

Optimizing Windows® Vista and Windows 7 for Music Production

Because Windows Vista and Windows 7 are meant for an entire spectrum of users, by default, the Windows user interface is designed to have a very nice GUI (Graphical User Interface), plenty of security, a pleasing set of sounds, and several other features. Some of these are not the ideal settings for dedicated DAW users, though. This guide is intended to step you through optimizing your machine in preparation for your new hardware and software to gain the most out of your system without experiencing the unnecessary heavy processor loads of poorly optimized machines.

It is important that you read through this documentation, as it covers several crucial optimization steps recommended when setting up your DAW.

A few conventions are used in the following sections:

1. This guide assumes that you are working off a fresh install of Vista/Win7. Therefore, if you have modified the way your windows are displayed, or otherwise customized the OS, some of the instructions may be slightly different.
2. Classic View is used in the Control Panel. There is a link on the left-hand pane in the Control Panel window to engage Classic View.
3. When navigating Vista/Win7, the ">" symbol is used to show the next step. For example, instead of seeing "double-click on Computer, then double-click on C:, then double-click on Program Files," you will see this: "Go to Computer > C: > Program Files."
4. It is assumed you can access the Device Manager. Here are a number of ways:
 - Right-click on Computer > Manage > Device Manager.
 - Start > type in "Device Manager" and press "Enter."
 - Start > Control Panel > Device Manager.

Performance

These adjustments are some of the more sweeping optimizations in this guide. They address the visual aspects, processor handling, and Data Execution Prevention (DEP) for the Vista/Win7 OS. One of the most highly touted aspects of Vista/Win7 has been the new visual effects, or "eye candy." As impressive as they are, Aero effects do take a significant amount of system resources. These are valuable resources that can instead be devoted to your audio software. If you have a powerful enough video card, then it will assume all video processing; in that case, it is fine to leave Aero enabled.

Processor scheduling determines which types of processing are given a higher priority by Vista/Win7. The default setting is to devote more to your programs. This seems good on the surface; however, audio drivers run in the background, not as separate programs. In order to get the most performance from audio gear, it is best to set your processor to handle background services first.

Data Execution Prevention (DEP) is a set of hardware and software technologies that perform additional checks on memory to help prevent malicious code from running on a system. This is a technology that was originally developed in Windows XP and is now a part of Vista/Win7. While great in theory, DEP can sometimes see audio applications as "malicious code." Leaving it on to prevent attacks on essential Windows files is preferable.

To make these adjustments, right-click on Computer > Properties > Advanced System Settings > Performance > Settings, and select:

- Visual Effects > Adjust for best Performance (this disables all Aero effects).

- Advanced > Processor Scheduling > Background Services.
- Advanced > Data Execution Prevention > Turn on DEP for essential Windows programs and services only.
- Press OK when done. This will disable the Windows Aero theme. If you would like to enable it again, right-click on the desktop and choose Personalize > Theme > Windows Vista/Win7. Resource usage from the Vista/Win7 theme is negligible. See the section on Personalization for more details.

The Win7 Legacy Driver and Your FireWire Interface

The new Windows 7 FireWire driver can sometimes cause problems when streaming audio over FireWire. These problems can range from annoying dropouts all the way to complete (and unexpected) loss of sync with your favorite FireWire audio interface. In order to resolve these issues, you may need to switch to the “Legacy” driver that Microsoft provides.

To change your FireWire (aka IEEE1394):

- Open up Device Manager and locate the IEEE 1394 Host Controller.
- Once there, open Properties and select “Install New Driver” in the driver tab.
- Choose “Search for files on your computer.”
- Select “Choose from a list.” The “Legacy” driver will be an option. Select it and press OK.

Note that not all sync and dropout issues can be blamed on the Windows 7 FireWire driver. If you continue to have these types of issues after switching to the Legacy Driver and optimizing your Win7 machine into a recording workhorse, and you’re using a PreSonus FireWire device, please contact PreSonus Technical Support for further assistance.

Power Options

Windows allows custom configuration of its power settings. This is useful for conserving energy when the computer is not in use. It works by automatically powering down, or “hibernating,” one or more components of the computer system when the computer has been idle for a predetermined amount of time. This can pose a major problem for users who record long sessions, as the computer may power itself down in the middle of recording!

To optimize your power settings for audio performance, go to Start > Control Panel > Power Options > choose “High Performance.” Click the “Change plan settings” button, and make sure both options are set to “Never.”

Many systems come preset to conserve USB power by temporarily cutting or disabling power to USB ports that are not actively in use. This can often be problematic for USB drivers that run in the background, since background tasks are not given power priority by the OS. If you use USB interfaces or controllers, then you should disable this power-management scheme. Go to the Device Manager > Universal Serial Bus Controllers > right-click on a “USB Root Hub” > Properties > Power Management > deselect “Allow the computer to turn off this device to save power” > press “OK.” Repeat this process for all USB Root Hubs in the Device Manager.

User Account Control

The new User Account Control (UAC) in Vista/Win7 is among the more controversial features. It is beneficial for preventing unwanted changes to the system, especially for protecting against unauthorized installations and file executions. However, the constant prompts asking to allow or deny access can interfere with overall workflow; all activity is suspended while the prompt waits for a reply. Furthermore, user-account monitoring uses extra CPU cycles (albeit an almost negligible amount), so disabling the feature improves performance ever so slightly.

All in all, the impediments in a DAW seem to outweigh the added security, especially if the system is kept off the Internet. To disable UAC, go to Start > Control Panel > User Accounts (your account) > “Turn User Control on or off” > Uncheck “Use UAC” > OK > Restart.

Keep in mind that some programs may require UAC to be enabled to complete the installation. If this is the case, then follow the manufacturer’s instructions.

Windows Security Center

Another enhancement in Vista/Win7 is the increased efficiency and centralized configuration of the Security Center. It is great for keeping out intruders, spyware, viruses, etc., but does so at the cost of CPU cycles. If you are online, it is best to leave the Security Center alone and active. Otherwise, you risk losing data, the integrity of your system drive, and even your identity. If you are not online with your Vista/Win7 DAW, then disabling the Security Center features will free up some extra resources for you.

The following instructions are for the offline user.

To access the Security Center, go to Start > Control Panel > Security Center. There are several adjustments to be made from the Security Center window:

- Click on Windows Update on the left-hand pane > Change Settings > Never Check for Updates... > OK > close the update window.
- Click on Windows Firewall > Change settings > Off > OK > close the Firewall window.
- Click on Windows Defender > Tools > Options > uncheck “Automatically scan my computer” > Save > close the Defender window. You can manually scan at any time by pressing the “Scan” button from the main Defender window. Again, this is not an issue if you’re offline.

Note that if you make these adjustments, Windows will continually remind you that your computer is at risk. To stop these reminders, go to “Change the way Security Center alerts me” > “Don’t notify me and don’t display the icon.”

Bear in mind that in this state, you are at risk if you should choose to go online. Before doing so, it is highly recommended that you reenable everything in the Security center, and also connect immediately to Windows Update for the latest security updates from Microsoft.

Antivirus software is another subcategory of Windows security. While not included as part of the Security Center, antivirus software is another near-necessity for everyday computing. For the online DAW user, it is best to disable antivirus software before using any audio applications. Since you will not be actively online, Windows Firewall and Defender (provided they are up to date) will be enough to monitor the background. For the offline DAW user, it’s best to not install it in the first place.

In Vista/Win7 Ultimate and Enterprise editions, another relevant security feature is BitLocker drive encryption. While it is a fantastic tool to prevent theft and piracy, the added encryption is not suitable for a high-performance DAW. It is best to leave BitLocker off on any drive that will actively be running DAW applications or streaming audio. However, for backup and non-DAW-related drives, it is fine to leave it enabled. To adjust BitLocker on your drives, go to Start > Control Panel > Control Panel Home > Security > BitLocker Drive Encryption.

Virtual Memory and ReadyBoost

Virtual memory (or paging files) is a technique that involves using a dedicated section of the hard drive as though it were additional RAM. The downside is that hard drives invariably process data slower than RAM does, so using paging files decreases performance. This can be beneficial for low-performance, high-data applications where lots of material is loaded into RAM but does not need to be processed extremely quickly. With audio applications, this is not a good idea because they are very demanding on system resources, so using a lower-speed hard drive is not a viable solution. However, some applications may require the use of a paging file, for one reason or another.

If this is the case, then make sure to set all of your buffer sizes in your audio application as high as possible to compensate for the hard drive's latency.

Right-click on "Computer" (either from desktop or Start button) > Properties > Advanced System Settings. This will bring you to the Advanced tab in the System Properties window. Under the Performance section, go to Settings tab and select Advanced, then press the "Change" button under Virtual memory. Uncheck "Automatically manage paging file size for all drives." For each drive listed, click on "No paging file" and "Set." You will be warned that a crash file may not be recorded if you have no paging file. Choose "Yes" to this message. Once all drives have been modified, choose "OK." Restart your computer for the changes to take effect.

If you do need to enable a paging file, for whatever reason, it is usually best to use a multiple of 2 for the size. Examples would be 256 MB, 512 MB, and 1024 MB. There is no need to exceed the amount of physical RAM installed for a paging file. If you find yourself continually needing to increase the paging file size, it is probably time to upgrade your system RAM.

One alternative to paging files is a new Vista/Win7 technology called ReadyBoost. It essentially uses a USB flash drive as a high-speed paging file. Not all flash drives will work, though. A device must have the following minimum specifications:

- The device must be at least 64 MB
- The device must be USB 2.0
- It has to be able to read at 3.5 MB/s
- It has to be able to write at 2.5 MB/s
- To activate ReadyBoost on a USB flash drive, go to Computer > right-click on the drive > Properties > ReadyBoost > select "Use this Device" and choose the amount of space you wish to dedicate to ReadyBoost. Click "OK" when finished. As with paging files, it is best to stay with multiples of 2.

Hard-Drive Performance

Vista/Win7 has an option to boost the normal performance of ATA and SATA drives by enhancing write caching. If power is interrupted to the hard drive, then the risk of data loss or corruption is greatly increased, but if you use a battery backup or some other type of uninterruptible power supply, you should not have anything to worry about. To speed up your drives, navigate to the Device Manager. Click on the "+" next to Disk Drives, then right-click on the drive you wish to change and choose Properties > Policies > check the box next to "Enable advanced performance."

There are several ways in which data on a hard disk can be accessed. DMA is one of them. This format is the best and fastest method available, so it is recommended for audio. To make sure DMA is enabled on your hard drives, go to the Device Manager > IDE ATA/ATAPI Controllers. You will see one or more ATA Channels. On each channel, right-click and choose Properties > Advanced Settings > make sure "Enable DMA" is checked > press "OK." There is another type of device beyond the ATA Controllers. In some cases, changing this listing (which varies according to the motherboard) to "Standard Dual Channel PCI IDE Controller" has been known to increase performance. Note, however, that this is not a required step to optimize your system. It is an optional step that may increase performance. If you choose to do this, then right-click on it and choose "Update Driver Software..." > "Browse my Computer..." > "Let me pick..." > "Standard Dual Channel PCI IDE Controller" > Next > Close. You have to restart your computer for this change to take effect.

There are two other drive properties to consider. These can be accessed by going to Computer and right-clicking on the drive in question, and:

Under the General tab, make sure "Compress this drive..." is unchecked.

Under the Quota tab, you have "Do not limit disk usage" selected, but nothing else.

Indexing Options

Vista/Win7 can automatically index all the files in the Start Menu, user profile folders, and files setup for offline access. Too many files in these locations, especially when the files change often, causes the indexing service to add to the overall CPU load. While this change speeds up your overall performance, it will also adversely affect your searching speed in those locations. However, with a good file-management strategy, this will be irrelevant for the DAW user. To adjust your indexing options, go to Start > type in “indexing options” > press Enter > Modify. In the “Change selected locations” window, uncheck everything except for the Start menu, located in C: > ProgramData > Microsoft > Windows.

Onboard Devices

An onboard device is any device built into the computer. Examples include built-in wireless adapters, audio cards, and Web cams. Most of these are benign but some have the potential to interfere with digital-audio software and hardware. Historically speaking, the most problematic devices are wireless Internet cards and audio cards; we typically recommend disabling these, at least while using your software. Onboard wireless Internet cards periodically send and receive information when activated (even without a Web browser open), and these bursts of data transfer use CPU cycles to the point of causing audible pops and clicks in DAW applications. Onboard audio cards can cause driver conflict problems, and they generally are not as high in quality as professional interfaces. In addition, they are often selected as the default driver in most DAW applications, forcing you to manually select your primary interface instead.

In the Device Manager, you can right-click on any device and choose “Disable.” This will essentially turn that device off, releasing its drivers and stopping any resources from being used to run it. Internet and other wireless cards are typically found under the “Network Adapters” category. Onboard audio cards and Web cams will be found under “Sound, video and game controllers.”

Windows Sidebar

Windows Sidebar’s gadgets provide very useful information. They also take up very useful CPU cycles. For the serious DAW user, it’s best to have Sidebar disabled, at least while working on audio. This will not only allow extra CPU power, it will also clear the desktop to make room for applications to be seen. If Sidebar is active, double-click on the icon in the system tray and uncheck “Start Sidebar when Windows starts.” Click “OK.” It will be disabled the next time you reboot.

Personalization

Like all previous version of Windows, Vista/Win7 allows a high level of customization, enabling users to configure the OS to look and sound almost any way they want. Unfortunately, some of the popular settings can interfere with DAW workflow. Under the Personalize window (which can be accessed by right-clicking on the desktop), here are some settings to look out for:

- **Screen Saver.** When screen savers become active, DAW users lose all sense of what is happening in their system (for example, visually monitoring recording levels). For this reason, it is better to set your screen saver to “none.”
- **Sounds.** As certain events happen, Vista/Win7 notifies you by playing a sound. This can be problematic while recording, since the sound may cause a driver problem by trying to access the driver currently in use. For this reason, it is usually best to set your sound scheme to “No sounds.”
- **Using the Aero theme** usually does not cause any problems. Since Vista/Win7 outsources visual processing to your video card, it will not take up any additional resources. If your video card is robust enough for Aero’s effects, then leaving the theme enabled will not cause any problems.

If you do not have a dedicated video card, or you have one that is under-powered, then it may be better to use the Windows Classic theme, but switching to the Vista/Win7 theme should not use any more resources.

Startup Service and Applications

By default, Windows preloads applications and services from installed programs and deposits icons in the system tray. The goal is to both decrease load times and provide easy access to a variety of programs. While very helpful in theory, these partially launched applications are a CPU drain. Disabling them helps Windows allocate more resources to running applications. Windows will also load faster, since it is not preloading every application during startup. To disable these applications from loading on startup, do the following.

CAUTION: Make absolutely sure you follow the directions EXACTLY. Startup configuration is powerful stuff, and if used carelessly, it can cause problems. Follow the directions, do not treat this section lightly, and you will be fine.

- Go to Start > Run, type in “msconfig” (without the “ “ marks) and press OK. When the System Configuration Utility comes up, click on the Startup tab.
- Press the button to “Disable All.”
- Click on the Services tab. Check the box at the bottom of the window to “Hide All Microsoft Services.”
- Press the “Disable All” button, but only after hiding the Microsoft services. Press “OK,” then “Restart.”
- When Windows boots back up, check the box next to “Don’t show this message...” and then press “OK.”

NOTE: After pressing “Disable All,” Pro Tools users must recheck “MMERefresh” in the Startup tab and “Digidesign MME Refresh Service” in the Services tab. GigaStudio users must check “msg32” in the Startup tab, even if GigaStudio was installed and then uninstalled later. All users will notice that the system tray is now empty (or very close to being empty). If there are certain applications that you would like preloaded on startup (and thus back in your system tray), simply go back to the utility and recheck them. Be advised, though, that each application that is checked (and loaded) will draw CPU resources away from your audio applications.

Also, please remember that this process will prevent all non-system programs from booting along with Windows, including antivirus software and, occasionally, utilities used for your computer’s hardware to function properly. General-use computers may need other services and applications in order to function, such as proprietary drivers for mouse touchpads, wireless Internet cards, etc. If a particular program that you need stops working after running the msconfig utility, do not go back and attempt to reinstall the program. Simply choose “Enable All” instead of “Disable All” to restore full functionality. Then, you can go through your processes, one by one, to see what needs to remain enabled. You may need to contact your PC manufacturer to double-check whether or not an application need to be enabled or not.

Make absolutely sure you hide the Microsoft services in the Services tab. This is critical, as not doing so will cause various Windows features to (temporarily) stop working. Be aware that antivirus utilities will also be turned off by using msconfig in this way.

Keep in mind that the msconfig utility is always reversible, but uninstalling and reinstalling software may not be. If your PC malfunctions immediately after using msconfig, then before doing anything else, enable everything to reverse the effects.

Audio Streamlining and File Management

Now your computer is ready for the intense demands of audio processing. There are still a few things to remember so your system stays in optimal condition. These steps will allow you to work efficiently without having to reconfigure your computer.

Defrag Often

Defragmenting your hard drives is recommended in all Windows OS's, and particularly in systems running and editing large audio and multimedia files. As data begins to be physically written to the disk, it is placed by the drive on the first available empty location. Eventually, the file will run out of space by approaching the next file on the disk. At this point, the file is split, and the remainder of it is written elsewhere on the disk. Large files on often-used drives can end up with hundreds of these fragments. Defragmenting your disks places the data for files next to each other (rather than fragmented throughout the disk), which speeds up reading from and writing to the disk, and increases system stability.

In Vista/Win7, you can defragment a disk by going to Start > Computer > right-click on the drive to defragment > Properties > Tools > Defragment now. Vista/Win7 offers the option to automatically schedule a defrag. Think of this as a regularly scheduled oil change. It is preferable to schedule these automatic defrags for times when you know the PC will not be in use. Early in the morning or very late at night are preferable times. Defragmenting should be done about every 80 to 100 hours of studio use (or more, if you constantly record and delete new files).

Check Your RAM

Vista/Win7 has a built-in utility that can check your RAM for you. It will let you know if there are any errors in your RAM that need to be addressed. RAM errors can lead to such things as lockups, freezes, restarts with no warning, blue screens, and failures to boot the PC.

To access Vista/Win7's RAM diagnostic tool, go to Start > Control Panel (make sure you are in Classic View) > Administrative Tools > Memory Diagnostics Tool.

Alternatively, you can type in "memory diagnostic" in the Start search box. You will have the option to restart immediately and check, or check the next time you restart. Once you restart, the memory-diagnostic tool will begin.

The memory test is subdivided into Basic, Standard, and Extended tests. The tests are progressively longer and more thorough. When the test finishes, Vista/Win7 will boot automatically and will display a notification balloon with the results of the test.

Driver Modes

Windows essentially utilizes three driver modes: WDM, ASIO, and WaveRT. WDM is the oldest of the three, provides the widest range of compatibility (especially with consumer-level, built-in audio cards), and operates with the slowest response. ASIO is a third-party standard developed by Steinberg and is more than adequate for a DAW user. WaveRT is a new driver mode developed specifically for Vista/Win7 that provides a kernel-level data transfer, allowing for the most stability and least latency (delay) of the three. Some interfaces may not have WaveRT support, so in this case, ASIO is a necessity. This is fine, as ASIO has been the preferred standard for years for DAW use and is still very widely used. However, if WaveRT is available, it is the preferred driver mode due to its speed and OS integration.

Plug-in Resources

Plug-ins can take the form of inserts (reverb, compression, etc.) and virtual instruments (synths, rewire applications, etc.). Both types can consume large amounts of CPU resources when instantiated. It is a good idea to use as few instances of each plug-in as possible. Reverbs and hardware emulators—typically the most resource-hungry plug-ins—can be inserted to auxiliary tracks, and audio can be bused to these tracks from multiple sources. Similarly, multiple MIDI tracks can send to a single virtual instrument. Both methods conserve resources by loading the plug-in only once.



In addition, analog-emulation plug-ins can take up a large amount of CPU resources. Rather than inserting a modeled compressor on, say, seven drum tracks, create a group channel for your drums and only insert it once. With this method, you still get the sound you want on the drums, but you save your CPU six instantiations of a plug-in. Limiting the amount of active plug-ins has the added benefit of keeping your session smaller and more streamlined.

To monitor how your computer is utilizing its resources, right-click in an empty space on the task bar (somewhere between the Start button and the clock). Select Task Manager. The Performance tab will give you a fairly accurate idea of the average load put on your CPU. This meter takes into account everything that is running. Keep in mind that it can be a little jerky; what you are looking for is an average measurement over several seconds. Try to keep the processor (there will be more than one processor window on an Intel or AMD multicore CPU) at an upper limit of 70 to 75%. Higher loads than this are known to cause stuttering, dropouts, freezes, and crashes. If the load is too high, you can remove plug-ins or applications. If this still doesn't help, then the solution very well could be to increase the amount of RAM installed in your computer.

Saving and File Management

The preferred setup for all audio computers makes use of at least two hard drives. One drive, the system or C: drive, will only have the OS and all applications installed on it. All data will be saved to other drives. This prevents the C: drive from becoming too full and too fragmented and allows for faster transfer rates for your audio files, thus increasing track counts. Full system drives run much slower than their clean counterparts because there is more data to search through when trying to find system or application files, and there are fewer open spaces to write files. It is strongly advised to save everything (sessions, downloads, documents—everything) to a second (or third, fourth, etc.) hard drive. The general principle is that things you install go to the C: drive, while things you save go to a different drive.

External hard drives are becoming very popular because the data can be easily transported to a different computer. Whichever type of hard drive you opt for, make sure that it has a minimum speed of 7,200 RPM (revolutions per minute). Drives running at 10,000 RPM are ideal, especially when running large sessions (over 24 tracks). Slower drives may not be able to keep up with the demands of recording and streaming audio.

A word on saving: Often, when creating a new session, it is easy to choose the default name and location provided. Be careful not to do this! The default settings are usually to name the session “Untitled” and save it somewhere in the C: drive. You will soon get a full C: drive and too many “Untitled” sessions to tell which is which! Use the same amount of care with file management that you do when recording.

Archiving

Even when taking care to save to multiple hard drives, you can still run short on space. This is especially true if there are many sessions (complete with audio files) and sample libraries on the same drive. A good idea is to archive these sessions. Archiving in this sense means either burning to a removable disk (such as CD or DVD) or transferring to a backup drive. DVDs are the preferred method of removable storage because they can hold over 5 times more data: 4.7 gigabytes on a DVD versus 800 megabytes on a CD. If you archive to a backup hard drive, make sure to access the drive frequently—say, every six months—to ensure smooth operation.

Another reason to archive is to prevent data loss. An entire drive full of sessions can be lost at any time due to a hard-drive crash. Having all of your sessions backed up on removable media will allow you to maintain a copy that can then be copied back onto a new drive, if necessary. Removable media has the added bonus of being relatively impervious to data loss; unless you physically lose or damage the disk, your data will not be lost (translated: CDs and DVDs don't crash and, if properly stored, will last almost indefinitely).





The Manual is Your Friend

Audio applications are complicated; it's the nature of the beast. Even though PreSonus Studio One is much easier to use than most DAWs, it's still a deep program. However, all of the major DAWs include extensive help files, and in many cases, thorough tutorials. The vast majority of operational questions can be answered from the manual. We strongly advise that you read at least the introductory sections, if not the entire manual, before you attempt to use your software. This will allow you to understand where key tools and menus are, give you insights into what you can and can't do, walk you through how to do various tasks, and increase efficiency and reduce stress when making music.

If there's a section you don't understand, read it several times. Walk through the procedure step by step as you read it. Repeat this as many times as you need. Use the index and table of contents to find areas in which you need to brush. Never assume that you will know every feature in any piece of hardware/software. Always read your manual.

Ready, Set, Record!

Now that your system is optimized, and you have the tools to keep it that way, there is nothing preventing you from getting the most out of your gear. If you do get stuck, do not hesitate to use all available support channels to get back up and running.

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