Optimizing Photoshop for Peak Performance

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What we will cover

- Watching your system
  - Why you want to watch
  - What to watch
  - How to watch it
What we will cover

- Watching your system
- Testing and Numbers
  - How to test your own system
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What we will cover

- Watching your system
- Testing and Numbers
- Keeping things clean
  - Good habits
  - Things to avoid
What we will cover

- Watching your system
- Testing and Numbers
- Keeping things clean

- Setup guidelines
  - Photoshop setup
  - Purchase priorities
  - Operating systems
• All resources: how fast, how many?
• If all the CPUs are pegged, that’s as fast as you can go.
• CPUs have followed Moore’s law, the rest of the system hasn’t.
• Not everything can be made threaded, not everything can benefit from being threaded – if a single thread can use up all the memory bandwidth, then having multiple threads going won’t help. Photoshop has supported multiple cores / cpus for over a decade.
• CPUs show up as 100% busy even when they’re waiting on RAM.

CPU
- Ultimate speed limit.
- Improvements outpacing the rest of the system.
- Often starved waiting for memory... but you can’t tell or do much about it.
- Photoshop can use multiple cores, but diminishing returns beyond 4.
• Many operations in Photoshop won’t speed up with multiple processors because they’re already waiting on memory. Two cores can’t wait on memory any faster -- but two AMD CPU chips can because there’s a separate memory controller on each chip.

• And address space is (currently) limited – it doesn’t matter how much RAM you have in your machine, the application only has direct access to so much. To operate on a data set – consisting of images, history states, and all the other “stuff” – that’s bigger, you have to have some way of spilling over to disk.

• Mac, 64-bit Windows: 3.5G direct, 6-8GB usefully. 32-bit Windows: 1.8GB direct. CS4 / Vista64: huge amount direct.
- Orders of magnitude slower than RAM.
- If you've run out of RAM, OS uses it to store application address space data in the pagefile. If the drive where OS paging is going ever runs out of space, you are in trouble.
- Drives generally only have one read/write head - if something else is trying to read or write at the same time – make that drive head dance!
- Vista in particular tries to be smart about positioning and fetching files -- good for performance, bad for predictability.
Mac: Activity Monitor can be found under Applications\Utilities

PC: Task Manager can be launched by right-clicking on the Windows task bar
- Lets you see two things: are you using all the cpu? Is anything besides Photoshop using much cpu? 
gmail / safari, flash animations on web pages, mp3 players.
• Play who’s the pig (RAM edition). You’ll find that you can be quite surprised at what is taking memory. music player, Safari, Firefox.
• If the CPU usage isn’t what you think it should be (caution here about multiple processors), look for another cause – is RAM low? Is the disk busy? If the usage is too high, you can play find-the-pig.

• If only one CPU is getting pegged, the operation may not be one that takes advantage of multiple cores / cpus.
Note that any test that involves file I/O or relies heavily on the VM system will result in less predictable results.
When does a test ‘fit in RAM’?

- Check to see if the test image you’re using is smaller than the total physical RAM of your system.
- Efficiency (found as an option in the PS document window) should be >95%
How to create a test based on your workflow...

- What are the most common functions you use in Photoshop?
- Create an action based on those functions and use a stopwatch to time how long it takes to complete those functions.
- In my action I opened a large (~4.5GB image), applied a Hue/Sat adjustment layer, applied a Shadow Highlight, Gaussian Blur, and then closed the image.
The VM OS buffering plug-in only useful if you’re running CS3 on Tiger with >4GB RAM in the machine. Turning it on in this case may cause pauses in your painting. In all other cases, it’s on automatically when it would help.
• Default = the default install settings for CS3 on Windows (55%)
• Default + RAID0 = default settings + RAID0 for PS scratch disc
• 100% + RAID0 = 100% RAM allocated to PS + RAID0 for PS scratch disc
• + DSC = 100% RAM allocated to PS + RAID0 for PS scratch disc + Disable Scratch Compression plug-in (not a big win)
• Default = the default install settings for CS3 on OSX (70% RAM, OS 10.4.10)
• Default + RAID0 = default settings + RAID0 for PS scratch disc
• 100% + RAID0 = 100% RAM allocated to PS + RAID0 for PS scratch disc
• + DSC = 100% RAM allocated to PS + RAID0 for PS scratch disc + Disable Scratch Compression plug-in (not a big win)
• Note the big difference using a RAID0 w/fast hard drives produces in this particular test
• Default = the default install settings for CS3 on OSX (10.4.10)
• Default + RAID0 = default settings + RAID0 for PS scratch disc
• 100% + RAID0 = 100% RAM allocated to PS + RAID0 for PS scratch disc
• + DSC = 100% RAM allocated to PS + RAID0 for PS scratch disc + Disable Scratch Compression plug-in (not a big win)
• Also note that this is an example of a test that fits in RAM as changing settings does little to change the timing results
In Leopard you’d get VM OS buffering by default, and these results are from a MacPro running 8GB of ram on Tiger 10.4.10.
The results on the left side are using the default RAM % settings of 70%, the results on the right side have the RAM % set to 100% in the performance preference panel.
RAID0 in this case is a burly box (see www.macgurus.com for more info) with 8 74GB WD Raptor hard drives as a RAID0 striped volume.
VM = use of the Force VM OS Buffering plug-in.
BT = Bigger Tiles plug-in (off by default w/CS3).
DSC = Disable Scratch Compression which didn’t help the times of this action in either case.
Photoshop Acceleration Basics

Photoshop Acceleration Basics 2.4
A MacGurus Guide to Photoshop Performance Acceleration
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- An excellent (and highly recommended) performance guide by George Middleton can be found here:
  http://homepage.mac.com/boots911/Public/PhotoshopAccelerationBasics2.4W.pdf
Keeping things humming.

- Cleanliness is next to fastiness -- don't install misc games and utilities.
- Beware the cloaked pig (hidden apps and utilities that eat CPU and RAM).
- Find a better virus scanner and beware continuous scanning.

- Applies to Windows users a bit more – Macintoshes don't seem to suffer the gradual performance decline that XP seems to. Vista isn't supposed to either. And so many Windows machines come with junk now. Most of us engineers do a fresh OS install on any new machine. We start from a known state and control what gets installed. At least scan Add/Remove programs on a new machine and remove anything you don't think you'll need.

- Be careful about what you install. In theory, an uninstall cleans things up – but it doesn't usually work that way on Windows. Mac users are in good shape here. On Windows, scan through Add/Remove Programs (Vista: Programs…) once a month or so to see what things you really didn't use or need and remove them.
  - Mac users should occasionally look at /System/Library/Startup to make sure nothing unwanted got added there.

- Some programs can be surprisingly resource hungry. Browsers. MP3 players. Do you really need those things open while you work? Look for alternatives. Old machine you were about to toss, FM radio, laptop, etc.

- Get a firewall. Something in between your machine and the net that means you don't have to be running your virus scanner in scan-everything-all-the-time mode. That will kill you.
  - Search the review sites for which scanners aren't so resource heavy.
  - Schedule scans for weekly, turn off as much of the active scanning as possible / reasonable – and don't do the things that would cause you to need so much turned on! Don't open e-mail attachments, blender frogs.
  - We have seen cases where even just having a virus scanner installed slowed things down, but not installing one means taking extreme precautions, too.
• By “lots of layers”, I mean 50+, in all the layers in all the simultaneously open documents. The more layers you have, the more difference it will make *not* to have cache levels set too high.
• By “fits on screen”, I mean with the window zoomed out to however you normally work when you need to see the entire image.
• That 27.4% example is from opening a 1Ds2 file on my laptop.
• with 512 layers on a small doc in 1GB of RAM takes over 25 seconds to open with 6 cache levels, less than 3 seconds with 1.
By “lots of layers”, I mean 50+, in all the layers in all the simultaneously open documents. The more layers you have, the more difference it will make *not* to have cache levels set too high.

If you have huge files with lots of layers... you're going to eat lots of RAM and disk no matter what you do.
• Going over 2 cores in a system has diminishing returns. It won’t hurt, but it won’t help as much as you might think. This goes back to the speed of processors versus the bandwidth of memory. Of course, if you do radial blurs all day, more cores will almost always help. Don’t avoid getting more, of course, there just may be better ways of spending your machine budget.

• On operating system, the latest Macintosh OS X is what you should be on.

• On the Windows side, if you can do it, Windows Vista x64 – make sure that you can find Vista x64 drivers for everything you have including printers, scanners, calibrators. Ultimate comes with both x86 and x64 in the box, but with others you can order the x64 version for a bit of extra money.

• If you can’t move to Vista x64, consider moving to Vista, but many of the same driver concerns are there. XP SP2 works in this case.

• In outfitting the system the first thing is to make sure you have two drives. As we get further down this list, you’ll see there are multiple ways of getting more than once drive.

• Drives should all be on fast interfaces: internal, or FW-800, or e-SATA. FW-400 and (especially) USB-2 not as good. USB-1 or NAS / remote disks? Don’t bother.

• Then, if you’ve still got budget left over, add RAM out to 6GB on the Mac -- you’ll see more benefit on Leopard.

• On the Windows side, if you’ve managed to get to the 64-bit version of the OS, get to 6GB. Otherwise, 4GB is as much as the operating system can handle.

• Consider using Bigger Tiles. This is where your workflow is key. If you are doing large operations on large files, your overall throughput will benefit, even if the display sometimes seems slower.

• Still have budget left over? Going for some really heavy lifting? Then it’s time to spend some money on a RAID box. Try and get something with at least 4 bays. And see if you can get 4 fast drives into it – size isn’t nearly as important here. For using it as Photoshop scratch, RAID 0 is best. On the Windows side, turning on the Disable Scratch Compression entry is a small win. Use either the software RAID support built into the OS, or a hardware box that includes its own RAID controller card to go into your computer. Latter is faster, but much more expensive. Software RAID is free other than the cost of the drives.

• Still have budget left over? Ah, lucky. Only thing left is more memory. This makes using Foce VM Buffering on the Macintosh side even more of an issue. And of course, this is only an option on the Windows side if you are on a 64-bit version of the operating system. How much more? It all helps, but there are diminishing returns. We’ve seen improvements going from 8GB to 16GB, but they are small. As with many things, the last bits of optimal performance are the most expensive.
Revolutionizing
how the world engages
with ideas and information

- End of presentation.