

Terry W. O'Connell



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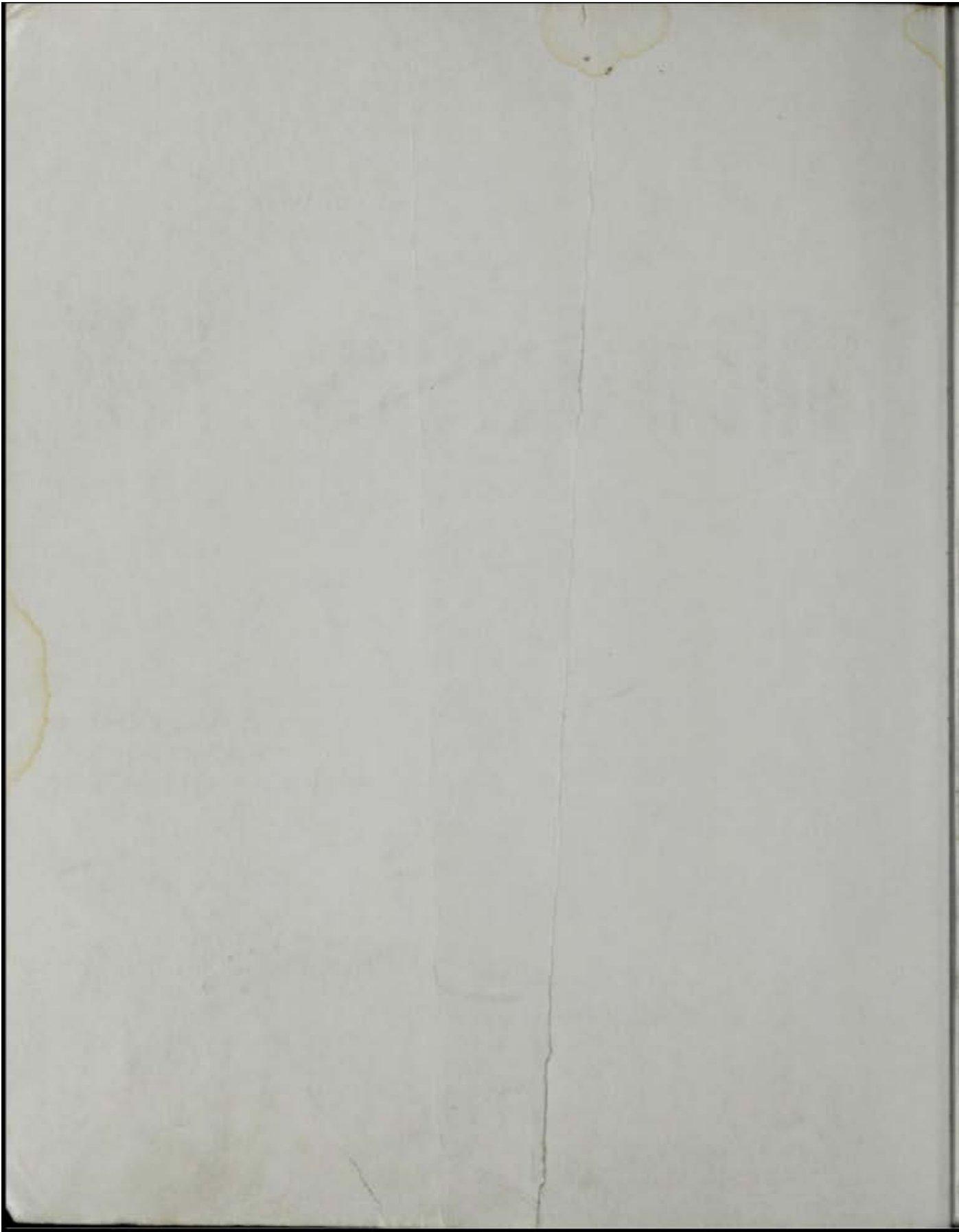
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CHAPTER 1

Looking Inside Windows XP Professional

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- The Windows XP Architecture: Kernel Mode and User Mode 9
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Note

You may find that some applications will not run reliably under Windows XP. Those that fall into the categories of antivirus programs, backup applications, and some system utilities may not work. However, vendors of the top-selling programs will produce upgrades for these programs, so you will still be able to use your favorite utilities under Windows XP. Just check the Windows Catalog Web site (<http://www.microsoft.com/windowsxp/partners/catalog.asp>) for the applications compatible with Windows XP. (You can also access this Web page within Windows XP by selecting Start, All Programs, Windows Catalog.)

In addition to running applications written for earlier versions of Windows (and even some MS-DOS programs), a 64-bit version of Windows XP will provide support for 64-bit applications. The 64-bit version of Windows XP will include another subsystem, called *Windows on Windows 64 (WOW64)* that will enable 32-bit applications to run with applications specifically written for the 64-bit version. Although most of us don't need the number-crunching capabilities of a high-end 64-bit workstation, this version of Windows XP will be very useful in environments such as computer-aided design (CAD) and 3-D animation. Since support for the 64-bit Alpha processor has been dropped, the 64-bit version of Windows XP will run on the Intel Itanium processor.

Protected Memory and the Kernel

Since physical memory is only used when allowed by the kernel mode code of the operating system, it is also known as *protected memory*. In early operating systems, such as MS-DOS, it was simple for a badly coded program to overwrite a section of memory that it should not. The results could be unpredictable, but usually resulted in a system crash. By separating the operating system into user mode and kernel mode, and thus protecting memory with privileged code, user applications will not find it easy to access memory locations that they should not.

Executive Services

Executive Services is simply a label given to a diverse set of components that provide the basics of an operating system. These basic services offered by the kernel executive include the following:

- **Virtual Memory Manager**—This component of the Executive is responsible for managing the 4GB virtual address space for each process, as well as paging in and out of physical memory all the pages of memory the operating system or an application needs at any particular time.

- **Local Procedure Call Facility**—This component is responsible for interprocess communications. This component is necessary because each process uses the same virtual address space.
- **Process Manager**—When it comes time to start or shut down a process, this component of the Executive is responsible for creating the necessary memory structures and starting up the threads of the process. From that point, other components of the Executive, such as the Virtual Memory Manager, become involved in controlling how a process functions and uses system resources.
- **Object Manager**—Windows XP uses the concept of an object for many different things. Consider an object as a basic unit that can be managed by the Executive. For example, system resources such as ports are considered objects. An object provides an interface that the application program can use to interact with a system resource in a uniform manner.
- **Security Reference Monitor**—This is a very important part of the Executive. The Security Reference Monitor is that component which controls all security mechanisms that are implemented in the operating system. This includes such things as the initial logon, validating a user's password, and checking whether a user can be granted access to a resource such as a disk file.

How Virtual Memory Works

A component of the kernel called the *virtual memory manager (VMM)* is responsible for taking charge of the physical memory installed in the computer and allocating it to individual processes on an as-needed basis. This is one of the most important features of not only Windows XP, but of all modern operating systems such as Unix and OpenVMS. The 32-bit Windows XP can support addressing up to 4GB of memory, although you likely won't find this much memory on a desktop PC at this time!

Note

The 64-bit version of Windows XP that will run on Intel's Itanium processor will support up to 16 terabytes of virtual memory. That is a huge increase in the virtual memory available to the more common 32-bit version of Windows XP Professional. By doubling the size of the numeric value that the processor can handle, it is easy to see why XP most likely will succeed. By allowing applications that require larger data structures and faster number crunching capabilities than a 32-bit machine can provide, users needing more powerful computing capabilities can find it in Windows XP.

CHAPTER 2

Before You Install or Upgrade

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- Conduct a Pilot Program 28
- Understanding Network Installations 29
- Should You Upgrade or Install? 34
- Preparing Your Computer for XP 41
- Make a List and Check It Twice 51

This chapter explains some things you should do before attempting to install Windows XP Professional or upgrade your current operating system to Windows XP Professional. Some of the topics discussed in this chapter may seem obvious, but it never hurts to make a list and check off each item when performing something as major as an operating system install or upgrade. By taking the appropriate steps upfront, you lessen the chance for something to go wrong, and you can also prepare a back-out procedure for recovering your system if anything out of the ordinary occurs.

Hardware Prerequisites

When preparing for an upgrade or installation you should first make sure that your computer meets the minimal hardware requirements for the operating system. Advances in hardware components have been made at a phenomenal rate during the past few years, along with a reduction in prices. A typical computer running Windows 95 or Windows 98 can get by with 16MB of RAM. However, Windows XP requires much more than that, but fortunately, prices for memory are probably not as high as when you first purchased your computer.

As this table shows, the most important items are the central processing unit (CPU) speed and the amount of random access memory (RAM) installed in your computer. The amount of free disk space depends on a number of factors. For example, if you choose to copy the setup files to your hard drive, either during an installation from the CD or by obtaining the setup files from a network connection, you will need additional space to store these files. A 2GB disk drive is the minimum size required for a Windows XP computer, but this doesn't leave much space for installing applications or data after operating system is installed.

Most keyboards and mice work with Windows XP, but you may find some features don't work as expected. For example, some keyboards have shortcut keys that do things like dial up to your Internet Service Provider (ISP). Depending on the keyboard and the features, you may be able to download a driver from the manufacturer to remedy these sorts of problems.

The same goes for other hardware components, especially disk drives. A disk drive with 5MB to 10MB of storage capacity was once considered enormous, but now a 60GB or larger hard drive is not only the norm but also available for a very low cost. Computers today also come equipped with better graphics adapter cards, DVD/CD-ROM drives, and in some cases, CD/RW drives. However, you don't have to have the latest and greatest system in order to load Windows XP on your computer. Table 2.1 lists the minimum hardware requirements your computer needs to perform an installation of Windows XP, along with the recommended and maximum values.

Table 2.1 Minimum, Maximum, and Recommended Hardware Requirements for Windows XP Professional

Item	Minimum	Recommended
RAM	64MB	128MB (or more!)
CPU Speed	233MHz	Anything faster!
Disk Drive	2GB	Anything larger!
Free Disk Space	650MB	More for network installation
Display	VGA	SVGA for best results
Keyboard	Standard	n/a
Mouse	Standard	n/a
CD-ROM	CD-ROM	CD-ROM or DVD-ROM/CD-ROM
Network Card	Check the HCL	10/100Mbps card, for Category 5 twisted-pair wiring, RJ45 Jack

RAM, random access memory; MB, megabyte; CPU, central processing unit; MHz, megahertz; GB, gigabyte; VGA, video graphics array; SVGA, super video graphics array; CD-ROM, compact disc-read only memory; HCL, hardware compatibility list.

In general, your system should exceed the minimum requirements listed in Table 2.1, especially for memory and CPU speed. Although Windows XP will run on a machine equipped with the minimal requirements, you won't be able to achieve a very satisfactory experience. This is especially true if you decide to use some of the multimedia capabilities that are included with Windows XP or with applications written to take advantage of the DirectX 8 technology built into Windows XP. For example, if you are heavily into games, which depend on fast graphics and input devices, you will find that more memory and a high-end graphics adapter will make your gaming experience a lot more enjoyable. Similarly, if you are planning on using Windows XP as a graphics workstation for computer-aided design or another application of this sort, then you must upgrade your computer to a faster CPU and possibly a newer motherboard.

However, if you are only installing Windows XP to see if it's the operating system for you for the next few years, then the minimum requirements will allow you to do so. For simple office applications, the minimum requirements listed in Table 2.1 will suffice, as long as you have sufficient local disk space or space on network file shares to store your applications and data.

Check the Hardware Compatibility List

After you have made sure that your computer meets or exceeds the minimum requirements listed in the previous section, it is time to check out other hardware components in the system to make sure that they are supported by Windows XP. The simplest way to do

CHAPTER 4

Unattended Installation and Sysprep

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- Using the unattend.txt Setup File for Automated Installations 85
- Using Sysprep to Install Windows XP 97

The SID is important for any computer that participates in a domain or the Active Directory. It is this ID that the domain security accounts manager (SAM) database or the Active Directory uses to identify the computer. The hostname you give your computer is just a user-friendly name that is easy for humans to remember. The networking components of modern Windows networks use the SID to identify your computer.

Using Sysprep to Set Up a Single Computer

One way you can use Sysprep is to create an initial installation that may include other applications that you may use in your business. You can pre-stage a common desktop environment for your user; when the user boots the system for the first time, he will have to complete just the last few steps of the Windows XP Setup process.

To do this, you begin by installing the Windows XP operating system (see Chapter 3). You can then customize the operating system and add applications that you want to include in the install. When you have finished tweaking the operating system and applications to your satisfaction, then it is time to configure Sysprep.

Keep in mind that in most companies not every desktop computer is configured exactly the same. For example, the applications used by an employee in the accounting department might not be the same ones needed by an employee who works in the manufacturing facility of your company. You can use Syspart to create customized installations for each of your different sets of users that need to share a common desktop setup. Then, when you need to install a computer for a new employee, just use the correct system image that was created using Syspart to prepare the new employee's PC.

For the following steps, you will need to have on hand a copy of the original Windows XP installation CD so that you can copy the Sysprep files to the computer you are using to create a system image for cloning. To use Sysprep, follow these steps:

1. Log onto the system using the Administrator account. If you are logged on under another account, simply log off and use Ctrl+Alt+Del to bring up a logon dialog box; then log onto the system using the Administrator account.
2. Insert the Windows XP Professional installation CD into the CD-ROM drive on the computer you used to create the install image.
3. Click Start/Run, and enter CMD into Open field of the Run dialog box.
4. Set your default directory to the root of the disk that holds the operating system. For example, use `CD C:\`, if you are using the drive letter C: for the system disk. If you are using multiple partitions, use the SET command at the command prompt and look for the value of the variable %SYSTEMDRIVE% to determine where your system files are stored.

5. Create a directory for the temporary Sysprep files: `MKDIR SYSPREP`.
6. Next, copy two files from the `Deploy.cab` file on the Windows XP Professional CD to this folder. First, set default to the new directory you created: `CD SYSPREP`.
7. Use Start, All Programs, Accessories, Windows Explorer to bring up the Windows Explorer program. Double-click on My Computer to expand the list of resources available. You should see the CD-ROM drive that holds the Windows XP Professional CD. Navigate to the folder `Support` and then `Tools`; then look for the `Deploy` folder and double-click on it.
8. Right-click on `sysprep` and from the menu; choose `Extract`. Extract the file to the Sysprep directory you created in Step 5. Do the same for the file `setupcl`.
9. Take the Windows XP installation CD out of the CD-ROM drive.
10. At the command prompt, execute the following command: `Sysprep -nosidgen`.

After you have issued the `sysprep` command, the system should automatically shut down. When the users boot the system, they will be prompted for the last few items required by the Setup process, such as accepting the license agreement, among other things.

In this example the `-nosidgen` parameter was used. This is because the installation is not being cloned, but you have simply set up a computer having completed most of the installation steps. The Setup process you went through when you installed Windows XP generated a unique SID for the computer.

Using Sysprep to Clone an Installation

Sysprep is usually used to clone an installation when a large number of computers need to be set up using Windows XP, and you have some means for duplicating a disk drive. This is the case with most computer vendors that sell computers with Windows XP already preinstalled on the hard drive. A large corporation may also use this method.

Use the same steps you did in the previous section to install and customize the operating system, as well as install additional drivers or applications. However, when you execute the `sysprep` command, omit the `-nosidgen` parameter.

When you have finished and the system has shut down, you can remove the drive from the computer and use whatever method you normally use to duplicate a disk. Place the copied disks in new computers. When the system is booted, the user will again have to answer a few prompts, but a new SID will be generated for the computer. After the user has finished answering the prompts, the Sysprep folder and its contents will be deleted automatically.

Using the Sysprep.inf File

You can make matters even easier for the end-user by supplying an answer file for Sysprep. Earlier in this chapter you learned how to create an unattended answer file to be used with the `winnt.exe` or `winnt32.exe` Setup programs by using the Windows Setup Manager Wizard. This wizard was used to generate an unattended setup answer file for use in installing Windows XP. You can use this same program to create a file called `sysprep.inf`, which will allow you to supply answers for some of the prompts that the mini-setup process issues when the user boots the computer. For example, you can supply a company name, regional settings, and so on.

To create the `sysprep.inf` file using the Windows Setup Manager Wizard, just select the radio button labeled *Sysprep Install* instead of *Windows Unattended Installation*, when prompted in the third screen presented by the wizard.

If you do create a `sysprep.inf` file, place it in the same Sysprep folder you created to hold the Sysprep program itself.

Summary

In this chapter you learned how to automate most of the process of installing Windows XP. By using an answer file you can supply answers to most of the prompts that the Setup program uses. You can also create multiple answer files if you have groups of users where each group needs to have their computer setup a little different from the other groups. The Windows Setup Manager Wizard can help you create the answer files that can be used by the Setup program (or by the Sysprep utility) so that you don't have to become intimately familiar with the hundreds of variables that can be used in an answer file. While the Syspart utility is usually needed only in a very large scale environment, it can be useful to ensure that you can clone a system that contains not just the Windows XP operating system, but also other applications that you need to install for a group of users.

CHAPTER 9

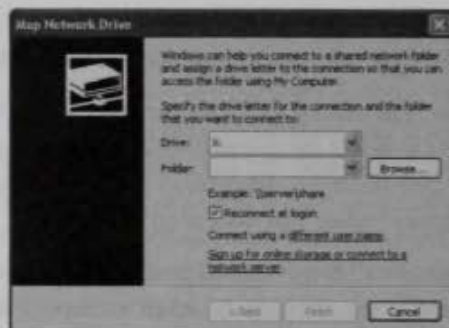
Working with Files and Folders

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- Using the Indexing Service for a Fast Find 209
- Burn That CD: Copying Files and Folders to a CD-R 212
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FIGURE 9.11

This dialog box allows you to specify the drive letter for a file share and to browse the network to find the file share you need to use.



4. If you select the check box named Reconnect at Login, then the drive will be mapped automatically every time you log in so that you won't have to repeat these steps again!
5. You can also use the links at the bottom of the dialog box, including Connect Using a Different User Name (although you will need the password), Sign Up for Online Storage, or Connect to a Network Provider.
6. When finished mapping the drive, and click Finish.

Step 5 indicates how to connect using a user account that has access to files and folders your logon user account does not. This is most useful when an administrator wants to let a user connect for a file share for just a short period of time, after which this file share can be deleted. By connecting in this manner, the administrator doesn't have to give advanced privileges or grant additional access rights for the user's own account.

The second link mentioned in Step 5 leads you to a wizard for signing up for an online storage service. There are many of these on the Internet, and you can even have one on your LAN. File shares offered by other servers on your network may be available using this link.

Burn That CD: Copying Files and Folders to a CD-R

One of the new features incorporated into Windows XP is the capability of burning CDs without having to buy additional software. When you buy a CD burner and install it into your Windows XP machine you usually get a stripped-down copy of some other commercial CD burning product. This usually provides only the basic burning capabilities.

Windows XP now supports a lot of different features for burning CDs, including using them to store data files, as well as using your CD burner to create audio CDs. For more information about using the CD burning features of Windows XP to create audio CDs,

see Chapter 29, "Windows Media Player 8." Here, we will learn about the process of creating a data CD.

The Data Files to Be Burned Are First Sent to a Staging Area

Windows XP lets you send files and folders to a staging area on your hard drive so that when you are ready to burn the CD, you will have all those files just waiting for you. This is a more efficient method because it conserves space on the CDs you burn.

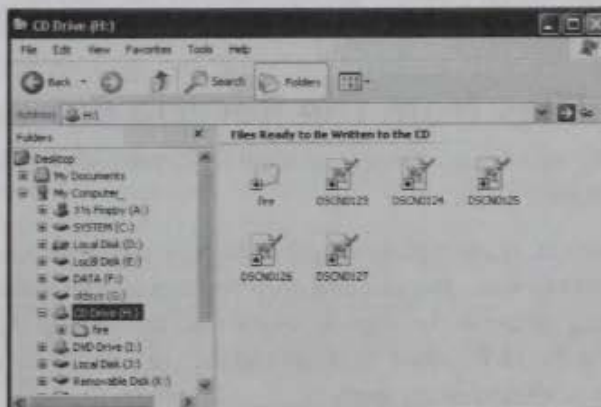
To send a file to this staging area, simply right-click on the file or folder and select Send To. Then, from the next menu, select the CD-burner drive. A small balloon message pops up indicating that you have files waiting to be written to a CD. If you click on the balloon, you can see a list of files in this staging area.

The following steps make up a more direct method for burning several files to a CD:

1. In Windows Explorer, click on My Computer.
2. Select the files and folders to be sent to the CD burner. Use the Shift+Click or Ctrl+Click methods to select multiple files or folders.
3. From the File and Folder Tasks menu, which is present if you click on the Folders button (IMPORTANT!), depending on your choices, you can select Copy This File, Copy This Folder, or Copy the Selected Items. The selections that will be present in this menu will depend on whether you selected a single file, folder, or multiple items, as described in the previous step.
4. A Copy dialog box (or Copy Items if you have multiple selections) will appear. Select the CD burner drive and click Copy.
5. To view the files/folders waiting to be burned, click on the CD burner's drive letter in Windows Explorer under the My Computer section (see Figure 9.12).

FIGURE 9.12

You can see the files being staged for the burning process by clicking on the CD burner's drive letter.



6. Select Write These Files to CD from the File menu to start the burning process. The CD Writing Wizard will pop up and guide you through the process. You can give a name to the CD in the first dialog box of the wizard (or accept the default) and then click Next to continue.
7. Another dialog box appears, indicating several steps for preparing to write the file, such as creating the CD's table of contents, and then the actual writing process. (Be patient or buy a faster burner!)
8. A dialog box appears when the process is finished. You can use the check box labeled Yes, Write These Files to Another CD, if you want to create additional backup copies; otherwise, click Finish.

As you can see, it is not at all difficult to stage or write data files to a CD using Windows XP.

As you can see from this figure, the first menu selection is to write the files to the CD burner. You can also delete these temporary copies of files if you have changed your mind

The Recycle Bin

The Recycle Bin is where items go when you delete them. Deleted items using GUI interfaces send files to the Recycle Bin instead of actually deleting them. However, you are still taking up disk space, since the files are not really erased until you empty the Recycle Bin. You can either retrieve things from the Recycle Bin or permanently delete them.

Caution

Keep in mind that if you delete a file or folder from the Command Prompt, a floppy disk, or a network file share, these do not get placed into the Recycle Bin. These files have been permanently removed.

Retrieving Files from the Recycle Bin

If you delete a file by mistake or change your mind later, you can open the Recycle Bin window in many different ways.

To restore a file, shortcut, or other item, simply right-click on the item in the Recycle Bin's listing and select Restore. You can also open the Recycle Bin window on the desktop and click and drag the items you want to restore onto the desktop. Additionally, you can open the Recycle Bin in Windows Explorer and drag restored items directly to the folders you where you want to return them.

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CHAPTER

Managing Disks and Partitions

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The most immediate storage options available to a central processing unit (CPU) are its own cache memory and the registers built onto the CPU board. Next is the computer's physical memory (SIMM, DIMM, and so on), followed by the hard disk and other fixed media, and finally the machine's removable media. Managing all of this memory for optimum computer performance can be a challenging task. Windows XP Professional's most important memory-management tools are partitions. In this chapter, you learn how to partition disks and manage the disk volumes in your computer. Not only do you learn how to create partitions on the fixed hard drives in your computer, you also learn about sharing disks and partitions with other users in a network, along with other offline storage techniques such as CD burning.

This chapter also discusses basic and dynamic disks, volumes, and file systems. Windows XP offers many different ways to store data, so you should be able to easily decide how you want to partition the disks in your computer, create partitions, and manage the disk volumes in your computer when you finish reading this chapter. In addition to the usual tasks provided by a file system, you will also learn how to encrypt and compress files and folders (if you choose to use the NT file system (NTFS)), as well as how to defragment a hard disk to dramatically improve performance when using disk-intensive applications.

Basic Disks and Dynamic Disks

Windows XP's disk management tools go beyond anything Windows 9x system had, although Windows NT users will certainly recognize them.

Every operating system uses partitions to help organize the data stored on hard drives. In all Windows and DOS machines, all physical hard drives are (usually) completely filled with one partition each, unless you indicate otherwise. These partitions are denoted by a drive letter (C:, D:, and so on). You can divide these physical partitions into what is known as a logical partition. Logical partitions look and behave like separate physical drives on your computer system. Each logical partition gets its own drive letter and directory system, separate from the other partitions.

In Windows XP, such partitions, physical or logical, are referred to as basic disks. They are what Windows 95/98/Me and Windows NT users have grown accustomed to using. In Windows 2000, a new type of disk volume, the dynamic disk, was introduced, bringing with it some interesting new features.

A dynamic disk is a physical hard drive that foregoes the use of physical and logical partitions. Instead, it contains only dynamic volumes that you create in the Disk Management console. Dynamic volumes do not use any drive letter notation and can even be extended on the computer without restarting the system.

To get all these features, though, you have to upgrade your drives from basic to dynamic. This procedure is relatively painless, but you should be aware of some limitations:

- You cannot use dynamic disks on a portable computer; nor can you use them on removable drives, detachable disks, or disks that share a SCSI bus. If you have any of these configurations, you're out of luck.
- You cannot access dynamic volumes with any operating system other than Windows 2000 and Windows XP Professional, no matter what file system you're using for the volume. This means that MS-DOS, Windows 95/98, Windows ME, Windows NT, and Windows XP Home Edition are right out. You can, however, get to any folder that is shared from the network, just as before. Because of this access limitation, though, you will have greater difficulty booting multiple operating systems on any system with dynamic drives. It is strongly recommended that you don't even try.

You should also note that although the change to dynamic disk is reversible, reverting from a dynamic disk back to a basic disk is not an easy matter because the disk must be completely empty before you convert it back to basic.

Note

Most computers use a disk-partitioning scheme that creates a master boot record (MBR), which is read by the computer's BIOS when the system is booting. Some high-end workstations with the Itanium 64-bit processor also use the Extensible Firmware Interface (EFI) scheme. EFI supports a partitioning mechanism known as the GUID partition table, also known as GPT. GPT enables you to create up to 128 partitions per disk and volumes in sizes up to 18 exabytes (an exabyte is 2 to the 60th power in bytes). GPT also supports the creation of a backup partition table in case the main one becomes corrupted. Most people using Windows XP Professional, however, need only a simple basic disk with a few partitions

You can install Windows XP on mirrored or simple disk volumes. You cannot install Windows XP on a basic partition you converted to a dynamic volume, unless the partition was a former boot or system partition. The Setup procedure only recognizes these partitions because they have entries in the partition table. Later in this chapter, you will see that by using the Disk Management tool, you can determine the disks, partitions, and volumes on your computer.

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CHAPTER

Performance Monitoring, Logs, and Alerts

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Processor

The processor (or central processing unit [CPU]) is the other major component, in addition to memory, that affects system speed. Microsoft's minimum requirement for running Windows XP is a 233MHz processor, although it recommends 300MHz. A 300MHz processor from either the Intel or AMD line will run Windows XP; truthfully, however, you are probably going to want something more. An Intel Pentium III or AMD Thunderbird greater than 800MHz will do the job admirably and meet the needs of most users.

You can determine the processor installed on your computer using the following procedure:

1. Click Start, Control Panel.
2. If your Control Panel window is currently in Category View, click the Switch to Classic View link.
3. Double-click the System icon.
4. The Processor installed on your computer is listed near the bottom of the General tab in a section labeled Computer:.

Unlike adding more memory, upgrading your processor can be a bit tricky. The following are some things to watch out for:

- Different processors normally require different motherboards. For example, if you have a system with a Pentium III processor, you will probably be able to upgrade to a higher-speed Pentium III processor, although you may still want to check to make sure. You would not, however, be able to upgrade that same computer to a Pentium 4 or AMD processor.
- Even if you decide to get a different motherboard along with your new processor, you may not be able to use your current memory. You will need to check to make sure that your memory can be used on the new motherboard or buy new memory as well.
- For the most part, components like disk drives, video cards, and modems will work just fine with the various motherboards and processors that support Windows XP. Nonetheless, you should always check to make sure before upgrading.

Tip

Unless you are the type who must have the latest and greatest technology, the most cost-effective processor upgrade is usually only one or two steps below the current leader. For example, if a 2GHz Pentium 4 is the current speed leader, you will probably notice a sharp price difference between it and the next fastest processor. From the next fastest down, you will usually notice a more regular price difference.

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PERFORMANCE
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Microsoft® Windows® XP

UNLEASHED

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Terry W. Ogletree travels the world, consulting with major corporations on many computer topics, from disaster recovery to operating systems. His clients include Bristol-Myers Squibb, Digital Equipment, and AT&T. Terry is well known for his magazine articles and his devotion to writing computer books. Recent publications include *Windows NT Server 4.0 Networking*, *Practical Firewalls*, and *Upgrading and Repairing Networks, Second Edition*.

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