The Best Ways to Back Up Your Data

Nobody likes backing up, but one day, it'll save your bacon. Here are the most efficient methods of protecting your stuff, no matter what your situation. »

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Your hard drive might crash.

Thieves might steal your laptop at a café. You might realize on Friday that you need the now-departed Wednesday version of an important document that you altered on Thursday.

At times like these, having a secure, up-to-date backup of your hard drive can be a lifesaver. Here are seven practical strategies, including using USB storage, backing up via the Internet or through your local network, backing up Windows itself, and preserving huge media files like songs and videos.

What to Back Up

Your hard drive may contain hundreds of thousands of files. Many of them should be backed up every day, others only occasionally, and still others—including temp files, the hibernation file (hiberfil.sys), and your browser cache—not at all. Let's look at the different kinds of files individually.

YOUR DOCUMENTS: You should back up your word processing files, spreadsheets, and similar documents every day. Any basic backup program can perform incremental backups, in which the program copies only the files that have changed since the most recent previous backup. (Good backup programs also perform versioning; that is, they keep several iterations of the same file on hand and enable you to choose which version to restore.)

YOUR RECENT DOCUMENTS: If your backup program can handle incremental backups, you don't have to worry about recent documents as separate entities. But if you often work on these files on other people's computers, you may want to carry a copy of them on a flash drive or store a copy of them online.

APPLICATION DATA: Apps create and maintain data files such as e-mail messages, browser favorites, calendar entries, and contacts that require daily backing up. Most programs store them in a hidden folder inside your user folder (in XP, C:\Documents and Settings*your name*\Application Data; in Vista, C:\Users*your name*\AppData). Also, in XP, Microsoft stores Outlook and Outlook Express data in C:\Documents and Settings*your name*\Local Settings\

Application Data). Fortunately, any well-designed backup program intended for everyday, nonexpert users (as opposed to IT departments) knows where to look for Outlook data.

MEDIA: If your backup medium is sufficiently roomy and fast, you can back up your photo, music, and video files every day. But these large files may require a separate backup strategy.

HEIRLOOMS: Files that you want to keep forever—family photos, the special anniversary card you made for your parents, and so on—need backing up and extra protection.

YOUR SYSTEM: You can always reinstall Windows and your apps, if you have the original discs or can download the programs. But if Windows becomes unusable or your hard drive crashes, switching to a system backup (also called a *disaster recovery backup*) that you create a couple of times a year can get your machine up and running smoothly without much effort.

You can separate and store various types of data on different hard drives (or partitions—see find.pcworld.com/63512 and find.pcworld.com/63513). But Windows doesn't make the procedure easy, and the strategies I discuss don't require this separation.

Strategy 1 Employ the Easiest Backup of All

- **GOOD FOR:** Your documents (including recent documents), application data, and media files, and the system as a whole
- **FREQUENCY:** Daily
- **RECOVERY FEATURES:** Versioning and full-system restore
- **AUTOMATIC OFF-SITE STORAGE:** No
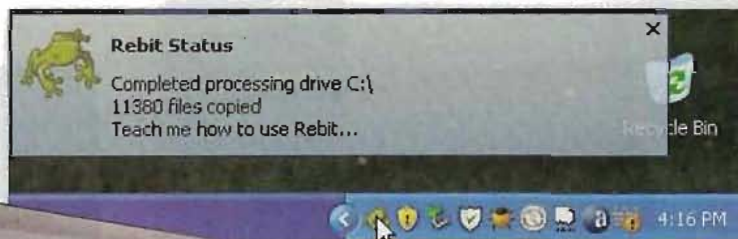
Strategy 1 A Rebit external hard drive—or Rebit software loaded on any external hard drive—makes recovery easy with automated daily backups.

You buy a USB drive, you plug it into your PC, and the backup starts. You don't have to install software on your hard drive, or figure out and configure backup sets, or even tell the program to launch. This fully automated backup knows what needs backing up and what doesn't. (Okay, you do have to remember to plug in the drive. And it's true that you could get the same result by buy-

ing software and installing it on an existing hard drive.)

It's the latest in backup software; and if done properly, it can serve as the ultimate no-brain backup.

But that's a very big *if*. Some plug-in-and-back-up setups have major flaws. For instance, even though the Seagate Replica drive claims to back up all partitions on a drive, *PC World* couldn't get that feature to work during our review.

Other automated backup drives have serious limitations. SanDisk put a backup button and a very good data-backup program (one that can back up and restore files, but not Windows) on its Ultra Backup line of portable drives (find. pcworld.com/63511). However, because the Ultra Backup line consists of flash drives, you don't get many gigabytes for the price. SanDisk's 64GB Ultra Backup sells for $160—the same amount that you'd pay for a 500GB HP SimpleSave hard drive, and roughly $20 more than you'd pay for a 320GB Clickfree portable backup hard drive (find.pcworld.com/63514). (On the other hand, the Clickfree software can't perform versioning, a serious shortcoming.)

But Rebit (www.rebit.com) offers the easiest backup of all. You don't have to decide which files and folders to back up. The first time you plug in the drive, it backs up everything on your regular hard drive—data, applications, even Windows.

Because Rebit backs up everything, you can recover your entire system after a hard-drive crash or other disaster simply by booting from a special CD (you can download the .iso file from Rebit's Web site when the time comes).

Rebit makes recovering a specific file easy. Right-click a file in Windows Explorer, select *My Rebit*, and pick a version of the file from your backup. Or double-click the Rebit system tray icon for the Windows Explorer–like Rebit Browser.

Rebit is designed for real-time, around-the-clock backup. The program backs up a file as soon as you change it, so you never have to think about backing up. Of course, constantly creating backups will slow the computer noticeably. And keeping backup media plugged into your PC 24/7 puts it at risk of power surges, malware, and thieves because your backup is as exposed to those threats as your primary system is.

Fortunately, you don't have to keep the Rebit drive plugged in. If you can remember to plug it in once a day, it will back up everything that has changed since you last had it attached.

Rebit portable and desktop drives are available in various storage capacities. The company recommends buying a drive that's at least 25 percent larger than the one you want to back up. But don't get too big a drive: You can't use a drive running Rebit for any other purpose, such as extra storage. Other simple backup drives, like HP's SimpleSave, do allow

Strategy 2 The MozyHome online service guarantees you access to a daily system backup stored in a safely remote location for a low monthly fee.
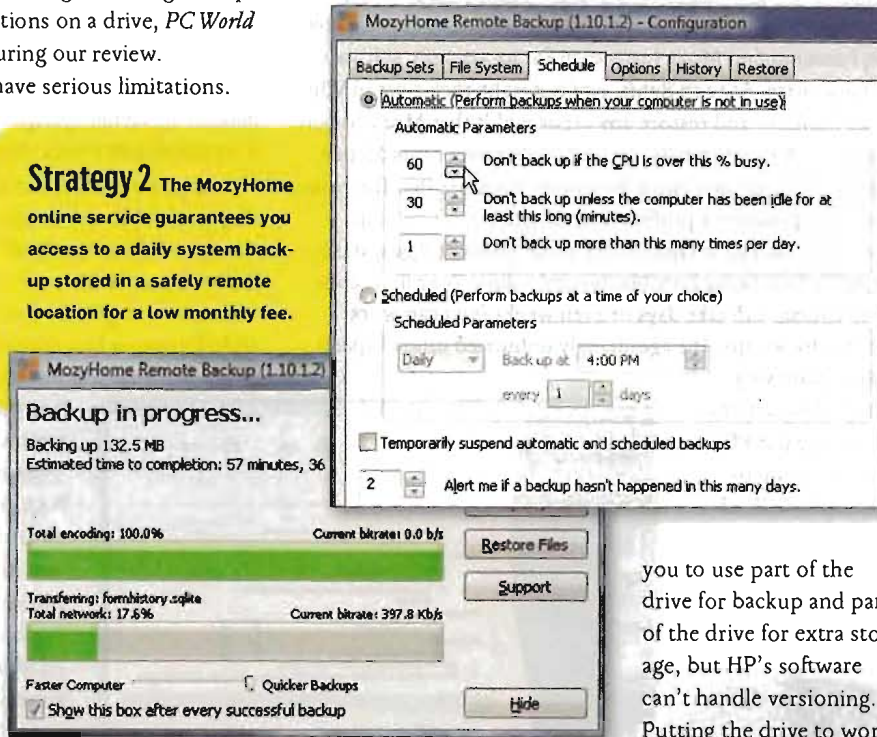
you to use part of the drive for backup and part of the drive for extra storage, but HP's software can't handle versioning. Putting the drive to work for multiple uses raises other issues of data safety: The data simply being stored on the drive won't be backed up, and the files that are backups of content on your primary drive must share space with actively used data that could become infected on its own.

If you already have an external drive of the right size, you can buy the Rebit software by itself for $50 (though I've seen it for less than $30) and install it on your own drive.

Strategy 2 Automate Your Backup, and Store It at a Safe Distance

- **GOOD FOR:** Your documents (including your recent documents), and application data
- **FREQUENCY:** Daily
- **RECOVERY FEATURES:** Versioning but no full-system restore
- **AUTOMATIC OFF-SITE STORAGE:** Yes

A backup continuously connected to your computer is vulnerable to the same dangers that might threaten your PC, as is a backup kept in the same building as the PC. But if your system rarely lacks a fast Internet connection, an online backup service can perform completely automated backups that it saves to a server miles from your PC. You don't have to purchase hardware or plug anything new into your computer, »

though you must install software. This arrangement gives you access to your data from any Internet-enabled computer.

Backing up Windows and applications online is impractical, however, so online services don't offer that option.

A number of online backup services, such as Comodo (find. pcworld.com/63516) and SpiderOak (spideroak.com), are available. But I recommend Mozy (mozy.com) for its versatile software and low price. As with Rebit, you can right-click a file in Windows Explorer and restore any version of it that Mozy has on hand. The MozyHome (mozy.com/home) service costs $5 per month per computer, with no storage limit per PC. The company also provides a professional service (mozy.com/pro).

Internet backup services share some inherent flaws, starting with their being horribly, horribly slow. Your first, complete backup can take days or even weeks (you can work while it backs up). The agonizingly unhurried upload speed may explain why Mozy offers unlimited storage per PC. Anyone trying to back up 500GB of video over the Internet would soon give up. In general, if you
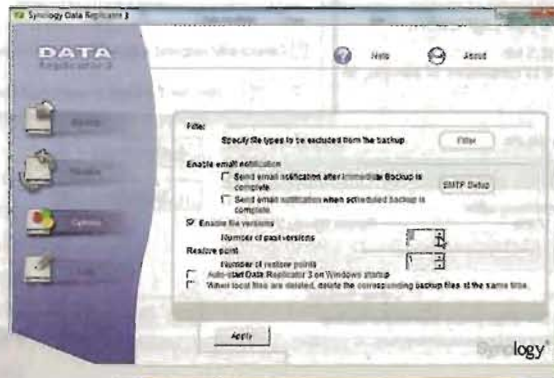
Strategies 3 & 4 A network-attached storage drive provides the best backup method for local systems that share a network, as well as for large multimedia files.

use online backup, consider finding another medium for your large media files (see Strategy 4 for advice). But I do use the Internet to back up photos.

For similar reasons, I don't recommend online backup services for people who work with music or video files. If you're editing a movie, for example, the daily backups will be much too large for a once-a-day upload to manage.

Another issue: Can you trust an online company for long-term data storage? I sure wouldn't. See "Will Your Data Disappear When Your Online Storage Site Shuts Down?" (find. pcworld.com/63517) for some nightmare scenarios.

Also consider cost. Though $5 per month per machine may sound cheap, with multiple systems the charges add up.

Strategy 3 Back Up the Whole Family on Your Home Network

• **GOOD FOR:** Your documents (including your recent documents), application data, and media files
• **FREQUENCY:** Daily
• **RECOVERY FEATURES:** Versioning (which is switched off by default) but no full-system restore
• **AUTOMATIC OFF-SITE STORAGE:** No

Getting yourself in the backup habit is hard enough. Getting your family on board is nearly impossible. So why not set up a single centralized backup for everyone in the group?

If you connect several computers to one another and to the Internet through a router, buy a network-attached storage (NAS) drive—a box containing one or more hard drives that you plug into your router via ethernet. Anyone on the network who has the right permission can access those hard drives.

Besides performing large-scale backups, NAS drives can store photo, video, and music files, and you can access that content even from outside your network. (If you store media files on a NAS drive, you must back those up; see Strategies 4 and 7.) Many NAS drives also work as print servers, giving connected PCs easy access to any network printer.

Most NAS drives come with software for backing up. Every PC on the network has instant access to a huge drive that can hold vast video files or anything else. And the drive is always on and always attached, so backups can run automatically.

I recommend the Synology DS209j (find. pcworld.com/63530) for home use because of its powerful yet easy-to-use data-backup program. Synology sells the DS209j with or without drives; an empty unit (that you add your own drives to) costs about $215. A DS209j with two preinstalled 500GB drives configured as a RAID is about $420. The two-bay DS209j supports RAID 0 (for striping data across two drives) and RAID 1 (for mirroring, preferred for data preservation) configurations.

Higher-end NAS devices—for example, the Seagate Black Armor NAS 440, the Synology DS509, and the Western Digital ShareSpace—have four drive bays, possess even greater storage capacities, and support RAID 5 for disk parity. These devices scatter and replicate data across the four disks in such a way that, if a drive fails, the data on that drive can be rebuilt based on the data replicated elsewhere.

The device is easy to set up, but if you are buying your own hard drive, you should check Synology's Web site (find.pcworld. com/63518) to ensure compatibility. Once the hardware is up
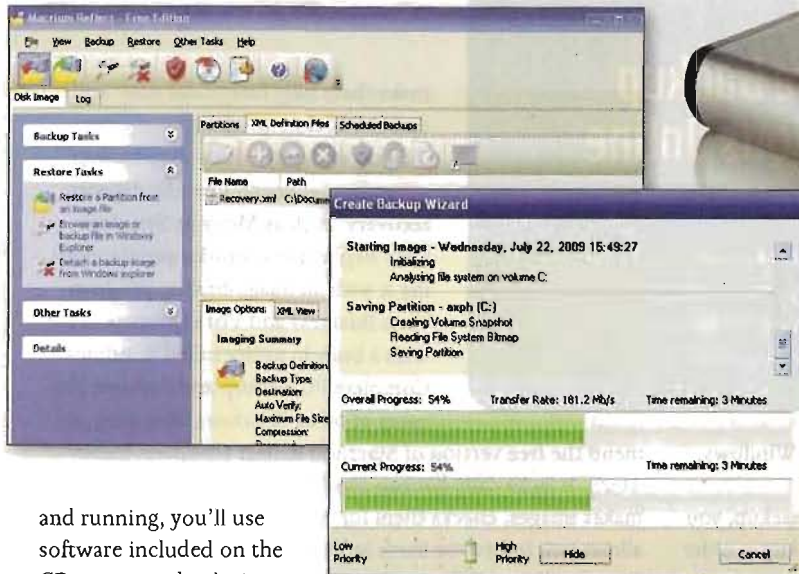
and running, you'll use software included on the CD to set up the device for your users, assigning a separate safe backup location to each. You must install the backup program, Synology Data Replicator, on every system.

On its own, Data Replicator is one of the easiest, simplest, and most sensibly designed data-backup programs I've ever worked with. Its what-to-back-up options, though few, are the right ones and are easy to understand. The software backs up files by copying them, so you don't need Data Replicator to recover a file (using it will make the recovery easier, however).

The scheduler is easy to set up and doesn't overwhelm you with options. It won't work properly if the backup drive is unavailable, but that's no problem with a NAS drive. You can use this program with a local—versus network—external drive, too, but I wouldn't try scheduling with such a setup.

By default, Data Replicator keeps only the latest version of each file; the Options box lets you turn on versioning and set how many versions to keep. A NAS drive stays on all the time, but it uses considerably less energy than a computer, so if you currently keep a PC on continuously for network access, NAS is a relatively green option. According to Synology, the DS209j pulls 36 watts when in use and 15 watts when idle.

Strategy 4 Save Your Entertainment

- GOOD FOR: Photos, music, and video files
- FREQUENCY: Daily
- RECOVERY FEATURES: No versioning or full-system restore
- AUTOMATIC OFF-SITE STORAGE: No

How many gigabytes of multimedia files do you have? If you back up to an external hard drive or a NAS drive, large media files don't cause problems. But if your backup media has limited capacity (like a flash drive) or is slow to upload (like the Internet), you may want to find another way to protect your folders of digital pictures, music, and video.

The best approach for you depends on how often your files change. If you edit them regularly, they are current docu-

ments and should be part of your daily backup routine. In that case, go with NAS backup (see Strategy 3).

Things are simpler when you're dealing with files consisting of photos and videos that seldom change, or of music bought online. (In the case of music ripped from CDs, the original CD functions as a reliable backup version.) Incremental backups and versioning aren't issues here. You just need to make sure that the files exist in more than one place.

How you use these files protects you to some extent. You likely copy your music to a portable media player that may permit you to copy the files back. (The iPod doesn't allow this, but if you enter 'transfer from iPod to computer' into any search engine, you'll find plenty of workarounds.) Posting your pictures on a photo-sharing site such as Flickr creates a temporary backup; but note the site's rules governing capacity, retention of original full-resolution images, and export of full-resolution images from the site back to your PC.

If you don't back up your music, photos, and videos daily, you need to copy them to something other than your internal hard drive. DVD-Rs and DVD+Rs cost little and work well, but an external hard drive is faster and holds everything without swapping. Either option works, so decide based on how much data you need to safeguard and how patient you are.

Strategy 5 Prepare for the Big Disaster

- GOOD FOR: The system as a whole
- FREQUENCY: Once or twice a year
- RECOVERY FEATURES: Full-system restore but no versioning
- AUTOMATIC OFF-SITE STORAGE: No

In a worst-case scenario, you lose a lot more than just your data. If your hard drive crashes and has to be replaced, or if Windows becomes corrupted and unusable, you'll have to start from square one—reinstalling Windows, removing the garbage that came bundled with your PC, reinstalling your »

More Backup Options Online

REBIT IS AMONG several hard drives that integrate software to simplify backing up. We examine the alternatives, including models from CMS Products, HP, Seagate, and Storage Appliance, at find.pcworld.com/63558.

programs, reinstalling your drivers, reconfiguring Windows, and restoring your data from a recent backup.

But if you have a system—or disaster recovery—backup, you can restore everything in one go. If the system backup is older than your data backup, you'll still have to restore your data, but that's a lot easier than setting up everything from scratch.

If your regular, daily backup program offers disaster recovery (as Rebit does), you have a system backup in place already. But Windows tends to get corrupted very slowly, so it's a good idea to create and set aside a permanent system backup when Windows is healthy. Rebit doesn't offer this feature.

Unfortunately, backing up Windows and your applications isn't as easy as backing up data. The only reliable way to proceed is to back up the entire drive. When disaster strikes, you'll need to restore the drive in its entirety.

You have two ways to back up an entire drive so that you can restore even Windows: cloning and imaging. Cloning involves transferring an exact copy of your main hard drive to another drive. To restore Windows, you can either clone in the other direction or physically swap the drives. CMS Bounce-Back Ultimate (find.pcworld.com/63515), also included with CMS ABS Plus hard-disk drives, is a popular cloning product.

Imaging involves copying a drive's structure and contents into a compressed, but still very large, file on another drive. To restore the image to its full size, you must use the same image-backup software that you created it with.

I prefer imaging because I can save multiple image backups onto one drive, enabling me to protect multiple PCs for less money or to keep more restore options for a single PC. Imaging also lets me back up to DVDs, saving even more money—though it does entail swapping discs, quite possibly for hours on end.

Aside from Rebit, the major commercial imaging programs available today—Ghost (find. pcworld.com/63519), Macrium Reflect (find.pcworld.com/63522), and True Image (find.pcworld.com/63520)—all provide incremental backups and versioning, and these features

Strategy 6
For archiving heirloom files, use special discs such as MAM-A's Archive Gold or Delkin's Archival Gold (right).

make them fully functional data- and disaster-backup programs.

If you're happy with a data-backup program that doesn't handle disaster recovery, such as Mozy or Synology Data Replicator, consider supplementing it with an image-backup program. Vista Business and Vista Ultimate come with a built-in utility called Windows Complete PC Backup and Restore. For users of other Windows OSs, I recommend the free version of Macrium Reflect (find.pcworld.com/63521). It lacks daily-backup capabilities, but it's easy to use, makes images, checks them for errors, restores them, and allows you to browse them in Windows Explorer for selective restores. You can also use it to create a bootable CD for recovering your hard drive even if Windows won't boot.

The best time to make an image backup is immediately after you set up a new PC. The second best time is today—if you are satisfied with the way Windows is currently running. Retain your first backup for as long as you keep that PC; it's a better recovery tool than the one that came with your PC.

Making additional image backups every so often—after installing a big application, say, or a service pack upgrade—is wise. Or make one every three to six months. You don't need to keep them all; just the first one and the last one or two.

Strategy 6 Store Items for the Long Haul

- **GOOD FOR:** Heirlooms
- **FREQUENCY:** Once a year
- **RECOVERY FEATURES:** No versioning or full-system restore
- **AUTOMATIC OFF-SITE STORAGE:** No

With proper archiving, your photos, videos, and other digital memorabilia could last a long time. Archive your valuable files about once a year, saving them to long-lasting media manually. Make multiple copies of the backups, and check to confirm that you can read them on another computer. Keep a copy for yourself and send others to relatives. Consider putting one in a safe deposit box.

Obviously, since properly testing an archiving strategy would take at least 50 years, and my deadline is much shorter, I can't guarantee that any of my suggestions will work. Still, a few wise choices can improve your odds of success.

Archival media should satisfy the following criteria.

The media must be unerasable: According to the law of data entropy, whatever can be erased, eventually will be

erased. (But beware of the corollary to that unalterable law, pointed out by PCWorld.com community member JimH443: "That which cannot be erased will be misplaced.")

Media and mechanicals must be separate: Hard drives hold a vast amount of data—up to 2TB on a single drive—but like other mechanical devices with moving parts, they can break. A well-made, properly stored CD or DVD (see find.pcworld.com/63524 for more on how to store discs) frees you from having to worry about mechanical-component failure. If you expect moving parts to last for decades, you'll be disappointed.

The media must be inexpensive: The cheaper copies are, the more likely you are to make multiple copies, which in turn will increase the odds that at least some will survive.

The media must be ubiquitous: If everyone uses the medium now, chances are better that someone will be able to use it in the 22nd century—or at least later in this century.

The media must be robust: It needs to survive for decades.

CD-Rs, DVD-Rs, and DVD+Rs meet the first four criteria, but—despite various claims of longevity based on laboratory aging—no one knows how robust they'll be in the long run. Representatives of leading data-recovery companies DriveSavers and Ontrack told me that they occasionally see optical discs with symptoms possibly related to age and poor manufacture, but that it isn't a common problem.

Your best bets among optical discs are relatively expensive archival discs such as Delkin's Archival Gold (find.pcworld.com/63526), Kodak's Gold Preservation (find.pcworld.com/63523), and MAM-A's Archive Gold (find.pcworld.com/63525). The makers of these discs claim to use higher standards for them than for run-of-the-mill data discs; and all use gold rather than silver in the disc's manufacture to increase longevity (see find.pcworld.com/63528). But archiving concerns extend to other issues such as whether the file format will be readable in 50 or 100 years. Your chances are better if you stick to popular formats such as .jpg, .mp3, .doc (but not .docx), .txt, .html, and .pdf. And the more formats you can save the file in, the better.

You should store the discs in jewel cases, upright, away from direct sunlight, humidity, and extreme temperatures.

Another possibility is to burn a copy to Blu-ray Disc. Blu-ray doesn't yet enjoy the same reach that DVD and CD have, and it remains pricey (about $25 for a 50GB disc). But Blu-ray far exceeds DVD and CD in capacity, and the format is gaining acceptance rapidly. Only Buffalo, LG, and Pioneer market Blu-ray burners today, but LG's NAS NB41 (find.pcworld.com/63527) packs four drive bays and a Blu-ray Disc burner.

With a little luck, your great-grandchildren will enjoy your mementos from the early days of digital photography.

Strategy 7 Back Up the Backup

- **GOOD FOR:** Your documents (including recent documents), application data, media files, and heirlooms, and the system as a whole
- **FREQUENCY:** Daily
- **RECOVERY FEATURES:** Not applicable, since this is just a copy
- **AUTOMATIC OFF-SITE STORAGE:** No

You should never have only one copy of anything, including your backup. Multiple backups add to your protection.

If you follow more than one of the strategies above, you'll have multiple backups. For instance, the image backup you create to protect Windows and your applications adds supplemental data protection. I endorse having more than one image backup, as well. Archiving your digital heirlooms introduces additional copies of files that should also be part of your regular, daily backup routine.

A few other options deserve mention.

A NAS drive such as the Synology DS209j permits you to back up your backup. You can plug an external USB drive into the DS209j and back everything up on it. Taking this step is essential if you use the NAS drive to store shared media that is unavailable on your local PCs, but it's a good thing to do even if you're simply backing up the backup.

You can use different backup programs and media to cover yourself in interchangeable ways. For instance, you might back up to an external hard drive with one program one day, and over the Internet via a service like Mozy the next.

You should protect immediately important files (as opposed to long-term important ones) as you go, by e-mailing them to yourself—preferably to an account that you access via the Web—as you work. For instance, I just now used Microsoft Word's Mail To feature to e-mail this article to my Gmail account. It will stay on Google's server until I delete it.

Get in the backup habit, and you'll be glad you did. Avoid backing up, and you'll eventually regret it. ●

Strategy 7 For backing up your backups daily, an external NAS drive such as these from Seagate (below left) and Western Digital works quite well.