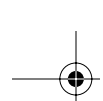


Part 1

Installation and Setup

In this section you will learn how to:

- ◆ **Install Windows XP Professional**
- ◆ **Use the Desktop and Get Help**
- ◆ **Customize the Interface**
- ◆ **Install, Remove, and Run Programs**
- ◆ **Organize Programs and Documents**
- ◆ **Use Features Specific to Notebook PCs**



Chapter 1

Introducing Windows XP Professional

Since the advent of the personal computer, users have wanted three things in an operating system: power, stability, and usability. Windows XP Professional has all these and more in abundance. It features an indefatigable 32-bit architecture, complete with built-in networking and the capability to run almost every piece of Windows software on the market, as well as a new interface.

What does all this mean to the consumer, the person sitting at a desk 52 weeks a year who just wants to be a productive computer user? It means a lot. It means a fast, up-to-date operating system with a slew of advanced features that ensure the computer will almost never crash. It means an operating system that can host the emerging multitude of 32-bit software applications, some of which offer amazing facilities for professional audio and video recording, editing, and broadcasting. It means a new interface, which gives users tremendous control over how the system performs its tasks and how it maintains its connections to peripherals and to other computers.

In this chapter, I'll give you an overview of Windows XP Professional: what's new, what's different, and what's under the hood. I'll compare Windows XP Professional with its sibling, Windows XP Home, with its cousins Windows XP Media Center Edition and Windows XP Tablet Edition, and with previous versions of Windows. In later chapters, I'll expand on most of the topics I'll introduce in this chapter, but you'll find a lot here to whet your appetite.

- ◆ What is Windows XP Professional?
- ◆ What's new in Windows XP Professional?
- ◆ Should you upgrade to Windows XP Professional?
- ◆ How is Windows XP Professional different from other operating systems?
- ◆ What are the features of Windows XP Professional architecture?

What Is Windows XP Professional?

In a nutshell: Windows XP Professional is the latest version of the Windows NT family of operating systems (which includes Windows 2000). Windows XP Professional comprises a feature set designed for business users, while its less powerful (and less expensive) sibling Windows XP Home offers features designed for home users.

If you've used Windows before, or if you're currently using Windows, you may wonder what the big deal is. The good news is that Windows XP is a big deal, especially if you've had less than satisfactory experiences with Windows in the past. Windows XP isn't the be-all and end-all of operating systems, but it's a great improvement on its predecessors.

As you probably know, in the past, Microsoft offered two main categories of Windows versions for 32-bit personal computers: the Windows 95 family and the Windows NT family. In the Windows 95 family were Windows 95 itself, naturally enough; Windows 98; Windows 98 Second Edition, which despite its unassuming name was a major upgrade to Windows 98; and Windows Millennium Edition, also known as Windows Me. In the Windows NT family were Windows NT versions 3.1, 3.5, 3.51, and 4, each of which came in a Workstation version and a Server version, and then Windows 2000, which came in a Professional version and several Server versions.

The Windows 95 family, widely referred to as Windows 9x in a brave attempt to simplify Microsoft's inconsistent nomenclature, offered impressive compatibility with older hardware ("legacy hardware," as it's sometimes politely termed) and software ("legacy software"), including full (or full-ish) DOS capabilities for running games and character-based applications. These versions of Windows kept their hardware demands to a reasonable minimum. They were aimed at the consumer market. When things went wrong (which happened regrettably often), they became unstable. And they crashed. Frequently.

Many of those people—both professionals and home users—who couldn't stand or afford to lose their work because of Windows 9x's frequent crashes migrated to Windows NT versions instead. (Others tried OS/2 while it lasted, then returned disconsolately to Windows. Others went to Linux and mostly stayed there.) NT, which stands for New Technology, had a completely different underpinning of code than Windows 9x. NT was designed for stability, and as a result, it crashed much less frequently than Windows 9x. Unfortunately, though, NT wasn't nearly as compatible as Windows 9x with legacy hardware and software. Most games and much audio and video software wouldn't run on NT, and it was picky about the hardware on which it would run. (Actually, this wasn't "unfortunate" at all—it was deliberate on Microsoft's part and probably wise. But the result was far from great for many users.)

So for the last half-dozen years, users have essentially had to decide between stability and compatibility. This led to a lot of unhappy users, some of whom couldn't run the software they wanted, and others who kept losing work or at least having to reboot their computers more than they should have had to.

The Windows 9x line culminated in Windows Me, which tacked some stability and restoration features on to the Windows 9x code base. NT culminated in Windows 2000 Professional, which featured increased compatibility with applications over NT (which wasn't saying all that much—many games still didn't run on Windows 2000 Professional), a smooth user interface, and usability enhancements.

Windows 2000 Professional was arguably the most stable operating system that Microsoft had produced until Windows XP came along. (Some old-timers reckoned Windows NT 3.51 was more stable.) But Windows 2000 Professional's stability came at a price: It had no interest in running any games or other demanding software that wouldn't conform to its stringent requirements. And while it was compatible with quite an impressive range of legacy hardware, many items still wouldn't work. Even up-to-date hardware could be problematic, especially if it connected via USB.

Since the late 1990s, Microsoft had been promising to deliver a consumer version of Windows that melded the stability of NT and the compatibility of Windows 9x. In Windows XP Home Edition, that version of Windows is finally here. According to Microsoft, Windows XP Professional is a strict superset of Home Edition, as well as of all the desktop clients that preceded Professional.

NOTE Windows 2003 Server is a separate version of Windows, designed for use on servers. It does everything that Windows XP Professional does and adds a comprehensive set of tools for managing and administering a network. It is designed to run on a network file server or application server. Chapter 20, "Connecting to Domains," and 21, "Introduction to Server 2003," cover it.

What's New in Windows XP Professional?

This section outlines the most striking and appealing new features in Windows XP, starting with installing and upgrading, moving through the user interface and visible features, and ending up with the features hidden under the hood.

Some of these new features fall into convenient categories, and this section presents them in those categories. Others don't; this section presents these features individually.

The "Evil" Windows Product Activation

The notion behind this controversial new feature of Windows XP is really rather simple—to prevent piracy. In a nutshell, Windows Product Activation (WPA) ties each copy of Windows XP to a specific computer. Although activation is mandatory, it is anonymous. Your Product Key is coupled to a computer hardware ID that is nonunique and cannot be traced back to a specific computer.

WPA is not the same as product registration, and you can take care of it over the Internet or by phone. After installation, you are asked if you want to activate the product. If you don't do it then, you'll have a certain number of days to do so. If you still haven't activated your copy of Windows XP within that time, you'll be able to boot the system, but you won't be able to get beyond the opening screen until you activate.

NOTE Corporate and academic users who purchase volume licenses for Windows XP don't have to worry about activation. Their versions of Windows XP don't include WPA.

Easier Installation and Updating

Windows XP includes several features designed to make it easier to install and to keep up-to-date. These include Windows Update; the Files and Settings Transfer Wizard; more wizards for a variety of tasks; a wider selection of device drivers; simplified installation for multifunction devices; and an effective way to uninstall and revert to your previous version of Windows.

WINDOWS UPDATE

The Automatic Updates feature runs periodically after setup and offers to download the latest patches, packages, and fixes and install them so that your copy of Windows is as up-to-date, secure, and compatible as possible. (You can also run Windows Update manually whenever you want.) When you install Service Pack 2 (SP2), or buy a PC with Windows XP SP2 already installed, the initial configuration routine offers to turn on automatic updating for you (highly recommended).

FILES AND SETTINGS TRANSFER WIZARD

Making its debut in Windows XP is the Files and Settings Transfer Wizard, a feature that Windows users have been demanding for a good 10 years. The Files and Settings Transfer Wizard provides a way of transferring designated files and settings from one computer to another or from one installation of Windows to another on the same computer. You'll still need to reinstall all your programs on the new computer or new installation of Windows, but you can transfer your data and a good amount of information about your work environment easily.

If you're migrating from an old computer to a new computer, or if you're installing Windows XP as a dual-boot with an existing version of Windows, you can use the Files and Settings Transfer Wizard to clone your existing Desktop and files and transfer them to the new computer or new version of Windows.

MORE WIZARDS TO MAKE TASKS EASIER

Windows XP includes a slew of wizards designed to walk you through complicated processes (and some that aren't so complicated). Perhaps most welcome are the improvements to the Network Setup Wizard, which provides effective configuration of simple networks and Internet Connection Sharing, and the Add Hardware Wizard. SP2 also adds a Wireless Network Setup Wizard that offers to configure WEP (Wired Equivalent Privacy) security for the network.

On the less useful front, Windows XP also includes wizards such as the Desktop Cleanup Wizard, which pops out periodically like the neighborhood dog and tries to persuade you to let it herd the stray icons on your Desktop into a folder where they'll be available but less obtrusive. If you refuse, it wags its tail and goes away for a while.

MORE DEVICE DRIVERS

Windows XP comes complete with drivers for a large number of devices, including scanners, digital still cameras, digital video cameras, printers, and so on. So there's a better chance than with another version of Windows (say, Windows Me or Windows 2000) that when you plug in a new device, Windows XP will be able to load a driver for it and get it working without any fuss.

You'll probably want to take this improvement with a grain of salt. To enjoy the latest features and the best performance from a new device, you'll probably want to install the driver that comes with the device or (better) download the latest version from the manufacturer's website.

SIMPLIFIED INSTALLATION FOR MULTIFUNCTION DEVICES

Apart from having more drivers (as described in the previous section), Windows XP makes it easier to install multifunction devices—for example, a multifunction printer/scanner/fax device (the kind that people sometimes call "hydra" machines), a PC card that combines a network interface card with a modem, or a sound board with extra features.

Previous versions of Windows tended to recognize the component pieces of multifunction devices separately in sequence. If you installed a hydra, Windows would recognize the printer and demand the installation software for it. Once that was done, Windows would recognize the fax and demand the software for *that*. After that, it would recognize the scanner and suggest you might want to install yet more software. Windows XP improves on this social ineptitude by recognizing multifunction devices as such the first time you introduce it to them, and so it demands the installation software only once.

EFFECTIVE UNINSTALL BACK TO WINDOWS 98 AND WINDOWS ME

Windows XP Professional provides an effective uninstall feature for rolling back the Windows XP installation to your previous installation of Windows 98, Windows 98 Second Edition, and Windows Me. However, you can't revert to a previous installation of Windows NT 4 or Windows 2000 Professional.

Effective Multiuser Capabilities

Windows XP provides far better multiuser capabilities than Windows 9x and requires an existing account and password in order to log on. Like NT and Windows 2000, Windows XP provides features for preventing one user from seeing another user's files. Windows XP keeps each user's files separate so that no user can see another user's files unless they have been shared deliberately.

Windows XP goes further than NT and Windows 2000, though, in that it lets multiple users be logged on at the same time, each with applications running. Only one user can be actually *using* the computer, or can be *active*, in Windows XP parlance, at any one time, but the other user sessions con-

tinue running in the background (*disconnected*, in Windows XP parlance). When you've finished with the computer for the time being, you can log off Windows, just as you did in previous versions. Logging off closes all the applications you were using and frees up the memory they took up. But if you stop using the computer only temporarily, you may prefer to "switch users," which leaves your applications running but lets someone else use the computer in the interim.

Enhanced User Interface

Windows XP has a completely revamped user interface with a large number of visual enhancements and improved functionality. Some of the visual enhancements improve usability, while others are mere eye candy. But the overall effect is mostly easy to use and mostly looks good—and if you don't like the look, you can restore the "classic" Windows look with minimal effort.

The following sections discuss the main changes to the user interface.

REDESIGNED START MENU

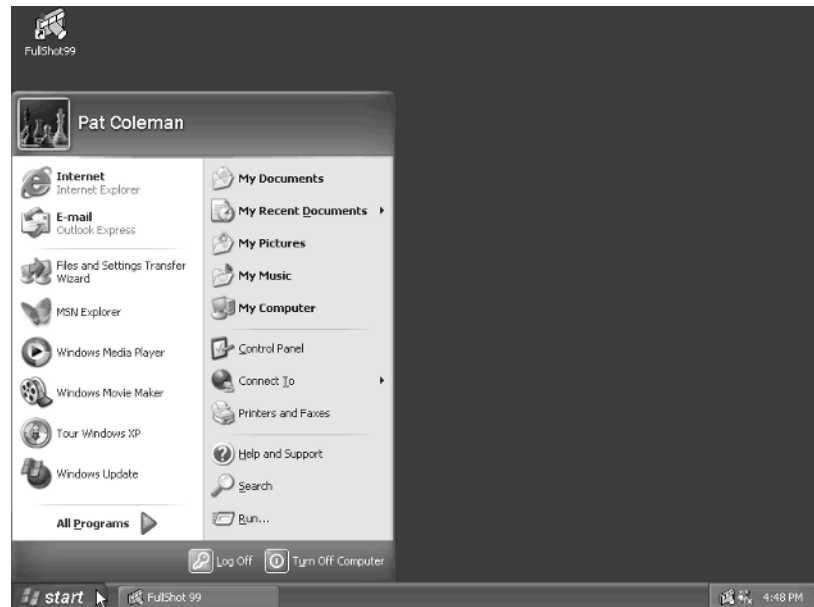
Windows XP sports a redesigned Start menu that's supposedly easier and quicker to use. Whether you find it so depends on your experience with the Start menu in Windows 9x and Windows 2000. But don't worry if you like the "classic" Start menu—you can restore it easily enough with a few clicks of the mouse.

The Start menu appears as a panel containing two columns (shown in Figure 1.1). The right-hand column remains the same unless you customize it. The lower part of the left-hand column automatically reconfigures itself to show your most used applications. You can pin an item to the Start menu to prevent it from moving and keep it available.

As you can see in the figure, the current user's name appears in a bar across the top of the Start menu, and the Log Off and Shut Down buttons appear at the bottom of the menu.

FIGURE 1.1

The redesigned Start menu contains a static column of choices on the right and a variable column of choices on the left.

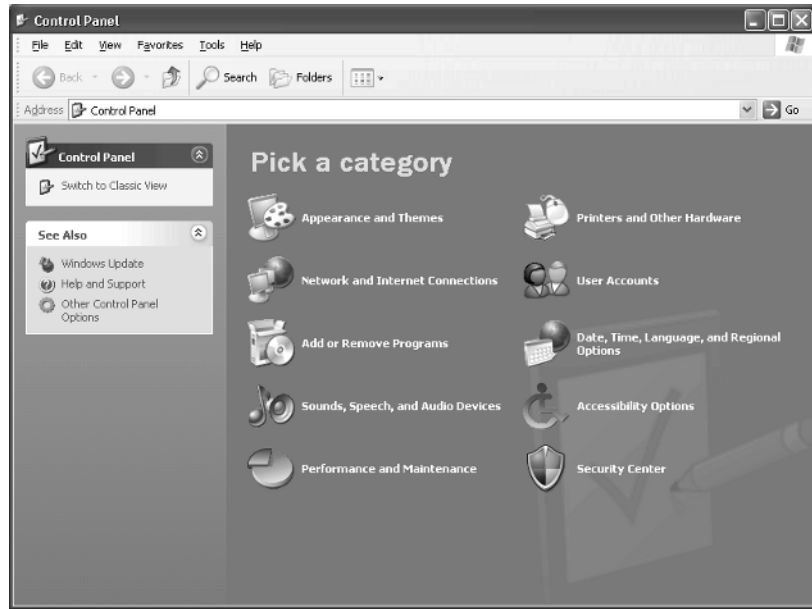


REDESIGNED CONTROL PANEL

Windows XP also has a redesigned Control Panel (shown in Figure 1.2) that presents Control Panel as categories of items and actions you can take with them. The Security Center icon will appear only if you have installed SP2.

FIGURE 1.2

Control Panel divides its bevy of icons into categories. You can use the Classic view to see all the icons at once.



New users will likely find the Category view of Control Panel easy to use. Power users who are familiar with the regular manifestation of Control Panel in Windows 9x, Windows NT 4, and Windows 2000 will probably prefer to use the Classic view. (I know I do.) You can select it from the pane to the left of the main Control Panel window.

EYE CANDY

To complement its highly graphical interface, Windows XP includes a dangerous amount of eye candy. Most people will like at least some of it. Some users will love it all. And no doubt, some people will claim to detest every pixel of it.

A prime example of eye candy is the My Pictures Slideshow screen saver, which lets you set up an automated (or mouse-controlled) slideshow of designated pictures instead of a regular screen saver. This feature seems destined to be widely popular.

Less assured of a rapturous welcome are the staggering amounts of adornment in the interface, such as shadows under the mouse pointer and under menus, the color gradient in the title bar of windows, and the effect of sliding icons, controls, and Taskbar buttons. This overbearing emphasis on graphics places heavy demands on your graphics board and processor, and if your computer's hardware tends to the lukewarm rather than hot, you may find the eye candy exacts an unacceptable performance penalty. Microsoft has had the sense to let you set performance options to balance the demands of appearance against your need for performance, so you can turn off the least necessary

effects and speed up your computer. (Chapter 24, “Active Directory Essentials,” discusses how to set performance options.)

Taskbar Changes and Enhancements

Windows XP includes a number of tweaks to the Taskbar. These seem designed for beginners, so if you're an experienced Windows user, you may find some good and others bad. Fortunately, you can change the Taskbar's behavior back to how it was in previous versions of Windows.

TASKBAR LOCKING

By default, the Taskbar is locked in Windows XP Professional. Presumably this is intended to prevent users from dragging their Taskbar to an inaccessible area at the edge of the screen. You can, however, easily unlock the Taskbar so that it can be resized or moved.

TASKBAR SCROLLING

If you read the previous paragraph, you probably started raising objections: If the Taskbar is a fixed size, the buttons for the running applications must become tiny and useless as soon as you've got 10 or more applications running.

Two other changes come into play here, of which the first is Taskbar scrolling. When the Taskbar is locked, it keeps the buttons bigger than a minimum size. To accommodate the buttons, it increases the depth of the Taskbar, but displays only its top row. On the displayed portion of the Taskbar, it puts scroll buttons so that you can scroll the Taskbar up and down one row of buttons at a time.

TASKBAR BUTTON GROUPING

The second change that makes Taskbar locking reasonable is Taskbar button grouping.

By default, Windows XP displays only one button per application on the Taskbar, whereas other versions of Windows displayed multiple buttons. For example, if you open nine Internet Explorer windows in Windows 98, it displays nine Internet Explorer buttons in the Taskbar. Having all these buttons can make it easy to find the window you want, but the buttons take up a lot of space (or each button on the Taskbar gets shrunk to a tiny size to fit them all in).

In Windows XP, if the application has multiple open windows, the Taskbar button displays the number of windows, the title of the current active window or last active window, and a drop-down arrow. To access one of the other open windows, click the Taskbar button. Windows displays a list of the windows by title. Select the window you want, and Windows displays it.

NOTIFICATION AREA

By default, Windows XP Professional collapses the notification area (formerly known as the *system tray* or the *status area*) so that only the icons you've used most recently are displayed. You can choose which icons will always appear regardless of usage and which ones will be hidden when unused or always hidden.

Better Audio and Video Features

Windows XP includes a slew of new features and improvements for audio and video. These include a new version of Windows Media Player, better features for grabbing and handling images from digital input devices such as scanners and cameras, and Windows Movie Maker, a modest video-editing application.

WINDOWS MEDIA PLAYER

Front and center among the improved audio and video features of Windows XP is Windows Media Player. The original Windows XP came with Windows Media Player version 8, which was a great improvement over earlier versions. It combines a video and DVD player, a CD player, an Internet radio tuner, and a jukebox for playing and organizing digital-audio files such as Windows Media Audio (WMA) files and MP3 files. Windows Media Player comes with a number of visually interesting skins (graphical looks) that you can apply at will, and you can even create your own skins if you have the time and talent to invest. Later OEM releases of Windows XP came with version 9, and the latest is version 10 (available with the Windows XP Reloaded update and also available as a free download from Microsoft).

Windows Media Player versions 8 and higher are huge improvements over the 98-pound weakling version of Windows Media Player that shipped with all previous versions of Windows except Windows Me. (Me included Windows Media Player 7, which offered many of the features of version 8.) Windows Media Player can even burn audio CDs at the full speed of your CD-R or CD-RW drive. Chapter 10, “Media Player,” explains Windows Media Player in detail.

MY MUSIC FOLDER AND MY PICTURES FOLDER

Like several of its predecessors, Windows XP uses custom folders for music (the My Music folder) and pictures (the My Pictures folder). Again like its predecessors, it tries none too subtly to persuade you to save your music in these folders. But Windows XP goes further, in that it makes these folders much more useful than they were in earlier versions of Windows.

The My Music folder and the My Pictures folder present customized lists of actions you can take with music files and picture files. Some of these actions tend to the commercial—for example, the Order Prints Online link in the Picture Tasks list, and the Shop for Music Online link in the Music Tasks list. But others are solidly useful—for example, the Play All link in the Music Tasks list, which lets you play all the music in a folder without spelunking into it, or the View As a Slide Show link in the Picture Tasks list, which lets you set a whole folder of pictures running as a slide show with a single click.

Not surprisingly, the My Music folder works hand-in-hand (or is it glove?) with Windows Media Player. Windows Media Player is definitely happy for you to keep your music in the My Music folder, though it will let you keep it elsewhere as well. Better yet, Windows Media Player’s features for cataloging music tracks are flexible enough to keep track of music files even when you move them from one folder to another.

The My Pictures folder works closely with Windows Image Acquisition, Image Preview, and Paint (all three of which are discussed in the next section). The folder includes a slideshow applet and a Filmstrip View, and it can publish your pictures to the Web.

TIP Filmstrip View can be used with any folder, not just My Pictures. Choose View ➤ Customize This Folder and choose the Photo Album template for the current folder to enable it.

BETTER IMAGE ACQUISITION AND HANDLING

Windows XP provides strong features for capturing images from scanners, still cameras, and video cameras. It also provides better throughput for video streams, though unless you had a duplicate computer running an older version of Windows to use as a benchmark, you could be forgiven for failing to go into raptures over the improvement. Less cynically, the improvement in throughput is unquestionably a good thing, and on decent hardware, Windows XP delivers adequate to impressive

video performance; but the chances of your confusing your PC with your GameCube remain poor. One of the central tools for image acquisition and handling is the Scanner and Camera Wizard. This wizard has a variety of duties, including transferring image files from still cameras and digital media (for example, CompactFlash cards and SmartMedia cards) to the computer. Most of its capabilities stay on the useful side of the esoteric. For example, you can scan multiple pages into a single image file, an ability that can come in handy in both home and business settings.

Windows XP provides some basic tools for handling still images. As mentioned, the My Pictures folder acts as a default repository for images and provides some basic image-handling abilities, such as rotating an image. The Image Preview feature lets you examine an image (and annotate a fax). And Paint, the basic image-manipulation and drawing package that's been included with Windows since Windows 3.x, has been beefed up as well. Paint can now open—and save—JPEG, GIF, TIFF, and PNG images as well as Windows bitmap (BMP) files, making it about five times as useful as before.

WINDOWS MOVIE MAKER

Windows XP includes Windows Movie Maker, a basic package for capturing video, editing video and audio, and creating video files in the Windows Media format. You won't find yourself making the next *Timecode* or *Traffic* with Windows Movie Maker, but it's good enough for home-video editing. You can also create video slide shows with still images for those family occasions on rainy weekends or holidays. Service Pack 1 included a newer and more feature-rich version of Windows Movie Maker. See Chapter 11, "Digital Media and Movie Maker," for details about making movies.

CD Burning

Windows XP comes with built-in CD-burning capabilities. You can burn CDs from an Explorer window with minimal effort. You can also burn CDs directly from Windows Media Player, which lets you easily create CDs containing music files, and work with packet-written CD-RWs as if they were normal disks.

Compressed Folders

Windows XP has built-in support for compressed folders in both the ubiquitous ZIP format and the Microsoft Cabinet (CAB) format. You can create ZIP folders containing one or more files or folders. Better still, you can view the contents of a ZIP or CAB folder seamlessly in Explorer as if it were a regular folder. Just double-click either type of file to browse its contents.

WARNING Sometimes you'll encounter problems if you try to run an executable file from a ZIP file, especially if it relies on support files to operate. You'll usually be able to open data files okay without extracting them, but you will probably want to copy or move an executable and its support files out of its ZIP file before running it.

Search Companion

Windows XP includes Search Companion, an enhanced search feature for finding information both on your PC and in the wider world. You can use Search Companion to search for files, for computers or people online, or for information in Help and Support Center. Search Companion brokers the search requests that you enter and farms them out to the appropriate search mechanisms.

You can choose between having Search Companion appear in a straightforward and unexceptional window and having it manifest itself using an animated dog reminiscent of the Office Assistant.

Easy Publishing to the Web

Windows XP makes it easier to publish files or folders to a website by using a web-hosting service. Windows XP includes a feature called Web Digital Authoring and Versioning (WebDAV for short) that lets you save information to the Web from any application rather than having to use the regular web-publishing protocols. You can set up a web server under My Network Places as a shortcut and then copy files directly to it.

A Sane Implementation of Autoplay

If you've used Windows 9x, NT 4, or Windows 2000, you'll know all about the Autoplay feature and how it used to drive people crazy. You remember Autoplay—the moment you insert a CD, it starts playing the music from it or installing any software it contains. By default, Autoplay was enabled, so you had to switch it off (or override it by holding down the Shift key while closing the CD tray) to prevent it from occurring.

Windows XP includes a new version of Autoplay that's improved in several ways. First, you can customize it. Second, you can configure it to take different actions depending on what the CD (or other medium) contains. For example, you might want Windows to play your audio CDs automatically when you insert them (okay, you don't—but you *might*), or you might want Windows to display a slideshow automatically when you insert a CD containing nothing but pictures.

What's that about "other medium"? That's the third thing: In Windows XP, Autoplay works for CDs, DVDs, assorted flash cards (including CompactFlash, Memory Stick, and SmartMedia), PC Cards, ZIP and other removable disk drives, and FireWire hot-plug external drives.

More Games

Windows XP includes more games than previous versions of Windows. Some of these are single-player games (for example, Spider Solitaire). Others are multiplayer games that you can play across the Internet via MSN's Zone.com website.

Remote Desktop Connection

Windows XP Professional includes Remote Desktop Connection, a technology that lets you use your computer to access a remote computer (for example, your computer at the office) that's running Windows XP Professional. Once you've connected to the remote computer, you can control it as if you were sitting at it. This is one of the features that is available only in the Professional edition, not the Home edition.

A More Useful Winkey

A what? "Winkey," pronounced "Win-key" rather than as the diminutive of "wink," is the Windows key on the keyboard—the key with the Windows logo. Most keyboards have one or two Winkeys, usually located next to the Alt or Ctrl keys.

Windows XP includes more functionality for the Winkey. You can still press the Winkey to open or close the Start menu, but you can also use it in a number of key combinations. For example, pressing Winkey+M issues a Minimize All command, and pressing Winkey+Shift+M issues an Undo Minimize All command.

For the full list of Winkey combinations, see Chapter 3, "Using the Desktop and Getting Help."

Improvements for Portable Computers

Windows XP includes several improvements for portable computers.

First, Windows XP supports processor power control, which lets the computer make use of features in chips such as Intel's SpeedStep technology, in which the processor runs at full speed when the computer is plugged into the main power supply (or told that it's plugged in) but at a lower speed to save power when it's running on battery power (or told that it is).

Throttling back the processor like this reduces the computer's power usage a bit, improving battery life, but in most portables, the screen consumes far more power than the processor. Windows XP also targets the screen, providing a couple of features designed to reduce power use when the computer is running on battery power. First, Windows XP turns off the display when the user closes the computer's lid, on the basis that the user probably isn't looking at the display. Second, it runs the screen at a dimmer brightness when the computer is running off the battery. The cynical among you will point out that most sentient portables implement both these functions already in hardware. Still, it shouldn't do any harm to have Windows help out for the manufacturers who design their machines a little less carefully.

Windows XP also includes some other less obvious visual enhancements, such as support for ClearType, a Microsoft text-display technology that improves the look of fonts on LCD screens that have digital interfaces. With the popularity these days of desktop LCD monitors, this is a feature that can help not just notebook users but many desktop users as well.

Faxing

Windows XP Professional contains a built-in fax client that's more than adequate for most home needs and many home office needs. You can send faxes from any application that supports printing and you can specify whether to print out incoming faxes automatically or store them in a folder. You can even configure different fax/modems to take different roles. For example, if you use faxes extensively, you might want to keep separate incoming and outgoing fax lines. You'll need a modem for each of the phone lines involved, but that's about as difficult as it gets. The fax service is not installed by default, but you can install it through Add or Remove Programs in the Control Panel. See Chapter 8, "Installing and Working with Printers and Fonts," for more information about it.

More Help

Windows XP delivers more Help—and more different types of Help—than any other version of Windows. If you've searched fruitlessly for information in the past, you'll be aware that Windows' Help files have never exactly delivered the ultimate in user satisfaction. Digging information out of Help often felt so difficult that if you knew Windows well enough to find Help on the right topic, you could probably solve the problem without Help's assistance.

Windows XP takes a new approach to Help. There are Help files on your hard drive still, but they're integrated into an application called Help and Support Center. Help and Support Center not only works with the Help files but also with the Microsoft Knowledge Base (a database of support queries) and other online sources of information. For example, if you run a query within Help and Support Center to find information on hardware, it might return some information from local files, some information from the Microsoft website, and some information from hardware manufacturers' websites, all packaged into one window so that you can access them conveniently.

Help and Support Center also provides a gateway to other areas of support, including Microsoft Assisted Support and Support Communities, and to applications that you can use to get help from

other users (such as Remote Assistance) and troubleshoot your computer (such as System Configuration Utility and System Restore).

The following sections discuss some of the Help and Support Center features.

MICROSOFT ONLINE ASSISTED SUPPORT

Windows XP's Microsoft Online Assisted Support feature lets you automatically collect information on a problem you're having and submit it to Microsoft electronically. A Microsoft technician then sends a solution, which appears as a pop-up in your notification area. You can read the response in the Help and Support Center window and apply the wisdom it contains to fix the problem.

Microsoft Online Assisted Support is designed to bypass the problems inherent with tech support via phone call, namely: that it's difficult for the user to tell the Help technician what's wrong with their computer; that it's even harder for the technician to get a good idea of what's going wrong without knowing a fair bit of technical information about the computer; and that waiting on hold for tech support is nobody's idea of fun, especially if you're paying for any part of the privilege.

SUPPORT COMMUNITIES

Instead of contacting a Microsoft technician via Microsoft Online Assisted Support, you can try to get support from one of the Windows Newsgroups, which are Microsoft-hosted newsgroups dedicated to Windows.

REMOTE ASSISTANCE

Remote Assistance is an ingenious feature by which you can get assistance from a friend or other knowledgeable person remotely by computer.

Here's the brief version of how Remote Assistance works. You send out an invitation file via e-mail or via Windows Messenger instant messaging. Your helper receives the invitation and responds to it. Remote Assistance sets up a secure connection between their computer and yours, using a password to verify their identity. Your helper can then view your screen remotely and chat with you (via text chat and voice). If you trust your helper, you can even let them control your computer so that they can take actions directly.

TOOLS SECTION

Help and Support Center includes a Tools section that gives you quick access to information about your computer (My Computer Information and Advanced System Information) and its configuration (System Configuration Utility), network diagnostic tools (Network Diagnostics), the System Restore feature, and more. In addition to the tools that Microsoft makes available in the Tools section, OEMs can add tools of their own, so you may also find custom tools provided by your computer manufacturer.

Many of the tools accessible through the Tools section are also accessible in other ways through the Windows interface. For example, Windows XP includes an improved version of Disk Defragmenter, which you can use to keep your hard disk from becoming fragmented (fragmentation decreases performance). You can run Disk Defragmenter from the Tools section, but you can also run it from the System Tools submenu of the Start menu (Choose Start > All Programs > Accessories > System Tools > Disk Defragmenter.); you can also schedule Disk Defragmenter to run automatically at convenient times.

FIXING A PROBLEM TOOL

Help and Support Center includes an area called Fixing a Problem that contains a number of troubleshooters for walking you through the steps of diagnosing and curing various common problems. Fixing a Problem isn't a panacea, but it's a good place to start, and it can save you a call to a guru or even a trip to your local computer shop.

DEVICE DRIVER REFERRAL SITE

Help and Support Center contains a system for referring searches for drivers that don't come with Windows or with the hardware device. When you plug in a new hardware device, and Windows finds that it doesn't have a driver for it and you can't supply a driver, Windows invites you to send information about the hardware to Microsoft. Once you've sent the information, you can take a variety of actions depending on what information is available. For example, you might be able to view a list of compatible devices (if any), search for information on compatible devices or Knowledge Base articles about the hardware, or find a link to the vendor's website.

OTHER HELP IMPROVEMENTS

Help and Support Center includes assorted other Help improvements that can save you time. For example, you can print out a whole chapter of Help information at once instead of having to slog through it screen by screen. And you can open multiple Help and Support Center windows at the same time. This makes it easier to pursue different avenues of exploration for the information you need. When you find useful information, you can create a favorite for it so that you can access it quickly again at need.

Network Connectivity

Windows XP provides various improvements in network connectivity, from creating a home or office network to joining a computer to two separate networks. There are also great improvements in Internet connectivity, discussed in the next section.

NETWORK SETUP WIZARD

The Network Setup Wizard simplifies the process of creating a network, sharing printers, Internet connections, and other resources, and configuring protocols and security. With SP2, there is also wizard-based functionality for configuring wireless networks and setting up Wireless Equivalent Privacy (WEP) security for them.

ALTERNATIVE TCP/IP CONFIGURATION

Windows XP provides an alternative TCP/IP configuration that allows you to connect to a network that has a DHCP server and to a network that doesn't without changing your TCP/IP settings. For example, you might use a laptop at work (where the network has a DHCP server) and at home (where your network doesn't).

NETWORK BRIDGING

Windows XP's network-bridging capability lets you use a computer with two or more network adapters to join two separate networks. You're perhaps unlikely to have two (or more) networks at

home or in a small office—unless you have a wired network to which you’ve added a wireless component to provide roaming capabilities for some of the computers.

Internet Connectivity and Web Browsing

Windows XP provides a number of enhanced features for Internet connectivity and web browsing, from favorites for Internet connections through to a new version of Internet Explorer.

INTERNET CONNECTION FAVORITES

Windows XP lets you create favorites for your Internet connections. By using favorites, you can switch easily from one Internet connection to another. This is a great time-saver if you use multiple ISPs or (perhaps more likely) travel frequently and need to use different dial-up numbers from different locations.

INTERNET CONNECTION SHARING AND INTERNET CONNECTION FIREWALL

Like Windows 98 Second Edition, Windows Me, and Windows 2000, Windows XP includes an Internet Connection Sharing (ICS) feature that lets you share an Internet connection on one computer with one or more networked computers. Windows XP’s version of ICS has some tweaks, such as that you can disconnect the shared Internet connection from another PC if necessary—for example, if you need to use the phone line that the connection is using. Windows XP includes a Quality of Service Packet Scheduler that works to optimize the utilization of a shared Internet connection.

ICS is a great convenience, particularly if you have a high-speed connection such as a Digital Subscriber Line (DSL) or a cable modem—but it lays your network open to assault from the Internet. Some people may still prefer to share an Internet connection via a router instead of through Windows, but not all connections can be router-shared (for example, satellite broadband cannot).

Windows XP goes one better than its predecessors by including a personal firewall (called Internet Connection Firewall) to protect the Internet connection (whether shared or not). It is not enabled by default in the original Windows XP and Service Pack 1, but Service Pack 2 adds a Security Center and enables the firewall by default, as well as offers some customization options for the firewall. (The firewall in SP2 is actually a new and improved program, not just a new interface.)

NEW VERSION OF INTERNET EXPLORER

Windows XP includes Internet Explorer 6, the latest version of Internet Explorer. Even if you feel you’ve already had it up to there with new versions of Internet Explorer, stifle your impatience, because Internet Explorer 6 offers a number of welcome innovations, including the following:

- ◆ You can save images, music, and videos more easily to your computer.
- ◆ The new Media bar makes it easier to listen to streaming audio directly in Internet Explorer.
- ◆ Internet Explorer provides better handling of cookies and digital certificates for securing information transfer and authenticating content.
- ◆ Internet Explorer can automatically resize an image you’ve displayed directly. If you’ve ever used Internet Explorer to open a digital photo and found it displayed bigger than your screen so that you could see only part of it, you may appreciate this feature. (But you’d be better off opening the photo in Paint in the first place.)

- ◆ Internet Explorer 6 has more integrated functionality for handling different file types. This won't strike you over the head; you'll simply find that more file types open without your being prodded to download and install extra components. For example, Internet Explorer 6 has built-in support for Macromedia Flash and Shockwave animations and support for Cascading Style Sheets Level 1 (CSS1). The net result is that more animations will play without your needing to add software, and documents formatted with cascading style sheets will be displayed as their authors intended. (They may still look horrible, but at least you'll know that they're meant to look that way.)
- ◆ Windows XP SP2 adds a pop-up blocker to Internet Explorer 6.

MSN EXPLORER

Windows XP includes MSN Explorer, an Internet client dedicated to MSN. If you don't have an ISP, you may want to use MSN Explorer to connect to the Internet.

Multiple Monitor Support—for Both Desktops and Laptops

Several versions of Windows have had multiple monitor support for desktops: By installing two or more graphics cards, each hooked up to a monitor, you can spread your Desktop across two or more monitors, giving you far more space to view multiple applications. Windows XP Professional includes multiple monitor support like its predecessors. Windows XP Professional also includes a new technology called DualView, which lets you hook up two monitors to a single graphics card that supports two interfaces. Relatively few AGP and PCI graphics cards support two VGA interfaces, but you'll find a number of cards with DVI outputs (for LCD panels) that have a regular VGA connection as well.

Most of the excitement here is for laptops, most of which have a connector for an external display as well as the internal connector for the built-in screen. Instead of using the external display to display the same image as the built-in screen, you can use DualView to make the external display an extension of your Desktop. This is a wonderful feature for laptop users who crave more screen space.

Advanced Features

Just so you know, most of the new features I've described so far apply to both Windows XP Professional and Windows XP Home. Those that follow are specific to Professional.

BACKUP AND AUTOMATED SYSTEM RECOVERY (ASR)

Windows XP Professional includes a Backup utility and an Automated System Recovery (ASR) feature that can be activated from bootup to restore a damaged system. The Backup utility comes on the Home Edition CD-ROM too (Ntbackup.msi), but it doesn't get installed by default, and it doesn't include ASR.

OFFLINE FILES

Offline files let you cache (store) copies of files located on network drives on your local drive so that you can work with them when your computer is no longer connected to the network. Windows XP Professional can encrypt the Offline Files database to help keep the information in the files secure.

REMOTE DESKTOP

Remote Desktop is a little confusing because of the terminology. The Remote Desktop component lets you make a computer available for remote control. The Remote Desktop Connection component lets you use a computer to access a remote computer that's running Remote Desktop. Both Professional and Home have Remote Desktop Connection. So you can use a computer running Home to access a computer running Professional, but not the other way around. If you need to be able to connect to your computer remotely via Remote Desktop Connection, you need Professional rather than Home.

NETWORKING FEATURES

Windows XP Professional has many networking features, including the Simple Network Management Protocol (SNMP), the Client Services for NetWare, Simple TCP/IP Services, and the Multiple Roaming feature. If you need to connect to a NetWare server, or if you need to use roaming profiles, you'll need Windows XP Professional rather than Windows XP Home.

NOTE One other thing—there is a 64-bit version of Windows XP Professional for the Intel Itanium processor.

IMPROVED SYSPREP

SYSprep is a tool used to prepare a system for drive imaging. It allows you to make a complete image of a hard drive and load it onto another system, thus facilitating the installation of the operating system on a large number of computers. In Windows XP Professional, SYSprep has been modified so that you can more quickly and efficiently install the operating system on multiple computers. These modifications reduce startup and imaging time and minimize restarts.

What's Hiding under the Hood?

The features mentioned so far catch the eye—some even on a cursory scan of the Windows XP Desktop and interface.

Less glamorous, but more important in the long run, are the enhancements hiding under Windows XP's hood. This section discusses the major enhancements that you probably *won't* see.

PROTECTED MEMORY MANAGEMENT

Windows XP offers fully protected memory management. With protected memory management, Windows XP can handle memory errors with more aplomb. When an application tries to access memory that doesn't belong to it, Windows XP can close the application without affecting any other running application. You still lose any unsaved work in the guilty application, but all your other applications continue running.

While Windows XP is dealing with the misbehaving application, you can move the application's window so that it doesn't obstruct your view of any other applications you have open.

SYSTEM FILE PROTECTION

Windows XP offers a feature called System File Protection that protects your system files from ill-advised actions on your part.

Windows XP tries to persuade you not to view the contents of folders that you probably shouldn't be messing with by refusing to show them to you until you demand it display them. You can then

delete system files if you want (except for any file that's actively in use, which is locked automatically). But the next time that Windows boots, or if it catches the damage you've done before you reboot it, it replaces the files you deleted without notifying you.

SYSTEM RESTORE

Windows XP offers a System Restore feature similar to but more effective than the System Restore feature in Windows Me. System Restore automatically creates restore points both periodically and each time you make a change to the system—for example, by installing an application or a driver. When one of your changes leads to an unwelcome result, such as your computer failing to boot, you can use System Restore to roll back the change to an earlier point at which the system was working properly.

DEVICE DRIVER ROLLBACK

Device drivers have long been the bane of Windows—okay, *one* of the banes of Windows. By installing the wrong driver, or a buggy driver, you could render your computer useless until you reinstalled Windows (or turned in frustration to another operating system).

Windows XP tracks the drivers you install and lets you roll back the installation of the driver—in other words, you can revert to the driver you were using before.

Better yet, Windows XP stores details of the previous driver in what's called the Last Known Good Configuration—the configuration used the last time the computer seemed to be running okay. This means that if installing a new driver prevents your computer from booting as normal, you can boot into Safe Mode and use the Last Known Good Configuration to restore the previous driver.

COMPATIBILITY WITH WINDOWS 9x APPLICATIONS

Windows XP aims to be able to run all applications that would run on Windows 9x, Windows NT, and Windows 2000. As you'll know if you've struggled to run a Windows 9x application on NT or Windows 2000, this is quite a challenge. NT-based operating systems (including Windows XP) handle memory and hardware access in a different way than Windows 9x operating systems. These differences mean that applications designed for Windows 9x often won't run satisfactorily on NT and Windows 2000.

Being able to run these legacy applications is a big feature of Windows XP—but because Microsoft has implemented this feature very successfully, it remains hidden most of the time. Usually, you can simply install a legacy application and run it without complications. Behind the scenes, Windows XP may be running the application in its Compatibility mode or applying one of its new AppFixes to the application (to prevent it from detecting the wrong operating system and from causing problems such as referencing memory once it's been freed up), but you often won't know about it. You may need to specifically run some applications in Compatibility Mode, and you may see Windows Update automatically downloading new information for AppFixes to keep your copy of Windows up-to-date, but most of the time your old applications will simply work—which of course is the way it should be.

Should You Upgrade to Windows XP Professional?

Whether you should upgrade to Windows XP Professional depends on your needs, how well your current version of Windows is fulfilling them, and whether your hardware is up to the test. The decision is wholly yours (of course), but the following sections offer some suggestions, depending on where you're coming from.

Windows 9x

If you're using one of the versions of Windows 9x—Windows 95, Windows 98, Windows 98 Second Edition, or Windows Me—the main attractions of Windows XP Professional are much greater stability, the enhanced user interface, the extra features that Windows XP includes, and security. You can use an Upgrade version of XP, as long as you either install over the top of it or, if you are doing a clean install, have your original product CD handy to insert as verification of past ownership when prompted.

Exactly which extra features Windows XP includes depends—obviously enough—on which version of Windows 9x you have. Not surprisingly, later versions of Windows 9x offer more features than earlier versions. For example, the ICS feature debuted in Windows 98 Second Edition, so ICS might be a reason to upgrade to Windows XP if you have Windows 95 or Windows 98 (first edition), but not if you have Windows 98 Second Edition or Windows Me. (The Internet Connection Firewall feature, however, is new.) Likewise, Windows Me includes Windows Media Player 7, a version that greatly improved on the earlier, anemic versions of Windows Media Player, but it isn't as capable as Windows Media Player 8, the version included in Windows XP. From Windows Me, the new version of Windows Media Player provides only a modest incitement to upgrade, whereas from earlier versions of Windows 9x, it provides much more encouragement—assuming you're interested in multimedia, that is.

Whichever version of Windows 9x you're using, you'll need to make sure that your hardware is up to scratch for Windows XP. Very generally speaking, if your computer is capable of running Windows 98 or Windows Me at a decent clip, it should be able to run Windows XP without much trouble (though you might need to add memory). You'll find details of Windows XP's hardware requirements in Chapter 2, "Installing Windows XP Professional."

Windows 3.1

If you're still using Windows 3.1 and DOS as your main operating system, Windows XP Professional represents a considerable upgrade. There are two major considerations in taking this step:

- ◆ First, unless you've installed Windows 3.1 on a modern system (as you might have done for backward compatibility with ancient applications), you'll almost certainly need to get a new PC to run Windows XP.
- ◆ Second, if you will need to continue running DOS applications and 16-bit Windows applications (rather than upgrading to 32-bit applications that provide similar functionality), check to make sure that these applications are compatible with Windows XP before upgrading. As mentioned earlier, Windows XP runs older 32-bit Windows applications quite impressively, but it has problems with some 16-bit applications.

Windows 2000 Professional

If you're currently using Windows 2000 Professional and are happy with it, stick with it for the time being. The "natural" upgrade path from Windows 2000 Professional is to Windows XP Professional, but make this upgrade only after carefully evaluating the benefits that Windows XP Professional will provide. If Windows 2000 Professional is currently fulfilling all your computing needs, stick with it.

Windows XP Home Edition

As its name suggests (and is designed to suggest), Windows XP Professional is geared toward use in a “professional” setting—for example, in an office or in a corporate setting. That doesn’t mean you can’t use it at home if you want, just that it has features designed for use in office and corporate settings. For example, it’s designed to connect to Windows 2000 servers running Active Directory, and it has features for being managed remotely by administrators.

Home-to-Professional is a minor upgrade, and not worth the money for most people. Peruse the section earlier in this chapter comparing the features between these two, and decide whether or not any of those features are worth the \$100 or more. Professional Edition will not make your PC run any better or faster—it’s purely a features thing.

How Is Windows XP Professional Different from Other Operating Systems?

I’ve discussed the differences and advantages of Windows 2000 Professional compared with Windows 95/98, but how does it stack up against other popular operating systems?

Windows XP Professional Compared with UNIX

Of all the operating systems under discussion here, UNIX is probably the most similar to Windows XP Professional in terms of architecture. There are many different flavors of UNIX, however. Each flavor has a different user interface, and not all of them are graphical. As a group, UNIX operating systems are 32-bit, secure, and capable of running on Intel, RISC, and DEC Alpha processors.

UNIX is mostly a server operating system (OS) these days; it is not very popular as a client OS anymore. In the past, artists and designers have used high-end UNIX -based workstations to create special effects for films. Windows XP Professional, however, supports high-end 3-D protocols such as Raydream. Running Windows XP Professional on a high-powered x86 processor will give you equal processing power to those UNIX workstations, with the added punch of Windows XP Professional, for a fraction of the price. And running Windows XP Professional on a high-end Pentium IV processor will pretty much leave every other workstation in the dust.

Windows XP Professional Compared with Linux

Linux is a freely distributed 32-bit OS, a variant of UNIX. Many shells are available that add a friendly graphical face to Linux, making it more accessible to the average end-user than standard UNIX, but with all of UNIX’s stability.

A large segment of the Linux fan base is the “anti-Microsoft” crowd that sees Microsoft’s industry dominance as a very bad thing and wants to counteract it in any way they can. They love Linux because of the philosophy behind it—free and constantly being collaboratively improved. There’s something to be said for that. But me, I’m not political. I just want to run some applications.

In the end, the main reason for owning a computer is to run applications, right? So it’s important to choose an OS that runs the applications you need. Some business software companies have released versions of their applications that run on Linux, but the majority of applications still run only on Windows XP. I am not going to disparage Linux here, partly because I think it’s a great OS and partly because I’m somewhat afraid of all those rabid Linux enthusiasts out there. However, I will say this: not all of the applications I need to run will work on a Linux system.

Windows XP Professional Compared with the Macintosh OS

Like Windows XP Professional, the Macintosh OS is a 32-bit environment with built-in networking capabilities. Despite its well-known and intuitive interface, the Macintosh OS lacks many of the powerful features found in Windows XP Professional. Object linking and embedding (OLE), MAPI, and TAPI are all unfamiliar to Apple users. The Mac OS supports only a limited sort of cooperative multitasking, and you can switch between programs only with the mouse; there's no equivalent to the mighty Alt+Tab key combination in Windows. There is also a relatively limited amount of software available to the Macintosh market as compared with the Windows market, and the Mac OS runs only on Mac hardware.

What Are the Features of Windows XP Professional Architecture?

I've already discussed some of the Windows XP Professional architecture. In this section, I'll analyze it a little more closely to see what makes Windows XP Professional tick and why it is different from other operating systems.

From a programmer's perspective, Windows XP Professional is divided into two layers. These are actually two separate operating modes. The *kernel mode* is where Windows XP Professional performs its internal tasks and controls interaction between programs and the operating system, and between programs themselves. It is generally protected from end users fiddling with it. The *user mode*, which is usually described as sitting above the kernel mode because it is closer to the end user, is where your applications run. The area is considered nonprotected because you have access to it through your applications.

Kernel Mode

Nothing happens in the Windows XP Professional universe without the operating system knowing about it and giving its blessing. The kernel is the core of Windows XP Professional. It acts as a "gofer" between the operating system and the computer's processor. As such, it is responsible for scheduling all the operating system's interactions with your computer. The kernel also manages all the interrelationships between the different kernel mode operations. It does this by means of *threads*. A thread is a series of instructions that are attached to a command that is executed by a program. Threads include memory addresses, scheduling for the amount of time the process will take, and anything else that describes the process.

The kernel mode is divided into three subsections: the Hardware Abstraction Layer (HAL), the kernel, and Executive Services. Executive Services is subdivided further into its own component parts; more on those parts shortly.

THE HAL AND THE KERNEL

The HAL controls the interaction between the kernel and the system hardware. One of the design goals of Windows XP Professional was the capability to be easily ported from one type of computer to another. To this end, the HAL *abstracts* the hardware from the kernel so that the kernel does not need to know what type of hardware is installed in the computer. This extends to running multiple processors in your computer. Windows XP Professional is one of the only PC-based operating systems that can take advantage of symmetric multiprocessing. The abstraction provided by the HAL gives Windows XP Professional greater stability.

Because of the abstraction provided by the HAL, software that attempts to directly access the hardware is not permitted to run. The HAL, working with the kernel, stops those programs dead in their tracks. For performance reasons, many DOS programs—particularly games—use direct hardware access. Programs written for Windows XP Professional don't need to worry about how to access the hardware; they just ask the operating system for support, and Windows XP Professional takes care of the rest.

Windows XP Professional does have some communication that bypasses the HAL and goes directly to the hardware. In each of these cases, the communication is between the Executive Services and the individual drivers for hardware devices such as the video card and network card. But the concept of hardware abstraction is still maintained.

EXECUTIVE SERVICES

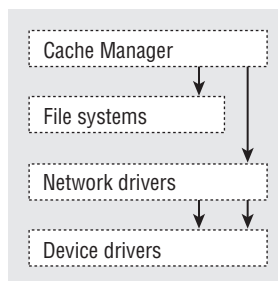
Executive Services is a set of separate components that complete the underpinnings of the Windows XP Professional kernel mode. Each Executive Service controls a specific function. The following is a brief overview of each of those functions.

I/O Manager

I/O Manager handles all communication between your applications and your hard disk. Additionally, it manages drivers for different file formats (FAT, NTFS) and keeps the Windows XP Professional kernel informed of the hard drive's status. I/O Manager also manages network cards and modems. In short, this manager controls any device that delivers data to or from the computer. Its components are illustrated in Figure 1.3.

FIGURE 1.3

I/O Manager is built to simultaneously control multiple devices and drivers.



I/O Manager is divided into the following sections:

Cache Manager Monitors your use of disk cache and disk pages.

File systems Manages the file systems you have installed on your computer.

Network drivers Controls your network cards and network protocols.

Device drivers Manages the hardware you have in your computer. This includes everything from your hard drive(s) and modem to your keyboard and mouse.

Object Manager

Object Manager manages all the system objects that are used by Windows XP Professional. An object is a piece of data used by the operating system to create system events. Objects are acted upon by processes. Every object has a handle (yes, that's the technical term) that a process connects to in order to complete its job. The Object Manager is extensible, meaning that it can be expanded and added to as new object types are developed.

Security Reference Monitor

Security Reference Monitor is the “watchdog” for Windows XP Professional. Security Reference Monitor assigns security tokens and authenticates users each time they execute a task.

Process Manager

Process Manager is the complement to Object Manager. Process Manager manages the creation and deletion of processes. A *process* is a set of threads combined with a memory address and the necessary objects needed to complete a system task. The Process Manager works in conjunction with the Security Reference Monitor to ensure that every process is assigned a security token.

Local Procedure Call Facility

Local Procedure Call facility acts as a negotiator between user mode and kernel mode. From an internal standpoint, Windows XP Professional uses a client-server model to administer itself. Just as Windows XP Professional connects to a server and requests services from it, the Windows XP Professional user mode requests services from the Windows XP Professional kernel mode. Those requests are handled by local procedure calls. Local procedure calls are also used in standard client-server networks.

Virtual Memory Manager

Virtual Memory Manager oversees how Windows XP Professional uses virtual memory. To increase the amount of usable memory space, Windows XP Professional uses hard-disk space as memory when it runs out of memory (which can happen fairly quickly with some high-powered programs). The disk memory is known as *virtual* memory.

Win32K and GDI

The Win32K and Graphics Device Interface (GDI) are the graphics subsystem of Windows XP Professional. The graphics functions in earlier versions of Windows NT were provided by the Win32 subsystem in user mode. Microsoft moved the graphics subsystem into Executive Services for version 4 to give the graphics functions a performance boost. In fact, this resulted in the single greatest increase in the apparent speed of Windows NT 4.

User Mode

In the Windows XP Professional user mode, each of your programs runs in a separate memory space, an arrangement that protects each program from the others in case one should crash. This is true for 32-bit and 16-bit programs, both Windows and DOS.

The user mode is divided into subsystems. Each subsystem handles a different type of application and can report directly to the kernel mode. The subsystems are described briefly in Table 1.1.

TABLE 1.1: User Mode Subsystems

SUBSYSTEM	DESCRIPTION
Win32	Administers 32-bit and 16-bit Windows programs.
OS/2	Administers character-based OS/2 programs.
POSIX	Administers POSIX programs, which are Unix hybrids that can be run on any POSIX-compliant system, including Windows XP Professional. They are written to a series of application programming interfaces (APIs) that are platform independent. They control interaction with system components such as hard drives and memory.
Security	Administers system security and manages security tokens, monitors, and passwords. The user mode portion of the Security subsystem runs only during a user logon.

In addition to the subsystems noted in Table 1.1, user mode may also contain VDMs (video display metafiles). A VDM simulates a computer running MS-DOS 5, with 16MB of RAM and conventional, expanded, and extended memory. As stated earlier in this chapter, this simulation makes it possible to run MS-DOS programs on Windows XP Professional. It also enables you to run 16-bit Windows applications by simulating Windows 3.1 running on that MS-DOS computer with 16MB of memory. By default, Windows XP Professional starts all 16-bit Windows applications in the same Win16 or Win32 or WOW environment. This simulates exactly the environment the programs were written to operate in under Windows 3.1. However, Windows XP Professional gives you the ability to start the application in a separate memory space, which creates another WOW for each 16-bit Windows application.

Remember that the WOW environment imitates Windows 3.1 so well that it even hangs just like the old Windows did! That means that if one of your 16-bit Windows applications crashes, it will take all the other 16-bit applications with it—unless you have chosen to start them in their own memory spaces, in which case the other 16-bit programs will keep running without a problem.

TIP If a 16-bit application crashes, it will also crash any other program running in the same memory space. If this happens, you can stop the WOW by using Task Manager and restart the 16-bit program. All 32-bit applications will be unaffected by the crash and continue to run normally.

Summary

This chapter has discussed what you need to know about Windows XP Professional in order to decide whether to upgrade to it or stay with your current version of Windows.

