

Installing and Upgrading Windows

In this chapter, you will learn how to

- Identify and implement pre-installation tasks
- Install and upgrade Windows 2000, Windows XP, and Windows Vista
- Troubleshoot installation problems
- Identify and implement post-installation tasks
- Explain the structures created during the installation process

An *operating system* (OS) provides the fundamental link between the user and the hardware that makes up the PC. Without an operating system, all of the greatest, slickest PC hardware in the world is but so much copper, silicon, and gold wrapped up as a big, beige paperweight (or, if you're a teenaged boy, a big, gleaming, black paperweight with a window and glowing fluorescent lights, possibly shaped like a robot). The operating system creates the interface between human and machine, enabling you to unleash the astonishing power locked up in the sophisticated electronics of the PC to create amazing pictures, games, documents, business tools, medical miracles, and much more.

This chapter takes you through the processes for installing and upgrading Windows. It starts by analyzing the pre-installation tasks, steps not to be skipped by the wise tech. The bulk of the chapter comes in the second section, where you'll learn about installing and upgrading Windows 2000, XP, and Vista. Not all installations go smoothly, so section three looks at troubleshooting installation issues. Section four walks you through the typical post-installation tasks. The chapter finishes by examining what you've created in the installation process, such as where the various operating system (OS) files reside and how they interact to create a seamlessly booting new installation of Windows.

Essentials

Preparing for Installation or Upgrade

Installing or upgrading an OS is like any good story: it has a beginning, a middle, and an end. In this case, the beginning is the several tasks you need to do before you actually do the installation or upgrade. If you do your homework here, the installation process is a breeze, and the post-installation tasks are minimal.



EXAM TIP This chapter has no Practical Application section, but don't let that lull you into skimming. The CompTIA A+ exams don't test you directly on the basics of installation, but you need to understand installation and installation troubleshooting to understand the types of questions you'll be asked on the exams.

Don't get discouraged at all of the preparation tasks. They usually go pretty fast, and skipping them can cause you gobs of grief later when you're in the middle of installing and things blow up. Well, maybe there isn't a real explosion, but the computer might lock up and refuse to boot into anything usable. With that in mind, look at the nine tasks you need to complete *before* you insert that CD or DVD. Here's the list; discussion follows:

1. Identify hardware requirements.
2. Verify hardware and software compatibility.
3. Decide what type of installation to perform.
4. Determine how to back up and restore existing data, if necessary.
5. Select an installation method.
6. Determine how to partition the hard drive and what file system to use.
7. Determine your computer's network role.
8. Decide on your computer's language and locale settings.
9. Plan for post-installation tasks.

Identify Hardware Requirements

Hardware requirements help you decide whether a computer system is a reasonable host for a particular operating system. Requirements include the CPU model, the amount of RAM, the amount of free hard disk space, and the video adapter, display, and storage devices that may be required to install and run the operating system. They are stated as minimums or, more recently, as recommended minimums. Although you could install an operating system on a computer with the old minimums that Microsoft published, they were not realistic if you wanted to actually accomplish work. With the last few versions of Windows, Microsoft has published recommended minimums that are

much more realistic. You will find the published minimums on the packaging and at Microsoft's Web site (www.microsoft.com). Later in this chapter, I'll also tell you what I recommend as minimums for Windows 2000, Windows XP, and Windows Vista.

Verify Hardware and Software Compatibility

Assuming your system meets the requirements, you next need to find out how well Windows supports the brand and model of hardware and application software you intend to use under Windows. You have two basic sources for this information: Microsoft and the manufacturer of the device or software. How do you actually access this information? Use the Web!

If you're installing Windows XP or Vista, the Setup Wizard automatically checks your hardware and software and reports any potential conflicts. But please don't wait until you are all ready to install to check this out. With any flavor of Windows, *first do your homework*.

Microsoft goes to great lengths to test any piece of hardware that might be used in a system running Windows through their *Windows Logo'd Products List* (Figure 14-1). This list, formerly known as the *Hardware Compatibility List (HCL)*, is the definitive authority as to whether your component is compatible with the OS. Every component listed on

The screenshot shows a Microsoft Internet Explorer window with the following details:

- Title Bar:** Products Designed for Microsoft Windows – Windows Catalog, Windows Vista Compatibility Center, - Windows Internet Explorer
- Address Bar:** http://www.microsoft.com/whdc/hcl/default.mspx
- Toolbar:** Favorites, Suggested Sites, Get More Add-ons, Back, Forward, Stop, Refresh, Home, Page, Safety, Tools, Help.
- Page Content:**
 - Header:** Products Designed for Microsoft Windows – Win...
 - Search Bar:** Search Microsoft.com, bing
 - Navigation:** United States Change | All Microsoft Sites
 - Left Sidebar:** Windows Hardware Developer Central, HCL Home, Microsoft Support, Windows Logo'd Product List, Windows Vista Compatibility Center, Microsoft Hardware Innovation.
 - Main Content:** Products Designed for Microsoft Windows – Windows Catalog, Windows Vista Compatibility Center, and Windows Logo'd Product List. Updated: November 5, 2008.
 - Table:** A grid showing compatibility for different Windows editions:

Windows Vista	See the Windows Vista Compatibility Center
Windows XP	See the Windows XP Hardware Compatibility List
Windows Server 2008, Windows Server 2003, Windows 2000 Server, Windows 2000 Professional	See the Windows Server Catalog
Legacy & Windows Me, Windows 98	Windows NT 4.0 Windows 98 Windows Me
 - Bottom Links:** For product support life-cycle information, see [Windows Life-Cycle Policy](#).
Looking for drivers and updates?
Go to [Microsoft Update](#) for downloads--plus the latest updates for Office and other Microsoft applications.
Go to [Windows Vista Compatibility Center](#) for the latest driver upgrades from hardware manufacturers.
 - Footer:** Need help with your PC?

Figure 14-1 Windows Logo'd Products List

the Windows Logo'd Products List Web site has been extensively tested to verify that it works with Windows XP, Windows Vista, or Windows 7 and is guaranteed by Microsoft to work with your installation. The URL for the Windows Logo'd Products List is www.microsoft.com/whdc/hcl/default.mspx. Sadly, Microsoft no longer maintains a compatibility list specifically for Windows 2000, but in general, products compatible with XP will also be compatible with 2000.



NOTE You'll occasionally hear the HCL or Windows Logo'd Products List referred to as the Windows Catalog. The Windows Catalog was a list of supported hardware Microsoft would add to the Windows installation CD. The Windows Logo'd Products List Web site is the modern tech's best source, so use that rather than any printed resources.

When you install a device that's not been tested by Microsoft, a rather scary screen appears (Figure 14-2). This doesn't mean the component won't work, only that it's not been tested. Not all component makers go through the rather painful process of getting the Microsoft approval so they can list their component in the Windows Logo'd Product List. As a general rule, unless the device is more than five years old, go ahead and install it. If it still doesn't work, you can simply uninstall it later.

Figure 14-2
Untested device
in Windows XP



Don't panic if you don't see your device on the list; many supported devices aren't on it. Check the optical discs that came with your hardware for proper drivers. Better yet, check the manufacturer's Web site for compatible drivers. Even when the Windows Logo'd Products List lists a piece of hardware, I still make a point of checking the manufacturer's Web site for newer drivers.

When preparing to upgrade, check with the manufacturers of the applications already installed in the previous OS. If there are software compatibility problems with the versions you have, the manufacturer should provide upgrade packs that you can install during the Windows setup process.

Decide What Type of Installation to Perform

You can install Windows in several ways. A *clean installation* of an OS involves installing it onto an empty hard drive with no previous OS installed. An *upgrade installation* means installing an OS on top of an earlier installed version, thus inheriting all previous hardware and software settings. You can combine versions of Windows by creating a *multiboot installation*. Installing usually involves some sort of optical disc, but other methods also exist. Let's look at all the options.



EXAM TIP CompTIA tests you on knowing how to upgrade a Windows 9x or Windows NT system to Windows 2000 or Windows XP and how to upgrade from Windows XP to Windows Vista. You do not need to know about Windows 9x or NT for the tests, but you do need to know how to upgrade them.

Clean Installation

A clean installation usually begins with a completely empty hard disk. The advantage to doing a clean installation is that you don't carry problems from the old OS over to the new one, but the disadvantage is that you have to reinstall all applications and reconfigure the desktop and each application to the user's preferences. You perform a clean installation by resetting your CMOS to tell the system to boot from the optical drive before your hard drive. You then boot off of a Windows installation disc, and Windows gives you the opportunity to partition and format the hard drive and then install Windows.

Upgrade Installation

In an upgrade installation, the new OS installs into the same folders as the old OS, or in tech speak, the new installs *on top of* the old. The new OS replaces the old OS but retains all saved data and inherits all of the previous settings (such as font styles, desktop colors and background, and so on), hardware, and applications. You don't have to reinstall your favorite programs!



TIP Before starting an OS upgrade, make sure you have shut down all other open applications!

To begin the upgrade of Windows, you must run the appropriate program from the optical disc. This usually means inserting a Windows installation disc into your system while your old OS is running, which starts the installation program. Then, to do an upgrade, you indicate that the new version of Windows should install into a directory that already contains an installation of Windows (it will do this by default). You will be asked whether it is an upgrade or a new installation; if you select new installation, it will remove the existing OS before installing.

If for some reason the Windows 2000 or Windows XP installation program doesn't start automatically, go to My Computer, open the installation disc, and locate WINNT32.EXE.

This program starts an upgrade to Windows 2000 or XP. In Windows Vista, open the disc in Windows Explorer and run Setup.exe in the disc's root directory, which starts the Vista upgrade.

Multiboot Installation

A third option that you need to be aware of is the dual boot or multiboot installation. Both Windows 2000 and Windows XP can install in a separate folder from your existing copy of Windows so you can put both operating systems on the same partition. Then every time your computer boots, you'll get a menu asking you which version of Windows you wish to boot. Multiboot requires that you format your active partition with a file system that every operating system you install can use. This hasn't been much of a problem since the Windows 9x family stopped being relevant, because there's really no reason to use anything other than NTFS. Windows Vista doesn't let you define its install folder, so to multiboot Vista and XP, for example, you'd need to install each OS on a different partition.



NOTE When configuring a computer for multibooting, there are two basic rules: first, you must format the system partition in a file system that is common to all installed operating systems, and second, you must install the operating systems in order from oldest to newest.

Other Installation Methods

In medium to large organizations, more advanced installation methods are often employed, especially when many computers need to be configured identically. A common method is to place the source files in a shared directory on a network server. Then, whenever a tech needs to install a new OS, it is a simple task of booting up the computer, connecting to the source location on the network, and starting the installation from there. This method alone has many variations and can be automated with special scripts that automatically select the options and components needed. The scripts can even install the necessary applications at the end of the OS installation—all without user intervention once the installation has been started.



TIP Scripting OS and application installations is a full-time job in many organizations. Many scripting tools and methods are available from both Microsoft and third-party sources.

Another type of installation that is very popular for re-creating standard configurations is an *image installation*. An image is a complete copy of a hard disk volume on which an operating system and, usually, all required application software programs have been preinstalled. Images can be stored on optical discs, in which case the tech runs special software on the computer that copies the image onto the local hard drive. Images can also be stored on special network servers, in which case the tech connects to the image server by using special software and copies the image from the server to the

local hard drive. A leader in this technology has been Norton Ghost, which is available from Symantec. Other similar programs are Clonezilla and Acronis's True Image.

Beginning with Windows 2000 Server, Microsoft added *Remote Installation Services (RIS)*, which can be used to initiate either a scripted installation or an installation of an image.

Determine How to Back Up and Restore Existing Data, If Necessary

Whether you are installing or upgrading, you may need to back up existing user data first, because things can go very wrong either way, and the data on the hard drive might be damaged. You'll need to find out where the user is currently saving data files. If they are saving onto the local hard drive, it must be backed up before the installation or replacement takes place, to preserve the data. However, if all data has been saved to a network location, you are in luck, because the data is safe from damage during installation.

If the user saves data locally, and the computer is connected to a network, save the data, at least temporarily, to a network location until after the upgrade or installation has taken place. If the computer is not connected to a network but the computer has a burnable optical drive, copy the data to DVDs. You can also use an external hard drive, which is a handy thing for any tech to have. Wherever you save the data, you will need to copy or restore any lost or damaged data back to the local hard disk after the installation.

If you plan to migrate a user from one system to another, here's where you might start the process by running the Files and Settings Transfer Wizard (Windows XP) or Windows Easy Transfer (Windows Vista). You'll complete that process during the post-installation tasks. Rather than discuss the process twice, I leave the full discussion on migration for the "Post-Installation Tasks" section later in this chapter.

Select an Installation Method

Once you've backed up everything important, you need to select an installation method. You have two basic choices: insert the installation disc into the drive and go, or install over a network. The latter method falls into the realm of CompTIA Network+ technicians or even network administrators, so this book assumes you'll install from disc.

Determine How to Partition the Hard Drive and What File System to Use

If you are performing a clean installation, you need to decide ahead of time how to partition the disk space on your hard disk drive, including the number and size of partitions and the file system (or systems) you will use. Actually, in the decision process, the file system comes first, and then the space issue follows, as you will see.

This was a much bigger issue back in the days when older operating systems couldn't use newer file systems, but now that every Windows OS that you could reasonably want to install supports NTFS, there's really no reason to use anything else. You still might have a reason to partition your drive, but as for choosing a file system, your work is done for you.

Determine Your Computer's Network Role

The question of your computer's network role comes up in one form or another during a Windows installation. A Windows computer can have one of several roles relative to a network (in Microsoft terms). One role, called *standalone*, is actually a non-network role, and it simply means that the computer does not participate on a network. You can install any version of Windows on a standalone computer, and this is the only role that a Windows XP Home computer can play on a network. Every other modern version of Windows can be a member of either a workgroup or a domain (or, if you're using Windows 7, a HomeGroup). You will learn more about the workgroup and domain member roles in Chapter 23, "Local Area Networking."

Decide on Your Computer's Language and Locale Settings

These settings are especially important for Windows operating systems because they determine how date and time information is displayed and which math separators and currency symbols are used for various locations.

Plan for Post-Installation Tasks

After installing Windows, you may need to install the latest service pack or updates. You may also need to install updated drivers and reconfigure any settings, such as network settings, that were found not to work. You will also need to install and configure any applications (word processor, spreadsheet, database, e-mail, games, etc.) required by the user of the computer. Finally, don't forget to restore any data backed up before the installation or upgrade.

Installing and Upgrading Windows

At the most basic level, installing any operating system follows a fairly standard set of steps. You turn on the computer, insert an operating system disc into the optical drive, and follow the installation wizard until you have everything completed. Along the way, you'll accept the *End User License Agreement (EULA)* and enter the product key that says you're not a pirate; the product key is invariably located on the installation disc's case. At the same time, there are nuances between installing Windows 2000 or upgrading to Windows Vista that every CompTIA A+ certified tech must know, so this section goes through many installation processes in some detail.

Installing or Upgrading to Windows 2000 Professional

On the face of it, installing Windows 2000 Professional seems fairly simple. You insert the installation disc, access the setup routine, and go! But that conceptualization does not hold up in practice.

Hardware Requirements

The minimum specs represent what Microsoft says you need so you can install the Windows 2000 Professional OS. However, you need to take these specifications and at least double them if you want to be happy with your system's performance.

Here is a more realistic recommendation for a useful Windows 2000 Professional computer system:

Component	Minimum for a Windows 2000 Professional Computer	Recommended for a Windows 2000 Professional Computer
CPU	Intel Pentium 133 MHz	Intel Pentium II 350 MHz
Memory	64 MB	128 MB
Hard disk	2 GB with 650 MB of free space	6.4 GB with 2 GB of free space
Network	None	Modern network card
Display	Video adapter and monitor with VGA resolution	Video adapter and monitor with SVGA resolution, capable of high-color (16-bit) display
Optical drive	If you don't have an optical drive, you must use a floppy disk drive or install over a network.	If you don't have an optical drive, you must use a floppy disk drive or install over a network.

If your test system(s) exceeds the recommended configuration, all the better. You can never have too fast a processor or too much hard disk space.

Installing or Upgrading to Windows XP Professional

You prepare for installing Windows XP just as you do for installing Windows 2000. Windows XP has a few different aspects to it that are worth considering as a separate issue.

Upgrade Paths

You can upgrade to Windows XP Professional from all of the following versions of Windows:

- Windows 98 (all versions)
- Windows Me
- Windows NT 4.0 Workstation (Service Pack 5 and later)
- Windows 2000 Professional (including service packs)
- Windows XP Home Edition

XP Hardware Requirements

Hardware requirements for Windows XP Professional are higher than for previous versions of Windows, but are still very low by modern hardware standards.

Microsoft XP runs on a wide range of computers, but you need to be sure that your computer meets the minimum hardware requirements as shown here. Also shown is my recommended minimum for a system running a typical selection of business productivity software.

Component	Minimum for a Windows XP Computer	Recommended for a Windows XP Computer
CPU	Any Intel or AMD 233 MHz or higher processor	Any Intel or AMD 300 MHz or higher processor
Memory	64 MB of RAM (though Microsoft admits XP will be somewhat crippled with only this amount)	512 MB of RAM or higher
Hard disk	1.5 GB of available hard drive space	4 GB of available hard drive space
Network	None	Modern network card
Display	Video card that supports SVGA with at least 800 × 600 resolution	Video card that supports DirectX with at least 1024 × 768 resolution
Optical drive	Any CD- or DVD-media drive	Any CD- or DVD-media drive

Hardware and Software Compatibility

You'll need to check hardware and software compatibility before installing Windows XP Professional—as either an upgrade or a new installation. Of course, if you purchase a computer with Windows XP preinstalled, you're spared this task, but you'll still need to verify that the application software you plan to add to the computer will be compatible. Luckily, Microsoft includes the Upgrade Advisor on the Windows XP disc.

Upgrade Advisor You would be hard-pressed these days to find a computer incapable of running Windows XP, but if you are ever uncertain about whether a computer you excavated at an archeological dig can run XP, fear not! The *Upgrade Advisor* is the first process that runs on the XP installation disc. It examines your hardware and installed software (in the case of an upgrade) and provides a list of devices and software that are known to have issues with XP. Be sure to follow the suggestions on this list.

You can also run the Upgrade Advisor separately from the Windows XP installation. You can run it from the Windows XP disc. Microsoft used to offer the XP Upgrade Advisor on its Web site, but searching for it now will just redirect you to the Vista Upgrade Advisor (more on that later), so running it from the disc is the way to go nowadays. Here are the steps.

1. Insert the Windows XP installation disc. If Autorun is enabled, the Welcome to Microsoft Windows XP screen appears. If this does not appear, select Start | Run, enter the following, and then click OK:
`d:\SETUP.EXE`
 (Where *d* is the drive letter for the optical drive.)
2. At the Welcome to Microsoft Windows XP screen, select Check System Compatibility to start the Upgrade Advisor. On the following page, select Check My System Automatically.

3. In the Upgrade Advisor dialog box, select the first choice if you have an Internet connection. If you don't have an Internet connection, select No, Skip This Step and Continue Installing Windows. (Don't worry, you aren't really going to install yet.)
4. Click Next. The Upgrade Advisor shows the tasks that Dynamic Update is performing, and then it restarts Setup.
5. After Setup restarts, you'll be back at the same page in the Upgrade Advisor. This time, select No, Skip This Step and Continue Installing Windows, and click Next. The Upgrade Report page appears next. You can save the information in a file by clicking Save As and selecting a location.
6. Read the findings that the Upgrade Advisor presents. If a problem was found, click the Full Details button for instructions, and be sure to follow them. When you have recorded any necessary instructions, click Finish.

Booting into Windows XP Setup

The Windows XP discs are bootable, and Microsoft no longer includes a program to create a set of setup boot disks. This should not be an issue, because PCs manufactured in the past several years can boot from the optical drive. This system BIOS setting, usually described as boot order, is controlled through a PC's BIOS-based Setup program.

In the unlikely event that your lab computer can't be made to boot from its optical drive, you can create a set of six (yes, six!) Windows XP setup boot floppy disks by using a special program you can download from Microsoft's Web site. Note that Microsoft provides separate boot disk programs for XP Home and XP Pro.

Registration Versus Activation

During setup, you will be prompted to register your product and activate it. Many people confuse activation with registration, but these are separate operations. *Registration* tells Microsoft who the official owner or user of the product is, providing contact information such as name, address, company, phone number, and e-mail address. Registration is still entirely optional. Activation is a way to combat software piracy, meaning that Microsoft wishes to ensure that each license for Windows XP is used solely on a single computer. It's more formally called *Microsoft Product Activation (MPA)*.

Mandatory Activation Within 30 Days of Installation Activation is mandatory, but you can skip this step during installation. You have 30 days in which to activate the product, during which time it works normally. If you don't activate it within that time frame, it will be disabled. Don't worry about forgetting, though, because once it's installed, Windows XP frequently reminds you to activate it with a balloon message over the tray area of the taskbar. The messages even tell you how many days you have left.

Activation Mechanics Here's how product activation works. When you choose to activate, either during setup or later when XP reminds you to do it, an installation ID code is created from the product ID code that you entered during installation and a 50-digit value that identifies your key hardware components. You must send this code to Microsoft, either automatically if you have an Internet connection or verbally via a phone call to Microsoft. Microsoft then returns a 42-digit product activation code. If you are activating online, you don't have to enter the activation code; it happens automatically.

If you are activating over the phone, you must read the installation ID to a representative and enter the resulting 42-digit activation code into the Activate Windows by Phone dialog box.

No personal information about you is sent as part of the activation process. Figure 14-3 shows the dialog box that opens when you start activation by clicking on the reminder message balloon.

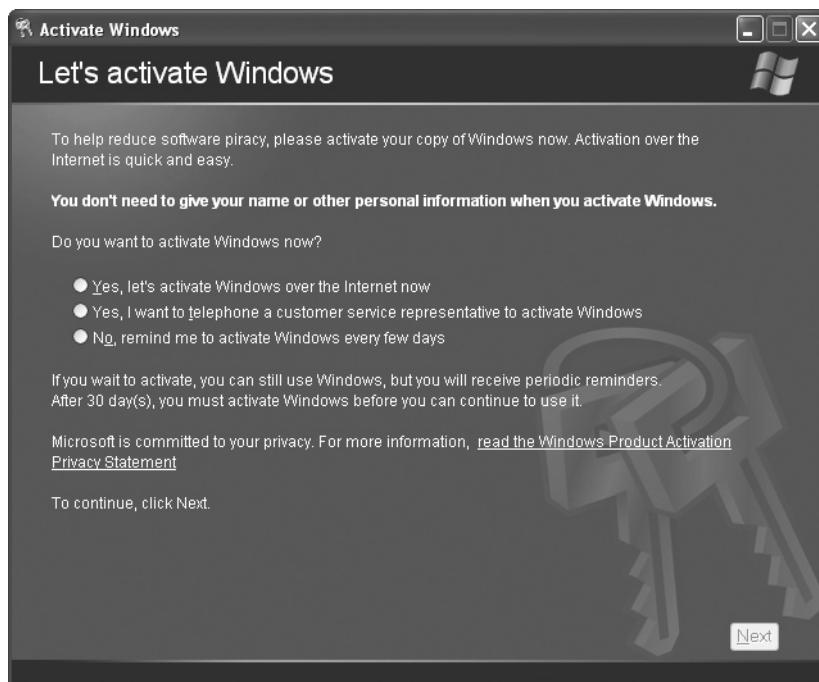


Figure 14-3 Activation takes just seconds with an Internet connection.

Installing or Upgrading to Windows Vista

Preparing for a Windows Vista installation is not really different from preparing for a Windows 2000 or XP install. There are, of course, a few things to consider before installing or upgrading your system to Vista.

Upgrade Paths

Windows Vista is persnickety about doing Upgrade installs with different editions; although you can upgrade to any edition of Vista from any version of Windows XP, many upgrade paths will require you to do a clean installation of the Vista operating system. Note that you cannot upgrade from Windows 2000 to Vista, but must do a clean installation. Vista's upgrade paths are so complicated that the only way to really explain them is using a grid showing the OS you're trying to upgrade from and the edition of

Vista you're upgrading to. Fortunately for you, Microsoft provides such a grid, which I've re-created in Table 14-1.

	Vista Home Basic	Vista Home Premium	Vista Business	Vista Ultimate
XP Professional	Clean Install	Clean Install	Upgrade Install	Upgrade Install
XP Home	Upgrade Install	Upgrade Install	Upgrade Install	Upgrade Install
XP Media Center	Clean Install	Upgrade Install	Clean Install	Upgrade Install
XP Tablet PC	Clean Install	Clean Install	Upgrade Install	Upgrade Install
XP Professional x64	Clean Install	Clean Install	Clean Install	Clean Install
Windows 2000	Clean Install	Clean Install	Clean Install	Clean Install

Table 14-1 Vista's labyrinthine upgrade paths.

Hardware Requirements

Windows Vista requires a substantially more powerful computer to run than Windows 2000 or XP. Make sure your computer meets at least the following minimum hardware requirements suggested by Microsoft, though it would be far better to meet my recommended requirements:

Component	Minimum for a Windows Vista Computer	Recommended for a Windows Vista Computer
CPU	1 GHz 32-bit (x86) or 64-bit (x64) processor	Any dual-core Intel or AMD processor or better
Memory	512 MB of RAM for Vista Basic (for all other editions, 1 GB of RAM)	2 GB of RAM or higher
Hard disk	20 GB hard drive with 15 GB of available hard drive space for Vista Basic (for all other editions, 40 GB hard drive with 15 GB of free space)	100 GB hard drive or greater
Network	Modern network card with Internet access	Modern network card with Internet access
Display	Support for DirectX 9 graphics and 32 MB of graphics memory for Vista Basic (for all other editions, 128 MB of graphics memory, plus pixel shader 2.0 support, the WDDM driver, and 32 bits per pixel)	DirectX 10 capable graphics card with at least 512 MB of graphics memory
Optical drive	Any DVD-media drive	Any DVD-media drive

If you're uncertain about whether your computer will run Vista, you can download and run the Windows Vista Upgrade Advisor from www.microsoft.com/windows/windows-vista/get/upgrade-advisor.aspx, which will tell you if your computer meets Microsoft's minimum requirements.



EXAM TIP The CompTIA exams are likely to test your knowledge regarding the minimum installation requirements for Windows Vista Home Basic, Home Premium, Business, or Ultimate. Know them well!

Hardware and Software Compatibility

Windows Vista is markedly different from Windows XP in many very basic, fundamental ways, and this causes all sorts of difficulty with programs and device drivers designed for Windows XP. When Vista came out, you probably heard a lot of people grumbling about it, and likely they were grumbling about hardware and software incompatibility. Simply put, a lot of old programs and devices don't work in Windows Vista, which is bad news for people who are still running Microsoft Word 97.

Fortunately, Microsoft offers a Windows Vista Compatibility Center where you can check whether a piece of software or hardware will work with Vista. Most programs developed since Vista's release in 2007 should work, but checking the compatibility of any programs you absolutely cannot do without is always a good idea.



NOTE Software incompatibility in Vista was such a problem for many corporate customers and end users that Microsoft is including a Windows XP Mode in the higher-end editions of Windows 7, enabling most Windows XP programs to be run despite the different OS.

Upgrading Issues

A few extra steps before you pop in that installation disc are worth your time. If you plan to upgrade rather than perform a clean installation, follow these steps first:

1. Check out the Windows Logo'd Product List site or the Windows Vista Compatibility Center site, or run a compatibility report by using the Check Upgrade utility provided with Windows 2000 Professional or the Upgrade Advisor for Windows XP or Vista, depending on which OS you're planning on installing. These utilities generate a detailed list of potentially problematic devices and applications. You can run the utility in both 2000 and XP as follows: Insert the Windows Installation disc and, from your current OS, open a command prompt or use the Start Run dialog box to run the WINNT32.EXE program with the CHECKUPGRADEONLY switch turned on. The command line will look like this:
`d:\i386\winnt32 /checkupgradeonly` (where *d:* is the optical drive).
2. Have an up-to-date backup of your data and configuration files handy.
3. Perform a "spring cleaning" on your system by uninstalling unused or unnecessary applications and deleting old files.
4. Perform a disk scan and a disk defragmentation.
5. Uncompress all files, folders, and partitions.
6. Perform a virus scan, and then remove or disable all virus-checking software.

7. Disable virus checking in your system CMOS.
8. Keep in mind that if worse comes to worst, you may have to start over and do a clean installation anyway. This makes step 2 exceedingly important. Back up your data!

The Windows 2000/XP Clean Installation Process

The steps involved in a clean installation of Windows 2000 Professional and Windows XP are virtually identical. The only differences are the order of two steps and some of the art on the screens that appear, so we can comfortably discuss both installations at the same time.

NOTE Not all screens in the installation process are shown!



A clean installation begins with your system set to boot to your optical drive and the Windows installation disc in the drive. You start your PC, and assuming you have the boot order right, the installation program starts booting (Figure 14-4). Note at the bottom that it says to press F6 for a third-party SCSI or RAID driver. You only do this if you want to install Windows onto a strange drive and Windows does not already have the driver for that drive. Don't worry about this; Windows has a huge assortment of drivers for just about every hard drive ever made, and in the rare situation where you need a third-party driver, the folks who sell you the SCSI or RAID array will tell you ahead of time.

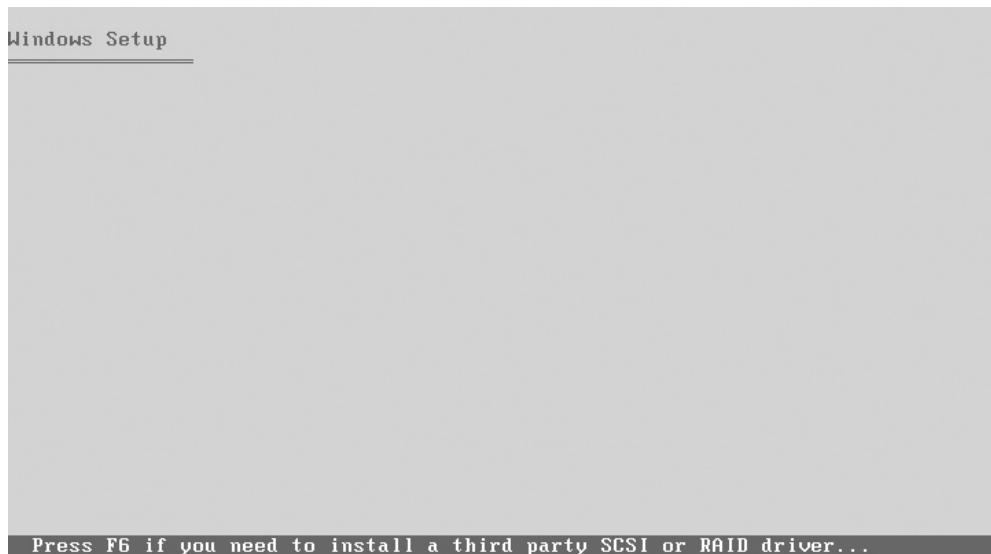


Figure 14-4 Windows Setup text screen

After the system copies a number of files, you'll see the Welcome screen (Figure 14-5). This is an important screen! As you'll see in later chapters, techs often use the Windows installation disc as a repair tool, and this is the screen that lets you choose between installing Windows or repairing an existing installation. Because you're making a new install, just press ENTER.

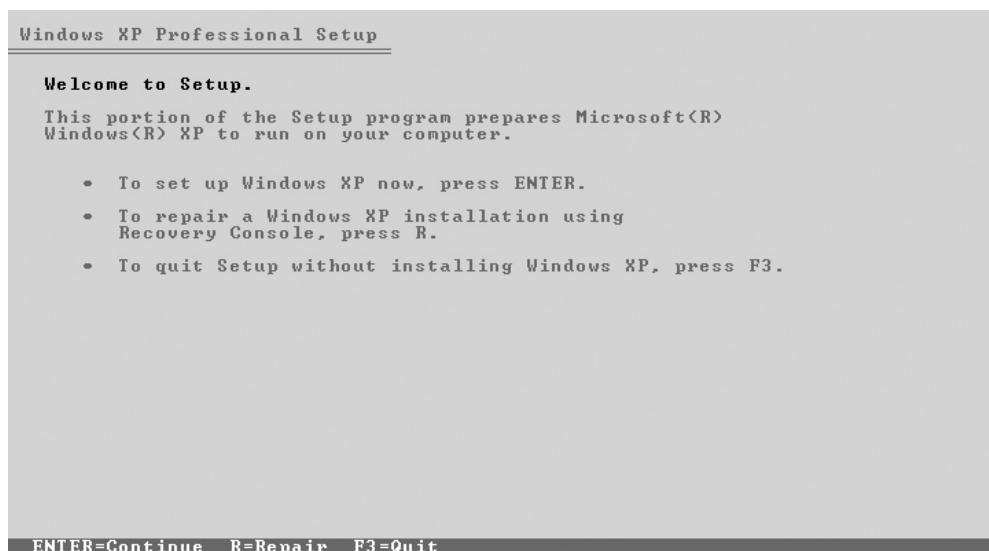


Figure 14-5 Welcome text screen

You're now prompted to read and accept the EULA. Nobody ever reads this—it gives you a stomachache when you see what you're really agreeing to—so just press F8 and move to the next screen to start partitioning the drive (Figure 14-6).

If your hard disk is unpartitioned, you need to create a new partition when prompted. Follow the instructions. In most cases, you can make a single partition, although you can easily make as many partitions as you wish. You can also delete partitions if you're using a hard drive that was partitioned in the past (or if you mess up your partitioning). Note that there is no option to make a primary or extended partition; this tool makes the first partition primary and the rest extended.



NOTE Many techie types, at least those with big (> 500 GB) hard drives, only partition half of their hard drive for Windows. This makes it easy for them to install an alternative OS (usually Linux) at a later date.

After you've made the partition(s), you must select the partition on which to install XP (sort of trivial if you only have one partition), and then you need to decide which file system format to use for the new partition. Unless you have some weird need to support FAT or FAT32, format the partition by using NTFS (Figure 14-7).

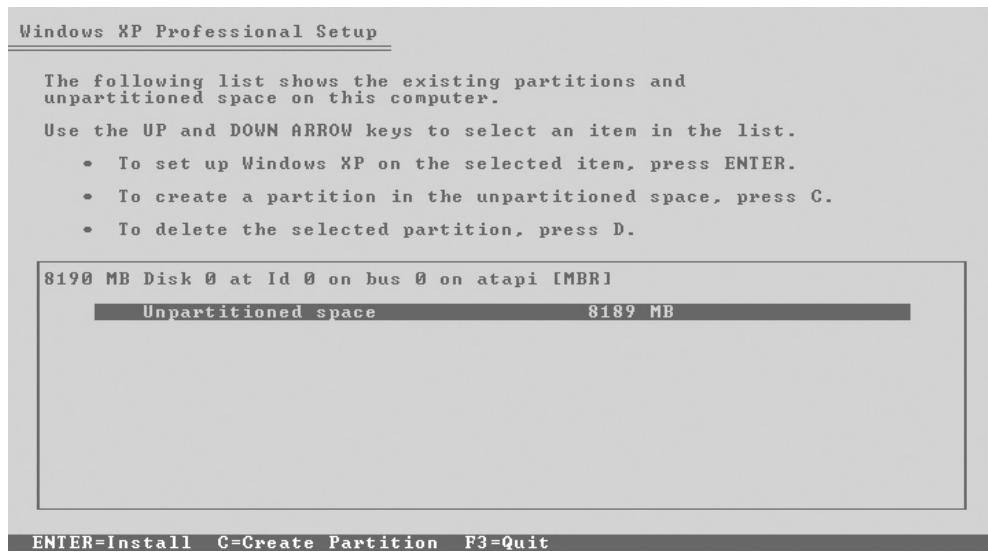


Figure 14-6 Partitioning text screen

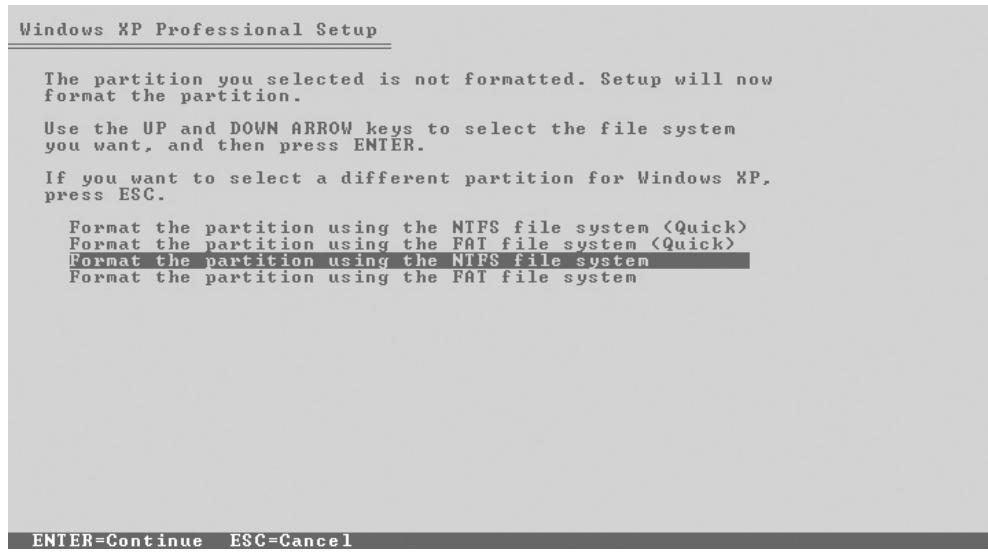


Figure 14-7 Choosing NTFS

Setup now formats the drive and copies some basic installation files to the newly formatted partition, displaying another progress bar. Go get a book to read while you wait.

After it completes copying the base set of files to the hard drive, your computer reboots, and the graphical mode of Windows setup begins. This is where 2000 and XP

begin to vary in appearance, even though they are performing the same steps. The rest of this section shows Windows XP. If you're running a Windows 2000 install, compare it to the screens you see here; it's interesting to see the different presentation doing the same job.

You will see a generic screen during the installation that looks like Figure 14-8. On the left of the screen, uncompleted tasks have a white button, completed tasks have a green button, and the current task has a red button. You'll get plenty of advertising to read as you install.

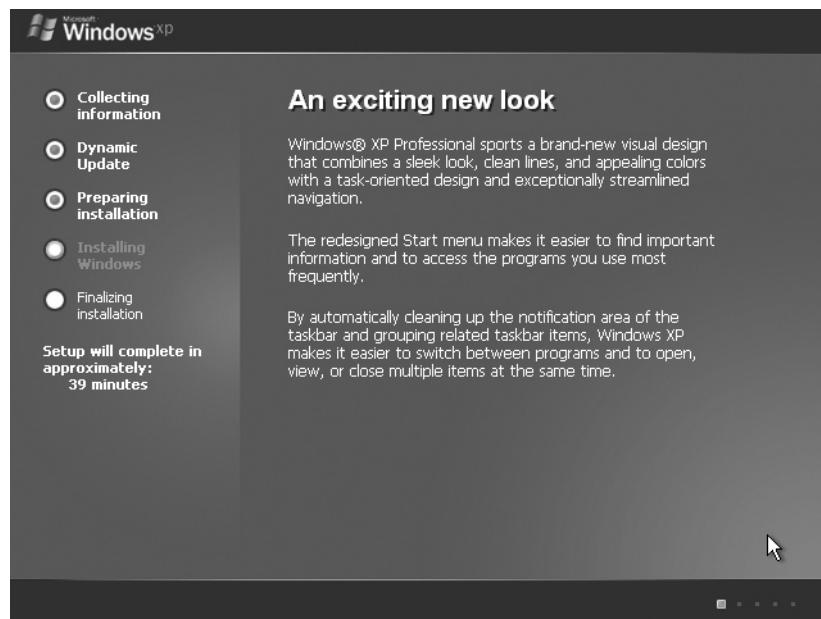


Figure 14-8 Beginning of graphical mode

The following screens ask questions about a number of things the computer needs to know. They include the desired region and language the computer will operate in, your name and organization for personalizing your computer, and a valid *product key* for Windows XP (Figure 14-9). Be sure to enter the product key exactly, or you will be unable to continue.



NOTE Losing your product key is a bad idea! Document it—at least write it on the installation CD-ROM.

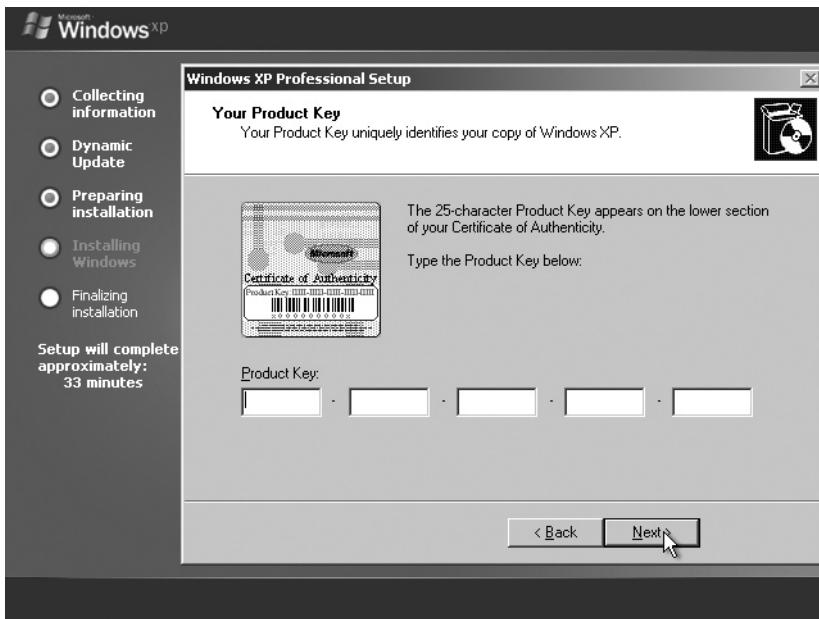


Figure 14-9 Product key

Next, you need to give your computer a name that will identify it on a network. Check with your system administrator for an appropriate name. If you don't have a system administrator, just enter a simple name such as MYPC for now—you can change this at any time—and read up on networking later in this book. You also need to create a password for the Administrator user account (Figure 14-10). Every Windows system has an Administrator user account that can do anything on the computer. Techs will need this account to modify and fix the computer in the future.

Last, you're asked for the correct date, time, and time zone. Then Windows tries to detect a network card. If a network card is detected, the network components will be installed and you'll have an opportunity to configure the network settings. Unless you know you need special settings for your network, just select the Typical Settings option (Figure 14-11). Relax; XP will do most of the work for you. Plus you can easily change network settings after the installation.



NOTE Even experienced techs usually select the Typical Settings option. Installation is not the time to be messing with network details unless you need to.

The big copy of files now begins from the CD-ROM to your hard drive. This is a good time to pick your book up again, because watching the ads is boring (Figure 14-12).

After the files required for the final configuration are copied, XP reboots again. During this reboot, XP determines your screen size and applies the appropriate resolution. This reboot can take several minutes to complete, so be patient.



Figure 14-10 Computer name and Administrator password

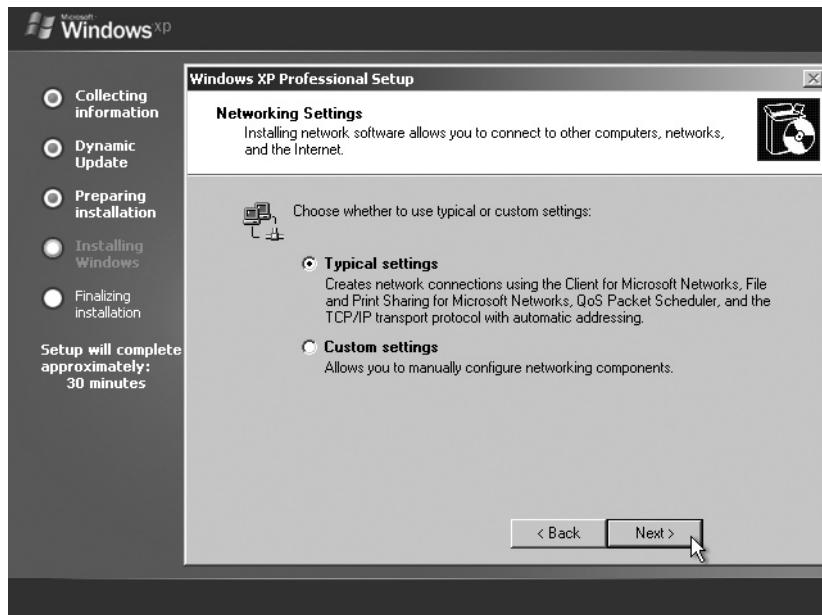


Figure 14-11 Selecting typical network settings

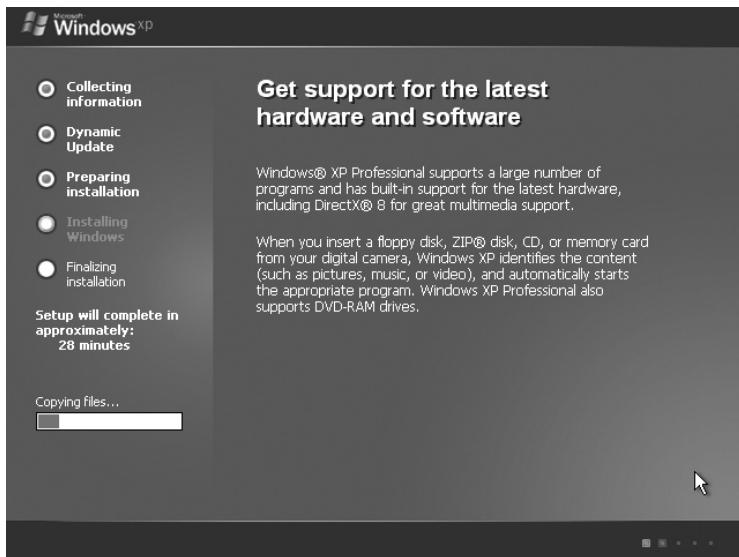


Figure 14-12 The Big Copy

Once the reboot is complete, you can log on as the Administrator. Balloon messages may appear over the tray area of the taskbar—a common message concerns the display resolution. Click the balloon and allow Windows XP to automatically adjust the display settings.

The final message in the installation process reminds you that you have 30 days left for activation. Go ahead and activate now over the Internet or by telephone. It's painless and quick. If you choose not to activate, simply click the Close button on the message balloon. That's it! You have successfully installed Windows XP and should have a desktop with the default Bliss background, as shown in Figure 14-13.

The Windows Vista Clean Installation Process

With Windows Vista, Microsoft has dramatically changed the installation process. No longer will you spend your time looking at a boring blue ASCII screen and entering commands by keyboard—the Vista installer has a full graphical interface, making it easy to partition drives and install your operating system. You already saw some of this process back in Chapter 12, “Implementing Hard Drives,” but this chapter will go into a bit more detail.

Just as when installing Windows 2000 or XP, you need to boot your computer from some sort of Windows installation media. Usually, you’ll use a DVD disc, though you can also install Vista from a USB drive, over a network, or even off of several CD-ROMs that you have to specially order from Microsoft. When you’ve booted into the installer, the first screen you see asks you to set your language, time/currency, and keyboard settings, as in Figure 14-14.

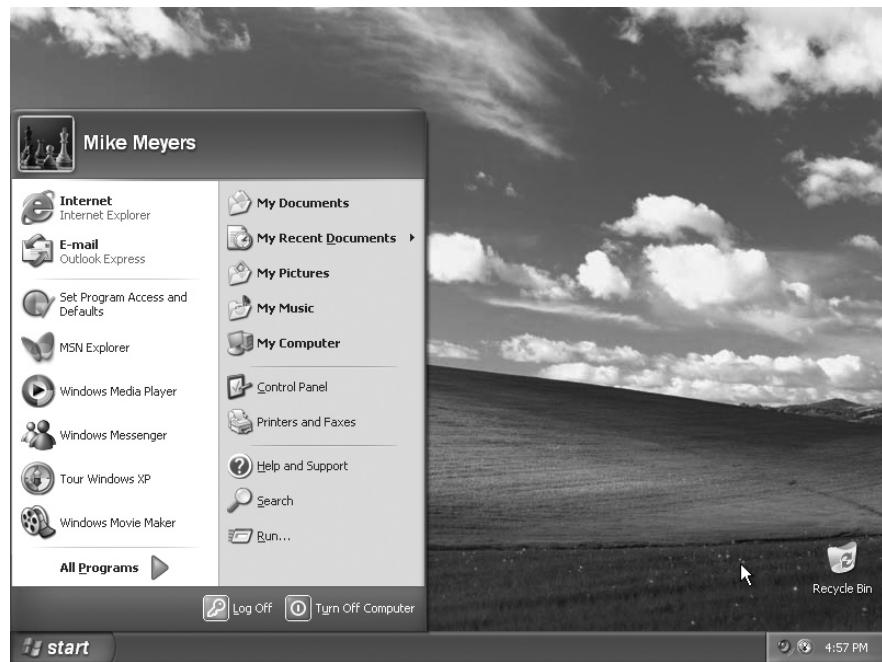


Figure 14-13 Windows XP desktop with Bliss background



Figure 14-14 Windows Vista language settings screen

The next screen in the installation process is somewhat akin to the 2000 and XP Welcome screen, in that it enables techs to use the installation disc's repair tools (Figure 14-15). Just like the completely revamped installer, the Vista repair tools are markedly different from the ones for Microsoft's previous operating systems. You'll learn more about those tools in Chapter 17, "Maintaining and Troubleshooting Windows," but for now all you need to know is that you click where it says *Repair your computer* to use the repair tools. Because you're just installing Windows in this chapter, click *Install now*.



Figure 14-15 The Windows Vista setup Welcome screen

The next screen shows just how wildly different the Vista installation order is. When installing Vista, you enter your product key before you do anything else, as you can see in Figure 14-16. With Windows 2000 and XP, this didn't come until much, much later in the process, and there's a very interesting reason for this change.

Microsoft has dramatically altered the method they use to distribute different editions of their operating system; instead of having different discs for each edition of Windows Vista, every Vista installation disc contains all of the available editions. In Windows 2000 and XP, your product key did very little besides let the installation disc know that you had legitimately purchased the OS. In Vista, your product key not only verifies the legitimacy of your purchase; it also tells the installer which edition you purchased, which, when you think about it, is a lot to ask of a randomly generated string of numbers and letters.

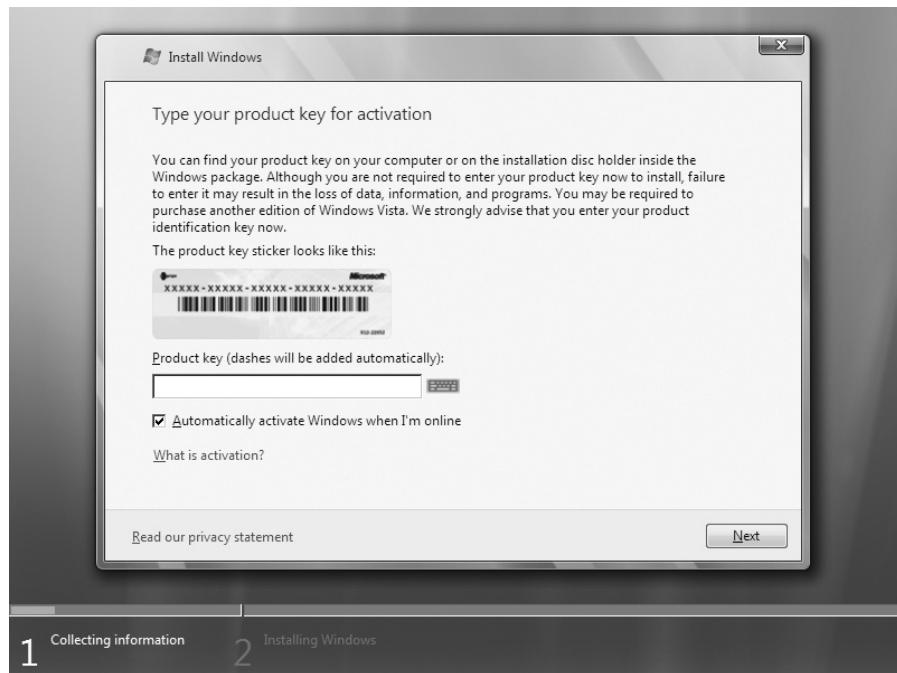


Figure 14-16 The Windows Vista product key screen

If you leave the product key blank and click the Next button, you will be taken to a screen asking you which version of Vista you would like to install (Figure 14-17). Lest you start to think that you've discovered a way to install Vista without paying for it, you should know that doing this simply installs a 30-day trial of the operating system. After 30 days, you will no longer be able to boot to the desktop without entering a valid product key that matches the edition of Vista you installed.

After the product key screen (and in Figure 14-18), you'll find Microsoft's new and improved EULA, which you can skip unless you're interested to see what's changed in the world of obtuse legalese since the release of Windows XP.

On the next page, you get to decide whether you'd like to do an upgrade installation or a clean installation (Figure 14-19). As you learned earlier, you have to begin the Vista installation process from within an older OS to use the Upgrade option, so this option will be dimmed for you if you've booted off of the installation disc. To do a clean installation of Vista, edit your partitions, and just generally install the OS like a pro, you choose the Custom (advanced) option.

You may remember the next screen (Figure 14-20) from Chapter 12, "Implementing Hard Drives." This is the screen where you can partition your hard drives and choose which partition to install Windows to. From this screen, you can click the Advanced button to display a variety of partitioning options, and you can click the Load Driver button to, well, load hard drive drivers (Figure 14-21). The process of loading drivers is

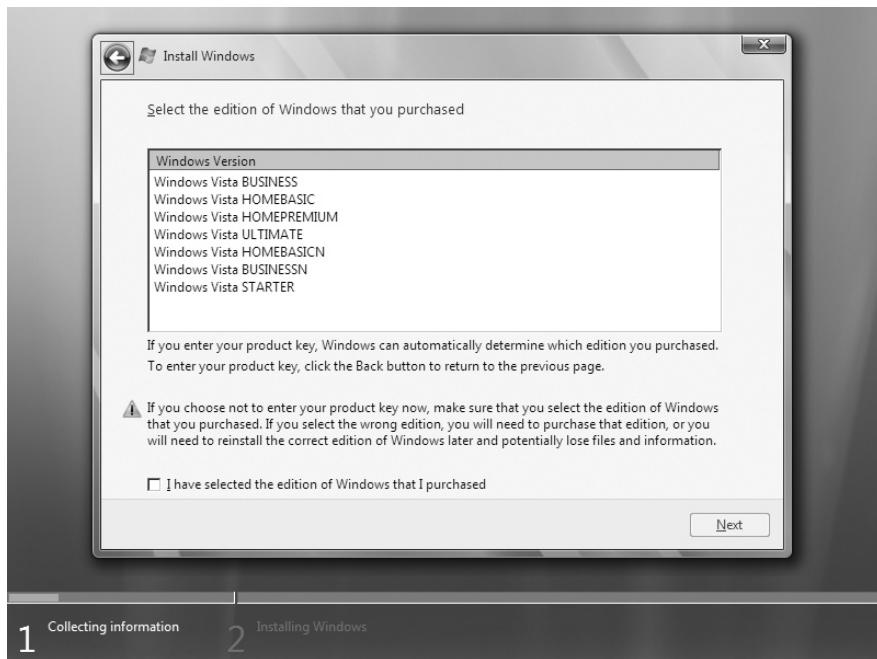


Figure 14-17 Choose the edition of Vista you want to install.

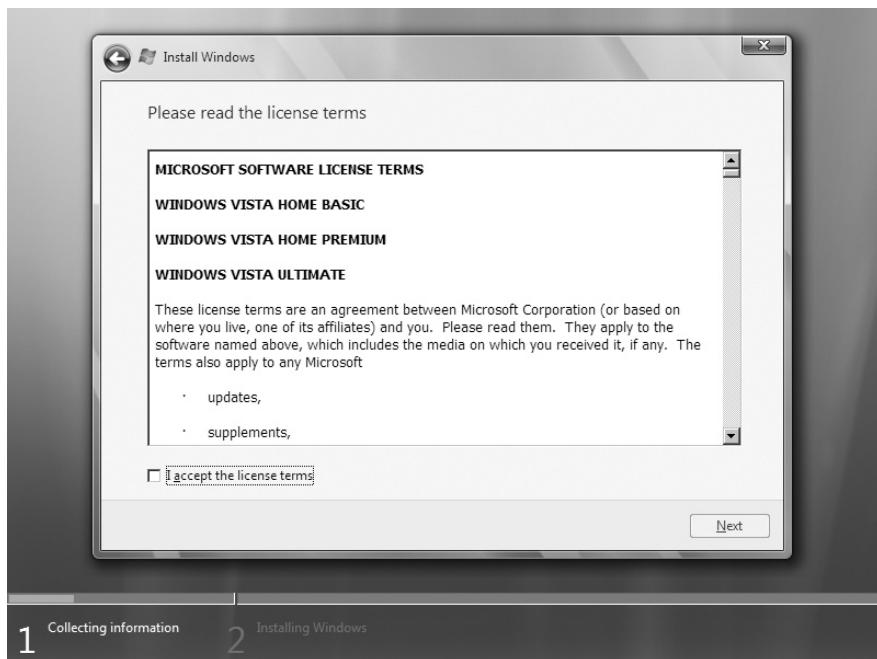


Figure 14-18 The Vista EULA

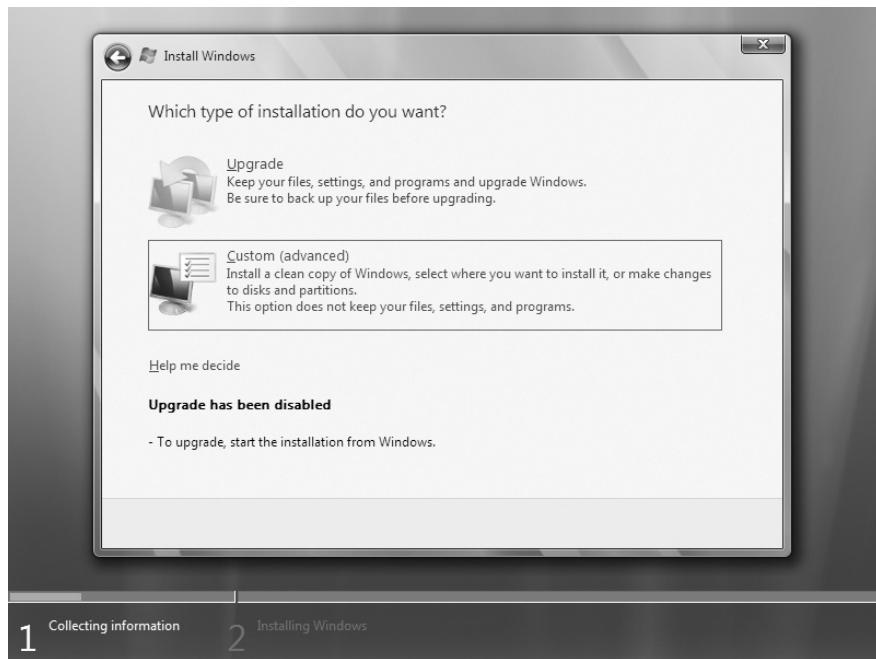


Figure 14-19 Choose your installation type.

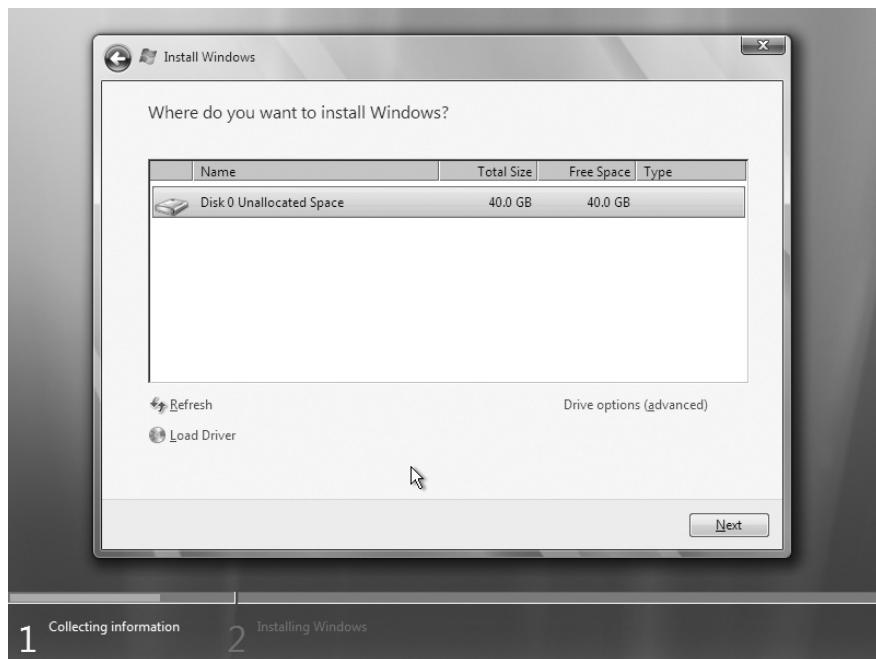


Figure 14-20 The partitioning screen

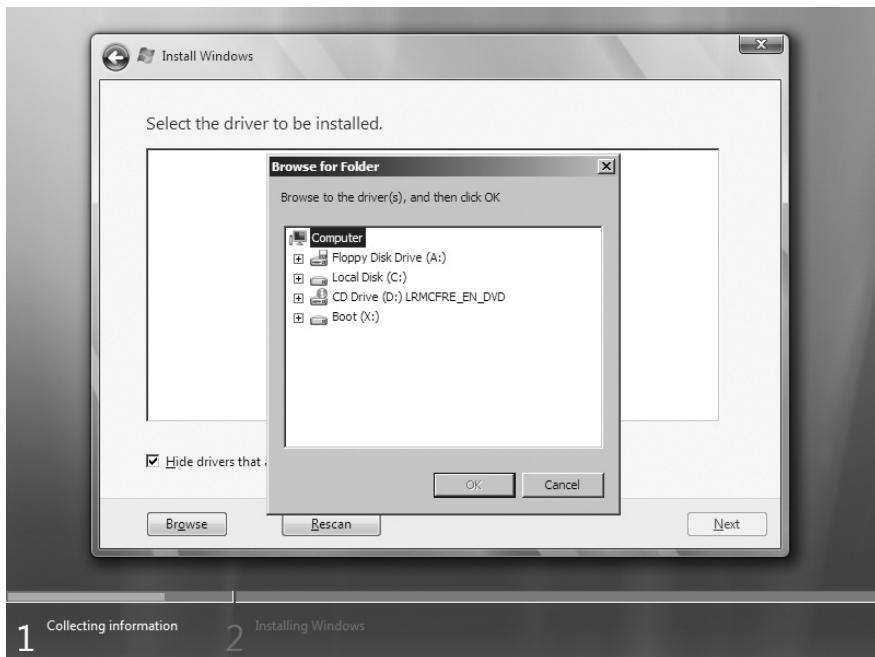


Figure 14-21 Browse for drivers

much more intuitive than in Windows XP and 2000: you just browse to the location of the drivers you want by using Windows' very familiar browsing window.

Of course, you will most likely never have to load drivers for a drive, and if it is ever necessary, your drive will almost certainly come with a driver disc and documentation telling you that you'll have to load the drivers.

Once you've partitioned your drives and selected a partition to install Vista to, the installation process takes over, copying files, expanding files, installing features, and just generally doing lots of computerish things. This can take a while, so if you need to get a snack or read *War and Peace*, do it during this part of the installation.

When Vista has finished unpacking and installing itself, it asks you to choose a user name and picture (Figure 14-22). This screen also asks you set up a password for your main user account, which is definitely a good idea if you're going to have multiple people using the computer.

After picking your user name and password, and letting Windows know how much you like pictures of kitties, you're taken to a screen where you can type in a computer name (Figure 14-23). By default, Windows makes your computer name the same as your user name but with "-PC" appended to it, which in most cases is fine.

This is also the screen where you can change the desktop background that Windows will start up with. You can change this easily later on, so pick whatever you like and click the Next button.



Figure 14-22 Choose a user picture

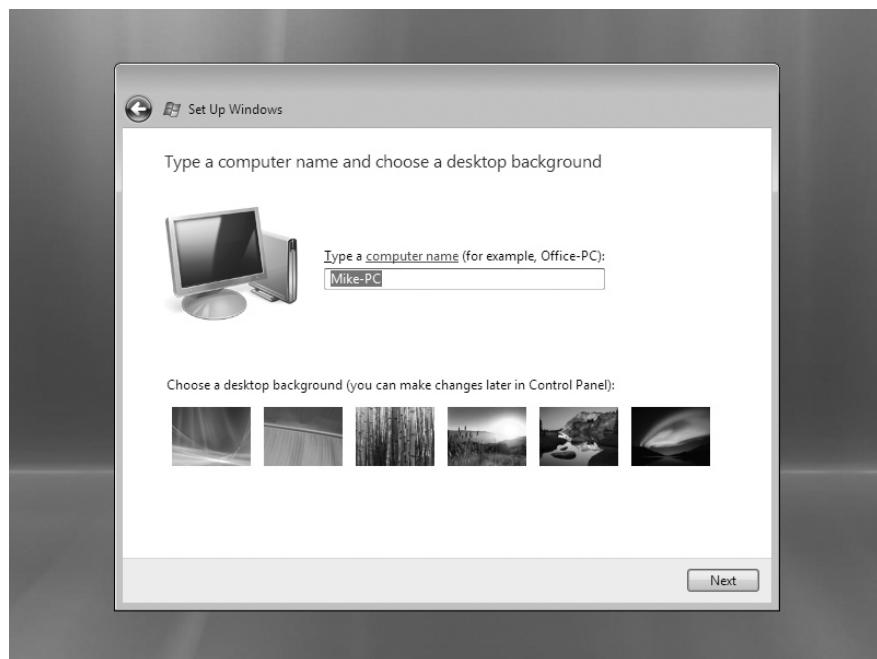


Figure 14-23 Choose your computer name.

The next page asks you how you want to set up Windows Automatic Updates (Figure 14-24). Most users want to choose the top option, *Use recommended settings*, as it provides the most hassle-free method for updating your computer. The middle option, *Install important updates only*, installs only the most critical security fixes and updates and leaves the rest of the updates up to you. This is useful when setting up computers for businesses, as many companies' IT departments like to test out any updates before rolling them out to the employees. You should only select the last option, *Ask me later*, if you can dedicate yourself to checking weekly for updates, as it will not install any automatically.

Next up is the time and date screen, where you can make sure your operating system knows what time it is, as in Figure 14-25. This screen should be pretty self-explanatory, so set the correct time zone, the correct date, and the correct time, and move to the next screen.

If you have your computer connected to a network while running the installer, the next screen will ask you about your current location (Figure 14-26). If you're on a trusted network, such as your home or office network, make the appropriate selection and your computer will be discoverable on the network. If you're on, say, a Starbucks' network, choose *Public location* so the caffeine addicts around you can't see your computer and potentially do malicious things to it.

Once you're past that screen, Windows thanks you for installing it, which is awfully polite for a piece of software, don't you think (Figure 14-27)?

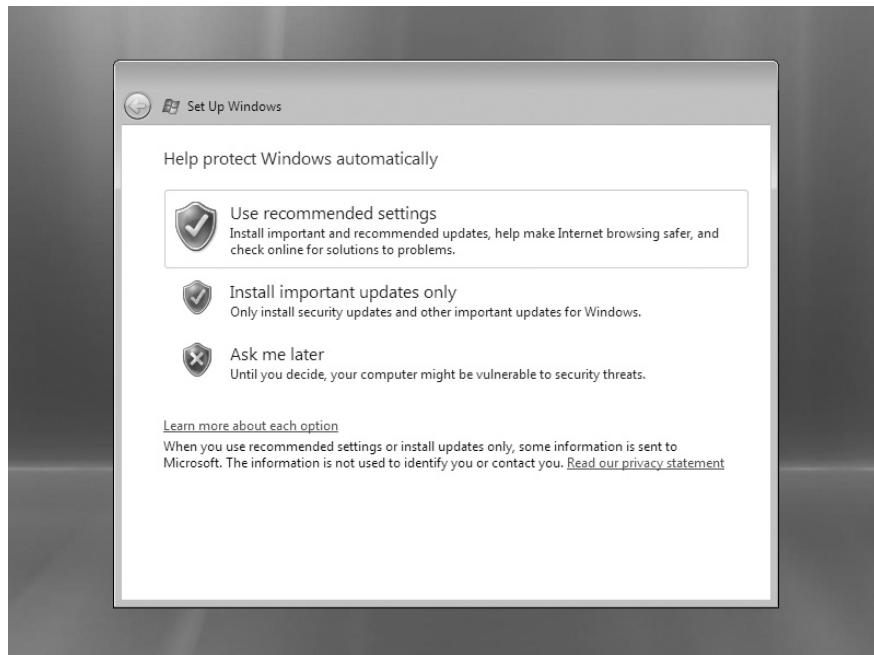


Figure 14-24 The automatic updates screen

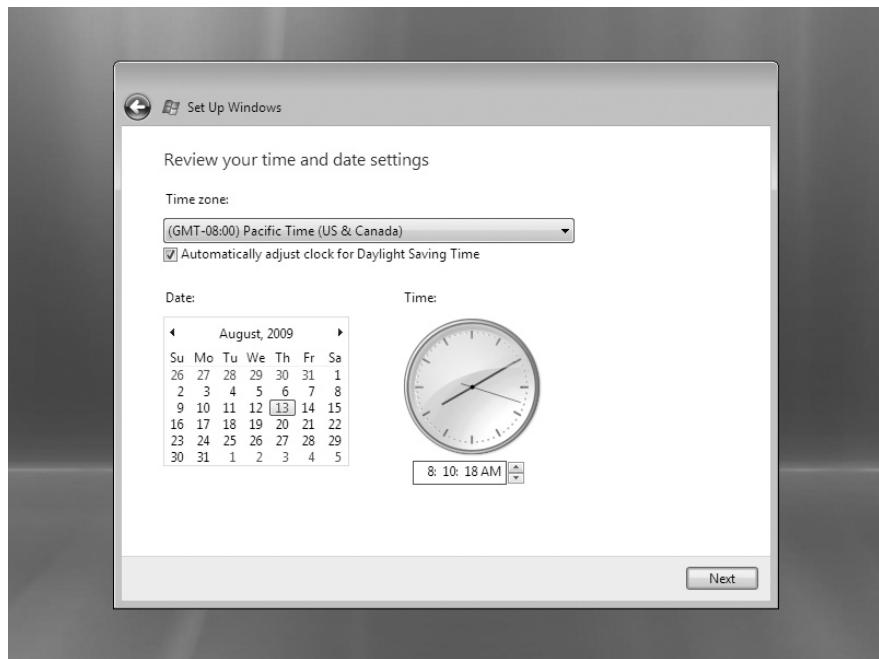


Figure 14-25 Vista pities the fool who doesn't know what time it is.

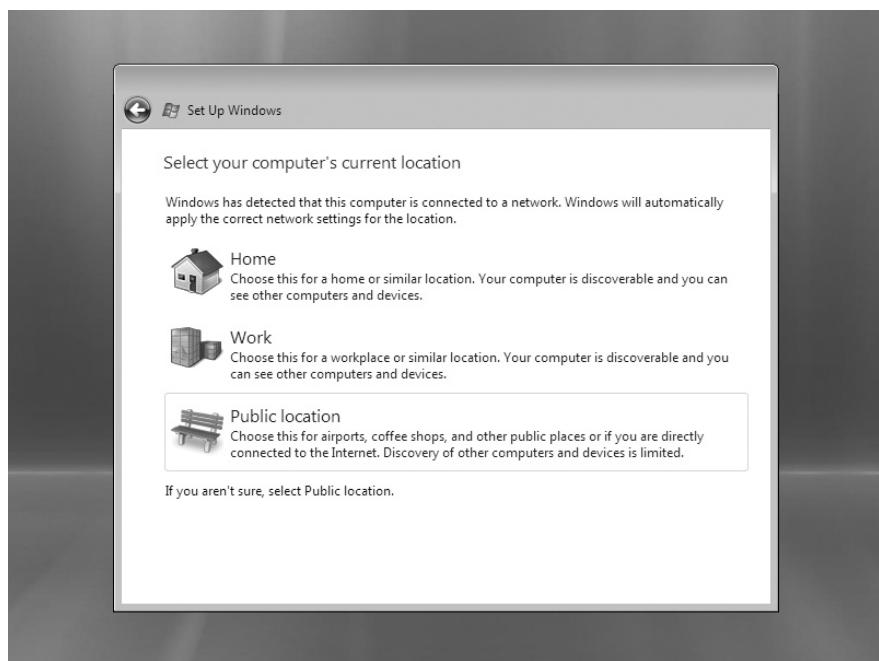


Figure 14-26 Tell Windows what kind of network you're on.

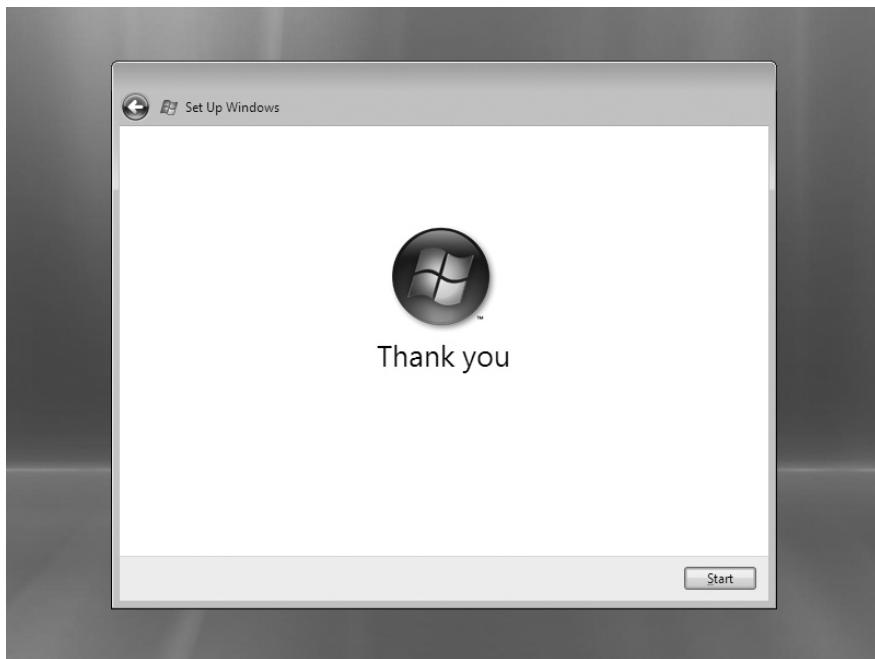


Figure 14-27 Aw, shucks, Microsoft Windows Vista. Don't mention it.

Lest you think you're completely through the woods, Windows will run some tests on your computer to give it a performance rating, which, in theory, will tell you how well programs will run on your computer. You'll sometimes see minimum performance ratings on the sides of game boxes, but even then, you're more likely to need plain, old-fashioned minimum system requirements. This process can take anywhere from 5 to 20 minutes, so this is another one of those coffee-break moments in the installation process.

Once the performance test finishes, Vista boots up and you have 30 days to activate your new operating system.

Automating the Installation

As you can see, you may have to sit around for quite a while when installing Windows. Instead of having to sit there answering questions and typing in CD keys, wouldn't it be nice just to boot up the machine and have the installation process finish without any intervention on your part—especially if you have 30 PCs that need to be ready to go tomorrow morning? Fortunately, Windows offers two good options for automating the installation process: scripted installations and disk cloning.

Scripting Windows 2000 and XP Installations with Setup Manager

For automating a Windows 2000 or XP install, Microsoft provides *Setup Manager* to help you create a text file—called an *answer file*—containing all of your answers to

the installation questions. Windows doesn't come with Setup Manager, but you can download it from the Microsoft Download Center (www.microsoft.com/downloads) as part of the Windows XP Service Pack 2 Deployment Tools. Setup Manager supports creating answer files for three types of setups: Unattended, Sysprep, and Remote Installation Services (Figure 14-28). The current version of the tool can create answer files for Windows XP Home Edition, Windows XP Professional, and Windows Server 2003 (Standard, Enterprise, or Web Edition); see Figure 14-29.

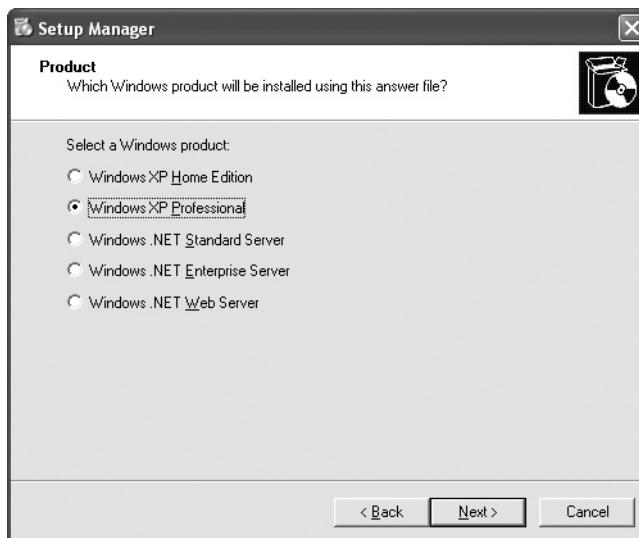
Figure 14-28

Setup Manager
can create three
types of answer
files.



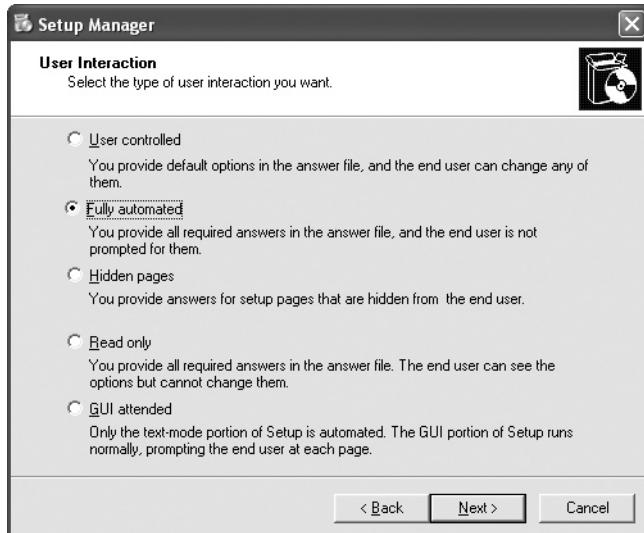
Figure 14-29

Setup Manager
can create
answer files for
five versions of
Windows.



Setup Manager can create an answer file to completely automate the process, or you can use it to set default options. You'll almost always want to create an answer file that automates the entire process (Figure 14-30).

Figure 14-30
Setup Manager
can create several
kinds of answer
files.



When running a scripted installation, you have to decide how to make the installation files themselves available to the PC. Although you can boot your new machine from an installation CD, you can save yourself a lot of CD swapping if you just put the installation files on a network share and install your OS over the network (Figure 14-31).

Figure 14-31
Choose where
to store the
installation files.



When you run Setup Manager, you get to answer all those pesky questions. As always, you will also have to “accept the terms of the License Agreement” (Figure 14-32) and specify the product key (Figure 14-33), but at least by scripting these steps you can do it once and get it over with.

Figure 14-32
Don't forget to
accept the license
agreement.

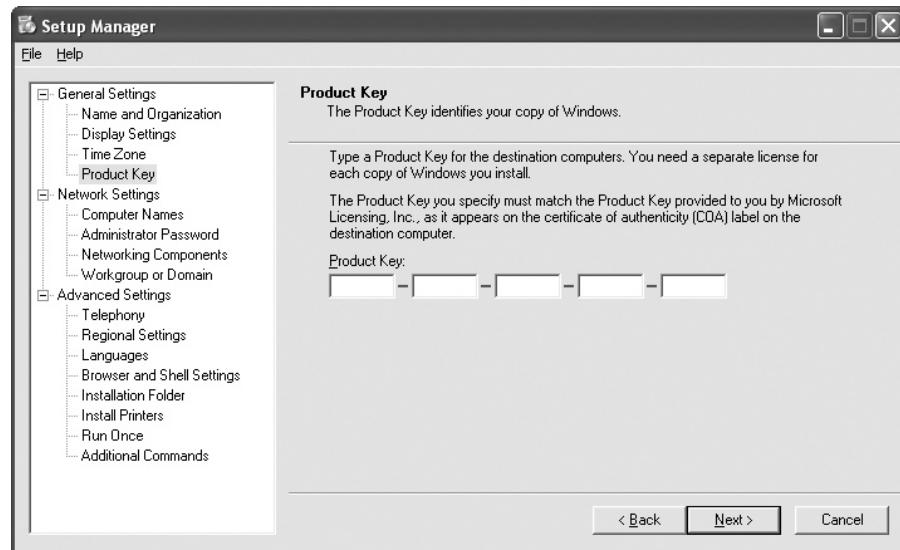


Figure 14-33 Enter the product key.

Now it's time to get to the good stuff, customizing your installation. Using the graphical interface, decide what configuration options you want to use: screen resolutions, network options, browser settings, regional settings, and so on. You can even add finishing touches to the installation, installing additional programs such as Microsoft Office and Adobe Reader by automatically running additional commands after the Windows installation finishes (Figure 14-34). You can also set programs to run once (Figure 14-35).

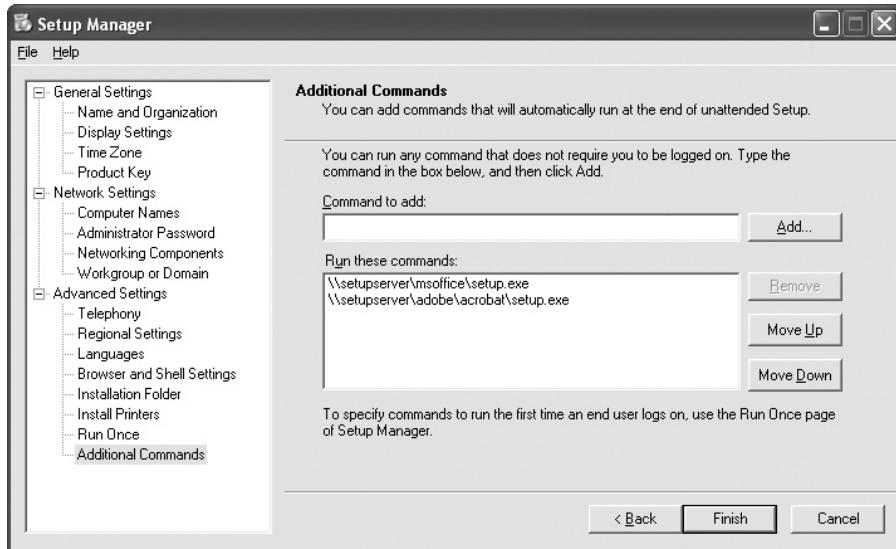


Figure 14-34 Running additional commands

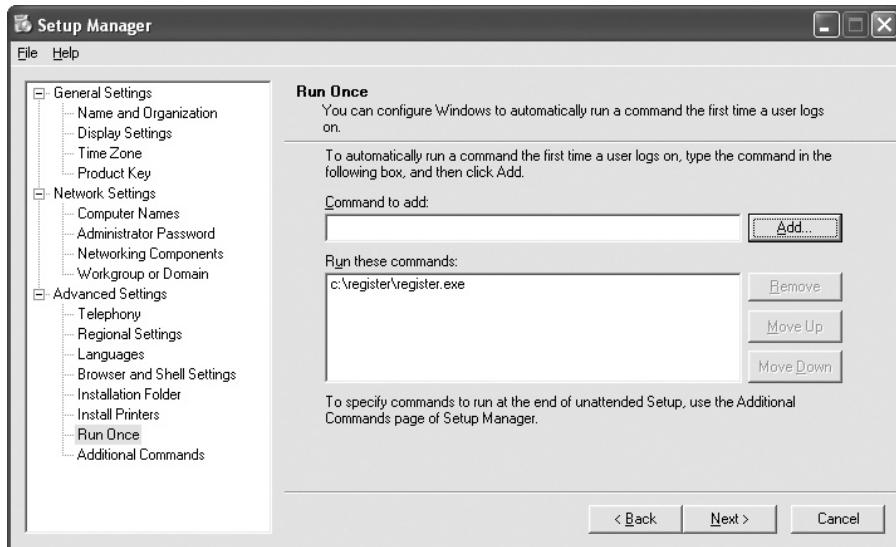


Figure 14-35 Running a program once

Remember that computer names must be unique on the network. If you're going to use the same answer files for multiple machines on the same network, you need to make sure that each machine gets its own unique name. You can either provide a list of names to use, or you can have the Setup program randomly generate names (Figure 14-36).

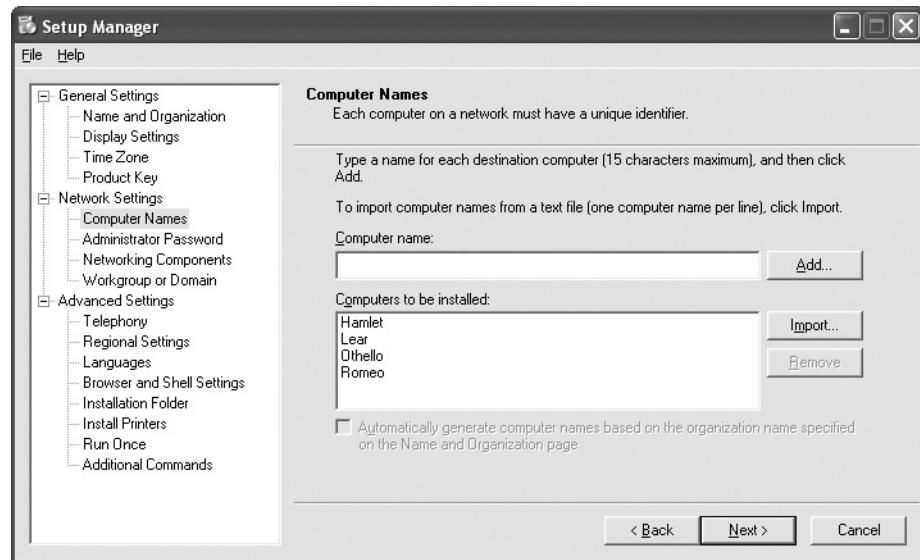


Figure 14-36 Pick your computer names.

When you're finished, Setup Manager prompts you to save your answers as a text file. The contents of the file will look something like this:

```
;SetupMgrTag
[Data]
AutoPartition=1
MsDosInitiated="0"
UnattendedInstall="Yes"

[Unattended]
UnattendMode=FullUnattended
OemSkipEula=Yes
OemPreinstall>No
TargetPath=\WINDOWS

[GuiUnattended]
AdminPassword=414c11f760b0064 ... [out to 64 characters]
EncryptedAdminPassword=Yes
OEMSkipRegional=1
TimeZone=85
OemSkipWelcome=1
AutoLogon=Yes
AutoLogonCount=1
```

```
[UserData]
ProductKey=FFFFFF-FFFF-FFFF-FFFF-FFFF
FullName="Scott"
OrgName="Total Seminars"
ComputerName=*

[Identification]
JoinDomain=TOTAL
DomainAdmin=admin09
DomainAdminPassword=my-password

[
```

The list goes on for another hundred lines or so, and this is a fairly simple answer file. One thing to note is that if you provide a domain administrator's user name and password for the purpose of automatically adding new PCs to your domain, that user name and password will be in the text file in clear text:

```
[Identification]
JoinDomain=TOTAL
DomainAdmin=admin09
DomainAdminPassword=my-password
```

In that case, you will want to be very careful about protecting your setup files.

Once you have your answer file created, you can start your installation with this command, and go enjoy a nice cup of coffee while the installation runs:

```
D:\i386\winnt32 /s:%SetupFiles% /unattend:%AnswerFile%
```

For %SetupFiles%, substitute the location of your setup files—either a local path (D:\i386 if you are installing from a CD) or a network path. If you use a network path, don't forget to create a network boot disk so that the installation program can access the files. For %AnswerFile%, substitute the name of the text file you created with Setup Manager (usually unattend.txt).

Of course, you don't have to use Setup Manager to create your answer file. Feel free to pull out your favorite text editor and write one from scratch. Most techs, however, find it much easier to use the provided tool than to wrestle with the answer file's sometimes arcane syntax.



NOTE If you need help creating a network boot floppy or CD, check out www.netbootdisk.com/bootcd.htm.

Automating a Vista Installation with the Automated Installation Kit

As of Windows Vista, Setup Manager is history—as is any method of automating an installation that isn't extremely complicated and intimidating. Microsoft has replaced Setup Manager with the Windows Vista Automated Install Kit (AIK), a set of tools which, although quite powerful, seem to have made something of a Faustian deal to obtain that power at the expense of usability (Figure 14-37).

Figure 14-37
The Automated
Installation Kit



Writing a step-by-step guide to creating an answer file in the AIK would almost warrant its own chapter, and as the CompTIA A+ exams don't cover it at all, I'm not going to go into too much gory detail. I will, however give a brief account of the process involved.

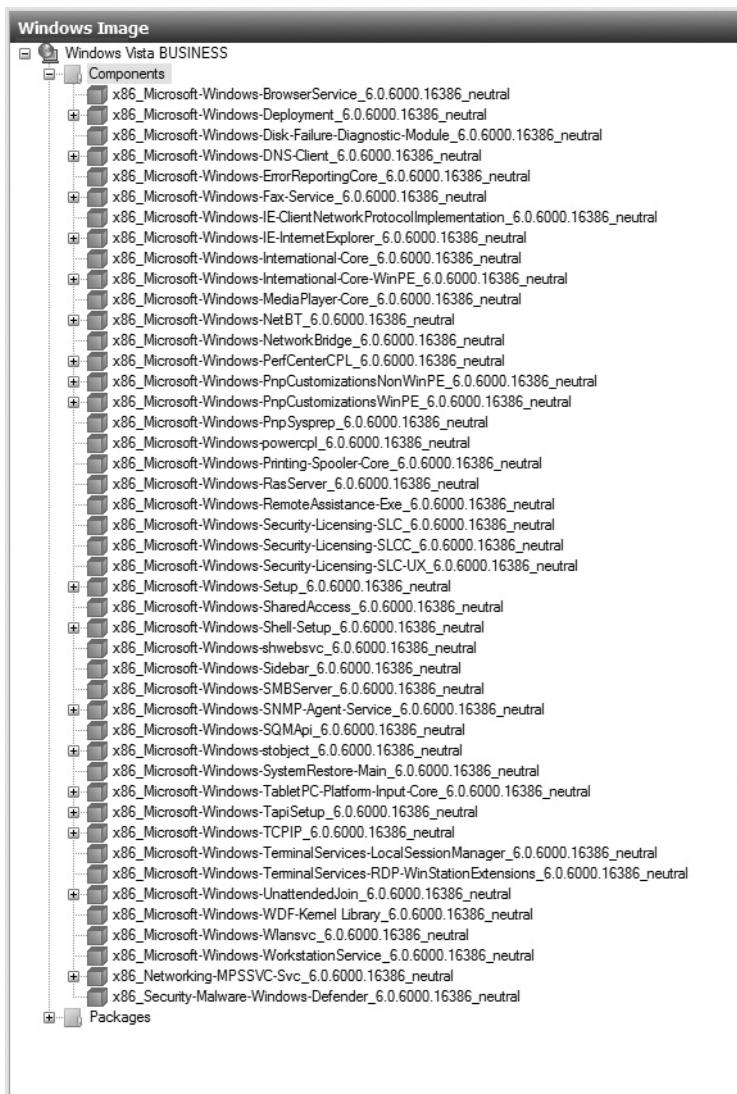
The basic idea behind the AIK is that a tech can create an answer file by using a tool called the Windows System Image Monitor, and then use that answer file to build a Master Installation file that can be burned to DVD. Vista's answer files are no longer simple text documents but .XML files, and the process of creating one is much, much more complicated than it used to be. Gone are the days of simply running a wizard and modifying options as you see fit, replaced instead with a method of choosing components (which represent the things you want your automated installation to do, such as create a partition, enter a certain product key, and much, much more) out of a huge, often baffling list and then modifying their settings (Figure 14-38).

Once you've selected and modified all of the components you're interested in, you have to save your answer file, copy it to either a floppy disk or a USB thumb drive, and plug that into a new computer that you're going to install Vista on. When you boot a computer off of the Vista installation disc, it automatically searches all removable media for an answer file, and, finding one, uses it to automatically install itself. If you're only installing Vista to this one computer, you're finished, but if you want to install it to multiple computers, you'll probably want to create a disc image based off of your Master Installation file.

To create such an image, you must use a couple more tools in the AIK—Windows PE and ImageX—to "capture" the installation and create a disc image from it. If the rest of the process seemed a bit complicated, this part is like solving a Rubik's cube with your

Figure 14-38

The list of components in the Image Monitor



teeth while balancing on top of a flag pole and juggling. Suffice it to say that the AIK comes with documentation that tells you how to do this, so with a bit of patience, you can get through it.

After you've created an image from your Master Installation file, you can burn it to discs or share it on a network to set up new computers. All in all, this is an extremely complicated process that will, when you're finished with it, make installing Windows Vista a snap.



NOTE You can save time by “slipstreaming” your installation files to include the latest patches. See the following site for instructions on how to merge (slipstream) Service Pack 3 into your Windows XP installation files:

www.helpwithwindows.com/WindowsXP/Slipstreaming_Windows_XP_Service_Pack_3.html

You can also slipstream Windows Vista Service Pack 1 (though not, as of this writing, Service Pack 2) into a Vista installation disc. Check out the following article for instructions:

www.helpwithwindows.com/WindowsVista/Slipstream_Windows_Vista_SPI.html

Scripted installations are a fine option, but they don’t work well in all scenarios. Creating a fully scripted installation, including the installation of all additional drivers, software updates, and applications, can be a time-consuming process involving lots of trial-and-error adjustments. Wouldn’t it be easier, at least some of the time, to manually set up one PC exactly the way you want it, and then automatically create exact copies of that installation on other machines? That’s where disk cloning comes into play.

Disk Cloning

Disk cloning simply takes an existing PC and makes a full copy of the drive, including all data, software, and configuration files. You can then transfer that copy to as many machines as you like, essentially creating clones of the original machine. In the old days, making a clone was pretty simple. You just hooked up two hard drives and copied the files from the original to the clone by using something like the venerable XCOPY program (as long as the hard drive was formatted with FAT or FAT32). Today, you’ll want to use a more sophisticated program, such as Norton Ghost, to make an image file that contains a copy of an entire hard drive and then lets you copy that image either locally or over the network.



NOTE Norton Ghost is not the only disk imaging software out there, but it is so widely used that techs often refer to disk cloning as “ghosting the drive.”

Sysprep

Cloning a Windows PC works great for some situations, but what if you need to send the same image out to machines that have slightly different hardware? What if you need the customer to go through the final steps of the Windows installation (creating a user account, accepting the license agreement, etc.)? That’s when you need to combine a scripted setup with cloning by using the System Preparation Tool, *Sysprep*, which can undo portions of the Windows installation process.

After installing Windows and adding any additional software (Microsoft Office, Adobe Acrobat, Yahoo Instant Messenger, etc.), run Sysprep (Figure 14-39) and then



Figure 14-39 Sysprep, the System Preparation Tool

create your disk image by using the cloning application of your choice. The first time a new system cloned from the image boots, an abbreviated version of setup, Mini-Setup, runs and completes the last few steps of the installation process: installing drivers for hardware, prompting the user to accept the license agreement and create user accounts, and so on. Optionally, you can use Setup Manager to create an answer file to customize Mini-Setup, just as you would with a standard scripted installation.

Troubleshooting Installation Problems

The term “installation problem” is rather deceptive. The installation process itself almost never fails. Usually, something else fails during the process that is generally interpreted as an “install failure.” Let’s look at some typical installation problems and how to correct them.

Text Mode Errors

If you’re going to have a problem with a Windows installation, this is the place to get one. It’s always better to have the error right off the bat as opposed to when the installation is nearly complete. Text mode errors most often take place during clean installations and usually point to one of the following problems:

No Boot Device Present When Booting Off the Startup Disk

Either the startup disk is bad or the CMOS is not set to look at that disk drive first.

Windows Setup Requires XXXX Amount of Available Drive Space

You forgot to format the C: drive, or there’s a bunch of stuff on the drive already.

Not Ready Error on Optical Drive

You probably just need to give the optical drive a moment to catch up. Press R for retry a few times. You may also have a damaged installation disc, or the optical drive may be too slow for the system.

A Stop Error (Blue Screen of Death) After the Reboot at the End of Text Mode

This may mean you didn't do your homework in checking hardware compatibility, especially the BIOS. I'll tell you more about stop errors in Chapter 17, "Maintaining and Troubleshooting Windows," but if you encounter one of these errors during installation, check out the Microsoft Knowledge Base.

Graphical Mode Errors

Once the installation passes the text mode and moves into graphical mode, a whole new crop of problems may arise.

Hardware Detection Errors

Failure to detect hardware properly by any version of Windows Setup can be avoided by simply researching compatibility beforehand. Or, if you decided to skip that step, you might be lucky and only have a hardware detection error involving a noncritical hardware device. You can troubleshoot this problem at your leisure. In a sense, you are handing in your homework late, checking out compatibility and finding a proper driver after Windows is installed.

Every Windows installation depends on Windows Setup properly detecting the computer type (motherboard and BIOS stuff, in particular) and installing the correct hardware support. Microsoft designed Windows to run on several hardware platforms using a layer of software tailored specifically for the hardware, called the *hardware abstraction layer (HAL)*.

Can't Read CAB Files

This is probably the most common of all installation errors. *CAB files* (as in cabinet) are special compressed files, recognizable by their .CAB file extension, that Microsoft uses to distribute copies of Windows. If your system can't read them, first check the installation disc for scratches. Then try copying all of the files from the source directory on the disc (\i386) into a directory on your local hard drive. Then run Windows Setup from there, remembering to use the correct program (WINNT32.EXE). If you can't read any of the files on the installation disc, you may have a defective drive.

Lockups During Installation

Lockups are one of the most challenging problems that can take place during installation, because they don't give you a clue as to what's causing the problem. Here are a few things to check if you get a lockup during installation.

Smart Recovery, Repair Installation

Most system lockups occur when Windows Setup queries the hardware. If a system locks up once during setup, turn off the computer—literally. Unplug the system! Do *not* press CTRL-ALT-DEL. Do *not* click Reset. Unplug it! Then turn the system back on, boot into Setup, and rerun the Setup program. Windows will see the partial installation and

either restart the installation process automatically (Smart Recovery) or prompt you to repair the installation. Both of these look at the installation progress and complete the installation.

Optical Drive, Hard Drive

Bad optical discs, optical drives, or hard drives may cause lockups. Check the optical disc for scratches or dirt, and clean it up or replace it. Try a known good disc in the drive. If you get the same error, you may need to replace the drive.

Log Files

Windows generates a number of special text files called *log files* that track the progress of certain processes. Although Windows creates different log files for different purposes, two files most interest us:

- *SETUPLOG.TXT* tracks the complete installation process, logging the success or failure of file copying, Registry updates, reboots, and so on.
- *SETUPAPI.LOG* tracks each piece of hardware as it is installed. This is not an easy log file to read, as it uses Plug and Play code, but it will show you the last device installed before Windows locked up.

Windows stores these log files in the WINNT or Windows directory (the location in which the OS is installed). These operating systems have powerful recovery options, so, honestly, the chances of your ever actually having to read a log file, understand it, and then get something fixed as a result of that understanding are pretty small. What makes log files handy is when you call Microsoft or a hardware manufacturer. They *love* to read these files, and they actually have people who understand them. Don't worry about trying to understand log files for the CompTIA A+ exams; just make sure you know the names of the log files and their location. Leave the details to the übergeeks.

Post-Installation Tasks

You might think that's enough work for one day, but your task list has a few more things. They include updating the OS with patches and service packs, upgrading drivers, restoring user data files, and migrating and recycling.

Patches, Service Packs, and Updates

Someone once described an airliner as consisting of millions of parts flying in close formation. I think that's also a good description for an operating system. And we can even carry that analogy further by thinking about all of the maintenance required to keep an airliner safely flying. Like an airliner, the parts (programming code) of your OS were created by different people, and some parts may even have been contracted out. Although each component is tested as much as possible, and the assembled OS is also tested, it's not possible to test for every possible combination of events. Sometimes a piece is simply found to be defective. The fix for such a problem is a corrective program called a *patch*.

In the past, Microsoft provided patches for individual problems. They also accumulated patches until they reached some sort of critical mass and then bundled them together as a *service pack*. They still do this. But they also make it easier for you to find and install the appropriate patches and service packs, which, when combined, are called *updates*. They make these updates available at their Web site or on optical disc. Many organizations make the updates available for distribution from network servers. Immediately after installing Windows, install the latest updates on the computer. Chapter 17, "Maintaining and Troubleshooting Windows," covers this process more fully.

Upgrading Drivers

Even if you did all your preinstallation tasks, you may decide to go with the default drivers that come with Windows and then upgrade them to the latest drivers after the fact. This is a good strategy, because installation is a complicated task and you can simplify it by installing old but adequate drivers. Maybe those newest drivers are just a week old—waiting until after the Windows installation to install new drivers gives you a usable driver to go back to if the new driver turns out to be a lemon. In Chapters 17, "Maintaining and Troubleshooting Windows," and 18, "Input/Output," you'll learn more about working with drivers, including a little driver magic called "Roll Back Driver."

Restoring User Data Files (If Applicable)

Remember when you backed up the user data files before installation? You don't? Well, check again, because now is the time to restore that data. Your method of restoring depends on how you backed up the files in the first place. If you used a third-party backup program, you need to install it before you can restore those files, but if you used the Windows Backup utility (Windows 2000 or XP) or the Backup and Restore Center (Windows Vista), you are in luck, because they are installed by default (with the exception of Windows XP Home edition). If you did something simpler, such as copying to optical discs or a network location, all you have to do is copy the files back to the local hard disk. Good luck!

Migrating and Retiring

Seasons change and so does the state of the art in computing. At a certain point in a computer's life, you'll need to retire an old system. This means you must move the data and users to a new system or at least a new hard drive—a process called *migration*—and then safely dispose of the old system. Microsoft offers a few tools to accomplish this task, and because it's important to know about them for the A+ exam (not to mention for your next new computer purchase), I'm going to go over them.

Files and Settings Transfer Wizard

You've already heard a bit about the *Files and Settings Transfer Wizard* (FSTW) back in Chapter 4, "Understanding Windows," but the CompTIA A+ exams expect you to have more than just a passing knowledge of it. When migrating to a new system, you would run the Files and Settings Transfer Wizard on the newer computer (assuming the newer

computer is running Windows XP, but more on Vista's migration options later), which would then use the wizard to pull files off of the older one. You start the wizard by going to Accessories | System Tools in Windows XP's All Programs menu. Once you've fired it up, you're presented with the screen in Figure 14-40.

Figure 14-40

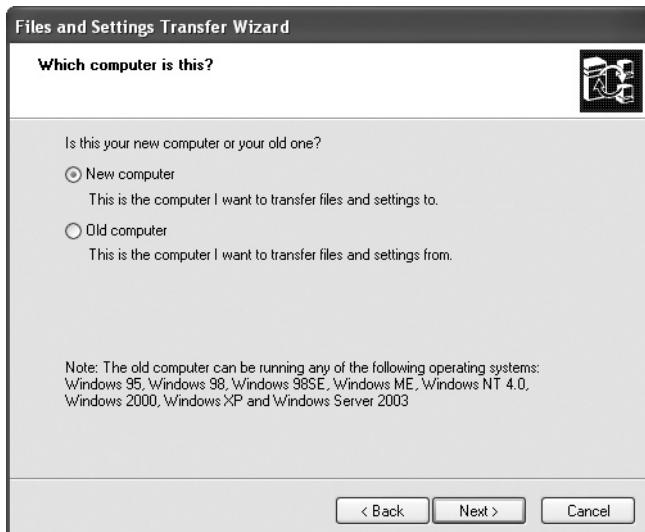
The Files and Settings Transfer Wizard's initial screen.



When you click the Next button on the wizard's first screen, you're asked whether the computer you're using is the new or old computer, as in Figure 14-41.

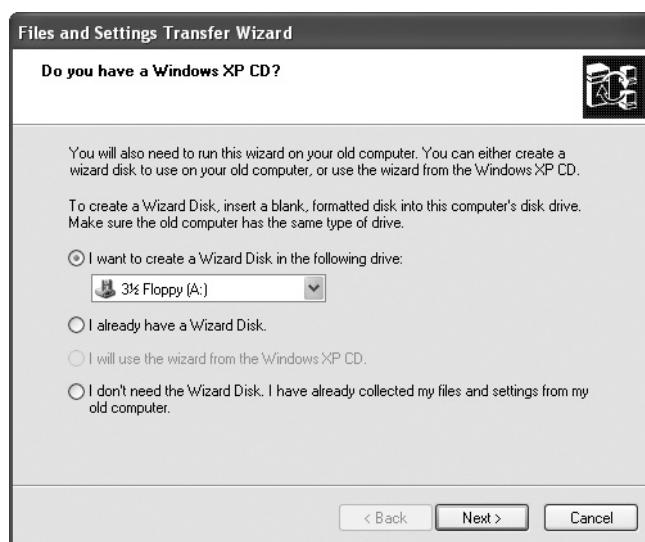
Figure 14-41

Is this the new computer or your old one?



Note that the old computer can be running any version of Windows all the way back to Windows 95. Older Windows operating systems didn't come with the Files and Settings Transfer Wizard installed, so if you're migrating from an older version of Windows, you'll have to either install the wizard onto the older computer with the XP disc or create a Wizard Disk that will enable you to do the same thing. You're given the option to create such a disk by clicking Next with New computer selected, as in Figure 14-42.

Figure 14-42
Creating a Wizard Disk



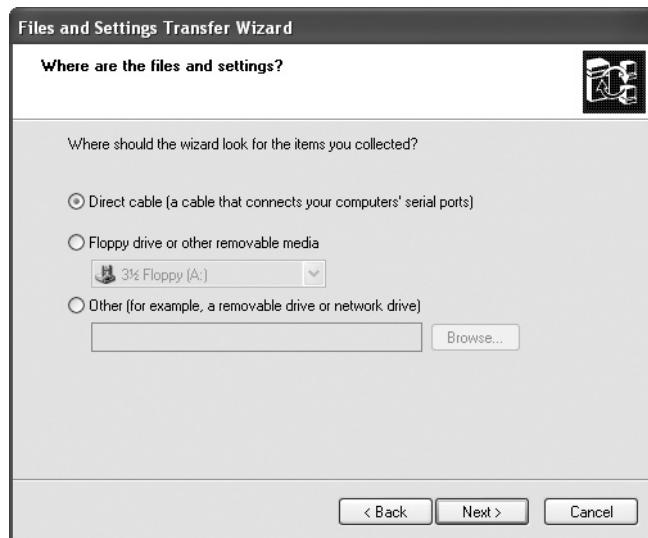
Once you've either created a Wizard Disk (or told the wizard that you're going to install the wizard from the XP CD), you're taken to a screen that asks where to look for the files and settings that you've collected (Figure 14-43). The first two options are slightly outdated, because the first refers to a direct serial connection, now a rarity in the personal computing world, and the second asks for a floppy disc, though you can use it with USB thumb drives as well. The third option is the most likely candidate for a migration, because it enables you to look for your older computer on your home network.

Meanwhile, to actually determine which files and settings are going to be transferred, you need to run the wizard on your old computer. If you're migrating from another Windows XP machine, you need to tell the wizard where it's being run; otherwise, you skip to the next step, which asks how you want to transfer the files (Figure 14-44). The best option is to transfer them over a home network, but you can also save the files on a USB thumb drive or simply on a folder on your computer, though, obviously, that doesn't do a lot for transferring the files.

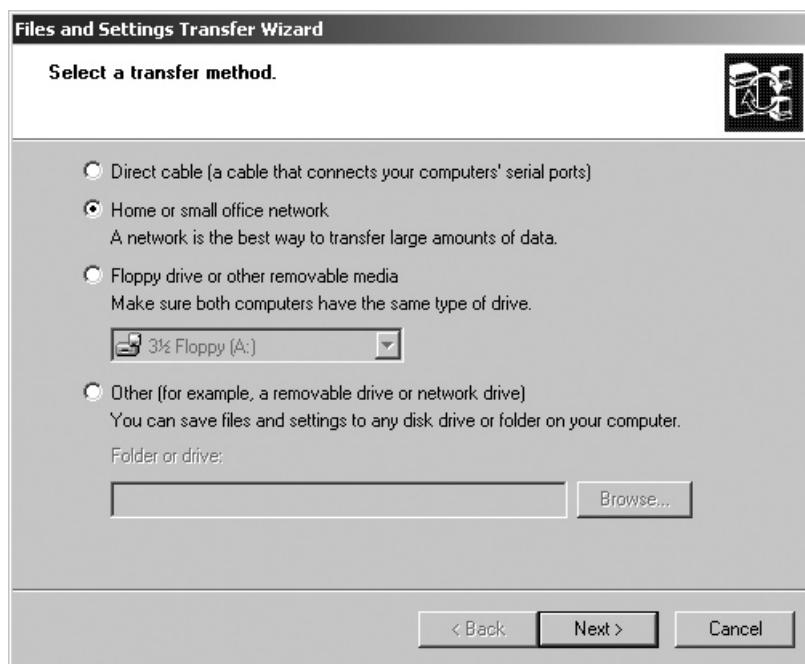
When you click Next, the wizard shows its default list of folders and settings to save, but being the savvy PC tech you are, you'll probably want to customize which folders

Figure 14-43

Where are the files and settings?

**Figure 14-44**

How will you transfer the files?

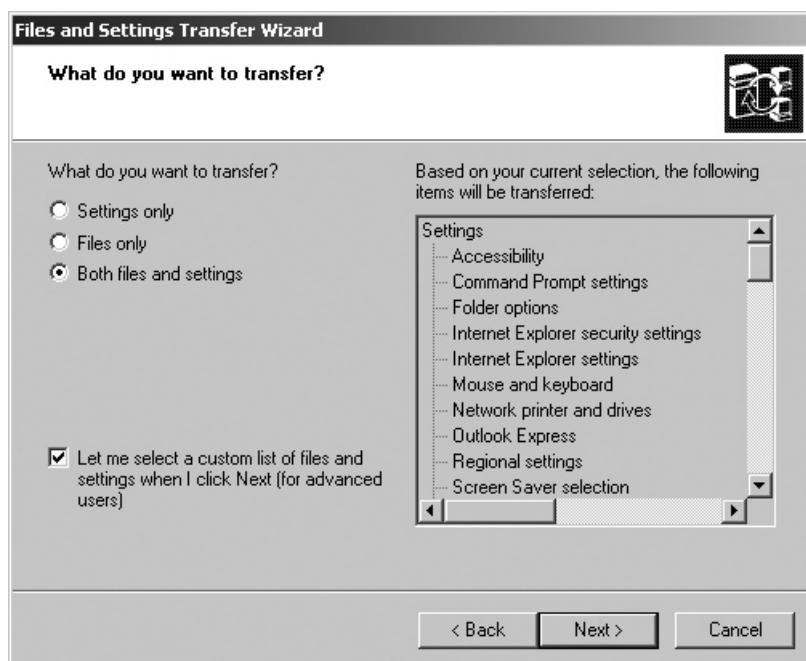


are migrated. You can do that by checking the box that says *Let me select a custom list of files and settings when I click Next* (Figure 14-45).

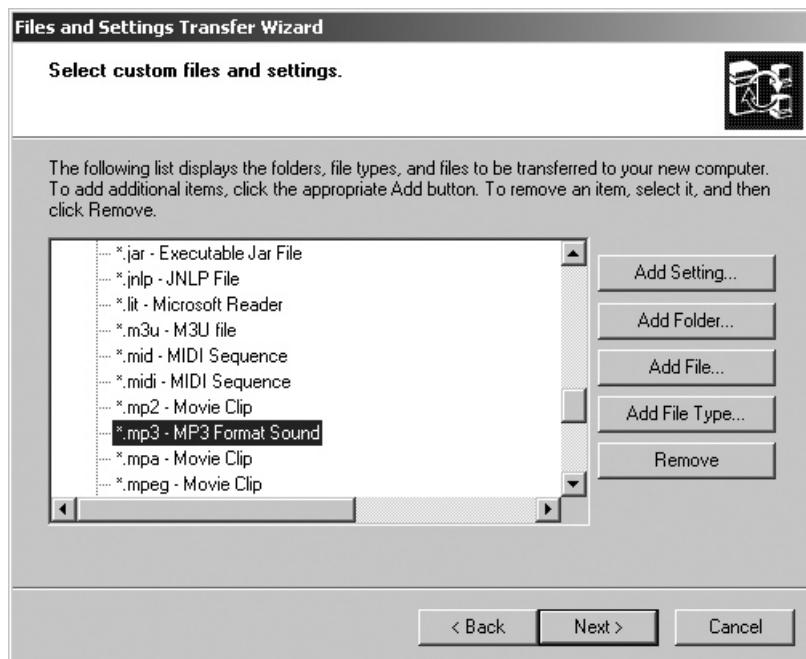
If you've checked that box, the next page enables you to add additional settings and browse for additional folders, files, or even file types to back up, making it pretty easy to simply back up every .MP3 on your computer (Figure 14-46). Neat, huh?

Figure 14-45

The files and settings you're going to transfer

**Figure 14-46**

Customizing the transfer



Once you click Next on that screen, the wizard begins the actual transfer process, which can take quite a lot of time depending on how much stuff you're transferring. This is an excellent time to, for example, read the complete works of Pliny the Elder, or, even more usefully, to memorize all of the previous chapters of this book word-for-word, because you'll probably have plenty of time.

User State Migration Tool

If you're the sort of computer user who demands maximum functionality and power from your operating system, you'll probably want to use the *User State Migration Tool* (USMT). The USMT has all of the same features as the Files and Settings Transfer Wizard, but with much more control over advanced configurations for the new computer. Its primary use is in businesses, because it has to be run in a Windows Server domain. In practice, if you're migrating a single user, use the FSTW. If you need to migrate multiple users, the USMT is the tool.

Windows Easy Transfer

With Windows Vista and 7, Microsoft has upgraded the Files and Settings Transfer Wizard, calling it *Windows Easy Transfer*. Windows Easy Transfer comes native in Vista/7 and can be downloaded and installed on Windows XP or 2000 as well, though you won't be able to transfer settings from a 2000 computer, only files. Windows Easy Transfer is located in the System Tools subfolder of the Accessories folder in your Programs menu. The first screen of the Windows Easy Transfer simply gives you a bit of information about the process, so there's not really much to do there.

When you click Next, you're taken to a screen that asks if you want to start a new transfer or continue an old one (Figure 14-47). If you've already set up your old computer to transfer the files, select the latter option; if you haven't, select the former.

If you choose to start a new transfer, the process is very similar to the Files and Settings Transfer Wizard: you select whether you're using your new or old computer and then follow the same basic steps as before. There are some differences, of course—network security is improved by using Transfer Keys to protect your files from others on the network, there's an option to use a special Easy Transfer cable to transfer your files between USB ports, and the order of some screens is changed around a bit—but if you understand the Files and Settings Transfer Wizard transfer process, Windows Easy Transfer shouldn't be too difficult.

Migration Practices

When talking about migration or retirement in terms of security, you need to answer one question: What do you do with the old system or drive?

All but the most vanilla new installations have sensitive data on them, even if it's simply e-mail messages or notes-to-self that would cause embarrassment if discovered. Most PCs, especially in a work environment, contain a lot of sensitive data. You can't just format C: and hand over the drive.

Follow three principles when migrating or retiring a computer. First, migrate your users and data information in a secure environment. Until you get passwords properly in place and test the security of the new system, you can't consider that system secure.



Figure 14-47 Start a new transfer or continue one?

Second, remove data remnants from hard drives that you store or give to charity. Third, recycle the older equipment; don't throw it in the trash. PC recyclers go through a process of deconstructing hardware, breaking system units, keyboards, printers, and even monitors into their basic plastics, metals, and glass for reuse.

Migrate your users and data information in a secure environment. Until you get passwords properly in place and test the security of the new system, you can't consider that system secure. Don't set a copy to run while you go out to lunch, but rather be there to supervise and remove any remnant data that might still reside on any mass storage devices, especially hard drives.

You might think that, as easy as it seems to be to lose data, you could readily get rid of data if you tried. That's not the case with magnetic media, though, such as hard drives and flash memory. Cleaning a drive completely is very difficult. Repeated formatting won't do the trick. Partitioning and formatting won't work. Data doesn't necessarily get written over in the same place every time, which means that a solid wipe of a hard drive by writing zeroes to all of the clusters still potentially leaves a lot of sensitive and recoverable data, typically called *remnants*, on the drive.

Although you can't make data 100 percent unrecoverable short of physically shredding or pulverizing a drive, you can do well enough for donation purposes by using one of the better drive-wiping utilities, such as Webroot's Window Washer (Figure 14-48). With Window Washer, you can erase your Web browsing history, your recent activity in Windows (such as what programs you ran), and even your e-mail messages permanently. As an added bonus, you can create a bootable disk that enables you to wipe a drive completely.

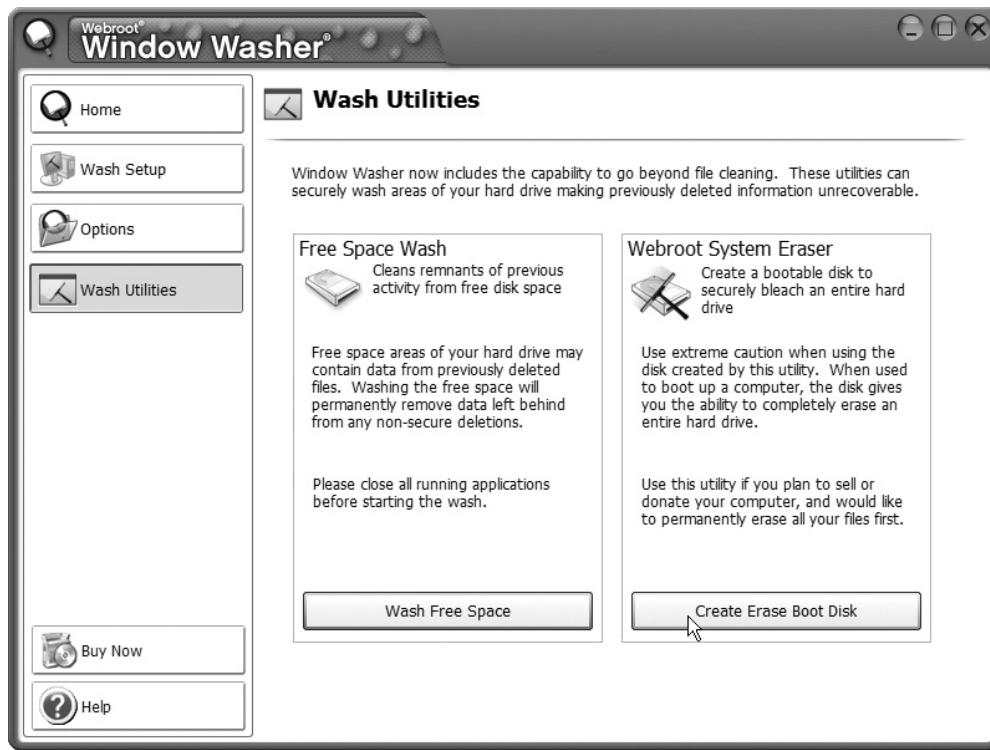


Figure 14-48 Webroot Window Washer security software

Recycle

An important and relatively easy way to be an environmentally conscious computer user is to *recycle*. Recycling products such as paper and printer cartridges not only keeps them out of overcrowded landfills but also ensures that the more toxic products are disposed of in the right way. Safely disposing of hardware containing hazardous materials, such as computer monitors, protects both people and the environment.

Anyone who's ever tried to sell a computer more than three or four years old learns a hard lesson: they're not worth much if anything at all. It's a real temptation to take that old computer and just toss it in the garbage, but never do that!

First of all, many parts of your computer—such as your computer monitor—contain hazardous materials that pollute the environment. Luckily, thousands of companies now specialize in computer recycling and will gladly accept your old computer. If you have enough computers, they might even pick them up. If you can't find a recycler, call your local municipality's waste authority to see where to drop off your system.

An even better alternative for your old computer is donation. Many organizations actively look for old computers to refurbish and to donate to schools and other organizations. Just keep in mind that the computer can be too old—not even a school wants a computer more than five or six years old.

Post Installation: How All the Pieces Fit Together

You know from previous chapters the locations of many of the user-focused folders that are installed automatically. The Windows desktop, for example, is simply a folder, most commonly found in the user folders section of the C: drive. Similarly, My Documents/Documents is just another folder.

Installation creates a set of Windows-specific files and folders that the OS needs to run a PC. Some of these files and folders are directly on the root of the C: drive; others can be elsewhere. The best way to remember the locations of these files and folders and to know their importance to the OS is by looking at how they interact to boot the PC. Windows 2000 and Windows XP have pretty much the same files and boot process; Windows Vista differs a bit, so we'll look at the latter OS separately.

The 2000/XP Boot Process

Windows 2000 and XP distinguish between the files that start the operating system (called the *system files*) and the rest of the operating system files (usually in the \WINDOWS or \WINNT folders). The system files (memorize these!) consist of three required files: NTLDR, BOOT.INI, and NTDETECT.COM. If you're using a SCSI hard drive, there's a fourth file called NTBOOTDD.SYS. The NTLDR (pronounced *NT loader*) file begins the boot process.

You know from earlier chapters that to make a drive bootable requires an active, primary partition, right? Let's look at the process in a PC with a hard drive partitioned as C: and D:.

The CPU wakes up and runs the system BIOS, and then the BIOS sends out a routine looking for a valid operating system in the boot sector of the primary master hard drive. The master file table (MFT) lives in the boot sector of the C: partition. It points to the location of the Windows 2000/XP system files, also on the C: drive, because that's the bootable drive. Windows calls the primary active partition the *system partition* or the *system volume* (if it's a dynamic disk).

The Windows 2000/XP *boot files* consist of NTOSKRNL.EXE (the Windows kernel), the \WINNT\SYSTEM32\CONFIG\SYSTEM file (which controls the loading of device drivers), and the device drivers. Although these files are the core of the Windows 2000/XP OS, they are not capable of booting, or starting, the system. For that feat, they require NTLDR, NTDETECT.COM, and BOOT.INI—the system files.

The system files start the PC and then, at the end of that process, point the CPU to the location of the boot files. The CPU goes over and chats with NTOSKRNL, and the GUI starts to load. The operating system is then up and running, and you're able to do work.

The odd part about all this is that Microsoft decided to make the OS files mobile. *The Windows operating system files can reside on any partition or volume in the PC.* The \WINDOWS folder, for example, could very well be on drive D:, not drive C:. Whichever drive holds the core OS files is called the *boot partition*. This can lead to a little confusion when you say the system files are on the C: drive and Windows is on the D: drive, but that's just the way it is. The vast majority of Windows 2000/XP systems have the system partition and the boot partition both on the same big C: partition.

You have the process now in general, so let's look more specifically at the makeup and function of the individual files involved in the boot process.

2000/XP System Partition Files

Windows 2000 and XP require the three system files in the root directory of the system partition:

- NTLDR
- BOOT.INI
- NTDETECT.COM

To see these files, go into My Computer and open the C: drive. Go to Tools | Folder Options. Click *Show hidden files and folders*, uncheck the *Hide protected operating system files (Recommended)* option, and click OK. Now when you return to viewing the folder in My Computer, you will see certain critical files that Windows otherwise hides from you to prevent you from accidentally moving, deleting, or changing them in some unintended way (Figure 14-49).

NTLDR

When the system boots up, the master boot record (MBR) or MFT on the hard drive starts the NTLDR program. The NTLDR program then launches Windows 2000/XP or another OS. To find the available OSs, the NTLDR program must read the BOOT.INI configuration file. To do so, it loads its own minimal file system, which enables it to read the BOOT.INI file off of the system partition.

BOOT.INI File

The BOOT.INI file is a text file that lists the OSs available to NTLDR and tells NTLDR where to find the boot partition (where the OS is stored) for each of them. The BOOT.INI file has sections defined by headings enclosed in brackets. A basic BOOT.INI in Windows XP looks like this:

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition\WINDOWS
[operating systems]
multi(0)disk(0)rdisk(0)partition\WINDOWS="Microsoft Windows XP
Professional" /fastdetect
```

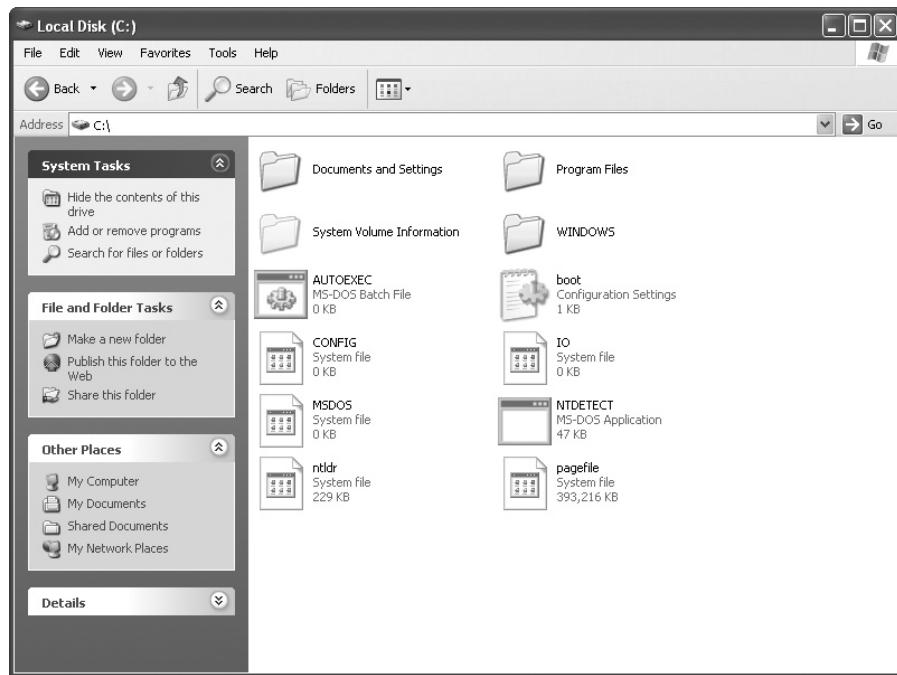


Figure 14-49 My Computer showing the system files

A more complex BOOT.INI may look like this:

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition\WINDOWS
[operating systems]
multi(0)disk(0)rdisk(0)partition\WINDOWS="Microsoft Windows XP
Professional" /fastdetect
multi(0)disk(0)rdisk(0)partition\WINNT="Microsoft Windows 2000
Professional" /fastdetect
```

Such a BOOT.INI would result in the boot menu that appears in Figure 14-50.

This crazy multi(0)disk(0)rdisk(0)partition(1) is an example of the Advanced RISC Computing (ARC) naming system. It's a system that's designed to enable your PC to boot Windows from any hard drive, including removable devices. Let's take a quick peek at each ARC setting to see how it works.

Multi(x) is the number of the adapter and always starts with 0. The adapter is determined by the boot order you set in your CMOS setting. For example, if you have a single PATA controller and a SATA controller, and you set the system to boot first from the PATA, any drive on that controller will get the value multi(0) placed in its ARC format. Any SATA drive will get multi(1).

Disk(x) is only used for SCSI drives, but the value is required in the ARC format, so with ATA systems it's always set to disk(0).

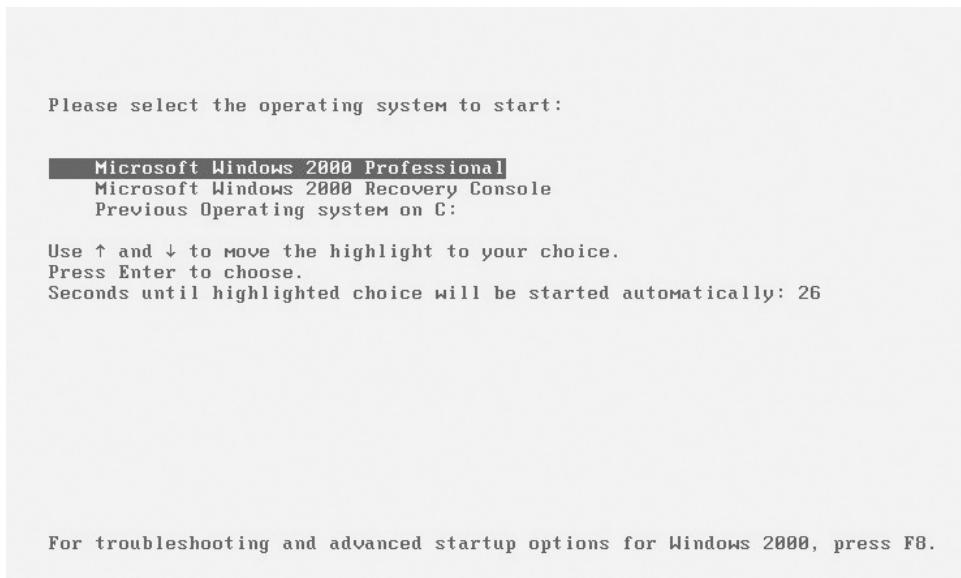


Figure 14-50 Boot loader in Windows 2000 with System Recovery Console

Rdisk(x) specifies the number of the disk on the adapter. On a PATA drive, the master is rdisk(0) and the slave is rdisk(1). On SATA drives, the order is usually based on the number of the SATA connection printed on the motherboard, though some systems allow you to change this in CMOS.

Partition(x) is the number of the partition or logical drive in an extended partition. The numbering starts at 1, so the first partition is partition(1), the second is partition(2), and so on.

The \WINDOWS is the name of the folder that holds the boot files. This is important to appreciate! The ARC format looks at the folder, so there's no problem running different versions of Windows on a single partition. You can simply install them in different folders. Of course, you have other limitations, such as file system type, but in general, multibooting in Windows is pretty trivial. Better yet, this is all handled during the installation process.

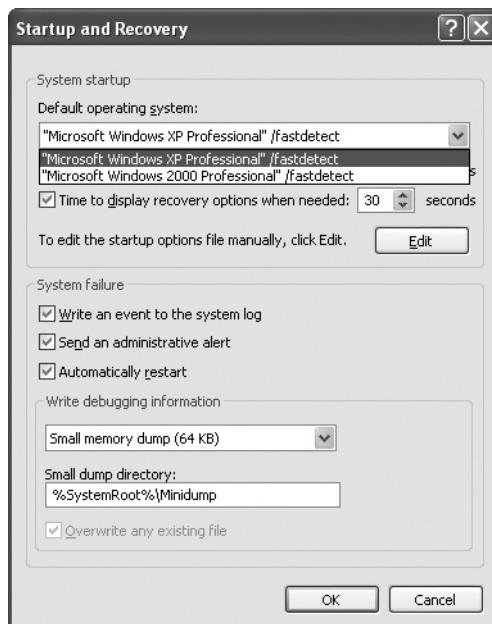
ARC format can get far more complicated. SCSI drives get a slightly different ARC format. For example, if you installed Windows on a SCSI drive, you might see this ARC setting in your BOOT.INI:

```
scsi(0)disk(1)rdisk(0)partition(1)
```

If you want to boot to a SCSI drive, Windows adds a fourth file to your system files called NTBOOTDD.SYS. This file only exists if you want to boot to a SCSI drive. Most people don't boot to a SCSI, so don't worry if you don't see this file with the other three system files.

On rare occasions, you might find yourself needing to edit the BOOT.INI file. Any text editor handily edits this file, but most of us prefer to edit BOOT.INI via the System Setup dialog box. In Windows 2000/XP, open the System applet from the Control Panel. Click the Advanced tab and then click the Startup and Recovery button. The BOOT.INI options show up at the top (Figure 14-51).

Figure 14-51
BOOT.INI



BOOT.INI has some interesting switches at the end of the ARC formats that give special instructions on how the operating system should boot. Sometimes Windows puts these in automatically, and sometimes you will add them manually for troubleshooting. Here are a few of the more common ones:

- **/BOOTLOG** Tells Windows to create a log of the boot process and write it to a file called Ntblog.txt.
- **/CMDCONS** Tells Windows to start the Recovery Console (see Chapter 15, "Working with the Command-Line Interface").
- **/LASTKNOWNGOOD** Tells Windows to boot the Last Known Good set of files (see Chapter 15, "Working with the Command-Line Interface").
- **/NOEXECUTE** Newer CPUs come with Data Execute Protection (DEP) to prevent unruly programs from causing system lockups. The setting for this, /NOEXECUTE=OPTIN, is the default on Windows systems.

NTDETECT.COM

If the NTLDR determines that you have chosen to start Windows 2000/XP, it boots the system into protected mode and then calls on *NTDETECT.COM* to detect the installed hardware on the system. NTLDR then refers to the BOOT.INI file to locate the Windows boot files.

Critical Boot Files

Naming all the critical boot files for Windows 2000/XP is akin to naming every muscle in the human body—completely possible, but time-consuming and without any real benefit. However, a few of the *most* important files certainly deserve a short mention.

Once NTLDR finishes detections, it loads NTOSKRNL.EXE, HAL.DLL, some of the Registry, and some basic device drivers; then it passes control to the NTOSKRNL.EXE file. NTOSKRNL.EXE completes the Registry loading, initializes all device drivers, and starts the WINLOGON.EXE program, which displays the Windows 2000/XP logon screen (Figure 14-52).

Figure 14-52

Where do you want to go today?



Take the time to memorize the primary boot files and the boot process for Windows 2000/XP. Most boot errors are easily repaired if you know which files are used for booting and in which order they load.



EXAM TIP The Recovery Console can be used to restore damaged/corrupt or missing NTLDR and Ntdetect.com files from the Windows XP CD.

The Vista/7 Boot Process

Windows Vista has a very different boot process than previous versions of Windows. For one thing, Vista supports both BIOS and UEFI, whereas older versions of Windows did not, so things are a bit more complex right off the bat. Instead of having a unified Windows Vista boot process, there are actually two slightly different boot processes: one for systems using BIOS and one for systems with UEFI.

The very first thing that happens when you power on a system with Windows Vista is that either the BIOS or the UEFI starts up. The difference between BIOS and UEFI systems is in what happens next. In a BIOS-based system, the BIOS uses its boot order to scan partitions, one by one, for a Master Boot Record (MBR). The MBR holds a small bit of file system boot code that scans the system's partition table for the system partition and then loads its boot sector. The boot sector in turn contains code that does nothing but point the boot process toward a file called BOOTMGR (pronounced "boot manager," or "boot mugger" if you're trying to make nerds laugh). On an UEFI system, on the other hand, neither the MBR nor the file system boot code are run and UEFI simply loads up BOOTMGR directly.



NOTE If you use Vista long enough, you may encounter an error message saying that Windows cannot boot because the BOOTMGR is missing. This message is generated when the boot sector code is unable to locate the BOOTMGR, which can be caused by file system corruption, a botched installation, or viruses.

If you've ever run a dual-boot system with Vista on it, you're probably already somewhat familiar with the BOOTMGR; one of its jobs is displaying that "Which operating system do you want to load?" screen and then loading the appropriate operating system. When the BOOTMGR starts, it reads data from a Boot Configuration Data (BCD) file that contains information about the various operating systems installed on the system as well as instructions for how to actually load (bootstrap) them. Once an operating system is selected (or immediately if only one is present), BOOTMGR loads a program called WINLOAD.EXE, which readies your system to load the operating system kernel itself rather like the way you clean up your house before Aunt Edna comes to visit. It does this by loading into memory the hardware abstraction layer, the system Registry, and the drivers for any boot devices before the operating system itself takes over.



NOTE BOOTMGR is also responsible for bringing Windows out of hibernation, so if your computer refuses to wake up, blame BOOTMGR!

Once the operating system process (called NTOSKRNL.EXE) takes over, it loads up all of the various processes and systems that comprise Windows, the Windows Vista logo comes up, and you're happily computing, completely oblivious to all of the complex electronic communication that just took place inside your computer.



NOTE Unlike with Windows 2000 and XP, the boot files and the system files must all reside on the same partition in Vista and Windows 7.

No Installation Is Perfect

Even when the installation seems smooth, issues may slowly surface, especially in the case of upgrades. Be prepared to reinstall applications or deal with new functions that were absent in the previous OS. If things really fall apart, you can go back to the previous OS or, if you have an OEM computer (one built by, for example, Dell or HP instead of by you), your computer likely came with either a special recovery partition on its hard drive or a set of recovery discs that you can utilize to restore your operating system to its factory settings. You usually invoke a system recovery by hitting a certain key during boot-up—usually F10 or F11—and then following a set of prompts.



EXAM TIP Boot Configuration Data (BCD) replaces the boot.ini used in previous operating systems and can be altered by using the command-line tool bcdedit.exe.

The procedures I've laid out in this chapter may seem like a lot of work—how bad could it be to grab an installation CD/DVD-ROM, fling a copy of Windows onto a system, and, as the saying goes, let the chips fall where they may? Plenty bad, is how bad. Not only is understanding these procedures important for the CompTIA A+ certification exams; they can also save your, ah, hide, once you're a working PC tech and you're tasked to install the latest version of Windows on the boss's new computer!

Chapter Review Questions

1. Which of the following is an advantage of running Windows 2000 on NTFS as opposed to FAT32?
 - A. Security
 - B. Support for DOS applications
 - C. Long filenames
 - D. Network support
2. Ricardo's Windows XP installation has failed. What file should he check to see what files failed to copy?
 - A. Install.log
 - B. Setup.log
 - C. Setup.txt
 - D. Setuplog.txt
3. If you do not complete the activation process for Windows XP, Vista, or 7, what will happen to your computer?
 - A. Nothing. Activation is optional.
 - B. The computer will work fine for 30 days and then Windows will be disabled.

- C. Microsoft will not know how to contact you to provide upgrade information.
 - D. You will have to use a floppy disk set to boot to Windows.
4. If Windows locks up during the installation, what should you do?
- A. Press CTRL-ALT-DEL to restart the installation process.
 - B. Push the Reset button to restart the installation process.
 - C. Press the ESC key to cancel the installation process.
 - D. Unplug the computer and restart the installation process.
5. You can upgrade directly to Windows 2000 from which of these operating systems?
- A. Windows 3.11
 - B. Windows 95
 - C. Windows Me
 - D. All of the above
6. The Windows XP disc contains which two tools for checking hardware and software compatibility?
- A. The HCL and the HAL
 - B. The HCL and the Windows Catalog
 - C. The Windows Catalog and the Upgrade Advisor
 - D. The Upgrade Advisor and the HCL
7. Which term describes a combination of many updates and fixes?
- A. Hot fix
 - B. Hot pack
 - C. Service pack
 - D. Service release
8. What does the BOOTMGR do in the Windows Vista installation process?
- A. It loads device drivers and files from the system Registry to prepare for the loading of the operating system.
 - B. It gathers information about a system's installed operating systems, enables a user to select between them, and then loads WINLOADER.EXE.
 - C. It manages a system's boot order.
 - D. It's the name of the operating system process.

9. If you are experiencing problems with Windows Me and wish to install Windows XP, what type of installation is preferred?
 - A. Clean installation
 - B. Upgrade installation
 - C. Network installation
 - D. Image installation
10. You've just replaced Jane's PC with a new, upgraded version. What post-installation tool should you run to make the transition as painless as possible for her?
 - A. Windows Activation
 - B. Repair installation
 - C. Files and Settings Transfer Wizard
 - D. User State Migration Tool

Review Answers

1. A. Security is an advantage of running Windows 2000 on NTFS as opposed to FAT32.
2. D. Ricardo should check SETUPLOG.TXT.
3. B. If you do not complete the activation process for Windows XP, Vista, or 7, the computer will work fine for 30 days and then Windows will be disabled.
4. D. If Windows locks up during the installation, you should unplug the computer and restart the installation process.
5. B. You can upgrade directly to Windows 2000 from Windows 95.
6. C. The Windows XP CD-ROM contains the Windows Catalog and the Upgrade Advisor for checking hardware and software compatibility.
7. C. A service pack is a combination of many updates and fixes.
8. B. The BOOTMGR has many functions, but its main job is to use Boot Configuration Data files to figure out which OS to load, and then to hand off the boot process to WINLOADER.EXE.
9. A. If you are experiencing problems with any OS, a clean installation is preferred so you don't simply migrate the trouble to the new OS.
10. C. Run the Files and Settings Transfer Wizard to move all her personal files and familiar settings, like her desktop, to the new computer.