

# Keeping Your Data Safe: File and PC Backup

## In This paper

- ✓ Backing up and restoring data
- ✓ Utilizing Windows Backup
- ✓ Creating and restoring data backups
- ✓ Managing automatic backups with Windows Backup
- ✓ Backing up an entire PC using system images
- ✓ Restoring an entire PC using the Windows Recovery Environment
- ✓ Using the Previous Versions feature to recover old versions of data files

**Eiffel Net**

With Windows 7, Microsoft expands on the pervasive and reliable backup and restore solutions for both data files and the entire computer that it introduced in Windows Vista. You can use Windows Backup to copy your important files and folders to a safe location or create a system image that can be used later to restore a broken PC. There's even a cool new feature that debuted first in Windows Server that helps you recover old versions of data files if you save the wrong version. Windows 7 has everything you need to make sure your data is safe. You may never need to turn to a third-party backup and restore utility again.



### Secret

That's right: years before Apple shipped a feature called Time Machine in Mac OS X 10.5 that it promoted with a "go back in time" marketing mantra, Microsoft had this feature in Windows Server and then later in Windows Vista first—and you thought only Microsoft copied features from other operating systems.

## Different Backups, Different Goals

Now that you've moved to digital storage for your most valuable data, it's time to start thinking about creating backups, copies of your original data that are ideally kept elsewhere for safekeeping. Many people don't even consider backing up until the unthinkable happens: a hard drive breaks down, literally taking all the data with it, or fire or theft occurs. Whatever the situation, you should be prepared for the worst before it happens. This is all the more important because many people now manage both their professional and private lives on their PCs. It's one thing to lose this week's meeting agenda, but quite another when a hard-drive crash destroys the only copies you had of five years' worth of digital photos. Those are memories, for crying out loud.

Given the almost complete lack of decent backup solutions in Windows XP and previous Windows versions, you may be surprised to discover that Windows 7 (like Windows Vista before it) offers an almost mind-boggling array of backup and restore solutions, each aimed at a different need. Best of all, Windows 7 also includes friendly front ends to all these capabilities, so that even the most nontechnical user can get up to speed quickly. Before getting into that, however, consider the various types of data safety facilities that Windows 7 supports.

## Data Backup

If you think of your Documents library as the center of your data universe, and keep an elaborate series of folders and files there and in other libraries, then you'll understand the necessity of backing up these crucial files on a regular basis. To this end, Windows 7 supports both automatic and manual data backup options, enabling you to choose which files to back up and when. You can then restore your backups at any time to recover previous versions of documents, or to replace a file you may have accidentally deleted.

## System Image

There's nothing worse than discovering that you need to reinstall Windows for some reason. Not only do you have to take the time and make the effort to reinstall the operating system again, you also have to ensure that you have drivers for all your hardware, find and reinstall all the applications you use regularly, reload all your personal data, and reconfigure all of the system's options so that it's exactly the way you used to have it. Rather than go through this rigmarole, you can use a Windows 7 feature called System Image Backup to create what is called a system image or snapshot. This image—which is essentially a huge backup file—contains the entire contents of your PC as it existed the day you created the image. If you need to recover your entire PC, you can simply restore the system image and get right back to work.

## File Recovery

Windows 7 offers the following two excellent ways to recover lost files:

- **Previous Versions:** If you want to recover an older version of a document, perhaps because you made an editing error and then saved it, you can use this feature to access previous versions of the file.
- **System Restore:** If you make a change to your system that renders the PC unstable, such as installing a bad driver, you can use this feature to return to a previous state in time, or restore point. When you reboot, none of your data has been changed, but the rest of your system configuration returns to that of the day and time the restore point was first made.

Add all that up, and what you have is the makings of a full-featured data recovery software suite. Amazingly, Microsoft provides all of that functionality in Windows 7, for free.



### Secret

Okay, there's gotta be a catch, right? Actually, there is: Microsoft does not offer two kinds of backup that would be useful to have as part of Windows 7. The first is PC-to-PC data synchronization, or what we might call peer-to-peer (P2P) synchronization. With a such a solution you could, among other things, ensure that all of the files in your home PC's Documents library were always duplicated, automatically, with the Documents library on your laptop; anytime you made a change in either place, it would be replicated in the other. As it turns out, Microsoft does make such a tool, two in fact. They're called Windows Live Sync and Live Mesh, respectively.

The second type of backup is online backup, where you back up files to the Internet cloud. Microsoft does have two online storage solutions, Windows Live SkyDrive, which is aimed at general online storage needs, and Office Live Workspace, which is really about document collaboration. However, neither offers any automated way, perhaps through Windows Backup, to back up files or system images from your PC to the Internet. Maybe in Windows 8.

### Available Backup Capabilities in Various Windows 7 Version

As explained in Chapter 1, different product editions of Windows 7 include support for different features. These differences can be dramatic in some cases—digital media feature support is an obvious example—and subtle in others. In Windows Vista, lower-end versions lacked some of the system’s best data and PC reliability features. Fortunately, this is no longer the case in Windows 7: now, all Windows 7 product editions get Windows Backup (with file and system image backup capabilities), Previous Versions, and System Restore. The only exception is network-based backups: Only Windows 7 Professional, Enterprise, and Ultimate support that capability.

As a reminder, Table 1-1 outlines the backup technologies highlighted in this chapter and explains which are available in each mainstream Windows 7 product edition.

Table 1-1: Reliability Features

	Windows 7	Home Basic	Home Premium	Professional	Enterprise and Ultimate
File backup	Yes	Yes	Yes	Yes	Yes
Backup to network	—	—	—	Yes	Yes
System image backup	Yes	Yes	Yes	Yes	Yes
Previous Versions	Yes	Yes	Yes	Yes	Yes
System Restore	Yes	Yes	Yes	Yes	Yes

### One Tool to Rule Them All: Using Backup and Restore

Although various data recovery tools are available scattered through the Windows 7 user interface, a single interface—Backup and Restore—provides a handy front end to most of them. Shown in Figure 1-1, this application helps you backup and restore files on your PC, create and restore complete system image backups as well, and access the System Restore recovery utility.



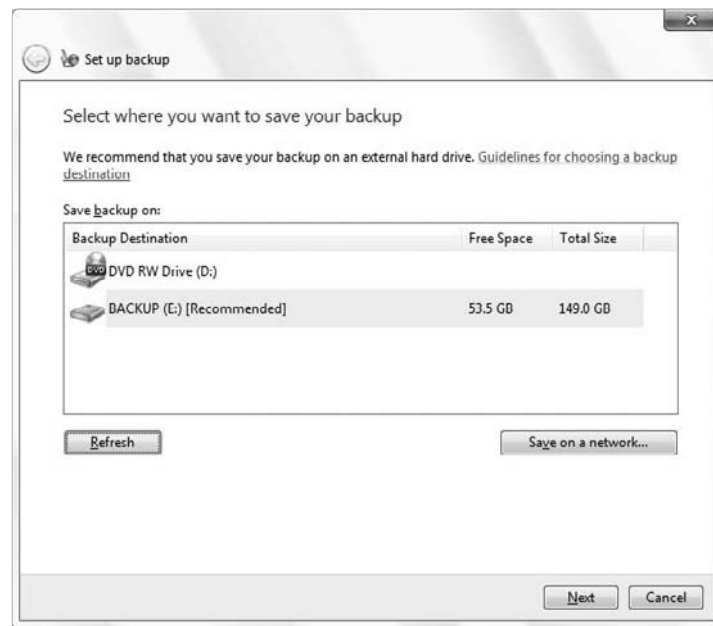


Figure 1-1: Backup and Restore is a one-stop shop for all your data protection needs

Because Backup and Restore basically sits in front of most of the other data recovery functions included in Windows 7, we will use this as the obvious starting point for most of the data, file, and system backup and restore features discussed in this chapter.

Backup and Restore can be found in the Start menu under All Programs ⇌ Maintenance, but the easiest way to find this application, as always, is Start Menu Search: type backup and press Enter.

## Backing Up Documents, Pictures, and Other Data

If you want to create a data backup, you can use Windows Backup, which is available from Backup and Restore. To do so, launch Backup and Restore and click the Set up backup link. This launches Windows Backup's Setup up backup wizard, as shown in Figure 1-2.



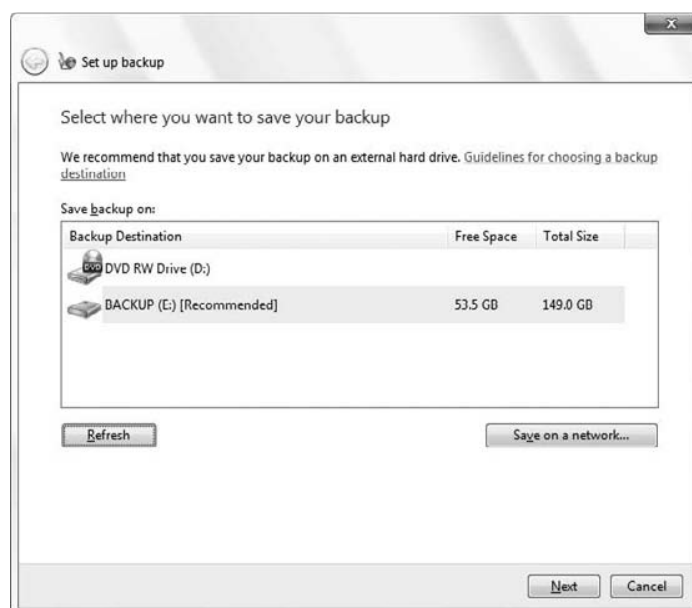


Figure 1-2: Windows Backup helps you manually create a back up of your important data files.

In the first step of the wizard, you must choose a location to store the backup. You can save a backup to an internal or external hard disk or other storage device, a recordable optical disk (typically a writeable CD or DVD), or a network share. (Network backup is not available in Windows 7 Starter, Home Basic, or Home Premium, however.) The amount of space you need, of course, depends on the amount of data you are backing up. The wizard automatically selects the local storage offering the most free space, but you can change this selection, of course.

Microsoft does not allow you to back up to the disk or partition you are backing up. That is, if you are backing up data from the C: drive, you cannot save the backup to the C: drive.

In the second step, shown in Figure 1-3, you have two options: Let Windows choose (recommended) or Let me choose. If you choose the former, Windows Backup will automatically back up data files saved in libraries, on the desktop, and in any folders found in your user folder. (Windows Backup will also create a system image if you choose this option, and then automatically make periodic backups on a schedule going forward.) If you select Let me choose, Windows Backup will present an expandable view of your file system, as shown in Figure 1-4, with some recommended locations already selected for you. From this interface, you can pick and choose exactly what to back up. You can also optionally cause a system image to be made with this type of backup.

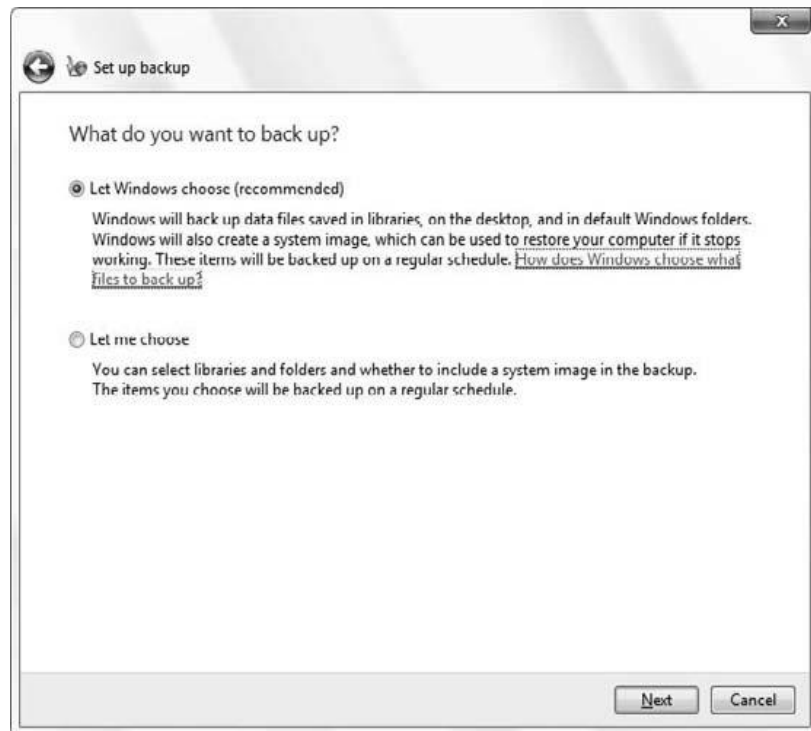


Figure 1-3: Here, it really is best to let Windows choose.

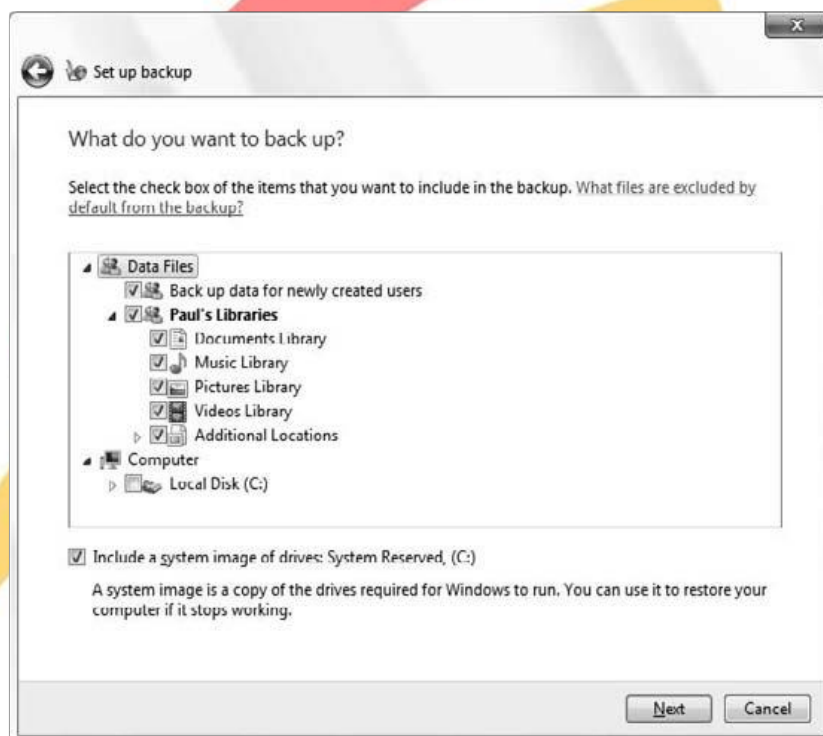


Figure 1-4: If you have specific backup needs, you can micro-manage Windows Backup as well.

In the next step, review what you've chosen. As shown in Figure 1-5, this step is important because you can change the schedule on which Windows Backup backs up your data going forward. Click the Change schedule link to change the default, which is to make a backup every Sunday night at 7:00 p.m.

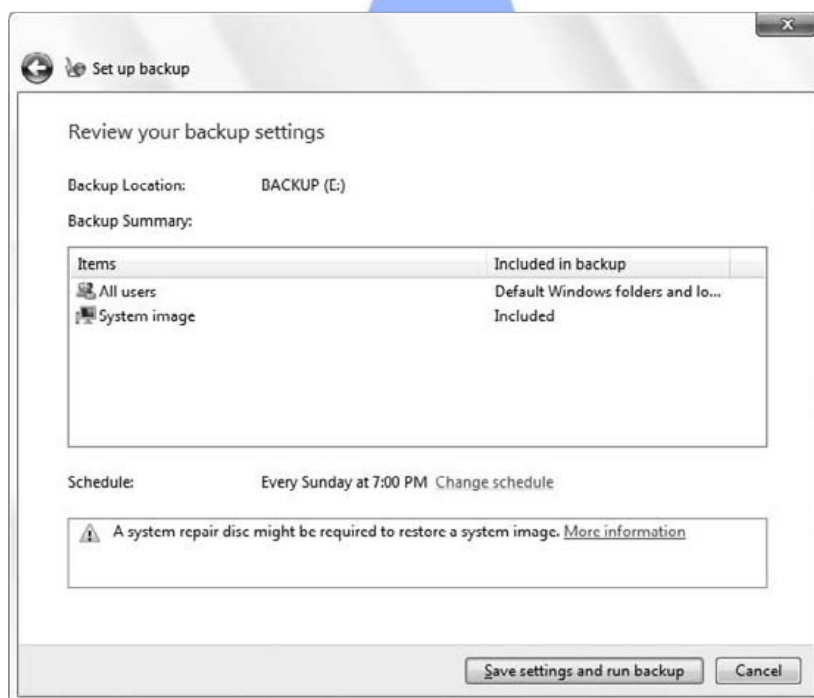


Figure 1-5: This is your last chance to adjust settings before the first backup is created.

Click **Save settings and run backup** to start the backup and establish a backup schedule going forward. As the backup begins, Backup and Restore displays its progress (see Figure 1-6)

If you set up an automatic backup schedule now, Windows 7 will monitor your PC usage and prompt you to perform occasional full backups over time as well.

As the backup runs, the Action Center icon in the notification area of the taskbar changes, adding a small black clock. If you click this icon, you'll see the message shown in Figure 1-7: Backup in progress. This message will occur in the future, when Windows Backup runs in the background.



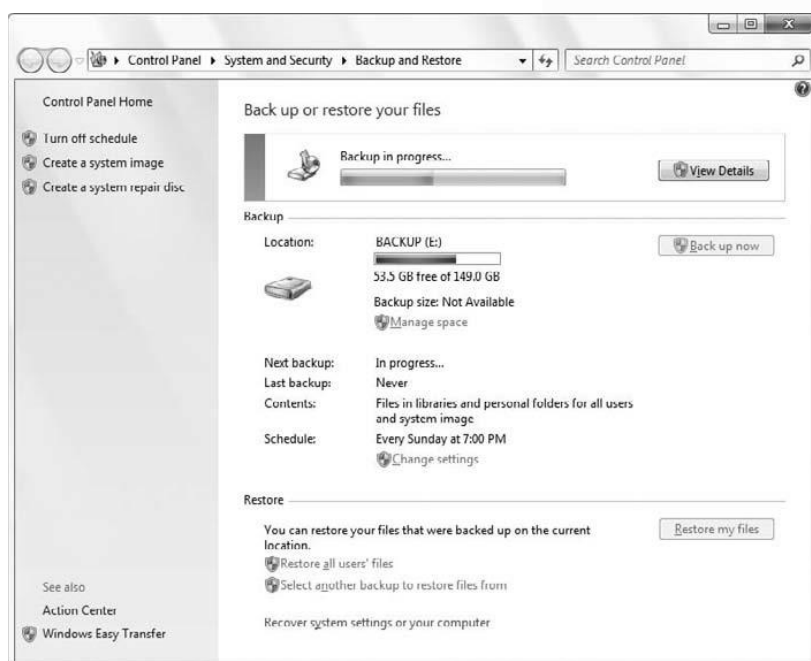


Figure 1-6: You can monitor the backup progress or get on with other work.

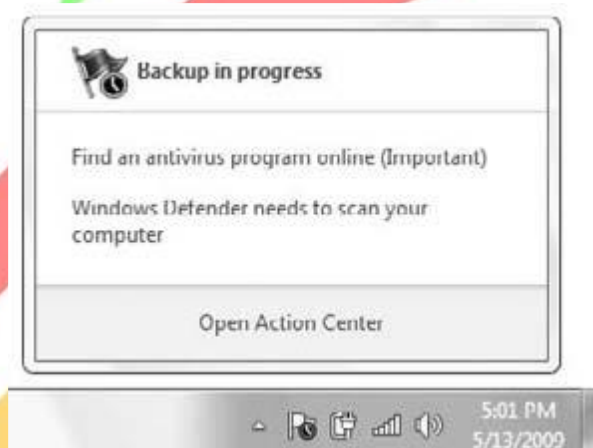


Figure 1-7: Backups trigger a change in the Action Center notification icon

You can create multiple automatic data backup schedules if you want. For example, you may want to back up different drives or data file types at different times or with different regularity.

## Managing Backups

Once you have created your first data backup, a few things in the user interface change. First, Backup and Restore indicates that you've configured a backup location, as shown in Figure 1-8, and notes when

the last and next backups occur. You can also change the automatic backup settings and restore all of the files for the current user.

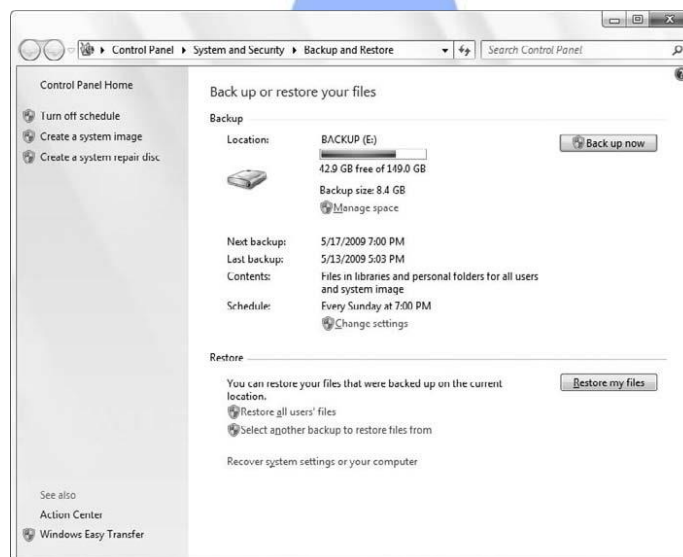


Figure 1-8: Backup and Restore reflects the recent backup

You can also manage the disk space used on your backup device. When you click the Manage space link in Backup and Restore, the Manage Windows Backup disk space window will appear, displaying information about the currently selected backup device. As shown in Figure 1-9, you can browse the file system of the backup location, view backups stored on that device, and change settings associated with system image backups.

If you do click View backups, you can't actually navigate around inside of the backups you have made so far. Instead, you're provided with the window shown in Figure 1-10. From here, you can view the backups and delete them, but not get into them in any meaningful way.





Figure 1-9: From this simple interface, you can manage details associated with your backup device and the backups stored on it.

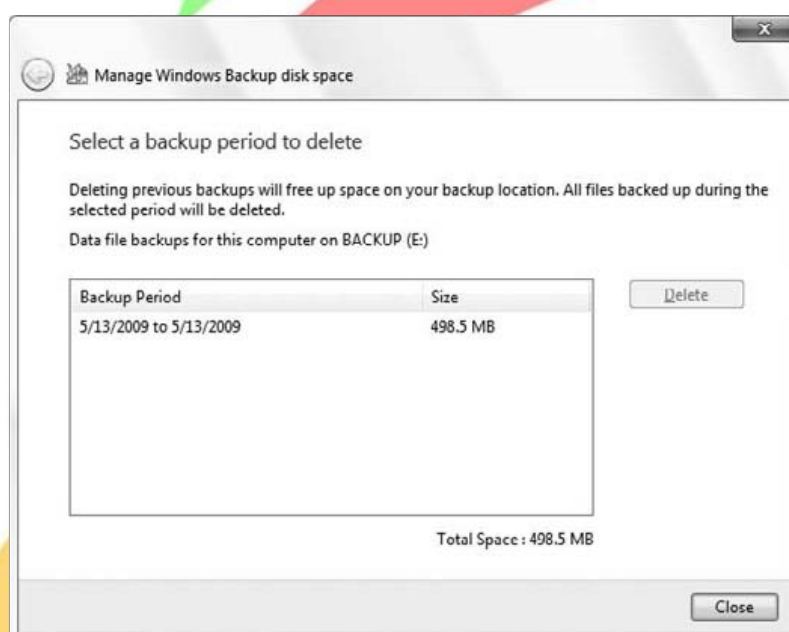


Figure 1-10: Only the simplest of backup management options are available

Want to see what's in a backup? You can do it, but not from this interface. Instead, go back to the previous window and click Browse. This will open Windows Explorer, pointing at the location of your backup. At this location, you will see a special folder with a Windows Backup icon and the name of your PC. If you try to double-click this folder, a Windows Backup window will appear. Instead, right-

click the folder and choose Open. Then, click Continue in the permission folder that appears. You'll be presented with a folder structure representing your various backups. Inside of each of these folders is a number of standard ZIP files (see Figure 1-11) containing your original directory and file structure. If worse comes to worst and you lose everything, at least these files will always be accessible.

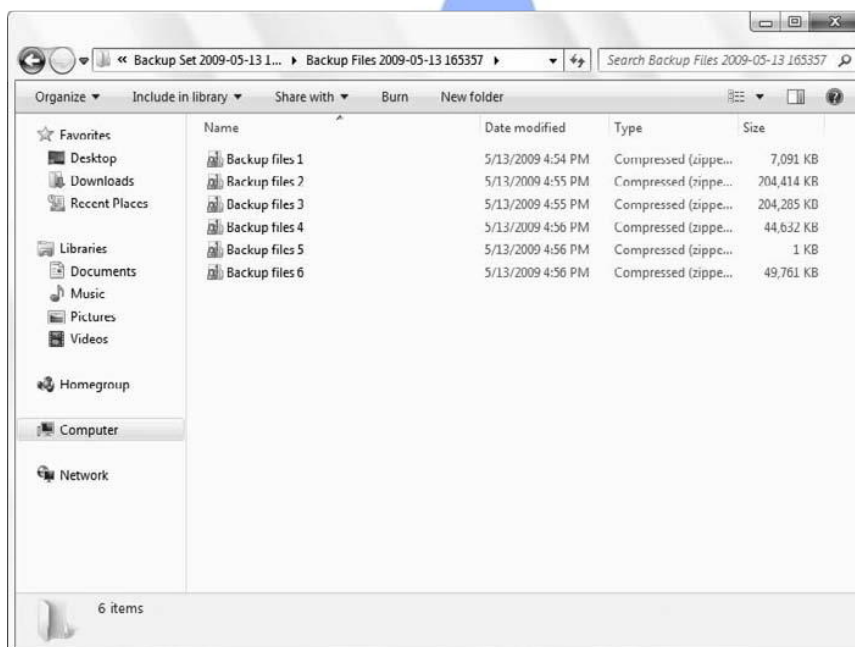


Figure 1-11: Windows Backup uses regular ZIP files under the covers to back up your data.

## Restoring Files

Backup and Restore can also be used to restore files you have previously backed up. There are three general file restore methods:

- **Restore my files:** Restore your own files and folders.
- **Restore all users' files:** Restore your own files and folders as well as those of other users.
- **Select another backup to restore files from:** Perform more advanced restoration tasks, such as restoring files from a different PC.

These all work similarly. You can follow these steps to trigger a restore of your own data:

1. Open Backup and Restore and click the Restore my files button.
2. The Restore Files window, shown in Figure 1-12, appears.



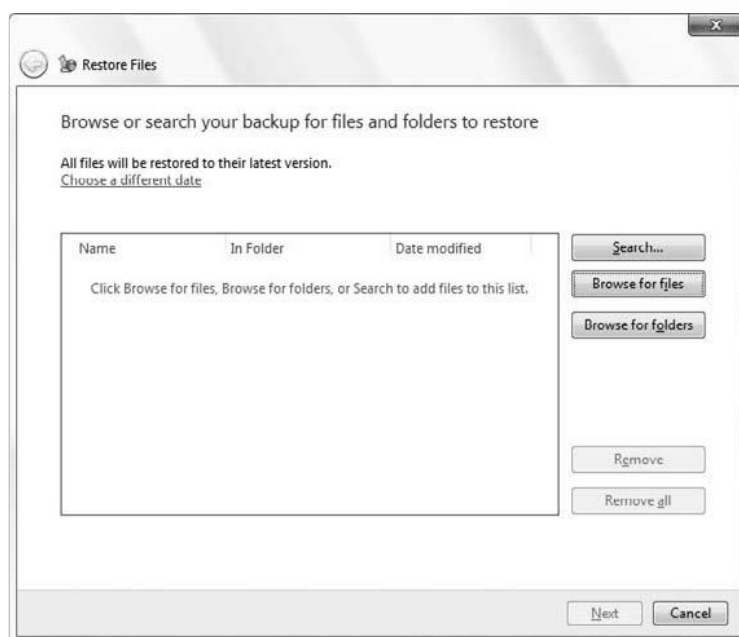


Figure 1-12: Restore Files lets you find the files you'd like to restore.

From here, you have three options:

- **Search:** If you know exactly what you're looking for, and need only one or a handful of files, you can use the Search button to search your existing backup sets.
- **Browse for files:** If you'd like to manually browse around the backup set to find a file or any number of individual files, click Browse for files. You'll be presented with a modified File Open dialog (see Figure 1-13), from which you can browse the various backups you've created, diving into the full backup or just the files in your user account.
- **Browse for folders:** Choose this option to recover entire folders full of files (and other folders).

Whichever method you choose, you can mark files and folders for restoration as you go and then continue looking for more.



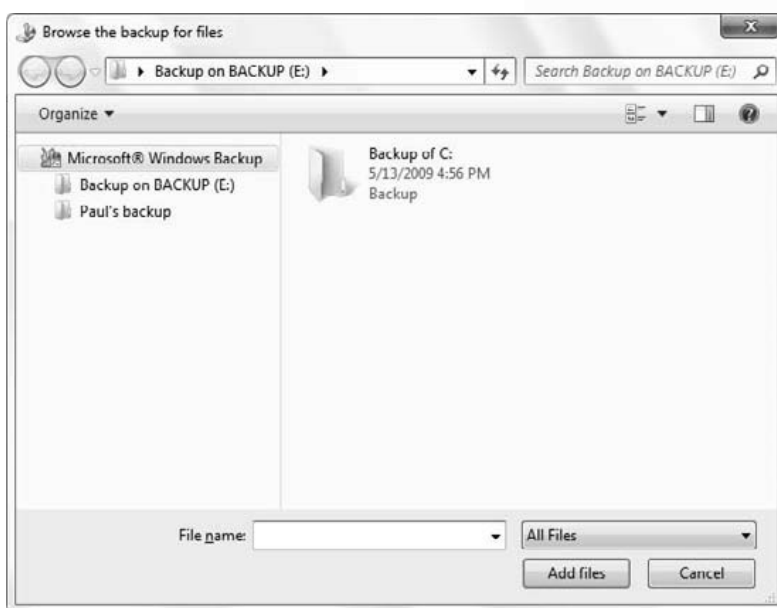


Figure1-13: With either Browse for files or Browse for folders, you can dig in and root around inside the backup set.

3. When you're ready to go, click the Next button in the Restore Files window. Windows Backup will prompt you to specify where you want to restore the files to: either their original location or a different location (see Figure 1-14)

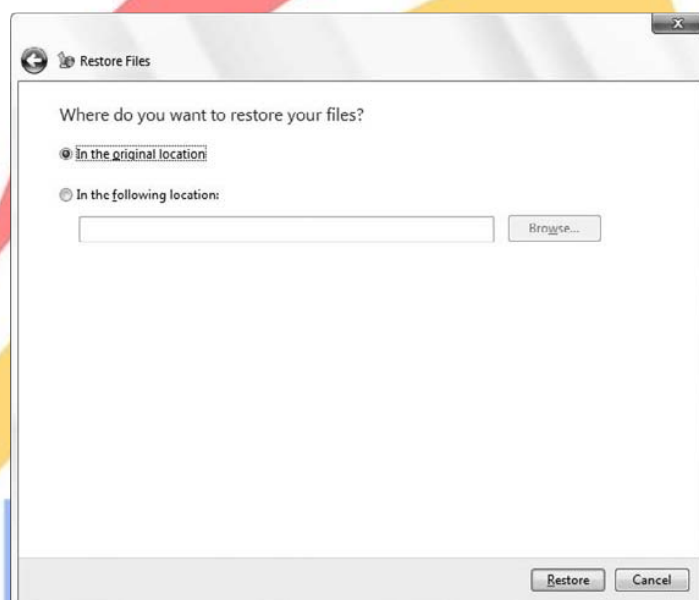


Figure 1-14: While you will often want to simply restore to the original location, sometimes it's a good idea to see what's in the backup before overwriting your files.

Choose one and then click Restore. Windows Backup will begin restoring your files. If any of the backup files will overwrite an existing file, you'll see the normal Copy File window shown in Figure 1-15, which offers you a chance to overwrite, copy but keep both files, or not copy.

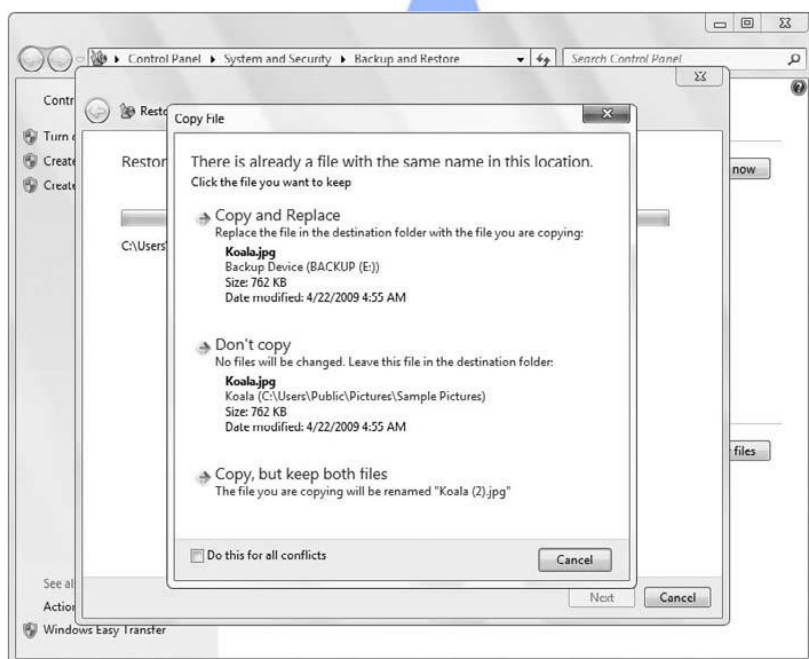


Figure 1-15: Make sure you don't wipe out anything important while restoring files.

When the restore is complete, Windows Backup will let you know that the files have been restored and give you an opportunity to view a list of restored files.

## Backing Up the Entire PC: System Image

Backing up and restoring data files is important and should occur on a regular basis; but over the past few years, a new type of backup utility that backs up entire PC systems using system images has become quite popular. These types of backups protect against a hardware disaster: if your hard drive completely fails, for example, you can purchase a new drive and use the system image to restore the PC to its previous state. System imaging utilities aren't actually all that new; corporations have been using them for years. But now that consumer-oriented system imaging utilities have gained in popularity, Microsoft has created its own version, which it includes with Windows 7.



**Secret**

The system image utility was called Windows Complete PC Backup in Windows Vista

System imaging utilities typically compress the data on your hard drives so that the image file takes up a lot less space than the original installation. Various solutions use different compression schemes, but

you may be interested to know that Windows 7 uses the tried-and-true Virtual Hard Disk (VHD) format that Microsoft also

uses in Windows Virtual PC and its server-based Hyper-V virtualization solutions. That means system images created with Windows 7 will be supported for a long time to come.

#### Coution

System images contain complete PC environments. You can't arbitrarily restore only parts of a system image, as you can with data backups. Instead, when you restore a system image, it restores the entire PC and overwrites any existing operating system you may already have on it. That means you should be careful before restoring a system image: any data you have on the disk will be overwritten. Of course, you're using automatic backups, too, right?

To create a system image, launch Backup and Restore and click the Create a system image link on the left. This launches the Create a system image wizard, shown in Figure 1-16, which walks you through the steps needed to completely back up your PC system. You can save system images to hard disks or optical storage (such as recordable CDs or DVDs), as well as network locations (Windows 7 Professional, Enterprise, or Ultimate only). However, network-based system images cannot be securely protected, as hard drive-based and optical disc-based backups can.



#### Secret

To create a system image, launch Backup and Restore and click the Create a system image link on the left. This launches the Create a system image wizard, shown in Figure 24-16, which walks you through the steps needed to completely back up your PC system. You can save system images to hard disks or optical storage (such as recordable CDs or DVDs), as well as network locations (Windows 7 Professional, Enterprise, or Ultimate only). However, network-based system images cannot be securely protected, as hard drive-based and optical disc-based backups can.



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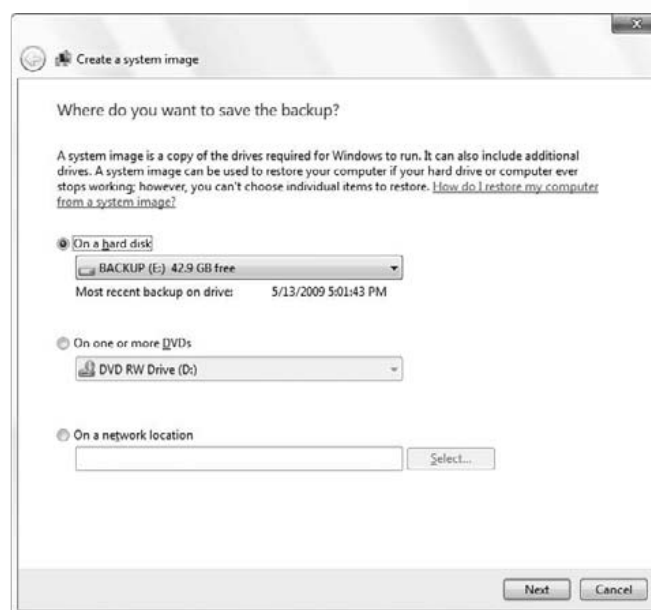


Figure 1-16: System Image is one of the best features in Windows 7.

Click Next. As shown in Figure 24-17, the wizard will give you a chance to confirm the backup settings and remind you which partitions are being imaged. It will also provide an estimate of the amount of space needed to create a system image. The required storage space varies according to the size and usage of the hard disk on your PC.

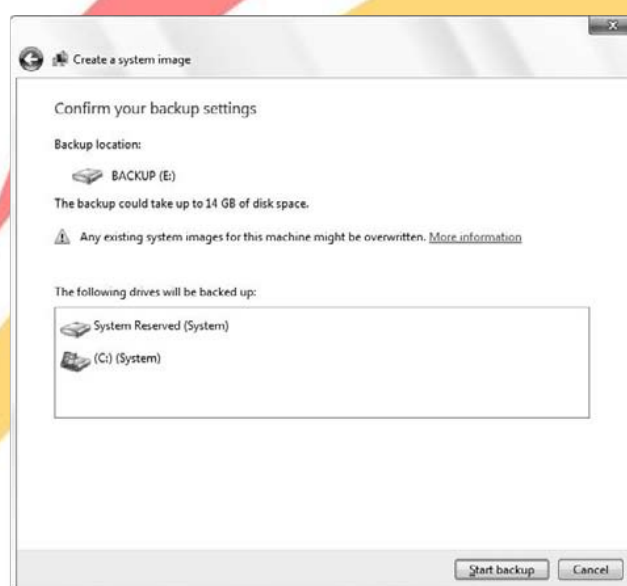


Figure 24-17: System Image is ready to go.



## Secret

Two file system locations must be included in the system image—what Microsoft refers to as the boot partition and the system partition. The boot partition is always C:\, whereas the system partition is the drive with the Windows 7 Windows directory. This is typically C:, but if you installed Windows 7 in a dual-boot setup with a previous Windows version, the system partition might be in a different location. If you have other drives or partitions, you can optionally choose to include them in the system image as well.

As the image is created, Windows Backup will provide an ongoing progress indicator, as shown in Figure 1-18.

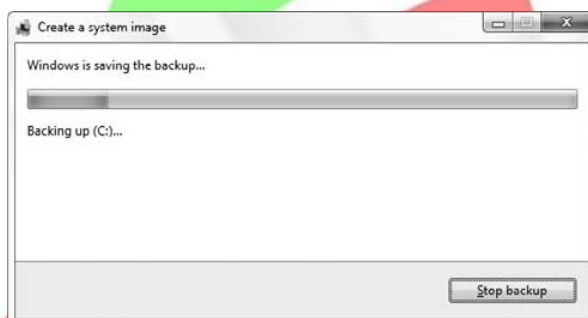


Figure 1-18: Though complete PC backups are huge, they are compressed and therefore much smaller than the actual disk to which you are backing up.

This process could take some time, especially on a heavily used PC. When it's done, Windows Backup will prompt you to create a system repair disc (see Figure 1-19). You should do so: While Windows 7 does install recovery files directly into the boot partition, in some instances, these files will not boot the PC. If that happens, you can use the system repair disc to boot your PC, a requirement for restoring the entire PC with the system image (as you'll see in the next section).

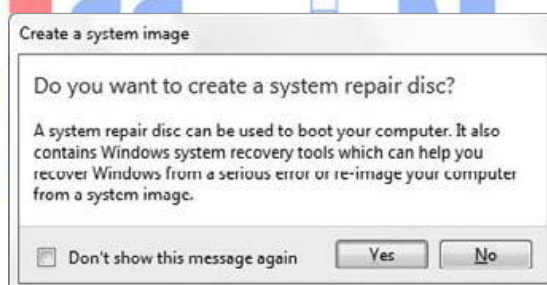


Figure 1-19: If you don't have one already, be sure to create a system repair disc.



### Secret

You can use any writeable CD or DVD for a system repair disc.

If you have both 32-bit and 64-bit versions of Windows 7 on different PCs, you cannot use the same system repair disc for each. Instead, you must create separate system repair discs for 32-bit and 64-bit systems.

## Restoring the Entire PC

If a catastrophic hardware or software failure has rendered your computer untenable, and you simply want to return to a known good system backup, you can use one of the system images you've previously created. Note, however, that you typically need to boot your PC into the Windows Recovery Environment to make this happen, either using the boot files on your PC or using the system repair disc that you previously created. Note, too, that restoring your PC in this fashion will wipe out all of the data and settings changes you've made since the last system image, so this should not be undertaken lightly. Follow these steps to restore your entire PC using a system image:

1. Reboot the computer.
2. If you are using a system repair disc, boot the PC with that. Otherwise, after your PC has finished its BIOS sequence, hold down the F8 key. Choose Repair Your Computer from the Advanced Boot Options screen (see Figure 24-20) and tap Enter.
3. After the Loading files screen, choose the correct language and keyboard input method and then click Next.
4. If you booted from the hard drive, you will need to choose System Image Recovery from the System Recovery Options window that appears. Otherwise, System Recovery will examine the hard drives attached to your PC and look for Windows installs. When it's done, it will list the install(s) it found and give you the opportunity to use Windows 7's built-in recovery tools to fix problems with Windows (which we cover in Chapter 24) or you can restore your PC to an earlier time using a system image. Choose that latter option and click Next.



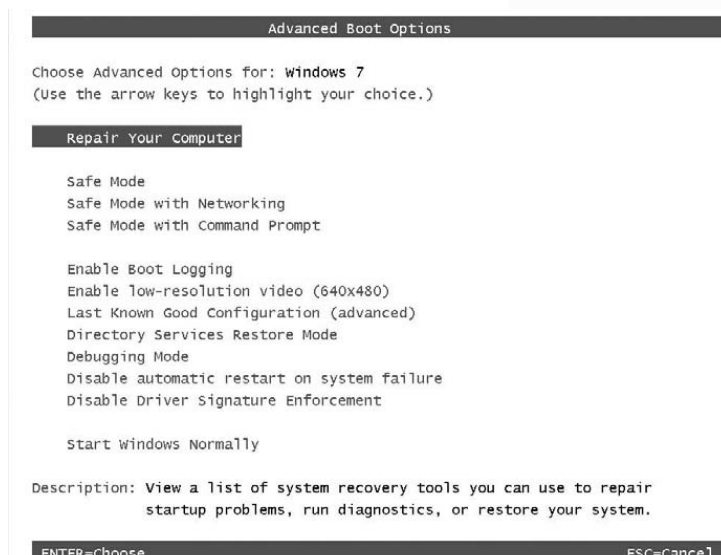


Figure 1-20: Choose the top option to restore your entire PC

5. The Re-image your computer wizard begins, as shown in Figure 24-21. In the first phase of this wizard, you can choose the latest image available (the default) or you can select a different system image. When you've chosen, click Next.



Figure 1-21: This wizard will step you through the process of restoring your PC with a system image.



6. In this step, you can choose to format the PC's hard drive and repartition disks (as Windows 7 Setup would do) to match the layout of the system image. Generally speaking, you should enable this option. Click Next to continue.
7. In the final phase of the wizard, you can verify your selections and click Finish to continue. Note that restoring an entire PC from a system image can be a timeconsuming process.

## Recovering Old Versions of Data Files

One of the most useful new features for information workers in Windows Server 2003 was Volume Shadow Copy, which silently and automatically created tiny backups, called snapshots, of data files stored on the server every time a user made any changes. In a managed environment like those based on Windows Server, Volume Shadow Copy is a wonderful feature, because users who save documents on the server can easily recover older document versions without having to summon an administrator to restore an old backup from a tape or a hard drive.

With Windows 7, Microsoft has added Volume Shadow Copy to its client operating system as well, renaming it Previous Versions. This means that any Windows 7 user can take advantage of this amazing bit of functionality and recover seemingly lost versions of files they have mistakenly edited. No server operating system is required. The trade-off, of course, is disk space. Because Windows must store multiple copies of your data files, Previous Versions does eat up a bit of disk space; but because Previous Versions saves only the parts of files that have changed, or what Microsoft calls the delta changes, the disk space loss is not as bad as it would be otherwise. In fact, you probably won't even notice it's happening.

Unlike with Windows Server, you can't really manage how much disk space Volume Shadow Copy uses, or even the drives on which it is enabled. Instead, Microsoft enables the service across all drives, folders, and data files on a Windows 7 PC.



### Secret

Previous Versions is yet another Windows 7 reliability feature that requires certain Windows 7 product editions. Previous Versions is available on Windows 7 Business, Enterprise, and Ultimate editions only; users with Windows 7 Home Basic and Home Premium need not apply.

To access this feature, find a document that you have changed a lot recently, right-click it, and choose Properties. Then, navigate to the Previous Versions tab. As shown in Figure 1-22, Windows maintains a number of previous versions, each of which you can restore if needed.



Figure 1-22: Previous Versions makes it possible to resurrect old versions of data files.

To restore an older version of a file, select the file version you want and click the Restore button. As with any other file copy operation, you are prompted to replace the existing file, keep the existing file, or keep the existing file and rename the newly recovered version.



The number of previous versions shown in this dialog depends on a number of factors, including how long your system has been up and running and how many times the document has been edited. In some cases, you may see no previous versions. If so, ensure that the System Restore service is running. We'll show you how in the very next section.



What happens when you delete a file or folder, either accidentally or otherwise? Can you use Previous Versions to restore that item? Actually, you can. Here's how: using Windows Explorer, navigate to the folder that contained the deleted item, right-click the containing folder, and choose Restore previous versions. (This method does not work with Libraries.) Then, find a previous version of the containing folder; copy it from the Previous Versions tab of the Properties window for that folder to your desktop

or some other location. Then, navigate into the folder structure on the desktop (or wherever) and find the folder or file you are looking for.

## Summary

Windows 7 includes a surprisingly rich set of features for backing up and restoring documents and other data files, as well as the entire PC. With Windows 7, you get handy file backup and restore wizards, a system imaging utility that enables you to recover completely from almost any PC calamity, and a nice front end from which to manage all of this functionality. It will be interesting to see how the third-party utility market responds to these changes now that virtually all of the most important backup and restore technologies in Windows are available in all product editions.

