



Chapter 2 - Demystifying the Backup

The apparently simple task of backing up one's data is not so simple when you start reading advertisements and reviews of backup software. "It does full, partial, and incremental backups; mirrors and clones disk drives..." Let's take these terms and explain them all in plain English...

Making a Backup: Options and Terminology

What do all these geeky buzzwords mean, and what kind of backups should you be doing? If you're just as confused about backups as [the guys on the Seinfeld show](#), you'll find this article helpful. Let's start by explaining some common types of backups, without the techie jargon.



A **“full backup”** is also called a **“system image”** or an **“image backup”** in computer parlance. It is a copy of an entire hard drive's contents, from the boot record to the last file you created or changed by clicking Save or Send. System settings, the Windows registry, hidden files such as the page file and hibernation file, everything on your hard drive is saved as a single file on your backup media (usually an external hard drive or network-attached storage device). If you've ever created a ZIP file, it's similar in concept -- lots of files combined into one large file.

Sometimes compression or encryption techniques are used to save space or secure the image file. The advantage of an image file over just copying a bunch of files to a backup device is the convenience of having just one file, especially if you want to store the backup in more than one location.

Full backups are sometimes made when a system is “just right,” with everything installed and set the way its owner wants it. A computer can be restored to that ideal state from a full backup copy. Another benefit of a full backup is that it's easily restored; just read the whole image file, unravel the digital “packing material”, and write each individual file to the hard drive.



If you need to recover from a disk disaster quickly, a full image backup is good to have. Depending on your needs, and how often you add, delete or update files, you might decide to make an image backup on weekly, monthly or other timeframes.

But full backups can take a long time, and a lot of storage space, so it's generally not a good idea to do them on a daily basis. Only a small percentage of files change from one day to the next. So why should they be copied and stored in a backup file again and again? That's where incrementals come in handy.

Incremental and Differential Backups

Incremental backups make backup copies only of files that have been modified or created since the last backup session. First a full backup is made; it serves as a reference point. Thereafter, only the files that have been created or changed (since the last full or incremental backup) are backed up. To restore a crashed system, you need to start by restoring the full backup copy. Then every incremental backup made since that full backup was created must be applied in the order they were made.

A **differential backup** is similar, in that it saves data that has changed (or been created) since the last full backup. Each differential backup contains ALL of the differences between the last full backup and the current state of the hard drive. It has the advantage of requiring only two sets of data – the full backup and the latest differential backup – to restore a system to its most recent state. The downside is that more data needs to be backed up in each differential since the last full backup.

Here's a simplified illustration to make that a bit clearer. Let's say you make a full image backup every Sunday morning, and then every day, you create one new document. Daily incremental backups would each contain ONLY that one new file. But the daily differential backups would contain one, then two, then three, and finally six files by the end of the week. The nuances of incremental and differential really aren't so important. Years ago, when hard drives were much slower, storage space was more expensive, and processing power was limited, it made more of a difference. The more important thing is that you actually DO make an image backup on a regular schedule, and supplement it as files are created or updated.

More Backup Buzzwords



A bit of confusion exists over the terms “**image**,” “**clone**,” and “**mirror**.” All three are full backups of a hard drive, but they're each distinct. I've already defined image, which is basically the entire contents of a hard drive rolled up into one large file.

Cloning means making an exact file-for-file copy of one hard drive on another drive. A cloned hard drive will have exactly the same files as the original. Think of it as a snapshot.

The advantage of an image is that it's handy for transporting your entire backup to another location, because only one file needs to be copied. It also enables compression, so you can save space on your backup drive.

Mirroring is an ongoing process; as data is added, deleted or changed on the original disk, it is mirrored to the backup disk. This is the least common of the three backup types, because it requires a lot more resources on a continuous basis.

Synchronization, or “**sync**,” is a two-way street. In a traditional backup, data from the source drive is backed up to a destination drive. In syncing, data is continuously copied from drive to drive so each drive contains exactly the same files and versions of those files as the other. Syncing is most commonly used on a folder basis, for example, when you want all of your music or documents to be available on multiple devices.

Versioning is a feature that some backup programs offer, which allows you to keep multiple backups of frequently updated files. If you have a document or spreadsheet that's updated on a daily basis, and you want to see what it looked like yesterday, last week or last month, versioning is just the ticket. It can also save your bacon if you make accidental changes to a file and then save it, wiping out the original. Think of versioning as the “undo button” you can use *after* you save and close a file.

Whatever sort of backup you do, you will end up with multiple backup copies taken at different points in time. How long you want to keep backup copies is up to you, unless you're in a business whose “records retention” policies are regulated by law.

I've been intentionally vague here about specific tools you can use for backups, imaging, cloning, and other ways to protect yourself from data disasters. Other chapters in this book will go into more specifics about some excellent, free software you can download to get started with your own backup plan.



And finally, is it “backup” or “back up” – which is correct? If you’re a stickler, there’s a difference. The noun “backup” refers to the end result, as in “I made a backup of my hard drive.” The verb “back up” is the action taken, as in “I will back up my hard drive.” But many people (including me) use the terms interchangeably, as in “I will backup my files to a backup drive.” If you’re a linguist or an English teacher, I apologize in advance. 😊



Chapter 28 - Easy Backup Drives

Here's a common question about backups: 'Do I need to back up everything on my hard drive, or just certain user files? Backup software is complicated and I don't understand all the tech terms that are tossed around. Isn't there a backup device that just plugs in and does the job automatically?' Well, yes, actually! Here are some external hard drives that are easy to use...

No More Excuses: Drives for Easy Backups

Backups used to be straightforward. Back in the day, your data was stashed on an internal hard drive, and all you needed to do was copy it to a CD or an external hard drive. (Anyone else remember the XCOPY command?) But now, megabytes have blossomed into gigabytes and terabytes.

Some files are locked can't be backed up by simply copying them. Data is spread out over local drives, removable media, home networks, mobile devices, cloud storage services, and social media. Some backup software wants YOU to decide what needs to get backed up.



Plug and play is good. Automatic backups are great. Software that runs out of the box, without geekspeak and techno-jargon is awesome. Below are several affordable backup drives that manage to keep things easy for users. All but one work on both PC and Mac computers.

If you're backing up your data to a separate partition on your hard drive, you still run the risk of losing everything to a hardware or natural disaster. If you're still procrastinating about doing backups, check out all each of these backup drives and choose one to safeguard your data from loss.



1: [Western Digital's My Book External Drive](#) is a small, quiet, efficient way to backup your files. Equipped with WD Backup software for Windows and Apple Time Machine compatibility for Mac, the My Book desktop hard drive can back up your photos, videos, music and documents. Built-in 256-bit encryption helps keep your content private and safe. The My Book comes with a 3-year limited warranty, and is designed for durability, shock tolerance and long-term reliability. Pricing starts at \$95 for the 4TB model. It's also available in other sizes up to 16TB.

2: [Seagate's Backup Plus](#) family not only makes backups of your PC or Mac hard drive, it also handles backups of photos on Facebook and Flickr. You can restore selected files to social networks, too. It comes in 1 TB to 5TB capacities. USB 3.0 is standard; faster Thunderbolt and FireWire 800 connections are optional. The Seagate Dashboard software lets you choose either scheduled or continuous backups. Both desktop and portable versions are available.

3: [Toshiba's Canvio Portable External Hard Drive](#) is about the size of a wallet. Capacities range up to 4 TB. The pre-loaded software requires no installation, as it runs right from the drive. The menu-driven interface is easily configured, and after the initial configuration, backups proceed automatically whenever the drive is plugged into your PC or Mac. Both USB 2.0 and USB 3.0 data transfers are supported.

4: The 2-TB [LaCie Rugged Secure](#) is perfect if you need to take your data on the go. It's drop, crush, shock, and rain resistant, and self-encrypting. It's compatible with USB-C, USB 3.0, and Thunderbolt 3, and comes with 2-year Seagate Rescue Data Recovery Services.



Chapter 48 - Is Your Hard Drive Going to Crash?

A reader asks: 'Sometimes I hear a clicking sound from my hard drive, but it's only occasionally. Does this mean my hard drive is going to crash soon? Are there any tests I can run to check the health of my hard drive?' Read on to learn the tell-tale signs of impending hard drive doom, and some things you can do now to protect your data...

How Can I Tell If My Hard Drive Is About To Fail?

How long will your hard drive last? Is it giving you subtle signs that a data disaster is looming? How will you know when it's time to buy a new hard drive? Here are some things you can look for.

Your computer's hard drive is its permanent memory, the critical repository of all your important data, the programs and operating system that make a computer "smart". If the hard drive doesn't work, the whole computer is as useful as a brick. Human memories break down gradually, in most cases, giving ample warning that something needs to be fixed. So how can you tell if your hard drive is close to failing and needs fixing or replacement?



The bad news is that hard drives may give NO warning of imminent failures. Like a tire that runs over a nail, a hard drive most often just dies, leaving you stranded suddenly. The sudden burnout of electronic components; a bearing that blows in a second; a "head crash" in which the read/write head touches and scratches the magnetic platter; these sorts of catastrophes usually happen without warning. Fortunately, they are pretty uncommon.

But don't take chances – especially if you don't have a backup plan in place.



The good news is that modern hard drives last a long time. Look on your drive's label or in its technical specs and you will find a value labeled MTBF – Mean Time Between Failures. That's the average (mean) number hours a whole bunch of drives spun at full speed before something broke in each of them. An MTBF of 50,000 hours is the minimum acceptable today; 100,000 hours is not uncommon. There are about 2,000 hours in a typical employee's work-year.

Note that "average" does not mean "guaranteed minimum." An exceptional drive that runs 400,000 hours may be offset in the average calculation by one that burns out after only 5,000 hours – and that early departer could be yours. You just never know. (Did I mention that you should have a backup plan?)

Warning Signs of Hard Drive Failure

If you start getting read/write errors, i.e., "cannot write to disk" or "cannot access file," something is going wrong. It may be the drive's firmware, and downloading the latest firmware update from the manufacturer's site could fix you right up. It may also be corrupted or cross-linked files. Run CHKDSK to find and fix such errors. These are the easiest and cheapest problems to fix.

CHKDSK comes with Windows, and it's pretty good at detecting bad files and physically damaged sectors. It will lock damaged sectors so that the computer will not attempt to write to them. To run CHKDSK, open a command prompt, then type `CHKDSK C: /F /R` then press Enter. This tells CHKDSK to scan for bad sectors, and fix any errors found. Substitute the "C:" with another drive letter if you have multiple drives (or partitions) and want to check those as well. CHKDSK may ask if you want the scan to be done on the next boot (start up) cycle. If so, respond with Y for yes.

There are free utilities out there that run more thorough tests. One of the highly recommended utilities is [Seagate SeaTools for Windows](#). The [Hitachi Drive Fitness Test](#) is another useful tool. Note that you don't have to have a Seagate or Hitachi brand hard drive to use these tools. They'll work with other brands, such as Samsung, Fujitsu, Western Digital, and Maxtor just as well. Another commercial alternative is [Hard Disk Sentinel](#).

Listen to your hard drive. If you hear a clicking sound, especially during startup, that's often a sign of a damaged disk, and impending data doom. Just like you can hear when a car engine is "laboring," you can often hear when a hard drive is working too hard. That means it's wearing out faster, just like an engine that climbs steep hills every day. If you hear vague rattling noises when your hard drive is



accessing data, you should run a disk cleanup and defragmentation right away. The less the read/write head must move to find, read, and write data, the longer it will last.

If noises or errors become frequent, don't hope the problem will go away -- because it won't. Back up all your data and buy a new hard drive. Move everything onto the new drive. Wipe your sensitive data from the old drive using a disk-wiping utility that overwrites every sector so it is very difficult to read what was there. Then toss the old drive; do not keep it around as an "emergency" drive and do not use it as a secondary drive. You wouldn't count on an old car with a blown engine seal in emergencies or even for backup use, would you?

Learn More About Backups!



If you enjoyed these sample chapters of **Everything You Need to Know About BACKUPS**, please [CLICK HERE](#) to find out how you can get the entire ebook, which contains 79 chapters. There are some pretty awesome bonus materials that come with the ebook, too!