(Approx. 1916 words)

Backup Tools and ProceduresBy Tom Burt, Vice President
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It's been a few years since I've written about tools and procedures for backing up your computer. With the growing popularity of smartphones and tablets, the need for backup has expanded to include those devices and traditional Windows, Macintosh, and Linux PCs. I can't stress enough how important it is to make regular backup copies of your data files and of your computer's entire hard drive. The backup landscape has changed somewhat, so it seemed a good time for an update.

## What is Backing Up?

Backing up means accurately copying some or all of the data and software stored on your computer's storage drive. The copy is commonly stored on some type of external storage device that is not generally connected to your computer. The external device may be a USB hard drive or flash drive, a removable rack-mount hard drive, a folder or partition on another computer on your in-house network, or a server elsewhere on the Internet such as Dropbox, MS OneDrive, or Google Drive. A personal backup solution may include some or all of the above.

## Why Back Up?

The reason to make backups is that (putting it politely) ***BAD STUFF HAPPENS!***Computer equipment is highly reliable and may run for years without failing, but sooner or later, storage devices fail. More commonly, accidents (drops and spills, turning off the PC's power, power failures and power surges, and so forth) happen, causing a storage device or other device component to fail. A vast array of malicious software waits for any opportunity to attack, damage, or lock up saved data. There's also a fundamental human error – accidentally deleting a file or a folder.

Without a safe backup copy, data saved on your computer may be irretrievably lost. For example, consider digital photos, videos, music, and financial / tax records. Also, if you had to start over with a new, blank hard drive, it would be relatively easy to reinstall Windows, Linux, or MacOS, but what about all the other programs, settings, and all your data?

## Full Disk Backup – Cloning and Imaging

A **clone** of a hard drive is a complete copy to another hard drive. All information needed to boot and run the computer and all the programs, settings, and data are written on the backup hard drive. A clone fills up all the backup hard drive; only ONE clone can be written to the backup drive. To **restore** after the computer's internal hard drive has failed or been corrupted, one can either clone from the backup drive to the computer's (possibly new) internal drive or remove the failed drive and install the backup drive in its place. Cloning back should be the first choice on a laptop or all-in-one computer, provided the internal drive hasn't failed. Removing and replacing a laptop's internal drive is a challenging task.

An **Image** of a hard drive is a complete copy written to a single compressed file on another storage device. The compressed image file doesn't typically use as much space as the original data; only the actual space is backed up. Keeping several image files on a single external storage device is usually possible. As with a clone, the image file contains all the information needed to boot and run the PC, along with all the programs and data. However, the image file is not itself bootable.

A bootable recovery disk (CD or DVD) or flash drive is required to restore either a clone or an image file. All the primary backup tools include a tool to create bootable recovery media.

## Popular Full Disk Backup Tools for Desktop Computers

There are several well-known software tools for backing up the hard drives of desktop PCs and Macs.

**Acronis Cyber Protect Home (2023)**

* [**https://www.acronis.com/en-us/**](https://www.acronis.com/en-us/) **or** [**https://ugr7.com/**](https://ugr7.com/)
* Integrated suite of backup, anti-virus, and ransomware protection.
* Excellent for backing up entire hard drives or partitions.
* Makes both "clones" and "images."
* Can "mount" a backup image as a logical drive.
* Can make bootable "Rescue Media" for both backup and restore.
* It can also back up individual files and folders.
* Single PC essential subscription lists at $50 / year, family pack of 3 about $80 / year
There are premium offerings, including cloud storage.
User Group Relations (Gene Barlow) prices are 50% lower. <https://ugr7.com/>

**CASPER by Future Systems Software**

* [**https://www.fssdev.com/products/casper/**](https://www.fssdev.com/products/casper/)
* Makes "images".
* Features bootable images.
* The single system price is about $60; a family pack of 5 for $80.
* Has a 30-day free trial.

**Macrium Reflect 8 Home**

* <https://www.macrium.com/products/home>
* The free version has been discontinued but continues to work on Windows 10 and 11.; you can subscribe to the "Home" edition for an annual fee of $49.99 or buy a one-year license for $70 (no support after the first year). They offer a 30-day free trial.
* Can back up entire hard drive or partitions.
* Makes both "clones" or "images."
* Can "mount" a backup image as a logical drive.
* Can make bootable "Rescue Media" for both backup and restore.

**EaseUS ToDo Backup FREE**

* [**https://www.easeus.com/backup-software/tb-free.html**](https://www.easeus.com/backup-software/tb-free.html)
* See feature comparison,
* Makes "images". You can "boot" from an image.
* You can upgrade to a fuller-featured "Home" edition for $39.99 annually, one year free upgrade, or a "Lifetime Upgrades" edition for $79.95.

I tried using EaseUS ToDo Backup to back up my C: drive to a USB 3 external 7200 RPM hard drive. It required 52 min to back up 300 GB of data. The resultant image size was 184.5 GB. A substantial number of MP4 files on the C: drive had already been compressed.

## Windows 11 Backup (Windows 7) FREE (built-in to Windows 10 and 11)

* This backup tool is reached via:
Control Panel > All Control Panel Items > Backup and Restore (Windows 7)
* You can use it to back up key library folders or "Create a system image." Once there, you can add additional drives or partitions to the basic C: drive partition set.
* I set it up and let it run to make an image of my C: drive (300 GB of data). It ran for 92 minutes. The final image file size was 300 GB; there was NO compression.

Macrium Reflect Free Edition has been my favorite of the above offerings. It's fast, easy to use, and does everything I need for whole disk backup. And the price was right! However, I'm presently evaluating free and paid alternatives. Here's a link to a good article listing some free backup software tools:

<https://www.techradar.com/best/best-free-backup-software>. I'm disenchanted with the built-in Windows 7 backup. It's too slow, and the images aren't compressed. I'm also disenchanted that Acronis and Macrium will use an annual subscription model. EaseUS ToDo Backup Free edition looks promising as a replacement for the Macrium Reflect 8 Free edition.

## File Backup Tools

Full disk backups are great, but users don't typically run them daily because they take time, and the backup drive has to be retrieved and connected to the computer. This creates a risk that data files that change may not be accurately reflected in the backup. Consider your saved email and contacts, financial and accounting files, and other documents and spreadsheets you may be working on.

**Windows File History or MacOS Time Machine**

One approach is to use an automated file backup tool that scans a designated set of folders at some specified time interval (say every hour). It makes a copy of any new or changed files to a backup storage device such as a flash drive, external hard drive, or a shared folder on another computer. I use File History, checking once an hour, to supplement full disk backups for specific key file folders.

**Windows File Explorer or MacOS File Manager / Finder**

For simple one-shot backups, you can still use the built-in file manager programs to select a set of files and copy them to an external flash drive, hard drive, or network-shared folder.

## Cloud Backup Tools

There are many free and paid cloud backup services. Most of these include an automatic sync tool that copies files from your computer to your private space on the cloud server. Here are some of the free ones:

**Google Cloud (Google Drive) - *FREE***

* [**https://drive.google.com/drive/u/0/my-drive**](https://drive.google.com/drive/u/0/my-drive)
* Requires a Google / Gmail account
* 15-17 GB of free cloud storage
* **Install Google Backup and Sync** app (Windows)
* Use Settings to specify a set of folders to be monitored and backed up to the Google Cloud whenever a change is detected (very similar to Windows File History)

**Microsoft OneDrive - FREE**

* [**https://onedrive.live.com/about/en-us/**](https://onedrive.live.com/about/en-us/)
* Requires a Microsoft Account
* 5 GB free (more if you've had a Microsoft ID for a long time). If you're subscribed to Microsoft 365 (the Office suite), you get 1 TB per license user, up to 6 TB in total.
* Syncs from a OneDrive folder on your PC or device to your OneDrive cloud storage.

**Apple iCloud – FREE**

* [**www.apple.com/icloud**](http://www.apple.com/icloud)
* Requires an Apple ID (Account)
* 5 GB free, can add more space for a fee
* Built into all Apple devices, can install an App for Windows
* Syncs across all your devices

## What About My Smart Phone or Tablet?

Many computer users now rely on a mobile device as their primary computer for communication, news, and entertainment, taking photos and video clips, and recording sound. What are the options for backing up mobile devices?

**Android Phones and Tablets**

If you have a Google account and have configured your device to link to it, you get quite a lot of automatic backup of files to your Google Drive cloud space. You will want to be connected to a WiFi router when this happens, or your Android device may use up a lot of your monthly data allotment.

You can also connect your Android device via a USB cable to your desktop computer and use the Windows File Manager or MacOS Finder to copy files from the mobile device to a folder on the desktop computer. You can also copy files from the desktop computer to the Android mobile device.

To fully back up all your Android device's data, you can purchase and install third-party backup Apps. Try a web search for **Android Full Backup** to see what's available.

## Apple Phones and Tablets

If you have an Apple ID, all your devices, including iPhone, iPad, Mac, and Apple Watch, already have built-in iCloud support and will back up data files to your iCloud private storage space on Apple's servers. If you have several Apple devices, a concern is using up your free 5GB allocation; you may have to buy extra space to cover backups from all your devices.

You can connect your iPhone or iPad to your PC or Mac via a USB cable and then use Apple's iTunes program to synchronize various file types between your mobile device and your desktop computer. This isn't quite as general as what Android offers, but it takes care of many file types. iTunes also provides an easy way to fully back up all the data on your Apple mobile device into a file on your desktop computer.

Having the iCloud backup enabled on your mobile device is a good idea. This takes care of frequently changing files. Use the iTunes full backup occasionally to ensure ALL your devices' files are backed up.

With these backups in place, if your phone or tablet is damaged, goes up in flames, or gets lost, you can replace the phone or tablet with relative ease, restore all your saved data files, and be back in business.