# Operating System Management

# Operating System Management Tasks

The common management tasks that an operating system perform include:

- File Management
- User Management
- Memory Management
- Process Management
- Device Management
- Security Management
- User Interface Management

# File Management

The operating system is responsible for maintaining the file system. The tasks include:

- Find, move, edit and delete files
- Inspect files to find out their properties (e.g. creation date, size, type)
- Organize files into a series of folders and sub-folders
- View directory trees
- Formatting disks

# User Management

The operating system is responsible for managing which users can access the system and what levels of access the have. The tasks include:

- Adding users
- Editing user permissions
- Deleting Users
- Controlling the amount of resources (especially storage space) each user can use.
- On most centrally managed server based computer systems, such as school systems, user management will be disable for most users and only those with administrative privileges will be able to load / use the software

# Memory Management

The operating system performs a number of low-level memory management tasks, including:

- Allocating memory locations to processes that are running on the computer
- Ensuring that different processes cannot access the same memory location at the same time
- Managing virtual memory and page files

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# Process Management

When a computer is running hundreds of processes are all loaded at the same time. The operating system is responsible for sharing the computer's resources (such as CPU, RAM, Network access) and dealing with conflicts and interrupts.

# Device Management

One of the main jobs of the Operating System is to manage the hardware devices that are connected inside and outside the machine. These can include:

- Printers / Scanners
- Mice / Keyboards
- Speakers /headphones
- Games controllers
- External storage devices
- Graphics / Sound controllers

When a device is connected, the Operating System locates the appropriate **device driver software** and loads it into the kernel. If the computer cannot find an appropriate device driver, the user will have to download and install an appropriate driver from the internet before the device will work. Having device drivers separate to the Operating System itself means that the operating system is devices independent – it can be installed across a variety of different hardware.

**Printer Management**

- Printers require management by the operating system, and printer management consists of a number of tasks.
- Loading the printer driver
- Spooling print jobs
- Loading print jobs into the printer queue
- Sending data to the printer buffer.
- Controlling the printer while it is printing
- Handling errors in printing, such as a paper jam or low-toner warnings.

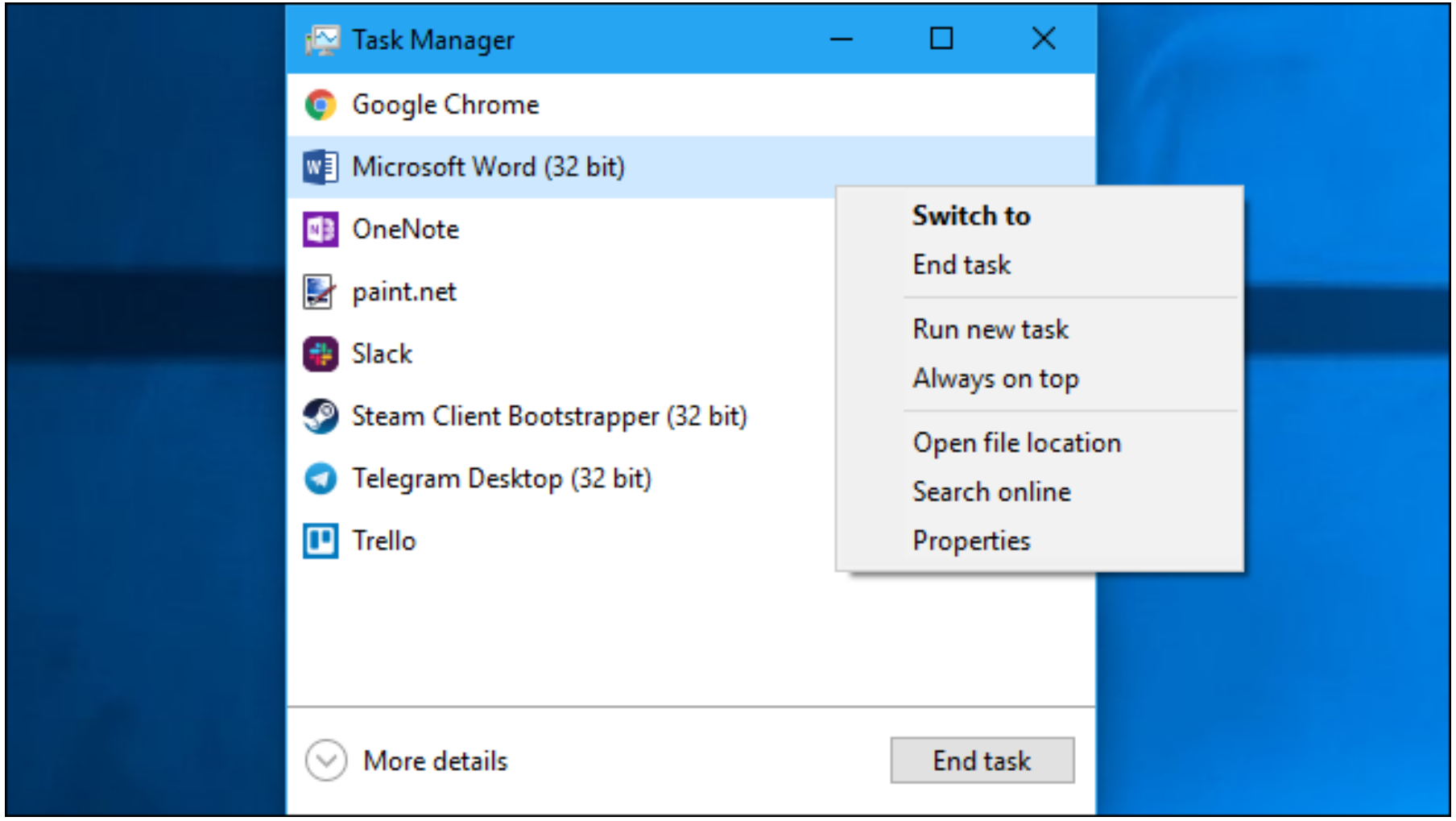
# Security Management

Part of the role of the operating system is to manage security of the devices, file system and memory. The management includes:

- Denying write access to protected files and folders
- Scanning memory and hard drives to ensure file integrity
- Encrypting data in protected areas
- Deploying software firewalls to prevent unauthorized access to the computer from the internet

# Windows Task Manager

- **Task Manager**, previously known as **Windows Task Manager**, is a task manager, system monitor, and startup manager included with Microsoft Windows systems. It provides information about computer performance and running software, including name of running processes, CPU and GPU load, commit charge, I/O details, logged-in users, and Windows services. Task Manager can also be used to set process priorities, processor affinity, start and stop services, and forcibly terminate processes.
- Press Ctrl+Shift+Esc to open the Task Manager with a keyboard shortcut or right-click the Windows taskbar and select “Task Manager.”
- You can also press Ctrl+Alt+Delete and then click “Task Manager” on the screen that appears or find the Task Manager shortcut in your Start menu.

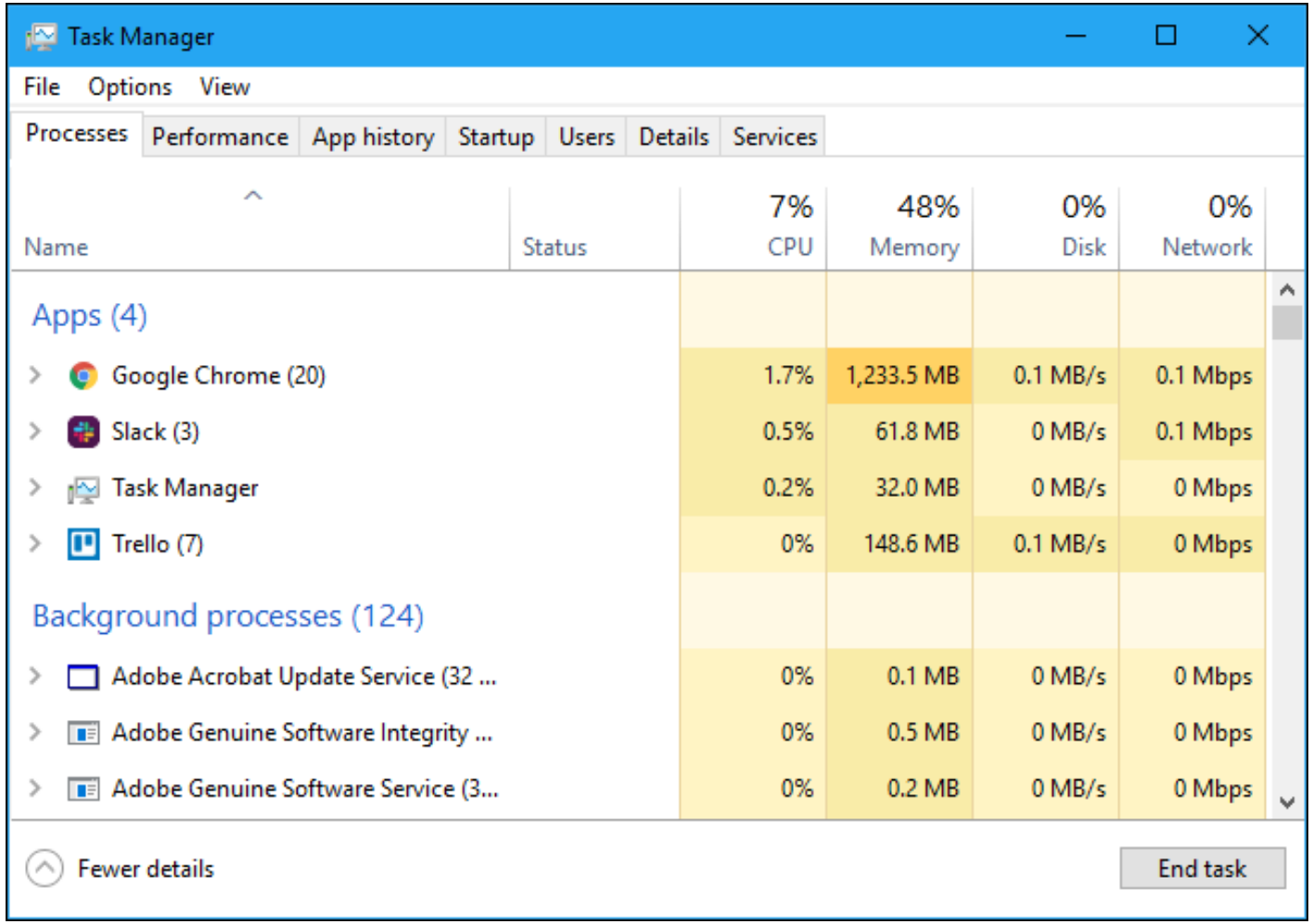

Task Manager
Google Chrome
Microsoft Word (32 bit)
OneNote
paint.net
Slack
Steam Client Bootstrapper (32 bit)
Telegram Desktop (32 bit)
Trello
Switch to
End task
Run new task
Always on top
Open file location
Search online
Properties
More details
End task

# Task Manager Tabs

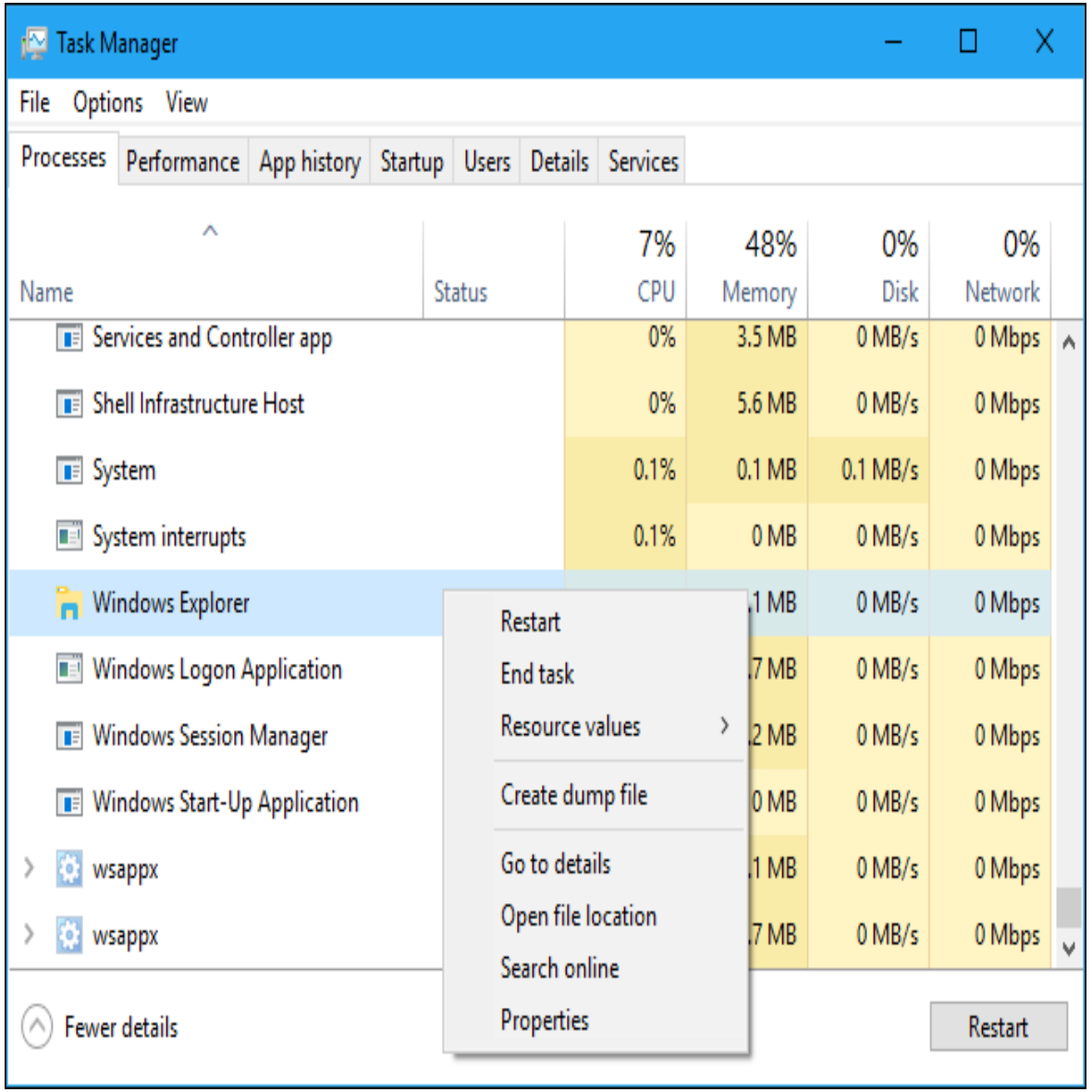
- **Processes**: A list of running applications and background processes on your system along with CPU, memory, disk, network, GPU, and other resource usage information.
- **Performance**: Real-time graphs showing total CPU, memory, disk, network, and GPU resource usage for your system. You'll find many other details here, too, from your computer's IP address to the model names of your computer's CPU and GPU.
- **App History**: Information about how much CPU and network resources apps have used for your current user account. This only applies to new Universal Windows Platform (UWP) apps—in other words, Store apps —and not traditional Windows desktop apps (Win32 applications.)
- **Startup**: A list of your startup programs, which are the applications Windows automatically starts when you sign into your user account. You can disable startup programs from here, although you can also do that from Settings > Apps > Startup.
- **Users**: The user accounts currently signed into your PC, how much resources they're using, and what applications they're running.
- **Details**: More detailed information about the processes running on your system. This is basically the traditional "Processes" tab from the Task Manager on Windows 7.
- **Services**: Management of system services. This is the same information you'll find in services.msc, the Services management console.

# Managing Processes

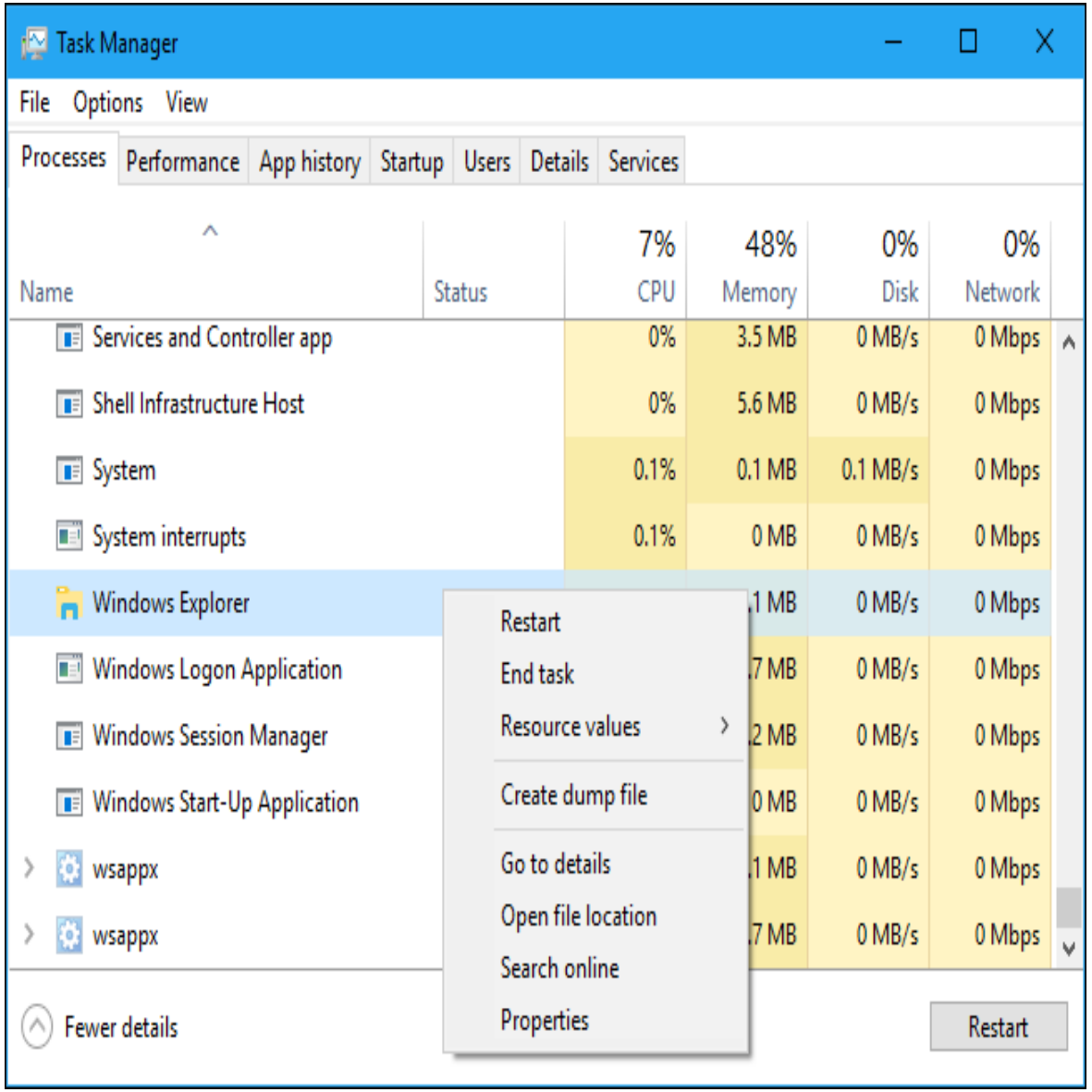
The Processes tab shows you a comprehensive list of processes running on your system. If you sort it by name, the list is broken into three categories. The Apps group shows the same list of running applications you'd see in the "Fewer details" simplified view. The other two categories are **background processes and Windows processes**, and they show processes that don't appear in the standard simplified Task Manager view. Windows processes include various processes that are part of the Windows operating system, although some of these appear under "Background processes" instead for some reason.



- **Expand**: Some applications, like Google Chrome, have multiple processes are grouped here. Other applications have multiple windows that are part of a single process. You can select expand, double-click the process, or click the arrow to its left to see the entire group of processes individually. This option only appears when you right-click a group.
- **Collapse**: Collapse an expanded group.
- **End task**: End the process. You can also click the “End Task” button below the list.
- **Restart**: This option only appears when you right-click Windows Explorer. It lets you restart explorer.exe instead of simply ending the task. In older versions of Windows, you had to end the Explorer.exe task and then launch it manually to fix problems with the Windows desktop, taskbar, or Start menu. Now, you can just use this Restart option.
- **Resource values**: Lets you choose whether you want to see the percentage or precise values for memory, disk, and network. In other words, you can choose whether you want to see the precise amount of memory in MB or the percentage of your system’s memory applications are using.
- **Create dump file**: This is a debugging tool for programmers. It captures a snapshot of the program’s memory and saves it to disk.



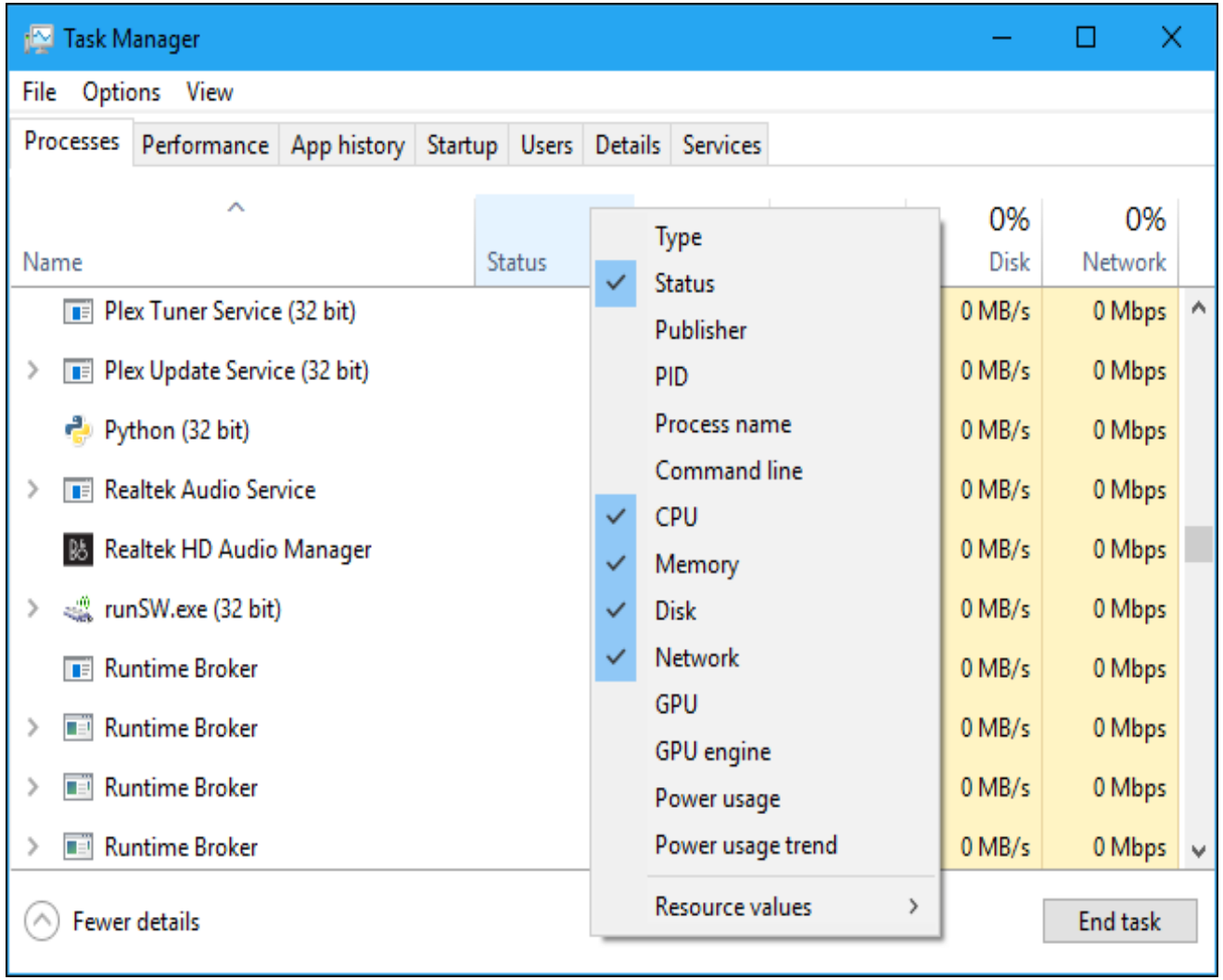
- **Go to details**: Go to the process on the Details tab so you can see more detailed technical information.
- **Open file location**: Open File Explorer with the process's .exe file selected.
- **Search online**: Search for the name of the process on Bing.
- **Properties**: View the Properties window of the .exe file associated with the process.



**Type**: The category of the process, which is App, Background process, or Windows process. **Status**: If a program appears to be frozen, "Not Responding" will appear here. Programs sometimes begin responding after a bit of time and sometimes stay frozen. If Windows has suspended a program to save power, a green leaf will appear in this column. Modern UWP apps can suspend to save power, and Windows can also suspend traditional desktop apps.

**Publisher**: The name of the program's publisher. For example, Chrome displays "Google Inc." and Microsoft Word displays "Microsoft Corporation."

**PID**: The process identifier number Windows has associated with the process. The process ID may be used by certain functions or system utilities. Windows assigns a unique process ID each time it starts a program, and the process ID is a way of distinguishing between several running processes if multiple instances of the same program are running.



•**Process Name**: The file name of the process. For example, File Explorer is explorer.exe, Microsoft Word is WINWORD.EXE, and the Task Manager itself is Taskmgr.exe.

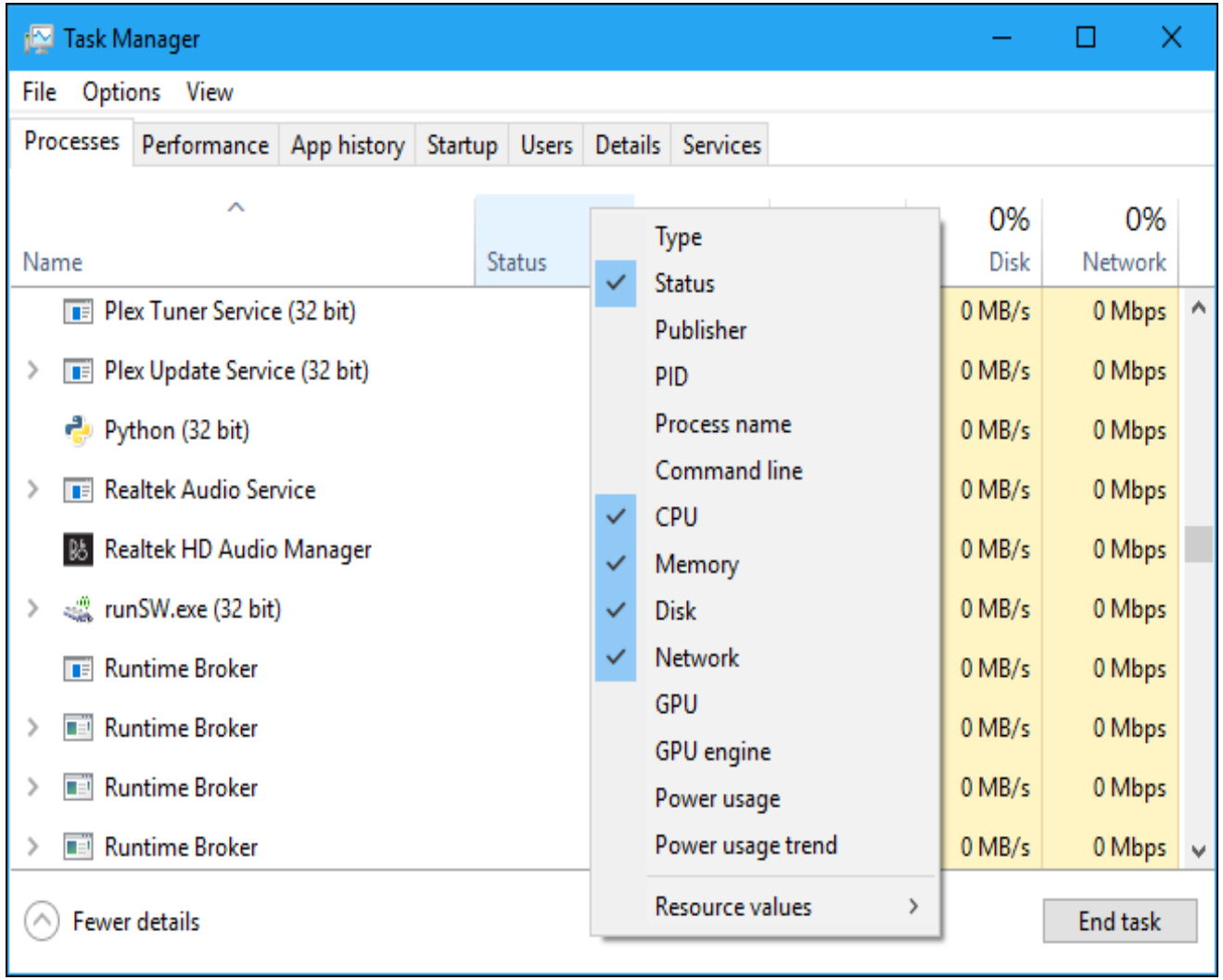
**Command Line**: The full command line used to launch the process. This shows you the full path to the process's .exe file (for example, "C:\WINDOWS\Explorer.EXE") as well as any command-line options used to launch the program.

**CPU**: The CPU usage of the process, displayed as a percentage of your total available CPU resources.

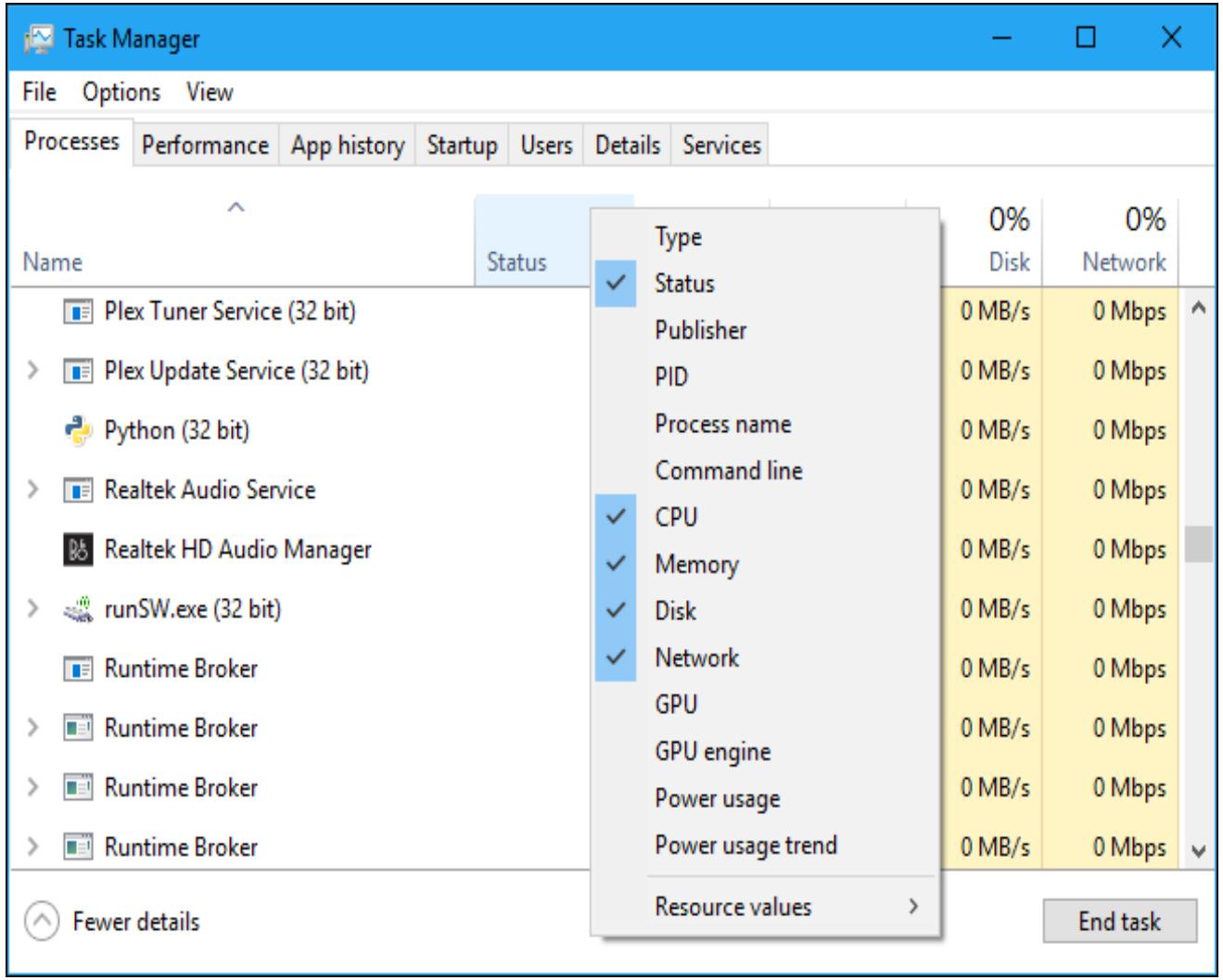
**Memory**: The amount of your system's physical working memory the process is currently using, displayed in MB or GB.

**Disk**: The disk activity a process is generating, displayed as MB/s. If a process isn't reading from or writing to disk at the moment, it will display 0 MB/s.

**Network**: The network usage of a process on the current primary network, displayed in Mbps.

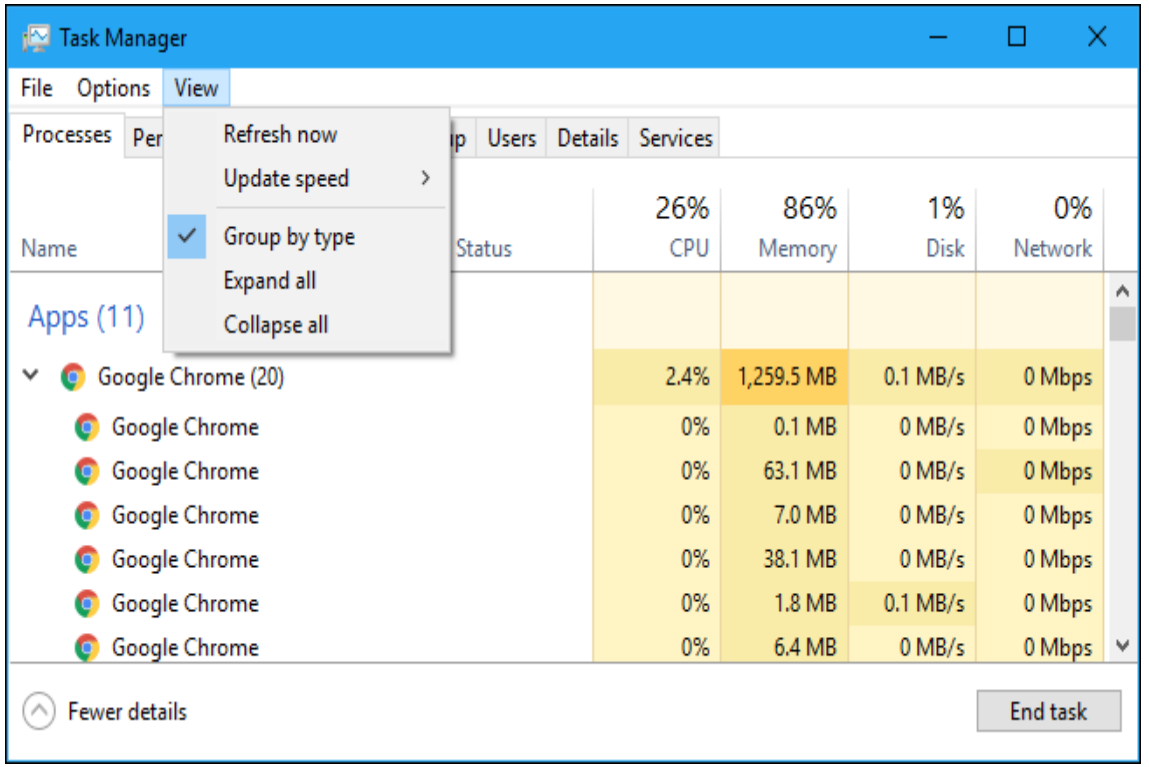


•**GPU**: The GPU (graphics processing unit) resources used by a process, displayed as a percentage of the GPU's available resources.
**GPU Engine**: The GPU device and engine used by a process. If you have multiple GPUs in your system, this will show you which GPU a process is using. See the Performance tab to see which number ("GPU 0" or "GPU 1" is associated with which physical GPU.
**Power Usage**: The estimated power usage of a process, taking into account its current CPU, disk, and GPU activity. For example, it might say "Very low" if a process isn't using many resources or "Very high" if a process is using a lot of resources. If it's high, that means it's using more electricity and shortening your battery life if you have a laptop.
**Power Usage Trend**: The estimated impact on power usage over time. The Power Usage column just shows the current power usage, but this column tracks power usage over time. For example, if a program occasionally uses a lot of power but isn't using much right now, it may say "Very low" in the power usage column and "High" or "Moderate" in the Power Usage Trend column.



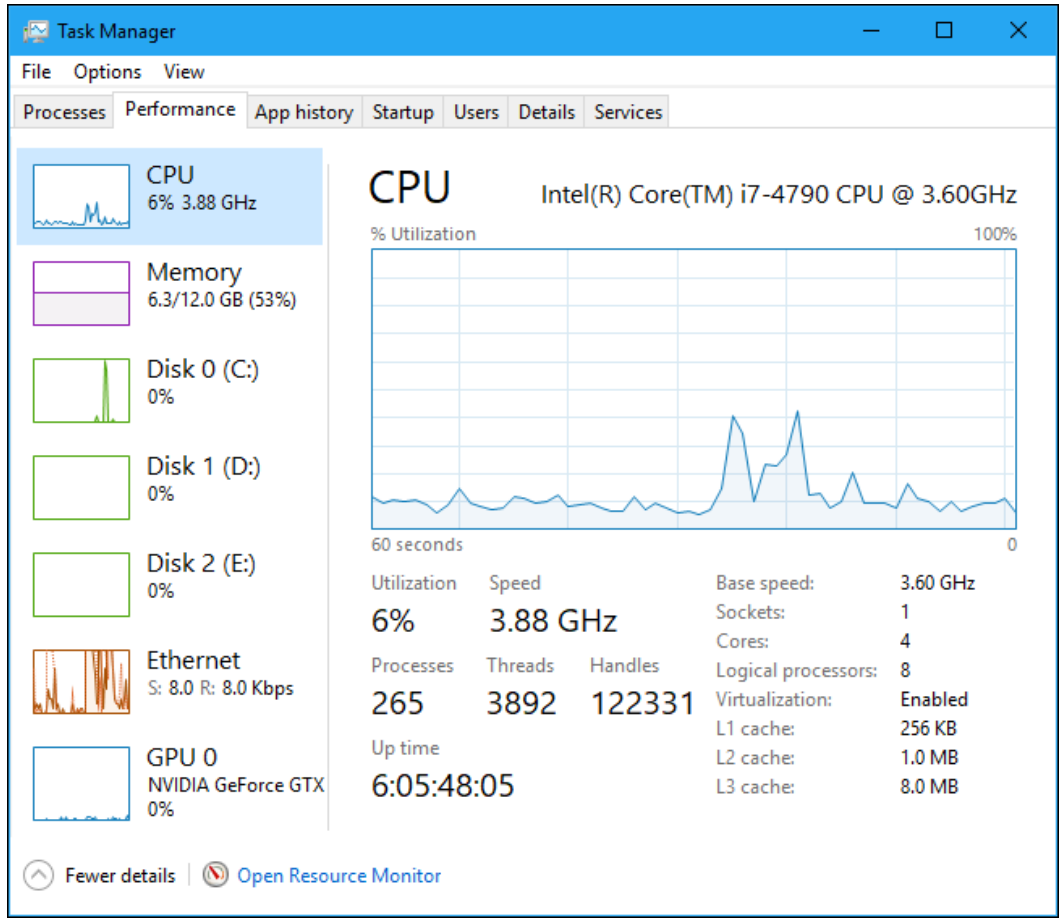
# Task Manager Menu Options

- File > **Run New Task**: Launch a program, folder, document, or network resource by providing its address. You can also check “Create this task with administrative privileges” to launch the program as Administrator.
- Options > **Always on Top**: The Task Manager window will always be on top of other windows while this option is enabled.
- Options > **Minimize on Use**: The Task Manager will be minimized whenever you right-click a process and select “Switch To.” Despite the odd name, that’s all this option does.
- Options > **Hide When Minimized**: The Task Manager will stay running in the notification area (system tray) when you click the minimize button if you enable this option.
- View > **Refresh Now**: Immediately refresh the data displayed in the Task Manager.
- View > **Update Speed**: Choose how frequently the data displayed in the Task Manager is updated: High, Medium, Low, or Paused. With Paused selected, the data isn’t updated until you select a higher frequency or click “Refresh Now.”
- View > **Group By Type**: With this option enabled, processes on the Processes tab are grouped into three categories: Apps, Background Processes, and Windows Processes. With this option disabled, they’re shown mixed in the list.
- View > **Expand All**: Expand all the process groups in the list. For example, Google Chrome uses multiple processes, and they’re shown combined into a “Google Chrome” group. You can expand individual process groups by clicking the arrow to the left of their name, too.
- View > **Collapse All**: Collapse all the process groups in the list. For example, all Google Chrome processes will just be shown under the Google Chrome category.



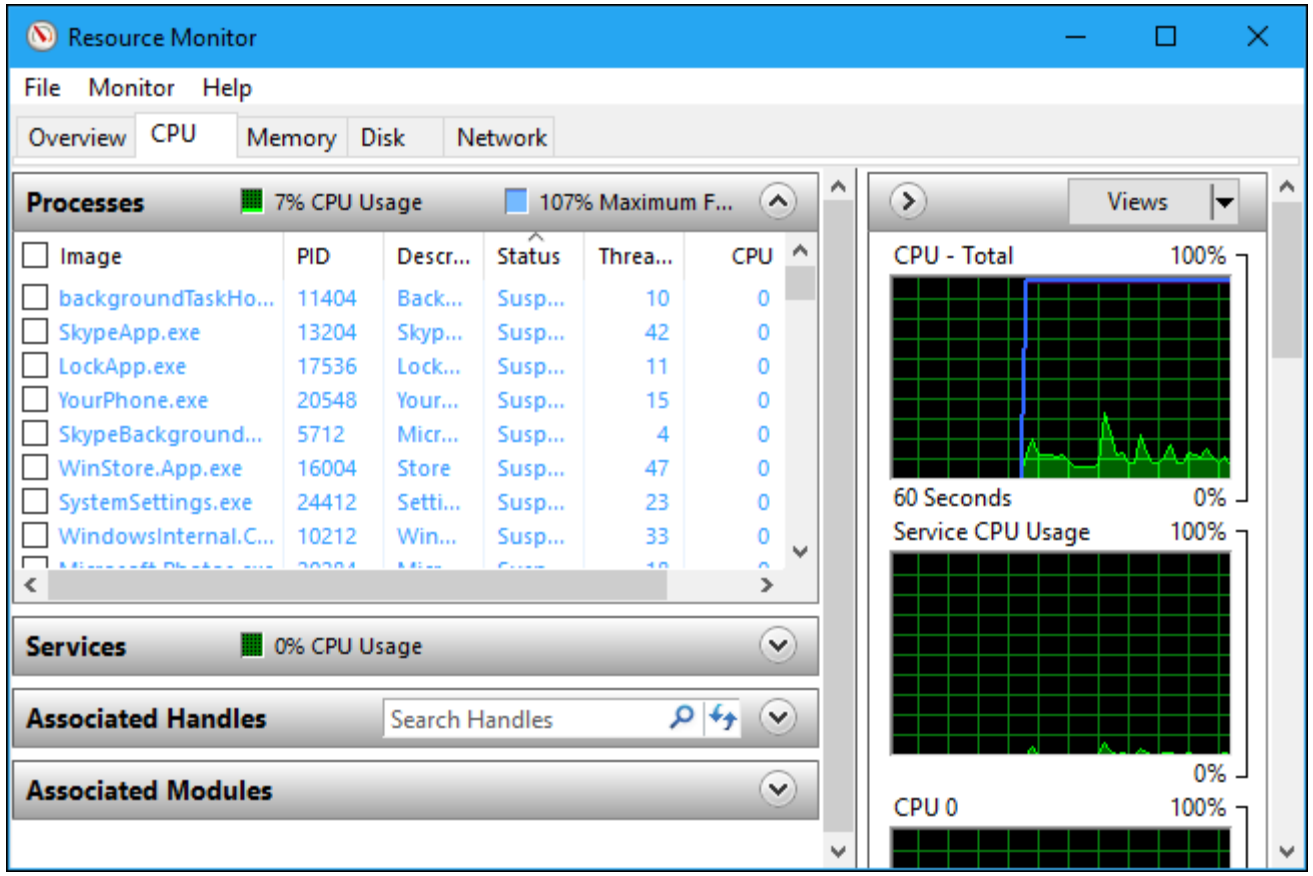
# Viewing Performance Information

•**CPU**: The name and model number of your CPU, its speed, the number of cores it has, and whether hardware virtualization features are enabled and available. It also shows your system's "uptime," which is how long your system has been running since it last booted up.
•**Memory**: How much RAM you have, its speed, and how many of the RAM slots on your motherboard are used. You can also see how much of your memory is currently filled with cached data. Windows calls this "standby." This data will be ready and waiting if your system needs it, but Windows will automatically dump the cached data and free up space if it needs more memory for another task.
•**Disk**: The name and model number of your disk drive, its size, and its current read and write speeds.
•**Wi-Fi or Ethernet**: Windows shows a network adapter's name and its IP addresses (both IPv4 and IPv6 addresses) here. For Wi-Fi connections, you can also see the Wi-Fi standard in use on the current connection—for example, 802.11ac.
•**GPU**: The GPU pane shows separate graphs for different types of activity—for example, 3D vs. video encoding or decoding. The GPU has its own built-in memory, so it also shows GPU memory usage. You can also see the name and model number of your GPU here and the graphics driver version it's using. You can monitor GPU usage right from the Task Manager without any third-party software.



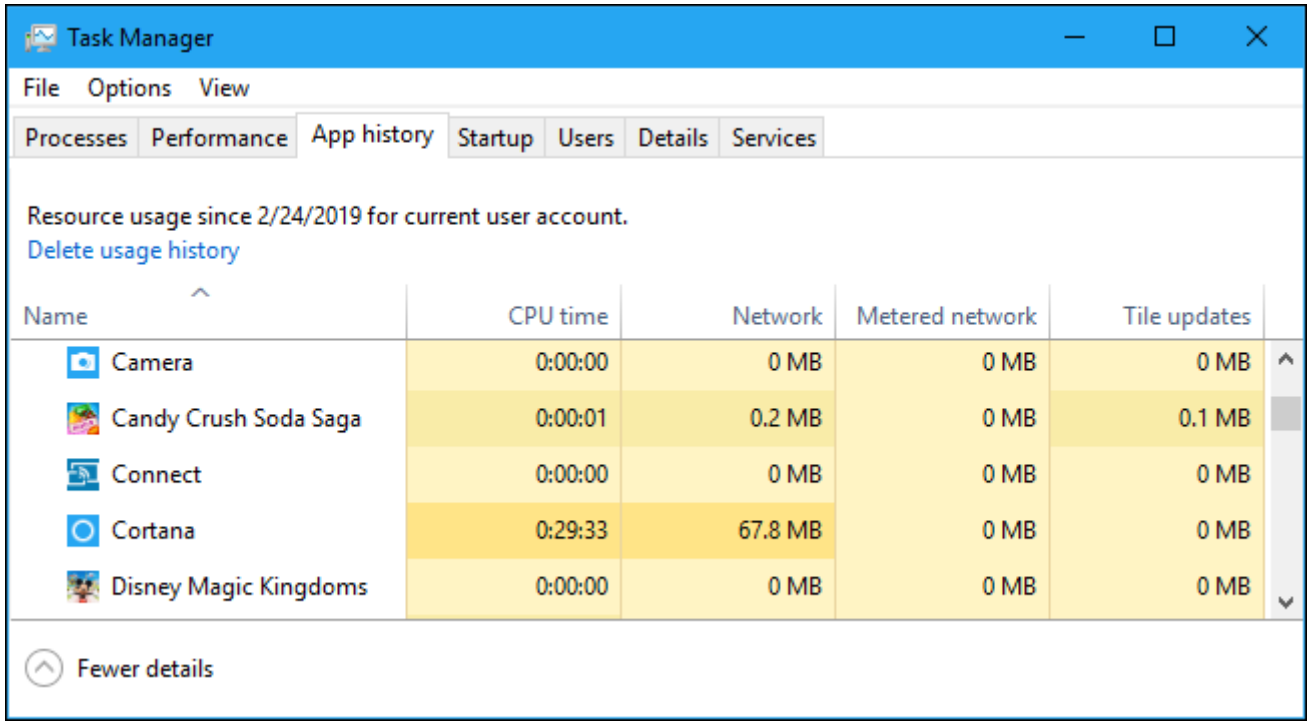
# Resource Monitor

The “Open Resource Monitor” button at the bottom of the window opens the Resource Monitor tool, which provides more detailed information about GPU, memory, disk, and network usage by individual running processes.



# Consulting App History

The App History tab only applies to Universal Windows Platform (UWP) apps. It doesn't show information about traditional Windows desktop apps, so most people won't find it too useful.



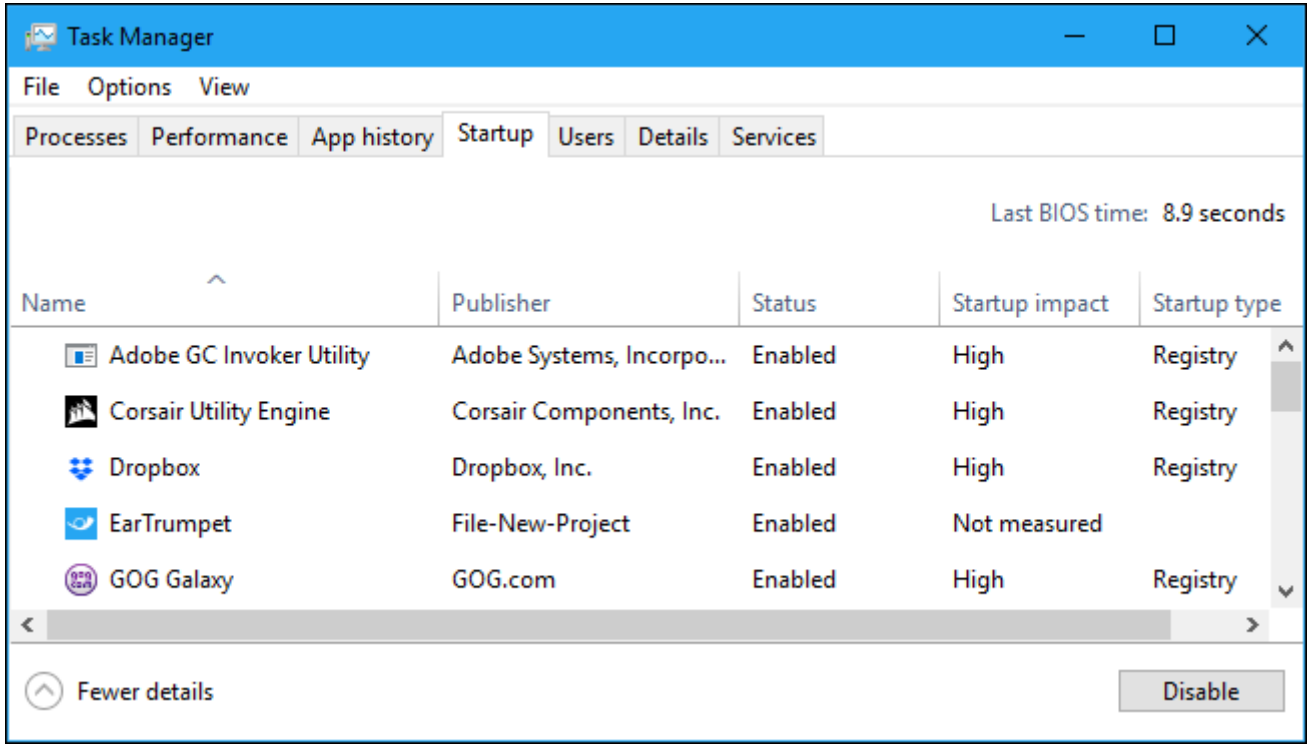
# Consulting App History

- **CPU Time**: The amount of CPU time the program has used within this time frame.
- **Network**: The total amount of data transferred over the network by the program within this time frame.
- **Metered Network**: The amount of data transferred over metered networks. You can set a network as metered to save data on it. This option is intended for networks you have limited data on, like a mobile network to which you're tethering.
- **Tile Updates**: The amount of data the program has downloaded to display updated live tiles on Windows 10's Start menu.
- **Non-metered Network**: The amount of data transferred over non-metered networks.
- **Downloads**: The amount of data downloaded by the program on all networks.
- **Uploads**: The amount of data uploaded by the program on all networks.

# Controlling Startup Applications

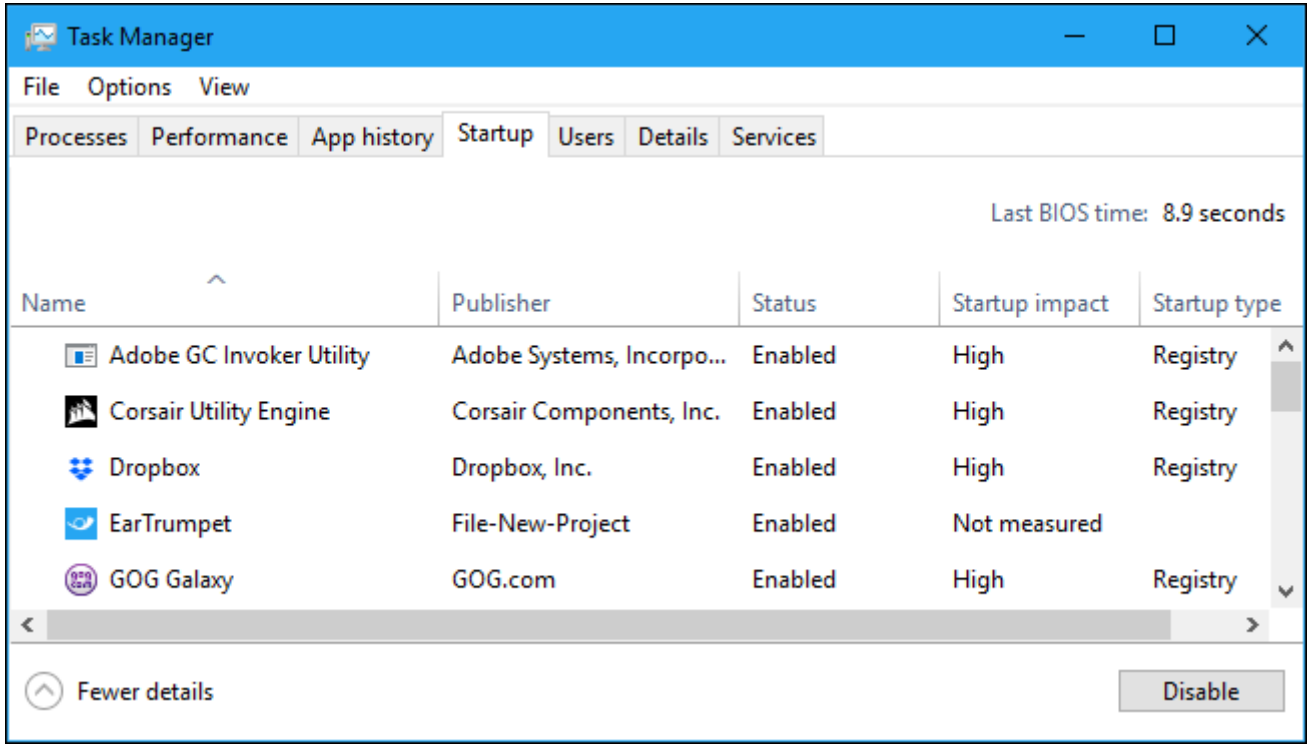
To disable a startup program, right-click it and select “Disable” or select it and click the “Disable” button. To re-enable it, click the “Enable” option that appears here instead. You can also use the Settings > Apps > Startup interface to manage startup programs.

At the top right corner of the window, you will see a “Last BIOS time” on some systems. This shows how long your BIOS (or UEFI firmware) took to initialize your hardware when you last booted your PC. This will not appear on all systems. You won’t see it if your PC’s BIOS doesn’t report this time to Windows.



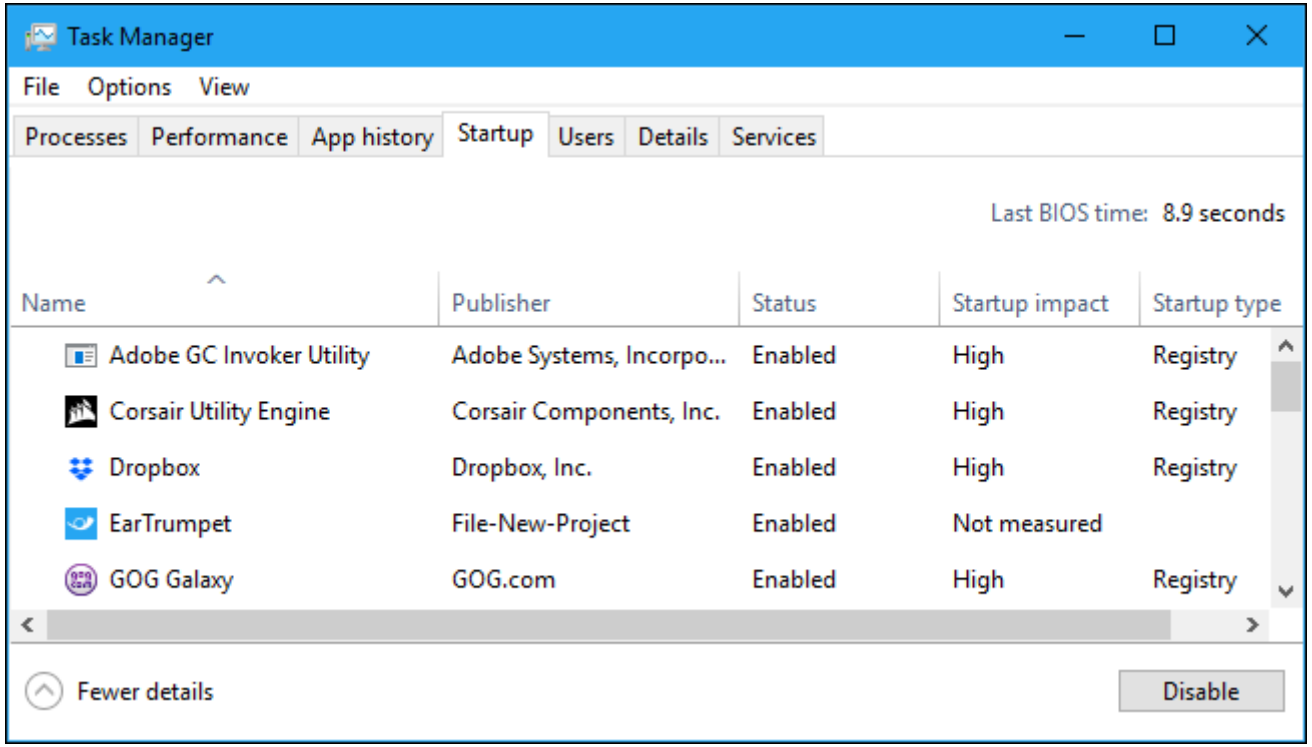
# Controlling Startup Applications

- **Name**: The name of the program.
- **Publisher**: The name of the program's publisher.
- **Status**: "Enabled" appears here if the program automatically starts when you sign in. "Disabled" appears here if you've disabled the startup task.
- **Startup Impact**: An estimate of how much CPU and disk resources the program uses when it starts. Windows measures and tracks this in the background. A lightweight program will show "Low," and a heavy program will show "High." Disabled programs show "None." You can speed up your boot process more by disabling programs with a "High" startup impact than by disabling ones with a "Low" impact.



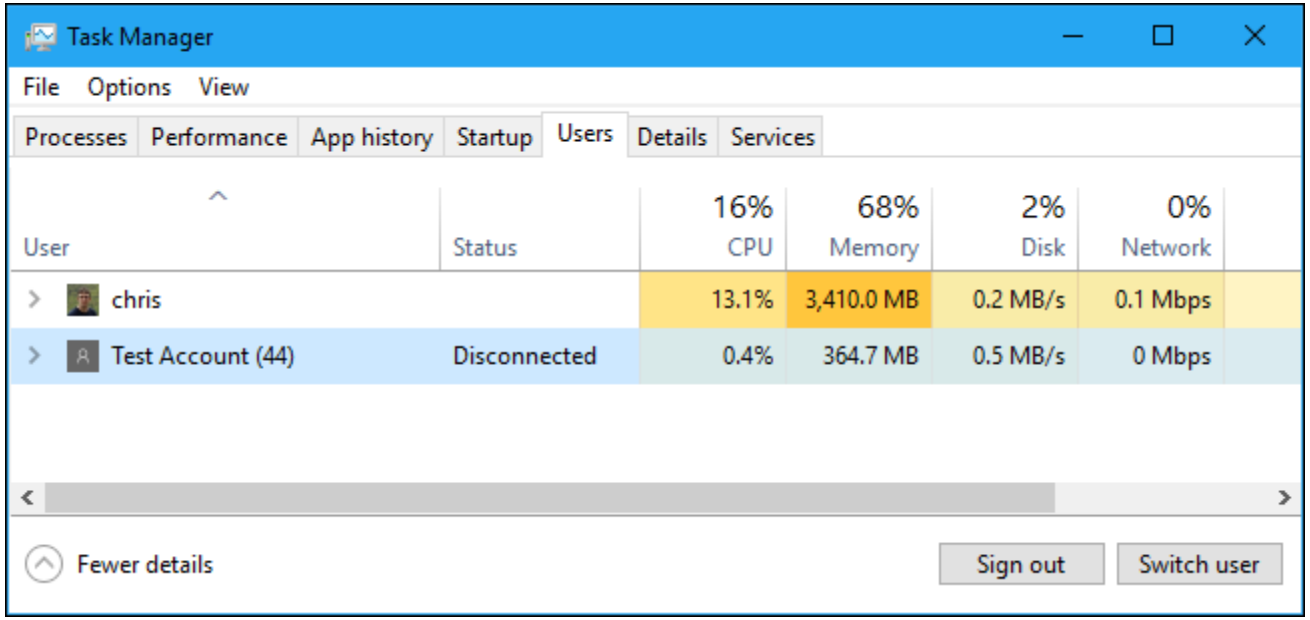
# Controlling Startup Applications

- **Startup Type**: This shows whether the program is starting because of a registry entry ("Registry") or because it's in your startup folder ("Folder.")
- **Disk I/O at Startup**: The disk activity the program performs at startup, in MB. Windows measures and records this each boot.
- **CPU at Startup**: The amount of CPU time a program uses at startup, in ms. Windows measures and records this at boot.
- **Running Now**: The word "Running" appears here if a startup program is currently running. If this column appears entry for a program, the program has shut itself down, or you've closed it yourself.
- **Disabled Time**: For startup programs you've disabled, the date and time you disabled a program appears here
- **Command Line**: This shows the full command line the startup program launches with, including any command line options.



# Checking on Users

The Users tab displays a list of signed in users and their running processes.



# Manage Another User Account

- **ID**: Each signed in user account has its own session ID number. Session “0” is reserved for system services, while other applications may create their own user accounts. You usually won’t need to know this number, so it’s hidden by default.
- **Session**: The type of session this is. For example, it will say “Console” if it’s being accessed on your local system. This is primarily useful for server systems running remote desktops.
- **Client Name**: The name of the remote client system accessing the session, if it’s being accessed remotely.
- **Status**: The status of the session—for example, if a user’s session is locked, the Status will say “Disconnected.”
- **CPU**: Total CPU used by the user’s processes.
- **Memory**: Total memory used by the user’s processes.
- **Disk**: Total disk activity associated with the user’s processes.
- **Network**: Total network activity from the user’s processes.

# Manage Detailed Processes

This is the most detailed Task Manager pane. It's like the Processes tab, but it provides more information and shows processes from all user accounts on your system. If you've used the Windows 7 Task Manager, this will look familiar to you; it's the same information the Processes tab in Windows 7 displays.