

Quickly Find what is Slowing Down the Performance of Your Windows System Using Resmon

Using the information given in this article you will be able to:

- ✓ Get a clear view of your system’s load and all the running processes,
- ✓ Optimise the performance of your system with perfect process management,
- ✓ Find and close suspect processes such as viruses or Trojans.


If your system is running sluggishly, you have two options: either tune your components to make them run faster, or locate whatever is dragging down performance. Fortunately, Windows has a tool that can help you with the latter. The Resource Monitor, known as Resmon for short, provides detailed information on the execution of the software on your system, allowing you to find out what is slowing down Windows. It has other uses too: if applications crash or you are denied access to a file, you can use the Resource Monitor to find the cause of the error. In this article, I’ll show you how to use the Resource Monitor to successfully find and fix errors and bottlenecks on your system.

• Quickly Access the Resource Monitor.....	R 511/2
• Set up the Resource Monitor to Find the Problems on Your PC.....	R 511/3
• Use the Resource Monitor to Close Applications that Aren’t Responding.....	R 511/8
• Use the Resource Monitor to Troubleshoot Your PC....	R 511/8
• How to Filter Data in the Resource Monitor.....	R 511/12
• How to Solve Problems with Unresponsive Applications.....	R 511/13
• Learn More about Processes Running on Windows.....	R 511/15

Quickly Access the Resource Monitor

The Resource Monitor allows you to keep an eye on the performance of your running applications and processes. There are two ways you can access the Resource Monitor in Windows:

Two ways to open the tool

- ✓ By pressing  + **R**, typing **resmon** into the Open field and clicking on **OK**.
- ✓ By opening the Task Manager using **Ctrl** + **Alt** + **Del** and clicking on **Task Manager** or **Launch Task Manager**. Click on the **Performance** tab and finally click on **Open Resource Monitor** or **Resource Monitor** at the bottom of the window.

Find more information in the Resource Monitor

When it first opens, you will notice that the Resource Monitor provides more detailed information than the Task Manager. In addition to system information relating to the CPU and network performance, which is shown by the Task Manager, the Resource Monitor provides details about your RAM and hard drives. This information is shown in both text and graphical form.

Detailed summaries

The Resource Monitor shows resources being used by all the programs on your PC in different categories: the CPU, hard drive, network and RAM. Clicking on a column heading such as **Image**, **PID**, **Threads** or **CPU** will sort the running processes by the category you have clicked on, in either ascending or descending order.

If your PC is running slowly, sort the running programs by these categories to find the problem program. For example, clicking on the CPU column will show you the programs that are using your CPU the most.

The Resource Monitor updates the status of running programs at one second intervals, so that you can keep an eye on how different processes use your PC over time.

Set up the Resource Monitor to Find the Problems on Your PC

Launch the Resource Monitor and configure the settings as shown below:

Default view

In the Image column you will see a list of the processes, services and running programs

Open the category views by clicking on the corresponding bar

Image	PID	Descrip...	Status	Threads	CPU	Averag...
Image						
ShellExperienceHost.exe	3992	Windo...	Suspe...	28	0	0.00
SearchUI.exe	3980	Search...	Suspe...	46	0	0.00
SkypeHost.exe	3496	Micros...	Suspe...	43	0	0.00
SkypeHost.exe	4704	Micros...	Suspe...	43	0	0.00
WinStore.App.exe	4752	Store	Suspe...	23	0	0.00
SystemSettings.exe	5412	Settings	Suspe...	26	0	0.00
perfmon.exe	2456	Resour...	Runni...	18	3	1.85
System	4	NT Ker...	Runni...	101	0	0.13
dmv.exe	864	Deikto...	Runni...	12	0	0.13

Image	PID	File	Read...	Write...	Total...	I/O Pr...	Resp...
Image							
System	4	C:\W...	0	424	424	Nor...	1,045
MsmEng.exe	2000	C:\S...	0	297	297	Nor...	637
MsmEng.exe	2000	C:\Pr...	0	566	566	Nor...	468
System	4	C:\Us...	0	72	72	Nor...	231
System	4	C:\W...	0	431	431	Nor...	12
perfmon.exe	2456	C:\W...	819	0	819	Nor...	2

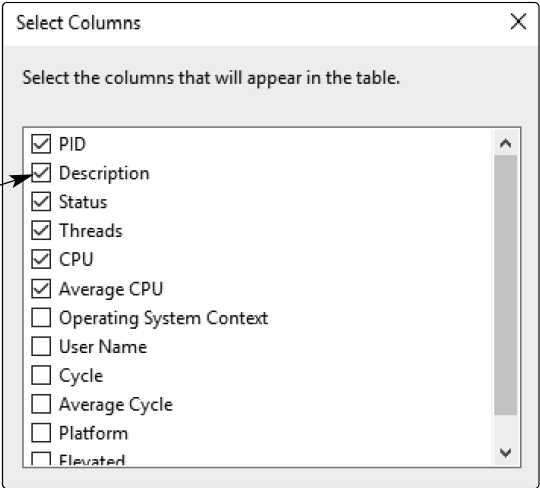
The Resource Monitor gives you an overview of all running processes grouped into the following categories: CPU, hard drive, network and RAM

If you would like to change which columns are displayed in the Resource Monitor, right-click on a column such as. Image and choose Select Columns from the pop-up menu.

Customise the display

You can then add or remove columns to monitor different performance options. In the table on page R511/5 you will find a short explanation of the available values, as well as what they monitor on your system. Select or unselect columns for a personalised view of the running processes.

Choose which items to have displayed



Choose which columns you want to have displayed in the Resource Monitor

The default columns and what they show

The measurements shown depend on the category

The Resource Monitor shows the performance parameters of all running processes, grouped by resource category. Depending on the category, you will find different values are shown in the columns:

CPU

- ✓ The CPU category shows the current CPU load as well as the load of each of the currently running programs. The percentage of the CPU that is currently being used is shown in green and the peak CPU usage is plotted in blue on the graph.

Disk

- ✓ The Disk category displays a detailed overview of your hard drive performance, including all opened programs and their drive consumption. The total input/output performance is shown in green, and the peak percentage usage is shown in blue.

- ✓

The **Network** category shows all the network activity on your system. You will see a list of the applications that are sending or receiving data on your network. Under TCP Connections you will find a list of all the current network connections, the local ports they are using, the remote addresses and latency times. The entire network traffic (in KB/s) is displayed in green, and the percentage of network activity is shown in blue.

Network
- ✓

In the **Memory** category, you can see a listing of all the currently open programs and the amount of memory they are consuming. Additionally, the total number of memory read errors is plotted in green, and the percentage of memory in use is shown in blue.

Memory

The following table describes the main parameters which you can choose to monitor in the Resource Monitor.

Parameters to monitor

Category	Column	Description
CPU	Image or Process	Shows the internal name of the application, service or process which is consuming the CPU resources.
	PID	ID that the process is assigned by Windows.
	Description	The public name of the application, service or process.
	Threads	The number of currently active threads for the application instance.
	CPU	The number of currently active CPU cycles for the application instance.
	Average CPU load	The average CPU load caused by the application over the last 60 seconds. The information is given as a percentage of the total CPU capacity.

Category	Column	Description
Disk	Image or Process	Shows the internal name of the application, service or process which is consuming the CPU resources.
	PID	ID that the process is assigned by Windows.
	File	Information about the file that the application instance is accessing (reading from and/or writing to).
	Read (B/sec)	Information about the average speed (in bytes/second) which the application's data has been read from the open file within the last minute.
	Write (B/sec)	Information about the average speed (in bytes/second) which the application's data has been written to the open file within the last minute.
	I/O Priority	Information relating to the priority of input/output tasks performed by the application.
	Response Time	Response time in milliseconds for the drive activity of the application.
Network	Image or Process	Shows the internal name of the application, service or process which is consuming the CPU resources.
	PID	ID that the process is assigned by Windows.
	Address	Shows the network IP address which the local computer is using in order to exchange information. It can be displayed in the form of a computer name, an IP address or a fully qualified domain name.

Category	Column	Description
	Send (B/sec)	Shows the amount of data (in bytes/second) that the application has sent from your PC to the remote computer it is connected to in the last minute.
	Receive (B/sec)	Shows the amount of data (in bytes/second) that the application has received from the remote computer to your PC in the last minute.
	Total (B/sec)	Shows the total network bandwidth used (in bytes/second) that the application has used to send and receive data.
Memory (RAM)	Image or Process	Shows the internal name of the application, service or process which is consuming the CPU resources.
	PID	ID that the process is assigned by Windows.
	Hard Faults/sec	Average number of major errors caused by the application in the last minute.
	Commit (KB)	Shows the amount of virtual memory reserved by the operating system (Windows 10 only).
	Working Set (KB)	Shows information concerning the amount of application data (in KB) that is currently in the RAM.
	Shareable (KB)	Displays the memory used by an application (in KB) that is available for other applications to use.
	Private (KB)	Displays the memory used by an application (in KB) that is reserved for use solely by the application.

Use the Resource Monitor to Close Applications that Aren't Responding

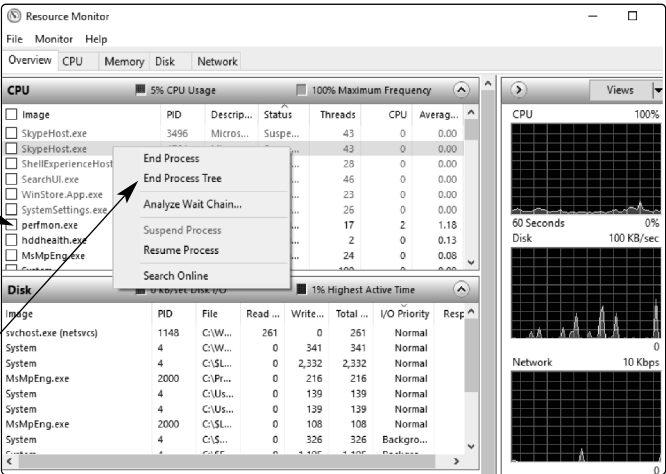
Close unresponsive programs

You may use the Task Manager to close applications that are no longer reacting, but the Resource Monitor also does this. This is handy if you need to quickly close an application that is unresponsive.

In the Overview tab, right-click on the application that is no longer responding, and select End Process from the pop-up menu.

All running applications are shown in here

Right-click on the frozen application to kill it



Close frozen applications using the Resource Monitor

Use the Resource Monitor to Troubleshoot Your PC

Investigate PC problems

The Resource Monitor is extremely useful if you want to check the performance of your PC and investigate its available resources.

Here are 3 key tasks that the Resource Monitor allows you to effectively perform:

- ✓ Find out the current resource consumption on your whole PC.
- ✓ Filter data relating to running applications to find problem programs.
- ✓ Solve problems with applications that no longer respond.



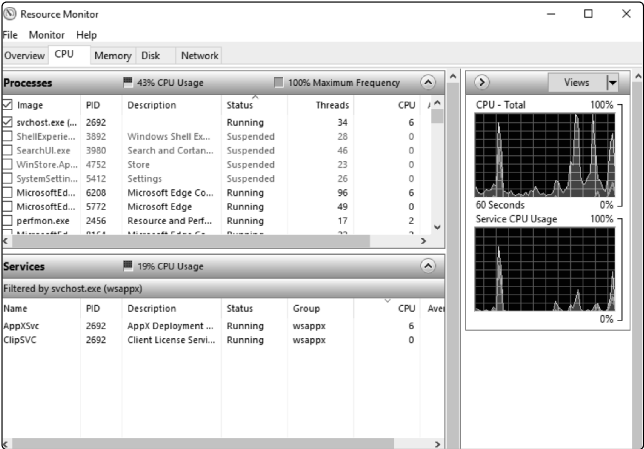
How to find your current resource consumption

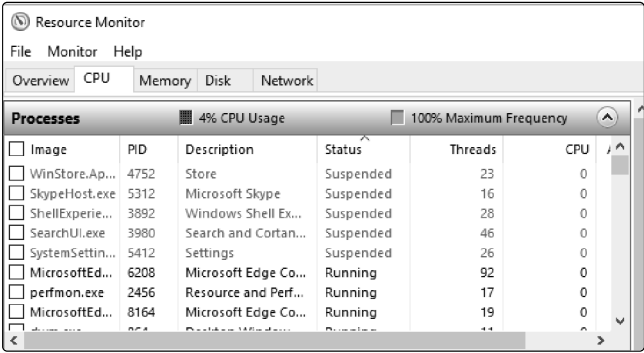
Finding the current consumption of your PC’s resources is one of the core features of the Resource Monitor. You can use the column sorting options in order to quickly find out which resources are being used by which processes.

Check your resource usage

The following table shows examples which you can use to analyse your resource consumption in practice:

Evaluation	Execution
Find the process with the highest CPU load	This test shows you the application, service or process that is currently using your processor the most. In the Resource Monitor, go to the CPU tab and click on the CPU header to sort the list by processor consumption. The first entry shown in the list is the one that is using your processor the most. If the application is no longer responding, or causing your PC to hang, you can end it by right-clicking on it and choosing End Process .
Check services that spend the most time using your CPU	Services can also consume valuable processor resources on your system. In the CPU tab, click on the Services heading to open that section. In the listing under Processes , tick the services that you want to monitor. These will then be shown in the Services section at the bottom of the window.

Evaluation	Execution
	<p>Click on the CPU heading in order to sort the running services by their processor load. The services using most of your CPU will be moved to the top of the list.</p>  <p><i>If you tick a particular process under Processes, all of the corresponding services will be listed in the Services window</i></p>
Find out which process is currently using a file	<p>If you want to know which program has access to a certain file, proceed as follows:</p> <p>In the CPU tab, click on the Associated Handles header to open it.</p> <p>In the search field to the right of Associated Handles, type in the name of the file that you wish to look for.</p> <p>The applications using the file you searched for are shown in the list of results. This allows you to quickly find which application is blocking access to a file, for example.</p>

Evaluation	Execution
	<div></div> <p><i>The Resource Monitor has uncovered several programs using the es.dll file in this example</i></p>
Check the available space on all your drives	<p>Explorer can provide some details on how your drives are being used, but it is very difficult to see how the drives are being used.</p> <p>For a more detailed analysis, click on the Disk heading then click on the Storage section heading to open it. In the Available Space column, you will see the amount of unused space (in MB) on each of the storage devices connected to your PC.</p>
Check the available space on all storage devices	<p>Click on the Network tab and then click on the TCP Connections header in order to open that section. Select the process whose network connection you wish to monitor in the Processes with Network Activity section. If you see many entries shown in the list, I recommend you click on the Image heading to sort the connections by process and make the display easier to read.</p> <p>Check in the Remote Address and Remote Port headings to find the network address and port of the remote machines that the process is connected to.</p>

How to Filter Data in the Resource Monitor

The Resource Monitor shows all the running processes that are currently active on your system. The vast amount of data shown makes it difficult to work out what is really going on.

Pinpoint the data you are interested in

Thankfully you can filter the listed processes and have unnecessary information hidden from view. Proceed as follows to filter the data for one or more processes:



- 1. In the Resource Monitor, tick the processes that you wish to monitor in the Image column. The selected processes will be moved to the top of the column.
- 2. Take a look at your filtered data in the sections below the top section to find information about the filtered applications.

The processes that are selected here...

...are shown here in detail

Resource Monitor

File Monitor Help

Overview CPU Memory Disk Network

☒ Image

Image	PID	Descrip...	Status	Threads	CPU	Averag...
<input checked="" type="checkbox"/> ShellExperienceHost.exe	3892	Windo...	Suspe...	28	0	0.00
<input checked="" type="checkbox"/> SearchUI.exe	3980	Search ...	Suspe...	46	0	0.00
<input type="checkbox"/> WinStore.App.exe	4752	Store	Suspe...	23	0	0.00
<input type="checkbox"/> SkypeHost.exe	5312	Micros...	Suspe...	16	0	0.00
<input type="checkbox"/> SystemSettings.exe	5412	Settings	Suspe...	26	0	0.00
<input type="checkbox"/> perfmon.exe	2456	Resour...	Runni...	17	0	2.20
<input type="checkbox"/> System	4	NT Ker...	Runni...	100	0	0.36
<input type="checkbox"/> MicrosoftEdgeCP.exe	6208	Micros...	Runni...	91	0	0.10
<input type="checkbox"/> System Interrupts	-	Deferr...	Runni...	-	0	0.08

Disk

0 KB/sec Disk I/O

0% Highest Active Time

Network

0 Kbps Network I/O

0% Network Utilization

Memory

0 Hard Faults/sec

32% Used Physical Memory

Filtered by ShellExperienceHost.exe, SearchUI.exe

Image	PID	Hard F...	Comm...	Worki...	Sharea...	Private ...
SearchUI.exe	3980	0	66.768	119.076	62.632	56.444

How to filter out unnecessary data in the Resource Monitor

You can also combine filters if you wish, for example, by selecting applications on the CPU, Memory, Disk and Network tabs.

Additional filter possibilities

Simply select the desired process and in the table that opens below you will see the results of the filter. In the table's heading you will also see an orange-coloured information bar that tells you the data is being filtered. Remove the ticks next to the process names in order to remove the filter.

Deactivate the filters

How to Solve Problems with Unresponsive Applications

The Resource Monitor can also help when you quickly need to find the cause of problems that lead applications to no longer respond.

What to do when an application freezes up

If there is an application that isn't reacting, you will receive a message from Windows that offers to immediately close or restart the application. This usually happens when the system is waiting for a process that hasn't completed, perhaps because there are not enough system resources available.

Using the Resource Monitor, you can monitor the queue of running processes and close any that are blocking the execution of other programs.

Processes that are not responding are displayed in red in the CPU section of the Overview tab, and in the Processes section in the CPU tab. Right-clicking on a red process will allow you to kill it using the End Process menu option.

Take note of the red display

When you do this, the opened process will be immediately closed and any data that hadn't been saved by the program will be lost. Closing a process that Windows depends on can lead to an unstable system and general data loss.



You can analyse a process using the Resource Monitor as follows:

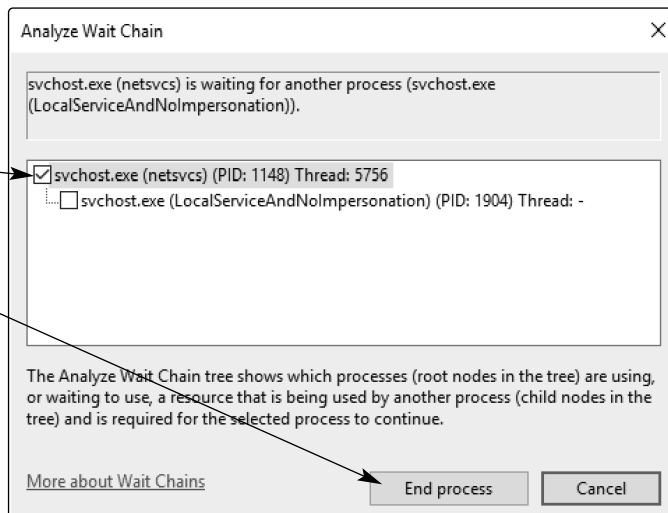


Analyse the Wait Chain

1. Select a tab in the Resource Monitor and click on the name of the process you would like to analyse in the **Image** column using the right mouse button.
2. Select **Analyse Wait Chain** in the pop-up menu. If the process isn't executing properly you will see details of the other processes that this process is waiting for.
3. If your application is not responding, you can end the process by clicking on it and then clicking the **End process** button.

Select the application that isn't responding and...

... click on **End process**



*In this example, svchost is waiting on another instance of itself. You can terminate it using the **End process** button*

Many system processes are dependent on other processes and services. If a system process entry in the table isn't displayed in red, and the process status shows **Running**, then you should not end the process.

Check for processes displayed in red

Learn More about Processes Running on Windows

Some processes can be easily identified from their process name (taskmgr.exe is the Task Manager, for example, or iexplore.exe is Internet Explorer), but other important Windows processes are hidden behind cryptic names.

Programs hide behind cryptic names

The following table shows you which processes are hidden behind which process names and whether they can be safely terminated using the Resource Monitor:

Process	Can it be Ended?	Description
Csrss.exe	No	This is the part of the Win32 subsystem that is responsible for user mode. Win32.sys, however, is a core part of Windows which runs on your PC. Csrss stands for Client/Server Run Time Subsystem. It is responsible for console windows, creating and deleting process threads and specific parts of the virtual command environment.
Explorer.exe	Yes	This is the user interface with takes care of displaying components such as the taskbar, desktop and so on, and giving you access to your programs and files. This process is not as important for normal Windows operation as you might think, and can be closed (and re-launched) using the Task Manager if

Process	Can it be Ended?	Description
		your interface freezes. Doing this usually doesn't have a negative effect on the system, and is quicker than re-booting.
Idle Process	No	<p>This is an individual thread that is run on every processor code. It fills the processor time when it is not being used for anything else.</p> <p>Usually, this process seems to takes up the most processor time in the Resource Monitor, but it actually does nothing.</p>
Internat.exe	Yes	<p>Internat.exe is loaded at Windows startup. The process loads the different keyboard layouts that are configured by the user. The layouts that are to be loaded for the current user are stored in the following register key:</p> <p>HKEY_CURRENT_USER\Keyboard Layout\Preload</p> <p>Internat.exe also shows the language icon (e.g. EN) in the taskbar, allowing you to easily switch keyboard layouts when you need to enter a symbol not shown on your keyboard, for example. This icon disappears when the process is ended. The keyboard layout can also be changed at any time using the Control Panel.</p>
Lsass.exe	No	<p>This is the local authentication server. It creates the process that is responsible for the authentication of users by the login service.</p>

Process	Can it be Ended?	Description
		In order to do this, different authentication packages can be used, but the default is Msgina.dll. This process became very famous due to the Sasser virus, which exploited gaps in its security.
Mstask.exe	No	This is the task scheduler service that automatically launches processes at a time configured by you.
Smss.exe	No	This is the Session Manager process that is the subsystem responsible for opening user sessions. This process is launched by the system thread at startup and is responsible for initiating various processes, including launching the Winlogon and Win32 processes (Csrss.exe), as well as setting different system variables.
Spoolsv.exe	No	This is the print queue service which is responsible for the management of all printing and faxing jobs initiated by the end user.
Svchost.exe	No	This is a general process that serves as a host for other processes that are launched by DLLs. That's why you will find multiple instances of this process running in the Resource Monitor.
Services.exe	No	This is the management process for system services. The launch and shutdown of services, as well as all usual interactions with services, are all managed by it.

Process	Can it be ended?	Description
Taskmgr.exe	Yes	This is the process that runs the Task Manager.
Winlogon.exe	No	<p>This process is responsible for the management of the user logon and logoff process.</p> <p>In addition, the Winlogon process is activated when the user presses Ctrl + Alt + Del at logon, to display the secure logon window.</p>
Winmgmt.exe	No	Winmgmt.exe is a core component of the client management subsystem. The process is launched the first time a client application is launched, and is always executed by a management service.

Summary

The Resource Monitor is an extremely useful tool that helps you to analyse how the programs and services on your PC are performing. Apart from monitoring resource usage in real-time, the Resource Monitor can also help you analyse processes that are no longer responsive, identify which applications are using which files and also manage running processes and services.