

Computers for Photography

Fort Collins Digital Camera Club
September 14, 2010

The Computer is Part of the "Digital Darkroom"

- The objective is to **manipulate an image to a desired product as fast as possible**
- Today's cameras have features that dramatically increase camera file sizes
 - RAW format
 - Batch processing
 - High megapixel counts (24 mp)
 - High color bit-depths (14 bits per color channel - R, G, B)
- Together, these features are **computationally challenging** for many computers that are only a few years old

Parts of a Computer

- Logic (or “mother”) board
- Central processing unit (cpu)
- Random access memory (RAM)
- Hard disk drive
- DVD/CD burner
- Video card
- Display
- Network
 - Ethernet
 - WiFi
- External ports
 - USB
 - Firewire
 - eSATA



CPU

- Two main suppliers of cpus
 - Intel
 - Advanced Micro Devices (AMD)
- Recent Intel cpus
 - 2004 - Core Duo series (32 bit)
 - 2006 - Core 2 Duo series (64 bit)
 - 2009 - Core i series (64 bit)
 - i3 - Good
 - i5 - Better
 - i7 - Best



The 64-bit computers with 64-bit operating systems can use a lot more memory and are about 10% faster

CPU

- Core i Series Features = **SPEED**
 - At least **two processing cores** per cpu
 - Effectively doubles the processing power
 - Core i5 and i7 are available with four cores
 - Some i series chips can also do **hyperthreading**
 - Intel claims up to **30% increased performance** using hyperthreading (4 cores become 8 **virtual** cores)
 - Software must support hyperthreading
- An i5 or i7-based computer is typically sufficient for digital photography*
- Core 2 Quad and AMD quad core chips are also capable of handling most cameras

*Other aspects of the computer are just as important!

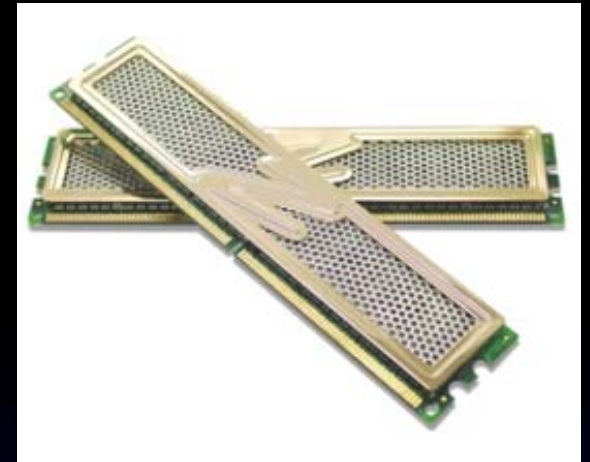
CPU

Minimum cpu for **fast** image processing*

Megapixels	8	10	12	18	21-24
Processor	2.4 GHz Core 2 Duo	2.8 GHz Core 2 Duo or i3	2.4 GHz Core 2 Quad or quad core i5	Quad core i5 or i7	Quad core i7

*Tony's wild-@\$ \$ guesses

RAM



- Two principal types
 - Dual-channel (installed in pairs)
 - Triple (tri)-channel (installed in threes)
 - In real world applications, **the difference isn't so great**
- RAM is used for the **temporary storage of image data**
- A minimum is **4 GB and 8 GB** probably is sufficient for most people
- A RAM module must be compatible with the logic board of the computer
 - Most RAM suppliers have selection databases to match RAM with your logic board
- The **RAM speed (in mHz) should be the same as your logic board's maximum supported speed**
- Memory allocation in Photoshop is in the Preferences pane

Hard Drives

- Hard drives are for the **long-term storage** of your photos
- The most common hard drives have **SATA interfaces**
 - SATA is the current technology used for most internal hard drives
 - Older technology is PATA (parallel-ATA) and should be avoided, unless that's all your logic board can support
- Hard drive vendors are:
 - Western Digital
 - Seagate
 - Hitachi
 - Samsung
 - Toshiba



Hard Drives

- Hard drive sizes
 - 3.5" Platters
 - Desktop computers
 - Require a 12V power source
 - Spin rates of up to 15,000 rpm
 - 7,200 rpm is suitable for most photo work
 - Capacity of up to 3 terabytes (TB)
 - 2.5" Platters
 - Notebook computers (and some low-power desktops)
 - Require 5V power source
 - Spin rates up to 7,200 rpm
 - Capacity of up to 1 TB

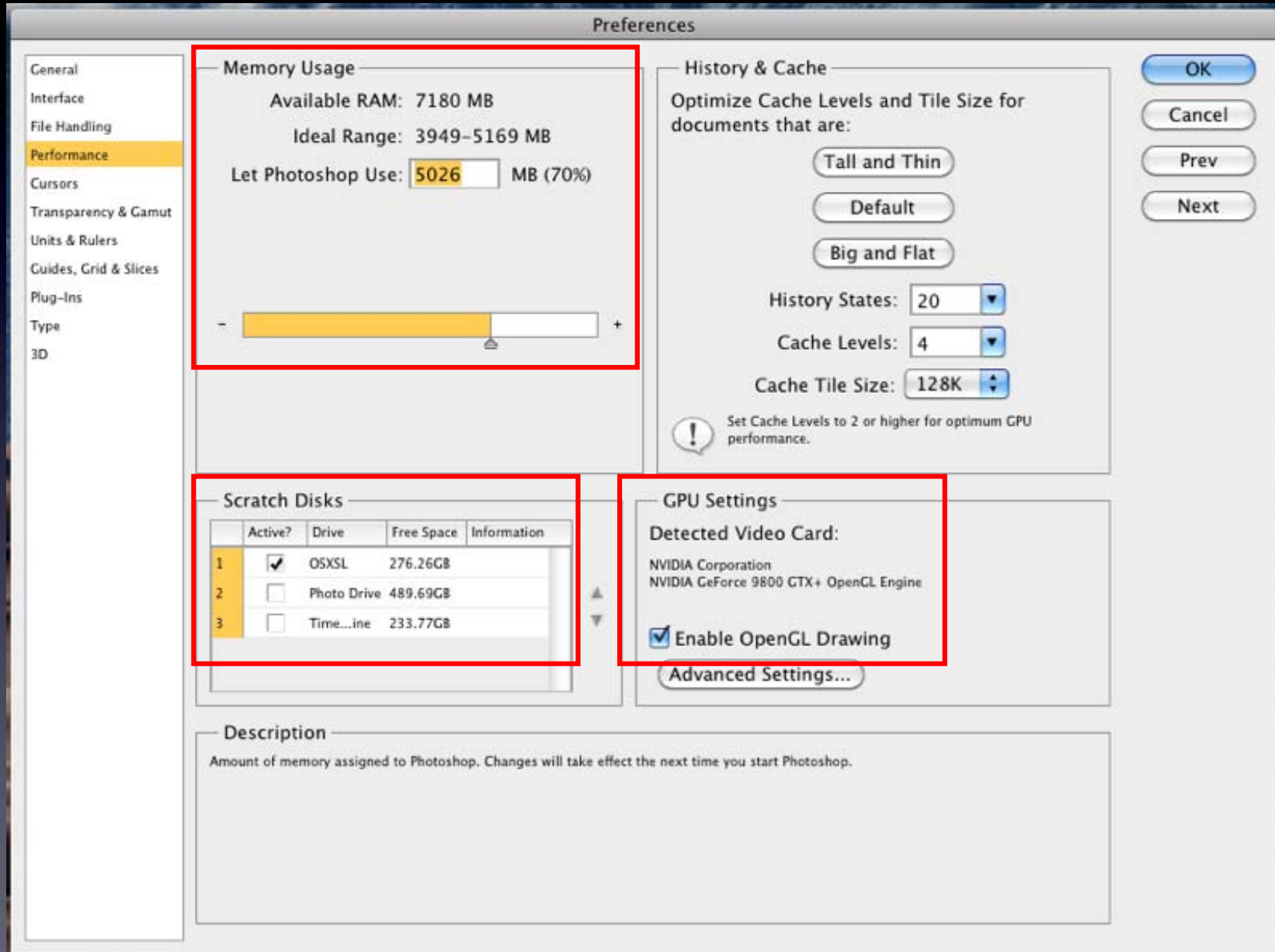


Hard Drives

- **Scratch disks**
 - Photoshop and some other applications use a “scratch” disk to temporarily store photo data
 - The scratch disk is usually used to keep past edits applied to an image
 - Ideally, the scratch disk should be its own hard drive of about 30 GB in size
 - You can partition hard drives with a 30 GB partition as the scratch disk to get some benefit
 - The drive or partition should be **defragmented** periodically for maximum performance
 - RAM is much faster than hard drives, so **maximize your RAM as much as possible** to reduce scratch disk access

Hard Drives

- Photoshop > Preferences > Performance



Hard Drives



- **Solid state drives (SSD)**
 - They have **no moving parts**
 - They use SATA interfaces
 - SSD use flash memory chips that **do not lose data after power is turned off**
 - They are **substantially faster** than spinning hard drives
 - They are **very expensive**
 - 40 GB = \$110
 - 256 GB = \$700
 - Many people use SSD for their boot drive and their **scratch disks** for Photoshop
 - Some suffer from degradation that compromises performance (slows down)
 - Intel X-25, OCZ and OWC Mercury SSDs don't have this problem

Hard Drives

- Backup plans
 - All hard drives fail
 - It's not "if", it's "when"
 - You should have a backup solution in place to keep your computer and files safe from a failure of your hard drives
- Internal backup drive
 - If your computer has room for additional drives you can install one and use it as a backup
- External backup drive
 - These usually cost more, but have their own power supply
 - The common interfaces are USB2, Firewire and eSATA
- It may be wise to have TWO backups of your files

Backup Software

- Windows
 - Windows Home Server
 - Ghost
 - Macrium Reflect
 - Robocopy
 - MS Synctoy
 - Shadowprotect
 - Acronis True Image
 - Symantec Backup
 - SyncToy 2
 - SyncBack Pro
- Mac OS X
 - OS X Time Machine
 - SuperDuper!
 - Carbon Copy Cloner
 - Retrospect



Video Cards

- Historically, video cards **have been unimportant** in photography
- New technologies have started to appear in video cards that allow use of the **multiple cores found in most graphics processing units** (gpu) for non-video processing

Processor	i3	i5	i7	NVidia 9800	NVidia 260
“Cores”	2	2 or 4	2 or 4	112	192

- Photoshop now uses the gpu for some of its functions and it is likely that **future versions will increase the use of the gpu**
- Video cards also have their own RAM (vRAM) and Adobe recommends 256 MB of vRAM for Photoshop CS5
- If your video card supports **OpenGL 2 and Shader 3**, Photoshop 5 will use its gpu for many functions

Video Cards

- GPU features added in Photoshop CS5
 - Scrubby Zoom
 - Heads Up Display (HUD) color picker
 - Color sampling ring
 - Brush dynamic resize and hardness control
 - Bristle Brush tip previews
 - Rule of thirds crop grid overlay
 - Repoussé
 - 3D overlays

Video Cards

- GPU features in Photoshop CS4 and CS5
 - Zoom enhancements
 - Animated transitions for one-stop zoom
 - Flick-panning
 - Rotate the canvas
 - View nonsquare pixel images
 - Pixel grid
 - Adobe Color Engine (ACE)
 - Draw Brush tip cursors
 - 3D Axis
 - 3D Lights
 - 3D acceleration

Video Cards

- Adobe Bridge CS4 and CS5 GPU features
 - Preview panel
 - Full-screen preview
 - Review mode

Video Cards

- Mac OS X applications that substantially use the gpu cores of a graphics card
 - Aperture 3 (RAW processor and DAM)
 - Pixelmator (between Photoshop and Elements)

External Ports

- Universal Serial Bus (USB)
 - USB2 is common on all new computers
 - 480 megabits per second (Mb/s)
 - Can provide power to 2.5" drives
 - Most cameras use USB2 ports
 - Input devices, such as Wacom tablets
- Firewire
 - Less common on Windows PCs, but on all Macs
 - Can be daisy-chained
 - FW400 - 400 Mb/s
 - FW800 - 800 Mb/s
 - Provides power to 2.5" drives
- External SATA (eSATA)
 - Common on new PCs, absent on all Macs
 - 3 to 6 gigabits per second (spinning hard drives limited to about 1.2 Gb/s)
 - Cannot provide power to external hard drives

Speed reality

eSATA > FW800 > FW400 > USB2

What Computer Should You Buy?

- An i series CPU
 - i5 or i7 if possible
- 4 GB of RAM, 8 GB if possible
- An NVida 9600 (or better) or ATI 4850 (or better) graphics card with 256 to 512 MB of vRAM
- Two hard drives of 1 TB or larger each
 - One as your primary drive
 - The other as your backup drive
- Gigabit ethernet
- 802.11n WiFi (high-speed wireless)
- Mid-tower with 500 watt (or more) power supply
- iMac with i5 or i7 processor

Budget and prioritize!