

Backups and Archives

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Backing up your computer is an often overlooked aspect of owning a computer these days. It is a dreary but essential endeavor. In this article, I attempt to impart some of the "backup wisdom" I've accumulated over a lifetime of using computers.

Backup and *Archive* -- these mean about the same thing, don't they? Well, not in my book. I define these terms as follows:

- *Backup* - A temporary copy of your hard drive. A *backup* is there in case your hard drive is lost or damaged.
- *Archive* - A permanent copy of all or some portion of your hard drive.

Let's first look at the term *Backup*. As you use your computer, you are constantly shuffling files on your hard drive. You are creating new files, modifying existing files, and deleting old files. You might be running tight on available hard drive space, and you want to make room. In all of this shuffling, it is easy to lose files, or accidentally delete files. Let's say you accidentally delete an important file. Only afterwards do you realize your mistake. It happens to all of us, believe me. A *Backup* is a way to be able to recover from that mistake. You just tell your backup software to restore a copy of that file. No problem.

A hard drive failure is a more severe catastrophe. Again, it happens to all of us. A *Backup* is a way to recover from that catastrophe. If your hard drive crashes, and you have a backup, you can rest easy. You have not lost all of that information you have accumulated over the years. Once you get a new hard drive up and running, you can just tell your backup software to restore your files from a *Backup*.

Now we turn to the term *Archive*. You might be looking at old files which you haven't touched in years, and you think to yourself: "I don't need that document taking up space on my hard drive. But it's still an important document, so I don't want to permanently delete it." Here, you are thinking in terms of creating an *Archive* of that document. You want to create a *permanent* copy of that document, and then erase it from your hard drive. You want to create an *Archive* of that document.

Most backup software is not designed to create a permanent record of information. It is only designed to provide a way to restore the state of your hard drive should you experience a catastrophic failure. The key concept here is that a *Backup* is

designed to restore your hard drive to the state it had at some certain time, usually the state it had at a time close to the time of the crash.

Most backup software is designed to backup to media with a definite limit on capacity. It is designed to reuse that capacity once it is filled up by removing some portion of the old backup data it has recorded previously, in order to make room for new backup data. This is what I mean when I say that *Backups* are *temporary* copies of your information. Because the backup media have limited capacity, eventually it will fill up. Eventually, you will have to erase old backups with newer backups.

"Ah", you say. "But DVD-R's are cheap. I can overcome that problem by using a different DVD everytime I do a backup." Yes, you can. I submit that what you are doing in that case is creating *Archives* of your data; that is, you are creating permanent copies of your data. In addition, you are being indiscriminate. Try using that approach for a while. You will eventually overwhelm your physical storage space for DVD-R's. You'll have them stored in the bookcase, in boxes in the attic, in the garage, where ever you can find room. What about that important document you deleted sometime around 6 months ago, or was it 18 months, secure in the knowledge that you had an *Archive* for it? Try poking through those DVD-R's, one at a time, first the ones from the bookcase, then the ones from the attic, trying to find that one document.

The words *temporary* and *permanent* are relative. A backup may be in existence for weeks or months. But, eventually, it will be overwritten by newer backup data. The backups you create are truly *temporary*, even if they hang around for months. You might think that using DVD-R's is perfect for creating *archives* because they are *permanent*. However, DVD-R technology will eventually be obsolete. DVD technology is already being supplanted by Blue-Ray technology, as DVD's themselves supplanted CD technology. Think about 3.5 inch floppy disks. If you have files *archived* to floppy disks, do you think you could restore those files today? Probably, but it wouldn't be easy and you might have to go to an expensive specialist to do it. So use of the word *permanent* is in a way misleading. Perhaps a better term might be *long-lived*. Even that term is relative. For the purposes of this article, I use the term *permanent* to mean *long-lived until such time as the technology used becomes obsolete*.

Nowadays, we generally use some form of external hard drive as a backup medium. This is a limited capacity device. Eventually it will fill up. Eventually you will have to overwrite existing information in order to make room for new information. Again, the backups are *temporary*. They won't stick around forever. They really don't need to be *permanent*, given their purpose, i.e., that of being able to restore your hard drive in the case of failure.

Here's an example to help you get your brain around the concept of *archival* versus *backup*. These days, personal computers tend to fill up with photos and videos. Its a natural thing. We all love to take photos and videos, and we do it all of the time. We are constantly putting new photos and videos on our hard drive, either from our

camera or from our scanner. These are treasures, they are records of our lives, and of our families as they proceed through life. We would like them around for a long time, so that we can look back at them and contemplate the memories they evoke.

In other words, they should be *permanent*. Whenever the word *permanent* pops up, think *archive*. You want to create *archives* of these precious memories. Backups are not adequate, because by definition they are not *permanent*.

Now, the thing about photos and videos is that they take up a lot of space on your hard drive. Photos these days can be up to 10 MBytes in size, and videos can be far larger, especially HD videos. You can easily fill up your hard drive with videos alone. You will eventually have to ask yourself the question: what can I get rid of to create space on my hard drive? Photos and videos are an obvious solution. Since they take up so much space, getting rid of them from your hard drive will free up a lot of space. But, you have to remember, these photos and videos are precious, so you don't want to delete them forever. You want to create *archives* of them before you remove them from your hard drive. If you just toss them out to a DVD-R, they're *archived*. If you later want to relive those memories, just plop that DVD-R back into your computer.

Music is another example of files that can fill up your hard drive. On my computer, my music comprises the single largest type of files on my hard drive. I'm constantly adding to my music collection. I use my backup strategy to create backup copies of my music, supplemented by occasional archiving. Music archival is complicated by Digital Rights Management (DRM). But iTunes gives you a way to archive even your purchased music. Use it.

It can get complicated. But in general, you need to do both *backup* and *archival*. So, let me make some recommendations here regarding *backup* and *archiving*.

Backup

Some form of *backup* strategy is essential. If you care at all about the files you create, you must do *backups*. Virtually everyone I know has had a disk crash at some point. They come to me for advice, and the first thing I ask them is "well, what were you using for backup"? If they look at me with a blank look in their eyes, I just send them to the nearest disk recovery service, an expensive and often unreliable way to recover your files. That's all I can do.

Here are some recommendations on *backup* strategies.

- Follow your operating system instructions for creating an emergency rescue disk. This will be an important part of recovering from a hard drive crash. This only needs to be done once. Strictly speaking, an emergency rescue disk is an example of an *archive*, because it is a *permanent* copy of your operating system.

- Save all of the disks you use to install software and applications. This is another important part of recovering from a hard drive crash. These are, strictly speaking, considered *archives* as well.
- If you install some software from the web, generally what you download is a *setup* program for the software. Generally speaking, the only way to recover programs or applications is to use their *setup* program. You usually cannot just backup a copy of the program and expect it to work properly when restored. Instead, you need to *archive* the setup program. So whenever you download a program (and especially if you have paid good money for that program), *archive* the file you downloaded.
- There are more and more online backup services available these days. This is becoming a viable alternative to backup to disk media. I have several friends who use online backup exclusively and they swear by it. I tend to avoid them for the following reasons:
 - They are not cheap, or if they are cheap or free, you don't get much capacity.
 - Online backup is very slow, and while it is in progress your computer and Internet connection are slowed down.
 - Most important, I don't like the idea of entrusting my data to third-parties. After all, companies (especially online companies) are failing all of the time. You don't want to be stranded with a defunct company just when you need to restore your data.
- Get yourself an external hard drive. They're relatively inexpensive these days, and worth the price. Use this strictly for *backup*. Get one that has a capacity of at least 2 times the capacity of your hard drive. The more, the better. I do all of my *backups* to my external hard drive.
- Get yourself some decent backup software. Set it up to backup periodically, maybe in the wee hours. If you don't want to pay for decent software, you can do it manually, as described in **Manual Backup** below. In the old days, the backup program provided with Windows was a piece of crap. So I always did manual backups. These days, I've moved over to Apple, and their backup software, Time Machine, is wonderful. I use it exclusively for *backup*. My understanding is that Windows backup software has improved, but if that's the case, why are there so many third-party Windows backup packages available?

Manual Backup

Let's say you want to do a manual backup procedure. This requires discipline, because you have to remember to do it periodically; often enough so that you don't lose important information should your hard drive crash. You should do a backup at

least weekly, unless you just aren't using your computer that much. Once you decide to do a backup, follow these steps:

- Create a folder on your external hard drive. The name you use should reflect the fact that it is a backup, and that it was performed on a certain date and time. You should be able to look at a listing of the top level of your hard drive and determine at a glance what folders are older. What I do is use the convention "Backup_yyyymmdd", where:
 - yyyy is the 4 digit year
 - mm is the two digit month
 - dd is the two digit day of the month.
- I use this convention because when I look at the listing of the top level of the external hard drive, it is automatically sorted for me (in most operating systems).
- Copy **all** personal documents from your hard drive to this folder. This should include:
 - All of your "Home" or "My Documents" folders.
 - All of your email. The place where your saved email is stored varies depending on which email program you use. It is unfortunate that many email programs don't put saved email into a sub-folder in your "Home" or "My Documents" folder. Otherwise, backing up your "Home" or "My Documents" folder would be sufficient. If you use Outlook, or Outlook Express, there are some excellent articles out there on the web describing how to backup your email.
 - All of your contact information. Again, many contact management programs don't put contact databases in a sub-folder of your "Home" or "My Documents" folder.
 - All of your bookmarks or Internet favorites.
 - All other information that is personally important to you but not stored in your "Home" or "My Documents" folders.
- In order to cut down on the amount of storage required, you don't need to include:
 - Installed programs - You have install disks for these, or you can restore them from the web. You probably won't be able to restore them from backup so why save them?
 - The operating system - You have install disks and/or emergency rescue disks for this. You definitely will not be able to restore the

operating system from a backup (that's what an emergency rescue disk is for), so there's no point in backing it up in the first place.

- Eventually, your external hard drive will fill up. Your manual backup will fail. When that happens, remove the oldest backup folder on your external hard drive (and remember to empty the trash). Then try to do your backup again. Keep repeating this until you have enough free space on your external hard drive for the backup to succeed.

Archival

Remember, *archival* is the process of creating *permanent* copies of important files in a place other than your hard drive. If you are a packrat (like some people I know), and **never** delete files, or if you just don't create that many files, then you won't need to *archive* (as long as you have a good *backup* strategy). However, if you're like most of us, you will eventually fill up your hard drive and will be forced to remove files to create space.

Here are a few recommendations and guidelines for *archival*:

- Archival is generally a manual process. Only you can decide what files are important enough to be considered *permanent*, and therefore candidates for *archival*.
- Often, *archiving* a document can be a simple matter of printing out a copy of that document and storing it in a safe place somewhere. This is an often overlooked way of *archiving*. It is not always ideal, because some files cannot be usefully printed, because hard-copies eventually fade, and because the storage of paper files usually takes up far more physical space than a CD or DVD. I usually print out copies of files I don't really need on my computer and don't need to save over the course of a decade, such as receipts, car registrations, medical claims, bills, etc. I then put the hard-copies into files in file cabinets. Never overlook the simplicity, ease, and relative cheapness of hard-copy archival.
- In general, *archival* will consist of sending a bunch of files to a CD or DVD. Usually, you will want to send as many files as you can, in order to avoid wasting space on the CD-R's or DVD-R's, although this is not as important in this day and age of cheap DVD-Rs. Usually, *archival* will consist of creating a *data* CD or DVD, as opposed to a music or video CD or DVD.
- If you use a manual procedure for *backup* to an external hard drive, you can also use the same external hard drive for *archival*. Just remember that you have both *backup* (temporary) files and *archive* (permanent) files on that drive, so that when the time comes to create free space on the drive for a new backup, you know which folders you can safely remove. It is helpful to use a

naming convention to distinguish *backup* files from *archive* folders. Also remember that you can eventually fill up your entire external hard drive with *archives*. You will then have to send those *archives* to CD or DVD in order to make room for further backups. If you use backup software, it will generally want to use the entire external hard drive, and might overwrite an *archive* when it needs space for a backup. For these reasons, I use my external hard drive strictly for *backups*, and use DVD's strictly for *archives*.

- Get some decent CD and DVD burning software. Many operating systems come with adequate disk burning software. I have used Nero and Sonic Record Now, both of them are adequate, and are available cheap or free.
- Be sure and use jewel cases for all *archive* CD's and DVD's. This helps protect them, an important consideration for media you want to be long-lasting. Be sure and label the media appropriately. I use Avery mailing labels on the jewel case. I label each archive with a summary of the contents of the disk. This has helped numerous times when I went back through my *archives* looking for a particular file.
- In general, I avoid DVD-RW and CD-RW. These technologies are not as reliable and long-lived as DVD-R and CD-R. Reliability and durability is an important consideration for *archival*.
- Any time you delete files from your hard drive, you should ask yourself first: will I need these files in the future? Do I need to *archive* these files first? If the answer is yes, take the time to create an *archive*.
- Many files do not need to be *archived*. For example, let's say you use your video camera to create a bunch of clips. You download these clips to your computer. Then you use your video editing software to assemble a complete movie of the clips, including fades and voice-overs, etc. At the end, you create a single product -- a .mpg or .mp4 file (or whatever) representing the final, complete movie. Then the time comes to *archive* the project. You need to ask yourself - do I need to archive everything, including the video clips, or should I just archive the end result? Will I ever go back to this project and edit it again? If the answer is yes, then you will need to archive the entire project. If the answer is no, then you will just need to archive the end result.
- Archive your music to CD or DVD. For example, iTunes has a way to archive all purchased music (although it is problematic if your music exceeds the capacity of the CD or DVD). Even if it's just a simple matter of burning music CD's, you should do this. That way, should your hard drive crash, you at least can restore your music by ripping the CDs. This has the added advantage of removing the DRM when you restore the music after a hard disk crash. And, you also have CD's that you can listen to, should your MP3 player stop working.

- Remember that your MP3 player is in a sense a *backup* of the music on your computer. If you lose your hard drive and all of your music, remember that it is still there in your MP3 player. Unfortunately, Apple's iTunes has made the restoration of music from your MP3 player difficult, if not impossible. However, there is third-party software available (for a price) to help you do that.
- I manage my photo and video folders in a certain way in order to accommodate *archival*.
 - Whenever I download a set of photos from my camera, I download them to a particular folder in my *pictures* folder. I use a naming convention for these photos of the form *yyyymmdd_description*, where:
 - *yyyy* is the 4 digit year
 - *mm* is the 2 digit month
 - *dd* is the 2 digit day of month
 - *description* is some form of brief description of the photo set.
 - This naming convention allows me to obtain a nice sorted view when I look at my *pictures* folder, or when I look at an archive disk. It also allows me to get some idea of what's in those folders, if only to get an idea of the time frame in which they were taken.
 - Sometimes, for especially important photos like my family, I move them to a special folder in my *pictures* folder, like *Photos_Family*.
 - I usually don't archive these folders immediately. Instead, I accumulate a set of these folders over time as I take photos. While they're on my hard drive and not yet archived, they are still protected through my backup procedures.
 - Eventually, I will accumulate enough that I feel it's time to archive. Generally, what I do is create a data DVD (that will hold about 4 GBytes) and copy the the sub-folders of my *pictures* folder to it.
 - Most DVD burning software will perform a phase of "verification" after burning a DVD. This helps ensure that all of the data made it to the DVD and is not altered or corrupted. However, I like to perform my own spot checks, as I've been burned in the past by what the DVD burning software told me was a good copy. After *archival*, remove the DVD and then insert it again. Use windows explorer or equivalent to poke around the DVD, occasionally spot-checking by opening individual pictures. Windows explorer will show you thumbnails of the individual pictures, and this helps verify that the copies of the

pictures are good. This helps give a measure of confidence that the DVD is good and has retained your files.

- Generally, if I feel that I don't need to keep the pictures on my hard drive, I will remove the folders after *archiving*. This keeps me from *archiving* a set of photos more than once.
- If I want to keep some photos on my hard drive, say to use as wallpaper or the like, I will generally copy them from their original folder to a special folder (I call it *NoSave*) before I remove the old folder. I never archive the *NoSave* folder. The *NoSave* name reminds me that these photos have already been *archived* and there is no need to archive them again.
- I apply similar techniques for videos.
- Note that DVD's and CD's are imperfect devices. They occasionally develop bad spots or otherwise stop working despite your utmost care. If you really, really care about some files, then make more than one *archive* copy. You might read up on CD and DVD storage considerations such as temperature and humidity.
- Along the same lines, a DVD or CD may burn perfectly in one computer, but may utterly fail when you try to read it in using a different computer. If this happens, try the disk in yet another computer. This will often work.
- Often, it might be that the disk has accumulated dust or other contamination over time. One technique I've used to overcome this is to put some isopropyl alcohol (rubbing alcohol) on a clean cloth, such as the kind used to clean lenses. Gently rub the entire recording surface of the disk with the cloth. Wait a minute or two to allow the alcohol to evaporate from the disk, and then try again.

There you have it. I hope that applying some, if not all of these techniques, can someday save you from a world of hurt. I've experienced a lot of the pain, and hope you can benefit from my experiences.