certificate Authority (CA), to identify one end or both end of the transactions. To be able to create an SSL connection a web server requires an SSL certificate. When you choose to activate SSL on your web server you will be prompted to complete a number of questions about the identity of your website and your company. Your web server then creates two cryptographic keys - a Private Key and a Public Key.

SSL certificate

SSL certificates are small data files that digitally bind a cryptographic key to an organization’s details, such as a company's domain name, your company name, your address, your city, your state and your country. When installed on a web server, it activates the padlock and the HTTPS protocol (over port 443) and allows secure connections from a web server to a browser. When a browser connects to a secure site it retrieves the site's SSL certificate and checks that it has not expired, it has been issued by a Certification Authority the browser trusts, and that it is being used by the website for which it has been issued. If it fails on any one of these checks the browser will display a warning to the end user letting them know that the site is not secured by SSL. SSL certificates can be either self-signed or CA signed.

SSL key

In typical public key infrastructure (PKI) arrangements, a digital signature from a certificate authority (CA) attests that a particular public key certificate is valid (i.e., contains correct information). An SSL key can be either a public key (can be disseminated publicly) or a private key (known only to the owner).

standard account selection popup

The standard account selection popup is a mode for the account selection popup that provides the basic features required to charge to shared accounts. It is ideal for sites with a small number of accounts.

T

time latch

Time latches allow a printer to be disabled for a predetermined amount of time. After the disable time has expired, the printer is re-enabled without the need for manual intervention.

TopUp cards

A Top-up card is a card with a monetary value (for example, $5, $10, or $20) that can be purchased by users or distributed by administrators. The value of the card can then be

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loaded into a user's account for printing or purchases through Web Cashier. Top-up are also known as Prepaid cards, and are most commonly used in a school or university environment.

U

universal driver

Manufacturer universal drivers are print drivers that work with multiple models across a single brand of MFP. They do not work across multiple brands.

unrestricted user

Unrestricted users are able to accumulate a negative balance, for example, their balance can go below zero, or if they have an overdraft, they can go beyond that.

up-front payment

Up-front payment is a control mode where users start off with a balance of zero and need to add money to their account before access to printing services is granted. Often TopUp/Pre-Paid cards (a voucher system) are used as a convenient way to manage the payment process.

User Client

The User Client tool is an add-on that resides on a user's desktop. It allows users to view their current account balance via a popup window, provides users with the opportunity to confirm what they are about to print, allows users to select shared accounts via a popup, if administrators have granted access to this feature, and displays system messages, such as the "low credit" warning message or print policy popups.

User web interface

The User web interface provide a range of services for users, including a summary of usage and balance history, a list of the shared accounts that the user can use for printing, the current costs for printing usage, ability to add balance by using a TopUp/Pre-Paid Card or an external payment system (when using the payment gateway module), transfer funds to other users, view a history of balance transactions, view a list of the user's recent printing, and view print jobs pending release (when using a Release Station).

V

Veritas Cluster Server (VCS)

Veritas Cluster Server (VCS) is a high-availability cluster software for Unix, Linux, and Microsoft Windows computer systems. It provides application cluster capabilities to systems running other applications, including databases, network file sharing, and electronic commerce websites.

virtual printer

A virtual printer is a printer driver that resembles the functionalities of a physical printer, but is not actually associated with one. Instead, a virtual printer sends its output to a file, normally in PDF format or in other image formats like JPEG, TIFF or PostScript. A virtual

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printer acts similarly to a physical printer in that it transforms an electronic document into a form that can be easily read by the target user or device. In PaperCut, virtual printers are used for Find-Me printing.

W

watermarking

Watermarking is a feature that allows you to print a small portion of text to the top or bottom margin of every page. Typical uses of watermarking include adding a username to the bottom of every page to help identify the owner, writing job metadata in the footer such as print time, printer or document name, and applying a digital signature to help track and verify documents.

Web Cashier

Web Cashier is a basic Point of Sale (POS) system to charge items to PaperCut accounts and deposit funds into users' accounts.

Web Print

Web Print enables printing from user-owned devices without the need to install printer drivers and manage server authentication.

web services

Web services are a standardized way of integrating Web-based applications using the XML, SOAP, WSDL and UDDI open standards over an Internet protocol backbone.

Windows Live Tile

The Windows Live Tile allows you to pin the Environmental Dashboard to the Windows Start screen to create a dynamic Live Tile. This Live Tile will communicate over 20 user-specific facts, awards and challenges all generated from real-time PaperCut data.

winpopup

Winpopup is a network program for Windows that allows you to send messages from one computer to another on the same network. You do not need to have Internet connectivity to use this feature. When sending PaperCut notifications via winpopup (also known as Net send), you can choose to send notifications either to the user or the workstation.

workgroups

Workgroup is Microsoft's term for peer-to-peer local area network. Computers running Microsoft operating systems in the same workgroup can share files, printers, or Internet connection. Workgroup contrasts with a domain, in which computers rely on centralized authentication.

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