Three

OPTIMIZING

Your System for Photoshop

Tuning for Performance
This chapter goes beyond speeding up how you can work faster in Photoshop to how to make Photoshop work faster on your computer. The most obvious thing you can do to speed up the performance of Photoshop is to buy the latest computer. Unfortunately, that is an expensive game to play and not really a good solution. Computers improve performance with each new model. However, new operating systems may add new features at the expense of performance gains from the hardware. Fortunately, you do not have to go to extremes to make Photoshop run faster on the computer you already use.

**Hardware**

Computers are made up of many different pieces. Sometimes keeping up with all the acronyms for the components can be puzzling. It can take a lot of work to learn what the latest technology improvements are to the components you do understand. All these pieces work together. Improving one piece often leads to faster performance, yet improving a different piece might be more suited for your work. It is useful to understand the hardware components and where you can get the most benefit for your performance costs.

### 64- Versus 32-Bit Architectures

In the past few years, both Macintosh and Windows computers have improved the operating systems (and hardware) to support 64-bit computing. Previously, the computers operated at 32 bit. These two phrases—“32 bit” and “64 bit”—are really descriptions of numbers. A system that supports 64-bit numbers can count higher than a system that supports 32-bit numbers.

As computers work with bigger and bigger chunks of data, they must be able to keep track of the data. Each piece of data has an address. That address is a number. The higher that address number can be, the more data a computer can work with. This idea affects things such as how much random access memory (RAM) can be installed in your computer. A 32-bit system cannot use as much memory as a 64-bit system, even if the memory is installed in the computer. More RAM means more data is loaded into the fast memory for use by applications that can use that memory.

Does 64-bit computing run 32 times as fast or even faster? The short answer is no. There is a cost for all this extra data being used. However, the performance gains are very significant. The gains can easily be twice as fast or even higher. The amount depends a lot on your computer and what you are doing. The exact numbers are unknown in practice. What is not in dispute, though, is that 64 bit is a performance improvement.

If you can run Photoshop in 64 bit, then it is worth doing so. How do you check? On Mac OS X, choose **Photoshop > About Photoshop...** from the Photoshop menus. On Windows, choose **Edit > About Photoshop...** from the menus. The application version number is shown below the application name in the About box (see Figure 3.1). Next to that number is the indicator of which architecture the application is using: **x64** is for the 64-bit architecture, and **x32** is for the 32-bit architecture.

![Figure 3.1 The Photoshop CS5 About box showing the version number and architecture number.](image-url)
That information is useful, but what if the x64 is not there? Which versions support 64 bit? The answers are a little complicated because of when the work was done for the various operating systems and when the versions of Photoshop were released. Here’s a general summary:

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**How to Run in 32-Bit**

It is not enough for your computer hardware and operating system to support 64-bit computing; the software must support it as well. There are a lot of reasons why this takes time for the engineers at all levels to implement 64-bit computing. The good news is that it has been done for the operating systems and for Photoshop. Despite that, other pieces that you may use also have to support 64 bit. You may use plug-ins that are not 64-bit compatible for one reason or another. If that is the case, that plug-in is not available in Photoshop while running in 64-bit mode. So you have to run Photoshop in 32-bit mode to use that plug-in.

On Windows, both versions are installed for you. To run the 32-bit version, just double-click the icon for that version of the application.

On Mac OS X, both versions are also installed for you. However, the operating system hides this from you and offers a different way to select which version is run. To switch the Mac OS X version to run in 32-bit mode, follow these steps:

1. In the Finder, navigate to the Photoshop CS5 folder and click to select the Photoshop application icon.
2. Choose **File > Get Info...** from the operating system menus. The Get Info window opens, as shown in Figure 3.2.
3. Click to check the **Open in 32 Bit Mode** checkbox in the Get Info window.
5. Run Photoshop normally. Choose **Photoshop > About Photoshop...** to see the About box and check the version number and architecture indicator.

If your plug-ins are only 32-bit compatible, they should show up in the menus when you run Photoshop in 32-bit mode. If you find they are not there, you should check the plug-in manufacturer’s website for the latest information. Most plug-ins have been updated for 64 bit at this time. Many companies offer the 64-bit versions as free updates.
RAM: Your Computer’s Short-Term Memory

Random access memory, known as RAM, is the place where the computer stores the data for files you have loaded and the applications that load them. The more applications running, the more files opened, and the larger the files in use, the more memory is needed by the computer. Modern computers can handle overflow when it occurs. The computer starts using the hard drive for temporary memory. It pages large chunks of RAM to the hard drive. These pages of memory can be swapped between the hard drive and RAM as needed. The problem is that the hard drive is slow compared to the RAM. The more the computer just uses the RAM, the faster everything runs.

One of the biggest increases in performance can come from increasing the RAM in the computer. When you increase the memory, you see a bigger jump in performance going from 1GB of RAM to 2GB than the increase going from 24GB to 32GB. The sweet spot for cost versus benefit depends on your computer and the type of work you do in Photoshop. If you are editing large photographs and adding a lot of masked layers to the image, then adding RAM helps. If you are combining multiple large images into a single image, like with a panorama, increasing RAM helps. If you are editing photos using Camera Raw and then saving the result as a JPEG file, the benefit may not be worth the price of the extra memory, depending on how much RAM you already have.

What you can do without spending money on RAM is tune Photoshop for the RAM you do have. You do this using the Performance panel in the Photoshop preferences (see Figure 3.3).

In Photoshop, choose Photoshop > Preferences > Performance... from the menus on the Mac or Edit > Preferences > Performance... on Windows. The Memory Usage section deals with the amount of available RAM that Photoshop is set up to use. It is best to keep the range in the low 70 percent range as suggested by Adobe. However, if you need a little extra, you can adjust this number higher. Just be aware that doing so can affect the rest of the computer, so do not go much higher. Do not change the amount by more than 5 percent before testing the performance to see how the change is working (or not).

FIGURE 3.3 The Performance preferences.

You might be tempted to allocate 100 percent of the RAM to Photoshop. Resist such big numbers. The operating system needs memory for the computer to work correctly. What happens when an application uses too much RAM is that the computer swaps a lot of those memory pages between the hard drive and the RAM to accomplish even simple tasks. This swapping slows down the whole system, which also slows down Photoshop.

Photoshop has a built-in efficiency gauge to help you tune its performance (see Figure 3.4). This is an option for display at the bottom of document windows.

The percentage displayed for Efficiency is how much of given operations are done using the available RAM without using the scratch disk. As you work on images, if you notice this number falling below 95 percent regularly, then you should adjust the setting in the Performance preferences. If you still cannot raise the Efficiency number, you should consider buying more RAM for your computer.
When you are doing a lot of work in Photoshop, it may also help to not be running too many other applications that use a lot of memory. Multiple applications all using up pieces of your computer’s memory can make everything run slower.

Hard Drives and Scratch Disks

As mentioned in the preceding section, the computer will use the hard drive to page memory out of RAM when it needs to. Photoshop does something similar. When you manipulate an image in Photoshop, it keeps a lot of data around in case you need it or for other uses. Sometimes this might be to quickly undo an operation or store history states. Sometimes Photoshop just needs extra memory for the calculations needed when doing adjustments.

The term “scratch disk” is used to mean a hard drive just used for the temporary paging of memory. The hard drive does not have to be empty for it to be of use. Just using a large drive with lots of available space can be helpful. Also helpful is if that drive is a fast hard drive. Numbers change on hardware, but it is good to get hard drives that run at 7200rpm or faster. There is no strict rule about such things, just suggestions.

In the Performance preferences, one of the sections is named Scratch Disks (see Figure 3.5). This section shows the available hard drives by name and their available disk space. Simply check or uncheck a drive to use it for a scratch disk. Usually, you want to set the drive with the most available space as a scratch disk. Scratch drives are used from the top of the list to the bottom. To change the order of the list, click to select the drive and then use the arrow buttons next to the list to change the drive’s order in the list.

The speed of a hard drive also affects how fast a file is written to disk. If you save a lot of large files, it may be worth the price to upgrade to a faster drive (with more space) to save time when you’re writing so many files.

Hard drives can become fragmented. As the drive writes data, then deletes data, and then writes more, data can get written to many smaller places. A document might be split into many parts written all over the drive, just based on how the drive has been used. There are several applications on both Macintosh and Windows computers to defragment drives. The applications may even be installed with the operating system. It is worth running these applications from time to time to defragment the drive and speed up the performance of the operating system and Photoshop.
**CPU: The Processor**

The CPU is the central processing unit of the computer. This is the main computation piece of the computer. It processes most of the instructions from the operating systems and applications. Often the speed of the processor or how many of them are installed or how many cores contained in each chip are the specifications advertised for new computers. All these specs do affect the performance of Photoshop. The application can take advantage of each of these improvements. It is hard to change processors in a computer, though. Usually, it is when you are purchasing a computer that you need to worry about the CPU. These days, what you want to be sure of is that the processor can support a 64-bit architecture. As time goes on, this is likely to be the only option available to you anyway. For the most part, you do not need to worry about the processor.

**GPU and Video Cards**

A computer’s video card is the hardware piece that processes graphics for display on the computer monitor. The term “GPU” means graphics processing unit. On many computers, you can upgrade video cards, and there are many options available. Why do you care?

Increasingly, the operating systems and applications like Photoshop are taking advantage of the fact the video cards can do image manipulations quickly. Many have built-in support for doing 3D calculations. There is power on the video card that can be used for performance gains.

Having a fast video card or upgrading your existing card may noticeably improve the performance of your work in Photoshop, especially if you are doing a lot of 3D work. In general, you want a card with a lot of video-RAM (VRAM). It is best to check directly with the Adobe documents related to supported video cards.

You might notice that the machine running Photoshop in Figure 3.5 does not have a video card that can be tuned for Photoshop. Not all machines can. Those that can will have settings enabled in the Performance and the 3D preference panels.

The GPU Settings section displays the make and model of the video card, and if it can be tuned by Photoshop (see Figure 3.6). The Advanced Settings... button brings up another dialog with more options (see Figure 3.7). The Mode value is what you are most likely to change.
Basic is for the minimum use of 3D technology. Normal is for times when you use features and calculations that take advantage of the GPU processor. Advanced is for heavy-duty 3D work. The default setting is Normal. Depending on the work you do with Photoshop, you should set this value accordingly.

The 3D Preferences are available in the Preferences dialog like other preference settings (see Figure 3.8).

The setting that is most important for performance is the VRAM setting. Similar to the RAM setting in the Performance panel, the VRAM setting allocates how much of the video RAM Photoshop can use for its operations. The percentage value for VRAM can be safely set higher than the RAM setting. Few other applications use the VRAM at the same time as other applications. However, the operating system always does use a piece of the VRAM. So again, do not set the value to 100 percent. Numbers between 85 and 95 percent should be fine.

If you start noticing strange drawing issues with the monitor, you may want to turn off OpenGL Drawing to see whether the video card is causing the issues. Be sure to restart Photoshop for these changes to take effect. If turning off OpenGL drawing causes the problem to go away, you should go to the manufacturer’s website to look for driver updates for your specific video card. Having the latest driver for the video card is a good way to ensure compatibility with Photoshop and to have the latest version of OpenGL, the 3D technology used by most video cards.

Operating System

There is little that you can realistically do to tune your operating system to improve Photoshop performance. However, what you can do is keep your operating system up-to-date. This does not mean that you should always buy the latest release from Microsoft or Apple; just keep your version of the operating system up-to-date. Updates can include performance fixes in addition to bug fixes. You might be surprised how small fixes can make big differences in your work. There are no guarantees with each update, but it is always good to have the latest fixes for your version of the operating system.

Photoshop

Photoshop has several ways to tune performance beyond those directly related to hardware. Although the hardware settings can make the biggest difference to Photoshop’s performance, other settings and even your own behaviors also can give big improvements. Many settings related to performance are a push-me-pull-you type of process. Changing one setting affects the overall performance and may undo, in a sense, the improvements made by changes to other settings. Tuning for performance is more art than science and varies depending on the work you do in Photoshop. It is beneficial to know what your options are to help maximize Photoshop’s performance for you.
Number of History States

If you haven’t already, you may want to increase the number of history states that Photoshop stores. The settings for history states are located in the Performance panel of the Preferences dialog (see Figure 3.9).

Why are history states part of the Performance preferences? The more history states you store, the more memory (RAM and potentially scratch disk) Photoshop will use. You can have Photoshop store up to 1000 history states. The rule of thumb for history states is the bigger your documents are, the smaller number of history states you want to store. If you’re doing layout work or web design, you may want to have hundreds of history states. If you’re retouching giant multi-megapixel images, you’ll probably want many fewer history states. Experiment to see what number works best for you.

History Cache

Images in Photoshop are divided into tiles. These tiles are small pieces of the overall image. This is done so that the adjustments made to an image can be performed quickly over small chunks of data, instead of over the entire image. Because there are times when the entire image is not displayed, these tiles can be ordered so the changes are displayed quicker if the tile is visible. Tiling is also done for the various zoom levels to make the zoom quick and seamless.

The larger the image you are editing, the more tiles are needed to display that image. It can be beneficial to increase the Cache Tile Size if you frequently work on large images. If you work on smaller images, you want the Cache Tile Size to be smaller.

Setting the Cache Level is similar to setting the Cache Tile Size. If you work on large documents, you want to set this number higher. For smaller documents, set this number lower.

Three buttons can help you keep all of this straight: Tall and Thin, Default, and Big and Flat. Think of these buttons as presets for the History & Cache preferences. Each is a suggestion for what the settings should be, depending on the types of images you usually work with.

The point to keep in mind with all these settings is that they affect the computer’s memory. The more history states you allow, the more memory required to save the states, which affects how much RAM is used and how much memory is paged out to the scratch disk. All these factors affect performance.

Close Unused Files

As you might expect, the more images you have open in Photoshop, the more memory is required to display them all. If you are done with an image, close it. Fewer document windows means a faster Photoshop.
Clear Available Memory With Purge

Choose Edit > Purge to view your options for purging some items from memory (see Figure 3.10).

Undo, the system clipboard, and history all use up memory. If you frequently find you get “Out of Memory” messages from Photoshop, you can choose one or more of these menu items to temporarily clear some memory. None of these commands can be undone because they are all related to undoing operations. After the memory is cleared, the data is gone. Use this option as a last resort.

Run Photoshop Only

It may be more and more inconvenient these days to run only Photoshop when working on your computer. Yet doing so is a way to free up memory for use by Photoshop, which speeds up the application’s performance. Other resources are also freed up in the operating system, the video card, and the hard drive when other applications are closed.

Keep Photoshop Up-to-Date

Keep your version of Photoshop updated, just like you do for the operating system. Photoshop does not release “dot updates” very often, but when it does, you should install the updates. Performance is a major concern for the Photoshop team, so performance fixes do find their way into updates.

The Adobe Camera Raw plug-in updates regularly, mostly to add support for newer cameras. These updates do include fixes. If you are shooting in the Raw file format of your camera, you should keep the plug-in up-to-date.

To update your version of Photoshop and Adobe Camera Raw, choose Help > Updates... from the Photoshop menus. If updates are available, the Adobe Application Manager launches to show you the updates. The application can download and install any updates for you.

Don’t Overload Presets

Presets for brushes and styles generate previews for display in the various panels and pickers in the application. Adobe provides several extra sets for most of the presets, and others can be obtained on the web and elsewhere. If you do not use any of these extra groups of presets, do not load them or load them only when you need them. It might also be a good idea to build your own custom sets that contain only the presets you do use. The more presets loaded, the more previews that need to be built, the more memory that gets used when you run Photoshop.
Note this does not mean that you should unload all the presets for each feature. Just don’t overload the presets.

### Turn Off Thumbnail Displays

A few panels, such as **Layers**, **Channels**, and **Paths**, show previews for their content. When changes are made, these previews are updated, which requires processing time. The previews themselves require memory for storage.

Choose **Panel Options** from any of these panel’s menus to bring up the **Channels Panel Options** dialog (see Figure 3.11) and change the size of the thumbnail being drawn.

![Channels Panel Options dialog](image)

**FIGURE 3.11** The Channels Panel Options dialog.