

Managing Digital Photography Data

A few years ago my cousin and I found a treasure trove of old family photos stuffed into a forgotten shoe box in a dusty attic closet on my grandfather's farm. How can you assure your grandchildren that they will have that same chance when it comes to your digital photographs?

One of the dirty little secrets of digital photography is that it forces you, whether you want to or not, to deal with lots of computer data. Every image you shoot becomes a computer file. You've got to figure out what you are going to do with that original image file, what you are going to do with all the files created by your various digital photography software applications when you modify that image, how and where you are going to store all those files, and what you are going to do with them over the long term.

How can you assure that your data will be organized, readable and recoverable next month, much less by your grandchildren? How can you build a computer system that will be stable and reliable to keep your data safe and accessible instead of buggy, crashing and corrupt?

Your digital photography data challenge starts the instant you push the shutter button and the camera writes the photo data file to the memory card and ends in a secure storage facility outside your primary residence, with many decision points, technologies and considerations in between.

To reach that goal, first you must understand where your risks lie, then you need to build computer systems and workflow processes that mitigate or eliminate those risks.

Digital Photography Data Risk

The primary risk points for data in digital photography are:

1. Camera memory card
 - a. Data corruption. This is relatively rare with brand name products.
 - b. Physical failure/destruction. This is fairly easy with SD and other small physical format memory cards.
 - c. Physical loss. Again, this is easier with the smaller physical memory cards such as SD.
2. First Tier storage. First tier storage is the first place you copy the data to when you remove the memory card from the camera. This first tier storage device will be dependent on your workflow strategy and your location, i.e. home, studio, location, 3rd world village, etc.. In a home or studio setting it may be a laptop or desktop computer. In a travel or location scenario, it is more likely to be a dedicated storage hard drive / image viewer device or a laptop computer. Any first tier storage device can suffer one of the following failures.
 - a. Drive failure. This is less common today, but always only a matter of time with mechanical hard drive technology.
 - b. Operating System (OS) failure/data corruption. Much, much more common than actual hard drive failure. This happens with every OS, even Macs and Linux.
 - c. Media failure / destruction. This is most common when you are burning your data directly from your memory cards to CDs/DVDs with a portable burner.
3. Primary workstation. This is your primary computer workstation for digital photography where you do your editing, modification, printing, etc. It can be a laptop or a multi-processor tower CPU. Any primary workstation is vulnerable to the following risks:
 - a. Operating System (OS) failure/data corruption. This is the number one cause of data loss and much, much more common than hard drive failure so often blamed. OS failure/corruption happens with every OS, including Windows, Macs and Linux. Unfortunately, in this failure scenario it doesn't matter how robust a hard drive data backup / fault tolerant system you create. If your OS corrupts your data, all you've got is a perfectly backed-up and/or fault tolerant collection of corrupt data. The solution to this challenge is to regularly snapshot your data (capture a copy of your data), disconnect

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- that copy from your primary workstation platform and put it into an off-site storage space, safety deposit box, sister's basement or some separate physical location from where you usually work. This accomplishes two goals. 1) it gets your data out of reach of the ravages of oft-misbehaving Operating Systems / Applications / Viruses / Drive controllers / etc. and 2) it gets your data in a separate physical location in case of catastrophic physical loss (fire, flood, earthquake, etc.).
- b. Application failure with data / OS corruption. This happens when your digital photography download / viewer/ utility / photo editing / formatting / printing software such as Photoshop crashes and corrupts your data file(s) and/or your OS. This is a very, very common, occurrence and, as you might expect, is always the fault of someone else's software other than the tech support person you are talking to. In my experience it is very common with Adobe applications (I don't work for any software company but have been using Adobe products since version 1.0 of everything they make.) The best strategy to mitigate this risk is to increment your file names and save off successive versions every 5-10 minutes, i.e. File:SaveAs:Roman Arch 01, work for a while then, File:SaveAs:Roman Arch 02, etc. You end up with a series of incremental files that allow you to go back one step and start at your last save point. A lot of applications claim to do this automatically (MS Word, XL, etc.) but none do it reliably. I believe this one single technique will save you more aggravation and thoughts of suicide than anything else you can do associated with digital photography. To fully mitigate the Application Failure risk, in addition to incremental file saving, you must also implement a high frequency data file backup to a separate physical disk drive.
 - c. Hardware failure. This is the fabled "hard drive crash" and is actually very, very rare today compared with even a few years ago. The term comes from the fact that the hard drives used in your computers use Winchester drive technology. They operate like old record players with the tone arm being the read/write head that reads and writes the data on the platter. The record album is the data platter, but instead of being hard vinyl, it is a platter covered with magnetic material similar to the coating on audio or video tape. There are multiple platters in a modern disk drive and a read/write head (tone arm) for each platter. The heads move in and out to seek out the data you need. When the spot is located, the read/write head reads the ones and zeros found there, or writes out the ones and zeros needed to store what you need. The data for your photo is not stored sequentially on the platter, but is scattered all over the place, wherever the disk drive controller can find some empty room. Your one photo of your smiling granddaughter could be stored not in one contiguous strip of your hard drive, but in 2,321 (or more) different tiny sections scattered all over different platters on your hard drive. The platters usually spin at 5600 to 7200 revolutions per minute (RPM). A faster RPM means that the place where your photo data is stored will spin under the read head more often, meaning that you can write or read that data faster. Speed costs money, so a 7200 (or faster) RPM disk will cost more than a relatively pokey 5600 RPM disk. When the drive is not operating the read / write heads (tone arms) are parked and locked in a safe place where they cannot contact the disk drive platter. When the drive is powered up and the platters spin they create a tiny cushion of air between the surface of the disk platter and the read/write head. This gap can be very, very small, a tiny fraction of the width of a human hair. If the read/write head is shocked/banged/dropped while the drive is spinning and the read/write head breaks through this cushion of air it will "crash" into the magnetic recording surface of the platter. This usually permanently corrupts that portion of the platter and can also destroy the read / write head. Many disk drives today are rated to withstand 20+ g's of shock force when they are not operating and some as high as 10+ g's when they are operating, so actual crashes are much less common today than they used to be. The reason you hear so much about "crashes" is that there are very, very few competent technical support people today. Their stock answers are either A: "it must be a virus, you'll need to reformat and reinstall everything" or B: "it must be a hard drive crash, you'll need a new drive, reformat and reinstall everything." Both answers are easy and mean a high rate of call handling volume which pleases their supervisors in Bangalore, India and takes the responsibility

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completely away from poorly written, unstable and unreliable Operating Systems and Applications where 99% of the problems actually lie.

4. Archival media storage

- a. Optical media (recordable CDs / DVDs). Most early recordable optical media had a pretty short shelf life, some as short as 12-24 months. Current archival optical media is rated to be stable for 50-100 years. You'll have to make your own choice on how long you think they will actually last. In any event the operating systems and physical devices used to read the optical media will be found only in museums long before that point arrives. As an example, try to listen to an Edison cylindrical recording that's about 100 years old. I've got data backup tapes that are less than 10 years old and there are no physical tape drives to read them available, much less a computer, operating system and application that could do so. The challenge with Optical Media is not the longevity of the media itself, but the longevity of the means to read it. Once you put data into archival storage, you must make a commitment to upgrade that data to whatever the current format and supporting technologies are every 5 years.
- b. Magnetic tape media. Magnetic tape is usually rated for 10-30 years of shelf life. Open reel magnetic tape designed for use on mainframe computers holds the vast majority of the world's archival data. Most is in very, very old data formats and there are businesses that do nothing but maintain obsolete tape drives so businesses can maintain visibility to data they are legally required to access. I have witnessed entire semi-loads of data tapes being hauled to the dump because it was not economically viable to port the data to modern storage systems. Again, the challenge is not usually the shelf life or stability of the media, it's the shelf life of the supporting technology. I personally have had very poor experiences personally and professionally with magnetic tape as a backup/recovery media. I do not recommend magnetic tape media for data backup.
- c. Winchester drives. If you are a high volume data producer, such as someone who shoots high volumes, high resolutions and/or with RAW files, then storing your data on hard drives will probably be your best option. The biggest advantage to using Winchester drives for backup storage is that they are so incredibly cheap per gigabyte of storage. Since you are using the drive to write data off and put it into your storage space or sister's basement, you don't care about performance. This means you can buy the slowest and cheapest drives on the market. When you are buying the bare disk drive, you will pay about \$.50 per gigabyte or less. That means you can store 250 gigabytes of data for less than \$125.00. It is very simple to set up a removable hard drive on your computer system using a USB or Firewire connection. Don't be afraid of handling the bare hard drives, just don't walk across carpet and be all static charged and then touch the circuit board of the drive. Ground yourself by touching something metal and then handle the drive by the edges. Try to avoid touching the circuit board area. I've installed literally hundreds of hard drives and have never zapped one yet. You can do this.

Regardless of the media or method chosen for archival storage by far the most important thing is to **GET A COPY OF THE DATA OUT OF YOUR HOUSE**. Put a copy in your safety deposit box, put a copy in your rented (sprinkler protected) storage space, put a copy in your mom's attic, but put a copy of your data somewhere that is 1) not connected to your computer and 2) outside the physical structure of your home / apartment / building / motorhome / motorcycle / sailboat / etc.

Data Management Strategies

Once you understand the risks associated with digital photography data, you must create a data management strategy that both mitigates the risks as much as possible and provides adequate storage capacity and archival throughput to meet your needs.

Digital photography data management is a fundamental part of your workflow. While we'd all like to spend 99% of our time shooting and the rest cashing checks for our work the realities of digital photography demand that we will spend a disproportionate percentage of our time managing the data files associated with the original shot, the edited shot, the print variations of the shot and the repurposed versions of the shot.

The most appropriate strategy for digital photography data management depends first on how much data you are producing both on a regular and peak basis. If you are shooting 8 – 40 megapixel RAW images, then you are going to pile up a lot of data. And the digital photography data challenge is not just for high end professionals. The next crop of cameras filtering down to consumers from the pro and semi-pro ranks will be 12-18 megapixels, which will produce large data files even when shooting in JPG format.

Secondly, an appropriate strategy for data management depends on the utilization and market for your images. If your workflow allows you to simply put your memory cards in a FedEx envelope and overnight them to New York, then say a prayer of thanks every day and enjoy life. If you are like the other 99.99% of digital photographers and are now responsible for everything other people used to do for us such as color matching, color balance, touch-up, pre-press prep, etc. then you must include those post-production data file demands in your data management strategy.

Even if you are just shooting your first digital images on your first memory card, you are going to need to consider everything you may do in the future with those files. You need to plan for uploading to a web site to share with family, ordering prints online, making custom prints at home, editing and selecting photos, touch-up and modification (red-eye removal, etc.)

All of these factors determine the data management strategy portion of your digital photography workflow. For hobbyists and enthusiasts, the data management strategy will be fairly simple. For working professionals or serious "pro-sumers," the strategy demands some serious thought and planning.

At a minimum, I recommend that all digital photographers implement a formal data management workflow that includes:

- Field backup (on location copying of photos from camera memory cards to dedicated storage / image review device, CD/DVD burner or laptop)
- Fault tolerant primary digital photography computer workstation
- Off-site data archiving

Your workflow can be as simple as burning a DVD of your work every month and mailing it to your best friend for them to put on a shelf for you or as complex as daily trips by a photo assistant to a fire-safe vault to deliver that day's 500 gigabytes of RAW files stored on bare Winchester drives. The complexity and throughput capacity of your particular workflow needs to match your specific requirements.

Data Management Workflow

Field Backup

The first lesson I learned when I started shooting professionally at age 16 was to never let a camera strap hang over a counter edge where it could get caught and the camera dragged off to the floor. The second lesson I learned was to ALWAYS put my exposed film in a jacket pocket separate from the camera bag that held the photo gear. The implicit message there is that the only thing that matters is the shot. The gear could and would be replaced by insurance, but the shots were irreplaceable. That was as true then when I was shooting the State High School Class A Wrestling Championships as it is now when I'm shooting the Bhutan National Archery Championship Finals.

Your first and primary responsibility in field backup is to get the images back safely. The first step is to get absolutely inviolate about ALWAYS putting things in the same place every time. When a memory card is full, put it in the same place, every time. Establish a system that works for you and stick to it. The second step is to back up your images from your memory card every night, even if the card is not full. With today's memory cards holding 4, 8 and more gigabytes you cannot afford to wait until the card is full before you back up the images onto your field storage device. Thirdly, keep your field storage device in a different place than your camera and memory cards. If you keep it in your camera bag and your camera bag is stolen you've lost your camera, all your memory cards and your backup copy of your images. Spread and separate your risk.

There are a plethora of devices available today that copy photos from your memory card to a dedicated hard drive, image viewer and/or CD/DVD burner. Or you can simply carry a laptop for this purpose. Whatever you use, back up your images every day when you are traveling and after every major event or shoot if you are not.

Fault Tolerant Primary Digital Photography Workstation

Anyone who has lost their homework, photos, hobby projects, America's Greatest Next Novel or just their darn address book knows the pain of having their computer fail them. An important philosophical step is to realize that it is only a matter of when, not if, your computer is going to fail. Although tech support will inevitably choose cop-out option A: "must be a virus, you'll have to reformat and reinstall everything and you'll lose all your data," or option B: "must be a hard drive crash, you'll have to replace the drive, reformat and reinstall everything and you'll lose all your data," the fact is most computer "failures" are not caused by viruses or bad hard drives but by poorly written, buggy, inefficient, and conflicting applications and operating systems. Most computer "failures" can actually be recovered, along with all or most of your data, but you'll likely never find anyone out there with the knowledge, experience or more importantly, motivation to put in the time and effort to do so. It's a lot easier to choose cop-out option A or B and check off another "successful" support call for their quota for the day.

So how can we survive this minefield of inevitably failing computer systems and off-shored, incompetent and unmotivated technical support? First, we've got to realize we are on our own and set up processes to protect ourselves to the maximum extent possible. The factors we've got working for us are that data storage is very inexpensive today and getting cheaper by the minute. This allows us to keep multiple copies of our data without costing us a fortune. Secondly, we have the opportunity to construct fault tolerant computer systems with huge amounts of storage that would have cost millions just a few years ago for \$1,000 or less.

Fault tolerant data storage systems are a special type of hard disk drive system for your computer. They allow the recovery of data in the event of data storage hardware failure. It is very important to note that fault tolerant data storage systems can do nothing to help you if Microsoft Windows or Apple OS or Linux or Adobe Photoshop has a problem and corrupts your data. Building a data fault tolerant system only protects you from data storage hardware failure, which is a pretty rare event these days. That's why for our purposes, we've got to spend as much effort protecting ourselves from our Operating Systems (Windows, Mac, Linux) and Applications (Photoshop, etc.) as we do against hard drive failure. In order to do that important first step, we've got to build a computer that is purely set up for Digital Photography.

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That doesn't mean we have to have two computers, one for digital photography and one for everything else. We can create one computer that boots either way, but at today's prices, it may make as much sense to just buy a cheapo computer for the non digital photography work.

How to build a fault tolerant primary workstation

Section A: Building a pure Digital Photography boot drive

Digital photography takes quite a bit of computing power, especially for complex operations in advanced software such as Photoshop. Every additional piece of software that we pile onto our computers, from automatic reminders for Aunt Nellie's birthday to Starfield simulators, steal computing power from what we really need it for, crunching pixels in our digital photos. The best way to ensure that 100% of the available computing power we've got is going to our intended purpose is to build a dedicated Digital Photography boot drive that creates a pure system that is 100% clean of anything not related to our goal of digital photography.

This looks very daunting but will only take you about a day to a day and a half, even if it is the very first time you've ever opened a computer. Computers are actually pretty easy. Computer geeks would all starve if the public knew how easy most of this actually is. You may need a Phillips screwdriver, but many systems don't require any tools.

1. Go online or to your local computer superstore and buy two identical brand name 100 gigabyte or larger 7200 RPM hard drives.
2. Mark them Boot Original and Boot Backup with a permanent marker.
3. Make copies of the sales receipt and warranty and tape both to each of the drives.
4. Remove all drives from your computer.
5. Disconnect all USB & Firewire devices from your computer.
6. Install the Boot Original drive to the primary drive controller.
7. Connect only your keyboard, mouse, monitor and internet/network (RJ45) cable
8. Use your computer recovery or system Operating System (OS) install CD to install the OS on the Boot Original hard drive. (Use the most recent version of your chosen OS unless it's only been out for a few months. It usually pays to wait until the first Service Pack/Update before moving to a brand new OS.)
9. The OS will automatically install the drivers for the keyboard, mouse, & monitor.
10. The OS should automatically setup your internet/network. You will need access to the internet for the next steps.
11. The OS should automatically upgrade itself with all the latest security patches, etc. Do this manually if required.
12. Install your choice of AntiVirus software (Semantec/Norton, McAfee, etc.)
13. The Antivirus software will update itself to the most current version(s).
14. Install your choice of firewall software if you choose to use a 3rd party software package for this purpose.
15. The firewall software will update itself to the most current version(s).
16. Install **ONLY** the printer(s) you use for digital photography.
17. Check to ensure the printer drivers & applications are fully updated with the latest patches, revisions, etc. (usually on the Help menu)
18. Install **ONLY** the scanner(s) you use for digital photography.
19. Check to ensure the scanner drivers & applications are fully updated with the latest patches, revisions, etc. (usually on the Help menu)
20. Install **ONLY** the digital camera drivers & applications that you use for digital photography.
21. Check to ensure the camera drivers & applications are fully updated with the latest patches, revisions, etc. (usually on the Help menu)
22. Install **ONLY** the applications you use for digital photography (Photoshop, Paint Shop Pro, Downloader Pro, BreezeBrowser Pro, etc.).

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23. After you install each digital photography application, check to ensure it is fully updated with the latest patches, revisions, etc. (usually on the Help menu)
24. Check the functionality of every element of the system. Check all scanners, cameras, applications, functions, etc. Can you scan a photo? Can you communicate with you camera and change its settings from the computer? Can you edit a high resolution RAW image? Can you edit the same image in different applications? Does any application crash?
25. Work out all bugs and resolve all problems until all applications and hardware are 100% reliable.
26. Use a hard disk clone package to create an exact duplicate copy of your Boot Original disk to your Boot Backup disk. Put your Boot Backup disk in a padded waterproof container in a safe place outside of your home/apartment/sailboat/etc.
27. When (not if) your OS and/or your digital photography applications corrupt your Boot Original disk then you can pull your Boot Backup disk out of storage and you've got a perfectly working system again. When this happens your first step is to go buy another disk drive and clone your Boot Backup onto a Boot Backup #2. Than you'll need to carefully go through each OS, driver and application to upgrade it to the latest patches, bug fixes, etc.

After step 26 you will have a computer system that is dedicated to working on digital photography and will be 99% more reliable than one that is loaded up with a bunch of applications, downloads, add-ins, etc. that have nothing to do with digital photography but are probably responsible for many of the crashes and conflicts with your digital photography applications, which certainly have enough of their own bugs, conflicts and crashes without any help from Wheel Of Fortune or Retirement Planner 3000.

If you want to also have a computer that has casino games, tax planning software, 3D deck design software, greeting card software, etc., then you've got two choices. You can buy another computer, which at today's prices is not the luxury it used to be, or create another Boot disk and load all of those applications on it. With a laptop, swapping the hard drive can take only seconds. With a regular tower PC you may want to install a special mount that allows you to physically swap the boot drives or have them both installed and use a software application that allows you to choose which disk you want to boot from.

Section B: Building a Fault Tolerant data array with offsite archiving

One of the most important things to do when trying to build a reliable computer system is to get your digital photo data files onto different physical disk drives than your Operating System (OS) and applications. On a Windows PC, your computer will boot from a C: drive, which is where your OS and your applications are installed automatically.

Also by default, Windows places all of your files into a "My Documents" series of folders. These include "My Pictures," "My Videos," etc. All of these folders are buried in an arcane place deep within the folder structure of the Windows Boot C: drive. They are all subfolders in a user identity folder that is created when you set up the Windows system. For instance, if your name is John Smith, then all of your documents, photos, music, video, etc. that you've got in your various "My Whatever" folders are all sub-folders (children folders) of a folder named "John Smith" that is buried in a special place in the Windows structure on the C drive.

This is all Hunky Dory unless or until Windows itself, in its semi-annual fit of self-destruction, or an application such as Adobe Photoshop (I've had this happen twice during automatic "updates") wipes out your "John Smith" identity on your computer. If your master "John Smith" identity gets corrupted, re-created or wiped out, your data in the My Documents folders is toast. Because all of your data was in sub-folders (children folders) of the master "John Smith" folder, you lose 100% of everything you've ever stored in your "My Documents" folder structure. This is not a good thing.

This is why most computer geeks never keep anything they care much about in the "My Documents" folder structure. Instead, they buy additional physical hard drives and keep their data on those separate drives, as far away from the evil intentions of misbehaving Windows / Mac / Linux OSes and nasty, corrupting, it's-always-someone-else's-fault Applications as they possibly can.

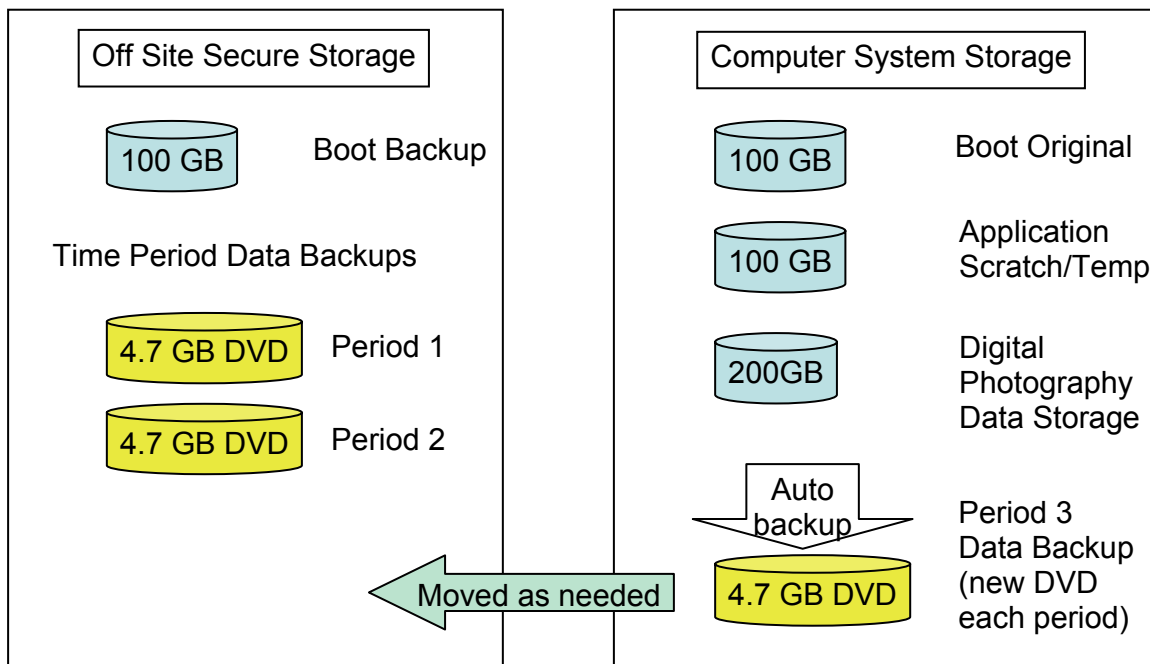
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So the first step in creating a fault tolerant data array is to create some different places to store your data other than the Boot (C:) drive. Some high performance applications such as Photoshop perform much, much faster if they have dedicated disk drives to use for temporary (scratch) files and for buffer space for very large files. We'd ideally also like to have a set of disk drives that could tolerate a failure of one or more of the drives and still not lose our data. In addition, the ability to backup our data onto a removeable media, optical or magnetic disk drive, and get it into a different physical location is a critical component of a safe and recoverable workflow.

Level One Data Array – Hobbyist / Amateur

The simplest and most common method to achieve these goals is a Level One Data Array represented in Figure One, which relies on recordable DVDs for off-site archival storage.

Figure One – DVD Archival Storage



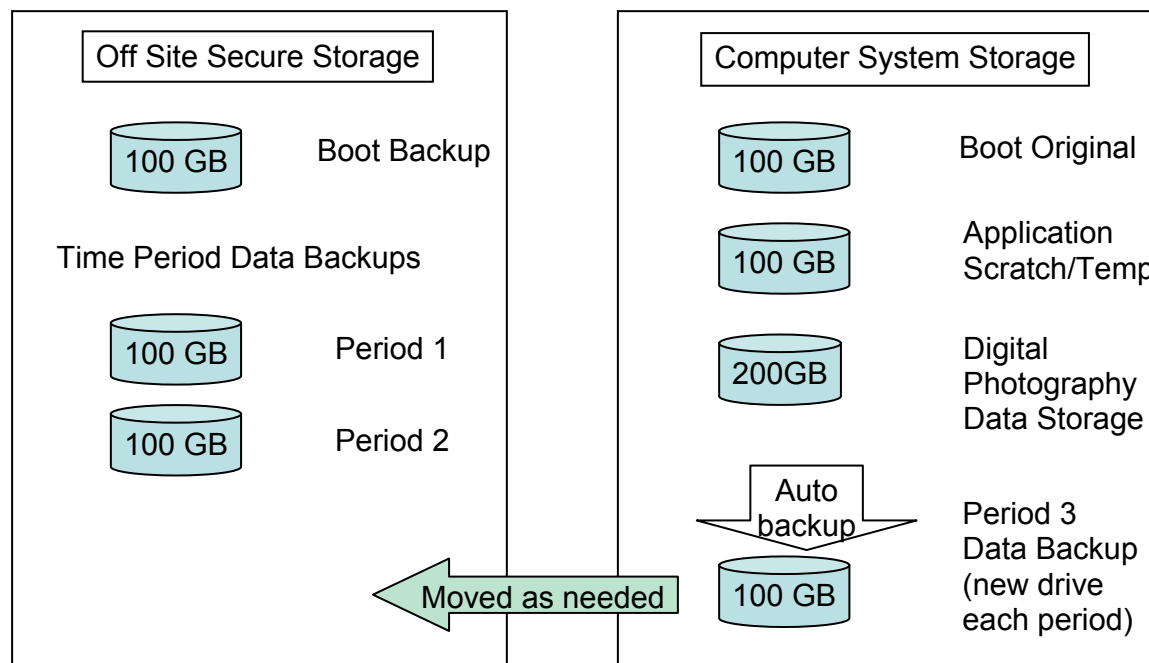
This method is good for digital photographers who shoot relatively low volumes and shoot in JPG format. In this method, the images archived on DVD are your recovery path should your primary Digital Photography Data Storage drive fail.

Your vulnerability will be determined by the period frequency of your data backup. If you backup nightly, then you would only lose one day's work. If you only backup weekly or monthly, then you could lose a week's or month's worth of work. As the saying goes, "don't backup what you are willing to lose."

Level Two Data Array – Enthusiast / “Prosumer”

If you find that your costs of DVDs is running high, or that your volume of data is too great due to the number of images you are shooting, higher resolution images or use of RAW format, then a Level Two strategy using Winchester disk drives for archival storage such as that illustrated in Figure Two will be more appropriate.

Figure Two – Winchester Drive Archival Storage



This method is good for digital photographers who are shooting in RAW format and/or in high resolutions. It also makes sense for those shooting high volumes of JPG images such as sporting and social event photographers.

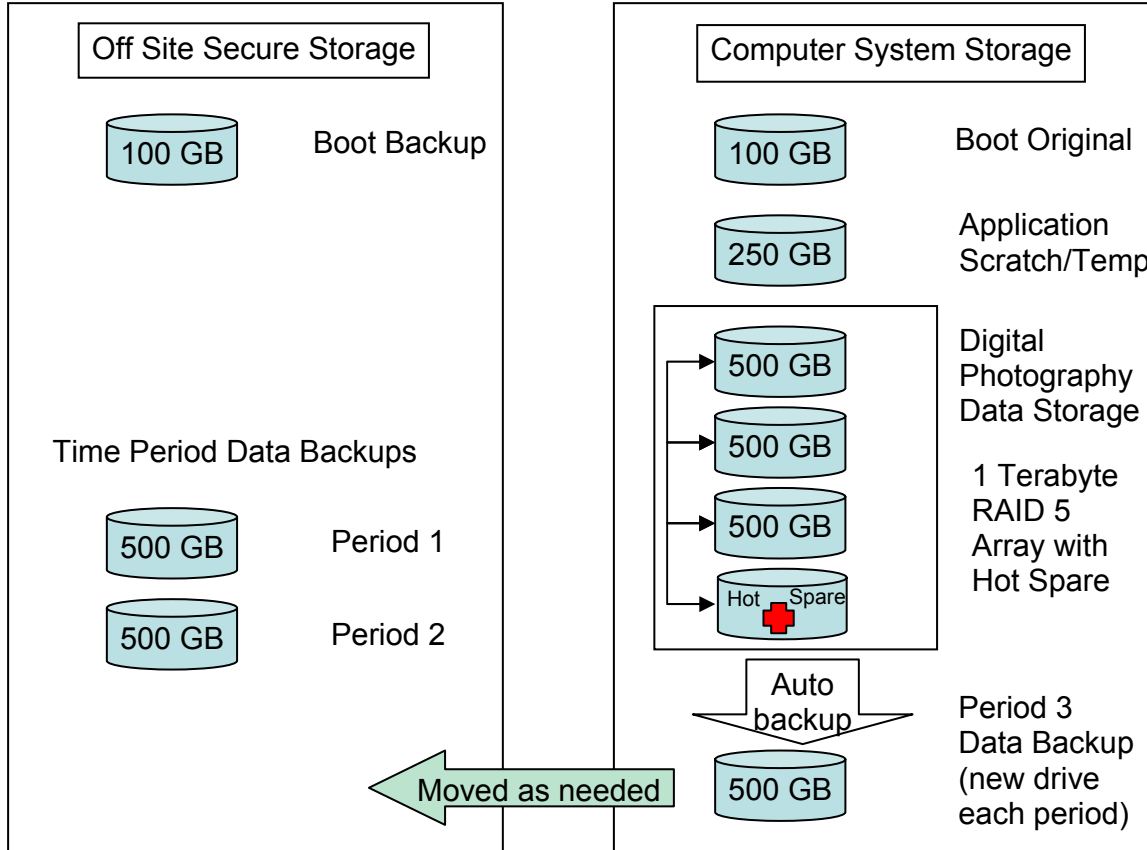
Again, your data loss vulnerability will be determined by the period frequency of your data backup. If you backup nightly, then you would only lose one day’s work. If you only backup weekly or monthly, then you could lose a week’s or month’s worth of work. As the saying goes, “don’t backup what you are willing to lose.”

The primary weakness in these first two strategies is that there is no inherent fault tolerance of the Digital Photography Data Storage drive itself. In the first two strategies the only fault tolerance is provided by the frequency of data backup of the Digital Photography Data Storage drive. If it fails at 3PM and you haven’t run a backup since the night before, you’ve lost your day’s work. That can be fatal to a photographer working against a deadline.

Level Three Data Array – Professional / Expert

In order to provide true fault tolerant capability, we need to move into a data storage design that provides the capability for data recovery in the event of a physical drive failure. In the computer world, this is commonly accomplished using a Redundant Array of Inexpensive Disks (RAID). There are a plethora of RAID types all with their own strengths and weaknesses, but we're going to concentrate on a design that will provide fault tolerance, meaning a drive can fail and you can recover your data, as well as "hot spare" capability, meaning your data can automatically rebuild without you having to go out and buy another hard drive first. This is a Level three design and is illustrated in Figure Three.

Figure Three – RAID 5 Winchester Drive Archival Storage



This system utilizes a RAID 5 disk drive array for the primary Digital Photography Data Storage system. A RAID 5 array allows any one of the disks to fail and still be able to recover and rebuild all the data files. Adding a Hot Spare drive to the array allows this to happen immediately and automatically, so you don't even have to purchase and install a replacement drive in order to recover your data (although you definitely want to replace the failed drive and have a Hot Spare as soon as possible).

This system is ideal for digital photographers working with high resolution 35mm and medium format digital backs, high volume and high resolution RAW files and very high volume, high resolution JPG format shooters such as action sports.

In a commercial setting, most shooters will use a RAID 1 mirror array on the Period Backup drive. This automatically creates duplicate (mirror) images of the data on two physically separate drives. They then keep one duplicate period backup drive in the studio and the other one in the off-site storage. In this way

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they always have all of their data immediately available and don't have to wait for a delivery company or a photo assistant to retrieve an old assignment from the off-site facility. Plus, due to the redundancy of studio based and off-site storage based duplicate copies of every data file, all of their work is safe and protected from almost any catastrophic loss scenario.

There's no escaping death, taxes or data storage failure, so ultimately your vulnerability to physical site destruction (fire, flood, earthquake, etc.) will still be determined by the period frequency of your data backup to your offsite facility. No matter what your level of expertise or compensation, your mantra remains, "don't backup what you are willing to lose."

Summary

Digital photography brings with it capabilities of expression and creativity that were unthinkable a few short years ago. It brings within reach of the amateur and hobbyist capabilities reserved only for the great masters of the past. It allows experts and professionals to explore and expand the bounds of photography and imaging into entirely new realms.

It also brings with it an entirely new set of challenges associated with managing the massive amounts of data generated in the original image data files and the data files of the utilities, editors and special effects packages we use to modify and enhance our digital photographs.

With a well formed data management strategy the digital photographer can successfully overcome the risks of digital data management and the challenges of a digital photography data management workflow.

For the weekend hobbyist or a commercial photographer the ultimate nightmare of a computer system failure, hard drive crash, theft, flood or fire is not the loss of the equipment but the loss of the images. With a well designed, well planned and well maintained process of data redundancy, fault tolerance and off-site storage you can always be assured that your most treasured images will be there for your future generations to discover someday in a dusty attic closet.

Whether they will then be able to read and display those image data files or not is the subject for another, ever more challenging, discussion...