

Updated for Windows 11

# The Ultimate Guide to Optimize your Windows PC for the Stage

Detailed steps to make your PC ready for glitch free audio performance

OWN THE  
*stage*®

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## 1 Introduction

This guide is intended to help musicians optimize their Windows PCs to process audio as fast as possible.

To get the most from your Windows operating system for digital audio processing, many Windows settings and features need to be configured properly. By following this guide, you will learn to avoid issues like crackles, dropouts, audio glitches, high latency and more.

You will explore many Windows settings to understand deeply what is happening in the background, and how to adjust those settings to fit perfectly your needs as a live or session performing musician.

As an IT engineer, I have spent over twelve years configuring and optimizing Windows, Windows Server and Linux operating systems for very specific scenarios. As a guitar player for twenty years using software-based setups, I have tweaked many Windows PCs to address their audio-specific issues and to make them run reliably.

In this guide I will condense all this experience into step-by-step instructions along with many screenshots in an easy to follow format.

Gig Performer® [was created](#) by people who are both developers and serious touring musicians. While including features particularly important to performers, Gig Performer® is also highly optimized when it comes to computer resources making it the perfect tool for creating a glitch-free environment both on-stage and in the studio.

This guide focuses on Windows 10 and Windows 11 Pro, and will be updated occasionally to address relevant changes in future versions. Please visit <https://gigperformer.com> to make sure you have the latest edition of this guide.

**Important:** be aware that some tips presented in this guide are only relevant if you have a dedicated PC for audio processing. If you use your PC for other purposes or for everyday use, you might want to skip some guidelines as it may be impractical to revert back to a computer usable for day-to-day work.

**Disclaimer:** Use this guide at your own risk. Create a full system backup before following these guidelines, and once you have modified your settings, it is critical that you test your entire gig carefully to make sure that these optimizations work correctly.

We will start by configuring BIOS and UEFI settings and conclude with a checklist that will help you to be fully prepared for your next glitch-free live performance.

**Get this book in HTML or an e-book format (ePUB or MOBI):**

Please visit: <https://gigperformer.com/docs/ultimate-guide-to-optimize-windows-for-stage/>



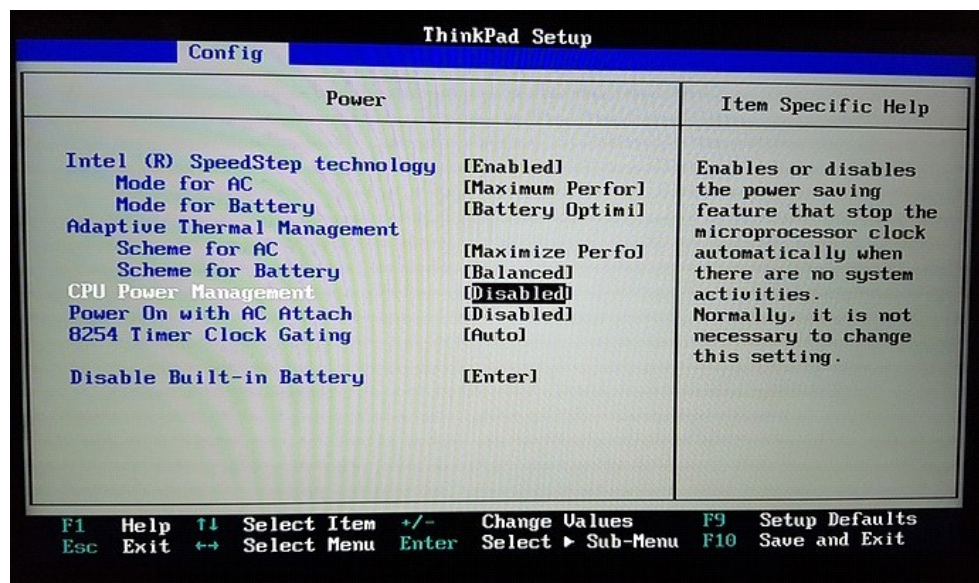
## 2 BIOS and UEFI settings

This guide starts with the first thing you will encounter while powering on your PC or laptop - the Basic Input/Output System (BIOS) or the more recent Unified Extensible Firmware Interface (UEFI) - a successor to the legacy PC BIOS. Please note that the actual BIOS/UEFI settings and their organization depend on your PC's manufacturer.

You usually enter your BIOS/UEFI by pressing one of the function keys (F1-F12, please check the documentation of your manufacturer) when your computer powers on.

### 2.1 Power saving features

To prolong a laptop's battery life, manufacturers can opt to reduce power consumption by slowing down the CPU. Consequently, you may experience [cracks, pops and clicks](#) while you are rehearsing, recording, composing or performing live. So first, we will review those power consumption settings that directly impact the speed of your CPU:

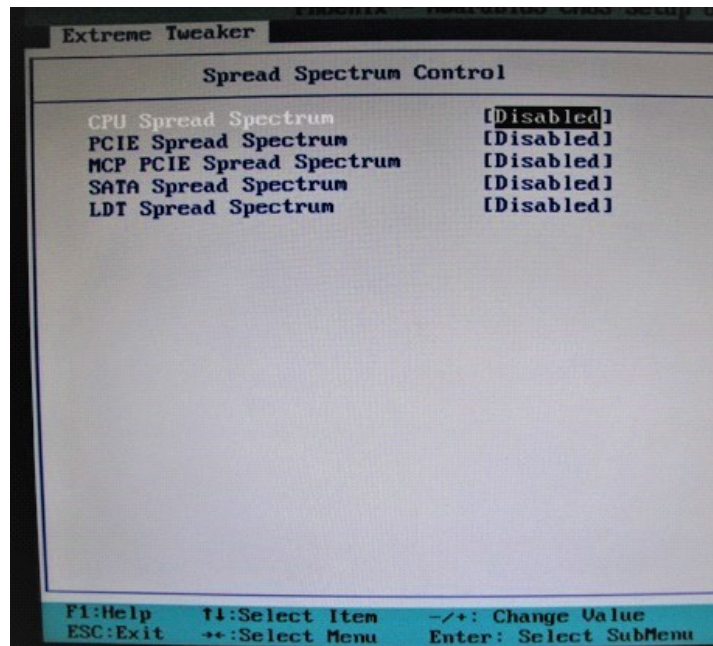


Disable **CPU Power Management** settings and adjust all the other settings to Maximum Performance.

Review all other power saving features such as **Adaptive Thermal Management** and also set them to Maximum Performance.

## 2.2 Spread Spectrum

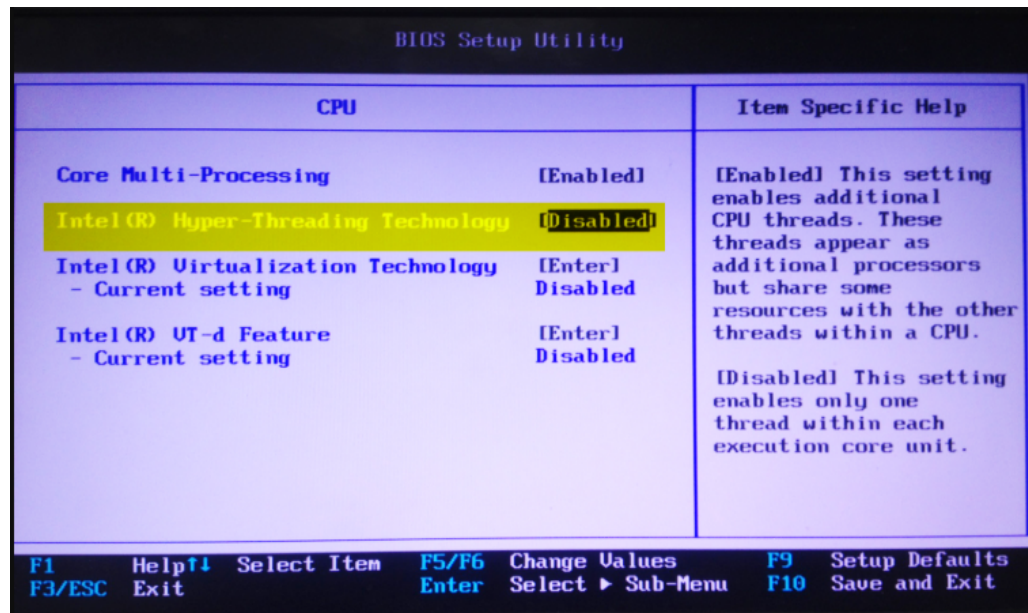
To meet strict US FCC regulations, computer engineers use a method called *spread spectrum clocking* to reduce the amount of electro-magnetic interference (EMI). Since even the smallest variation in a clock signal can be enough to create data transfer errors, it is recommended that you set these entries in BIOS to **Disabled**.



Review your BIOS settings to see if there are any entries related to **Spread Spectrum** and if so, disable them.

## 2.3 Hyper-Threading Technology

If you have a modern Intel processor, you probably have a Hyper-Threading Technology setting in your BIOS.



This technology delivers two processing threads per physical core of the CPU. Simply said, this means that your CPU core can run two tasks at once. This enables e.g. a two-core processor to process four tasks at once. Highly threaded applications can benefit from this technology, getting more work done in parallel, and completing tasks sooner.

However, in many circumstances disabling hyper-threading can bring about improvements in audio performance, so some experimentation here may be necessary to see which setting provides more performance for your audio setup.

The main reason that this technology often doesn't work well in audio applications, is that two intensive audio tasks run on a single CPU core, instead of two separate cores, which results in a significant loss of performance, especially at very low latency levels.

Experiment with this BIOS setting to see which option works better on your own audio setup.

## 2.4 Disable hardware you do not need

Depending on your BIOS manufacturer and your PC configuration you may have options to disable hardware devices and I/O ports that you do not need for your audio setup. Examples include Bluetooth, the integrated camera, your card reader, a fingerprint device and a LAN.

Security		
I/O Port Access		Item Specific Help
Ethernet LAN	[Enabled]	Select whether to enable or disable Bluetooth device.
Wireless LAN	[Enabled]	
WiMAX	[Enabled]	Enables use of Bluetooth device.
Wireless WAN	[Enabled]	
Bluetooth	[Enabled]	Disables use of Bluetooth device and keeps it disabled in the OS environment.
USB Port	[Enabled]	
Ultrabay (HDD/Optical)	[Enabled]	Disables use of Bluetooth device and keeps it disabled in the OS environment.
eSATA Port	[Enabled]	
Memory Card Slot	[Enabled]	Disables use of Bluetooth device and keeps it disabled in the OS environment.
Smart Card Slot	[Enabled]	
Integrated Camera	[Enabled]	Disables use of Bluetooth device and keeps it disabled in the OS environment.
Microphone	[Enabled]	
Fingerprint Reader	[Enabled]	

You may also want to disable the integrated sound device on your PC since you are (hopefully) using an external audio interface.

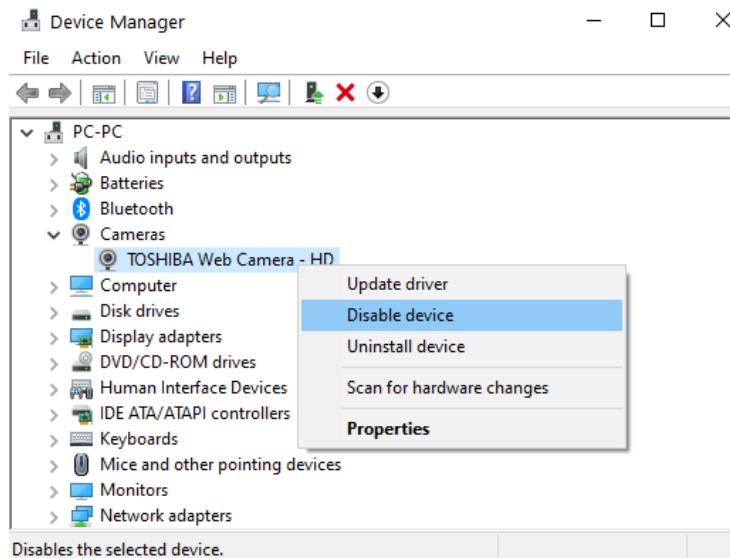
If there are no settings in your BIOS to disable Bluetooth and other devices, refer to the next section and disable them via the **Device manager** in Windows.

Please check thoroughly other BIOS/UEFI settings on your PC to get to know your system, then save your changes and reboot your computer once you are done.

## 3 Disable unnecessary hardware in Windows Device Manager

Unnecessary hardware can be disabled in the Windows Device Manager.

Use the **Win key + X** combination to open the Quick Access Menu and select **Device Manager**:



Review this list and disable any devices that you do not need, such as the Web camera, Bluetooth, DVD/CD-ROM drives, Ethernet or Wireless network adapters, and any other unneeded devices.

To disable a device, right click on the device name and click **Disable device**. If you need that device later, you can re-enable it by right clicking as before and clicking **Enable device**.

If you only need a Wireless network adapter on your live performance computer to [receive MIDI events or OSC messages from your tablet](#), you can safely disable your Ethernet adapter (and vice versa).

Hopefully, you have a dedicated external sound card or audio interface, so you can safely disable the built-in sound device. For best performance, we strongly recommend a dedicated audio interface with low latency drivers. Internal sound card drivers are notorious for poor latency and are really not suited for real-time audio processing.

Some benefits of disabling unnecessary hardware include:

- More CPU power for your PC,
- Windows will not load unnecessary drivers,
- RAM not needed by such drivers and hardware becomes available to your application.

Depending on the device and your power management settings, your operating system may turn them off, or at least put them into a low power state. These power management settings are very important and are discussed in the next chapter.

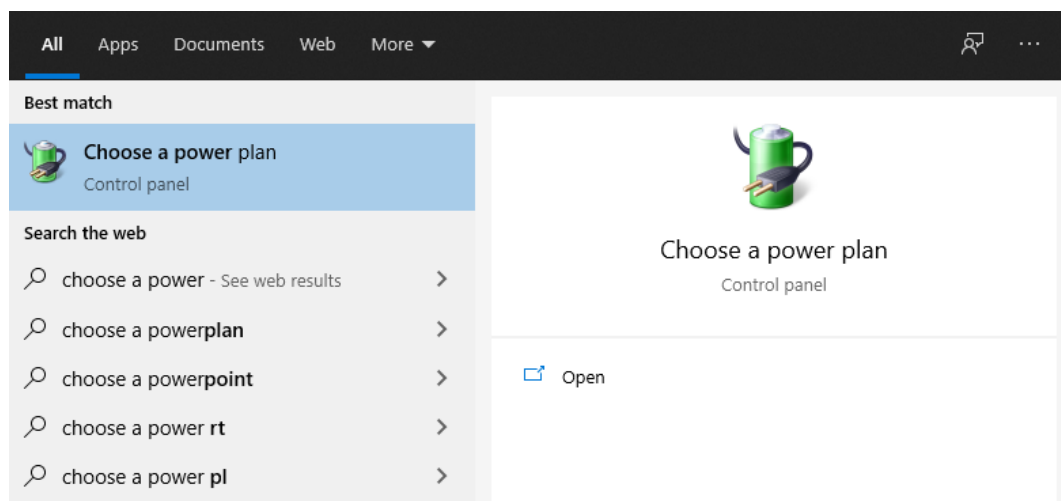


## 4 Power settings optimization

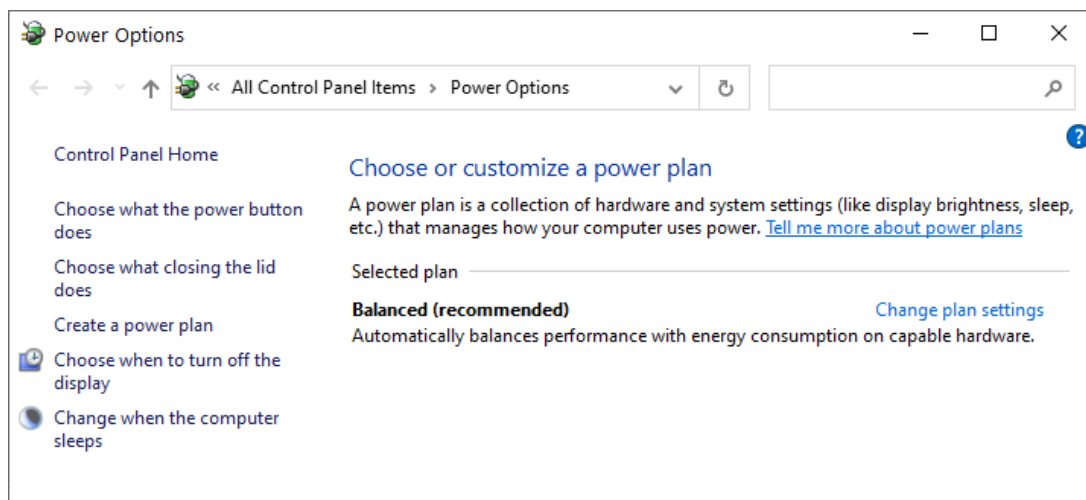
Windows PCs are configured to save power by default. To get the most out of your PC for reliable real-time audio processing, without audio glitches, power settings need to be set up properly.

In Windows 10, there are two power models for PCs: the legacy **S3** power model and **Modern Standby**. Modern Standby systems can still be connected to a wireless local area network while in standby, and can resume normal operation faster from a low power state.

Click on the **Start** button and type: *choose a power plan* to open your **Power Options**:



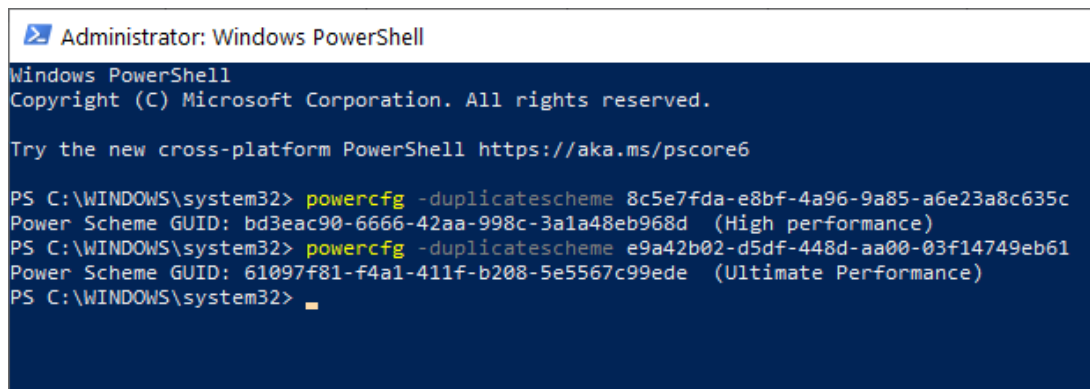
If your computer supports Modern Standby then by default only the **Balanced** power plan will be immediately available. The good news is that you can add and/or enable other plans:



Rather than just having one power plan, best practice suggests the Balanced power plan for regular use of your PC/laptop and at least one more plan optimized for audio processing to use for your live performance. Although a new custom power plan can be created by clicking on **Create a power plan**, we will show you how to enable two additional power plans intended for better performance.

## 4.1 Create a power plan for ultimate performance

Open your Powershell, press **Winkey + X** to open the Quick Access Menu, and select **Windows PowerShell (Admin)** or **Windows Terminal (Admin)** on Windows 11 :



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\WINDOWS\system32> powercfg -duplicatescheme 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c
Power Scheme GUID: bd3eac90-6666-42aa-998c-3a1a48eb968d (High performance)
PS C:\WINDOWS\system32> powercfg -duplicatescheme e9a42b02-d5df-448d-aa00-03f14749eb61
Power Scheme GUID: 61097f81-f4a1-411f-b208-5e5567c99ede (Ultimate Performance)
PS C:\WINDOWS\system32>
```

Copy the following commands (one at a time, just the text in *italics*) to your clipboard, paste them into the PowerShell Window and press Enter to install each new plan.

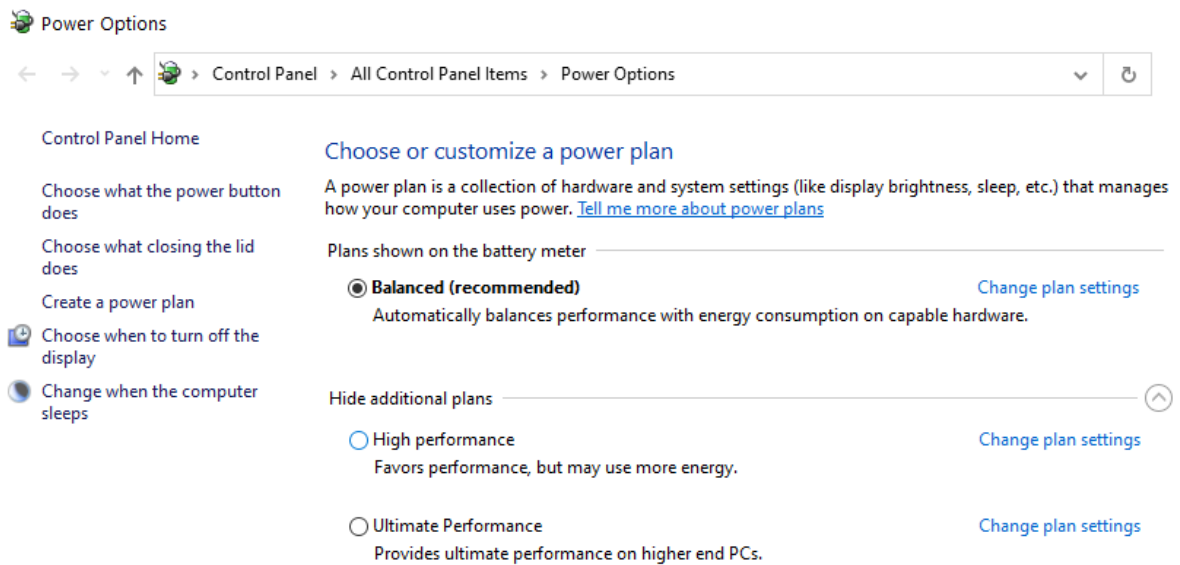
**High Performance:**

*powercfg -duplicatescheme 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c*

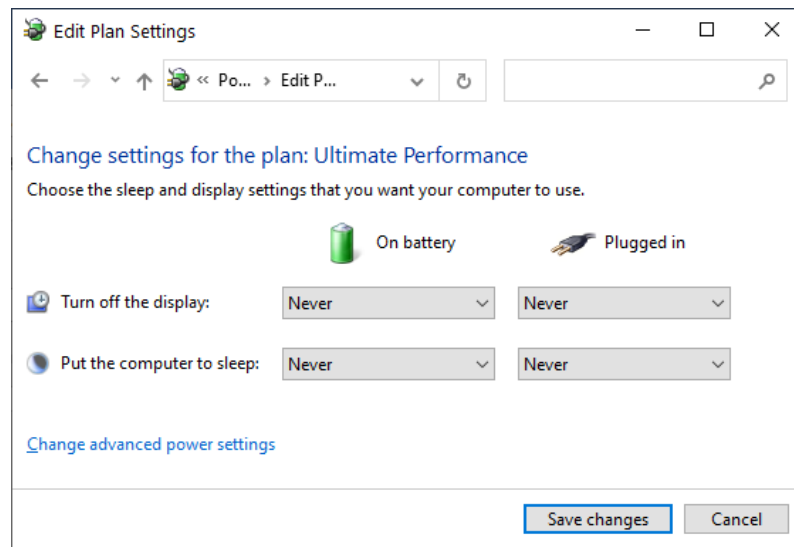
**Ultimate Performance:**

*powercfg -duplicatescheme e9a42b02-d5df-448d-aa00-03f14749eb61*

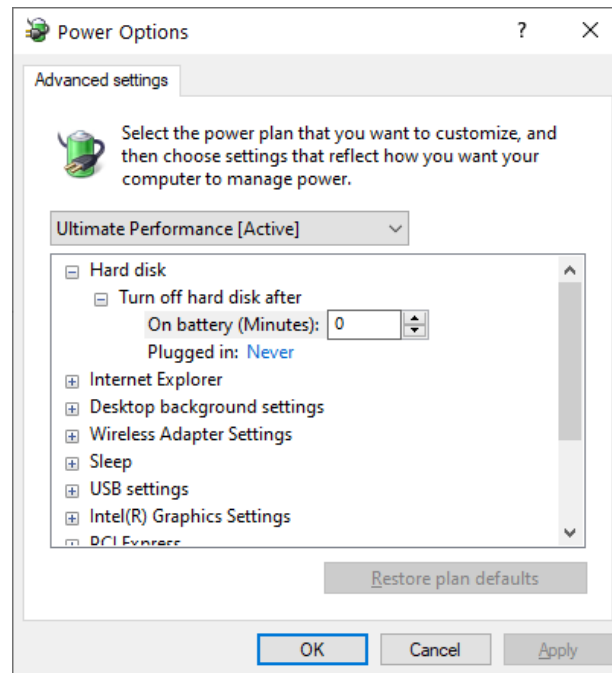
Open your Power Options again and you will see that two additional power plans are now available:



We will use the **Ultimate Performance** power plan and optimize it further for our audio-processing scenario; select it and click on **Change plan settings**:



If not already selected by default, choose **Never** for every combo box, and then click on **Change advanced power settings**:



Many options are correctly configured by default for this power plan, e.g. see the **Hard disk** section above. You definitely do not want Windows to turn off your hard drives, whether you are running on battery or plugged in. We do however recommend that you always plug in your laptop for your live performance.

Set the other options accordingly (use the same parameters for both *On battery* and *Plugged in* modes):

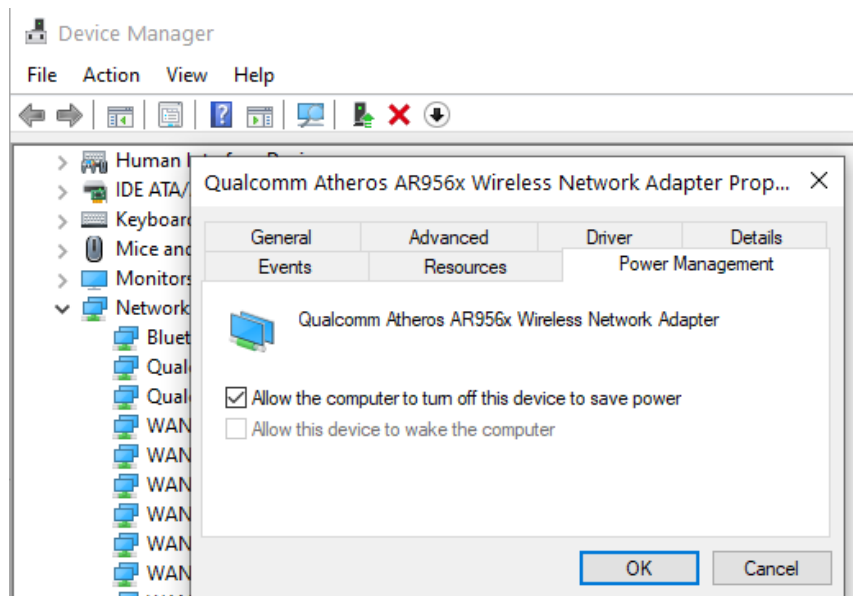
- **Internet Explorer** -> JavaScript Timer Frequency: **Maximum Power Savings**; although this setting affects IE users only, we do not want to pay much attention to JavaScript execution here.
- **Desktop background settings** -> Slide show: **Paused**; although a background slideshow on your desktop is quite an appealing feature, turn it off, as you do not want to spend even a bit of CPU power for this during your gig.
- **Wireless Adapter Settings** -> Power Saving Mode: **your choice**. If you did not disable your wireless adapter (in the previous chapter) you are probably using it to send OSC/MIDI messages to your audio plugin host or a DAW, so set it to **Maximum Performance**.
- **Sleep** settings are correctly configured for the Ultimate Performance power plan. You do not want your PC to go into Sleep, Hybrid sleep or Hibernation mode during your performance.
- **USB settings** -> USB selective suspend setting: **Disabled**; every PC used for live performance is going to be using some USB devices, such as a USB audio interface, USB MIDI keyboards or possibly even a USB mouse. You do not want these USB devices to be suspended while you are gigging.
- **Intel(R) Graphics settings**: leave as is (Maximum Performance).

- **PCI Express** -> Link State Power Management: **Off**; this means we do not want any power savings, and the PCI Express will stay active regardless of the state of the PC or laptop.
- **Processor Power Management** -> set both **Minimum** and **Maximum processor state** to **100%**; this means we do not want to use any CPU power saving mechanisms, so the CPU is always ready for processing at full capacity. Additionally, set **System Cooling Policy** to **Active** (if this setting is available). This means that the operating system will not reduce your CPU power to cool it down, but instead will increase the speed of your fans.
- **Display**: leave as is (Never).
- **Multimedia Settings**: leave the default configuration of these settings for this power plan.
- **Battery**: leave the default configuration of these settings for this power plan.

After you configure these settings, click on the **OK** button to save your changes.

## 4.2 Device power management

When you open your **Device manager**, you may notice that some devices have the **Power Management** tab in their **Properties**:



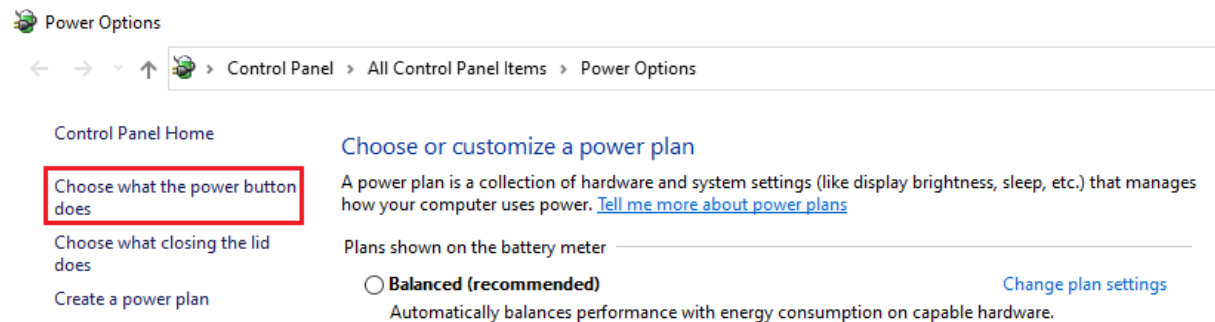
Such devices include **Network adapters** and **Universal Serial Bus controllers**; right click on one of these devices -> Properties -> Power Management and untick the option: *Allow the computer to turn off this device to save power*.

### 4.3 Fast Startup

Another power option you may want to consider turning off is **Fast Startup**. This feature is designed to reduce the time it takes for the PC to boot up. If you enable the Fast Startup feature and shut down your PC it looks like it is completely shut down; however, your PC has entered a state between hibernation and shutdown. Your PC does not really shutdown completely and consequently audio glitches and distortions may occur when you turn it back on.

These problems are due to compatibility issues with audio devices that do not support sleep mode or hibernation. Examples are [some UAD devices](#), where we strongly recommend that you disable the Fast Startup feature.

As shown above, click on the **Start** button and type: *choose a power plan* to open your **Power Options**:




Click on the **Choose what the power button does** option:







### Define power buttons and turn on password protection

Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans.

 [Change settings that are currently unavailable](#) **1**

#### Power button and lid settings

	 On battery	 Plugged in
 When I press the power button:	<div>Sleep</div>	<div>Turn off the display</div>
 When I close the lid:	<div>Shut down</div>	<div>Do nothing</div>

#### Shutdown settings

- ☒ **Turn on fast startup (recommended)** **2**  
This helps start your PC faster after shutdown. Restart isn't affected. [Learn More](#)
- ☒ **Sleep**  
Show in Power menu.
- ☒ **Hibernate**  
Show in Power menu.
- ☒ **Lock**  
Show in account picture menu.

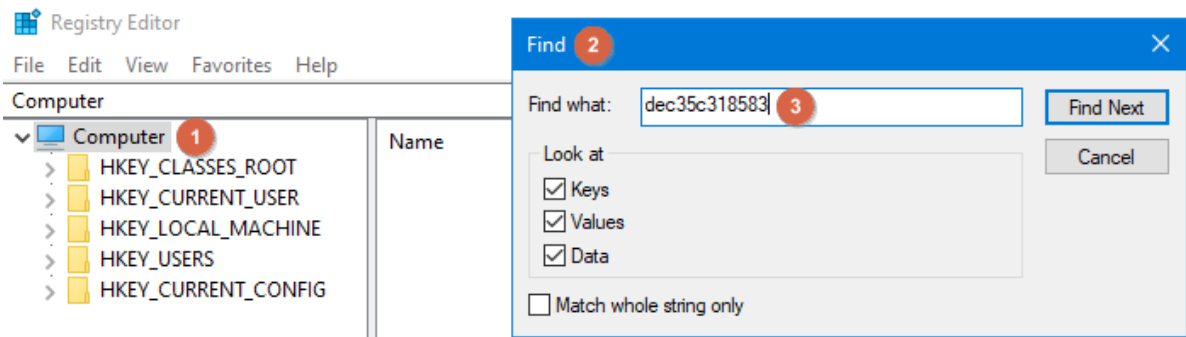
Click on **Change settings that are currently unavailable (1)** and then uncheck **Turn on fast startup (2)**.

## 4.4 Core parking

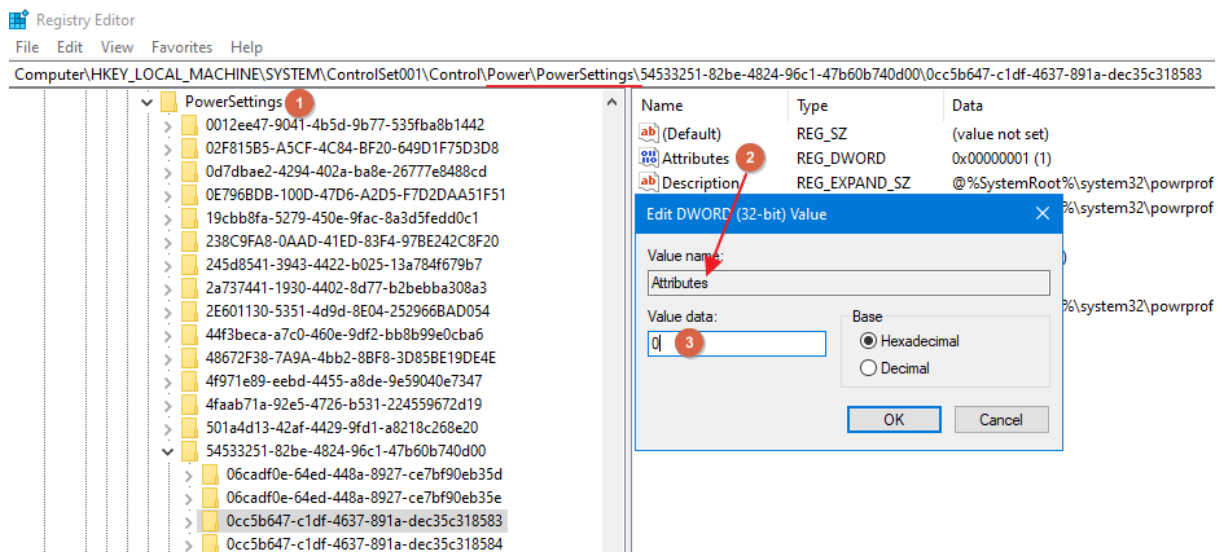
We conclude this chapter with one last thing to review: the hidden [core parking](#) power plan setting. The core parking feature enables you to completely shut down CPU cores to save power. Although this feature should be disabled in Windows 10 and Windows 11 high performance power plans by default, you might want to double-check this power setting to confirm it is disabled.

To unhide this setting, we need to use the **Registry Editor**. **Note:** Refer to chapter *Other best practices and tips* to make a registry backup before proceeding.

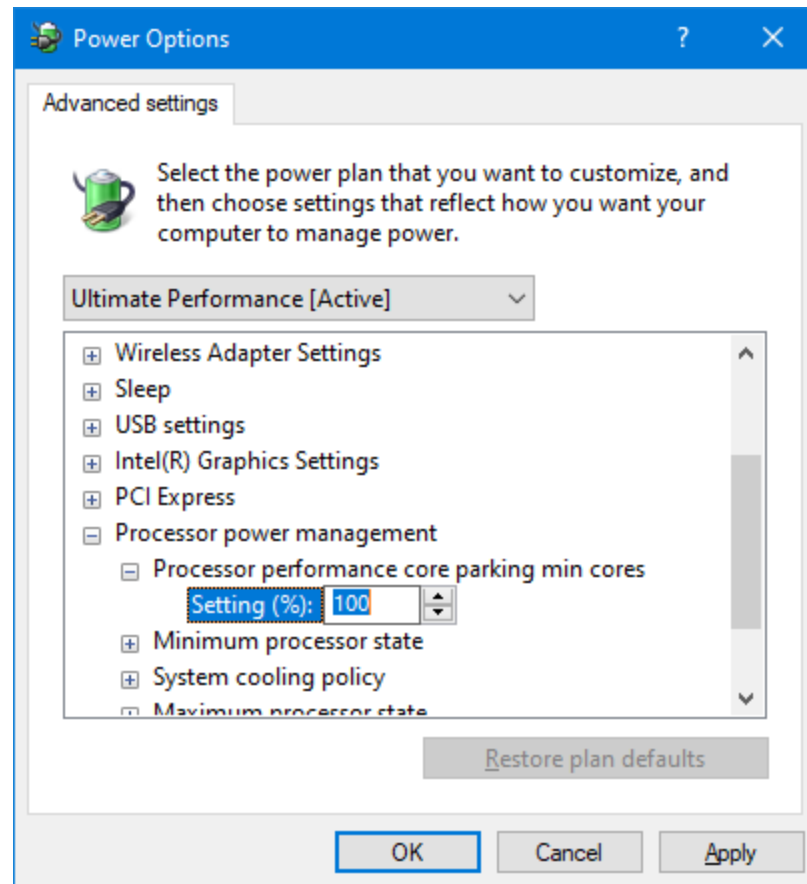
Press the **Win key + R** combination to open the Run dialog, type in **regedit** and click on the **OK** button:



Click on the **Computer** (1), then open the **Find** dialog (2) by pressing the key combination **CTRL+F**, and type in **dec35c318583** as shown in the picture above (3). Press the **F3** key or click on the **Find Next** button to start searching:



Make sure your search results are related to **PowerSettings** (1), and ignore other search results not related to PowerSettings. Double click on the **Attributes** value (2), and type in **0** as the **Value data** parameter (3). Repeat the search by pressing the **F3** key, as there might be more entries related to PowerSettings (ignore all other entries) and set the **Attributes** value data to **0**. Once you are done, open your power plan, as explained in the beginning of this chapter, and navigate to the now visible setting called **Processor performance core parking min cores**, and make sure it is set to **100%** :



























This way you make sure that CPU cores will not be parked which will prevent delays when Windows is parking and unparking CPU cores. These delays may lead to drop-outs in intensive real-time audio processing.

## 5 Control what is running in the background

In this chapter, we will remove all unnecessary programs, features and services, and configure their startup mode. Afterwards, we will deal with Windows privacy issues, and conclude with other tips.

### 5.1 Remove all unnecessary programs

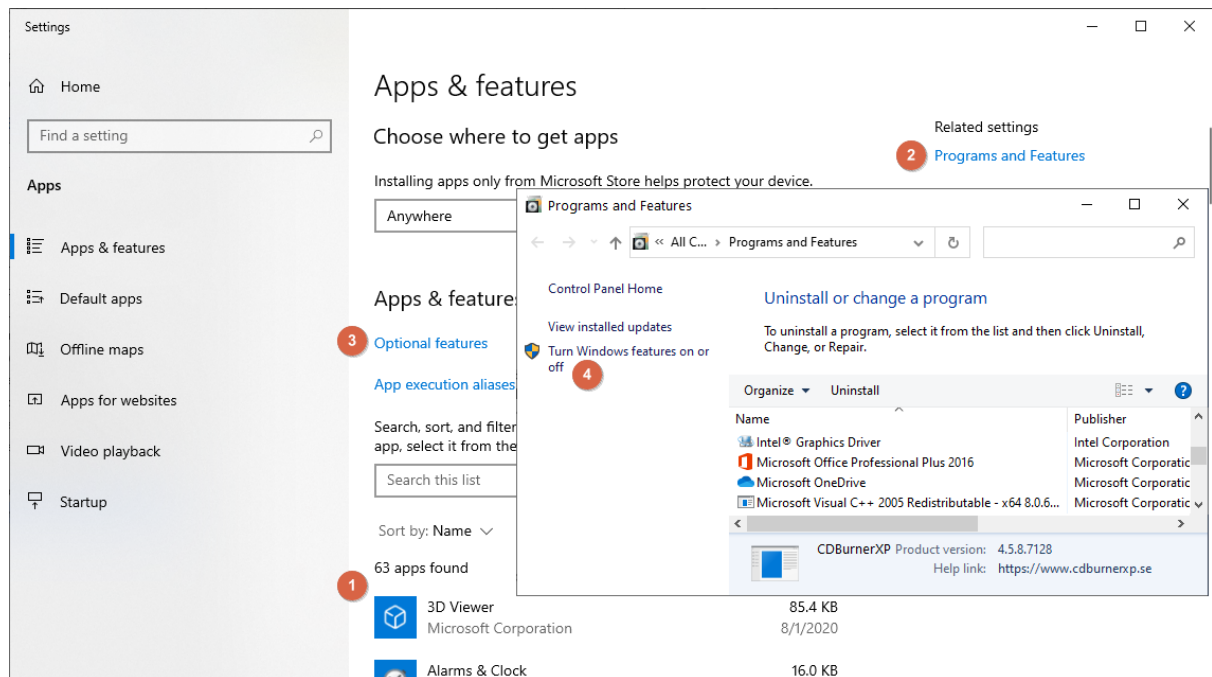
PCs and laptops with preinstalled Windows often come with many unnecessary applications which can be removed with no consequences. Such products include third-party security software, various trial applications and so on. These applications may already be running in the background and consuming RAM and CPU cycles. Owners of some brand-name PCs and laptops are familiar with this and here is a typical example from one such brand:

 HP Client Security Manager	HP Inc.	2019/2/12	88.6 MB 9.3.6.2475
 HP Create Control Panel	HP Inc.	2019/2/12	6.3.25-4
 HP Device Access Manager	HP Inc.	2018/2/26	33.4 MB 8.4.10.0
 HP Documentation	HP Inc.	2019/2/12	1.0.0.1
 HP DreamColor Assistant	Portrait Displays, Inc	2019/2/12	176 MB 1.0.8.128
 HP ePrint SW	HP Inc.	2019/2/12	62.0 MB 5.3.22034
 HP ESU for Microsoft Windows 10	HP	2018/1/18	1.71 MB 11.3.1
 HP Hotkey Support	HP	2018/1/18	19.2 MB 6.2.39.1
 HP JumpStart Apps	HP Inc.	2019/2/12	122 MB 7.0.32
 HP JumpStart Bridge	HP Inc.	2018/2/26	15.3 MB 1.3.0.407
 HP JumpStart Launch	HP Inc.	2018/2/26	433 KB 1.3.392.0
 HP MAC Address Manager	HP	2018/2/26	512 KB 1.1.11.1
 HP Notifications	HP	2018/1/18	18.4 MB 1.1.5.1
 HP Performance Advisor	HP Inc.	2018/2/26	20.8 MB 2.0.2009
 HP SoftPaq Download Manager	HP	2018/2/26	41.8 MB 4.3.19.0
 HP Software Setup	HP	2018/2/26	2.32 MB 9.2.3
 HP Support Assistant	HP Inc.	2018/2/26	55.7 MB 8.5.37.19
 HP Support Solutions Framework	HP Inc.	2018/2/26	7.89 MB 12.10.49.21
 HP Sure Connect	HP Inc.	2018/2/26	1.0.31.0
 HP System Default Settings	HP Inc.	2018/2/26	1.62 MB 1.2.12.2
 HP Universal Camera Driver	Realtek Semiconductor Corp.	2018/2/26	10.0.15063.11285
 HP USB Audio	Conexant	2019/2/12	1.31.36.23
 HP Velocity	HP Inc.	2019/2/12	15.1 MB 3.2.0.24905
 HP Wireless Button Driver	HP	2018/2/26	2.07 MB 1.1.21.1

Make yourself familiar with all the installed software on your computer to determine which applications can be safely removed. We recommend creating a system backup before you start removing unnecessary software from your PC. Such software might include various download managers, “app explorers”, support assistants, etc.

Use the **Win key + X** combination to open the Quick Access Menu and select **Apps and Features**.

The **Apps & features** window appears through which modern UWP apps (formerly Metro apps) and unwanted traditional desktop applications can be removed, see (1):



Remove UWP apps you do not use here, such as: 3D Viewer, Mail and Calendar, Microsoft Solitaire Collection, Mixed Reality Portal, Skype, Snip & Sketch, Weather, Xbox Console Companion, Xbox Live, Voice Recorder, Movies & TV, Paint 3D, One Note, Feedback Hub, and Groove Music.

Some of these applications cannot actually be uninstalled, such as Your Phone, so instead click on each of them, select **Advanced Options**, and under **App permissions** -> **Background apps** click the toggle button to show **Off**. You do not want these applications running in the background:

## Your Phone

### Specifications

Publisher	Microsoft Corporation
Version	1.20071.95.0
App	0 bytes
Data	181 KB
Total usage	181 KB

### App permissions

Background apps

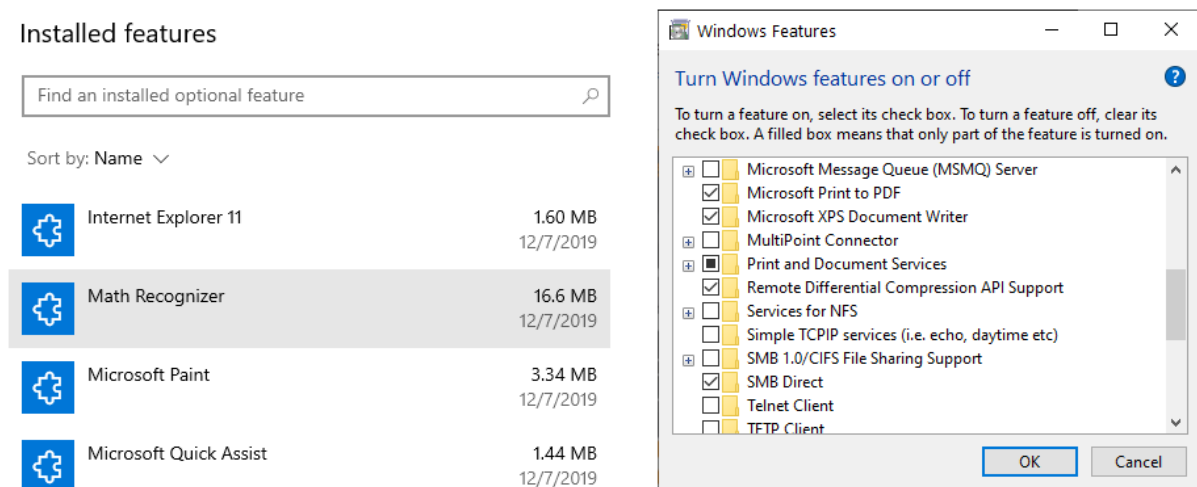


Click on **Programs and Features (2)** to open the control panel applet **Programs and Features**, where only desktop applications can be removed; remove all unnecessary applications, e.g. various cloud storage applications, if you do not use them. Be careful not to remove important applications and libraries such as Microsoft Visual C++ Redistributable as these are necessary for running your audio software.

Make sure you understand the purpose of specific applications and/or are certain you do not need them before actually removing them.

## 5.2 Remove unnecessary features

Look at the screenshot from the previous section where **Apps & features** are shown: **(3)** and **(4)** are places where you can list features on your Windows 10 operating system. Here is a side-by-side view of these windows:



Look on the left window and remove all installed features you do not need; for example, you may not need the Math Recognizer, a feature for recognizing handwritten math expressions, on your audio computer. On the right window, you can safely delete the Microsoft XPS Document Writer. XPS was intended to be a competitor to Adobe PDF, but due to widespread acceptance of the PDF format, XPS remains unused by most people.

Make sure you understand the purpose of these features before removing them.

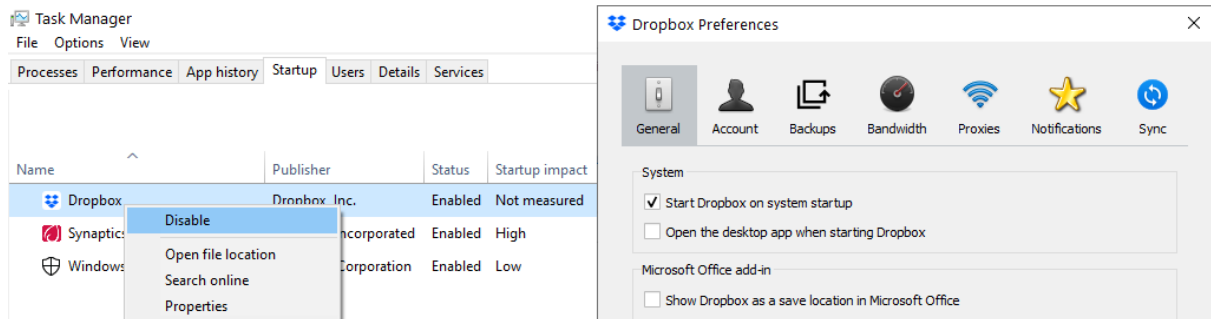
To access *Optional features* on Windows 11, click on the **Start** button, type in "Optional features" and then click on the **Optional features** setting.

From that window you can access the **Windows Features** window - just click *More Windows features* under the Related settings.



### 5.3 Control which programs run on Windows startup

When you install certain applications, such as various cloud-based services, they automatically run in the background after Windows starts running, and may often place icons in the Notification area. To see which programs run on Windows startup, click on the **Start**, type in "task manager" and then click **Task Manager** (or use the key combination: Ctrl+Shift+Esc):



Click on the **Startup** tab to see the list of applications that run automatically; right click on each line and select **Disable** for each application to prevent it from running automatically.

Many of those programs have their icon displayed in the Notification area and allow you to control their startup behavior through their Preferences.

Review these applications and disable all the ones you do not need.

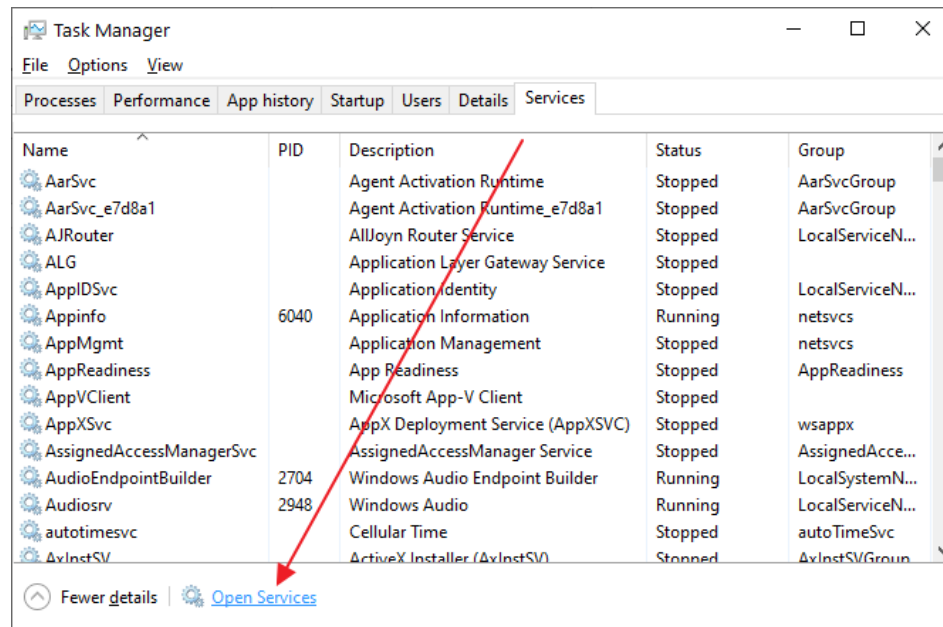
### 5.4 Optimizing Windows Services

Windows services are long-running executable applications that run in their own Windows sessions. These services can be automatically started when the computer boots, and they do not show any user interface.

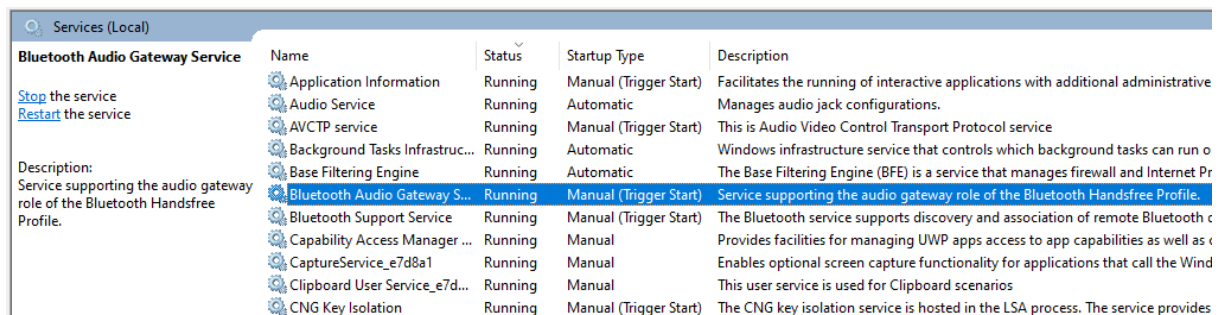
Windows services are programs that run unattended in the background, often continuing to run even if no user is logged in. They are used to implement functionality such as mail or cloud services, time services and other ongoing operations independent of users.

As you may have guessed, there are many unnecessary Windows services that you do not need and so can be turned off on your audio-processing and live-performance PC.

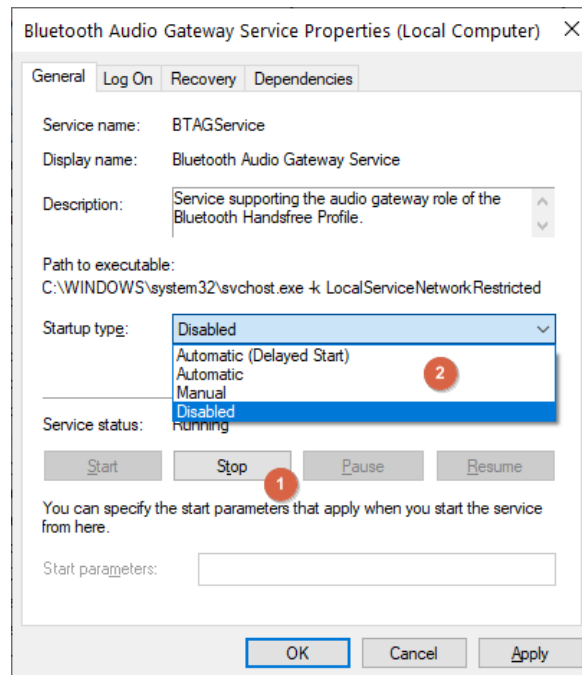
Open your **Task Manager**, as shown in the previous section, and click on the **Services** tab:



Although you can review the status of your services from here and start, stop or restart them, click on the **Open Services** button to open the **Services** management tool, as it provides more control of your services:



Read the description of your services and identify which ones are unnecessary (we have a list of 40 or so to get you started below). Double click on a service to see what options are available to control its behavior:



Click on the **Stop** button to stop this service, and set the Startup type to **Disabled**. When you reboot your computer, this service will not run in the background.

Carefully review your services. Here is a list of **40 services** you might want to **disable** if they exist on your system:

- **AllJoyn Router Service** – if you do not use smart devices (e.g. smart bulb) or do not want to control them through your PC.
- **AVCTP service** – if you do not use Bluetooth Audio Devices or Wireless Headphones.
- **BitLocker Drive Encryption Service** – if you do not use BitLocker storage encryption.
- **Bluetooth Audio Gateway Service** – if you do not use a Bluetooth audio handsfree device on your gig.
- **Bluetooth Support Service** – if you do not use any Bluetooth devices.
- **Bluetooth User Support Service** – if you do not use any Bluetooth devices.
- **Connected User Experiences and Telemetry** – unless you want to send your data to Microsoft so they can assess and analyze how you are using Windows on a daily basis.
- **Downloaded Maps Manager** – if you do not use the Bing Maps app on your PC.

- **Fax** – disable it unless you want fax sending and receiving capabilities on your PC.
- **GameDVR and Broadcast User Service** – this service is used for Game Recordings and Live Broadcasts, so if you do not use it – disable it.
- **Geolocation Service** – this service shares your location with apps.
- **HV Host Service** – a service related to the Hyper-V hypervisor. Presumably you do not run any virtual machines on your PC/laptop dedicated to real-time audio processing tasks.
- **Hyper-V Data Exchange Service** – a service related to the Hyper-V hypervisor.
- **Hyper-V Guest Service Interface** – a service related to the Hyper-V hypervisor.
- **Hyper-V Guest Shutdown Service** – a service related to the Hyper-V hypervisor.
- **Hyper-V Heartbeat Service** – a service related to the Hyper-V hypervisor.
- **Hyper-V PowerShell Direct Service** – a service related to the Hyper-V hypervisor.
- **Hyper-V Remote Desktop Virtualization Service** – a service related to the Hyper-V hypervisor.
- **Hyper-V Time Synchronization Service** – a service related to the Hyper-V hypervisor.
- **Hyper-V Volume Shadow Copy Requestor** – a service related to the Hyper-V hypervisor.
- **IP Helper** – you can disable it if you do not use IPv6 connections.
- **Netlogon** – disable if you are not on a domain controller (Active Directory) environment.
- **Parental Controls** – safe to disable.
- **Phone service** – this legacy service manages the telephony state on the device.
- **Print Spooler** – disable it if you do not have a printer attached to your PC/laptop.
- **Printer Extensions and Notifications** – disable it if you do not have a printer attached to your PC/laptop.
- **Remote Registry** – disable it to prevent remote access to your Registry.
- **Retail Demo Service** – this unnecessary service allows your PC to run in demo mode to showcase the operating system's features to potential customers or resellers.
- **Secondary Logon** – disable this service if you are either the administrator or the only user of your PC.

- **TCP/IP NetBIOS Helper** – this service provides legacy support for NetBIOS over TCP/IP. If your network does not use NetBIOS and/or WINS for file and printer sharing, disable this service. See more information [here](#).
- **Telephony** – provides telephony API support for programs that control telephony devices through a LAN.
- **Touch Keyboard and Handwriting Panel Service** – disable if your PC/laptop doesn't have a touch-enabled screen.
- **Windows Error Reporting Service** – disable unless you want to send error reports to Microsoft.
- **Windows Image Acquisition** – disable if you do not use a scanner.
- **Windows Camera Frame Server** – disable if you do not use a webcam or an integrated camera.
- **Windows Insider Service** - the Windows Insider Program enables power users to test upcoming builds of Windows before they are available to the general public. Disable it as you will not want to risk any instabilities.
- **Windows Mixed Reality OpenXR Service** – disable if you do not use HoloLens 2 and immersive devices like Windows Mixed Reality headsets.
- **Xbox Accessory Management Service** – another service for gamers that you do not need.
- **Xbox Live Auth Manager** – another service for gamers that you do not need.
- **Xbox Live Networking Service** – another service for gamers that you do not need.

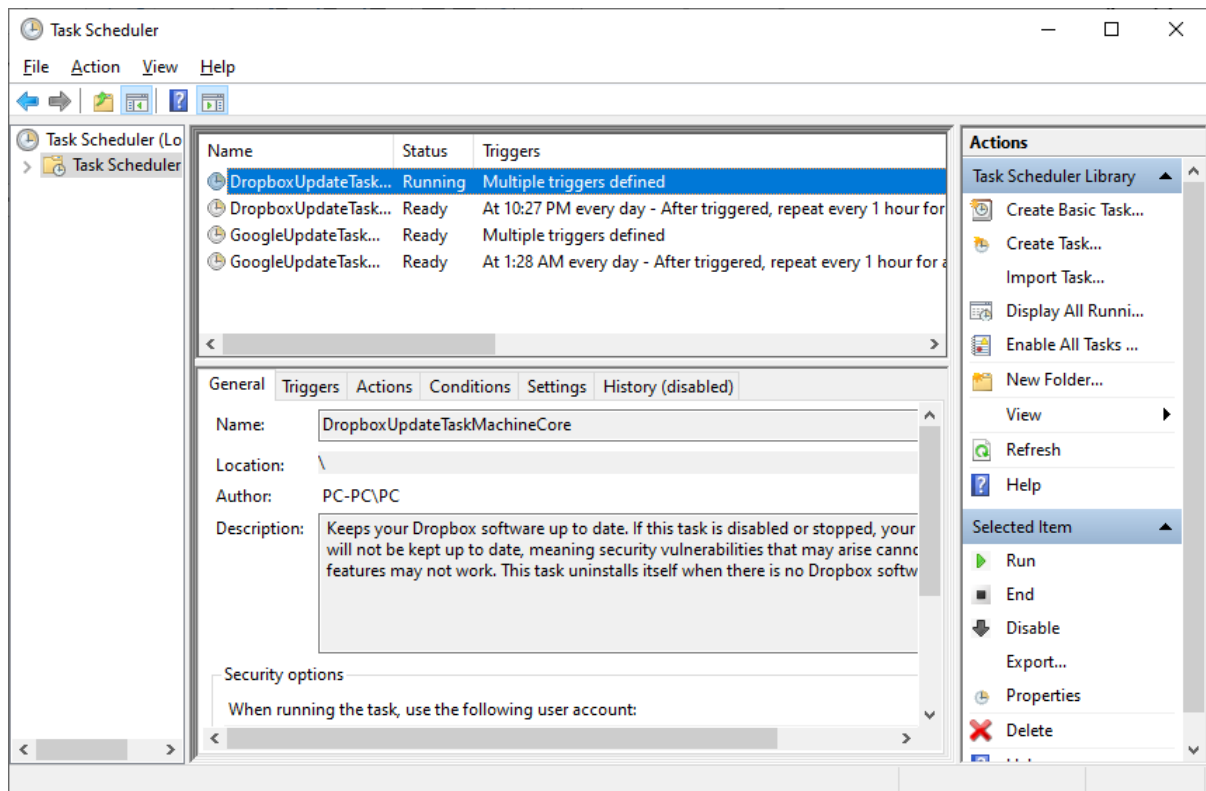
There are other services that you might want to consider disabling. Please refer to the chapters below where update mechanisms are discussed.

## 5.5 Task scheduler

The Task Scheduler is a Windows tool to schedule the launch of programs or scripts at pre-defined times. Many software update methods or backup activities rely on the Task Scheduler.

You definitely do not want to update your software or perform automatic backups and negatively impact your CPU, RAM and storage in the middle of your gig. Execution of these tasks during your gig will almost certainly cause latency issues, audio glitches or other unwanted behavior.

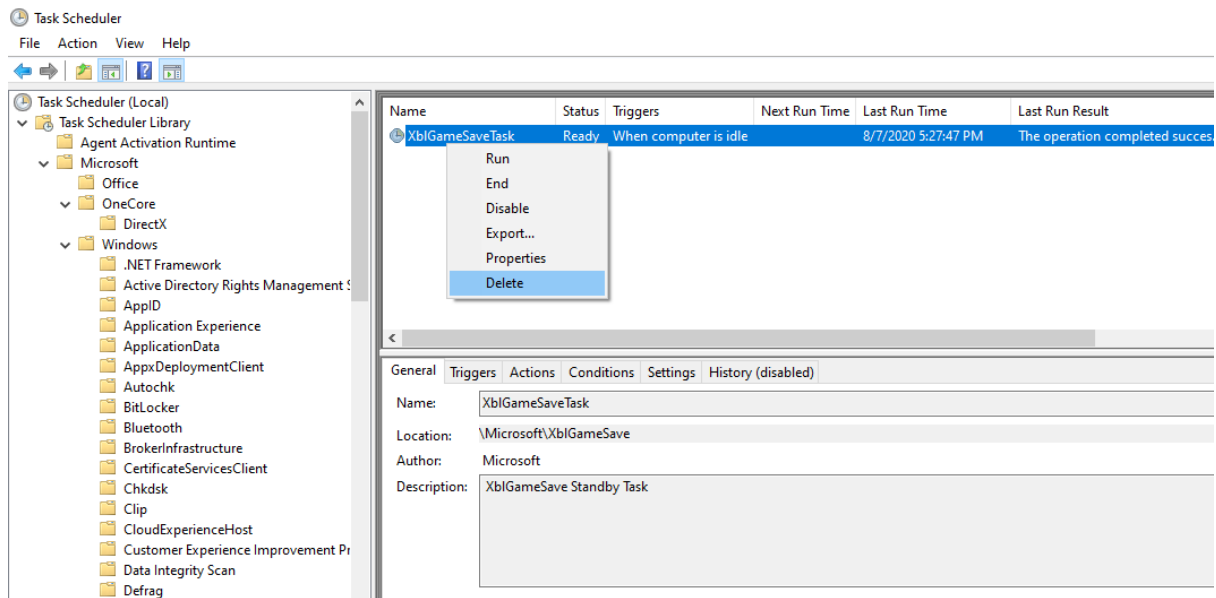
Click on the **Start** button, type in "task scheduler", and then click on **Task Scheduler**:



Click on **Task Scheduler Library** to show your scheduled tasks. Note that these tasks are often scheduled to run late at night, like the Dropbox Update Task, just when you might be in the middle of your gig. We recommend that you disable all tasks before your live performance (or to re-schedule them, at least) so you are sure that unwanted tasks and programs do not run in the background during your performance. Right click on each scheduled task and select **Disable** to disable it. Double click on each scheduled task to edit its various parameters (triggers, actions, schedule, etc.).

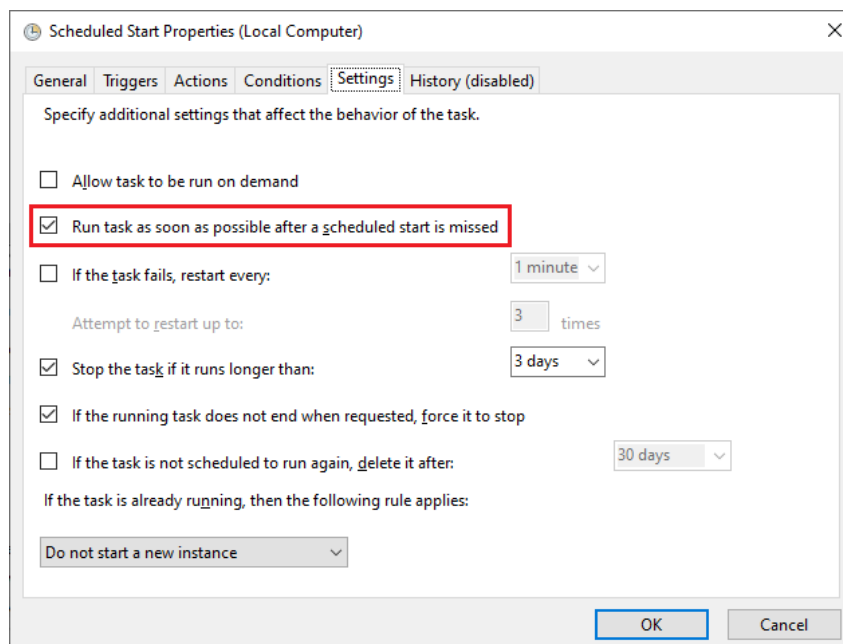
We are not done yet, that was just the tip of the iceberg! Expand the Task Scheduler Library and you will see many scheduled tasks that are organized in folders and need your review:





Review tasks that are triggered **when the computer is idle**.

Another option to review for each task is *Run the task as soon as possible after a schedule start is missed*:



You do not want to run lots of tasks when you power on your PC and prepare for your gig, if those tasks did not execute when scheduled. We suggest that you untick this check box.

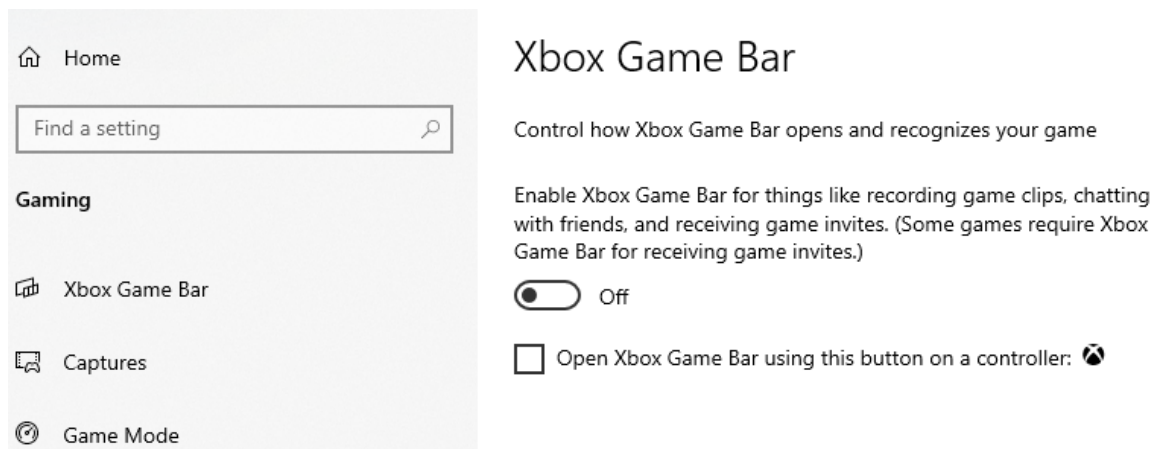
Carefully review these tasks, as there is a description available for every task, their scheduled time for execution and what triggers them. Afterwards do the following:

- While you should not just delete tasks arbitrarily, **it may make sense to delete** all tasks you are absolutely sure you are never going to need. For example, if you do not have an Xbox, you might want to delete all **Xbox**-related tasks. You might also delete all the **Customer Experience Improvement Program** tasks as you probably do not need tasks that collect and send usage data to Microsoft from your PC.
- If you do not need some tasks now but you might need them in the future, then rather than deleting them, you can **Disable** them instead. Such tasks might include **Bluetooth** or **DiskCleanup** tasks. We recommend that you run the Disk Cleanup utility manually once in a while to clean your drive of unnecessary files.
- **Reschedule** other tasks so as not to overlap with the period of your live performance. Good examples are **System Restore** or **Windows Backup** tasks.

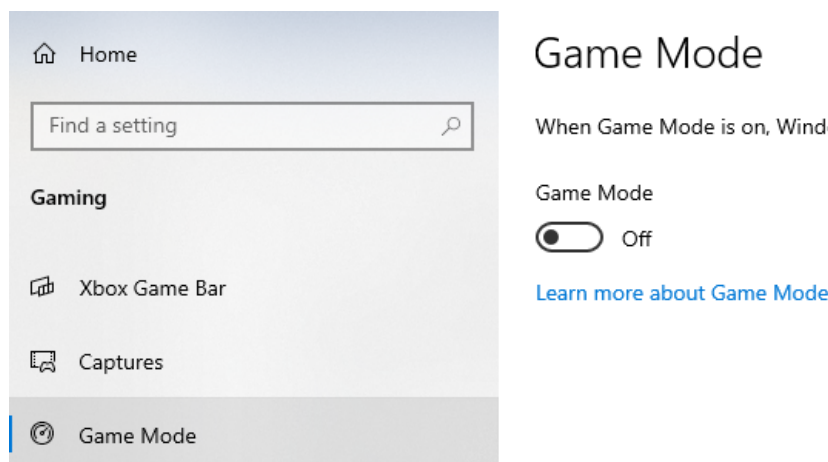
This way you have more control over your scheduled tasks.

## 5.6 Xbox Game bar and Game Mode

Speaking of unneeded features, we have mentioned Xbox apps, services and tasks. In this section we want to make sure that the focus of your optimizations is on audio rather than on gaming. Click on the **Start** button, then **Settings** and select **Gaming**:



**Turn off** all features here, including the **Xbox Game Bar**, Captures -> **Background recording**, and **Game mode**:



This way you are sure your PC is not optimized for playing video games at the expense of your needs for live performance.

## 5.7 Cortana

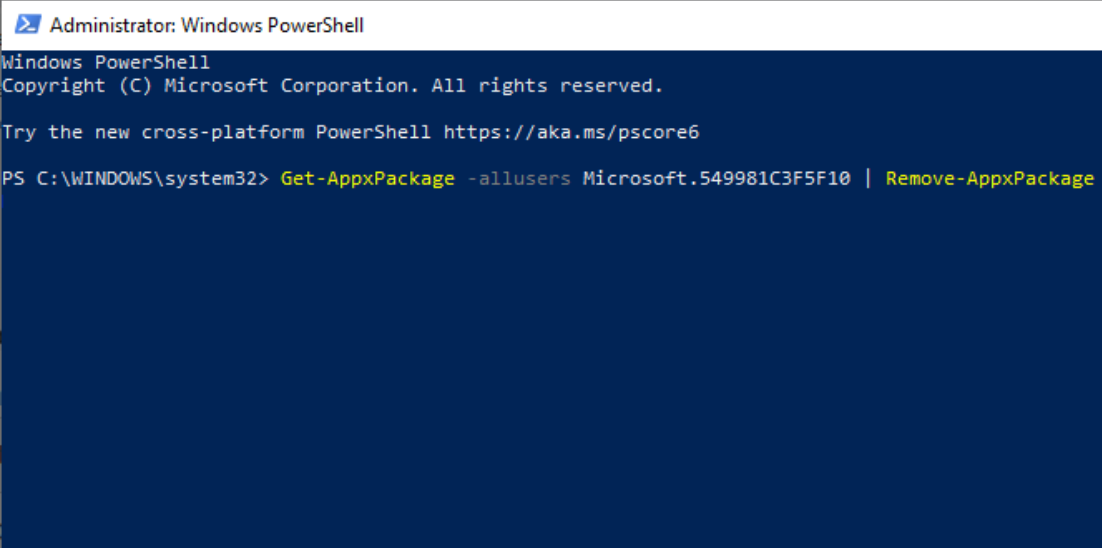
Microsoft's digital assistant Cortana is a standalone app and it is no longer an integral part of the Windows platform, as of the Windows 10 May 2020 Update.

As of that version, you must be signed in to use Cortana. When you are signed in, Cortana learns about you using information such as your searches, calendar, contacts, and location. Cortana can access your calendar, email, messages and other data by default.

By default, Cortana app is added to the Startup programs and so is started automatically when you turn on your PC. If you do not use Cortana or you want to disable its background presence on Windows 10 and Windows 11, you can disable it from the Task Manager, as shown in section *Control which programs run on Windows startup*.

If you cannot find Cortana in the Startup section in your Task Manager, you can completely remove it through the PowerShell. If you remove it, you will free up CPU cycles and some RAM, and have one less privacy concern.

To completely remove Cortana through your PowerShell, press **Win key + X** to open the Quick Access Menu, and select **Windows PowerShell (Admin)** (or **Windows Terminal (Admin)** on Windows 11):



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\WINDOWS\system32> Get-AppxPackage -allusers Microsoft.549981C3F5F10 | Remove-AppxPackage
```

Copy the following command to your clipboard:

```
Get-AppxPackage -allusers Microsoft.549981C3F5F10 | Remove-AppxPackage
```

then paste it into the terminal window and press Enter to remove Cortana.

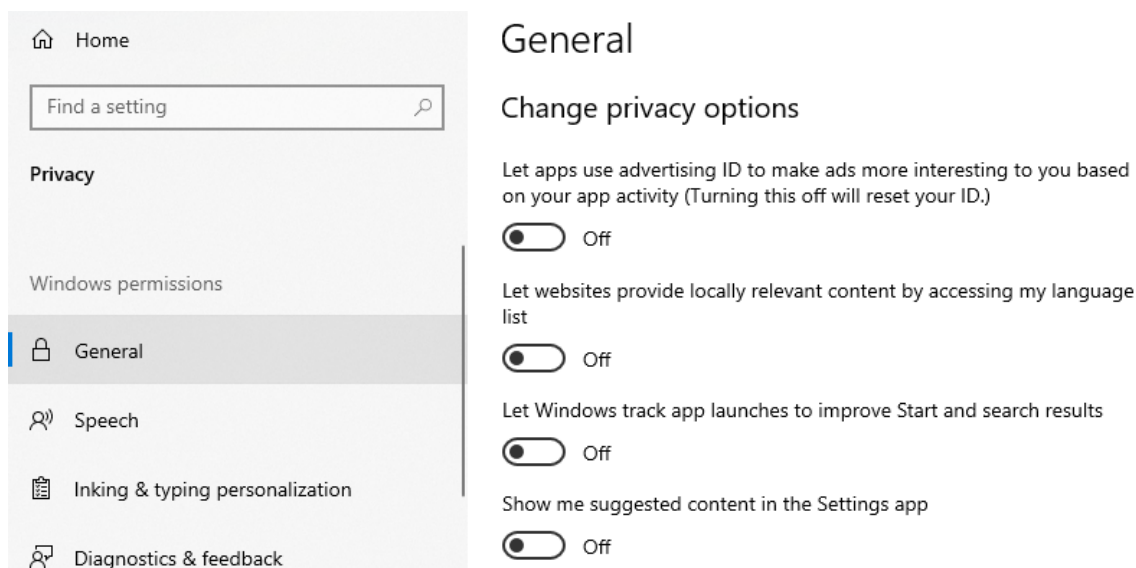
If you change your mind later you can always re-install Cortana from the Microsoft Store, as it is just a standalone app.

## 5.8 Windows Privacy settings

We finish this chapter by reviewing Windows privacy settings. Various data collection procedures run in the background by default and send the collected data to Microsoft.

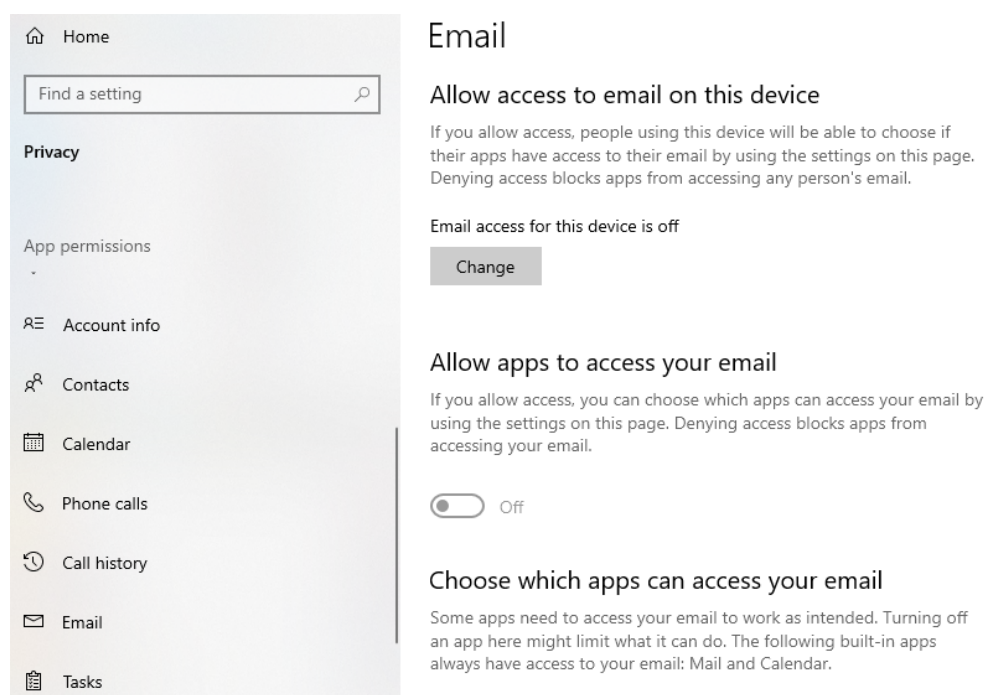
As seen in the previous sections, services, scheduled tasks, and the Cortana digital assistant are used for collecting and sending data to Microsoft. Unless you want to send this data to Microsoft, we recommend that you review your privacy settings, and remove the triggers for collecting and sending data to Microsoft in background.

Click on the **Start** button, type in **Privacy settings** and then click on **Privacy settings**:



There are many settings here, such as online speech recognition, typing history, diagnostic and feedback data, tailored experiences, activity history, among others that you might want to turn off.

You may also want to adjust app permissions here, e.g. which applications have access to your location, camera, microphone, calls, e-mails, and which can run in the background:



Carefully review these settings and turn off all unneeded ones.

In the next chapter we focus on the numerous update mechanisms that may run in the background while you are performing live.

**Note:** make sure to review privacy and tracking settings of your plugins as well. Tracking mechanisms of some plugins can heavily impact your CPU usage. Read [this blog article](#) for such an example.

## 6 Update mechanisms

In this chapter we cover the numerous mechanisms that update your operating system and applications such as updates through the Microsoft Store, Windows Update, antivirus updates and others.

**The best practice is to turn off all your update mechanisms before your live performance** to make sure automatic updates features do not download new updates and install them in the background. Auto-installation of new updates might significantly interfere with your live performance and cause many unwanted issues.

We recommend that you always perform manual updates and then test your whole PC-based setup, including whole gig and plugin setup, many weeks in advance before you go on tour or perform live. This will give you time to address any issues you encounter.

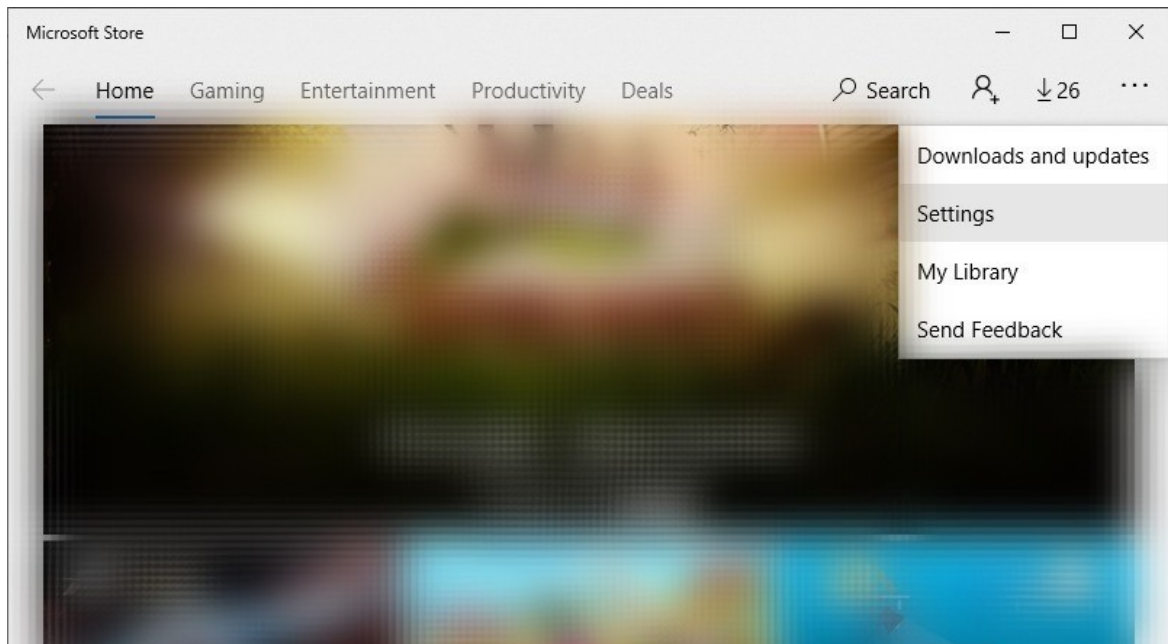
**Note:** some updates from Microsoft may cause Gig Performer to think you are on a different computer and you will have to activate it again (it won't use up an additional activation).

We **strongly** recommend that you do not update or upgrade your PC nor any applications while you are on tour to avoid unexpected problems. Windows updates, anti-virus updates and even seemingly unrelated application updates can cause havoc due to underlying changes they may make to the system.

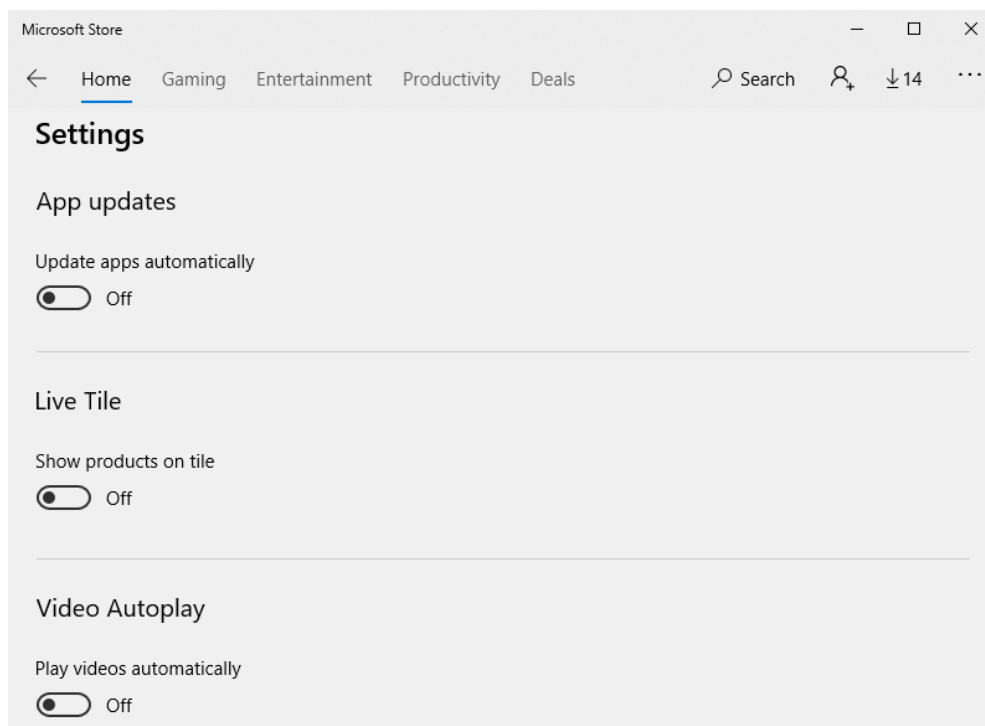
### 6.1 Microsoft Store automatic updates

Microsoft Store apps (modern, UWP apps) are configured to automatically update by default, whether or not you are signed into the Microsoft Store. We recommend that you disable such automatic updates.

On Windows 10, click on the **Start** button and select **Microsoft Store**:



Click on the menu button and select **Settings**:



**Turn off** the option for updating apps automatically.

On Windows 11, click on the **Start** button, type in **Microsoft Store** and then click on the app. Notice that there is no three dots menu and that you need to click on the **Account** icon, and then select **App settings**. Then turn off the **App updates** toggle button.



## 6.2 The Windows Update Service

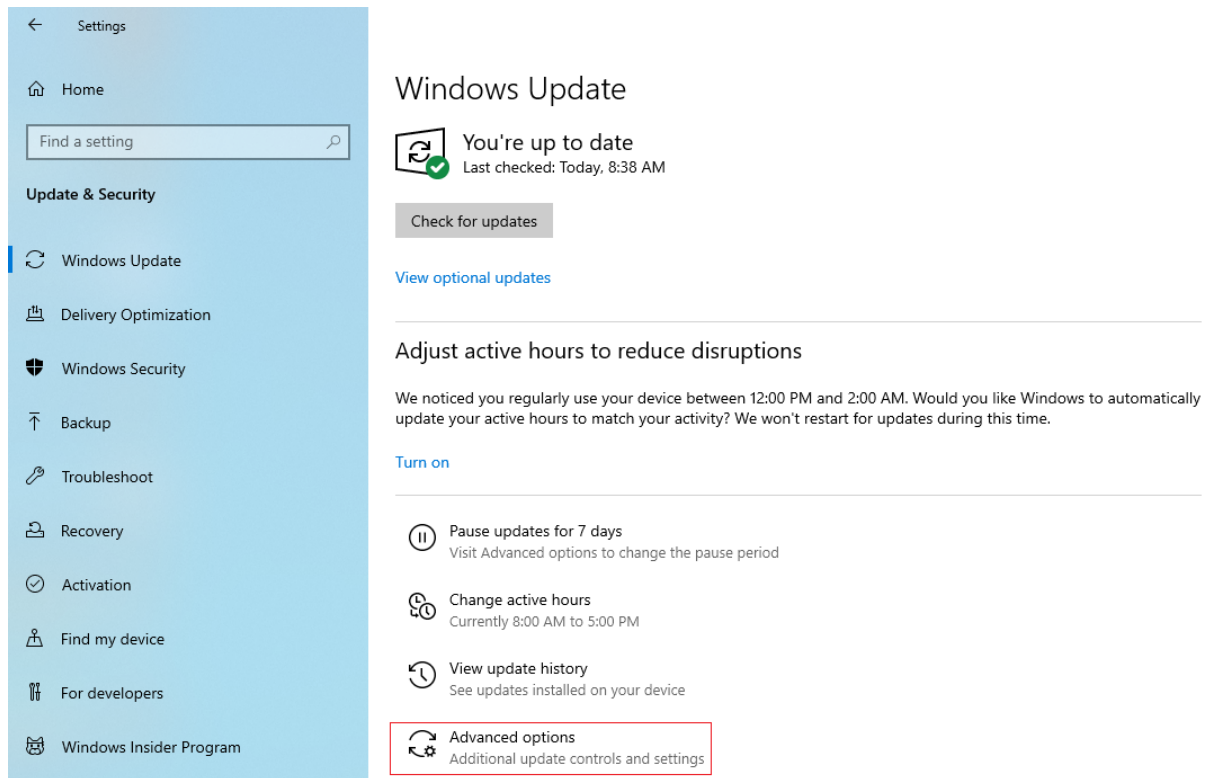
Windows Update is a service that automates downloading and installing Windows software updates over the Internet. This service is configured to regularly check with Microsoft for updates by default.

Since the focus of this guide is to create a stable system that provides maximum audio performance, we will make sure these updates are downloaded and installed in a way that allows you to test the updated PC long before using it for live performance.

The largest Windows updates are **Feature Updates** as they introduce a new set of features and major improvements to the Windows operating system. An example of such an update is Windows 10 May 2021 Update (codenamed "21H1"). See more information [here](#).

The key to a stable Windows PC is the proper configuration of Windows Update. We recommend that you pause Windows Update while you are on tour. You can pause Windows Update for up to 35 days.

On Windows 10, click on the **Start button**, then **Settings**, and select **Update & Security** to open Windows Update settings:



Click on the **Advanced options**:

## Update options

Receive updates for other Microsoft products when you update Windows

☒ On

Download updates over metered connections (extra charges may apply)

☐ Off

Restart this device as soon as possible when a restart is required to install an update. Windows will display a notice before the restart, and the device must be on and plugged in.

☐ Off

## Update notifications

Show a notification when your PC requires a restart to finish updating

☐ Off

## Pause updates

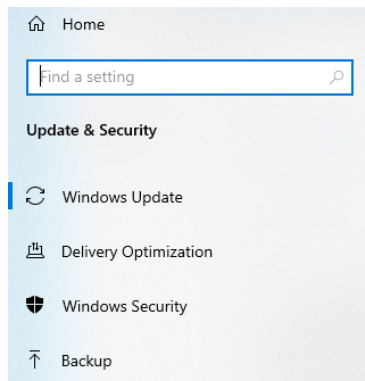
Temporarily pause updates from being installed on this device for up to 35 days. When you reach the pause limit, your device will need to get new updates before you can pause again.

Pause until

Thursday, November 25, 2021 ▾

[Delivery Optimization](#)

Click on the combo box to select a desired date. You will see the new status of your Windows Update service, showing that updates are paused:



## Windows Update



### Updates paused

Your device won't be up to date while updates are paused.  
Updates will resume on 11/25/2021

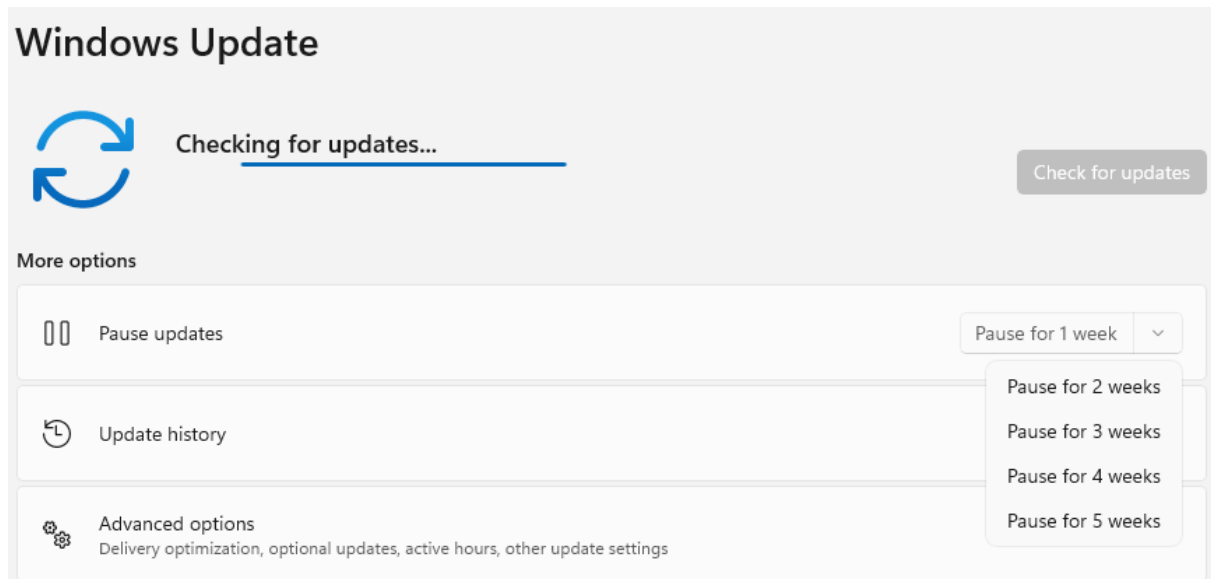
[Resume updates](#)

## Adjust active hours to reduce disruptions

We noticed you regularly use your device between 12:00 PM and 2:00 AM. Would you like Windows to automatically update your active hours to match your activity? We won't restart for updates during this time.

[Turn on](#)

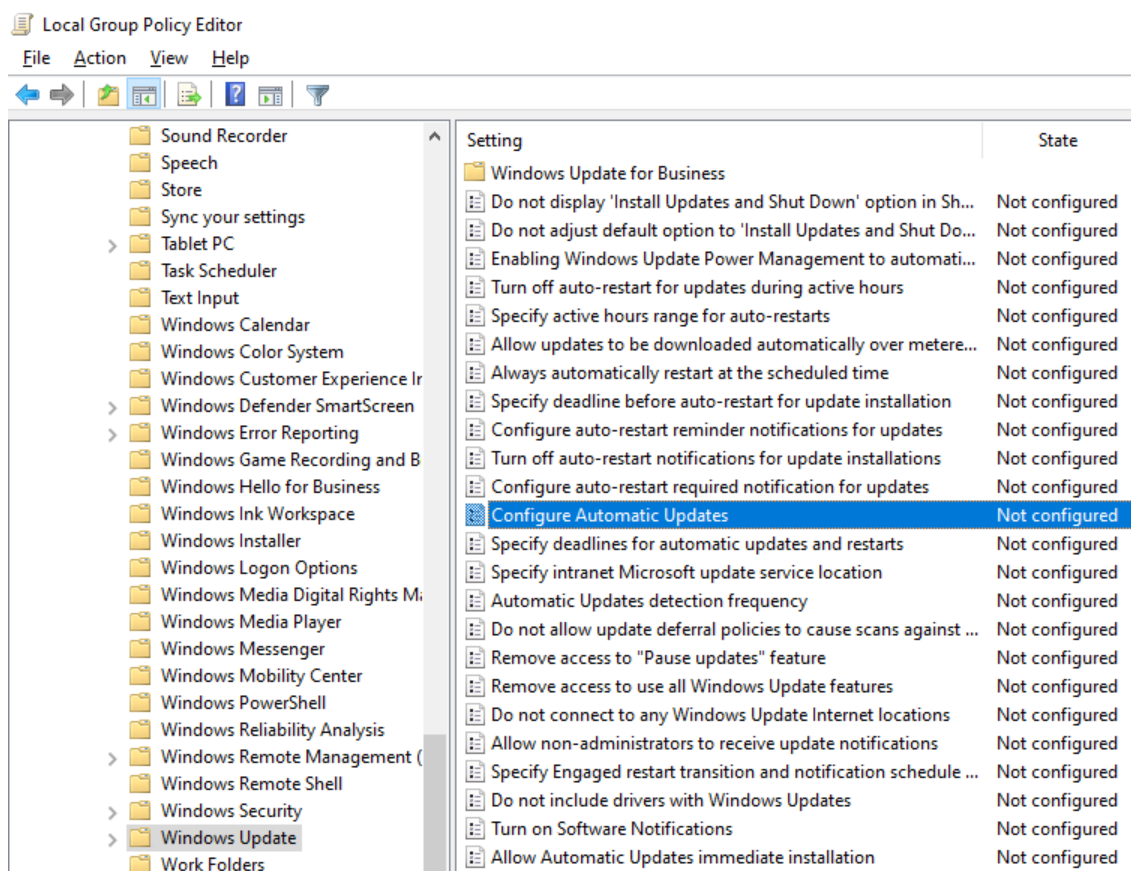
On Windows 11, click on the Start button, type in Windows Update settings and then click the **Windows Update settings**:



Simply select from the combo box up to 5 weeks to pause Windows updates.

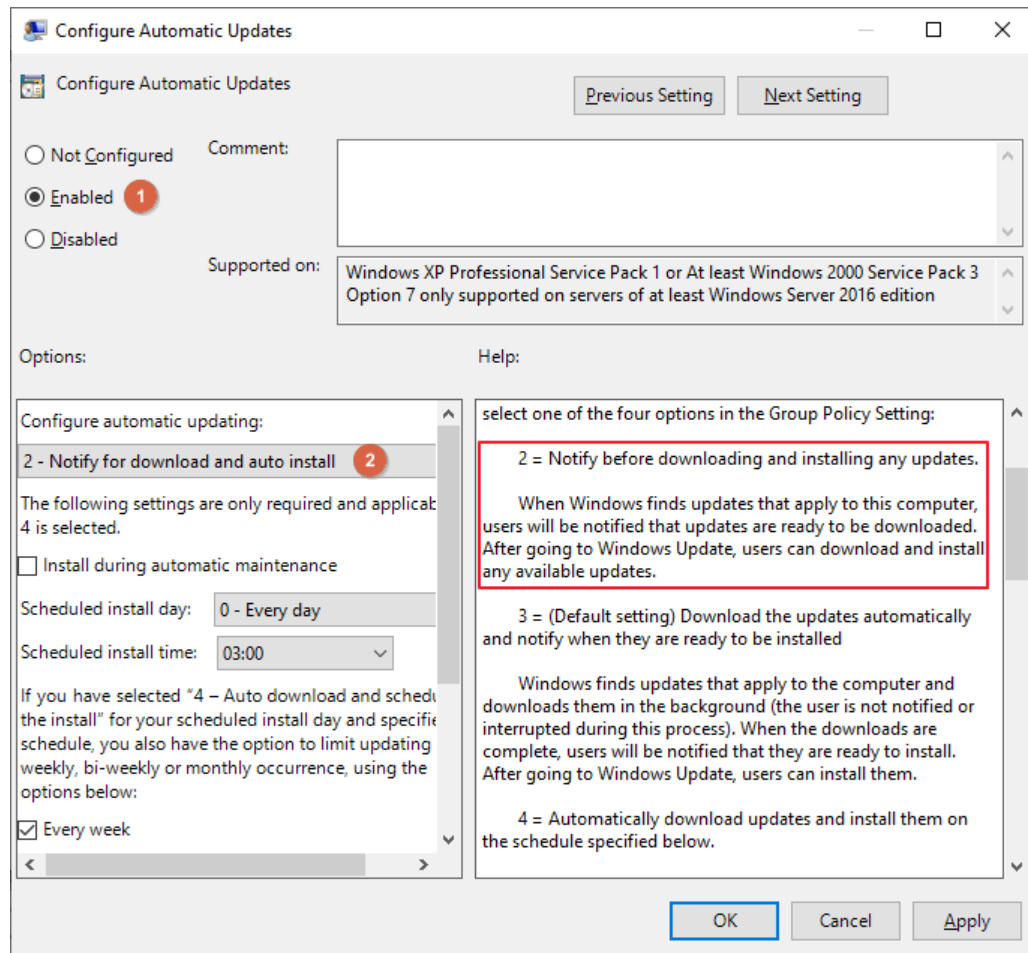
If your tour will last more than 35 days or you never want to automatically download/install Windows updates then you can configure your Windows Group Policy so you will only be notified that updates are available, but they will not be downloaded nor installed until you choose to download and install them.

Use the **Win key + R** combination to open the Run dialog box, type **gpedit.msc** and press Enter:



On Windows 10, navigate to **Computer Configuration -> Administrative Templates -> Windows Components -> Windows Update** and double click on the **Configure Automatic Updates** setting.

On Windows 11, navigate to **Computer Configuration -> Administrative Templates -> Windows Components -> Windows Update -> Manage end user experience** and double click on the **Configure Automatic Updates** setting.



Click on **Enabled (1)**, and then select option **2 – Notify for download and auto install (2)**. Click on the **OK** button to confirm the changes.

**Note:** if your group policy is applied, you will see in the Windows update window the information that *Some settings are managed by your organization*. Any available updates will not be automatically downloaded nor installed.

This way you have more control over the Windows update process.

Although we do not recommend it, there are musicians who want to completely disable the Windows Update mechanism running in the background, and enable it when they want. This can be done using some third-party applications. Please search for it on the Internet and use with care. There is a difference between the Group Policy method and using such applications; these applications completely disable the Windows Update mechanism, so Windows does not consume CPU cycles for it at all. Additionally, Microsoft Update servers are not contacted for new information about new updates, nor are notifications displayed that there are new updates ready to be downloaded and installed.

## 6.3 Antivirus updates

If you are using the integrated Windows Security solution and Microsoft Defender antivirus, Microsoft Defender Antivirus Security intelligence updates are delivered through Windows Update. Additionally, you may want to temporarily disable real-time protection while you are performing live.

Click on the **Start** button, type in Virus & Threat protection and then click on the **Virus & threat protection** app:

### Virus & threat protection

Protection for your device against threats.

#### Current threats

No current threats.

Last scan: 10/19/2021 9:00 AM (quick scan)

0 threats found.

Scan lasted 1 minutes 51 seconds

19205 files scanned.

Quick scan

[Scan options](#)

[Allowed threats](#)

[Protection history](#)

#### Virus & threat protection settings

No action needed.

[Manage settings](#)

Click on **Manage settings**:



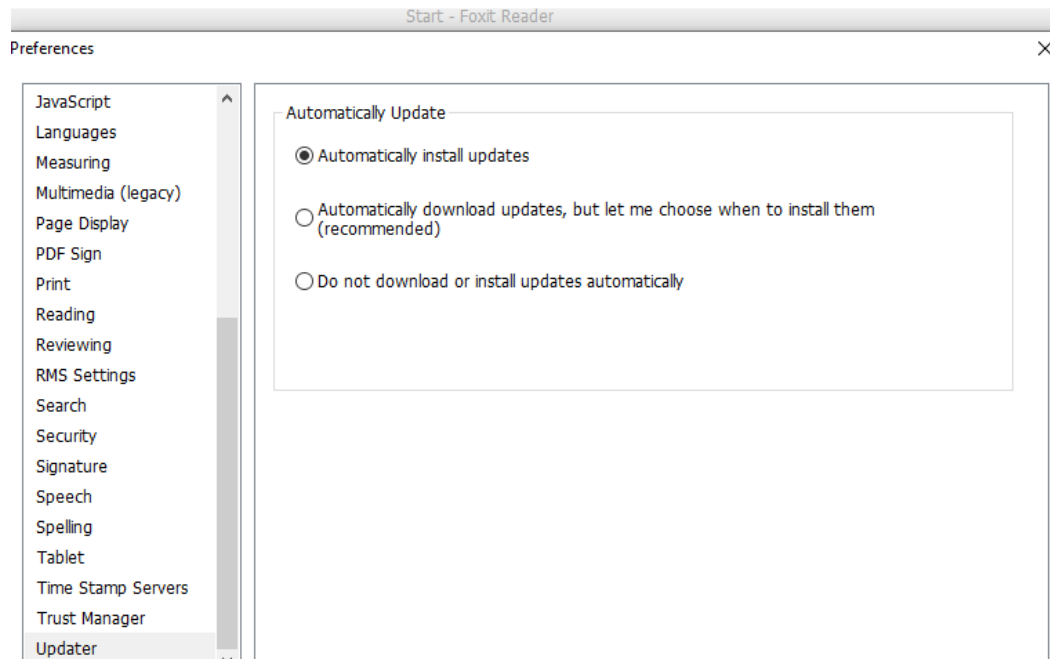
Temporarily turn off your real-time protection and Cloud-delivered protection.

If you are using other antivirus software, check their documentation on how to temporarily disable their updates and real-time protection.

Be very careful with anti-virus products. Updates can cause serious unexpected behavior such as preventing applications (including Gig Performer) from working properly and even crashing.

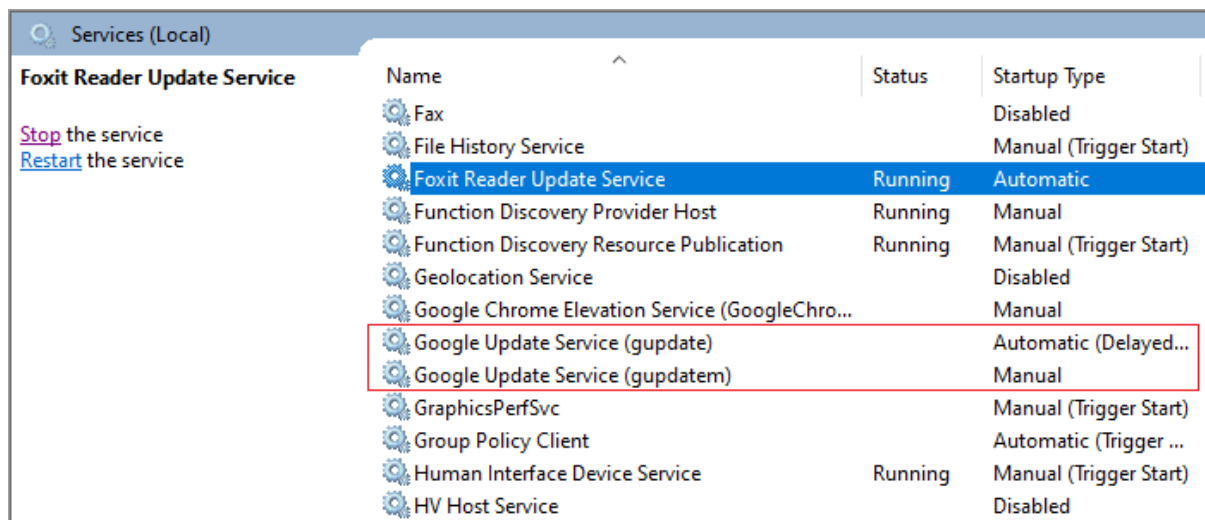
## 6.4 Installed application updaters

Installed applications may have their own individual updaters that run in the background. Get familiar with your installed applications and review their updater settings. Below is an example.



Select **Do not download or install updates automatically**, if you use similar applications that provide direct control over their update process.

Some programs just depend on the Task Scheduler or Windows Services for their updates, e.g. Dropbox, Foxit Reader and Google Chrome:



Foxit updater happens to be an example where you can adjust its settings from multiple places (e.g. remove it from Services or disable it from Foxit Reader Preferences).

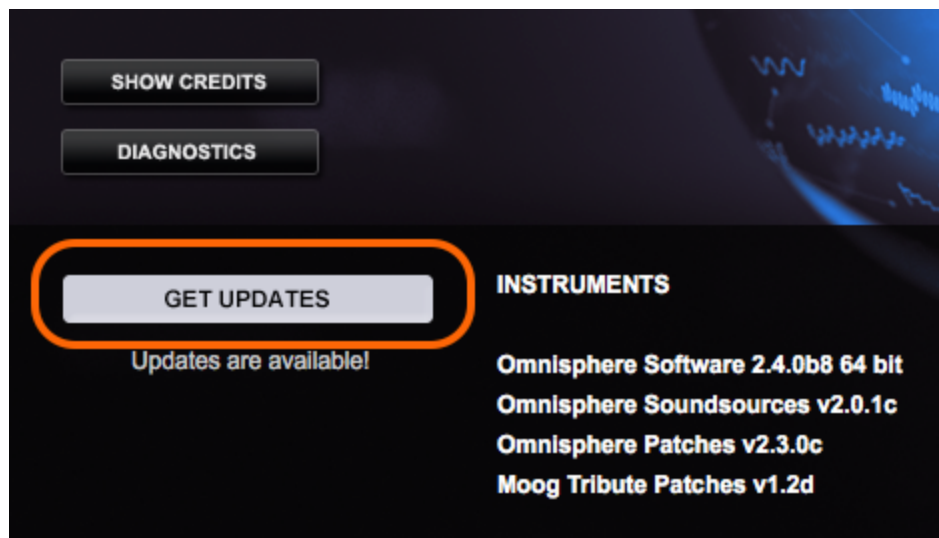
We recommend that you close any cloud-syncing applications you are using and stop their service before you perform live.



Review other applications that you have installed on your PC and check their updater preferences, and if there are corresponding scheduled tasks or services then disable them also.

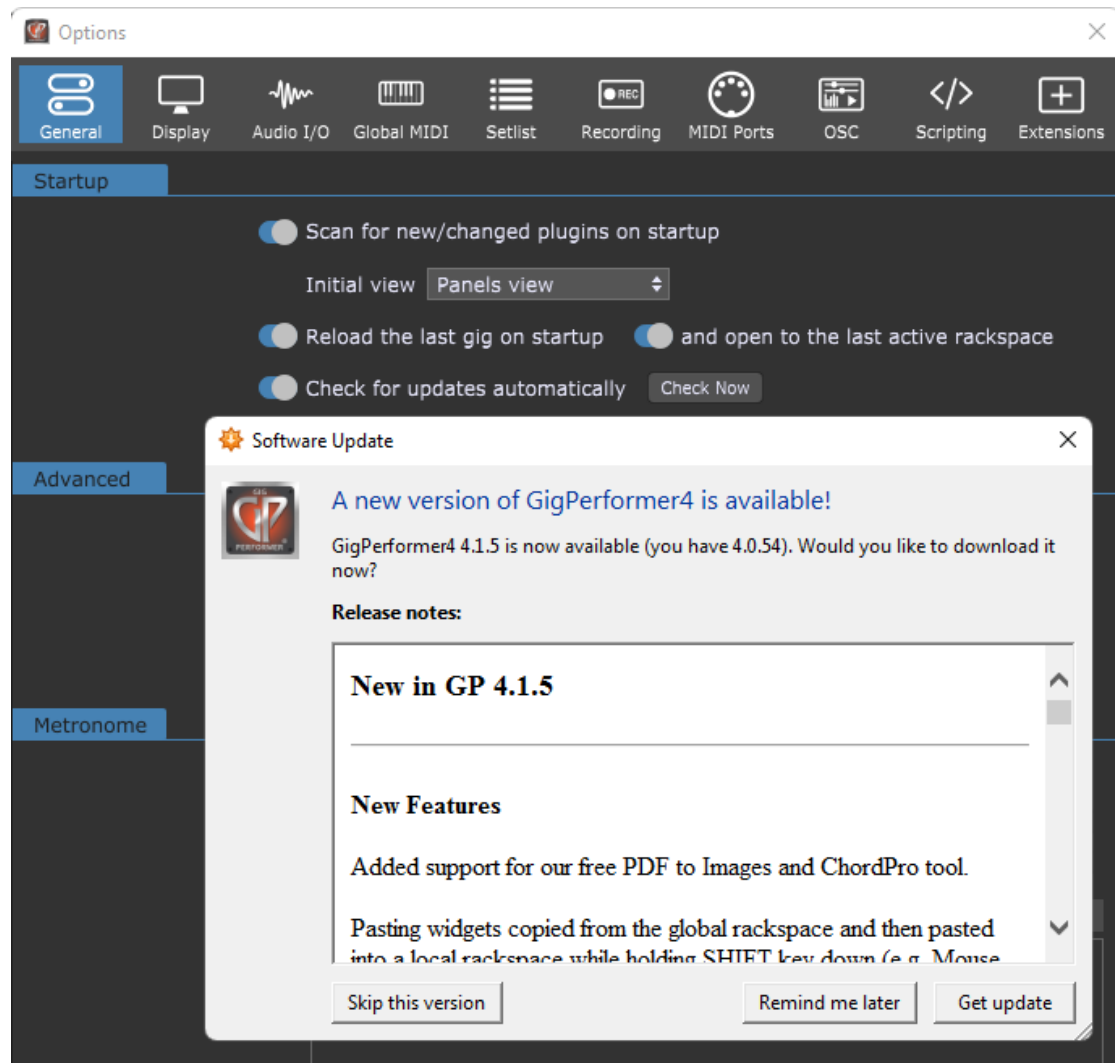
## 6.5 Audio applications and plugin updates

We do not recommend updating your audio software or plugins while you are on tour or if you are about to perform live. The best practice is always to test your audio setup after you update your audio software and allow a few weeks of testing before performing live.



Above is shown the Omnisphere [Smart Update](#) system.

If you are about to perform live and your audio plugin host Gig Performer notifies you that a new version is available, we strongly recommend that you [postpone the update](#) until your gig or tour has ended. Gig Performer updates are tested thoroughly before they are released so problems with new releases of Gig Performer are very rare. However, it could be that a plugin that used to work properly with an older version of Gig Performer doesn't work with a newer version of Gig Performer simply because the plugin itself has a bug that only manifested itself with the newer version. Review the update settings in Gig Performer:



We also recommend that you postpone audio driver or firmware updates for your audio hardware while you are on tour. Check your manufacturer's documentation to see if there are settings for automatic updates of your ASIO drivers, or firmware.

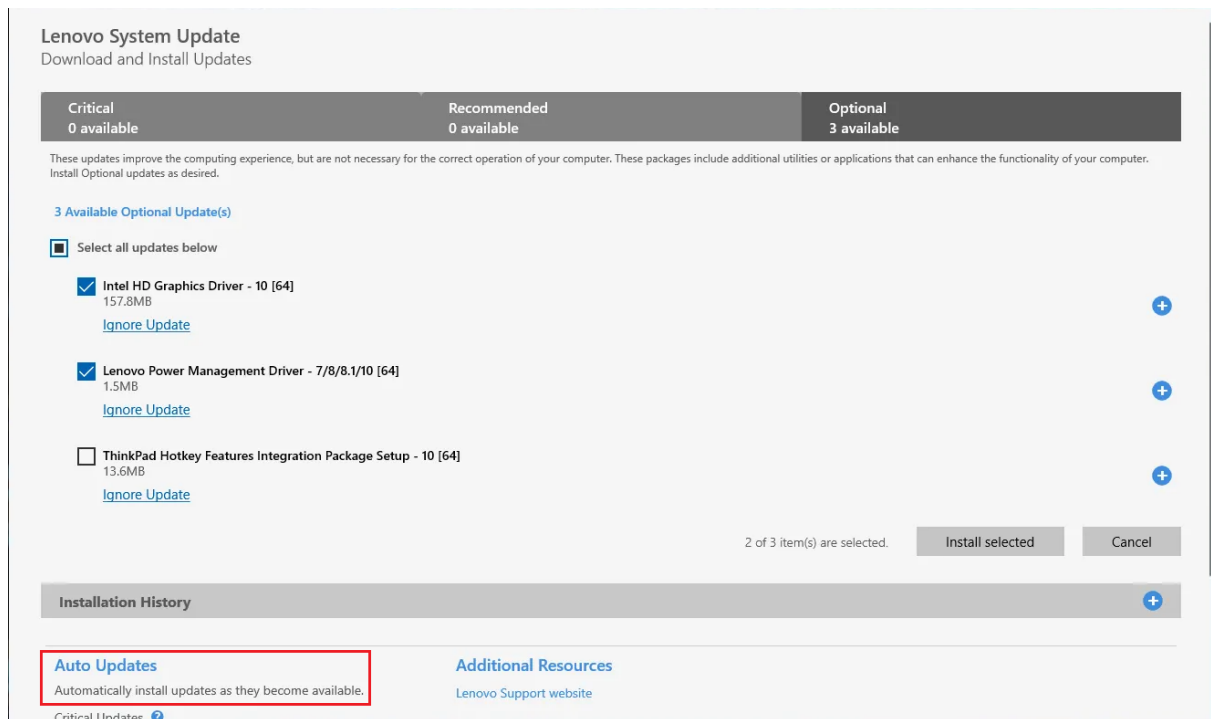
## 6.6 Integrated system utilities updates

As we already mentioned, many brand name PCs and laptops come with pre-installed software that may update drivers, BIOS, firmware or change system settings. Examples include **Lenovo System Update** and **Lenovo Vantage**.

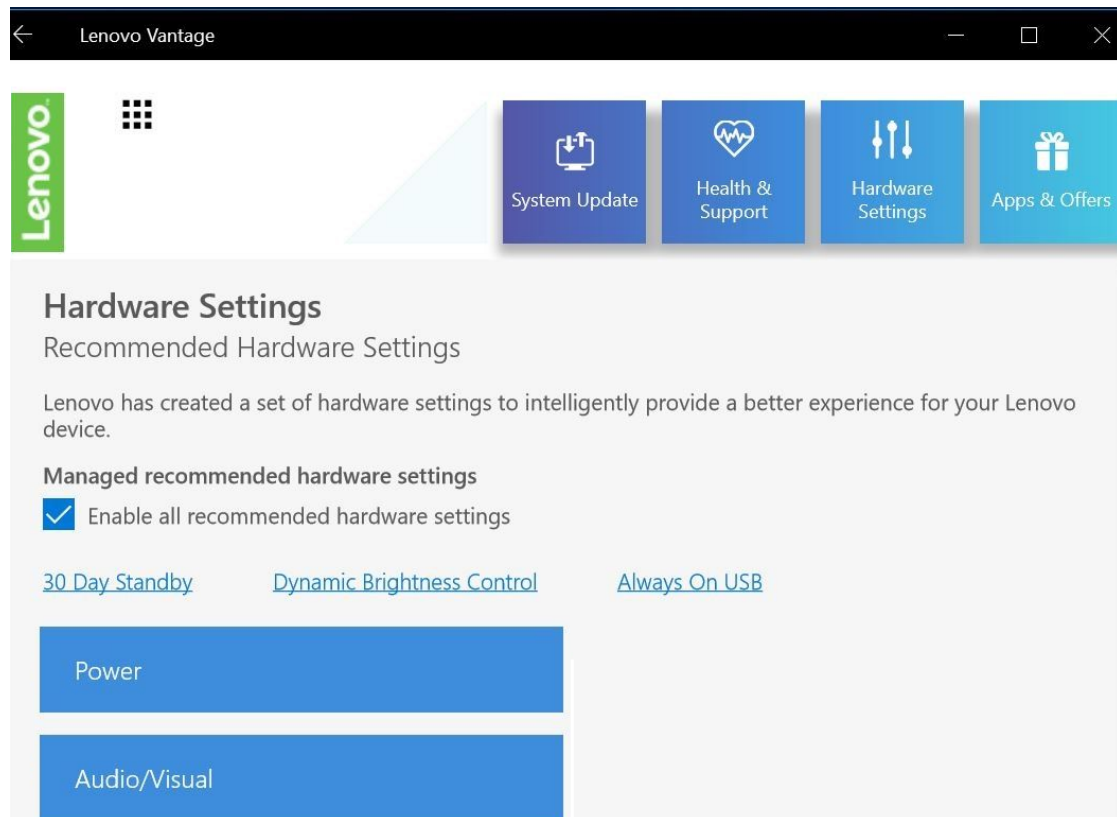
Although these applications may save time and effort by helping to automate the process of finding and installing the latest drivers, BIOS, and other applications to optimize the performance

of your system, like other updates, they may break things and cause latency issues and audio glitches with your audio setup.

Carefully review these settings and disable **Auto updates**:



The same applies to applications like Lenovo Vantage, since they may also update your drivers, install system updates or reconfigure your Windows settings:



Make sure that recommended hardware settings are not enabled, and review the automatic update settings.

Make yourself familiar with your pre-installed software to see if there are any applications that may perform automatic firmware or driver updates or can apply various hardware and system settings.

It is critical for your live performance and glitch-free audio processing to have these applications under control, since they can impact the overall stability and performance of your PC.

## 7 Optimize your Windows settings for the maximum performance

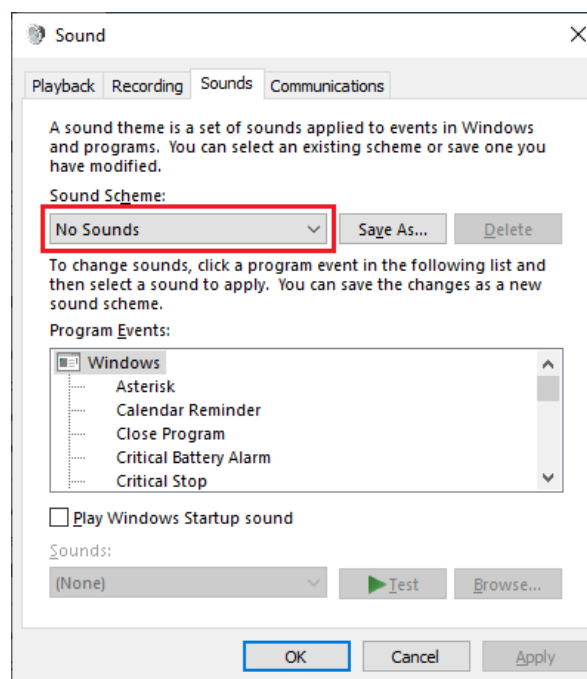
In this chapter we will look at other miscellaneous Windows settings and optimize them as much as possible for audio processing. You want your CPU cycles to be dedicated only for your gig needs.

### 7.1 Turn off Windows sounds

By default, the Windows operating system plays various sounds when certain events occur. Examples are when you connect or disconnect your thumb drive or external hard disk to your PC, or when a notification appears.

Whether you are rehearsing or gigging, you certainly want to turn off these sounds so as not to interfere with your performance. You also want to avoid accidentally blasting Windows sounds through the PA system.

Click on the **Start** button and then type in *Change system sounds*; click on the **Change system sounds** control panel item:

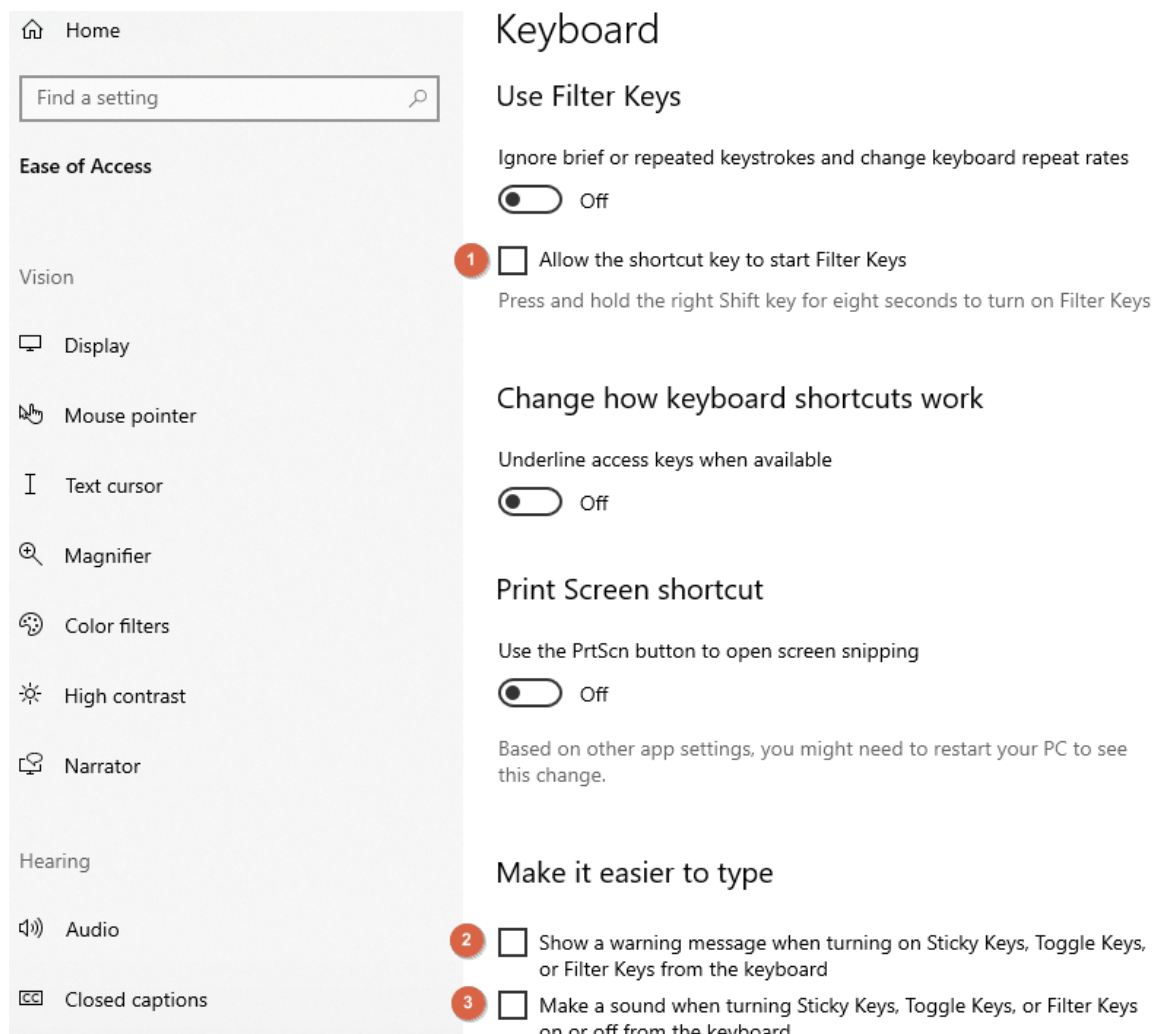


Select the **No Sounds** sound scheme from the combo box, and then click on **OK** to save your changes.

We also recommend that you disable the Sticky Keys, Toggle Keys, and Filter Keys accessibility features if you do not use them. If you do use those features, you should prevent them from making sounds.

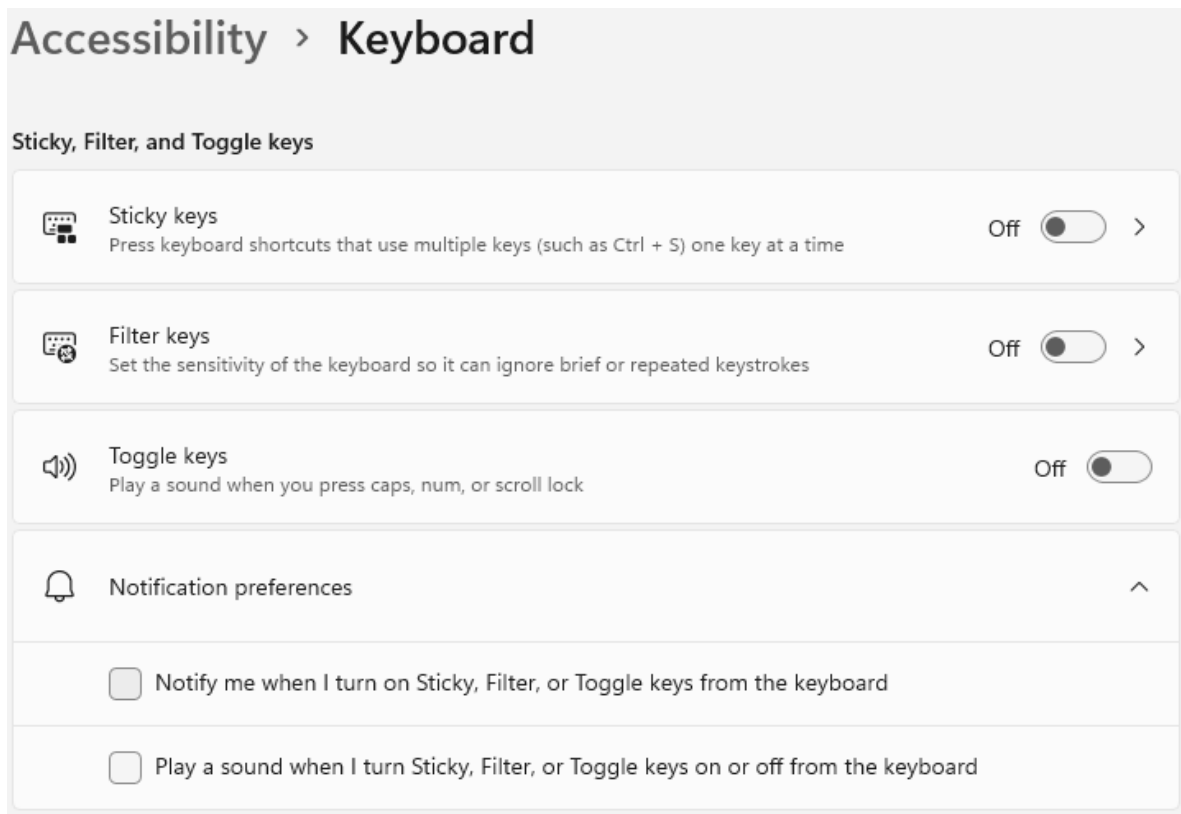
The fact is, even with the **No Sounds** sound scheme selected, Windows will play a beep sound by default if you, for example, press your SHIFT key five times in a row. This is an old Windows feature and experienced Windows users have almost certainly activated this accidentally a few times.

On Windows 10, click on the **Start** button and then type in *Make a sound* and click on the **Make a sound when enabling Sticky Keys, Toggle Keys, or Filter Keys** system settings item:



Turn off **Allow the shortcut key to start Filter Keys (1)**. Scroll up and also turn off this feature for **Sticky Keys** and **Toggle Keys**. Turn off the option to show a warning message if you activate these features **(2)** as it may overlap with one of your Gig Performer's windows. Also turn off the option to make a sound when turning these features on or off **(3)** as you certainly do not want any accidental beeps during your live performance.

On Windows 11, click on the **Start** button and then type in *Play a sound when I turn on Sticky, Filter, or Toggle keys* and click on the **Play a sound when I turn on Sticky, Filter, or Toggle keys** system settings item:



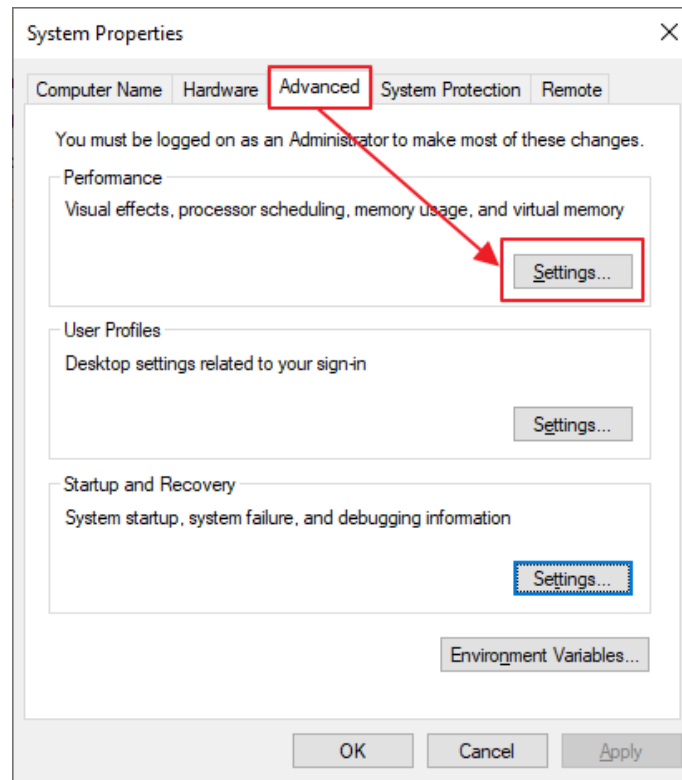
Turn off all toggle buttons and untick all check boxes.

## 7.2 Optimize your visual effects for the best performance

Windows enables various visual effects, such as fading or sliding menus or tooltips or windows animations while minimizing and maximizing, to enhance the appearance of Windows.

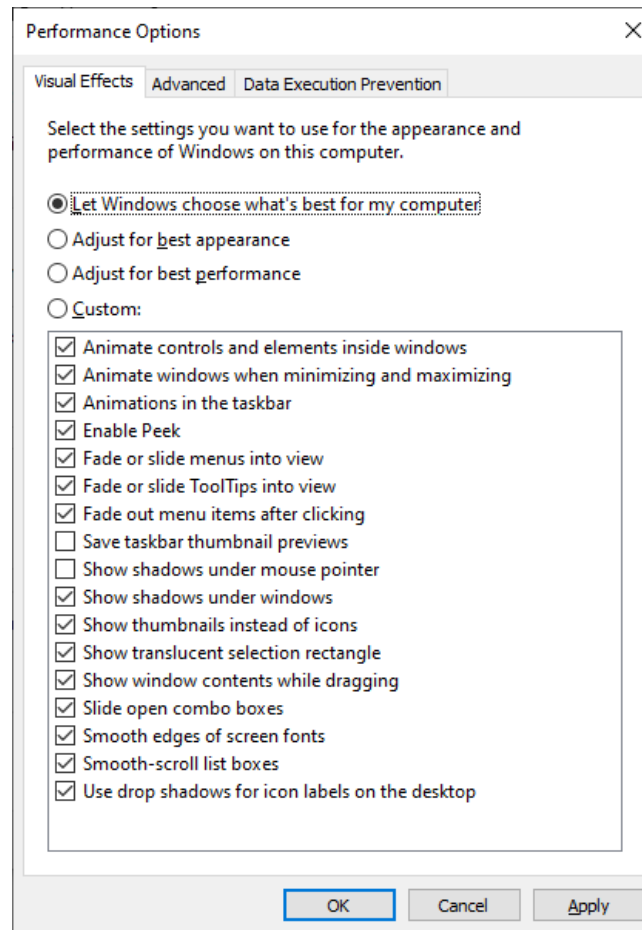
These effects do not have much impact on your CPU and most likely will not cause any problems with your audio setup, since your graphics card handles processing of these effects. However, if you want to get the best performance for your PC, you might want to review the settings for controlling the visual effects on your PC.

Click on the Start button and then type in *View advanced system settings*; click on the **View advanced system settings** control panel item:



Afterwards click on the **Advanced** tab and then on the **Settings...** button to show performance-related settings:



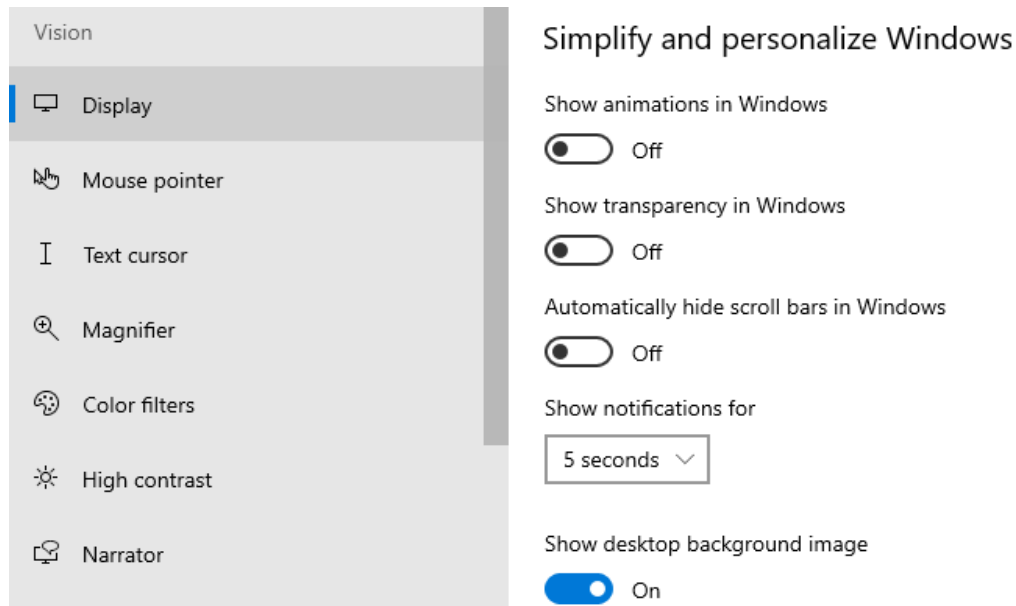


If you want to have the best performance at the expense of the visual appearance of your Windows, click on the **Adjust for best performance** radio button. We recommend that you use a **Custom** option for everyday use, balancing between appearance and performance, as the majority of people will most likely find the adjustments for best performance overly spartan and harder to read as font smoothing, for example, may get switched off.

We suggest that you **enable** the following settings, as they improve overall readability and the user experience:

- Use drop shadows for icon labels on the desktop,
- Smooth edges of screen fonts,
- Show window contents while dragging,
- Show thumbnails instead of icons.

On Windows 10, you might also want to adjust the Display settings, which are found under the Ease of Access section. Click on the **Start** button, click on **Settings** and then **Ease of Access**:



You can turn off animations, transparency effects and choose whether to hide scroll bars in Windows (NB **Colors setting** is the other place where you can turn off transparency; Start -> Settings -> Personalization -> Transparency effects).

On Windows 11, these settings are located under Settings -> Accessibility -> Visual effects.

## 7.3 Page file settings

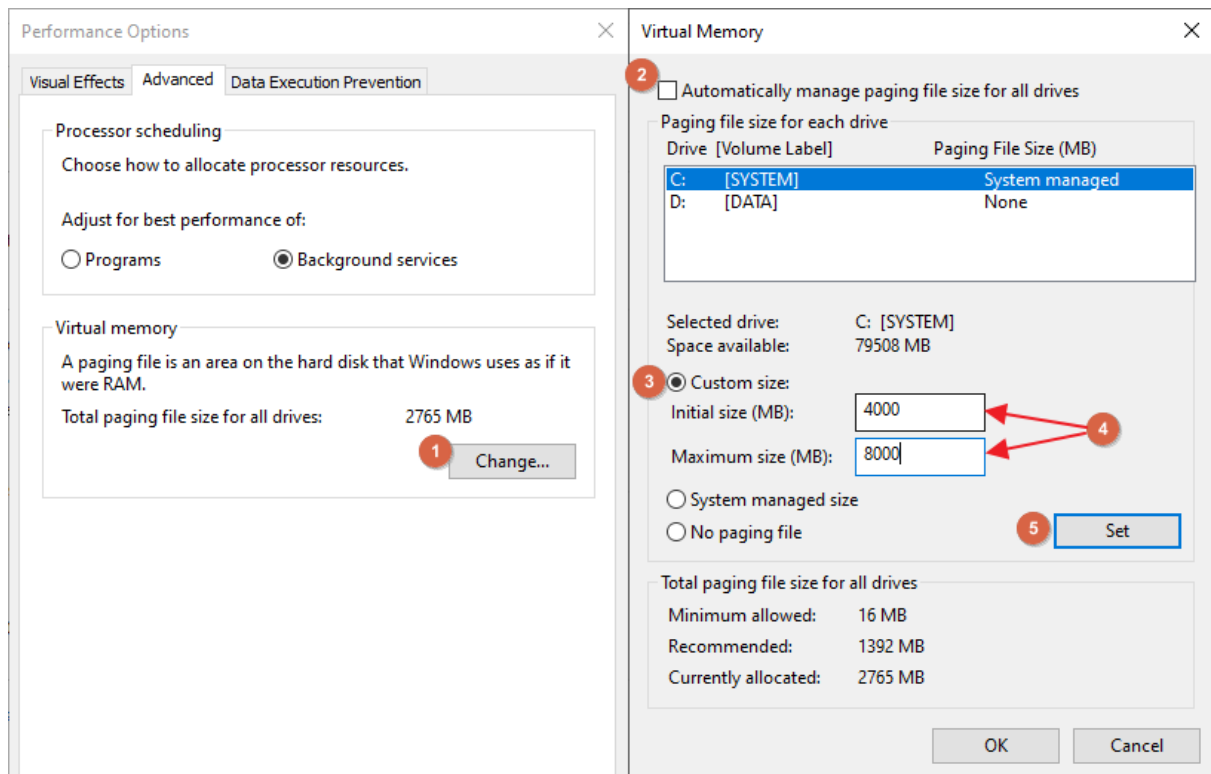
The page file (or paging file) allows Windows to perform smoothly by allowing programs to use more memory than is physically available. If you are running out of RAM, Windows can temporarily store some of your data on your hard drive and restore it later. This process is called *paging*.

The downside of paging is that hard drives process data more slowly than RAM, so paging decreases the performance of your PC if you are low on installed RAM and your audio plugin host uses RAM-hungry plugins.

Proper configuration of the page file depends on your PC's configuration. We strongly recommend that you use an SSD combined with fast hard disk drives, and at least 8 GB of RAM in your PC for your live performance (16 GB or more is preferred).

For this guide, we have optimized a laptop with only 4 GB RAM i3 CPU and one hard disk, and Gig Performer worked smoothly, with some help from its [Predictive Loading](#) feature. If you are very short of RAM, you can use Gig Performer's Predictive Loading feature which can reduce the amount of needed RAM but trades off instant switching if you are not following a setlist.

Open the **Performance Options** dialog box as shown in the previous section, and click on the **Advanced** tab:



You can see that Windows automatically allocated 2765 MB for virtual memory. Click on the **Change...** button (1), and untick **Automatically manage paging size for all drives** (2). Choose **Custom size** (3), and enter values for the **Initial size** and **Maximum size** of your page file. Then click on the **Set** button and confirm with **OK**.

Follow these tips to properly configure your page size:

- If you have 4 GB or 8 GB of RAM, choose select at least 1 x RAM for your initial page file and 2 x RAM for the maximum size.
- If you have 16 GB of RAM, you can use a smaller page file.
- For 32 GB of RAM or more, select the System managed size option, as the page file is most likely rarely used, so Windows will automatically handle the page file if a shortage of RAM occurs.
- **Never use the No paging file option**, as some [products or services](#) require a page file for various reasons.
- If you have an SSD, always put the page file on that drive.

We encourage you to monitor your total memory usage during your rehearsals to get a clearer picture of how much memory you really need and experiment with the tips above.

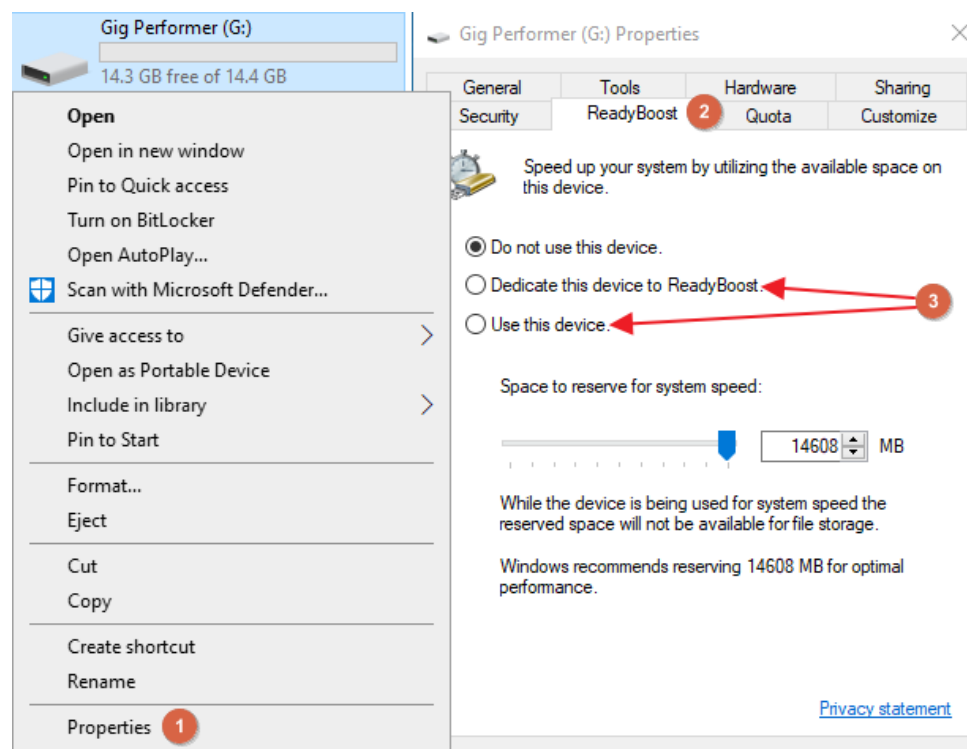
## 7.4 ReadyBoost

ReadyBoost is a mechanism that enables mass storage devices (such as SD cards and USB flash drives) to be used as a cache between a drive and RAM.

ReadyBoost relies on the SysMain service (formerly SuperFetch) and adjusts its cache based on your activity. It caches files and applications you frequently use and stores the cached data on a USB flash drive or an SD memory card.

This technology may improve your PC's performance if you are using only hard disk drives and you are low on RAM; If your computer has a solid-state drive and plenty of free RAM, then ReadyBoost will not improve performance.

To see the best results, use a quality USB flash drive at least USB 3.0 compatible and connect it to the USB 3.0 port on your PC.



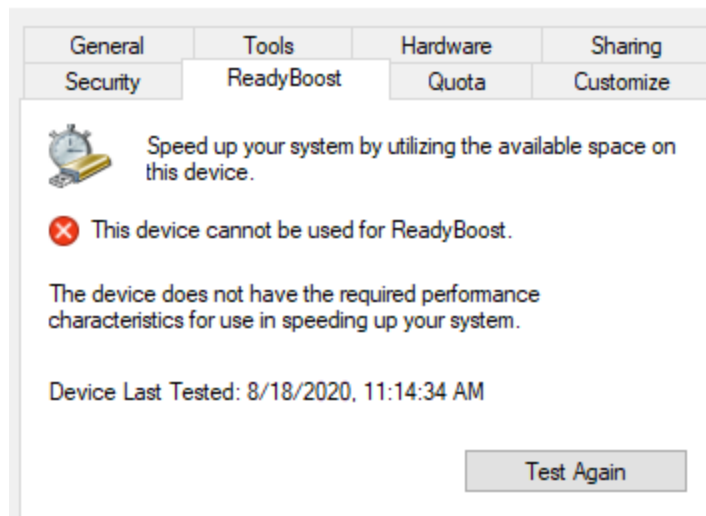
Open your **File Explorer** and click on **This PC**; right click on your USB flash drive and click on **Properties (1)**.

Click on the **ReadyBoost** tab (2). Windows will automatically test your USB flash drive to determine if it is suitable to be used for the cache (it must be an NTFS or exFAT formatted drive with a minimum transfer rate of 3.5 Mbit/s).

Afterwards, you may either dedicate the whole USB drive to ReadyBoost or a portion of it **(3)**. If you do not want to dedicate the whole USB drive for cache, select **Use this device**, and reserve space for the cache, e.g. 8 GB.

When you open your USB drive, you'll see a new 8GB file called **ReadyBoost.sfcache** that is used for cache.

You can use multiple USB drives or SD cards if they meet the minimum requirements for the cache. If they do not pass the test, you will see the following information:



Please note this feature should not be used as a long-term solution, as we strongly recommend that you upgrade your PC with more RAM and an SSD as soon as you get the opportunity.

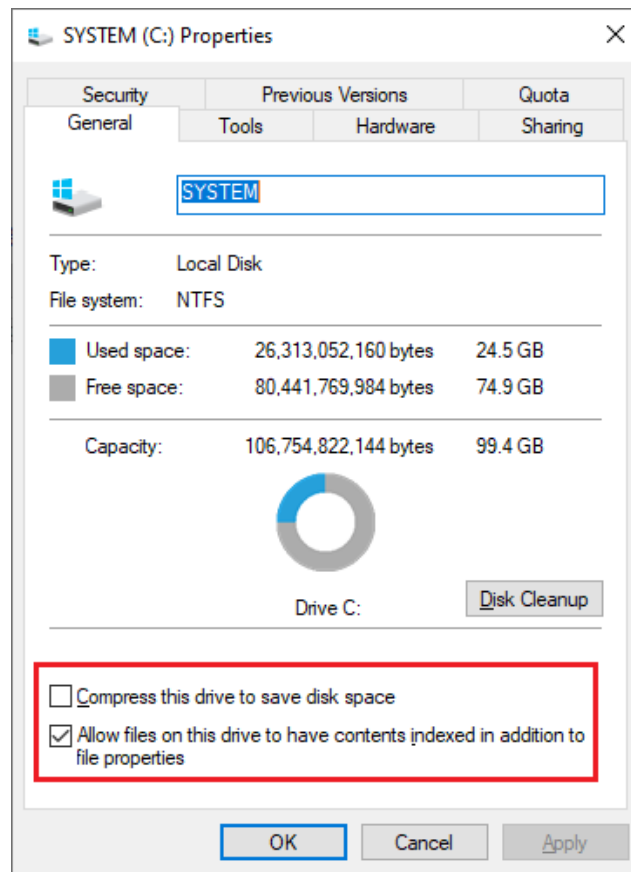
## 7.5 Indexing of your drives

When Windows determines your PC is idle, it indexes folders, files and their contents to make searching faster. Therefore, it could create or rebuild the index of your drive when you are preparing for a gig.

The **Windows Search** service is responsible for indexing the content of your files and folders and making the results available for faster searching. If you disable this service, you can still search for files and folders, but your searches will be slower as the index is not available. Windows will display a message: *"Your searches might be slow because index is not running"*.

Refer to section *Optimizing Windows Services*, to disable this service if you do not need it, or if you want to get more performance at the expense of getting faster search results.

Alternatively, open your **File Explorer**, then click on **This PC**, right click on your drive, e.g. System (C:) and select **Properties**:



Make sure that both options are unchecked and click on **OK**. If asked to apply on all subfolders, confirm. It may take a couple of minutes to apply this setting to all subfolders and files, depending on how much content is on your drive.

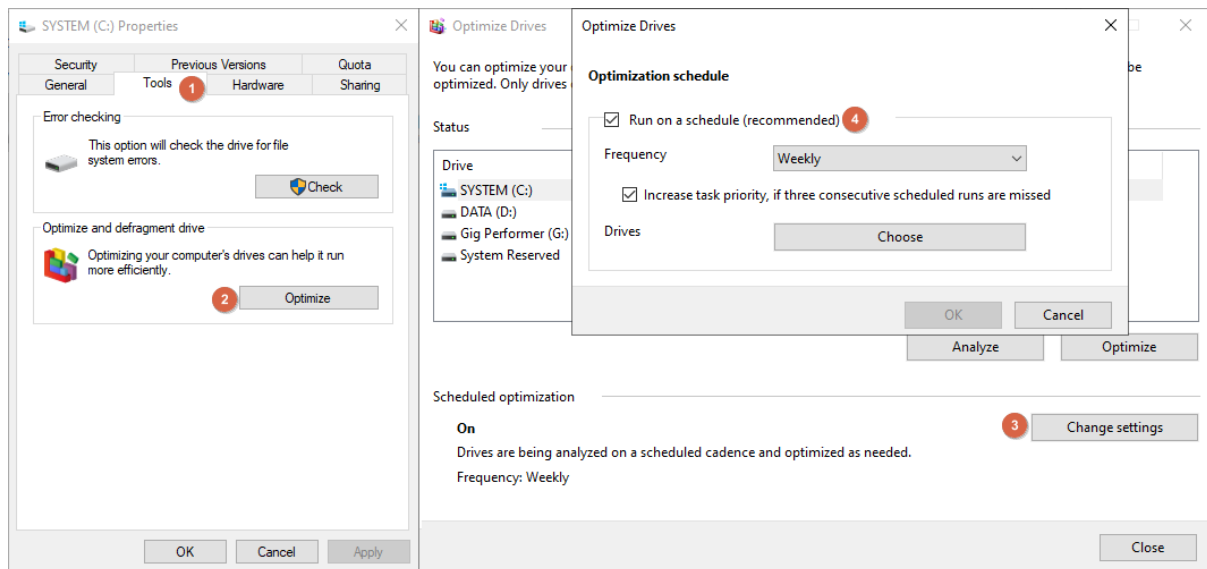
## 7.6 Optimize and defragment drive

Over time, hard drive performance can slow down due to fragmentation in the file system. When a hard drive is fragmented, its data blocks, called fragments, are scattered in multiple locations around the surface of the hard disk and so it takes longer to retrieve the required data.

Defragmentation is the process of rearranging blocks associated with individual files so that they occupy contiguous storage locations on the hard drive, to increase disk I/O performance by minimizing hard drive head travel. This reduces the time it takes to read files from and write files to the disk.

The Windows utility **Defragment and Optimize Drives** (formerly Disk Defragmenter) is used to defragment hard disk drives or to optimize solid state drives. Solid-state drives can also be fragmented, but that does not impact their performance as they do not have mechanical parts

used for data reading and writing.



To open this utility, click on the Start button and type in Defragment; then click on **Defragment and Optimize Drives** app.

Alternatively, right click on any of your drives and select **Properties**. Click on the **Tools** tab (1), and then on the **Optimize** button (2). We recommend that you turn off scheduled optimization before your gig. Click on the **Change settings** button (3), and untick **Run on a schedule** option (4). You can revert this setting after your gig.

Before optimizing your hard disk drive click on the **Analyze** button and Windows will notify you if the drive needs to be defragmented.

When it comes to solid state drives, optimization consists of performing [TRIM](#) on an SSD drive. TRIM is a command that erases data blocks that are no longer considered in use. The use of TRIM can improve the performance of writing data to SSDs and contribute to longer SSD life.

## 8 Optimize your sound card and audio software settings

In this chapter we will present the basic audio-related settings that can affect performance of your PC, since audio optimization is a topic on its own. It starts with "gain staging" and then moves down the line.

These settings will be shown using the audio plugin host Gig Performer.

It is important to select the right audio driver and set up options in your audio applications such as buffer size and sample rate to get the best performance on your live gig.

### 8.1 Audio drivers

A driver is a special kind of program used to help the operating system use hardware connected to the computer. An audio driver enables Windows to recognize and interface with audio hardware.

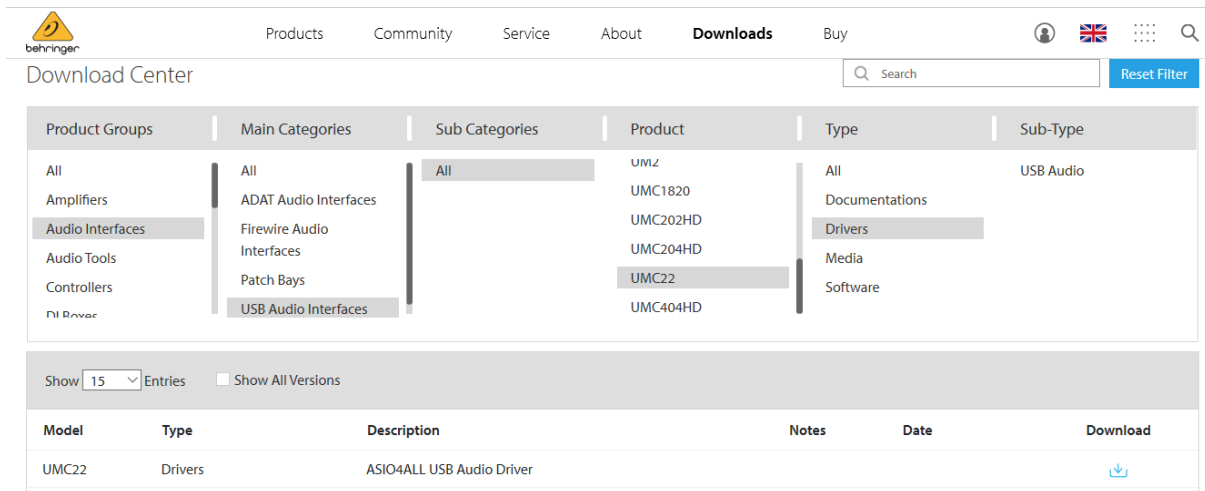
Many audio applications support different audio driver technologies such as ASIO, DirectSound, WASAPI, WaveRT and others.

For live use you must use the ASIO drivers as they provide a low-latency and high-fidelity interface between a software application and your audio interface. They are designed with real-time audio performance in mind. Anything else will most likely not be good enough.

While Microsoft's DirectSound is commonly used as an option for non-professional users, ASIO drivers provide professional musicians and sound engineers with a faster connection to the audio hardware.

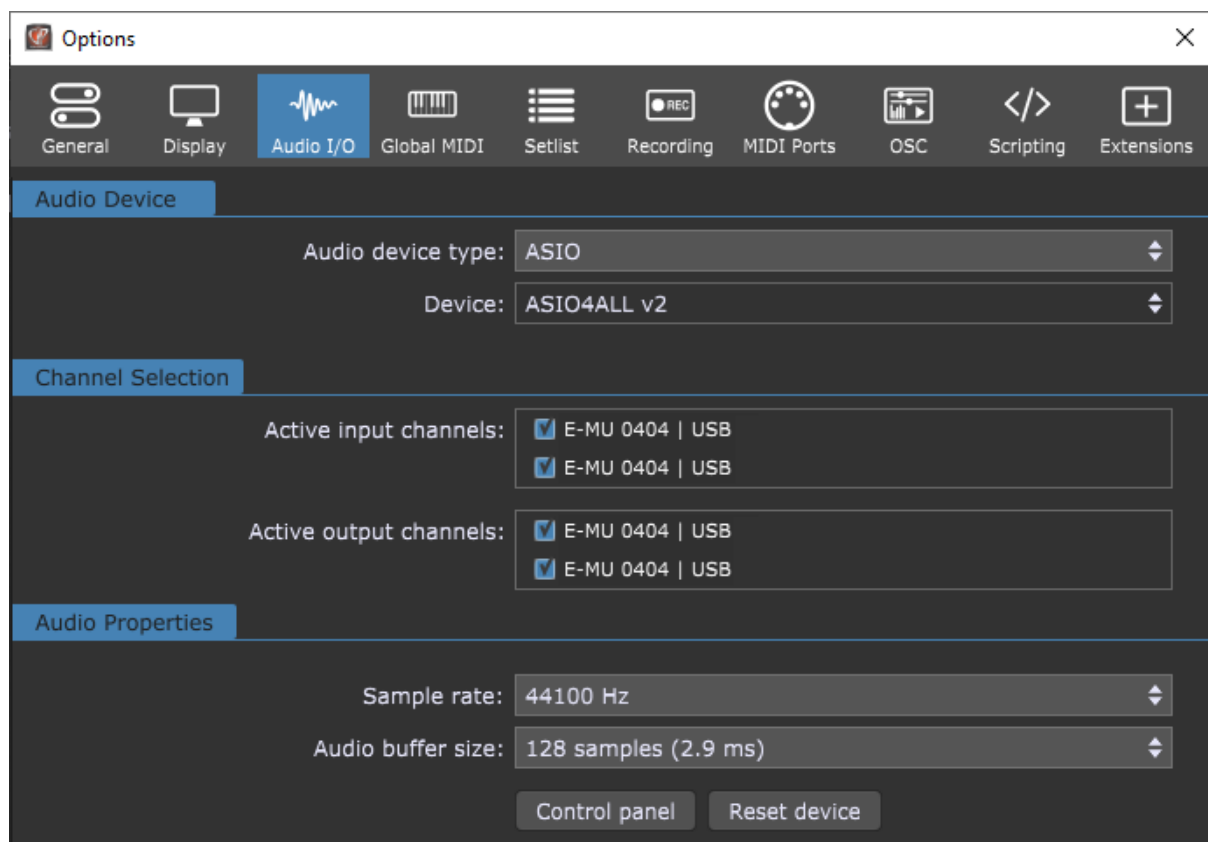
To download and install the latest ASIO drivers for your audio card or audio interface, refer to the manufacturer's web site. We always recommend that you use the audio drivers provided by the interface manufacturer. For some audio devices however, manufacturers do not provide proprietary ASIO drivers. An example is for example the popular Behringer UMC22 where the manufacturer recommends the use of the generic [ASIO4ALL](#) driver:





ASIO4ALL is a universal driver that acquires low level access to the sound card by using Windows kernel mode drivers and provides an ASIO interface to it.

If you have problems with your proprietary ASIO drivers, and especially if you own an older audio interface with dated ASIO drivers, such as the EMU 0404 USB you can try ASIO4ALL and see if it can improve your performance:



If none of these works as expected, there are a couple of other universal ASIO drivers that you might want to try, such as [FlexASIO](#). While ASIO4ALL uses a low-level Windows audio API known

as Kernel Streaming to operate, FlexASIO uses a different intermediate library called PortAudio that supports many operating system sound APIs.

If you plan to buy a new audio interface, make sure its manufacturer provides a [multi-client audio driver](#). Unfortunately, some Windows ASIO drivers still allow only one application to use the audio interface, and these are known as single-client drivers. Multi-client audio drivers allow you to use the same audio device with more than one audio application at the same time (two instances of your audio application counts as two different applications). This is important if you plan to take advantage of Gig Performer's multi-instance feature and/or if you want to use Gig Performer together with other audio/MIDI applications.

## 8.2 Choose your buffer size and sample rate

In this section we will introduce [some basic terms](#) such as audio latency, buffer size and sample rate and suggest recommendations for live use.

**Audio latency** is simply the amount of time that passes between the sound being generated and then perceived by your brain. Basically, it is a delay.

For example, if you are 10ft away from the speakers, and since the speed of sound is approximately 1,000 ft/s in air it means that it takes  $10 \text{ ft} : 1000 \text{ ft/s} = 0.1 \text{ seconds}$  (or 10 milliseconds) for sound to travel from the speakers to your ears. The latency here is about 10 ms.

**Buffer size** is basically the number of samples that will be collected before your audio plugins get to process them. Your audio interface is an analog-to-digital as well as digital-to-analog converter. It takes any audio input, converts that into digital form (numbers) and then on the output side – converts those numbers back to analog audio.

**Sample rate** determines how many samples your audio interface will capture every second and do the above-mentioned conversions. A common sampling frequency for live use is 44.1 KHz.

For example, if your buffer size is **256** and your sampling rate is **44.1 KHz** (44,100 times per second, as Hz means cycles per second) then your latency will be  $256/44,100 \text{ seconds}$  which is 0.0058 seconds or **5.8 ms**.

If your buffer size is **256** and the sample rate is **96 KHz** you will get  $256/96,000 = 2.7 \text{ ms}$  latency. You can experiment with this: If you change the buffer size to **128** and leave the sampling frequency at **44.1 KHz** – your latency will be **2.9 ms** and so on.

These values directly affect the performance of your PC, as smaller latency values require your computer to respond more quickly to process all those samples in time without producing any glitches.

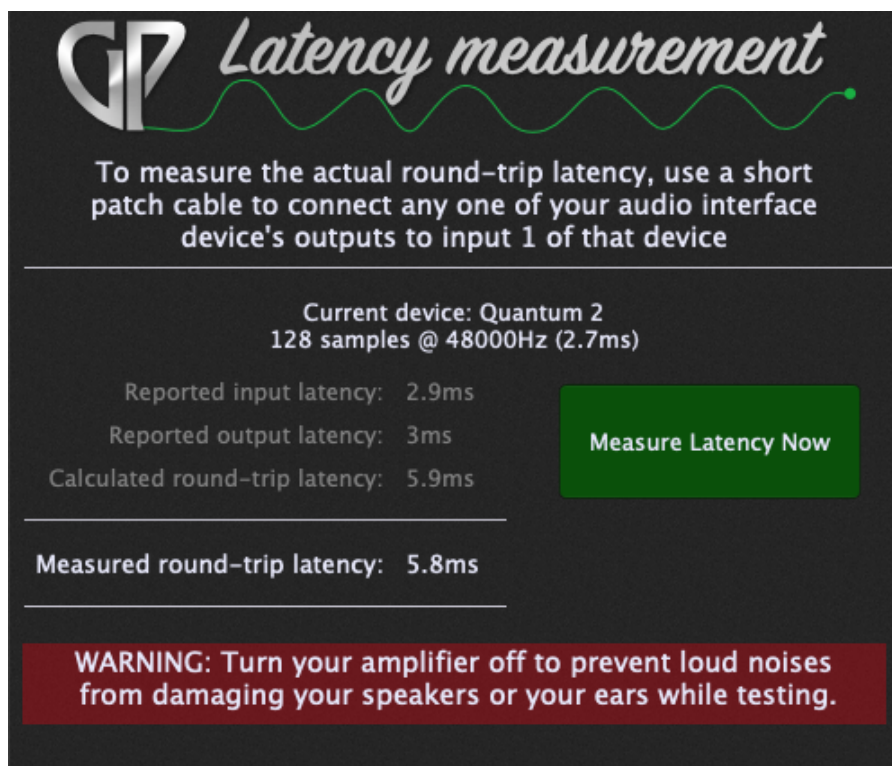
It has been shown that people can perceive differences between 3 ms – 10 ms, and that our brain cannot distinguish anything below 3 ms.

Therefore, for live performance, many musicians use a buffer size of 256 or 128 and a sample rate of 44.1 KHz. We are not discussing here a recording scenario, which should be done slightly differently.

Generally speaking, using higher buffer sizes or lower sample rates lets your computer run at lower temperatures and allows you to run more intensive plugins in parallel without crackles or pops, but the trade-off will be higher latency or lower quality respectively.

Another factor is the additional latency introduced by your audio interface. Not all audio interfaces are created equal. Some have low internal latency for both A/D and D/A conversions while others add more latency than perhaps you might like, so you have to lower your buffer size to get the overall desired latency.

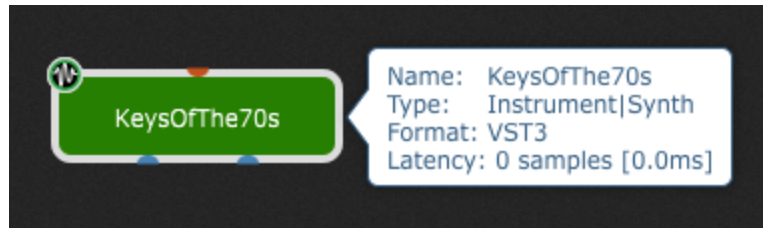
To find out how much extra latency your interface introduces – you can use Gig Performer's built in Latency Measurement Tool (found under the **Window** menu):



Make sure you do not use any plugins, and that your input signal is not too low.

The point of this section is to create sufficient CPU headroom to ensure a glitch-free live performance. You can also set smaller buffer sizes if that does not impact your live performance, but at the cost of less CPU capacity for processing more plugins.

**Note:** Gig Performer 4 provides you with a feature to see how much latency every new plugin adds to your setup. Simply hover over your plugin block to show a tooltip and look for the Latency information.



## 9 Other best practices and tips

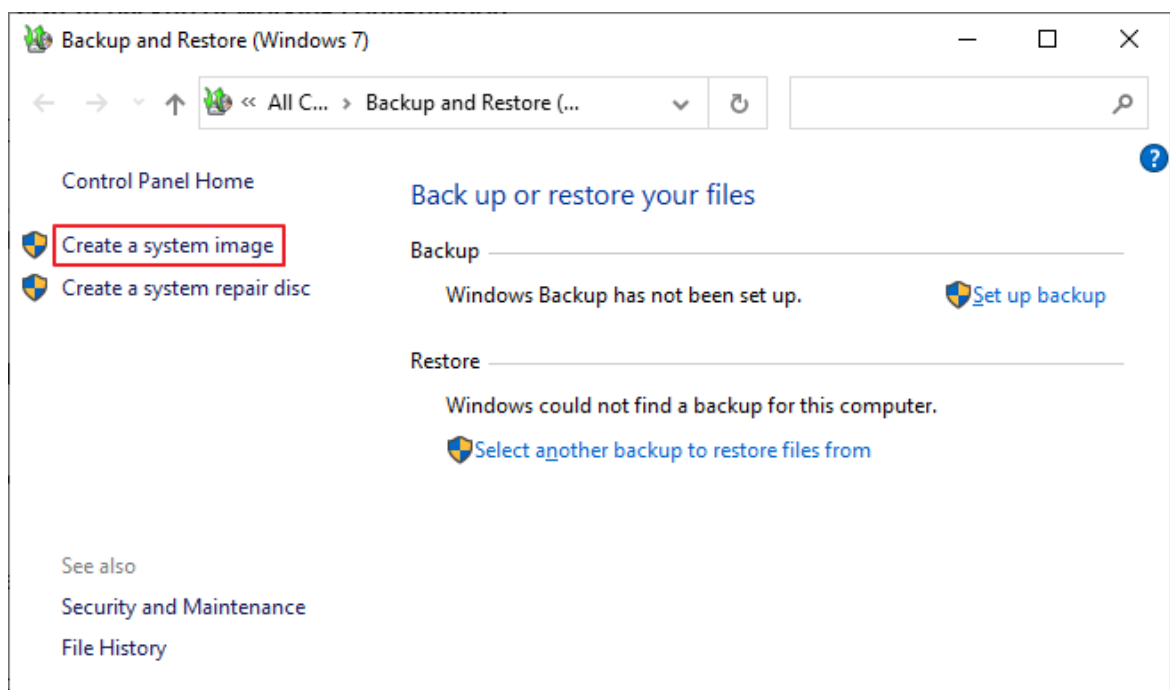
In this chapter we present other best practices and tips that will help you make and keep your PC a stable platform for your live performance. Sections in this chapter will not be presented in great detail since additional step-by-step tutorials for these topics can be easily found via your favorite search engine.

### 9.1 Create a full system backup of working configuration

Once you set up your audio applications, test their behavior, and determine your current audio setup is ready for live performance, we recommend that you make a complete system backup of your PC.

Although you can use many free 3rd party applications for the backup purposes, Windows 10 and Windows 11 still include a legacy tool called **Backup and Restore (Windows 7)** that allows you to perform various backup options.

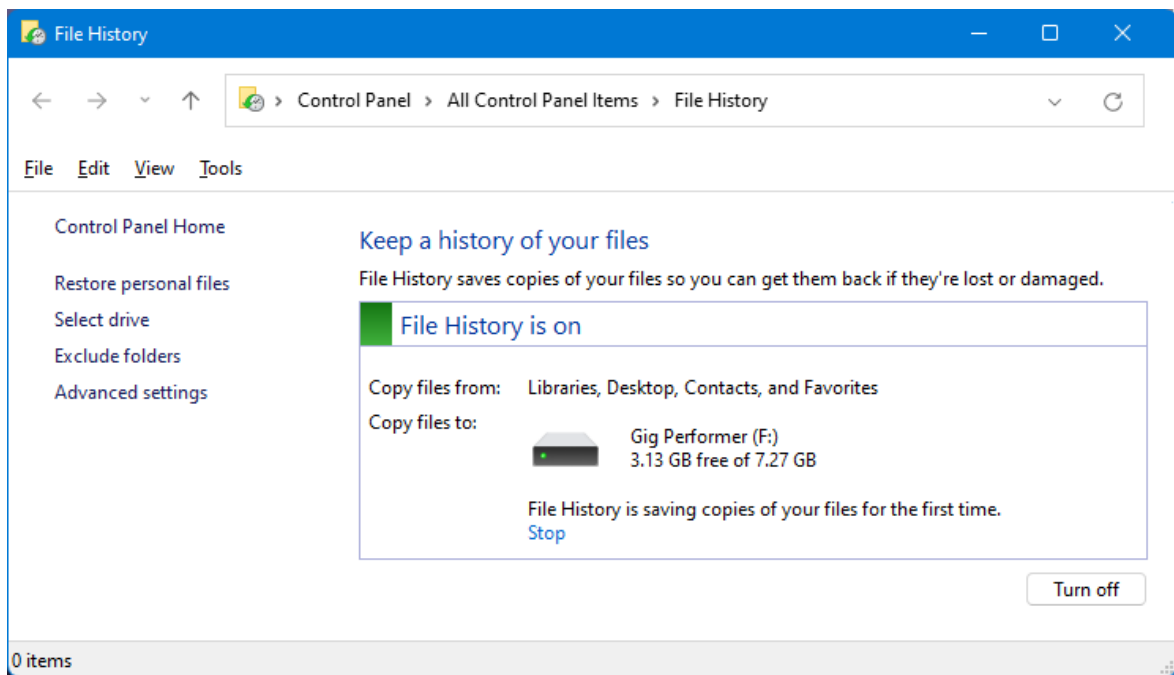
The easiest way to open this tool is to click on the **Start** button, type in **sdclt** and press Enter:



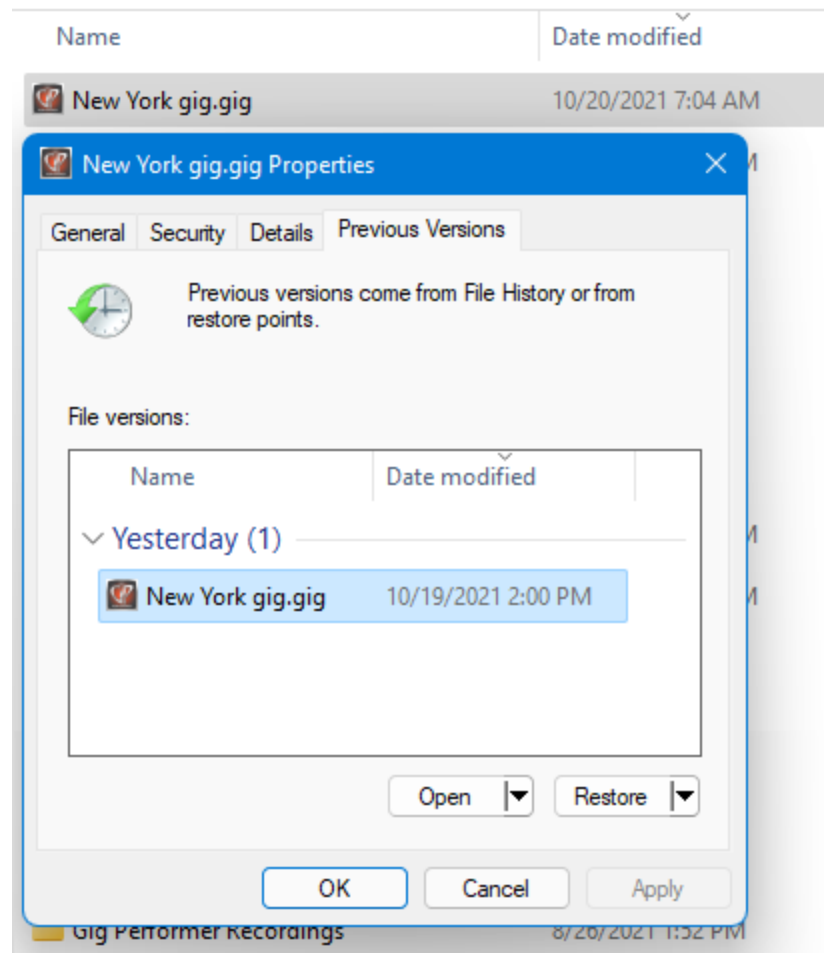
Creating a system image helps you to easily restore the last working PC's state, so you are always ready for your gig. The best practice is to always test your audio setup after major changes, such

as Windows feature updates, plugin updates or audio driver updates, and backup your working setup.

Another built-in Windows feature for creating backups is File History; it backs up versions of your files in Libraries and Desktop folders (on Windows 10 you can select a custom folder path). Therefore, File History is a great tool to keep versions of our gig files and other files related to your audio plugin host. To open this tool, click on the Start button and type in File History:



Using this feature, you can easily revert your progress to a version that you made a day earlier:



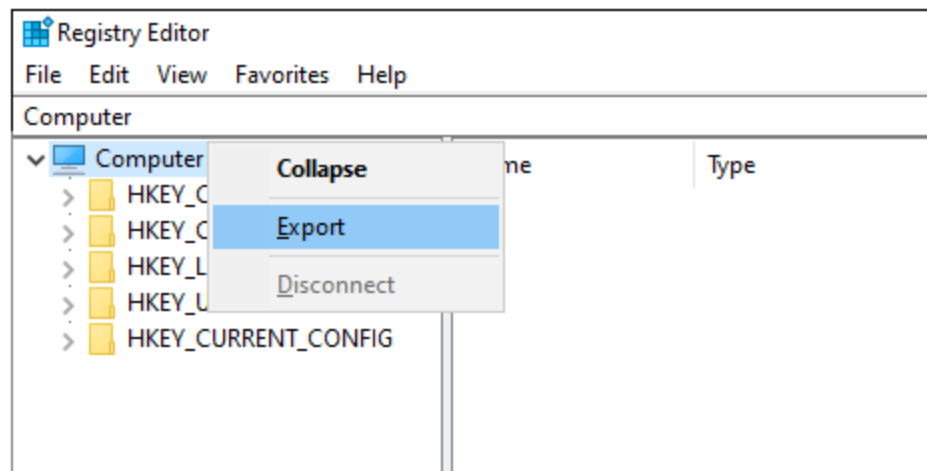
Check out [our community thread](#) to learn more about this feature.

## 9.2 Registry backup

In addition to creating a system image, you may want to create a backup of your working registry database.

The Windows Registry is a database where important system and application settings are stored.

Click on the **Start** button, type in **regedit** and press Enter:



Right click on the Computer and then click on **Export**. Keep your exported REG file at a safe location, i.e. on your external hard drive or at some offsite cloud storage system.

If you encounter any problems with your PC due to incompletely uninstalled applications or malware, open your Registry Editor, click on the **File** menu, select **Import...** and locate your REG file. The best practice is to make these backups occasionally.

**Note:** Many applications will store their licensing data either on your drive or in the registry. Restoring from the backup may invalidate these licenses and you may have to re-register some of your applications again if you registered those applications after you took the backup.

**Note:** some operating system upgrades can cause the computer to "look" like it is a new or different computer. Some previously activated software products, including Gig Performer and certain plugins may need to be reactivated after such upgrades.

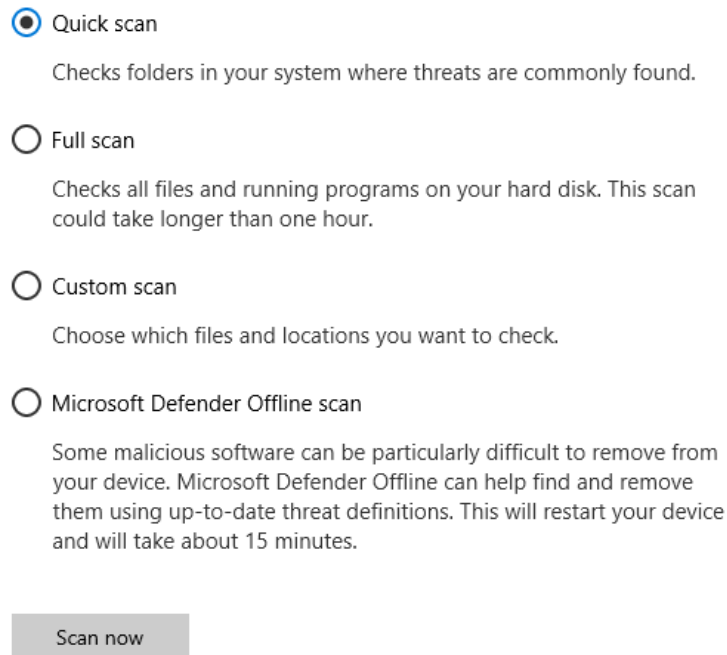
### 9.3 Full system antivirus scan before turning it off

Antivirus products can be notorious for interfering with audio applications, causing glitches and/or even prevent them from working properly. Gig Performer (for example) may work fine when initially installed but your anti-virus product may interfere after either Gig Performer or the anti-virus product is updated. Unfortunately, you cannot be without a decent anti-virus product because you need to protect your system from malware, such as viruses and Trojans, that will also cause your audio applications to misbehave or even crash the entire operating system at random intervals. The real-time protection feature of many anti-virus products can also cause problems as they take time to check files as they are being loaded or saved, something you don't want to be happening when you're loading audio samples into memory on the fly, for example.

Therefore, the best practice is to perform a full system scan before switching off your anti-virus system or at least its real-time protection feature.



Click on the Start button and then type in **virus & threat protection** and click on the Virus & threat protection system setting; click on the **Scan options** to list available scan options:

A screenshot of the Windows Security 'Scan options' window. It features four radio button options: 'Quick scan' (selected), 'Full scan', 'Custom scan', and 'Microsoft Defender Offline scan'. Each option has a descriptive text block below it. At the bottom, there is a grey 'Scan now' button.

☒ Quick scan  
Checks folders in your system where threats are commonly found.

☐ Full scan  
Checks all files and running programs on your hard disk. This scan could take longer than one hour.

☐ Custom scan  
Choose which files and locations you want to check.

☐ Microsoft Defender Offline scan  
Some malicious software can be particularly difficult to remove from your device. Microsoft Defender Offline can help find and remove them using up-to-date threat definitions. This will restart your device and will take about 15 minutes.

Scan now

Select the **Full scan** and click on the **Scan now** button to check your PC for malware.

Certain malware, such as rootkits, can be particularly difficult to discover and remove from your PC. In such cases, it is recommended that you perform an offline **Microsoft Defender** scan.

If your audio plugin host or entire operating system crashes at random intervals, that could be due to faulty RAM, a faulty drive or to malware that is hiding on your system, even though your security software didn't detect anything. In this situation it is recommended to run an offline Microsoft Defender [scan](#).

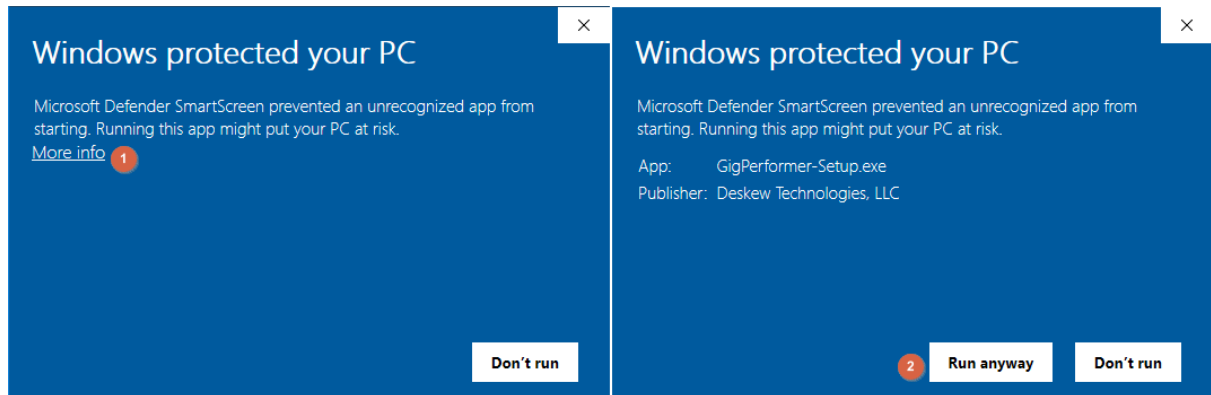
If you are using other antivirus solution, such as Kaspersky antivirus, check their documentation on how to create or download a rescue disk. Kaspersky provides a free rescue disk, which can be used to scan your computer offline for malware (find more information about it [here](#)).

Once again - the best practice is to turn off the real-time protection and other modules of your security software before your live performance. When you finish with gigging, turn them back on.

## 9.4 Microsoft Defender SmartScreen feature

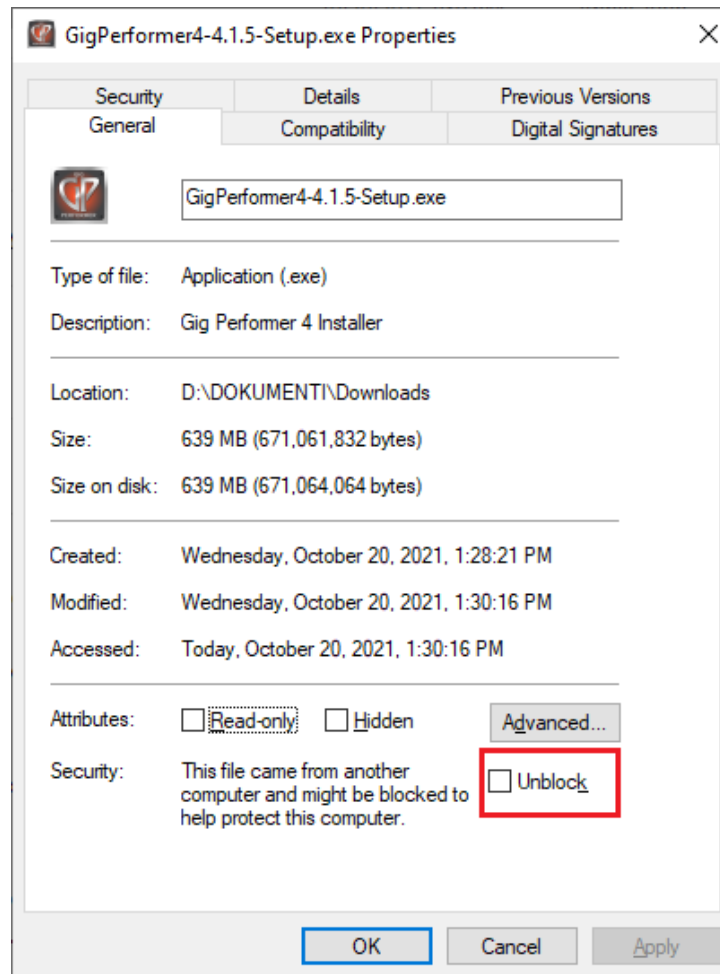
Microsoft Defender SmartScreen is a security program to block rogue websites, malicious applications and phishing attempts. Since it is reputation based, it may bring lots of confusion as it will likely block the latest version of your legitimate audio application from running.

Make sure you have downloaded your application from the official home page and run the installer:



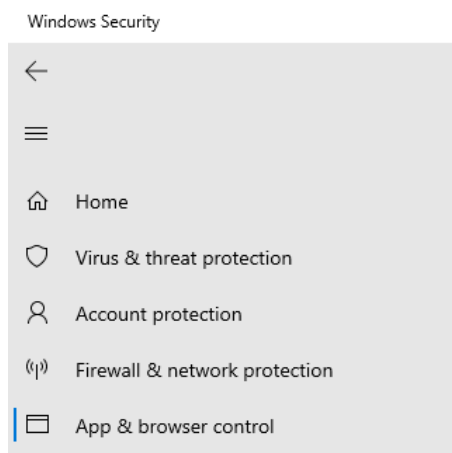
If SmartScreen dialog appears, click on **More info (1)**. Review the publisher and click on the **Run anyway (2)**.

Alternatively, right click on a downloaded setup file, and select **Properties**:



Tick the **Unblock** check box and confirm with clicking on **OK**. Setup is now marked as safe, and the SmartScreen window will not appear.

You may want to completely disable the SmartScreen feature before your gig; click on the **Start** button, type in **reputation-based protection** and click on the corresponding system setting:



## Reputation-based protection

These settings protect your device from malicious or potentially unwanted apps, files, and websites.

### Check apps and files

Microsoft Defender SmartScreen helps protect your device by checking for unrecognized apps and files from the web.

☐ Off

Set Check apps and files to **Off**.

Turn on that feature when you finish with your live performance.

## 9.5 Use quality USB hubs

When using a USB hub, note that the bandwidth of the PC's USB port is not increased and stays the same. Moreover, some USB devices may be notably more demanding than others, such as multi-channel USB audio interfaces or external hard drives, so it is crucial to test your USB hub thoroughly if you intend to use it for real-time audio processing.

Note that all USB hubs are not created equally. **A quality, self-powered, hub will go a long way.** Some interfaces require a good quality self-power hub, otherwise noise and dropout issues may occur.

If you are troubleshooting issues with your USB audio interface, make sure it is not connected to an external USB hub, but directly to a USB port on your PC or laptop. We recommend to always use a spare USB port, not a hub.

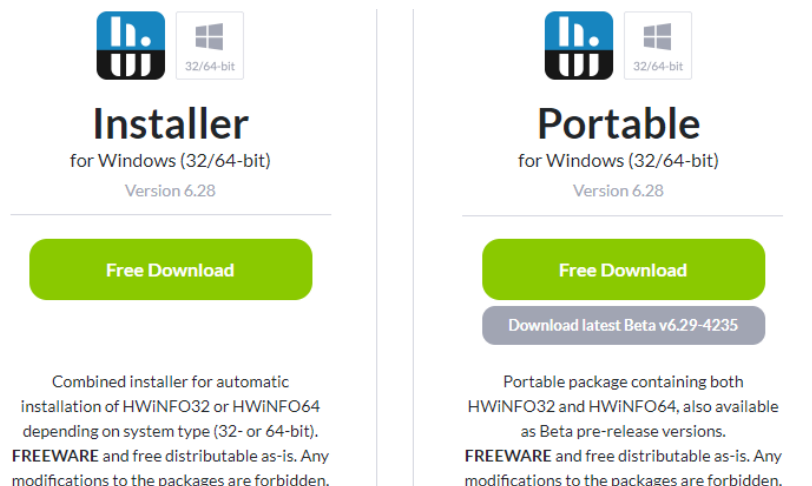
If necessary, consider upgrading to a premium USB cable. If you experience hum or noise when using your USB audio interface, you may want to upgrade your USB cable to a premium cable with extra shielding and a Ferrite Bead (it suppresses high-frequency electronic noise in electronic circuits) which can filter out some external noise.

Also make sure you do not allow the computer to turn off USB hub devices to save power, as explained in *Device power management* section.

## 9.6 Portable applications

If you want to dedicate your PC fully to audio processing, and keep it as clean as possible, you may want to consider using *portable applications*, instead of *installed applications* for your additional non-audio related needs (Web browsing, PDF viewer, etc.). A portable application is a program that does not need to be installed and is designed to read and write its configuration settings into an accessible folder in the computer, usually in the folder where the portable application can be found.

Many modern applications are offered as portable versions, besides installers:



To run a portable application, you normally download the ZIP archive, unzip it to a folder on your drive, and run the main executable.

To maintain a clean Windows environment focused on audio processing for live performance, we recommended that you uninstall all UWP apps that you do not use, as already described in chapter *Control what is running in the background*. There are several reasons for this:

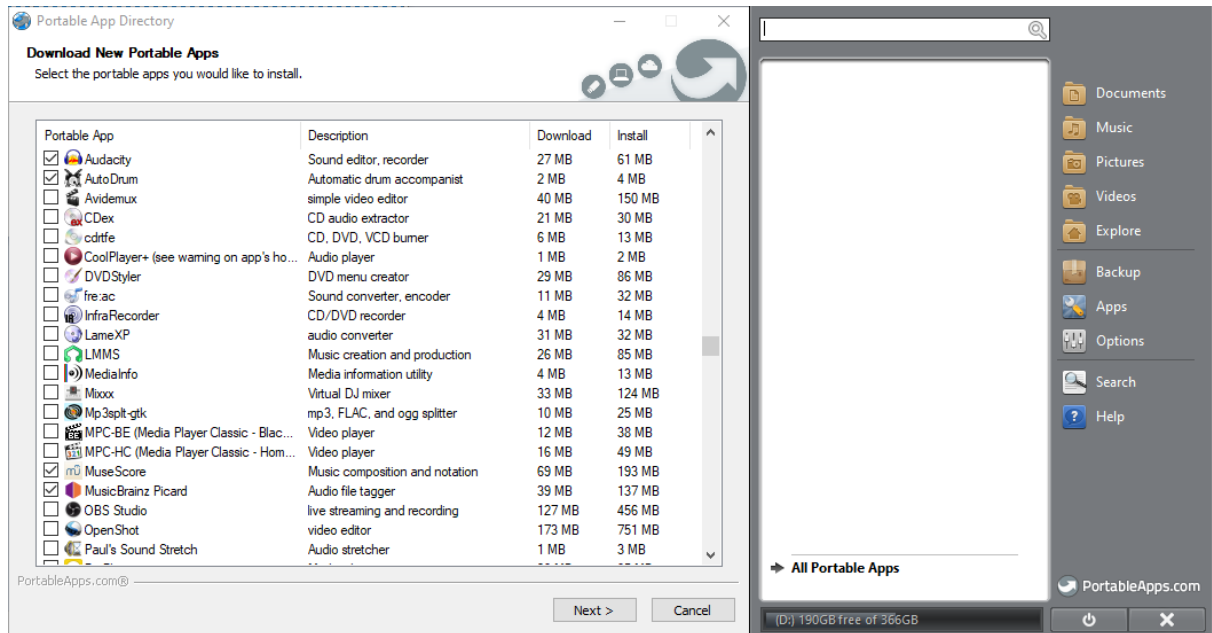
- **Speed** – UWP apps seem to be slower than installed or portable ones,
- **Reliability** – users experienced lots of problems where [UWP apps were failing](#), and not one or two, but **all** UWP apps except Edge,
- **Functionality** – installed or portable applications seems to be more feature-rich, and nice-looking compared to UWP apps.

Using portable applications bring many benefits if you want to create a stable and fully optimized PC as a platform focused for real-time audio processing:

- **Application traces** – portable applications do not write to the Windows registry nor store their configuration files in the user's profile; instead, they store their configuration files in the portable directory. This way you make sure that your PC stays clean and there are not unwanted traces in the registry, and any leftovers in Program Files, ProgramData or other folders on your drive.
- **Easier to control** – portable applications do not set scheduled tasks, install Windows services, or set themselves to run automatically when Windows starts (although some portable applications might also provide these features).
- **Portability** – as they do not need to be installed, portable applications can run from your thumb drive; you can insert your thumb drive into other computers or laptops, and they will run normally, as well. If you are a musician that is often on tour and you use different computers or laptops, you can save all your applications' preferences and ensure the same user experience across many PCs.

You can download many portable applications from web sites like [portableapps.com](http://portableapps.com) or [portablefreeware.com](http://portablefreeware.com).


The PortableApps.com also provides a platform which enables you to select and install more than 400 free and portable applications, organized in categories:



This platform can also automatically update your applications, such as Thunderbird or Libre Office.

## 9.7 Keep your ASIO driver and firmware of your audio interface up-to-date

Make sure you have updated your ASIO drivers and the firmware in your audio interface.

Windows 		
Driver / Firmware Update / Software	Release date	Download
Windows 7 to 10 PnP driver for MADiface XT / USB / Pro, Fireface UFX+ / UFX II, OctaMic XTC, ADI-2 Pro/AE/FS/DAC, Digiface USB / Dante Version <b>0.9722</b>	2020-08-18	<a href="#">driver_madiface_win_09722.zip</a>
Windows Flash Update Tool for MADiface XT/USB/Pro, OctaMic XTC, ADI-2 Pro Series & DAC, Digiface USB, UFX II. Update to firmware revision MADiface XT: 191/56/42, USB: 25, Pro: 73, OctaMic XTC: 47/26, ADI-2 Pro: 213/98, ADI-2 DAC: 27/34, Digiface USB: 14, UFX II 20/11/7.	2020-04-27	<a href="#">fut_madiface_win.zip</a>

Please visit your audio interface manufacturer's website and make sure you download and install the latest firmware and the latest ASIO driver for your version of Windows.

Refer to the manufacturers documentation on how to properly install an ASIO driver or firmware.

## 9.8 Test the entire gig

Once you follow these guidelines, it will be critical to test your entire gig (i.e. every song, every Rackspace in Gig Performer) to make sure that these optimizations have not broken anything.

Please note that you should not perform these optimizations right before your gig, or a couple of days before your gig – we strongly recommend to optimize your PC at least a few weeks before your gig, so you have plenty of time to sort out any issues or restore from your backup if something breaks.

If you are on tour, it is crucial to not perform any updates, or optimizations. You should keep your working PC configuration until your tour is finished.

You do not want to think about your PC while on tour, you just expect it to work. When you get to a show, you turn on your computer and perform - you do not even want to think about optimizations or any other computer-related stuff.

## 10 Troubleshooting

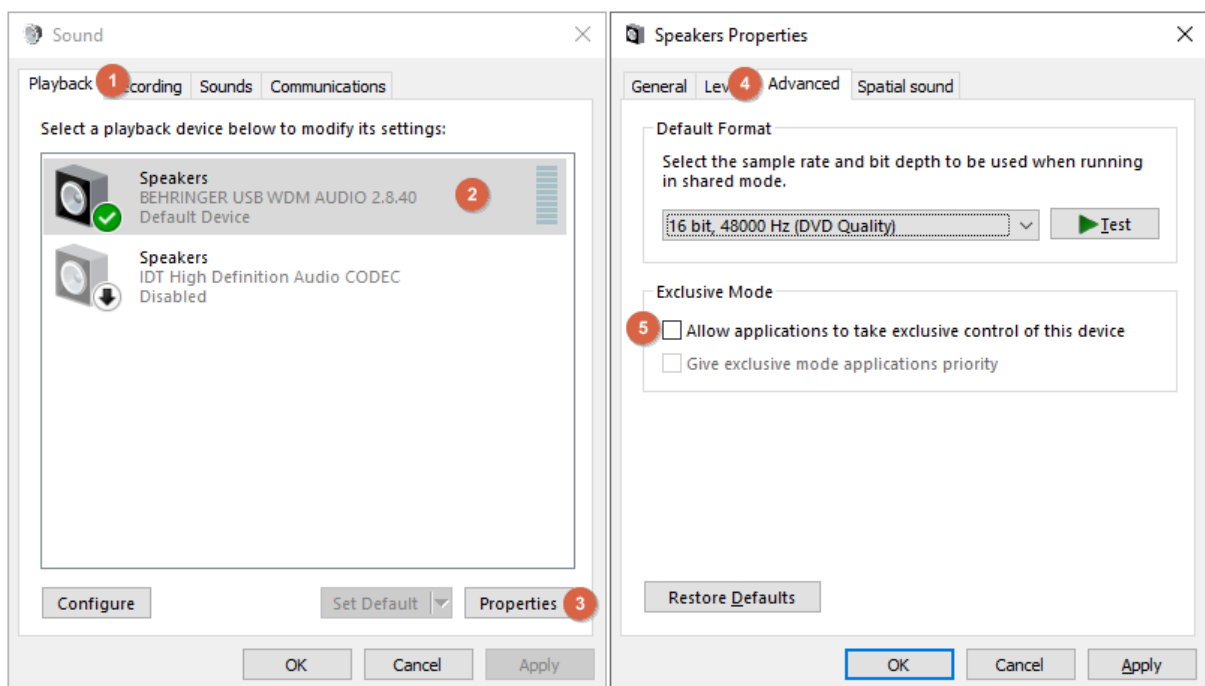
In this chapter we present tips and techniques on how to troubleshoot issues with your PC or audio system. In the previous chapter we mentioned that malicious programs can also cause your audio applications or even the entire operating system to crash at random intervals, so make sure you check your PC for malware before proceeding with the guidelines in this chapter.

### 10.1 Exclusive Mode

Some applications take over your audio interface when they start and do not allow any other applications to use it. If you run into an issue where no audio plays through your audio plugin host, make sure that exclusive mode for your audio interface is disabled.

Disabling the Exclusive Mode options in Windows Sound Preferences prevents audio applications from taking exclusive control of your interface's driver.

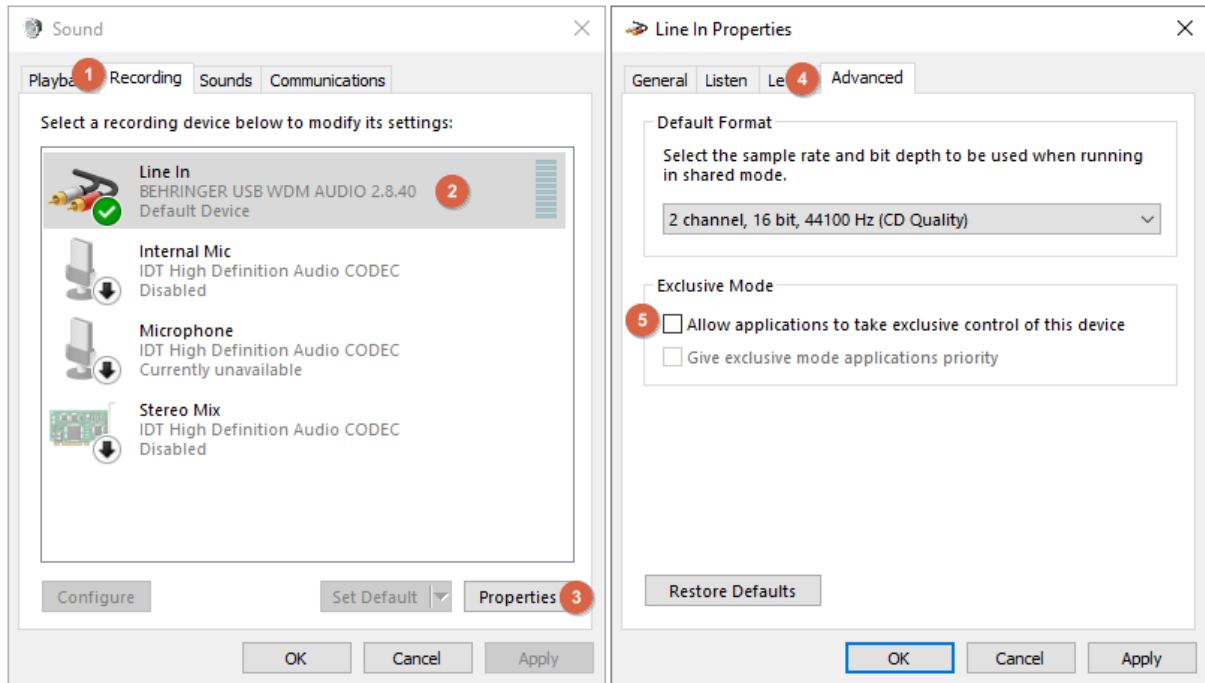
Click on the **Start** button and then type in *Change system sounds*; click on the **Change system sounds** control panel item:





Click on the **Playback** tab (1), then select your playback device (2), and click on Properties (3). In the Speaker Properties window, click on the **Advanced** tab (4) and untick **Allow applications to take exclusive control of this device** (5). Click on **OK** to save changes.

Repeat the same procedure for the recording device:

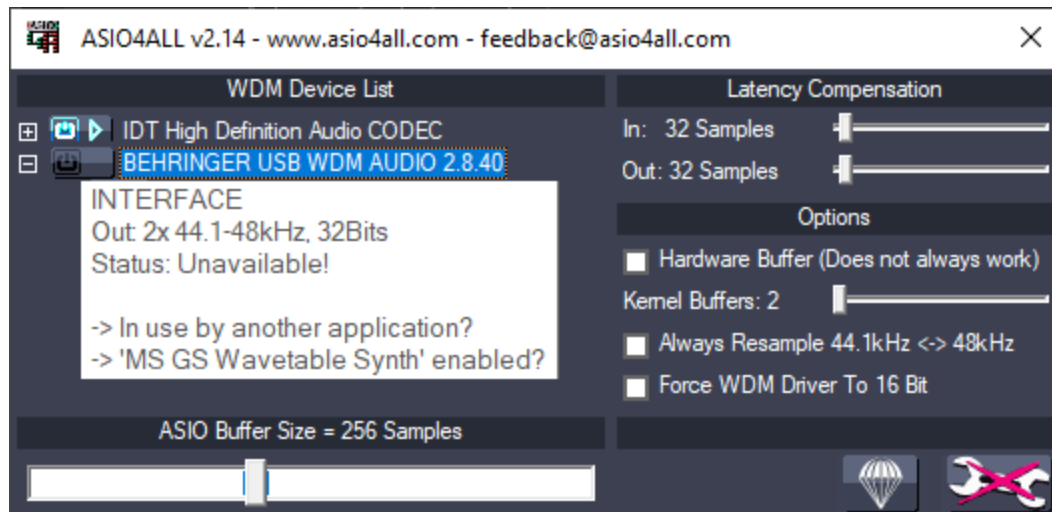


Click on the **Recording** tab (1), then select your recording device (2), and click on Properties (3). In the Line In Properties window, click on the **Advanced** tab (4) and untick **Allow applications to take exclusive control of this device** (5). Click on **OK** to save changes.

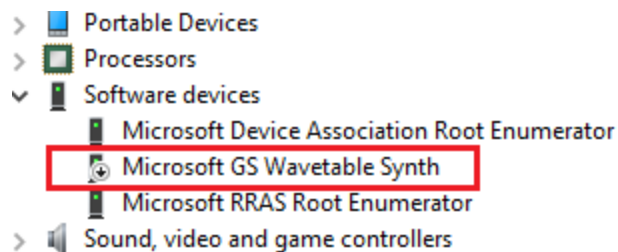
**Note:** under the **Exclusive mode** settings, you may have the **Signal Enhancements** settings. In that case you may want to deselect the *Enable audio enhancements* check box, as there are users that reported that audio sounded distorted when this option is enabled.

## 10.2 Microsoft GS Wavetable Synth

If you are using ASIO4ALL, the built-in Microsoft GS Wavetable Synth software device might interfere with ASIO audio processing:



Try disabling this software device through the Device Manager (refer to chapter *Disable unnecessary hardware in Windows Device Manager* for more information on how to do this):



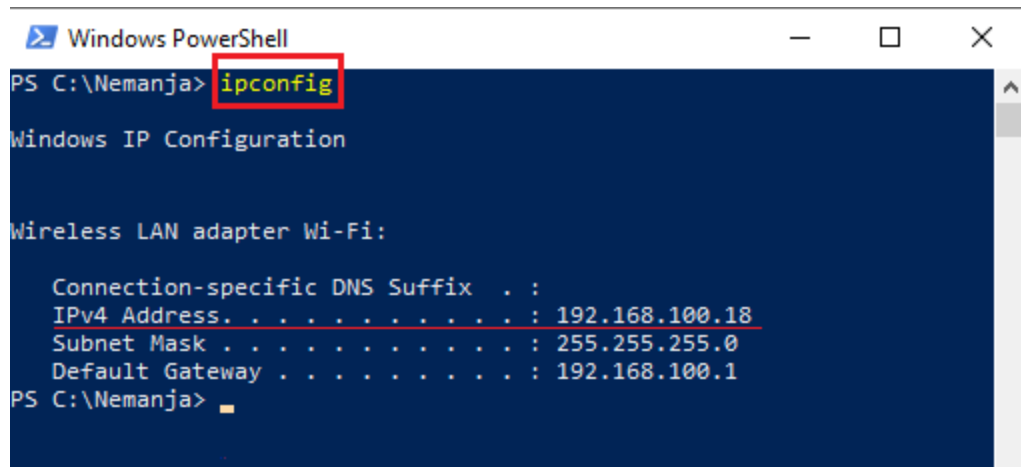
Right click on this device and select **Disable**. Check if the problem is solved.

## 10.3 Nagle's Algorithm

If you use network during your live performance (e.g. to send [OSC commands](#)) and experience high latency, you can reduce the network latency by disabling support for Nagle's algorithm. Nagle's algorithm lowers the overall number of packets sent over the network and improves network efficiency but at the cost of increased latency.

This algorithm works by combining a number of small network packets and sending them all at once, and it introduces a delay [up to 300 ms](#) before the packet is sent over the network. Disabling this algorithm will reduce your overall network latency.

Before disabling Nagle's algorithm, make yourself familiar with network interfaces you use, and their assigned IP addresses; to do this, press **Winkey + X** to open the Quick Access Menu, then select **Windows PowerShell** (or **Windows Terminal** on Windows 11):



```

Windows PowerShell
PS C:\Nemanja> ipconfig

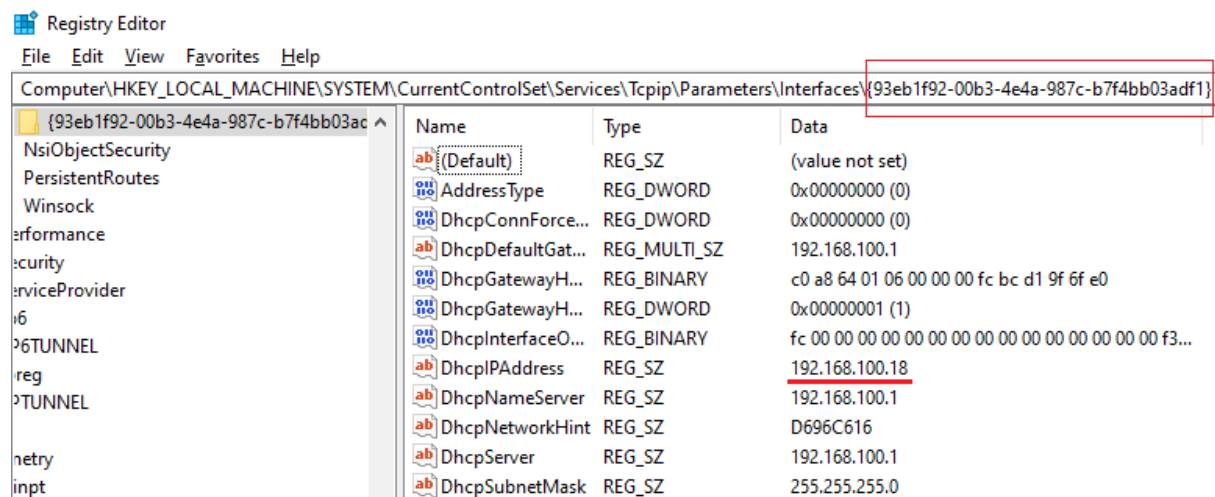
Windows IP Configuration

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . : 
    IPv4 Address. . . . . : 192.168.100.18
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.100.1
PS C:\Nemanja>
    
```

Type in **ipconfig** and press the Enter key; note the IPv4 address as you will need it to find the network adapter in the Windows Registry.

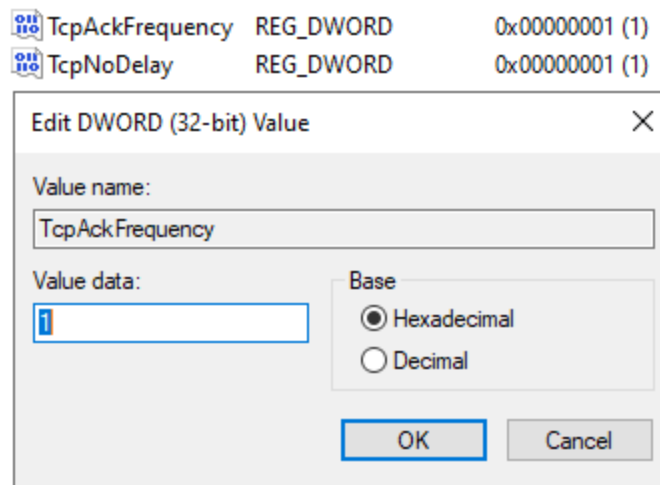
Nagle's algorithm can be disabled by using the Windows Registry. Click on the **Start** button, type in **regedit** and press **Enter**:



Navigate to: HKEY\_LOCAL\_MACHINE -> SYSTEM -> CurrentControlSet -> Services -> Tcpip -> Parameters-> Interfaces, and identify the interface that matches the IP address from the terminal window.

Two DWORD (32-bit) values must be created for this interface: **TcpAckFrequency** and **TcpNoDelay**. To create these values right click on the empty space of the interface, select **New** and then select **New DWORD (32-bit) Value**.

Name them exactly and set the Value data field to 1, as shown in the picture below:

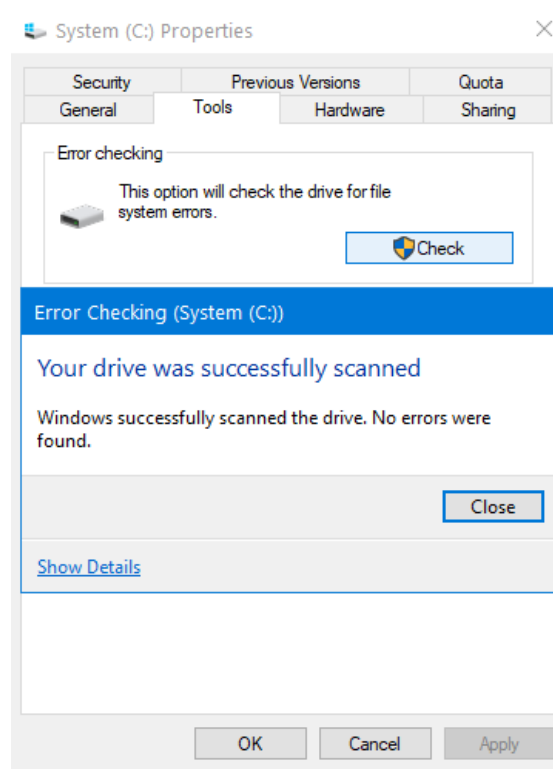


Repeat this procedure for every interface you want to disable the Nagle's algorithm.

## 10.4 Check disk

You may experience many audio-related issues with your PC if your hard drive has logical or physical errors, e.g. your plugin might load improperly or your audio plugin host might crash at random times.

Windows contains an integrated tool called **chkdsk** that can be used to check for such errors. To access it from Windows, right click on your drive, select **Properties**, and click on the **Tools** tab:



Click on the **Check** button to start the scan of your drive.

This tool checks the integrity of the file system of your drive, including file system meta data, and fixes any logical file system errors or bad sectors that it finds. Logical file system errors include corrupt entries in the master file table (MFT), bad security descriptors associated with files, and other file system errors.

You can also run [chkdsk](#) directly from the terminal or the Windows PowerShell.

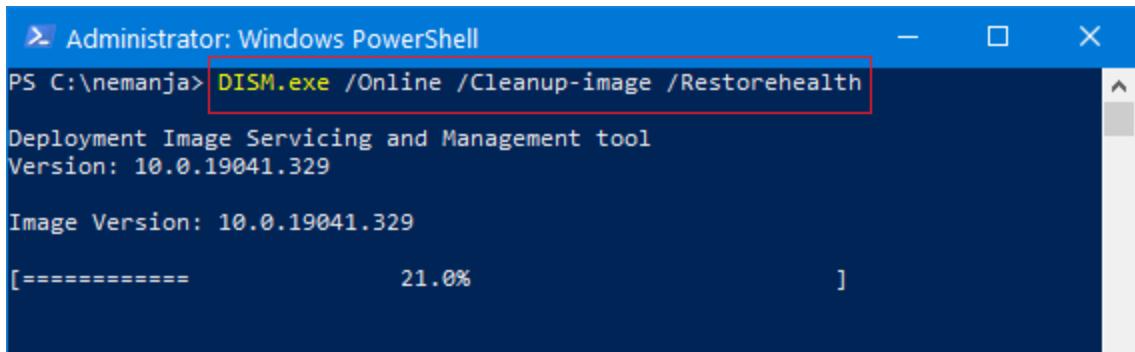
Faulty hard drive can cause random system or application crashes so make sure you check your hard drives with this tool if you experience such issues.

## 10.5 System file checker

Sometimes your problems with audio processing occur as the result of damaged Windows system files. Windows contains another integrated tool called **SFC** or System File Checker, that may help you troubleshoot this kind of issues with your PC.

SFC allows users to scan for and correct corruptions in Windows system files. Microsoft, however, [recommends](#) running the integrated Deployment Image Servicing and Management ([DISM](#)) tool prior to running the System File Checker.

Press **Winkey + X** to open the Quick Access Menu, then select **Windows PowerShell (Admin)** (or **Windows Terminal (Admin)** on Windows 11):



```
Administrator: Windows PowerShell
PS C:\nemanja> DISM.exe /Online /Cleanup-image /Restorehealth

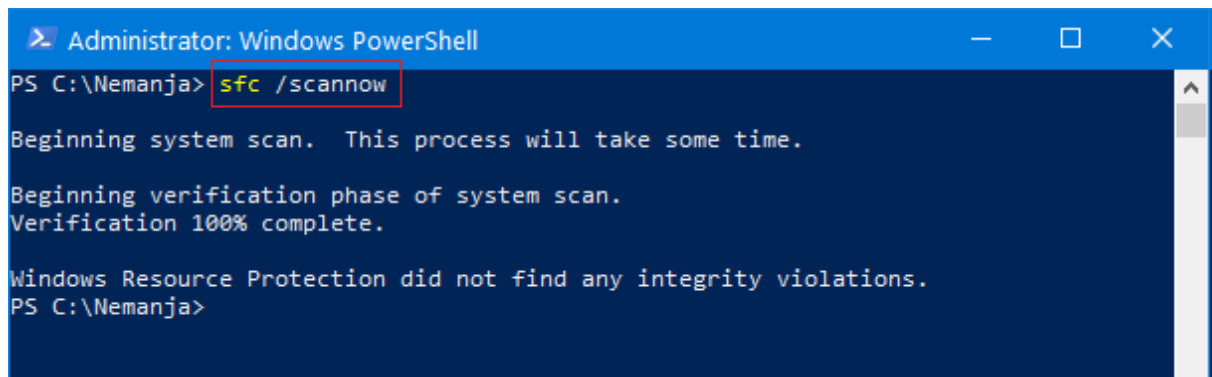
Deployment Image Servicing and Management tool
Version: 10.0.19041.329

Image Version: 10.0.19041.329

[=====                21.0%                ]
```

When you run this command, DISM uses Windows Update to retrieve the files that are required to fix corruptions. Make sure you are connected to the Internet while using this command.

It may take several minutes for the command operation to be completed. While you are still using PowerShell or terminal in Admin mode, use the SFC tool:



```
Administrator: Windows PowerShell
PS C:\Nemanja> sfc /scannow

Beginning system scan. This process will take some time.

Beginning verification phase of system scan.
Verification 100% complete.

Windows Resource Protection did not find any integrity violations.
PS C:\Nemanja>
```

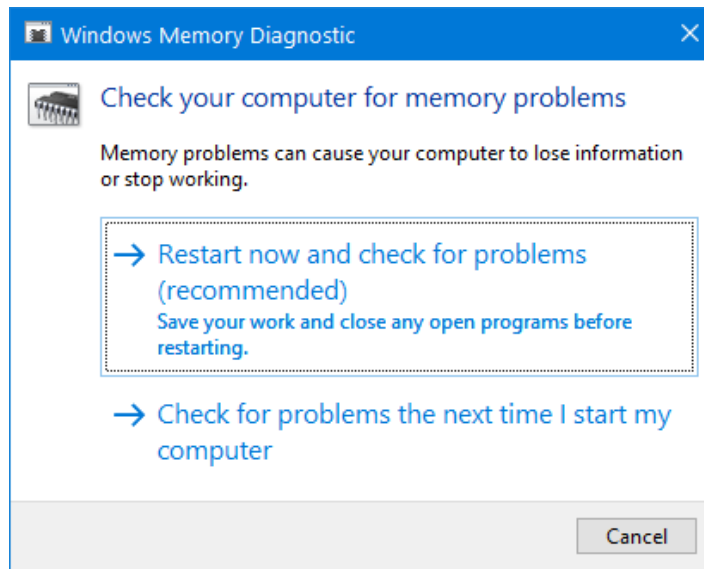
Type in **sfc /scannow** and press Enter to start the system scan.

This command will scan all protected system files, and replace corrupted files with a local cached copy.

## 10.6 Test your RAM

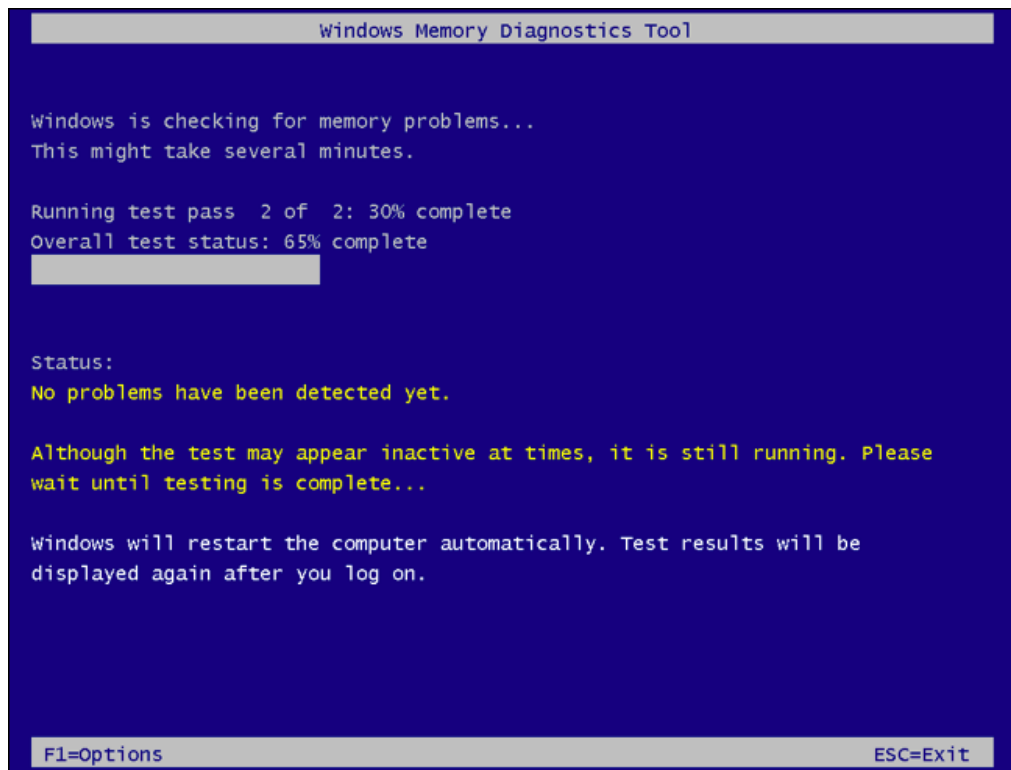
Faulty memory chip sometimes results in random system or application crashes. Microsoft provides an integrated tool called Windows Memory Diagnostic that tests your RAM for errors.

Click on the Start button, type in **mdsched** and press Enter:



Save your work and close any open programs and then click on **Restart now and check for problems**.

Your computer will restart and the Windows Memory Diagnostics Tool screen will appear:



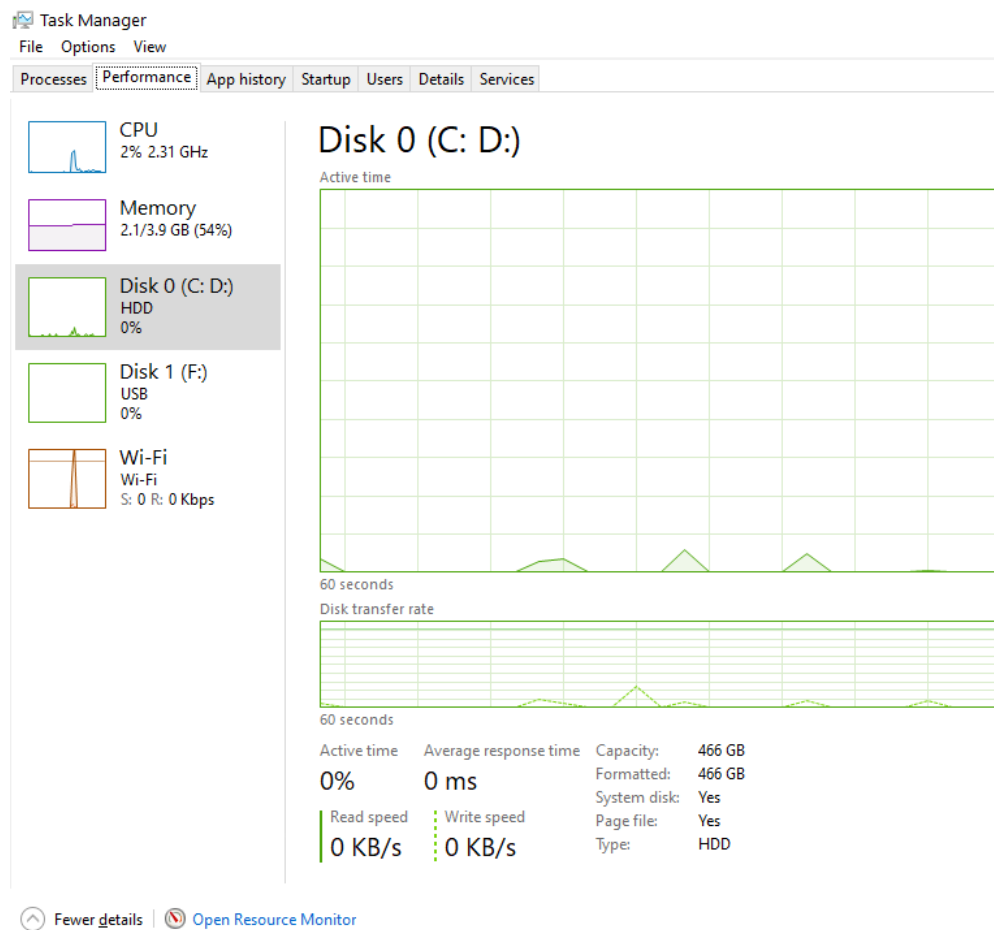
You can press the F1 key to select the Extended test, as it will include additional tests such as MATS+, Stride38, WSCHCKR and others.

This process may take a while, and once done, your computer will automatically reboot and the test results will appear when you log in (if they do not appear, then use the [Event Viewer](#) to review recent logs).

## 10.7 Performance monitoring

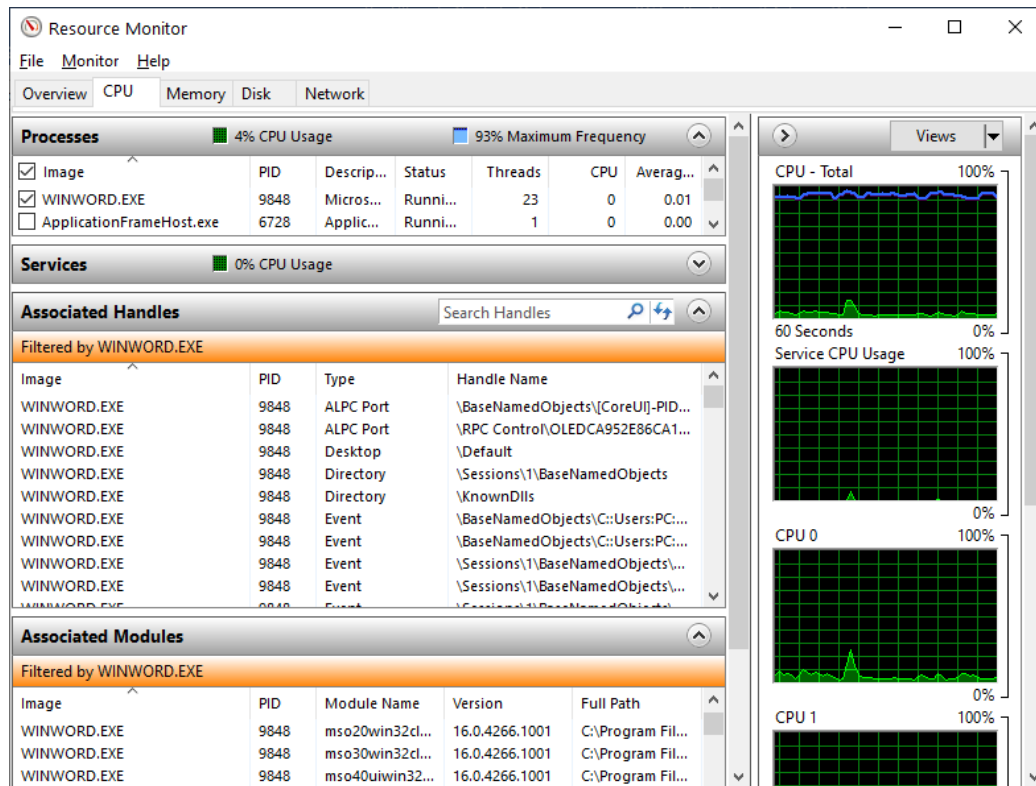
If you experience issues with high CPU, RAM or disk usage, you can use a couple of integrated utilities in Windows to identify bottlenecks, and fix those issues.

We have already mentioned **Task Manager**, and it provides the basic performance view, through which you can get quick information on available resources:



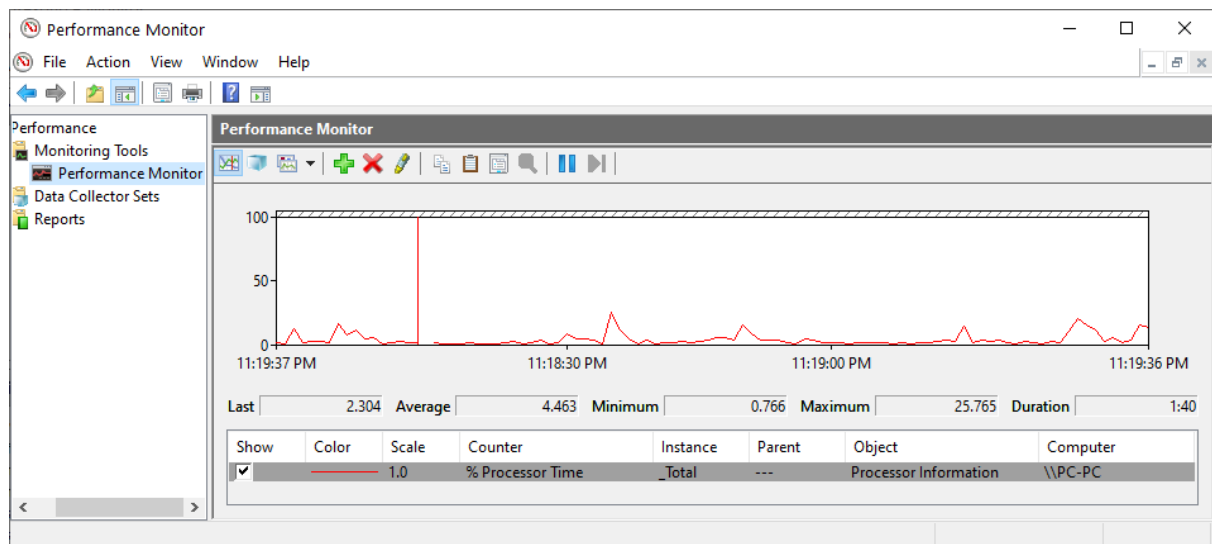
Note the **Open Resource Monitor button**, located at the bottom of the screenshot above and click on it:





The **Resource Monitor** is the second tool we want to present. This tool provides a detailed look at your PC's resource usage. You can select, for example, a process that has high CPU consumption and filter it to show all associated services, modules, handles, disk and network activity. The Resource Monitor provides much more detailed resource statistics than does the Task Manager.

Another great tool you might want to use to track performance of your PC is the **Performance Monitor**. Click on the **Start** button, type in **perfmon** and press Enter:



The [Performance Monitor](#) can display performance data from hundreds of different performance counters. You can use it to monitor and log your PC's performance over specific period of time, e.g. during your rehearsal, or you can monitor the performance of a remote computer in real-time.

Additionally, if you right click on **Monitoring tools**, and select **View system reliability...** you can use the **Reliability Monitor**, and [measure](#) hardware and software problems and other changes to your computer.

## 10.8 Troubleshooting DPC and ISR latency issues

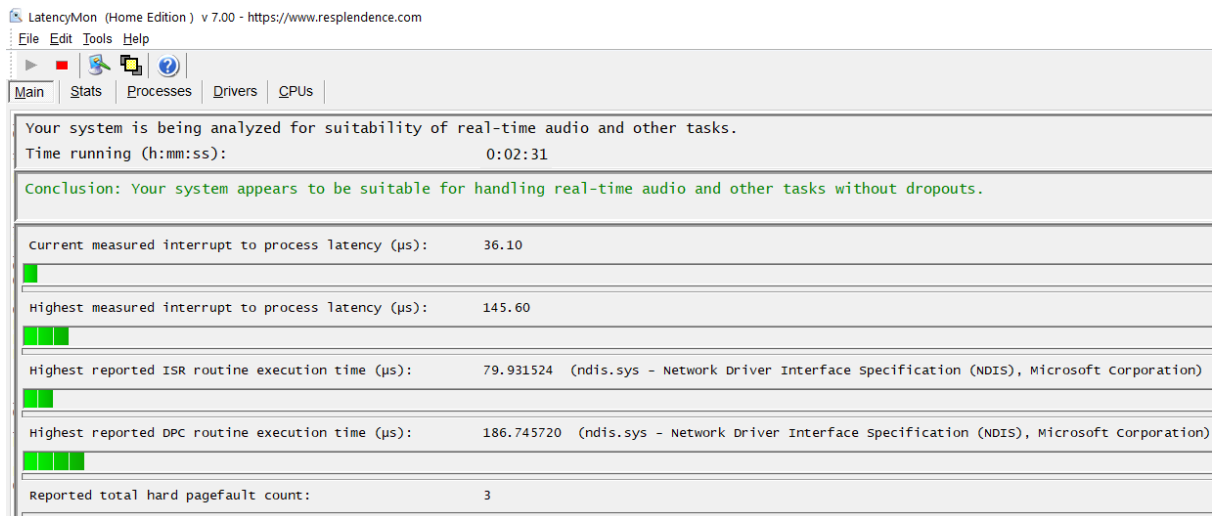
A **Deferred Procedure Call** (DPC) is a mechanism used to reduce the amount of time actually spent in a high-priority thread. High-priority tasks are related to drivers or processes that run simultaneously in the Windows operating system.

This mechanism enables device drivers and other low-level processes to perform the critical, high-priority part of their processing quickly, and schedule the non-critical, lower priority part of their processing for later execution.

As you might guess, there are many poorly written drivers that take longer than necessary to process, and therefore prevent other drivers from being processed in time. These situations may prevent your audio driver from being processed promptly thereby causing pops, clicks, dropouts or audio distortion.

An **Interrupt Service Routine** (ISR) is a software procedure that hardware call on in response to an interrupt. The hardware interrupts the CPU which then switches into kernel mode and jumps to the ISR, causing their interrupt service routines to execute.

Unfortunately, Windows does not provide an integrated tool for troubleshooting DPC and ISR latency issues. Luckily, there is a great application called [LatencyMon](#) (a free home edition is available) that checks if your PC is suitable for processing real-time audio and other tasks by measuring DPC and ISR execution time, kernel timer latency and pagefaults:



Click on the **play** button to start monitoring, let it run for a couple of minutes and then click on the **stop** button.

This application provides a report where you can determine which kernel modules and processes are responsible for causing audio latencies or might result in dropouts.

The [report](#) also includes a report on the suitability of your system for playing real-time audio:

- If the execution times of all DPC and ISR routines stay below 2000 µs (microseconds), your system is considered suitable for handling real-time audio without dropouts.
- If some routines have execution times between 2000 µs and 4000 µs, your system is considered doubtful.
- If ISR or DPC routines are detected to execute for longer than 4000 µs, a system is considered unsuitable for handling real-time audio.

Here are some tips to resolve DPC and ISR latency issues:

- **Update your drivers** - a common cause of DPC latency is out of date device drivers. New drivers will hopefully be better optimized and cause less interruptions in your audio stream.
- **Disable devices you do not use** – if you do not use network or WiFi adapters, disable them. The same applies to card readers, other sound devices that are not in use (e.g. your integrated audio card), Bluetooth adapters, imaging devices and others.
- **Research the Internet** – copy the name of the problematic driver and add DPC or ISR to your search query to find discussions on audio forums and make yourself familiar with that driver and possible solutions. Perhaps an older driver, or a specific version may work better than the newest one.
- **Find the alternative** – if for example tcpip.sys or ndis.sys are reported as the culprit (ndis.sys is displayed in the screenshot above), the chances are that the problems are

caused by your wireless network adapter. Therefore, try disabling the WiFi adapter and instead connect to your LAN or to the Internet via an Ethernet cable. If you are using a laptop and touchpad drivers are causing problems, use a USB mouse instead and re-run the test.

## 11 Why Gig Performer?

The last missing piece of your optimized and a complete glitch-free setup is the audio plugin host that provides the ultimate glitch-free experience on stage – Gig Performer. The secret behind its robustness lies in the very finest blend of programming and musical experience: Gig Performer is [developed](#) by people who are both software developers and serious touring musicians. Advanced optimization techniques and heavy [stress tests](#) make sure that if you use Gig Performer on stage for hours and hours – or even days – it will still perform without a glitch and will not stop running. Countless hours are spent to make sure that Gig Performer uses as few CPU cycles as possible.

Many [well-known](#) music professionals worldwide rely on Gig Performer as their audio plugin host of choice for live performance. Check [Gig Performer in Action](#) for various photos and videos of Gig Performer during live performances or rehearsals.

Gig Performer's innovative approach and focus on usability is paired with an intuitive rack design, called a *rackspace*, which transforms your plugins into the most powerful, yet user-friendly live music software system.



Connect your plugins together any way you wish without the need to create channel strips, busses, sends and inserts.

The impressive list of cutting edge [features](#) make Gig Performer stand out [compared](#) to other audio plugin hosts. For example, the [Predictive loading™](#) feature enables you to intelligently load parts of your show, instead of loading your entire show, so you can still switch instantaneously to the

next Rackspace or a Song. This feature significantly reduces both your [RAM](#) and CPU usage so you can perform confidently even with a [very old laptop](#).

Gig Performer allows you to control plugin parameters by assigning them widgets or multiple parameters by using widget groups. Widgets can be controlled using MIDI or OSC. The full OSC implementation in Gig Performer allows you to control your show from a [mobile phone](#), [iPad](#), [Android tablet](#), or even from a [Web browser](#).

As a software product created by musicians, for musicians, new updates and features are implemented often in Gig Performer.

Discover endless possibilities of your audio setup and customize your rig's behavior to the max by using its powerful, proprietary scripting language called GPScript.

[Download](#) a free, fully functional 14 day trial of this audio plugin host that truly addresses the needs of live performers.

## 12 Checklist!

The final chapter is dedicated to a very brief checklist to make sure you did not forget to configure something important.

1. Disable unnecessary devices, such as the WiFi adapter if you do not use it on your gig.
2. Select the Ultimate performance power plan.
3. Turn off all UWP background apps and close all programs you do not need for your gig in the Task Manager.
4. Do a quick review of Windows services.
5. Make sure there are no tasks scheduled for the duration of your live performance.
6. Turn off your antivirus or other security products.
7. Pause Windows Updates or disable them completely.
8. Make sure Gig Performer's windows has the foreground focus to help you prevent your PC to not go idle.
9. Remember to have fun!

Enjoy your live performance and Own The Stage® with Gig Performer®.

## 13 Conclusion

When you get a brand-new musical instrument, you would not go on stage with it immediately. You would set it up, tune it, make sure it does exactly what you need and practice with it so as to get the most out of your instrument.

The same applies to the PC you want to use on stage. If you spend some time tuning it up using this guide, you will make sure you get the most out of it and end up with a super stable, well performing platform for your live performance.

Our goal with this guide is not only to make your PC a great platform for audio processing, so you can perform confidently, having one less worry on stage, but also to provide a deeper understanding of what is happening behind the curtains and how to control it.

If you have other tips for PC optimizations or you want to see even more tips that were not included in this guide, please visit [our Community](#).

You can find us also on:

- Facebook: <https://www.facebook.com/GigPerformer/>
- Twitter: <https://twitter.com/GigPerformer>
- Instagram: <https://www.instagram.com/gigperformer/>
- LinkedIn: <https://www.linkedin.com/company/deskew-technologies-llc/>
- YouTube: <https://www.youtube.com/c/GigPerformer>

If you enjoyed this guide, you can subscribe to our social channels to be notified about future updates of this guide, and like or share this guide to spread the word.

We will continue to update this guide from time to time to address new versions of Windows and to include additional tips and tricks to make your real-time audio performance better on your PC.