Windows Maintenance

Windows Maintenance Instructions

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Browsers

Clear Web Browser's Cache

Before you begin

Clearing your web browser's cache, cookies, and history may remove data such as the following:

- Saved passwords
- Address bar predictions
- Shopping cart contents, etc.

While you should clear your web browser's cache, cookies, and history periodically in order to prevent or resolve performance problems, you may wish to record some of your saved information first. If you are unable to do so, see Troubleshooting alternatives below.

> **„ Notes:**
> - For desktop browsers, to quickly open menus used to clear your cache, cookies, and history, ensure that the browser is open and selected, and press `Ctrl-Shift-Delete` (Windows) or `Command-Shift-Delete` (Mac). If this doesn't work, follow the appropriate instructions below.
> - If the instructions below don't exactly match what you see, you may need to update your web browser to the latest version.

If you don't see instructions below for your specific version or browser, search your browser's Help menu for "clear cache". If you're unsure what browser version you're using, from the Help menu or your browser's menu, select About [browser name]. In Firefox, if you don't see the menu bar, press `Alt` .

Desktop browsers

Microsoft Edge

Important:

Microsoft Edge Legacy support ended on March 9, 2021. If you still have Edge Legacy, UITS recommends installing the new Chromium-based Microsoft Edge by running Windows Update.

1. In the top right, select the Hub icon (looks like star with three horizontal lines).
2. Select the History icon (looks like a clock), and then choose Clear all history.
3. Select Browsing history, then Cookies and saved website data, and then Cached data and files. Select Clear.
4. After the "All Clear!" message appears, exit/quit all browser windows and re-open the browser.

Chrome

1. In the browser bar, enter:

   chrome://settings/clearBrowserData

2. At the top of the "Clear browsing data" window, select Advanced.
3. Select the following:
   - Browsing history
   - Download history
   - Cookies and other site data
   - Cached images and files

   From the "Time range" drop-down menu, you can choose the period of time for which you want to clear cached information; *to clear your **entire cache***, select All time.
4. Select CLEAR DATA.
5. Exit/quit all browser windows and re-open the browser.

Firefox

1. From the History menu, select Clear Recent History....
   If the menu bar is hidden, press Alt to make it visible.
2. From the "Time range to clear:" drop-down menu, select the desired range; to clear your entire cache, select Everything.
3. Next to "Details", select the down arrow to choose which elements of the history to clear; to clear your entire cache, select all items.
4. Select Clear Now.
5. Exit/quit all browser windows and re-open the browser.

Opera

1. From the Opera menu, select Settings, then Privacy & Security, and then Clear browsing data....
2. In the dialog box that opens, from the "Obliterate the following items from:" drop-down menu, select The beginning of time.
3. Select the following:
   - Browsing history
   - Download history
   - Cookies and other site data
   - Cached images and files
4. Select Clear browsing data.
5. Exit/quit all browser windows and re-open the browser.

Safari 8 and later

1. From the Safari menu, select Clear History... or Clear History and Website Data....
2. Choose the desired time range, and then select Clear History.
3. Select Safari > Quit Safari or press Command-Q to exit the browser completely.

Mobile browsers

Android

The steps to clear your cache, cookies, and history may differ depending on the model of your Android device and your preferred browser, but you should be able to clear your cache and data from your application management settings menu:

1. Go to Settings and choose Apps or Application Manager.
2. Swipe to the All tab.
3. In the list of installed apps, find and select your web browser. Select Clear Data, and then Clear Cache.
4. Exit/quit all browser windows and re-open the browser.

Chrome for Android

1. Select Chrome menu, then Settings, and then (Advanced) Privacy.
2. From the "Time Range" drop-down menu, choose All Time.
3. Check Cookies and Site data and Cached Images and Files. Select Clear data.
4. Exit/quit all browser windows and re-open the browser.

Safari for iOS

1. Open your Settings app.
2. Select Safari.
3. Select Clear History and Website Data and confirm.
4. Exit/quit all browser windows and re-open the browser.

Chrome for iOS

1. Select Chrome menu, then Settings, and then Privacy.
2. Select Clear Browsing Data.
3. Choose the data type you want to clear, and then select Clear Browsing Data.
4. Exit/quit all browser windows and re-open the browser.

Change your display refresh rate in Windows

widnows-multiple-monitors-guide.png

The refresh rate of a display is the number of times per second that the image refreshes on the screen. For example, a 60Hz display will update the screen 60 times per second.

Overall, the refresh rate determines how smoothly motion appears on your screen. For example, if you're playing a game that has a lot of fast-moving action, a higher refresh rate can help improve your overall gaming experience to keep up with the action. A higher refresh can also help you get a better experience with smoother motion when you're browsing the web or using a digital pen to write or draw.

A higher refresh rate can also reduce battery life because it uses more power. So if you're using a laptop or tablet and want to save some battery, you could lower the refresh rate. However, that might also reduce the overall experience when you're using your device.

Windows 10

To change the refresh rate in Win 10

1. Select the **Start** button, then select **Settings** > **System** > **Display** > **Advanced display settings**.

2. Under **Refresh rate**, select the rate you want.
   The refresh rates that appear depend on your display and what it supports. Select laptops and external displays will support higher refresh rates.

To change the refresh rate in Win 11

1. Select **Start** > **Settings** > **System** > **Display** > **Advanced display** .
2. Next to **Choose a refresh rate**, select the rate you want.
   The refresh rates that appear depend on your display and what it supports. Select laptops and external displays will support higher refresh rates.

> **Note:**
> You might see the word "**dynamic**" next to some refresh rates that are listed. **Dynamic** refresh rates will increase the refresh rate automatically when you're inking and scrolling, and then lower it when you're not doing these types of things. This helps to save battery and provide a smoother experience.

> Please **DISABLE dynamic refresh rate**.
> Dynamic refresh rate will interfere with displaying images on the Smartboards

How to change audio playback medium in Windows

Windows 10

To change the Default Audio Device, do the following.

1. Click on the sound volume icon in the system tray.
2. Click on the up arrow in the sound flyout.

Windows 10 Sound Flyout 1
Image could not be found.

3. Choose the desired audio device from the list.

Windows 10 Sound Flyout 2
Image could not be found.

Export drivers from Windows

image.png
The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

image.png
Image not found or type unknown

PowerShell – Export drivers from Windows

You can easily export drivers from Windows OS using PowerShell. Using the Export-WindowsDriver cmdlet, you can export all third-party drivers from a Windows image to a destination folder.

The advantage of exporting the drivers is you can restore them when you require. Once you perform Windows 10 clean install, with this backup you can quickly install all the necessary drivers. In addition, if you deploy OS using MDT, you can always import the drivers and use it to deploy using [Configuration Manager](#).

The `Export-` `WindowsDriver` cmdlet exports all third-party drivers from your computer to a destination folder. You can either export drivers from the running operating system or export drivers from an offline image.

Export-WindowsDriver Parameters

There are [several parameters](#) which you can use while running Export-WindowsDriver cmdlet. Some of the parameters include:

- **-Destination** – Specify a folder or directory where you want to export third-party drivers.
- **-Loglevel** – Specifies the maximum output level shown in the logs.
- **-LogPath** – You can log the export process by adding the log file name and path.
- **-Path** – Specifies the full path to the root directory of the offline Windows image that you will service.
- **-WindowsDirectory** – Enter the relative path to the Windows directory relative to the image path.
- **-SystemDrive** – Specifies the path to the location of the BootMgr files.

- **-ScratchDirectory** – Specifies a temporary directory that will be used when extracting files for use during servicing.

PowerShell – How to Export drivers from Windows

To export drivers using PowerShell from Windows 10

- On your Windows 10, right click Start and click Windows PowerShell (admin).
- Enter the command `Export-WindowsDriver -Online -Destination D:\Drivers`. The D:\Drivers is the folder where all of your computer's third-party drivers will be exported.

PowerShell – Export drivers from Windows

Administrator: Windows PowerShell PS C: Export-WindowsDrivet' -Online -Destination D: \Drivers rive
Image not found or type unknown

Now go to the destination folder and you will see the folders containing the drivers.

So next time when you install Windows 10, you don't need to go to vendors website and search for drivers. With this backup you can quickly install all the necessary drivers.

And finally let me clarify the use of the below two commands.

- Export-WindowsDriver –Online -Destination D:\Drivers – Use this command to export the computer's third-party drivers to destination folder.
- Export-WindowsDriver -Path C:\Windows_Image -Destination D:\Drivers – Use this command when you want to export drivers from the offline Windows image mounted to destination folder.

How to Delete a User Profile on Windows

The first time a user logs in on a Windows computer, a user profile is created and stored on the local hard disk. This profile contains all settings, from wallpaper to email details and network connections. If you've created multiple user profiles on your PC over time, this tutorial shows how to delete a user profile on Windows that is no longer needed.

1. Advanced System Properties

The easiest way to delete an unnecessary user profile is by accessing the Advanced System Properties on your Windows PC.

Press `Win` + `R` on your keyboard to launch the Run dialog, type `systempropertiesadvanced` in the box, and click "OK."

Typing command in Run window.
Image not found or type unknown

In the "Advanced" tab, click the "Settings" button under "User Profiles."

Clicking "Settings" button under "User profiles" in System Properties.
Image not found or type unknown

From the list of user profiles stored on your Windows computer, select the one you don't need, and click the "Delete" button.

image.png
Image not found or type unknown

Click "Yes" in the confirmation dialog that pops up on your screen.

Clicking "Yes"" in "Confirm Delete" pop-up.
Image not found or type unknown

The user profile has now been successfully deleted from your computer.

Tip: experiencing [issues with the Settings app on Windows](#)? Check out the most effective solutions for this problem.

2. Settings App

You can also delete a user profile and all of its associated data from your Windows PC by using the Settings app.

Click the Start button, and launch the Settings app.

Clicking Start menu and selecting the Settings app.

Click "Accounts" in the left pane, scroll down and click "Other users" in the right pane.

Clicking on "Other users" under Accounts in Settings.

You will see a list of other users accessing your computer. Click the arrow next to the user profile that you want to delete.

Selecting user profile for deletion in Windows Settings.

4. Click the "Remove" button.

Clicking "Remove" button next under specific user profile in Windows.

Click "Delete account and data," and you're done.

Pressing on "Delete account and data" button to complete process.

3. Registry Editor

If you prefer, you can also delete a user profile from Windows through the Registry Editor. Make sure you [create a backup of the registry](#) before you proceed, in case something goes wrong during the process.

Press `Win + R` to launch the Run utility, then type `regedit` in the box, and click "OK."

Typing "regedit" in Run dialog to launch Registry Editor.

Navigate to the following path on the Registry Editor:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\ProfileList
```

Navigating to location in Registry Editor.

In the left pane, you'll find multiple keys under the ProfileList folder. Click each subfolder one by one. In the right pane, find the path to the profile you wish to delete in the "Data" field for the "ProfileImagePath" key. In this example, we're looking to remove the "vritr" user.

Right-click the ProfileImagePath key associated with the user profile you are looking to eliminate and select "Delete."

Deleting key associated with specific user profile in Registry Editor.

Click "Yes" in the confirmation dialog to remove the user profile from your Windows computer.

Pressing "Yes" on "Confirm Value Delete" window.

4. PowerShell

With PowerShell, you can do all kinds of things, including deleting user profiles, as shown in the steps below:

Press `Win + X`, and click "Terminal(Admin)" to launch PowerShell.

Opening Terminal(Admin) app from WinX menu.

Type the below command, and press `Enter` to view the list of user profiles on your computer. Make a note of the user profile you want to remove from your PC.

```
Get-LocalUser
```

Typing command in PowerShell.

To delete a specific user profile, use the below command, followed by `Enter`. Replace <userprofilename> with the name of the user profile you want to delete from your Windows computer.

```
Remove-LocalUser -Name <userprofilename>
```

Since you won't see a success message for the above command, you can use the same command in step #2 to verify whether the user profile was deleted.

Inputting commands in PowerShell.

5. File Explorer

You can also delete a user profile and its data on a Windows PC via the File Explorer app, but make sure you are logged in as an administrator before you attempt to do so.

Press `Win + E` to launch File Explorer and click "This PC" in the left pane.

Clicking "This PC" in File Explorer.

Double-click "Windows (C:)" under "Devices and drives."

Double-clicking (C:) to access the drive.

Click on the "Users" folder.

Selecting the "Users" folder in "C:\.""

Select the name of the user profile you wish to delete, and press the `Del` key on your keyboard to delete the user profile from your Windows PC.

Selecting user profile for deletion via File Explorer.

FYI: [are you frequently encountering problems with the File Explorer app](#)? Check out the most effective solutions.

Cleaning Up Your Windows PC

While deleting inactive user profiles will not significantly [free up storage on your "C:\" drive](#), learn additional methods to recover free space. If you've encountered the "[User profile service failed the sign-in](#)" error message, try to delete the user profile and create a new one.

How to Fix the "User Profile Service Failed the Sign-in" Error for Windows

Are you getting the "User Profile Service failed the sign-in" or "User profile cannot be loaded" error during Windows startup? This message is shown as soon you type your password in the Windows logon screen, and your default user profile fails to launch. In its place, a corrupt user profile takes over, changing your lock screen and desktop background. Because the proper profile wouldn't load, you're unable to log in to your system. If you're facing this frustrating issue, one of our solutions below will resolve it immediately.

Causes of "User Profile Service Failed the Sign-in" Error

There are many reasons you may encounter the "User profile failed the sign-in" error. Variations of this error include: "User profile cannot be loaded" and "User profile service failed the logon." If you get any of these error messages, it means the default Windows user profile has been corrupted, which can be traced to one or more of the following factors:

- **Improper Windows update:** User Account Control (UAC) is designed to prevent unauthorized changes to your Windows device. Any irregular or unfinished updates or a crash can sometimes corrupt host files that are required for UAC to work properly.
- **Partition resizing error**: when resizing partitions from Disk Management, those parts can occasionally get corrupted, leading to an incorrect user profile.
- **Antivirus program**: if an [antivirus program](#) was scanning your system while you tried to log in, it can abort the correct user profile and launch an incorrect one.
- **Improper shutdown and restarts in guest logons**: if you did not exit smoothly from a local account created on your PC, you may encounter a user profile error on a subsequent login.

Solutions for User Profile Service Failed the Logon Error in Windows

The good thing is that none of the above causes are major concerns. You can easily repair the corrupted user profile using one of the troubleshooting solutions below.

You should first attempt the first few easy methods. Go for the more intricate and time-consuming solutions toward the end – only if the easy ones fail to resolve the problem.

1. Restart or Shut Down Windows From Its Lock Screen

Sometimes you only need a simple restart or shutdown from the lock screen window to fix the issue.

1. Whether you're inside an administrator or guest logon, use `Win + L` to exit, and go to the Windows lock screen.
2. Navigate to the administrator profile (if a guest profile was previously used to log in), and click the lock screen shutdown/restart options. Make sure you log in as the administrator during the subsequent startup. We can help if you need to [reset your administrator password](#).

Logging out of local account on Windows.

2. Delete a Local User Account in Windows

If the user profile error is due to improper shutdowns and restarts during a guest logon, you may want to delete the unnecessary local account temporarily.

1. After signing in to your computer on an incorrect user profile, start the Windows Run command option using `Win + R`, and enter `netplwiz`.

   Typing "netplwiz" command in Run window.

2. You will encounter the Advanced User Accounts Control Panel screen. Enter your administrator password to proceed. Sometimes there will be an error if the system refuses to accept your admin password. In that case, use the Windows Safe boot to perform these steps. (Described in the FAQ below.)

   UAC prompt to type administrator password.

3. Click the "Remove" option next to your guest/local account. Even if you're currently logged in on your computer with the local account, the local profile here will be removed.

   Removing local account via User Accounts window.

4. Use `Win + L` to exit the local account logon window.
5. Restart the computer, and make sure to [use your regular Microsoft account to log back in](#).

3. Move NTUSER.Dat File to Default Username Folder

A user profile consists of personalized menu items for desktop, downloads, documents, music, videos, and saved links that are stored in a folder inside "C:/Users."

For each of these profiles, a .DAT file called NTUSER.DAT is created by Windows. It contains personalized user settings. Try moving the file associated with the buggy profile to a default username folder.

1. Go to the necessary local account inside "C:/Users," and press `Ctrl + X` to cut the NTUSER.DAT file for that account.

Locating NTUSER.DAT file under Users in "C:/."

2. Move the .DAT file into the "Default" username folder. You may not be able to see this folder. If so, change the "View -> Show" to "Hidden items" in File Explorer.

Accessing "View" menu in File Explorer to show hidden files.

3. Delete the local account folder, and restart the PC to see whether the proper user profile is loading.

Tip: did you know that you can [perform a Windows Defender scan from Command Prompt](#)? We demonstrate how in our guide.

4. Windows User Profile Repair Using Command Prompt

The evergreen Command Prompt can fix some of the hard disk-related issues that may have caused the user profile error problem.

1. Go to Start, and search for "Command Prompt." Select "Run as administrator" under the result.

Typing "command prompt" via the Start menu.

2. Perform a Deployment Image Servicing and Management Tool (DISM) scan, which helps repair the Windows image and may solve the user profile services error.

```
DISM.exe /Online /Cleanup-image /scanhealth
```

Running DISM scan via Command Prompt.

3. Likewise, a System File Checker (SFC) command is the best way to repair corrupt Windows files, including user profile settings.

```
sfc /scannow
```

How To Fix User Profile Service Failed Error View Sfc

Tip: the [WDF violation error](#) can sometimes arise on your Windows PC. Learn what to do about it.

5. Use Windows Registry Editor in Safe Mode

The Windows Registry Editor (Regedit) is one of the best solutions to fix the "User profile service failed the sign-in" error. For this, the troubleshooting is achieved in Safe mode.

1. In Windows 11, go to "Advanced startup" from the Search menu. For Windows 10, the corresponding option is "Change advanced startup options."
2. Click "Restart now" to initiate an advanced restart.

   Clicking "Restart now" under Advanced startup in Recovery.

3. Select "Troubleshoot" on the blue screen.

   Clicking "Troubleshoot" in recovery environment.

4. Go to "Advanced options -> Startup settings," and initiate another restart of the device.

   Clicking on "Startup Settings" via Advanced options.

5. Following the restart, you will see a number of startup settings that can be accessed using the number keys (1-9) or function keys (F1-F9). Select the option to "Enable safe mode."

Selecting "Enable Safe Mode" option in Startup Settings.

6. Once you sign in, you will enter Windows in Safe Mode. Very minimal options are visible in this mode.
7. Start the Windows Run command option using `Win + R`, and enter `regedit`. This task will be automatically created with administrator privileges.

Typing "regedit" in Run window.

8. Navigate to the following path in the Registry Editor:

```
Computer\HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\ProfileList
```

9. Check the last few entries under "ProfileList" to see whether there are any duplicates, e.g., the entries have similar names, but at least one will contain a .BAK file. This extension will appear at the end of one of the items in the "Name" column. For instance, if you open one of the ProfileList folders, you may see .BAK after any of the values listed. If you don't see anything with this extension, skip to the bottom of the section.

Checking ProfileList key in Registry Editor.

10. If you do have a value with the extension, and it's present in the last entry, rename the .BAK extension to just .BA. For any duplicate entry, rename it to something else, but keep the .BAK extension. Delete any surplus .BAK extensions, if present, for duplicate entries.
11. Delete the .BA extension in the entry that was just renamed.

ProfileList keys view in Registry Editor.

12. Right-click and modify the State key of the profile entry from where the .BAK was removed. Basically, we are switching the active default user profile through a minor registry tweak.

Modifying key in Registry Editor.

13. Change the hexadecimal DWORD value from a numerical value to "0." Click "OK" to save the settings.

Changing DWORD value via Registry Editor.

14. Restart the PC in normal mode.
15. The "User profile service failed the logon" error should be gone once you log in again.

No .BAK File?

If you don't have a .BAK file, see the workaround below.

1. Open File Explorer, and navigate to "C:\Users\Default\AppData\Local\Application Data"

2. If you see another folder inside this one named "Application Data," delete it, and restart your computer. If you don't have an Application Data folder at all, this fix will not apply.

FYI: wondering [when you should use Command Prompt over Powershell and vice versa](#)? We highlight the differences.

6. Restart the User Profile Service

Occasionally, third-party software and apps stop the User Profile service from running, resulting in this error. Restart it using Command Prompt:

1. Open Command Prompt, and run it as an administrator as shown above.
2. Enter the following command, and press `Enter`:

```
sc config ProfSvc start= auto
```

Running command in cmd.

3. At the next prompt, enter the following command, and press `Enter`:

```
sc start ProfSvc
```

Running a "sc start" command in cmd.

4. Restart your computer to fix the error.

5. If these commands won't run, try restarting your PC in Safe Mode, then performing the above.

6. If another app or program has changed the status of this service, it may continue to stop. To ensure it starts automatically with Windows, open a Run dialog window, and type `services.msc`.

Typing "services.msc" in Run window.

7. Scroll until you see "User Profile Service."
8. If it doesn't say "Automatic" under the "Startup Type" column, right-click "User Profile Service," and select "Properties."

Selecting "Properties" for "User Profile Service" in Services app.

9. Change "Startup Type" to "Automatic," and click "Apply" to save the changes. You may need to restart your PC to log in correctly.

Setting "Startup type" to "Automatic" in "User Profile Service" properties.

7. Reset Windows PC

If all the above options fail, use the "Reset" option to go back to a clean factory reset of your Windows operating system. You have to be connected online to achieve this cloud-based reset.

The [Windows 11 reset method](#) has been covered in detail, but the essential steps, which are common with Windows 10, too, are summarized below:

1. Go to "System -> Recovery -> Reset this PC," and click "Reset PC."
2. Choose "Keep the files" or "Remove everything." Choose the former option so that you don't need to save a backup. It's still a good idea to back up your files, just in case anything goes wrong.
3. Select the "Cloud download" option to reinstall your version of Windows. The download will take some time to finish.
4. Once you see the "Ready to reset the PC" screen, click "Next" to proceed.
5. Sit back and wait for the reset to finish, as the download will take some time. The entire procedure can consume anything from a few hours to an entire day, so we recommend the reset method only if the other methods don't solve the problem.

Tip: should you opt for a [cloud download or local reinstall](#) when performing a Windows reset? We explain the differences in our post.

Frequently Asked Questions

How do I fix the "User profile failed" error during sign-in for Windows 8/8.1 and Windows 7?

If you're using an older Windows version, such as 8.1/8/7, only a few of the above-described solutions will be able to address the user profile error. You can try a restart, use a DISM and SFC scans in Command Prompt, and move the NTUSER.DAT file to a default folder. The options to delete a local user account and enable a cloud-based reset will not work.

How do I solve the "We can't sign in to your account" error while restarting the User profile service?

Sometimes, while restarting the user profile service in guest/local account mode (Section 6), you're unable to sign in to your Administrator account. To solve the problem, boot into your Windows device in Safe Mode, and perform the same steps outlined in section 2. Then, repeat the steps from Section 6 to restart the User Profile Service.

Can other software or Windows updates interfere with the User Profile Service?

Sometimes it can. If you start getting this error the next time you sign in after installing something new, try uninstalling the new software to see whether that fixes the problem.

If your PC recently installed updates, try uninstalling them and updating again. Go to "Start," and search for "Windows updates." Select "Update history" and "Uninstall updates" under the list of recently installed updates. Select what you want to uninstall, and restart your PC.

Image credit: [Freepik](). All screenshots by Crystal Crowder and Sayak Boral.

Is this post useful?

Windows Protected Print Mode (WPP)

info icon
image not found or type unknown

Should I switch on WPP now?

Not yet! PaperCut is actively working on a solution to support printing with Windows Protected Print Mode. Sign up for early access through our [Percolator program](#).

What is Windows protected print mode?

Windows protected print mode (WPP) is a security-enhanced printing platform for Windows that runs with lower privileges and uses Internet Printing Protocol (IPP) to eliminate the need for third-party drivers. Together, these remove significant security risks that can lead to attackers gaining SYSTEM-level access.

Whether you're an IT manager, security professional, or business owner, understanding the impact and benefits of WPP is essential as it changes the landscape of print infrastructure. This page provides a comprehensive overview of WPP, its timeline, and how your organization can prepare for and benefit from this powerful security feature.

Why Microsoft is introducing Windows Protected Print Mode

[According to Microsoft](#), 9% of Windows security issues reported to the Microsoft Security Response Center (MSRC) were caused by print stack-related issues. The fact that the spooler runs with system privileges and has to load code over the network makes the entire operating system vulnerable to malware.

[Print Nightmare](#) allowed hackers to exploit this vulnerability to install programs remotely, view and delete data or even create new user accounts with full user rights. Another spooler-related weakness was exploited by the Stuxnet virus, which was used as a digital weapon to [gain remote access to the computers](#) that controlled centrifuges at an Iranian uranium enrichment plant. This allowed the attackers to configure the fast-spinning centrifuges to tear themselves apart.

Print Nightmare patches are a temporary workaround that now requires admin rights to install printers. The admin rights requirement only protects a shared computer, where one user might have installed a printer driver with malware that would compromise others on the computer too. This change doesn't fix the spooler privilege issue that is exploitable by a driver with malware, and it introduces user experience issues by forcing admin privileges just to install printers.

The proper solution is Windows Protected Print Mode, as it removes the fundamental flaw of drivers and moves the world of printers forward to finally settle on the IPP standard. At PaperCut, we support Microsoft's decision, even though it will cause some adoption friction.

As an aside, Windows isn't the only operating system plagued by a vulnerable print platform. CUPS, used in Linux, macOS, and ChromeOS, also has a long history of security issues. In September 2024, new reports showed how it is [possible to remotely execute code on a Linux computer](#) without requiring authentication. Some Linux distributions, like Ubuntu, are planning to limit access to the rest of the operating system by moving CUPS into a containerised Snap App.

How Windows Protected Print Mode works

WPP uses modern standards and secure communication methods to ensure a robust and consistent printing experience. Here are some of the key details.

1. Printer and job delivery is based on Internet Printing Protocol (IPP)
   - WPP uses IPP as the core transport protocol - a well-established, open standard that provides a framework for printer discovery, job submission, and status tracking.
   - IPP allows WPP to support advanced features such as finishing options, job status updates, and access control, enabling a richer printing experience.
   - The port monitor used when adding a WPP print queue is Microsoft's new IPP port, which provides a richer set of IPP functions.
2. No more third-party printer drivers and modules
   - WPP forces a driverless printing model. When it's enabled, client computers can no longer load third-party printer drivers, eliminating the risk of attackers loading malicious code.

- In addition to the printer drivers, the loading of other, less well-known modules, such as third-party [print providers](#), is blocked.
- WPP prevents Point and Print from ever installing third-party printer drivers. This eliminates the risk of an attacker pretending to be a printer and tricking users into installing malicious software.

3. Common print spooler tasks are now run at lower privilege level
   - Since the drivers are no longer required to run as SYSTEM, most common spooler tasks can now run as USER.
   - This reduces the risk of a rogue or a buggy program taking down the whole machine. The impact will be limited to actions only the user can perform.

The challenges of transitioning to Windows Protected Print Mode

When you switch on Windows Protected Print Mode, the existing print queues and drivers on the computer will be permanently deleted. You won't get them back if you decide to switch WPP off. It is an all-or-nothing setting.

You can't use a driver for some printers while using Windows Protected Print Mode for others. If WPP is enabled, print drivers are nonexistent.

Not all printers are equal. Based on a sample of thousands of printer models we assessed, roughly 70% of printers will work seamlessly over IPP. For the rest, they will either function with reduced speed, lower quality or not at all.

Existing scripts that system admins may have in use, such as [printui](#) scripts to manage printers, won't work anymore.

How enabling WPP will affect organizations and their print infrastructure

To understand how enabling Windows Protected Print Mode might affect organizations, let's use a hypothetical scenario:

info-green-icon
image green icon type unknown
Info

"

The university IT administrator's dilemma

Alex, the lead IT administrator at a mid-sized university, heard about WPP during a recent security conference.

The idea of having a more secure, driverless printing environment using the Internet Printing Protocol (IPP) sounded like a great way to tighten the university's security. With hundreds of devices across different departments, ensuring that no vulnerabilities could be exploited through outdated drivers or unmonitored print processes seemed like a major win.

Eager to implement WPP, Alex decided to enable it across the university's network, confident that this would reduce risks and future-proof the printing setup. The change went live during a routine maintenance window, with IT teams monitoring performance and response.

However, as the next day began, emails started flooding in from staff and students across campus. The university's fleet, consisting of older and newer printers, faced a serious issue: **30% of the printers weren't working!** Despite being reliable for everyday use, they weren't Mopria compliant and/or IPP-compatible.

The Issues staff and students were experiencing

1. Printer Recognition Problems: Some of the older printers weren't showing up in Windows' printer lists anymore and attempts to manually add printers were failing with error messages "can't add"
2. Loss of Features: Other printers were partially working, but features like stapling, colour management, and even advanced security protocols like pull printing were no longer functional. This disrupted the workflows of departments that relied heavily on advanced printing tasks.
3. User Frustration: Professors were missing critical deadlines to print exams, and research departments couldn't print their reports. The more Alex's team tried to patch things up, the more they realised the

> issue was systemic: these printers did not support IPP and were reliant on specific drivers that WPP no longer allowed.
>
> ## Lessons learned
>
> In retrospect, Alex realized that turning on WPP without fully assessing the fleet was premature. **While the security benefits were undeniable, it required careful planning and implementation.**

Will my printer work with Windows Protected Print Mode?

Mopria has an [online list of certified printers](#) you can use to check your printer models.

Although a printer could be listed as Mopria-certified, it doesn't necessarily mean it will work with WPP or that you will get the most out of your printer once you switch over to using IPP in WPP mode.

At the time of writing, Windows Protected Print Mode deems some IPP attributes mandatory, even though they are technically specified as optional according to Mopria standards, such as the hardware ID. Additionally, WPP requires some IPP values to be in a specific format that some printers do not follow.

Some printers that support IPP don't necessarily support PDF-based spool files; instead, they only support formats like URF/raster or JPEG. This still follows the specification, but these spool files will be much larger and often print in lower quality. In addition to being larger, these formats require the entire print job to be submitted to the printer before the printer can start printing them, which results in slower printing or even failure to print larger documents as the printer can't store the entire print job.

For now, the best way to confirm that your printer is ready for WPP is to enable WPP on a test Windows machine and print from it. If your printer can't be found when WPP is enabled, you know it's incompatible.

Check different finishing options, especially more advanced options like stapling and tray selection if the printer supports it.

Options for printers that are non-compliant with Windows Protected Print Mode

We are making changes in PaperCut MF/NG and PaperCut Hive/Pocket to support printers that are WPP ready and also printers that are not WPP ready. You can [sign up for PaperCut MF/NG Early Access](#) now. PaperCut Hive/Pocket Early Access registrations will open in November.

Alternatively, if your printers are not ready, your printer manufacturer may soon provide a firmware update if your printers are not too old, so keep an eye out.

How to switch on Windows Protected Print Mode

Enable WPP mode via Settings

How to enable WPP on your computer
1. Navigate to Settings > Bluetooth & devices > Printers & scanners > Printer preferences

papercut WPP navigate to Settings > Bluetooth & devices > Printers & scanners > Printer preferenc

2. Click 'Set Up'. Windows will display a warning message.

papercut WPP Click Set Up Windows will display a warning message.

3. Additionally, if WPP-incompatible print queues (such as standard TCP/IP queues) were already installed, Windows would warn that they would be removed.

papercut wpp warning

4. After successful completion, WPP should be turned on.

papercut WPP should be turned on

Enable WPP mode via Group Policy

Via Group Policy Editor > Administrative Templates > Printers > Configure Windows protected print > Edit

papercut wpp group policy approach

Timeline and updates

Note that these dates are subject to change:

01 OCTOBER 2024

When you enable Windows Protected Print Mode for the first time after the 24H2 upgrade, the existing incompatible (such as TCP/IP) queues may not get deleted. Also, you may still be able to create TCP/IP print queues. A system reboot may fix the issues. This is a known issue, and Microsoft is working on fixing it.

04 OCTOBER 2024

Microsoft is pushing the patch [KB5043178](#) to fix Windows protected print anomalies soon. The estimated rollout date is 8th October.

NOVEMBER 2024

First PaperCut MF/NG Windows Protected Print Mode release planned.

JANUARY 2025

First PaperCut Hive/Pocket Windows Protected Print Mode release planned.

2027

Windows Protected Print Mode is enabled by default.

Further reading

- The official [Microsoft Windows Protected Print Mode announcement](#)

- [More from Microsoft about WPP](#)

- Microsoft's [Windows protected print mode FAQ](#)

How to Login to a Company Computer for the First Time - Active Directory

Follow these steps to log in to your computer for the first time after joining the company:

Step 1: Get Your Login Details

- **Username**: Provided by IT (e.g., `jdoe`). This is what you use to log in to your computer.
- **Temporary Password**: A one-time password provided by IT for your first login.
- **Email Address**: Separate from your username, used for communication (e.g., `yourname@companydomain.com`).

Step 2: Turn On the Computer

1. Power on your computer and wait for the login screen to appear.
2. Make sure the device is connected to the company network:
   - **At the office**: The computer will usually connect automatically.
   - **Working remotely**: Connect to Wi-Fi or an Ethernet cable.

Step 3: Log In

1. **Click Other User:**
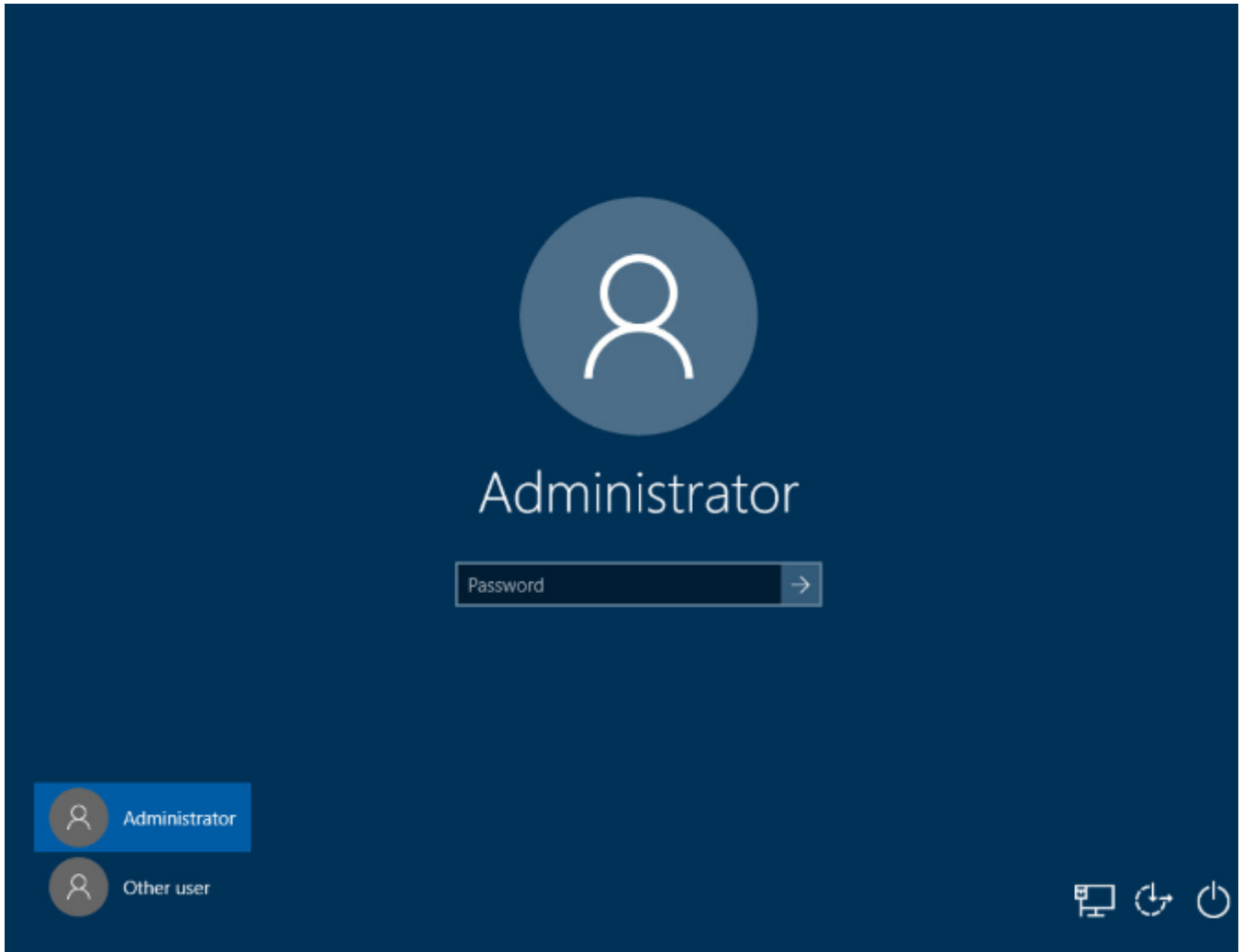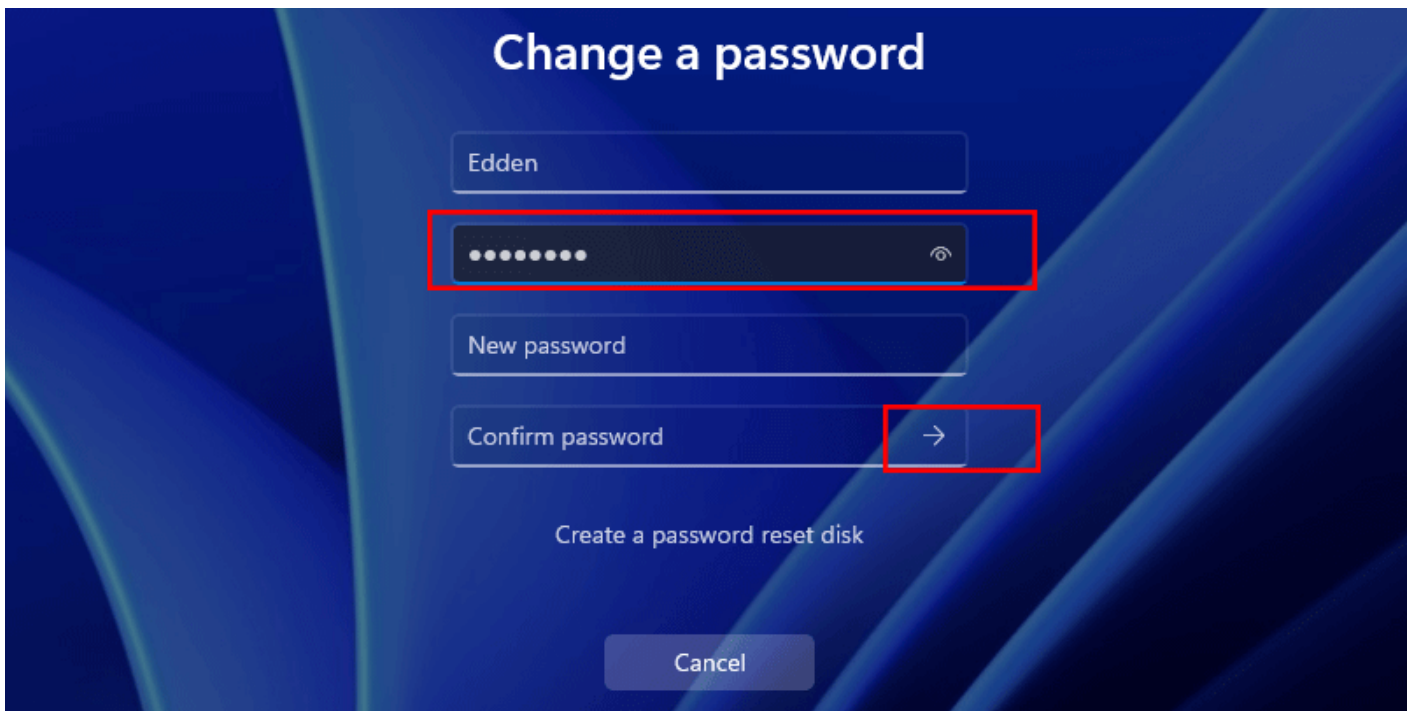

2. **Enter your Username**:
   - Use the username provided (e.g., `jdoe`). Do not include "@companydomain.com".
3. **Enter your Password**:
   - Use the temporary password provided by IT.
4. **Change Your Password**:
   - You will be prompted to create a new password. Choose one that meets company security standards:
     - Use a mix of uppercase, lowercase, numbers, and symbols.
     - Example: `SecurePass2024!`.

Step 4: Confirm Access

- After logging in:
  - Ensure you can access your desktop.
  - Open tools like email, shared folders, or other company applications to confirm everything works.

Step 5: Get Help if Needed

- If you experience issues:
  - Double-check your username and password.
  - Ensure your computer is connected to the network.
  - Contact IT for assistance.