Professional ▶

EXAM OBJECTIVES

Exam 70-210

- Install, configure, and manage DVD and CD-ROM devices.
- Implement, manage, and troubleshoot display devices.
  - Configure multiple-display support.
  - Install, configure, and troubleshoot a video adapter.
- Implement, manage, and troubleshoot mobile computer hardware.
  - Configure Advanced Power Management (APM).
  - Configure and manage card services.
- Implement, manage, and troubleshoot input and output (I/O) devices.
  - Monitor, configure, and troubleshoot I/O devices, such as printers, scanners, multimedia devices, mouse, keyboard, and smart card reader.
  - Monitor, configure, and troubleshoot multimedia hardware, such as cameras.
  - Install, configure, and manage Infrared Data Association (IrDA) devices.
  - Install, configure, and manage wireless devices.
  - Install, configure, and manage USB devices.

- Update drivers.
- Monitor and configure multiple processing units.
- Install, configure, and troubleshoot network adapters.
- Manage and troubleshoot driver signing.
- Configure, manage, and troubleshoot the Task Scheduler.
- Manage and troubleshoot the use and synchronization of offline files.
- Manage hardware profiles.
- Configure support for multiple languages or multiple locations.
  - Enable multiple-language support.
  - Configure multiple-language support for users.
  - Configure local settings.
  - Configure Windows 2000 Professional for multiple locations.
- Configure and troubleshoot desktop settings.
- Configure and troubleshoot fax support.
- Configure and troubleshoot accessibility services.

Continued ▶

EXAM OBJECTIVES ***Continued***

Server ▶

Exam 70-215

- Configure hardware devices.
- Configure driving signing options.
- Update device drivers.
- Troubleshoot problems with hardware.
- Install, configure, and troubleshoot network adapters and drivers.

CHAPTER

5 Using Control Panel

It seems that Control Panel just gets bigger and better with every new release of Windows—and Control Panel in Windows 2000 is no exception. Windows 2000 Control Panel is so robust that I could write a whole book about it alone. But I'll try to contain my enthusiasm and boil it down to the basics you need to prepare for the Microsoft Windows 2000 certification exams and to use Windows 2000 in the real world.

So, in this chapter, I'll start with a brief overview of Control Panel. Then I'll work my way through Control Panel applications, one at a time. I'll explain what each application is used for, and then show you how to use many of the applications to configure a Windows 2000 computer. As you can tell by reading the exam objectives for this chapter, a huge focus is placed on installing, configuring, managing, and troubleshooting specific hardware devices on a Windows 2000 computer. You'll see that same focus throughout this chapter, with a lot of emphasis placed on using Add/Remove Hardware, Device Manager, and various troubleshooting tips and tools.

Chapter Pre-Test

1. What is Control Panel?
2. What application is used to install hardware devices on a Windows 2000 computer?
3. What term is defined as “a special type of program that enables an operating system, such as Windows 2000, to recognize and work with a particular hardware device”?
4. How many displays can a Windows 2000 computer support simultaneously?
5. What is driver signing?
6. What does IrDA stand for, and what does this organization do?
7. List three tools used to troubleshoot hardware devices on a Windows 2000 computer.

Overview of Control Panel

Windows 2000 *Control Panel* is an exhaustive collection of applications, sometimes called applets. These applications, which are automatically installed during installation of Windows 2000, are used to install or configure various components, applications, hardware, protocols, and services.

Each Control Panel application is used for a different task. Some software packages and some installable services include their own Control Panel icon, which is displayed in the Control Panel dialog box after the new application or service is installed.

You can access Control Panel in several ways:

- Select Start ➪ Settings ➪ Control Panel.
- Open My Computer, and then double-click Control Panel.
- Open Windows Explorer either by selecting Start ➪ Programs ➪ Accessories ➪ Windows Explorer, or by right-clicking My Computer, and then selecting Explore from the menu that appears. Then click Control Panel

Figure 5-1 shows a screen shot of Control Panel on a Windows 2000 Server computer. Notice that twenty-four icons are displayed. Also notice that there are two Web links in the Control Panel dialog box: Windows Update and Windows 2000 Support. Clicking these links will connect you with Microsoft's Windows update or Windows 2000 support Web sites.

Depending on the Windows 2000 operating system you are running (Professional, Server, or Advanced Server), the hardware components in your computer, and the services or options you chose to install during your installation of Windows 2000, you may have either more or fewer icons displayed in Control Panel.

To start any of the applications in Control Panel, double-click the application's icon.

If you plan to use Control Panel applications extensively, which many administrators do, you might want to configure your Start menu so that when you select Start ➪ Settings ➪ Control Panel, a complete list of Control Panel applications is displayed in a menu. This enables you to start an application directly, instead of having to start Control Panel first, and then start the application. The following steps explain how to cause the Control Panel applications to be displayed in the Start menu.

FIGURE 5-1 Windows 2000 Server Control Panel

STEP BY STEP

CAUSING CONTROL PANEL APPLICATIONS TO APPEAR IN THE START MENU

1. From the Windows 2000 desktop, right-click any blank area in the taskbar. Then select Properties from the menu that appears.
2. In the Taskbar and Start Menu Properties dialog box, click the Advanced tab.
3. On the Advanced tab, select the check box next to Expand Control Panel, as shown in Figure 5-2. Click OK.
4. Now, when you select Start➪ Settings➪ Control Panel, a full menu of Control Panel applications is displayed on the desktop, as shown in Figure 5-3.

TIP

Control Panel applications look and feel the same in all of the Windows 2000 operating systems—Professional, Server, and Advanced Server.

STEP BY STEP *Continued*

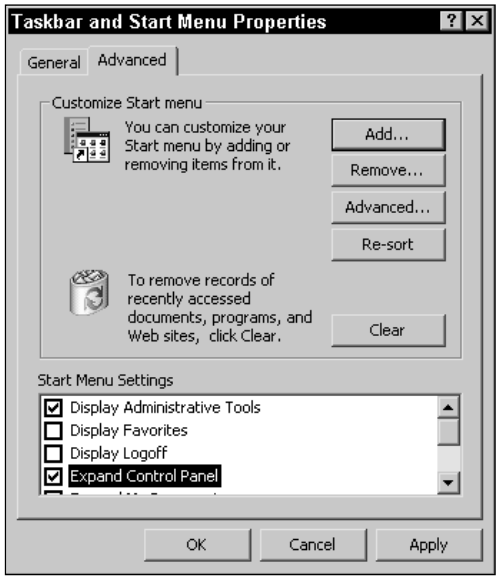

FIGURE 5-2 Expanding the Control Panel menu

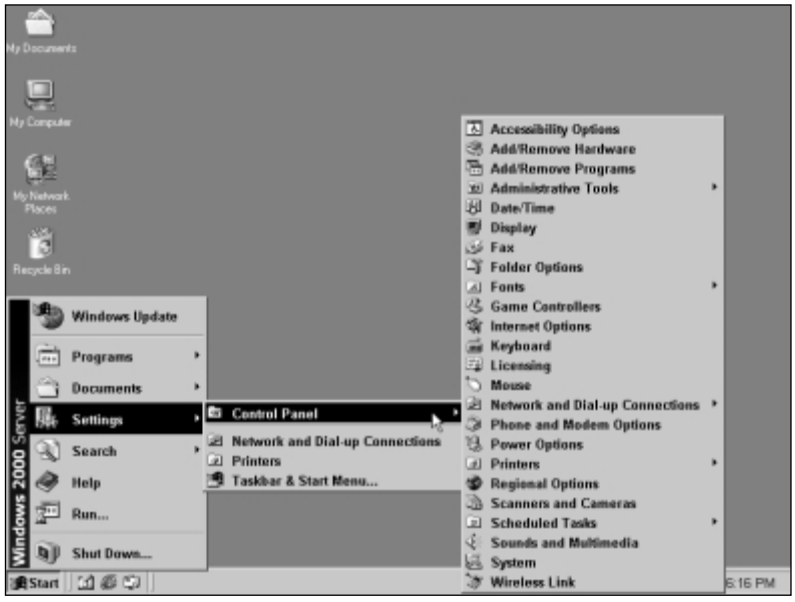

FIGURE 5-3 Control Panel applications in the Start menu

It's true that, depending on the Windows 2000 operating system you're running, you may have more or fewer Control Panel applications, and more or fewer configurable options within an application, but basically, if you know how to use a Control Panel application on one Windows 2000 computer, you'll be able to use that application on other Windows 2000 computers.

In the next sections, I'll describe each of the Control Panel applications and show you how to use many of these applications to configure and manage a Windows 2000 computer.

Accessibility Options

The Accessibility Options application is used to configure the keyboard, sound, display, and mouse options on a computer to accommodate users who are physically challenged, including people who have difficulty striking multiple keys simultaneously on a keyboard, people who are visually or hearing impaired, or people who have difficulty holding or clicking a mouse.

The Accessibility Options application is available unless you deselected it during the installation of Windows 2000. Accessibility Options is normally installed by default, but if it's not installed on your computer, you can use the Add/Remove Programs application (discussed later in this chapter) to install it.

In the following sections, I'll explain first how to configure Accessibility Options, and then how to troubleshoot Accessibility Options.

Configuring Accessibility Options

To start Accessibility Options, double-click the Accessibility Options icon in Control Panel. The Accessibility Options dialog box is shown in Figure 5-4. Notice the five tabs available in this dialog box: Keyboard, Sound, Display, Mouse, and General.

On the Keyboard tab, you can configure StickyKeys, FilterKeys, ToggleKeys, and show extra keyboard help in programs. *StickyKeys* enables a user to execute keyboard commands that normally require striking two or more keys simultaneously by striking one key at a time. *FilterKeys* instructs Windows 2000 to ignore quick or repeated keystrokes, or to slow the repeat rate of a key when it is held down. FilterKeys can be helpful when a user's hands tremble while typing, or when a user cannot remove a

finger quickly once he or she has pressed a key. *ToggleKeys* causes Windows 2000 to play a tone every time the Caps Lock, Num Lock, or Scroll Lock key is pressed. A high tone is played when the key is first pressed, and a lower tone is played when Caps Lock, Num Lock, or Scroll Lock is pressed again (and turned off). This feature is helpful for visually impaired users.

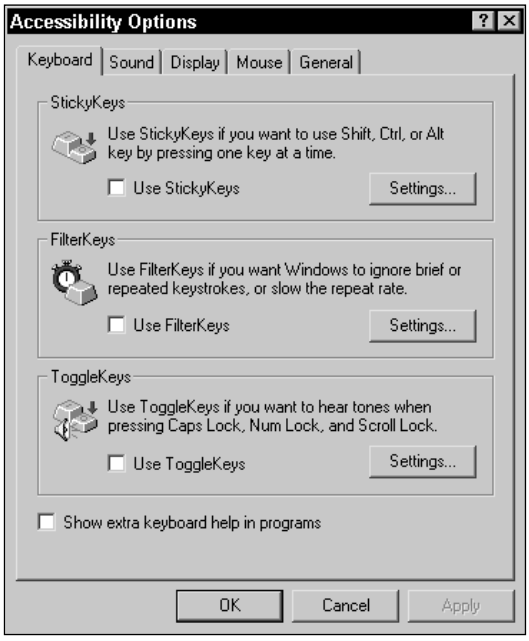

FIGURE 5-4 Accessibility Options

On the Sound tab, you can configure the SoundSentry and ShowSounds. When the *SoundSentry* is enabled, Windows 2000 displays a visual warning when the computer makes a sound. When *ShowSounds* is enabled, applications display captions for the speech and sounds they generate. Both of the features on this tab can be helpful for users who are hearing impaired.

On the Display tab, you can select the High Contrast option if you want Windows 2000 to use colors and fonts designed to be read easily. You can select from a white-on-black appearance scheme, a black-on-white scheme, or a custom scheme that you specify.

On the Mouse tab, you can configure a Windows 2000 computer to use MouseKeys. *MouseKeys* enable you to move the cursor by pressing the keys on your keyboard's 10-key pad instead of by using a mouse.

TIP

MouseKeys only works when you have a numeric keypad on your keyboard, which some laptop computers don't have.

On the General tab, you can configure Windows 2000 to turn off accessibility features after the computer has been idle for a specified number of minutes. You can also configure Windows 2000 to notify you, either visually or by making a sound, when an accessibility feature is turned on or off. You can also configure SerialKey devices, such as numeric keypads or other devices that augment the keyboard and mouse features, on this tab. As the name implies, SerialKey devices are connected to a computer's serial port. Finally, an administrator can choose to apply all selected Accessibility Option settings to the computer's default desktop that is displayed during logon, to new users that log on to this computer from this point on, or both.

Making configuration changes in the Accessibility Options application is fairly straightforward and self-explanatory. For example, suppose you want to configure keyboard settings for an employee who is unable to strike two keys simultaneously. Because many keyboard commands use the Shift, Ctrl, or Alt keys in conjunction with another key, you'll need to select the Use StickyKeys option on the Keyboard tab. You can either accept the default settings for this option, or click Settings for more StickyKeys configuration options. When you're finished configuring Accessibility Options, click OK.

TIP

In the Accessibility Options dialog box (and in many other dialog boxes in Windows 2000), you can click either OK or Apply. Clicking OK applies the changes you made and closes the dialog box. Clicking Apply applies the changes you made, but leaves the dialog box open. You don't need to click Apply first, and then OK. Just clicking OK will do the job.

Troubleshooting Accessibility Options

Troubleshooting Accessibility Options is typically a matter of finding the best combination of settings to meet a particular user's needs. This is normally not difficult once you have a good understanding of the various Accessibility Options features, but sometimes it takes a bit of trial and error to find the settings that best fulfill a user's needs. That said, here are a couple

of tips you might want to keep in mind when troubleshooting Accessibility Options:

- If you have enabled the StickyKeys option on the Keyboard tab, but don't select the "Apply all settings to logon desktop" option on the General tab, the user who requires the StickyKeys option will probably be unable to press Ctrl+Alt+Delete to log on.
- If users report that the Accessibility Options features they use often stop working, examine the "Turn off accessibility features after idle for" option on the General tab. You may need to increase the number of minutes the computer can be idle before the accessibility features are turned off. (The range of minutes you can select from are 5 to 30 minutes.)

Add/Remove Hardware

The Add/Remove Hardware application is a wizard that helps you add, remove, unplug, and troubleshoot the hardware in your computer. Hardware devices that you can add, remove, and troubleshoot include:

- Display devices/video adapters
- DVD and CD-ROM devices
- Input/output (I/O) devices, such as:
  - Cameras
  - Keyboard
  - Modems, including fax modems
  - Mouse
  - Multimedia devices
  - Printers
  - Scanners
  - Smart card readers
  - USB devices
  - Wireless devices, such as infrared (IrDA) devices
- Mobile computer hardware, such as PC Card devices
- Network adapter cards

TIP

When you add (or remove) hardware by using the Add/Remove Hardware application, what you're really doing is installing (or removing) device drivers for hardware devices that are already installed in (or connected to) the computer.

A *device driver* is a special type of program that enables an operating system, such as Windows 2000, to recognize and work with a particular hardware device.

You must be a member of the Administrators group (on the local computer) to use the Add/Remove Hardware application.

To start the Add/Remove Hardware application, double-click the Add/Remove Hardware icon in Control Panel. When you start the Add/Remove Hardware application, Windows 2000 starts the Add/Remove Hardware Wizard. This wizard takes you through the process of adding, removing, unplugging, or troubleshooting a hardware device, one step at a time. I'll show you when and how to use this wizard to perform each of these hardware tasks in the next several sections.

EXAM TIP

Because many of the Professional and Server exam objectives deal with installing, configuring, and troubleshooting hardware devices, and because Add/Remove Hardware is one of the primary tools used for these tasks, I urge you to read these next few sections carefully and practice using this tool.

Adding Plug and Play Devices

If all of the hardware in your computer is Plug and Play, you don't have to use the Add/Remove Hardware application to install hardware devices. This is because Windows 2000 automatically detects, installs, and configures device drivers for Plug and Play hardware when the hardware is initially installed in or connected to the computer.

The first time Windows 2000 automatically detects a Plug and Play hardware device (such as a PC Card or USB device), it displays a Hardware Found dialog box during the device installation process. It may also prompt you to provide the location of the manufacturer's device drivers. After detection, installation, and configuration of the device is complete, Windows 2000 may prompt you to restart your computer.

Adding Non–Plug and Play Hardware Devices

Unfortunately, not all hardware is Plug and Play. The Add/Remove Hardware application is especially useful when:

- You install Windows 2000, but Windows 2000 fails to install drivers for all of the hardware in your computer.
- You add a new hardware device to your Windows 2000 computer, and Windows 2000 either doesn't automatically detect the device, or detects it but doesn't correctly configure it.

Not long ago I installed Windows 2000 on a computer that contained an old IDE CD-ROM controller. Windows 2000 didn't detect the controller, so I had to manually add it using the Add/Remove Hardware application. Here are the steps I took, and that you can also use to install any hardware device that Windows 2000 doesn't automatically detect, install, and configure:

STEP BY STEP

USING THE ADD/REMOVE HARDWARE APPLICATION TO ADD A DEVICE

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Hardware.
3. The Add/Remove Hardware Wizard starts. Click Next.
4. The Choose a Hardware Task screen appears, as shown in Figure 5-5. Notice the two hardware task options in this screen. You can choose either to add or troubleshoot a hardware device, or to uninstall or unplug a hardware device.

   To add a new hardware device, select the "Add/Troubleshoot a device" option. Click Next.
5. Windows 2000 attempts to detect the new hardware device. If Windows 2000 is unable to detect the device, the Choose a Hardware Device screen appears. This screen contains a list of all of the hardware devices in your computer that Windows 2000 has detected and installed. If the device you want to add does *not* appear on this list, click "Add a new device" in the Devices list box. Click Next.
6. The Find New Hardware screen appears. Windows 2000 prompts you to choose whether to have Windows 2000 search for your new hardware device, or to permit you to manually select the hardware device from a list. If you've gotten this far along in the wizard, Windows 2000 probably can't automatically detect your new hardware device, so you should select the "No, I want to select the hardware from a list" option. Click Next.

STEP BY STEP *Continued*

FIGURE 5-5 Choosing a hardware task

7. The Hardware Type screen appears. Select the type of hardware device you want to add. (I selected IDE ATA/ATAPI controllers from the Hardware types list because I was installing an IDE CD-ROM controller.) Click Next.
8. The Select a Device Driver screen appears, as shown in Figure 5-6. Notice that a list of manufacturers and a list of specific devices (models) are displayed.

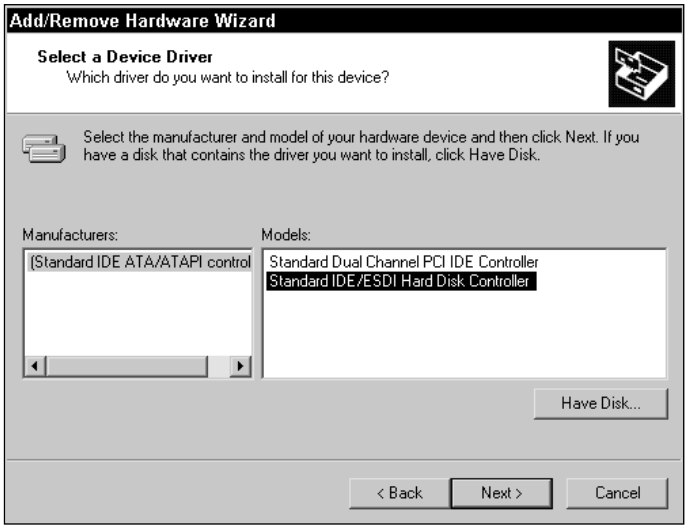

FIGURE 5-6 Selecting a device driver

STEP BY STEP *Continued*

Select the manufacturer of the device you want to add, and then select the specific model. If the manufacturer or specific model does not appear in the lists, and you have a manufacturer's disk with drivers on it, click Have Disk and follow the instructions presented on-screen. (Because I have a generic, industry standard IDE controller, I selected a manufacturer of [Standard IDE ATA/ATAPI controllers], and a model of Standard IDE/ESDI Hard Disk Controller.)

Click Next.

9. If the device you're adding is not Plug and Play, Windows 2000 displays a warning dialog box informing you that Windows 2000 could not detect the settings of the device. If this warning is displayed, click OK.
10. If Windows 2000 is unable to detect the settings of the device, a Resources tab is displayed, as shown in Figure 5-7. Notice that the configuration for the device I am adding (Basic configuration 0000) conflicts with devices already installed in the computer. We know this because hardware conflicts are listed in the "Conflicting device list" box at the bottom of the dialog box, and are also indicated by the international "no" symbol (the circle-and-slash) in the "Resource settings" box.

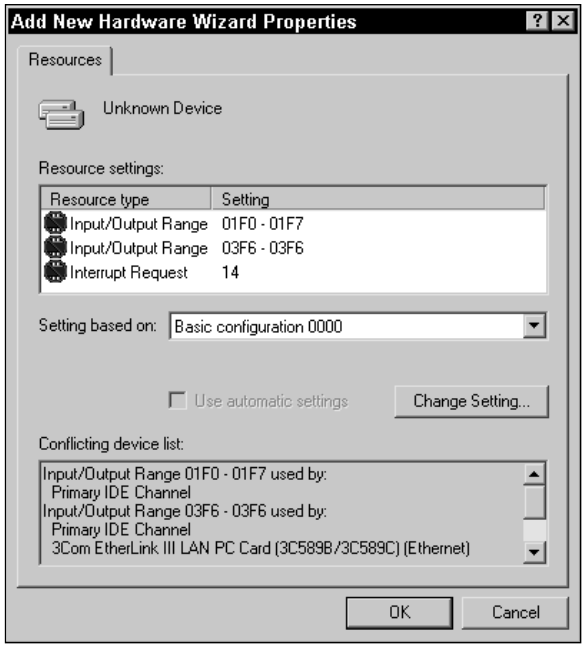

FIGURE 5-7 Device configuration conflicts

STEP BY STEP *Continued*

In order to correctly configure this dialog box, you'll need to know what settings you configured (by jumpers or switches) on the hardware device you installed. For example, for the IDE CD-ROM controller I installed, I configured the controller to use the I/O range of 0168–016F, the I/O range of 036E–036E, and an IRQ (interrupt request) of 10. I chose these settings because that is how the jumpers on the card itself were configured.

Then, what you have to do is to select, one at a time, the Basic configurations in the "Settings based on" drop-down list box until you find one that displays the correct settings (the settings that were manually configured on the card by using jumpers or switches) in the "Resource settings" box. When you find the correct setting, no conflicts should be listed in the "Conflicting device list" box. If conflicts are listed, you must resolve them, either by physically changing the hardware settings on the device you are adding or by using the System application in Control Panel to change the resource settings on the conflicting device.

TIP

If you're configuring a Plug and Play device, you don't need to know the resource settings for the device. Just try the Basic configuration options, one at a time, until you find an option that displays no conflicts. Windows 2000 will then configure the Plug and Play device for you.

If you are unable to find a Basic configuration option that matches your hardware configuration, select the Basic configuration option that most closely matches your hardware configuration (the settings made on the card using jumpers or switches). Then highlight the specific resource type in the "Resource settings" box that does not match your hardware configuration, clear the check box next to "Use automatic settings" if it is checked, and click Change Setting. If the "Use automatic settings" check box is grayed out, you won't be able to manually change individual settings, but you will still be able to select from among the Basic configuration options. Follow the instructions presented on-screen to make the setting match your hardware configuration.

Click OK.

11. In the Start Hardware Installation screen, click Next.
12. In the Completing the Add/Remove Hardware Wizard screen, click Finish.
13. Depending on the type of device being added, a System Settings Change dialog box may be displayed, notifying you that you must restart your computer before the new settings will take effect.

Removing Hardware Devices

The Add/Remove Hardware application is also useful for removing hardware devices.

Sometimes you may want to completely remove all drivers associated with a hardware device that you plan to physically remove from the computer. Windows 2000 refers to this as *uninstalling*. Other times, you may want to stop all drivers that may be running for a particular hardware device in preparation for disconnecting the device (such as a PC Card or USB device) from a computer. Windows 2000 refers to the physical disconnecting of the device as *unplugging*, or sometimes *ejecting*, especially in the case of PC Cards. When you prepare for unplugging or ejecting, it's somewhat different from uninstalling, because when you unplug or eject you want to leave all of the drivers for the device installed, so that you can plug the device back in again at a later time.

Here are the basic steps to use the Add/Remove Hardware application to uninstall a hardware device. I used these steps to uninstall a network adapter card, but you can use them to uninstall any hardware device.

STEP BY STEP

USING THE ADD/REMOVE HARDWARE APPLICATION TO UNINSTALL A DEVICE

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Hardware.
3. The Add/Remove Hardware Wizard starts. Click Next.
4. In the Choose a Hardware Task screen, select the "Uninstall/Unplug a device" option. Click Next.
5. The Choose a Removal Task screen appears. Select the "Uninstall a device" option and click Next.
6. The Installed Devices on Your Computer screen appears. Click the device you want to uninstall, and then click Next.
7. In the Uninstall a Device screen, review the device that is listed. If it's the device you want to uninstall, select the "Yes, I want to uninstall this device" option. Click Next.
8. The Completing the Add/Remove Hardware Wizard screen appears. Click Finish.

STEP BY STEP *Continued*

CAUTION

Don't just reach back and unplug the device at this point—if you do, you could damage the device or your computer because the device's drivers are still running in memory, even though they've been removed from the hard disk.

Now you can shut down your computer and remove the hardware device.

After uninstalling a device, you should either shut down your computer and remove the device, as I just mentioned, or use the steps that follow to unplug a device and then remove the device from your computer.

There are two methods you can use to unplug or eject a device. You can use the Add/Remove Hardware application in Control Panel, or you can use the Unplug or Eject Hardware icon that Windows 2000 automatically displays in the taskbar when a PC Card or USB device is installed. I'll explain how to use both methods in the steps that follow.

STEP BY STEP

USING THE ADD/REMOVE HARDWARE APPLICATION TO UNPLUG A DEVICE

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Hardware.
3. The Add/Remove Hardware Wizard starts. Click Next.
4. In the Choose a Hardware Task screen, select the "Uninstall/Unplug a device" option. Click Next.
5. The Choose a Removal Task screen appears. Select the "Unplug/Eject a device" option and click Next.

STEP BY STEP *Continued*

6. The Select Device to Unplug screen appears, as shown in Figure 5-8. Notice the devices that you can unplug. Also notice the icon that appears above the "Hardware devices" box. This is the Unplug/Eject icon, and it will be mentioned again in a later step.

   Click the device you want to unplug. Click Next.

FIGURE 5-8 Using Add/Remove Hardware to unplug a device

7. The Confirm Device screen appears. In this screen, Windows 2000 lists the device or devices it is preparing to unplug. In some cases more devices than the one you selected will be listed. If additional devices are shown, it is because they are dependent on the device you selected. To continue unplugging the device(s), click Next.
8. The Completing the Add/Remove Hardware Wizard screen appears, as shown in Figure 5-9. Note the Unplug/Eject icon in this screen, and notice where Windows 2000 displays this icon on the taskbar.

   Click Finish. It is now safe to unplug or eject the device.

STEP BY STEP *Continued*

FIGURE 5-9 The Unplug/Eject icon

Here's a shortcut method you can use to unplug or eject a device. In fact, it accomplishes the same job as the Add/Remove Hardware Wizard, and it's quicker to use.

STEP BY STEP

USING THE UNPLUG/EJECT ICON IN THE TASKBAR TO UNPLUG A DEVICE

1. Double-click the Unplug/Eject icon on the taskbar (it's located next to your system clock).
2. The Unplug or Eject Hardware dialog box appears. Click the device you want to unplug or eject. Click Stop.
3. The Stop a Hardware Device dialog box appears, listing the device (or devices) to be unplugged. Click OK to continue.
4. Windows 2000 displays the Safe to Remove Hardware dialog box, indicating it is now okay to remove the hardware device. Click OK, and unplug or eject the device.

Using Add/Remove Hardware to Troubleshoot Devices

As I mentioned early on in this section, the Add/Remove Hardware application can be used when troubleshooting numerous hardware devices. I find this application particularly useful for identifying and resolving hardware configuration problems and hardware device driver issues. The following steps illustrate how to use the Add/Remove Hardware application for troubleshooting a hardware device.

STEP BY STEP

USING THE ADD/REMOVE HARDWARE APPLICATION TO TROUBLESHOOT A DEVICE

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Hardware.
3. The Add/Remove Hardware Wizard starts. Click Next.
4. In the Choose a Hardware Task screen, select the "Add/Troubleshoot a device" option. Click Next.
5. The Choose a Hardware Device screen appears. This screen displays a list of all hardware installed in your computer. If Windows 2000 is unable to start the device driver for a particular device, it will display an exclamation point inside a yellow circle over the icon for the device. If Windows 2000 is unable to identify the device driver for a device, it will display a question mark in place of a regular device icon.

   Click the device you want to troubleshoot. Then click Next.
6. The Completing the Add/Remove Hardware Wizard screen appears. Pay special attention to the device status displayed in this screen for the device you selected. You may want to write down the device's status in case you are unable to solve your problem. Click Finish.
7. Depending on the type of device and the device status displayed, Windows 2000 may either:
   - Start the Upgrade Device Driver Wizard and prompt you to install a new device driver,
   - Start Windows 2000 Help and display a specific error code for your device, complete with a description of the problem and recommended solutions, or
   - Start Windows 2000 Help and display a Troubleshooter for the selected device. If the Troubleshooter is displayed, answer the series of questions presented to pinpoint your problem and find suggested solutions.

   Follow the instructions presented on-screen to finish troubleshooting your device.

Add/Remove Programs

The Add/Remove Programs application is used to install and remove third-party software and to add and remove optional Windows 2000 components. All users can use the Add/Remove Programs application to add and remove third-party applications, but only members of the Administrators group can use the portion of this application that enables you to add and remove optional Windows 2000 components.

To start the Add/Remove Programs application, double-click the Add/Remove Programs icon in Control Panel.

Adding a Program

One of the most common uses for the Add/Remove Programs application is to add a new program or application. To add a new program, such as a word processing application or a game, insert the application's compact disc (or first installation floppy disk) into your computer. In the Add/Remove Programs application main dialog box, click Add New Programs. A dialog box is displayed, as shown in Figure 5-10. Notice that you can either add a program from a compact disc or a floppy disk, or you can connect to Microsoft's Web site over the Internet and download new or updated Windows 2000 features, device drivers, service packs, and so on. If your Windows 2000 computer is a member of a domain, another option is displayed in this dialog box that enables you to add programs from your corporate network. Follow the instructions presented on-screen to install the new program.

Removing a Program

Another common use of this application is to remove an installed program, perhaps because the program is not functioning properly, because you want to free up disk space, or for any other reason. You can use the Add/Remove Programs application to remove a program entirely, or to remove a discrete component within a program. The following steps explain how to use the Add/Remove Programs application to remove a program.

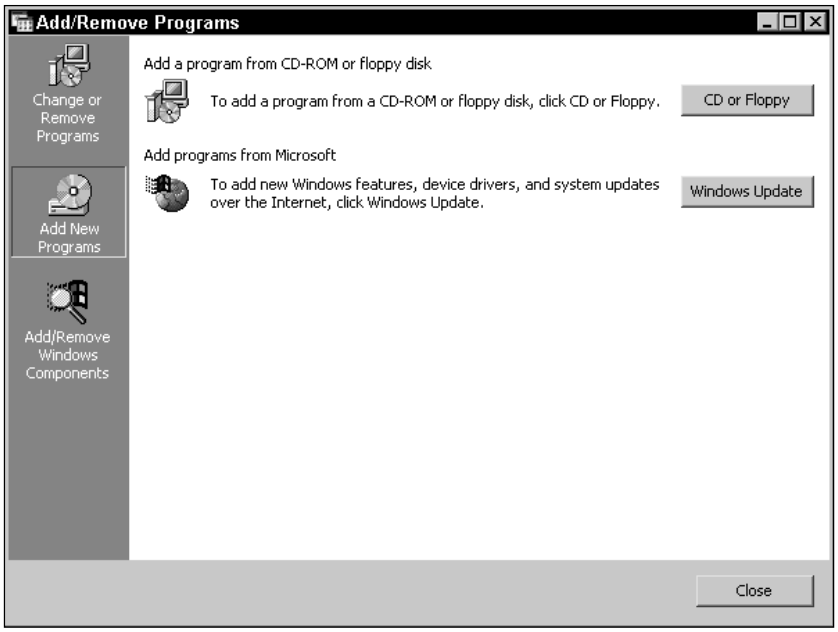

FIGURE 5-10 Adding a new program

STEP BY STEP

USING ADD/REMOVE PROGRAMS TO REMOVE A PROGRAM

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Programs.
3. The Add/Remove Programs dialog box appears, as shown in Figure 5-11. Notice the three tasks you can perform by using this application: Change or Remove Programs, Add New Programs, and Add/Remove Windows Components.

   Also notice in Figure 5-11 that a list of programs that are currently installed in the computer is displayed. Highlight (click) the application you want to remove. When you highlight a program, Windows 2000 displays the amount of disk space the program uses, how often the program is used, and the date the program was last used. Click Change/Remove.
4. A warning dialog box may be displayed, asking you to insert the program's compact disc. Follow the instructions and click OK.
5. Follow the instructions presented on-screen to remove the program.

STEP BY STEP *Continued*

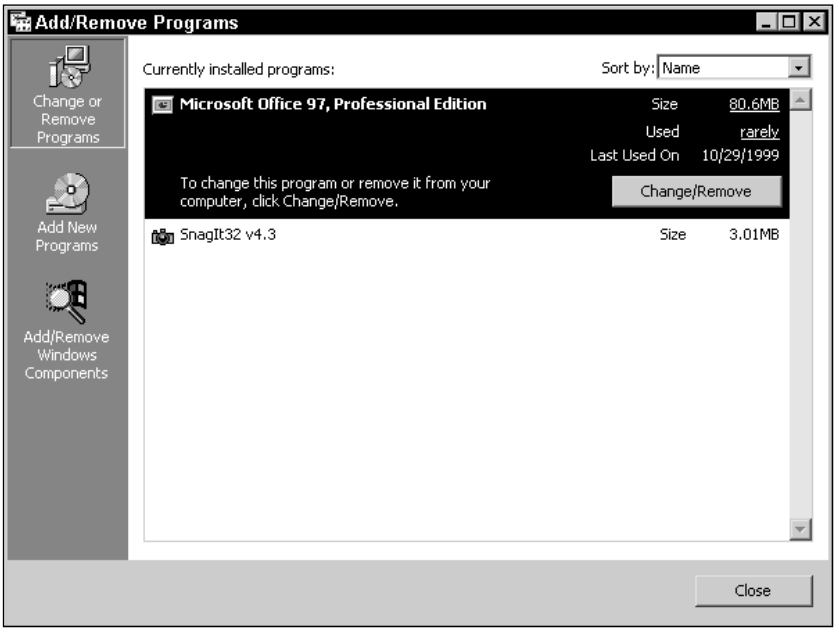

FIGURE 5-11 The Add/Remove Programs dialog box

Although the stated purpose of this section (and the previous steps) is all about removing a program, I should point out that many application setup programs, when launched using the preceding steps, also enable you to *add* components at this time. This can be a useful feature when you want to add and delete components of a program, but don't want to remove the program entirely.

Adding or Removing Optional Windows 2000 Components

You can also use the Add/Remove Programs application to add or remove any of the optional Windows 2000 components. You might want to add components that you didn't know you'd need when you installed Windows 2000, or you might want to remove components that you've determined

are unnecessary for you or your users. Here's how to add or remove optional Windows 2000 components:

STEP BY STEP

USING ADD/REMOVE PROGRAMS TO ADD/REMOVE OPTIONAL WINDOWS 2000 COMPONENTS

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Programs.
3. In the Add/Remove Programs dialog box, click Add/Remove Windows Components.
4. The Windows Components Wizard starts, as shown in Figure 5-12. Notice the detailed list of optional Windows 2000 components.

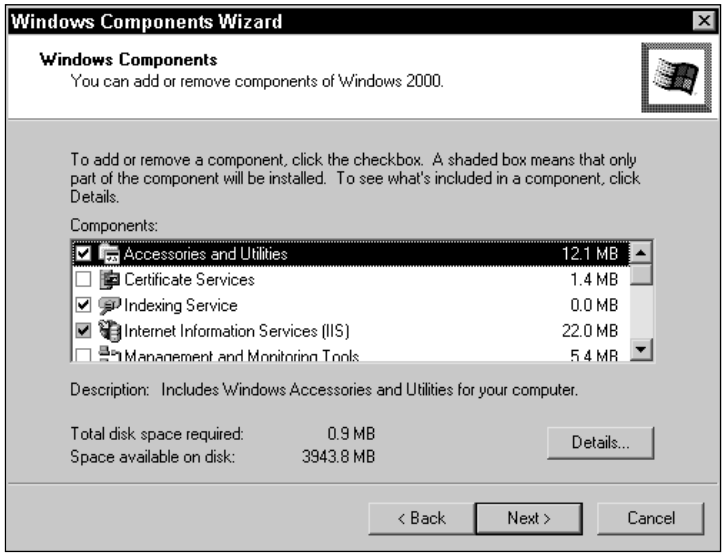

FIGURE 5-12 Adding or removing optional Windows 2000 components

To add or remove a component, select or clear the check box next to that component. The check boxes in this dialog box have three possible states:

- **Checked:** If the check box next to a component is checked when the dialog box first appears, this component, and all of its subcomponents, is already installed on this computer. If you select a check box that was previously cleared, this component, and all of its subcomponents, will be installed during this process.

STEP BY STEP *Continued*

- **Cleared:** If the check box next to a component is cleared when the dialog box first appears, this component, and all of its subcomponents, is not installed on this computer. If you clear a check box that was checked or gray checked, this component, and all of its subcomponents, will be removed by this process.
- **Gray Checked:** If the check box next to a component is gray checked when the dialog box first appears, this component and *selected* subcomponents are already installed on this computer. If you highlight a component, click Details, and then select or clear check boxes next to specific subcomponents, Windows 2000 will make the requested changes by either adding or removing selected subcomponents.

As you can tell from the preceding check box descriptions, you can control which subcomponents of a component are added or removed. To configure specific subcomponents, highlight a component and click Details. In the dialog box that appears, select the check boxes next to the subcomponents you want to add, clear the check boxes next to the subcomponents you want to remove, or both, and then click OK.

Click Next.

5. Windows 2000 configures components, and makes the configuration change(s) you requested. When the Completing the Windows Components Wizard screen appears, click Finish.
6. Click Close to exit the Add/Remove Programs application.

Administrative Tools Folder

The `Administrative Tools` folder, like its name implies, is a folder (located in Control Panel) that contains numerous Windows 2000 tools that you can use to manage your Windows 2000 computer and network. You must be a member of the Administrators group to perform most of the tasks that can be done using the tools in the `Administrative Tools` folder — that's why they're called *administrative* tools.

Date/Time

The Date/Time application is used to configure the date, time, time zone, and optional adjustment for daylight saving time. You must be a member of the Administrators group to use the Date/Time application.

To start the Date/Time application, double-click the Date/Time application in Control Panel, or double-click the clock/time display in the lower-right-hand corner of the taskbar on your desktop.

Because the configuration options and settings in this application are straightforward and self explanatory, I won't go into a detailed discussion of how to use this application.

Display

The Display application is used to configure a computer's desktop settings, including background, screen saver options and computer power settings, desktop appearance, Web pages that appear on the Active Desktop, desktop icons and visual effects, and display adapter settings (including multiple-display support). You can also configure the display to use large fonts, large icons, and a high-contrast color scheme to accommodate a visually challenged user. In addition to configuring desktop and display settings, the Display application is also useful for troubleshooting desktop settings and video adapters.

To start the Display application, double-click the Display icon in Control Panel; or, simply right-click the desktop and select Properties from the menu that appears.

There are six tabs in the Display Properties dialog box: Background, Screen Saver, Appearance, Web, Effects, and Settings.

Configuring a Display Background

When you first access the Display application, the Background tab appears on top, as shown in Figure 5-13. Notice that you can select a wallpaper background for your desktop on this tab.

There are several configurable options on the Background tab:

- **Select a background picture or HTML document as Wallpaper:** You can select any of the pictures or HTML docu-

ments in this list box for your background wallpaper on your desktop, or you can click Browse to browse your hard disk(s) for additional pictures or HTML documents. (I really like the Snow Trees wallpaper — check it out if you want to see the beauty of winter without going out in the cold.)

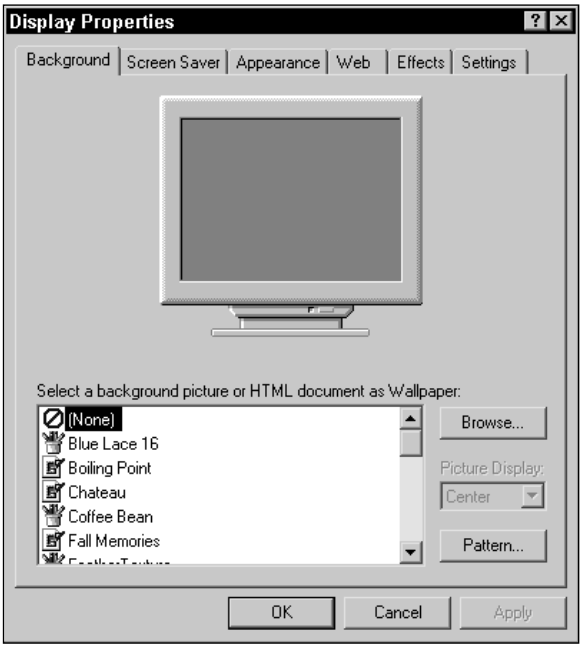

FIGURE 5-13 The Background tab in Display Properties

- **Picture Display:** In this drop-down list box, you can select one of three appearance options to apply to the picture you choose for your wallpaper: Center, Tile, or Stretch. If you select Center, the picture you selected for your wallpaper will be centered on your desktop. If you select Tile, multiple copies of the picture will be tiled on your desktop. If you select Stretch, the picture will be stretched to fit your entire desktop.
- **Pattern:** Maybe you don't want a picture on your desktop at all. In this case, you can select a pattern to use as wallpaper, instead of a picture. (In other words, the two choices, picture or pattern, are mutually exclusive.) To select a pattern for your desktop, first select a background picture of None in the "Select a background picture or HTML document as Wallpaper" list box. Then click Pattern.

In the Pattern dialog box, select a pattern for your desktop, then click OK.

Once you've configured the picture or pattern you want to use as wallpaper on your desktop, click OK.

TIP

If you select an HTML document to use as wallpaper, and you have not previously enabled Active Desktop, a dialog box is displayed, asking if you want to enable Active Desktop now. Click Yes if you want to use the HTML picture you've selected as wallpaper.

Working with Screen Savers

The next tab in the Display Properties dialog box is the Screen Saver tab, which is shown in Figure 5-14. Notice that you can configure both screen saver and energy saving features for your monitor on this tab.

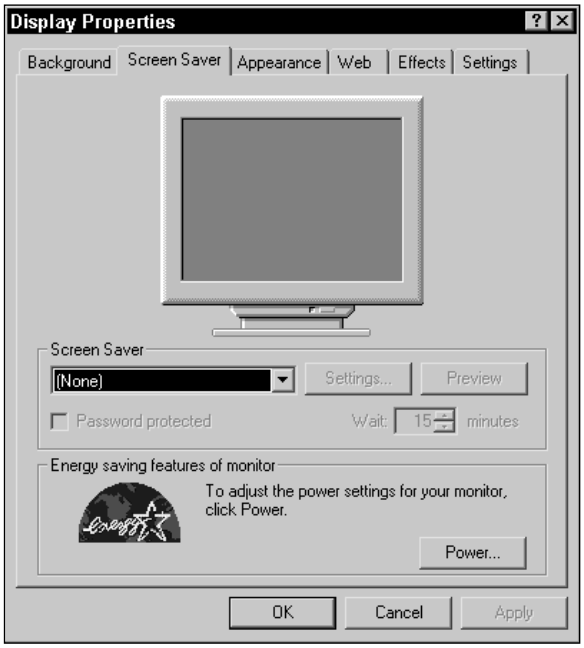

FIGURE 5-14 The Screen Saver tab in Display Properties

Screen savers perform an important function — they prevent a static image (such as your desktop) from becoming permanently burned into your monitor screen. I generally recommend that you use some type of

screen saver on all of the Windows computers on your network. Some screen savers, I should point out, use more processor power than others. You might want to consider using a screen saver that doesn't use a lot of processor power — such as the Logon Screen Saver — on your network's servers.

CAUTION

I don't recommend that you use any of the "3D" screen savers on servers. Using these screen savers can significantly slow server response time because of the large amount of processor utilization these screen savers need.

Here are the screen saver options you can configure on this tab:

- **Screen Saver:** In this drop-down list box, you can select a screen saver that will be displayed on your desktop after a specified number of minutes has passed without any user input. Once you've selected a screen saver, then you can configure the following optional settings:
- **Settings:** Clicking Settings causes a Setup dialog box to be displayed that contains customizable settings for the specific screen saver you've selected. In this dialog box, you can make configuration changes, and then click OK.
- **Preview:** If you want to preview your screen saver in full screen mode now (as opposed to waiting the specified number of minutes before it is scheduled to start), click Preview. Be careful to not move your mouse after clicking Preview — moving your mouse causes the preview to stop.
- **Password protected:** This check box is a security feature of Windows 2000. When selected, Windows 2000, once it runs your screen saver, locks your computer and does not allow any user to access your desktop without first entering either your password or the Administrator's password.
- **Wait:** In this spin box, you can select the number of minutes you want to pass without user input before Windows 2000 starts your screen saver. If you select too low of a number, your screen saver may become really annoying.

After you've selected and configured your screen saver, click OK.

Configuring Energy Saving Features

You can also configure the energy saving features of your computer by clicking the Power button on the Screen Saver tab. This starts the Power Options application, which is discussed in detail later in this chapter. For now, I'll say that this application, which enables you to select power schemes, specify hibernation support, and configure a UPS, was originally designed to address the needs of laptop and other mobile computers.

Configuring an Appearance Scheme

The next tab in the Display Properties dialog box is the Appearance tab, which is shown in Figure 5-15. Notice that on this tab you can configure the appearance of windows, dialog boxes, message boxes, and other items that appear in the Item pull-down menu.

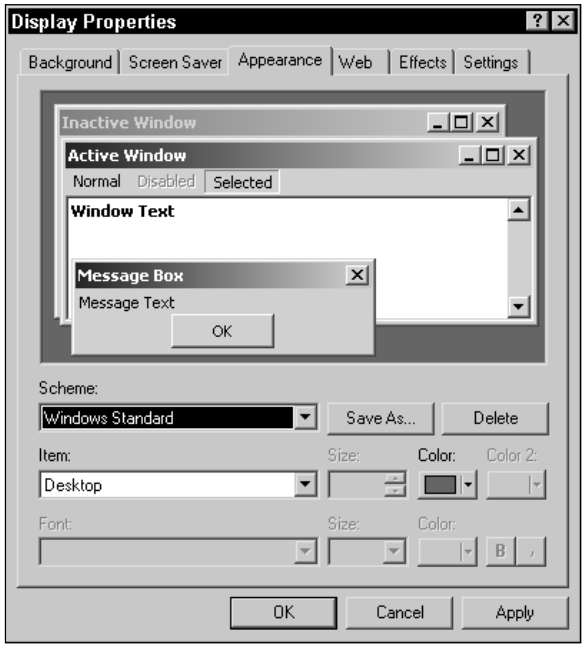

FIGURE 5-15 The Appearance tab in Display Properties

On the Appearance tab, you can select a preconfigured appearance scheme, such as Windows Standard (large) or High Contrast Black, that Windows 2000 will apply to your desktop and to all windows, dialog boxes, icons, message boxes, and so on. The default scheme is Windows Standard.

Or, you can create and save your own custom scheme by selecting each item individually and configuring the item's appearance.

Displaying a Web Page on Your Desktop

The next tab in the Display Properties dialog box is the Web tab, which is shown in Figure 5-16. Notice the check box next to "Show Web content on my Active Desktop."

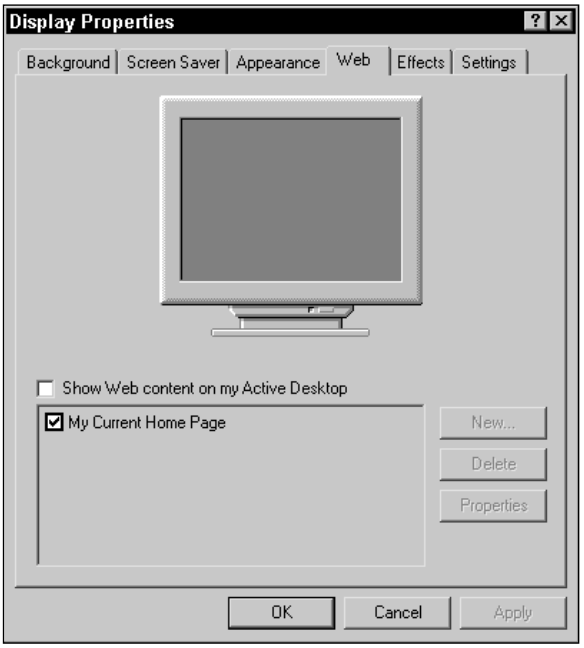

FIGURE 5-16 The Web tab in Display Properties

The primary purpose of the Web tab is to configure Windows 2000 to display a preselected Web page (or pages) on your desktop at all times. For example, suppose that you want to be able to view, at all times, a Web-based stock ticker that displays the current market price of your company's publicly traded stock. You can configure the Web tab so that the Web page that contains this ticker will always be displayed on your desktop.

To configure your computer to display a Web page on your desktop at all times, select the check box next to "Show Web content on my Active Desktop," and click New. In the New Active Desktop Item dialog box, type the complete URL to the Web page you want to display, and click OK. Once you've configured a Web page that will be displayed on your desktop,

you can configure the Web page's properties on the Web tab by using the Properties button (notice this is grayed out in Figure 5-16). When you've finished configuring the Web tab, click OK.

Configuring Desktop Effects

The next tab in the Display Properties dialog box is the Effects tab, which is shown in Figure 5-17.

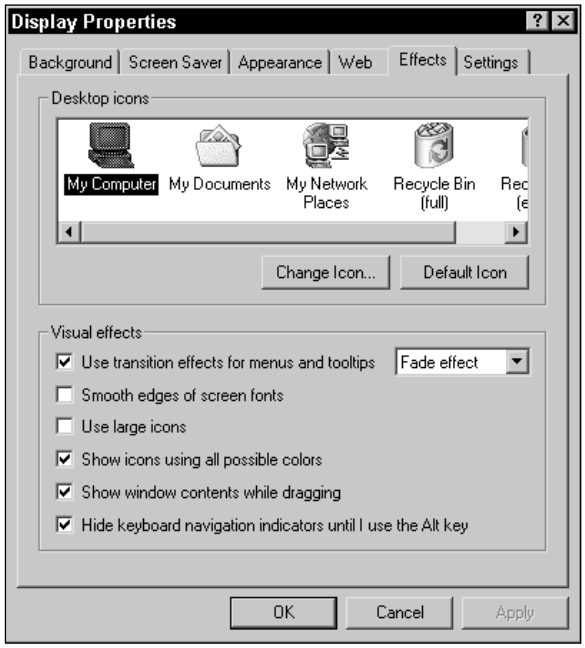

FIGURE 5-17 The Effects tab in Display Properties

On the Effects tab you can change icons for items on your desktop, and you can configure various visual effects. The configurable options on this tab are pretty self explanatory.

Configuring Display Settings and Multiple-Display Support

The last tab in the Display Properties dialog box is the Settings tab, which is shown in Figure 5-18. This tab is used to configure numerous display settings, including multiple-display support.

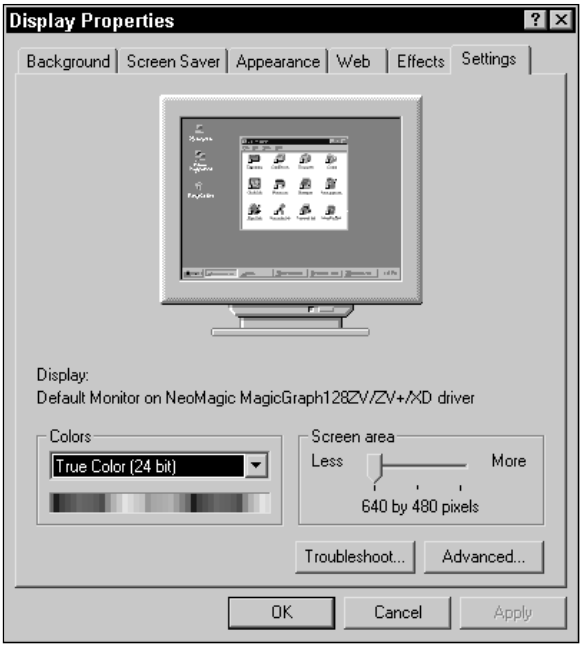

FIGURE 5-18 The Settings tab in Display Properties

In the following section I'll show you how to perform some of the most common display configuration tasks, including configuring the number of colors/color depth used by the display, configuring the display's resolution, and setting the monitor's refresh frequency.

STEP BY STEP

CONFIGURING DISPLAY SETTINGS: COLORS, RESOLUTION, AND REFRESH FREQUENCY

1. On the Settings tab in the Display Properties dialog box, select the number of colors/color depth you want the display to use from the Colors drop-down list box.

   Then, in the Screen area box, move the slider to select the appropriate display resolution. The display resolution you choose will depend on the size of your monitor and how large you want text and windows to appear on the monitor.

TIP

With some display adapters, you can either choose a very high color depth (such as True Color) or a high resolution (such as 1024 × 768), but you may not be able to choose *both*. For example, if you select True Color and then select a high display resolution, Windows 2000 may automatically change your color setting to a lower color depth setting (such as High Color).

STEP BY STEP *Continued*

2. To set the monitor's refresh frequency, click Advanced.
3. In the dialog box that appears, click the Monitor tab.
4. On the Monitor tab, select the refresh frequency you want your monitor to use from the drop-down list box. (In general, the higher a refresh frequency you select, the less likely you are to experience flickering on your monitor.) Click OK.
5. In the Display Properties dialog box, click OK.

A Windows 2000 computer can support up to ten display devices (monitors) at the same time. This feature is a huge benefit to users who commonly use multiple applications at the same time, because Windows 2000 permits those users to have a different application open on each monitor. Users of large documents (such as spreadsheets or large graphics documents) also benefit from this feature because it enables them to display a single document across multiple monitors. The next section explains how to use the Settings tab in the Display application to configure multiple-display support.

STEP BY STEP

CONFIGURING MULTIPLE-DISPLAY SUPPORT

1. If your current video card does not support multiple outputs, install and configure one or more additional display devices/video adapters in your Windows 2000 computer.
2. Start the Display application. (To do this, right-click anywhere on your desktop, then select Properties from the menu that appears.)
3. Click the Settings tab.
4. The Settings tab appears, as shown in Figure 5-19. Notice that multiple monitor icons are displayed in this dialog box.

   Also notice in Figure 5-19 that the primary monitor is shown as a highlighted box with a black frame around it. The primary monitor, by default, is monitor 1. The primary monitor is where the Logon dialog box will be displayed, and is also where applications will open, by default. (You can select which monitor will be used as the primary monitor in Step 6.)

STEP BY STEP *Continued*

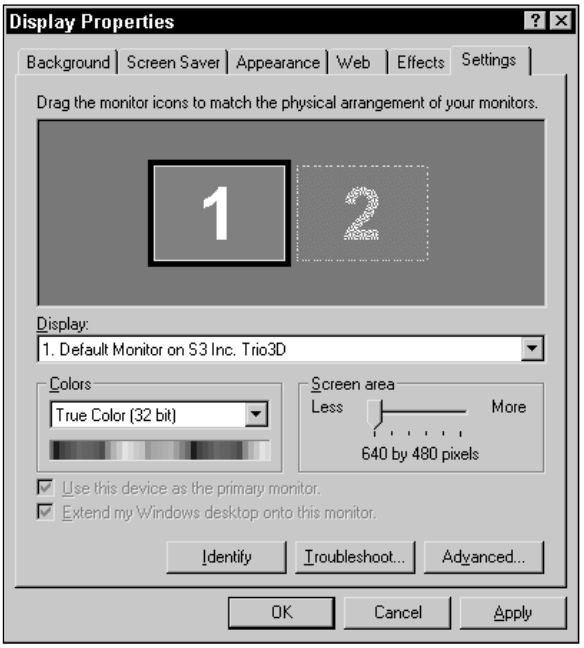

FIGURE 5-19 Configuring multiple-display support

TIP

By default, the primary monitor is the video adapter that is installed in the card slot closest to the power supply in the computer.

To use multiple monitors, you must enable each additional monitor. To enable a monitor, click its icon within the Settings tab, then select the check box next to "Extend my Windows desktop onto this monitor."

5. After each additional monitor is enabled, you can configure the color and resolution of each monitor by first clicking the monitor's icon, and then configuring the appropriate settings. You can configure different settings on each individual monitor.
6. Choose the monitor that will serve as your primary monitor. This does not have to be monitor 1. To perform this configuration, click the icon of the monitor you want to use as the primary monitor, then select the check box next to "Use this device as the primary monitor." If this check box is grayed out, the selected monitor is already configured as the primary monitor.
7. Configure the monitor icons on the Settings tab to match the physical arrangement of your monitors. For example, if you have two monitors, stacked one on top of the other, you can click and drag one monitor under the other so that the picture on the screen coincides with the actual physical arrangement.

STEP BY STEP *Continued*

IN THE REAL WORLD

Implementing this nifty feature is not quite as simple as it sounds. Windows 2000 only supports specific display adapters for use in a multiple-display configuration. Be sure to consult the Display Adapter (Multimon) section in the Windows 2000 Hardware Compatibility List *before* you start installing video adapter cards.

Troubleshooting Desktop Settings and Video Adapters

Troubleshooting desktop settings is often a matter of finding the best combination of settings to meet a particular user's needs. This is normally not difficult once you have a good understanding of the various Display features, but sometimes it takes several attempts to find the settings that best fulfill a user's needs. That said, here are a few tips you might want to keep in mind when troubleshooting desktop settings:

- If a user reports that their monitor flickers, you can try increasing the refresh frequency. (To do this, click the Advanced command button on the Settings tab, then click the Monitor tab, and then select a higher refresh frequency from the drop-down list box.)
- If a user reports that the icons on their desktop are too small or too hard to read, you can either decrease the monitor resolution or select a different appearance scheme, such as one of the High Contrast schemes, or one of the large schemes. (To do this, configure monitor resolution on the Settings tab, or change the appearance scheme on the Appearance tab.)
- If a user reports that a monitor frequently turns off unexpectedly, examine the energy saving features set for this monitor and consider trying a different power scheme. (To do this, click the Power command button on the Screen Saver tab.)

Windows 2000 includes a handy resource for troubleshooting video adapters/display devices. It's a special Help feature called the Display Troubleshooter. To access the Display Troubleshooter, click the Troubleshoot

command button on the Settings tab. Figure 5-20 shows the Display Troubleshooter.

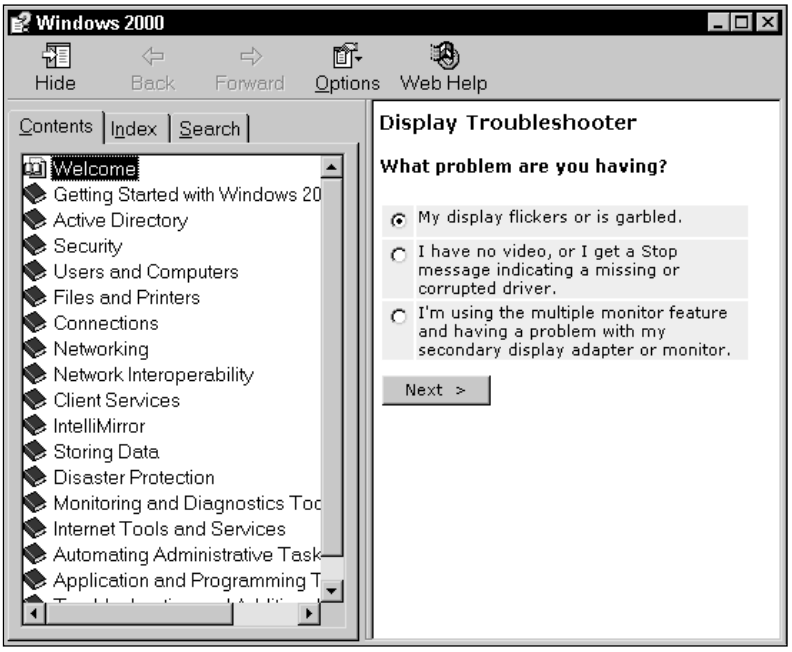

FIGURE 5-20 The Display Troubleshooter

The Display Troubleshooter takes you through a series of questions and steps to help you identify and resolve various display problems. Follow the instructions presented on-screen to resolve the particular problem you're experiencing.

Other resources you can also use to troubleshoot video adapters/display devices include the Add/Remove Hardware application, Device Manager, and System Information. Add/Remove Hardware was discussed earlier in this chapter, and I'll cover Device Manager and System Information later in this chapter.

Fax

The Fax application appears in Control Panel only when a fax device, such as a fax modem, is installed in the computer. The Fax application is used to configure Fax properties, including cover pages and the Fax status monitor.

This application can also be used to access the Fax Service Management Console and to add a Fax printer.

To access the Fax application, double-click the Fax icon in Control Panel. There are four tabs in the Fax Properties dialog box: User Information, Cover Pages, Status Monitor, and Advanced Options, as shown in Figure 5-21.

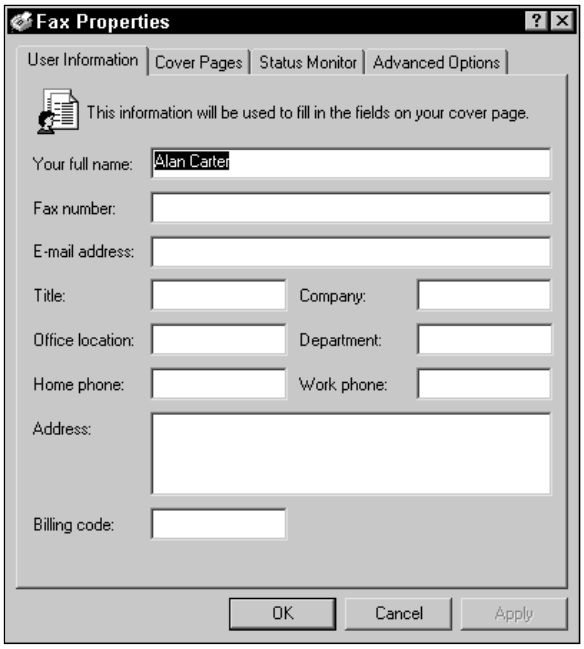

FIGURE 5-21 The Fax Properties dialog box

Notice in Figure 5-21 that the User Information tab appears on top, by default. On this tab you can configure your own personal user information, such as your name, home and work telephone numbers, fax number, and e-mail address. Windows 2000 uses this information to fill in the fields on your fax cover page.

The Fax Service Management Console

One of the most common uses of the Fax application is to access the Fax Service Management Console. This console, which is an MMC snap-in, is used to configure fax devices and fax logging on the local computer.

To access the Fax Service Management Console, click the Advanced Options tab, and then click the Open Fax Service Management Console

button. You can also access the Fax Service Management Console from the desktop by selecting Start ➪ Programs ➪ Accessories ➪ Communications ➪ Fax ➪ Fax Service Management. The Fax Service Management Console is displayed, as shown in Figure 5-22. Notice that you can configure both devices and logging in this console.

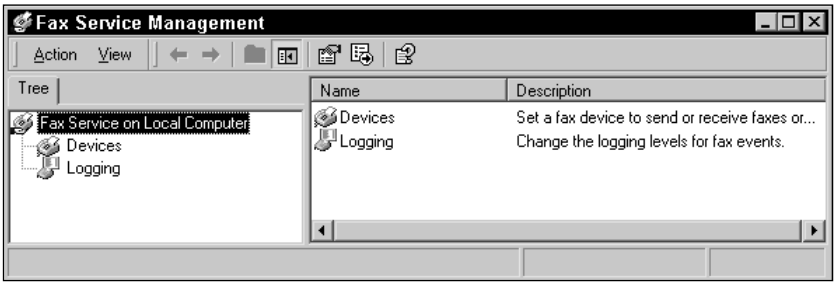

FIGURE 5-22 The Fax Service Management Console

Probably the most common use of the Fax Service Management Console is to enable a fax device to receive faxes. By default, Windows 2000 configures fax devices to send faxes, but doesn't enable these devices to receive faxes. You must manually make this configuration change. Next, I'll explain the steps required to enable a fax device to receive faxes and to set the station identifier.

STEP BY STEP

CONFIGURING A FAX DEVICE TO RECEIVE FAXES AND SETTING THE STATION IDENTIFIER

1. Start the Fax Service Management Console. (In the Fax application, click the Advanced Options tab, then click the Open Fax Service Management Console button.)
2. The Fax Service Management dialog box appears. In the left pane, click Devices. In the right pane, right-click the fax device you want to configure, and select Properties from the menu that appears.
3. The fax device's Properties dialog box appears, as shown in Figure 5-23. Notice the check box next to "Enable receive."

   To configure a fax device to receive faxes, select the check box next to "Enable receive."

   In this dialog box you can also configure the *Transmitting Station Identifier* (TSID), which is a line of text that typically includes the company name and fax number of the fax device you are configuring. You can also configure the Called Station Identifier (CSID), which is a line of text that is usually identical to the TSID.

STEP BY STEP *Continued*

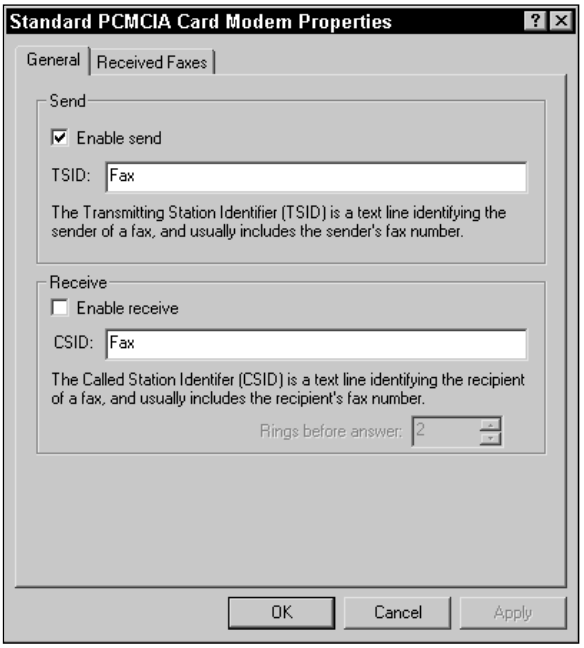

FIGURE 5-23 Configuring a fax device to receive faxes

TIP

The reason the TSID and the CSID are the same is because they both identify the same fax device. The TSID identifies the fax device when it is in a sending mode, and the CSID identifies the device when it is in a receiving mode.

4. After you configure a fax device to receive faxes, you may want to configure what Windows 2000 will do with received faxes. By default, Windows 2000 stores all received faxes in the `C:\Documents and Settings\All Users\Documents\My Faxes\Received Faxes` folder. To configure how Windows 2000 treats received faxes, click the Received Faxes tab.
5. On the Received Faxes tab, you can configure Windows 2000 to take any or all of the following actions with received faxes:
   - ► Print received faxes to a specified printer.
   - ► Save received faxes in a specified folder (either the default folder or any folder you choose).
   - ► Send received faxes to a local e-mail inbox.

STEP BY STEP *Continued*

TIP

In order to configure a fax device to send received faxes to a local e-mail inbox, you must first configure the Fax Service to log on to the computer using a user account that is a member of the Administrators group. You must also be using a MAPI-enabled client e-mail program, such as Microsoft Outlook.

When you're finished configuring the Received Faxes tab, click OK.

6. Close Fax Service Management.

Troubleshooting Fax Problems

Probably the most common fax problem reported by users is that they have a fax modem installed and configured in their Windows 2000 computer, but they can't receive faxes. You should ensure that the computer is configured to receive faxes, which, as was stated previously, it is not configured to do by default.

Another common fax problem is that users aren't able to configure faxes to print to a network printer. To resolve this problem, you must configure the Fax Service to log on using a user account that is a member of the Administrators group.

CROSS-REFERENCE

For more information on configuring a service to log on using a user account, see the "Configuring a service to log on using a user account" step-by-step section in Chapter 15.

If you're having fax problems on your computer that you are unable to resolve, you might consider configuring Windows 2000 to write the maximum amount of information on fax error events to the Application Log in Event Viewer. You can set logging levels in the Fax Service Management Console.

CROSS-REFERENCE

I'll cover how to use Event Viewer to view logged event information in Chapter 13.

Other resources you can use to troubleshoot fax devices include the Add/Remove Hardware application, Device Manager, and System Information. Add/Remove Hardware was discussed earlier in this chapter, and I'll cover Device Manager and System Information later in this chapter.

Folder Options

The Folder Options application is used to customize the manner in which files and folders are displayed, to change file associations (this term is explained later on in the chapter), and to make network files available for use offline.

To start the Folder Options application, double-click the Folder Options icon in Control Panel. You can also access this application by selecting Tools ➪ Folder Options in Windows Explorer. There are four tabs in the Folder Options dialog box: General, View, File Types, and Offline Files, as shown in Figure 5-24. Notice that the General tab appears on top by default.

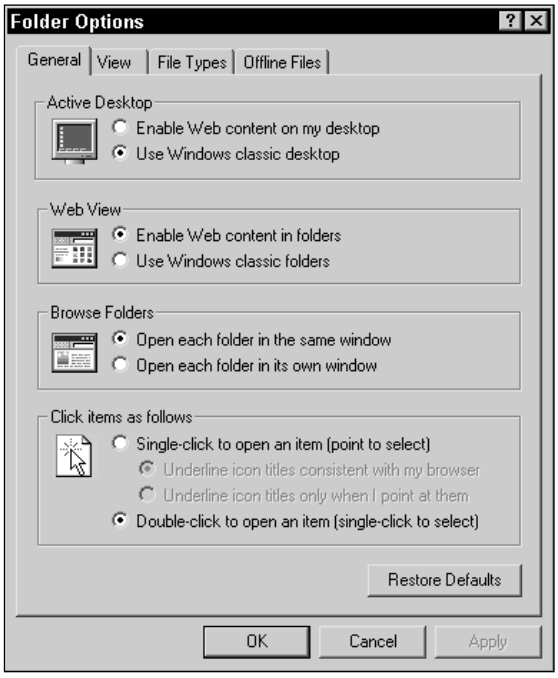

FIGURE 5-24 The General tab in Folder Options

Making Configurations on the General, View, and File Types Tabs

On the General tab, you can enable or disable Web content on your Active Desktop, enable or disable Web content in folders (such as My Computer or Windows Explorer), configure folder browsing options, and configure whether items can be opened with either a single-click or double-click.

The next tab in Folder Options is the View tab, which is shown in Figure 5-25. Notice that you can set all of your folders to the same view on this tab.

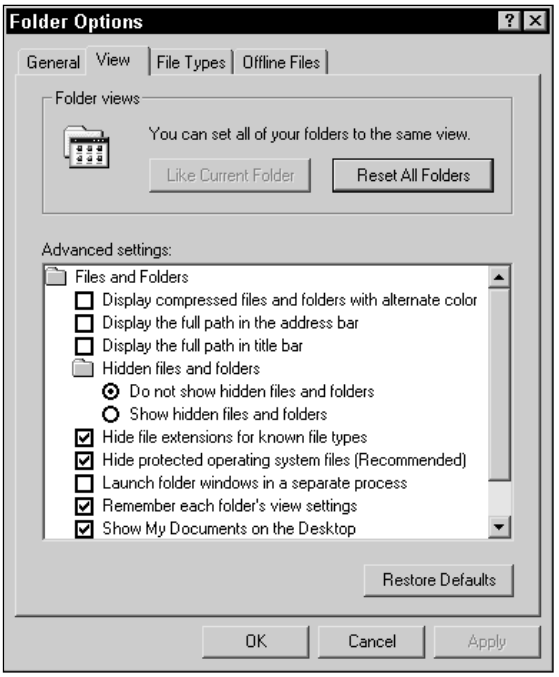

FIGURE 5-25 The View tab in Folder Options

You can configure many advanced file and folder settings on the View tab. For the average user, the default settings are generally appropriate, in my opinion. However, as an administrator, I like to use several of the settings in this dialog box to help me with managing and troubleshooting tasks. For example, I often select the "Show hidden files and folders" option so that I can view all files and folders on a particular disk or computer. In addition, I clear the check boxes next to "Hide file extensions for known file types" and "Hide protected operating system files." Making

these three configuration changes allows me to view (and manage) all of the files on a computer.

The next tab in Folder Options is the File Types tab. On this tab you can specify the application Windows 2000 will use to open files with specified file extensions. When an application is linked in this way to files with a particular file extension, a *file association* is said to exist. For example, files with the `.doc` extension are normally opened, by default, by WordPad. Once Microsoft Word is installed on a computer, the association is changed so that files with the `.doc` extension are opened by Word. Because administrators normally don't have to change file associations, you probably won't have to use this tab.

Configuring and Troubleshooting Offline Files

The last tab in Folder Options is the Offline Files tab, which is shown in Figure 5-26. Notice the check box next to Enable Offline Files.

FIGURE 5-26 The Offline Files tab in Folder Options

TIP

The Enable Offline Files check box is selected, by default, on Windows 2000 Professional computers, but you must manually enable offline files on Windows 2000 Server computers.

Offline files are files, folders, or Web pages that are stored on a network server and, in addition, are configured on the local computer so they can be used when the computer is not connected to the network. Offline Files is a more robust version of the briefcase feature that was introduced in previous versions of Windows.

Offline Files is a great feature for laptop computers. With offline files, you can work on a document (that is stored on a network server) at the office. Then, when you go home with your laptop for the night, you can continue to work on that document just as though you were connected to the network. The next morning, when you return to work and log on to the network, Windows 2000 will synchronize the document on your laptop with the network server so that the server's version of the document is updated. By default, Offline Files is enabled in Windows 2000 Professional, but is *not* enabled in Windows 2000 Server.

There are two or three primary tasks involved in configuring offline files, depending on whether you're running Windows 2000 Professional or Windows 2000 Server. First (if you're using Windows 2000 Server), you need to enable offline files in the Folder Options application. Then, in Windows Explorer, you select the specific files and folders you want to make available for use offline. Alternatively, you can use Internet Explorer if you want to make a Web page available for use offline. Then you can configure custom synchronization settings of your offline files if necessary. The following sections walk you through these tasks.

STEP BY STEP

ENABLING OFFLINE FILES (WINDOWS 2000 SERVER ONLY)

TIP

If the only type of files you want to make available offline are Web pages, you don't have to enable offline files.

1. In the Folder Options application, click the Offline Files tab.
2. On the Offline Files tab, select the check box next to Enable Offline Files. Click OK.

STEP BY STEP Continued

SELECTING OFFLINE FILES AND FOLDERS

1. Before you can work with files offline, you have to select the specific files or folders (located on a network server) to make them available for offline use. To do this, start Windows Explorer (select Start➪Programs➪Accessories➪Windows Explorer).
2. In Windows Explorer, right-click the file or folder on the network server you want to make available for offline use, and select Make Available Offline from the menu that appears.
3. Windows 2000 starts the Offline Files Wizard.

TIP

The Offline Files Wizard only runs the *first time* you make a file or folder available for offline use. If you've previously run this wizard, Windows 2000 makes the file or folder available for use offline at this point, and you're done with this process.

Click Next.

4. Select the check box next to "Automatically synchronize the Offline Files when I log on and log off my computer" if you want Windows 2000 to automatically synchronize the selected offline file or folder at these times. If you want to manually control synchronization, leave this check box blank. Click Next.
5. On the next screen, you can choose to enable periodic reminders that you are currently working offline to be displayed. You can also choose whether to create a shortcut to the `Offline Files` folder on your desktop. Select the check box next to either or both of these configuration options, as appropriate. Click Finish.
6. Windows 2000 copies the selected offline files from the server to the `Offline Files` folder on your computer.

MAKING A WEB PAGE AVAILABLE FOR OFFLINE USE

1. Start Internet Explorer. (On the desktop, double-click Internet Explorer.)
2. Connect to the Web site that contains the Web page you want to make available offline.
3. Select Favorites➪Add to Favorites.
4. In the Add Favorite dialog box, select the check box next to "Make available offline."

   If you want to make Web pages linked to this page available offline or if you want to schedule synchronization of this Web page, click Customize. The Offline Favorite Wizard starts. Follow the instructions presented on-screen to customize the offline Web page.
5. Click OK in the Add Favorite dialog box.

If you selected the check box next to "Automatically synchronize the Offline Files when I log on and log off my computer" when you ran the Offline Files Wizard, Windows 2000 synchronizes offline files each time you log on or off the network. This frequency of synchronization may be all that you need. However, if you want to manually synchronize offline files, or if you want offline files to be synchronized more frequently or at a scheduled time, you can use the steps that follow to accomplish this.

STEP BY STEP

CONFIGURING SYNCHRONIZATION SETTINGS (OPTIONAL)

1. Open Windows Explorer. Then select Tools ➪ Synchronize.
2. The Items to Synchronize dialog box appears.

   If you want to synchronize offline files now, click Synchronize.

   If you want to view the synchronization status of files or folders (that is, whether or not the file or folder is synchronized), highlight the file or folder and click Properties.

   If you want to customize the synchronization of a Web page, highlight the Web page and click Properties. In the Web page's Properties dialog box, you can view synchronization status, change the synchronization schedule for that particular Web page, and configure the number of pages linked to this Web page, if any, that are made part of the offline Web page.

   If you want to schedule the synchronization of offline files, click Setup.
3. The Synchronization Settings dialog box appears, as shown in Figure 5-27. Notice the three tabs in this dialog box: Logon/Logoff, On Idle, and Scheduled.

   On the Logon/Logoff tab, select the check box next to the offline files that you want to configure synchronization for. Then, select the check boxes next to "When I log on to my computer" and "When I log off my computer" as appropriate for your needs. You can also configure Windows 2000 to ask you before it synchronizes your offline files if you want.
4. If you want Windows 2000 to synchronize your offline files when your computer is idle for a specified amount of time, click the On Idle tab, which is shown in Figure 5-28.

   If you select the check box next to "Synchronize the selected items while my computer is idle," you may want to click the Advanced command button, which brings up the Idle Settings dialog box, as shown in Figure 5-29.

STEP BY STEP *Continued*

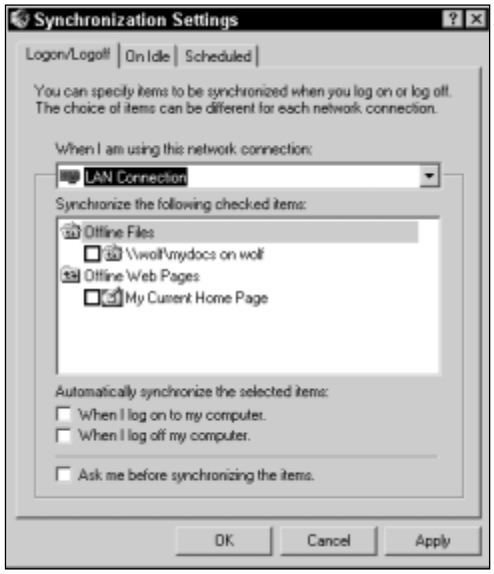

FIGURE 5-27 Configuring synchronization settings for offline files

FIGURE 5-28 Configuring idle settings for offline files

STEP BY STEP *Continued*

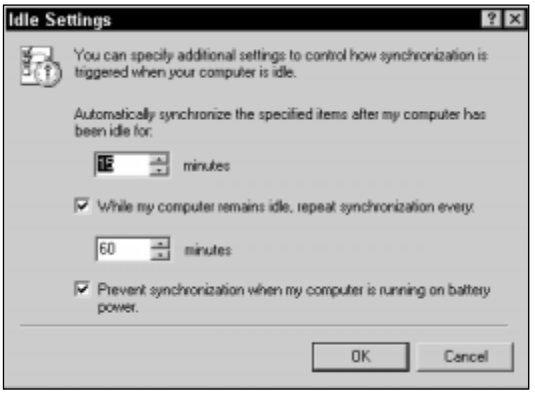

FIGURE 5-29 Configuring advanced idle settings

In this dialog box you can specify additional idle settings, such as the number of idle minutes before synchronization occurs, how often synchronization will occur if the computer remains idle, and whether Windows 2000 will perform synchronization when the computer is running on battery power. Click OK when you're finished configuring this dialog box.

5. To schedule when synchronization of offline files occurs, click the Scheduled tab, which is shown in Figure 5-30. You can use this tab if you want Windows 2000 to synchronize offline files at specific times, days, or both.

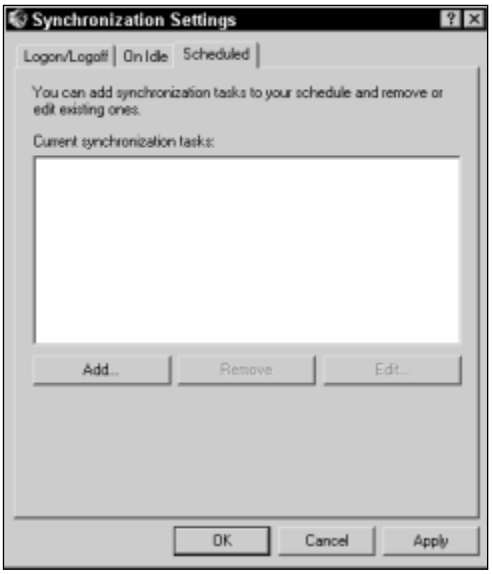

FIGURE 5-30 Scheduling synchronization tasks

STEP BY STEP *Continued*

To add a synchronization task, click Add. The Scheduled Synchronization Wizard begins. Click Next, and follow the instructions presented on-screen to schedule the task. When you've finished configuring synchronization tasks, click OK.

6. Click Close in the Items to Synchronize dialog box.

If you want to make changes to the way Windows 2000 handles your offline files after you've initially made them available offline, you can use the Offline Files tab in Folder Options to configure these changes.

STEP BY STEP

CUSTOMIZING OFFLINE FILE SETTINGS AFTER THE OFFLINE FILES WIZARD HAS RUN (OPTIONAL)

1. In the Folder Options application, click the Offline Files tab.
2. The Offline Files tab appears, as shown in Figure 5-31.

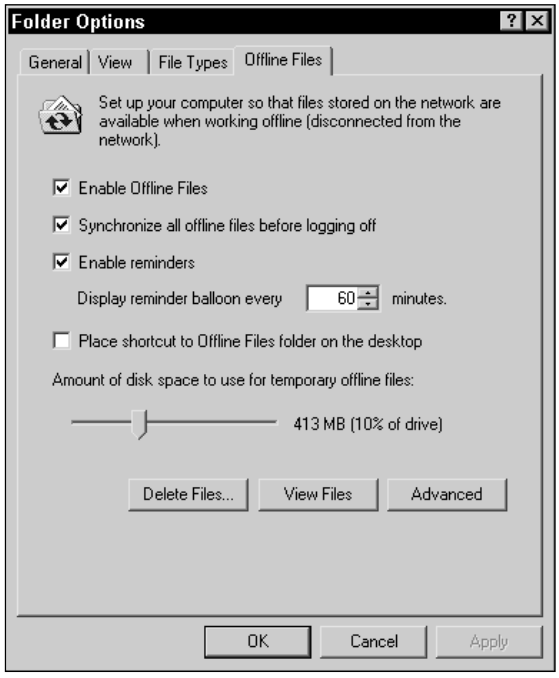

FIGURE 5-31 Customizing offline file settings

STEP BY STEP *Continued*

On the Offline Files tab, there are several configuration settings you can change:

- You can disable offline files by clearing the check box next to Enable Offline Files.
- You can enable or disable reminders to synchronize your offline files. (When offline files are enabled, reminders are enabled, by default, to occur every 60 minutes unless you specifically disabled reminders in the Offline Files Wizard.)
- You can place (or remove) a shortcut to the `Offline Files` folder on your desktop.
- You can configure the maximum amount of hard disk space to use for temporary offline files.
- You can view the files stored in your `Offline Files` folder—these are the files you've previously configured for offline use.
- You can delete temporary or permanent versions of offline files contained in the `Offline Files` folder to free up disk space on your computer.
- You can configure (using the Advanced command button) how your computer responds when it loses a connection to a server on your network that contains the original copy of your offline files.

When you're finished configuring this tab, click OK.

When troubleshooting offline files, several issues can arise. Most offline file problems involve synchronization problems. Some common offline file problems and potential solutions are:

- If a user reports that he or she is unable to make a file available for offline use, check the user's permissions to the file or folder in question. The user must have share and NTFS permissions that enable the user to read, write, and delete the file or folder.
- If users of laptop computers report that they don't have the most current versions of the offline files they work with, ensure that each user's mobile computer is configured to synchronize files both when the user logs on and logs off the network.
- If users report that they frequently don't have enough free disk space to perform tasks, consider decreasing the amount of disk space allocated for temporary offline files, or replacing the hard

disk in the user's computer. However, if the amount of disk space allocated for temporary offline files is set too low, users might not be able to download all of their offline files.

- If users report slow network response, consider decreasing the frequency of synchronization, or try scheduling synchronization to occur during nonbusiness hours. Synchronization can take up a large amount of network bandwidth.

Fonts Folder

The `Fonts` folder is actually a tool used to install, delete, and manage fonts. To access the `Fonts` folder, double-click the Fonts icon in Control Panel.

When you open the `Fonts` folder, numerous fonts are displayed, as shown in Figure 5-32. The `Fonts` folder displays every font that is installed on the computer. Notice that in this figure each font is represented by an icon that contains the letters TT, O, or A.

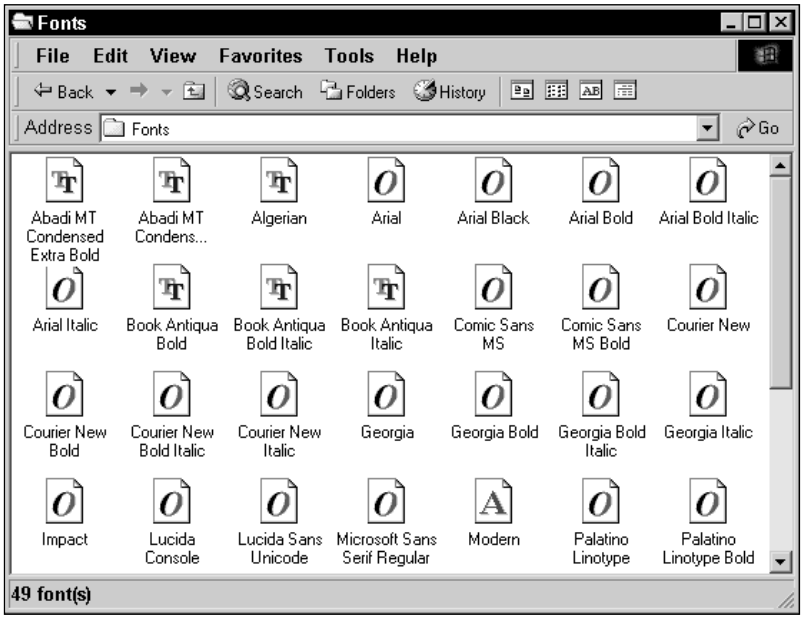

FIGURE 5-32 Fonts

The letter contained in a font's icon indicates what type of font it is. There are three possibilities:

- **A:** This letter indicates the font is either a vector, raster, or Adobe Type 1 PostScript font.
- **O:** This letter indicates the font is an OpenType font. OpenType fonts are an extension of the TrueType standard.
- **TT:** These letters indicate the font is a TrueType font.

Working with fonts is fairly simple. For example, to install a new font, with the `Fonts` folder open, select File ➪ Install New Font, and then follow the instructions presented on-screen. Or, you can install a new font by opening Windows Explorer, and then dragging the new font and dropping it on the `\Winnt\Fonts` folder. Windows 2000 will automatically install the new font.

There are at least three easy ways to remove an installed font. You can highlight the font and press Delete. Or, you can right-click the font's icon, and select Delete from the menu that appears. Or, you can highlight the font, and select File ➪ Delete.

To view what a font looks like, double-click the font's icon. You can print a sample of the font by clicking Print in the font's dialog box.

Game Controllers

The Game Controllers application is useful for managing game-related hardware, such as joysticks and gamepads. With Game Controllers, you can add, remove, and configure game controllers. You must be a member of the Administrators group to perform many of the tasks that can be done using the Game Controllers application.

To access Game Controllers, double-click the Game Controllers icon in Control Panel.

Because working with the Game Controllers application is fairly straightforward, and because most network administrators don't have a lot of game controllers to configure on the job, I won't bore you with the details of using Game Controllers.

Internet Options

The Internet Options application is a powerful tool that enables you to configure temporary Internet files and a home page; configure security levels for various Web content zones; manage content ratings, certificates, and personal information; configure dial-up and LAN connections to the Internet, including proxy server settings; specify which program Windows 2000 will use for each Internet service; and configure multiple advanced settings.

TIP

If you're familiar with Internet Explorer (version 5.*x*) on Windows 95, Windows 98, or Windows NT, you'll find that the Internet Options application in Windows 2000 is the same as the Internet Options application that is installed with Internet Explorer 5 on computers that run these other operating systems.

To access Internet Options, double-click the Internet Options icon in Control Panel. Or, you can open Internet Explorer, and then select Tools ➪ Internet Options.

Keyboard

The Keyboard application is used to configure specific keyboard features, including speed of character repeat and cursor blink rate, input locale (including keyboard layout), and keyboard device type.

To start the Keyboard application, double-click the Keyboard icon in Control Panel.

There are three tabs in the Keyboard Properties dialog box: Speed, Input Locales, and Hardware. The Speed tab is shown in Figure 5-33.

If you want to adjust the character repeat delay, the character repeat rate, or the cursor blink rate, drag the slider to the desired speed, and click OK.

The Input Locales tab, which is shown in Figure 5-34, is used to configure both the input locale (the language and locality of the language such as English United States) and the keyboard layout.

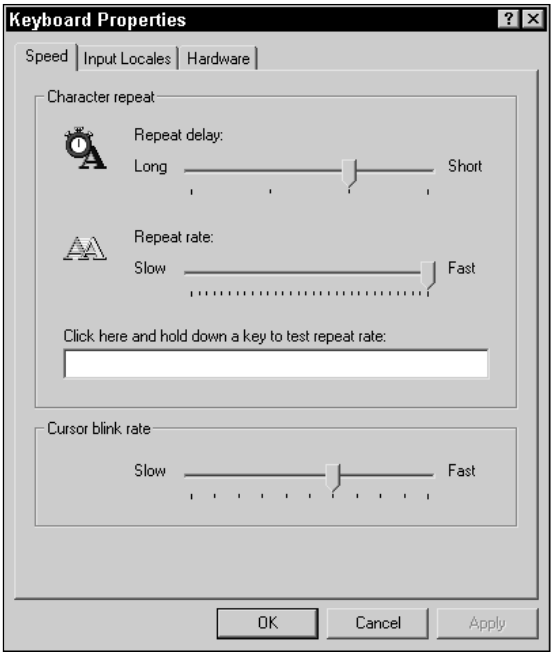

FIGURE 5-33 The Speed tab in Keyboard Properties

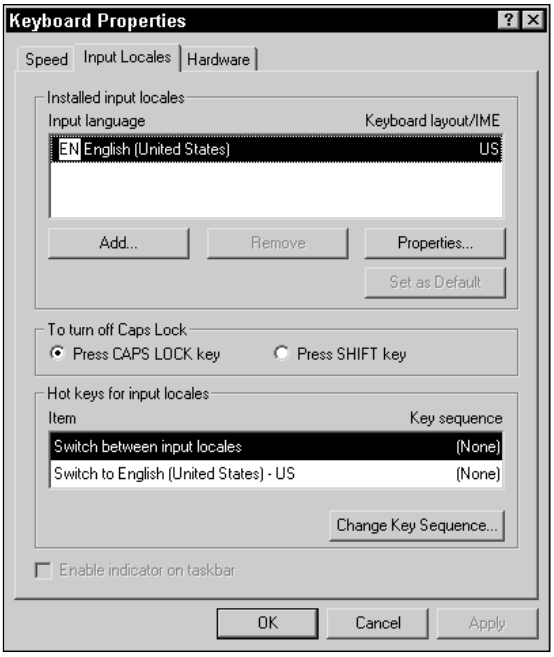

FIGURE 5-34 The Input Locales tab in Keyboard Properties

EXAM TIP

The Professional exam has five objectives on configuring a computer for multiple languages and multiple locations. Multiple locations are configured on the Input Locales tab in Keyboard or Regional Options (which is covered later in this chapter), and multiple languages are configured in Regional Options. I recommend that you know how to use both of these applications in your sleep!

The default input locale is English (United States). You can add other input locales (such as English [United Kingdom] or Dutch [Netherlands]) by clicking Add on the Input Locales tab, selecting the input locale you want from the Input locale drop-down list box, and then clicking OK. You can also remove an input locale on this tab by highlighting the input locale and clicking Remove.

TIP

You can have multiple input locales installed on a single computer.

The default keyboard layout option is US. To configure keyboard layout options, first highlight the input locale for which you want to modify the keyboard layout. Then click Properties, and select the keyboard layout you want from the "Keyboard layout/IME" drop-down list box, and click OK.

You can also use the Input Locales tab to configure hot key sequences to switch between input locales, and to switch to a particular input locale.

The Hardware tab is used to configure the hardware properties of your keyboard. This tab offers you the same configuration options that are available in Device Manager (which will be covered later in this chapter).

Licensing

The Licensing application is used to manage licensing and licensing replication on the local Windows 2000 Server computer. The Licensing application is *not* available on Windows 2000 Professional computers. You must be a member of the Administrators group to use the Licensing application.

A licensing mode (Per Server or Per Seat) is selected and the number of client access licenses is configured during the installation of Windows 2000 Server. However, if you purchase additional client licenses, or decide after installation to change your licensing mode, you can use the Licensing application to accomplish this.

CAUTION

It is a violation of the Windows 2000 licensing agreement to change the licensing mode of a server from Per Seat to Per Server.

The Licensing application in Control Panel is useful only for managing licensing on the local computer. If you want to manage licensing for your network from a central location, you should use the Licensing tool in the `Administrative Tools` folder.

To start Licensing, double-click the Licensing icon in Control Panel.

Two tasks you might want to use the Licensing application in Control Panel to perform are adding client licenses and changing the licensing mode of the local Windows 2000 Server computer. I'll explain how to make these changes in the next section.

STEP BY STEP

ADDING CLIENT LICENSES AND CHANGING THE LICENSING MODE

1. Start Licensing. (Select Start ➪ Settings ➪ Control Panel, and then double-click Licensing.)
2. The Choose Licensing Mode dialog box appears, as shown in Figure 5-35.

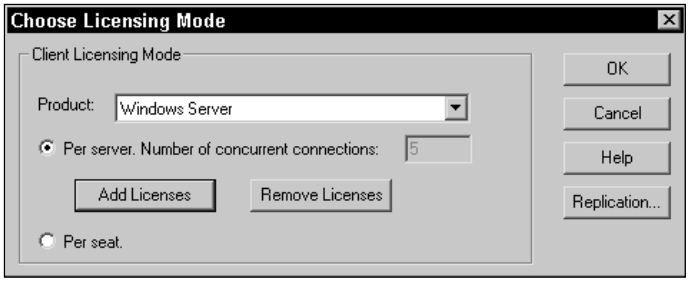

FIGURE 5-35 Configuring licensing

If you use the Per Server license mode and want to add client licenses that you have purchased, click Add Licenses.

3. In the New Client Access License dialog box, enter the number of new licenses that you want to add in the Quantity spin box, and click OK.
4. In the Per Server Licensing dialog box, agree to the license agreement and click OK. When the Choose Licensing Mode dialog box reappears, the number of concurrent connections is changed to reflect the number of client licenses you added.

STEP BY STEP *Continued*

5. To change your licensing mode from Per Server to Per Seat, select the "Per seat" option, and click OK.
6. In the Per Seat Licensing dialog box, agree to the license agreement and click OK.

Mouse

The Mouse application is used to configure a mouse or other pointing device.

To start the Mouse application, double-click the Mouse icon in Control Panel.

There are four tabs in the Mouse Properties dialog box, as shown in Figure 5-36. Notice the Buttons, Pointers, Motion, and Hardware tabs.

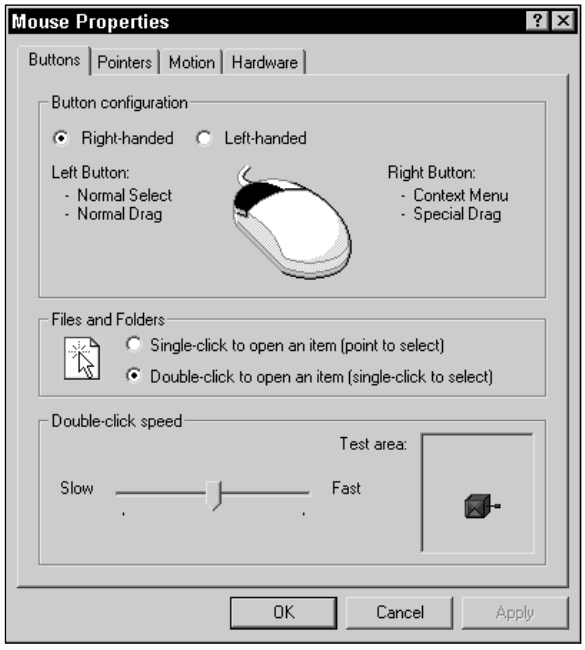

FIGURE 5-36 Mouse Properties

On the Buttons tab, you can configure either a right-handed or left-handed button configuration, whether a single-click or double-click will open a file or folder, and double-click speed. The default settings in this

dialog box are the right-handed button configuration, double-click to open an item, and medium double-click speed.

The settings on the Buttons tab are pretty self explanatory, but do notice the small box in the Test area. You can double-click this box to test your double-click speed. When the system detects a double-click here, a clown pops up like a jack-in-the-box. When you double-click again, the clown disappears back into the box. If you double-click in the Test area and nothing happens, you probably have your double-click speed set too high. Drag the slider to a slower speed and retest your setting.

The Pointers tab is used to select and customize a pointer scheme. The pointer is the arrow on your screen that moves as you move your mouse. For laptops with dual scan displays, I recommend the Magnified scheme because it's easier to see the larger pointer on the screen. I also like this scheme for teaching and for giving presentations.

The Motion tab is used to configure the speed and acceleration of your pointer. You can also select an option on this tab that causes the pointer to be automatically positioned over the default button in all dialog boxes when they are first opened. This option is called the "Snap to default" option.

The Hardware tab is used to configure the hardware properties of your mouse or pointing device. This tab offers you the same configuration options that are available in Device Manager (which will be covered later in this chapter).

Network and Dial-Up Connections Folder

The `Network and Dial-up Connections` folder in Control Panel is used to manage and configure local area and dial-up connections. Within this folder you can create new local area or dial-up connections, delete existing connections, and configure existing connections.

CROSS-REFERENCE

Because the `Network and Dial-up Connections` folder is primarily used to perform networking tasks, I'll explain how to use this folder in Chapter 15.

Phone and Modem Options

The Phone and Modem Options application in Control Panel is used to configure telephone dialing rules and modem properties. This application is used to configure dialing rules for fax servers or for other applications that use a modem to dial out, and is sometimes used to configure dialing rules for dial-up connections when they are dialed from more than one location.

Although any user can access and use the Phone and Modem Options application, you must be a member of the Administrators group to add and configure modems.

CROSS-REFERENCE

I'll explain how to use Phone and Modem Options when I discuss dial-up connections in Chapter 15.

Power Options

The Power Options application enables you to configure energy-saving settings for your computer. This application was originally designed to address the needs of laptop and other mobile computers. The battery life limitations of these computers inspire us to think about saving energy. This application is also useful for conserving energy used by desktop computers. If you're thinking, "Who cares about saving energy?" consider this: I recently saw a sign in a building of a Redmond, Washington–based software company that indicated the company could save over $1,000,000 a year if everyone turned off equipment when it was not in use.

The Power Options application also enables you to install and configure an uninterruptible power supply (UPS). A UPS permits an orderly shutdown of your computer to avoid data loss during a power outage.

Although all users can start the Power Options application, you must be a member of the Administrators group to use this application.

To start the Power Options application, double-click the Power Options icon in Control Panel. Figure 5-37 shows the Windows 2000 Professional version of the Power Options Properties dialog box.

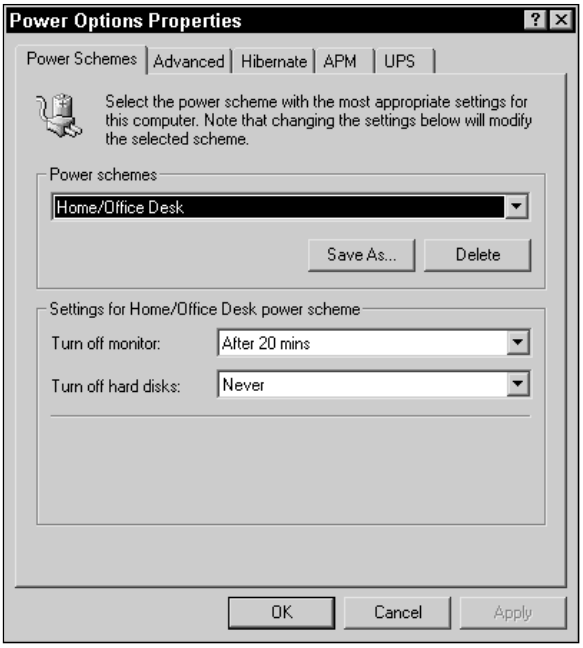

FIGURE 5-37 Power Options Properties

As Figure 5-37 shows, there are five tabs in the Power Options Properties dialog box: Power Schemes, Advanced, Hibernate, APM, and UPS.

TIP

The APM tab is only available on Windows 2000 Professional computers.

Configuring Power Schemes, Advanced Options, and Hibernation

On the Power Schemes tab, you can select a power scheme for your computer to use. There are several power schemes you can select from, including home/office desk, portable/laptop, max battery, always on, and so on. Each power scheme has its own preconfigured settings that determine how long Windows 2000 will wait, with no user input, before it turns off the computer's monitor, hard disks, or both. Once you select a power scheme, you can customize its default time settings for powering off the monitor and hard disks to meet your needs.

On the Advanced tab, you can select a check box that will cause Windows 2000 to always show the Power Options icon (which appears as

a power cord and plug) on the taskbar. You can then double-click this icon in the taskbar to quickly access the Power Options application.

On the Hibernate tab, you can enable hibernation support. When hibernation support is enabled, an additional option — Hibernate — is added to the Shut Down Windows dialog box that is displayed when you select Start ➪ Shut Down. When you select this method of shutting down, the contents of the computer's memory are saved to a file on its hard disk, and then the computer is shut down. When you restart the computer, the contents of memory are reloaded, and you can continue working in whatever program was open when hibernation occurred. This feature is particularly useful to users of laptop and other mobile computers who may frequently need to shut down and restart their computers (such as prior to an aircraft's takeoff and landing). To enable hibernation support, select the "Enable hibernate support" check box on this tab.

Configuring Advanced Power Management (APM)

Windows 2000 Professional has an additional tab in the Power Options application: APM, which stands for *Advanced Power Management*. APM is an older power management scheme that Windows 2000 supports only on laptop and other mobile computers. APM should never be enabled on a desktop or server computer.

In general, APM is useful on laptop computers that have BIOS support. If for some reason APM is disabled in your computer's BIOS, you must enable it before you can configure APM in Windows 2000.

It's important that you understand that APM is actually working in two places — in your computer's BIOS and in the Windows 2000 Professional operating system. To ensure that you can control the functioning of APM in the Windows 2000 Professional operating system, you should select the APM setting in your computer's BIOS that provides greatest system performance — this is typically called "Maximum Performance" and is the opposite of the Maximum Power Savings setting.

You can use the APM tab in Power Options to turn Advanced Power Management on and off. To turn on Advanced Power Management, select the check box next to "Enable Advanced Power Management support" on the APM tab, and click OK.

Once APM is enabled on a Windows 2000 Professional computer, some interesting changes occur in Power Management. Figure 5-38 shows the Power Options Properties dialog box immediately after APM is enabled.

Notice that two additional tabs — Alarms and Power Meter — have been added to the dialog box. Also notice that the UPS tab is no longer present. Microsoft assumes that if you're using Advanced Power Management you won't be using a UPS with that computer.

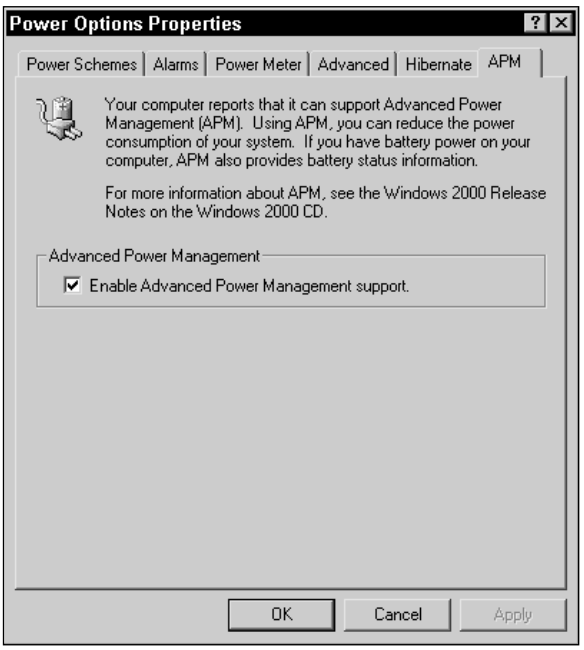

FIGURE 5-38 Enabling APM

The Alarms tab, which is shown in Figure 5-39, enables you to specify what actions are taken when the computer's battery runs low. Notice that there are two sections on this tab: "Low battery alarm" and "Critical battery alarm."

The premise of this tab is that you might want Windows 2000 to perform certain actions when your computer's battery charge drops to two distinct, predetermined (by you) levels. When the battery charge drops to the first level (typically 10 to 20 percent of the battery's total capacity), this is said to be a "Low battery alarm." When the battery charge drops to the second level (typically 3 to 10 percent of its total capacity), this is said to be a "Critical battery alarm." On the Alarms tab, you can configure the specific actions Windows 2000 will take when each of these two events occurs.

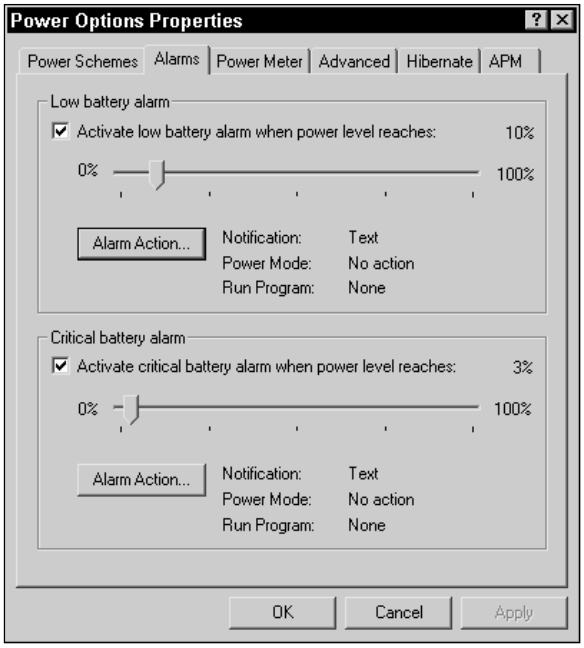

FIGURE 5-39 Configuring battery alarms

Some of the actions you can configure on the Alarms tab include:

- **Notification:** You can have Windows 2000 do nothing; or you can configure Windows 2000 to play a sound, display a message on your screen, or do both to notify you of the alarm.
- **Power Mode:** You can have Windows 2000 do nothing, go on Stand by, or power off when the alarm occurs. *Stand by* is a low power usage state where all unnecessary devices, such as monitors and hard disks, are turned off.
- **Run Program:** You can have Windows 2000 do nothing or run a specified program, script, or batch file when the alarm occurs.

You can configure Windows 2000 to take one set of actions when a low battery alarm occurs, and the same or a completely different set of actions when a critical battery alarm occurs.

The Power Meter tab shows the current power source (AC power or batteries) and the percentage of charge remaining in the computer's battery.

Another change that occurs after APM is enabled is that a Stand by option is added to the Shut Down Windows dialog box that is displayed when you select Start ➪ Shut Down. When you select Stand by, the computer switches

into its lowest power consumption mode. In Stand by mode, all unnecessary hardware in the computer (such as monitors and hard disks) is turned off, and the computer screen goes blank. The computer is still running, though, and you can return it to its normal, active state by pressing any key or moving the mouse.

One other change that occurs after enabling APM is that an additional option appears on the Advanced tab. This option configures Windows 2000 to prompt you for a password when the computer comes out of Stand by mode, and this option is selected by default.

Finally, if you've selected the option on the Advanced tab to always show the Power Options icon on the taskbar, this icon has an additional feature. After APM is enabled, the Power Options icon automatically displays a power cord and plug icon when the computer is connected to AC power, and displays a battery icon when the computer in running on battery power.

Configuring a UPS

The UPS tab is used to install, configure, and monitor an uninterruptible power supply (UPS). The UPS tab is not present on Windows 2000 Professional computers on which APM has been enabled.

THE UPS IS YOUR FRIEND

I strongly recommend you use a UPS on any Windows 2000 Server or Windows 2000 Advanced Server computer, and on any other computer that is critical to your operations. *Not* using a UPS can result in data loss and sometimes even hardware damage if electrical power fails unexpectedly. The UPS is your friend because it can save you from all of this. Of course, if you work somewhere that never has a power outage, perhaps under the Hoover dam, you needn't concern yourself about using a UPS at all. . . .

Also remember that UPS batteries don't last forever. Follow the manufacturer's recommendations for battery replacement and maintenance. There's nothing so dissatisfying as finding out that your UPS battery is dead *after* the power fails. I know. I once spent an entire day during a big Seattle windstorm responding to customer calls concerning damaged hardware and lost data problems that were the direct result of failed UPS batteries.

TIP

The UPS tab in Power Options is a basic UPS management tool. Most commercial quality UPS devices include software that is much more sophisticated. I recommend you use the software that the manufacturer supplies with your UPS.

The UPS tab is adequate for managing an inexpensive UPS that does not include Windows 2000–compatible software. Figure 5-40 shows the UPS tab in Power Options.

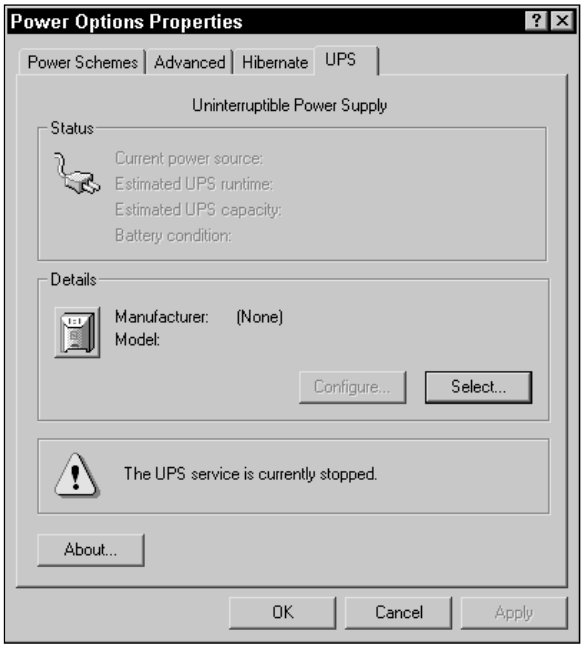

FIGURE 5-40 The UPS tab

Notice in Figure 5-40 that on the UPS tab you can view the status of a UPS device. You can also select and configure a specific UPS device for your computer under "Details." Finally, you can view the status of the UPS service (whether it is stopped or running). In the next section, I'll explain how to install and configure a UPS device on a Windows 2000 Server computer.

STEP BY STEP

INSTALLING AND CONFIGURING A UPS

1. Start Power Options. (Select Start ➪ Settings ➪ Control Panel, and then double-click Power Options.)
2. In the Power Options Properties dialog box, click the UPS tab.
3. To install a UPS, click Select.
4. In the UPS Selection dialog box, select the manufacturer of your UPS device from the "Select manufacturer" drop-down list box. The options you can choose from in this box are American Power Conversion and Generic. (Gee, I wonder who wrote this application?) If your UPS is not made by American Power Conversion, select Generic. Then select the model of the device in the "Select model" box. Finally, select the port this device will use. Click Next.
5. If you selected a generic UPS in Step 4, the UPS Interface Configuration On: COM*x* dialog box appears, as shown in Figure 5-41.

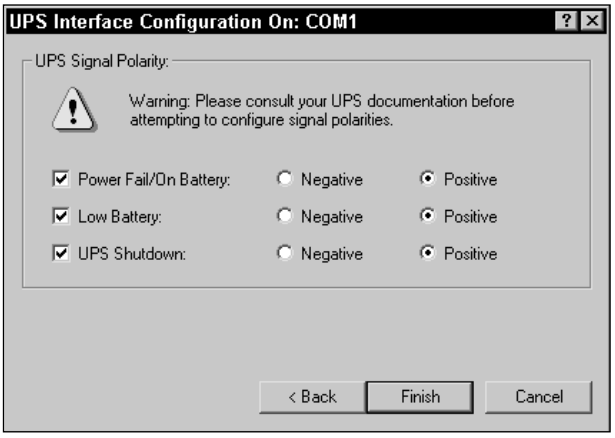

FIGURE 5-41 Configuring UPS signal polarity

In this dialog box, select the appropriate type of signal polarity (either negative or positive) for each of the three UPS events listed. Consult your UPS documentation before changing the default settings. Click Finish.

6. The UPS tab reappears. To configure the newly installed UPS, click Configure.
7. The UPS Configuration dialog box appears, as shown in Figure 5-42.

STEP BY STEP *Continued*

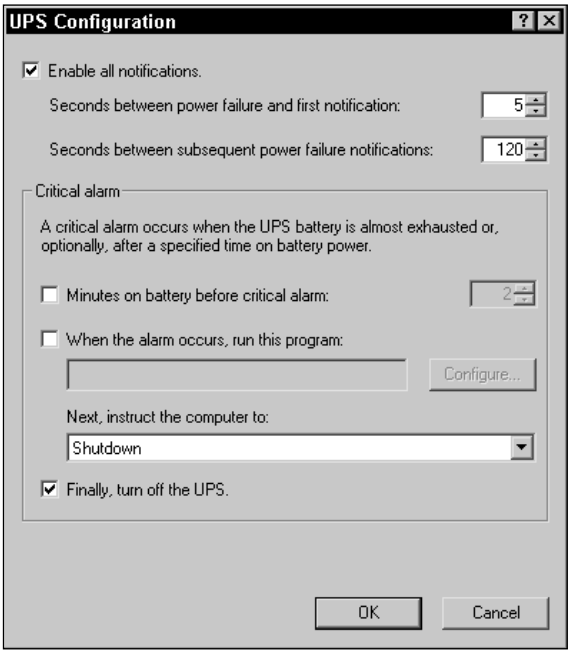

FIGURE 5-42 Configuring a UPS

In this dialog box, you can configure notifications and alarms. You can specify the number of seconds Windows 2000 will wait, after a power failure, before it displays a dialog box indicating that the power has failed. You can also configure the number of minutes Windows 2000 will run on a battery before generating a critical alarm, and configure a critical alarm procedure in this dialog box. A critical alarm is an event that occurs when either the UPS battery is almost dead, or after the computer runs for a specified number of minutes on battery power, whichever occurs first. When the point of critical alarm is reached, Windows 2000 runs a specified program, script, or batch file (if so configured), and then shuts down the computer.

Configure the settings in this dialog box to meet your needs. Click OK.

8. In the Power Options Properties dialog box, click OK.

Printers Folder

The `Printers` folder is a tool used to add, remove, and configure local and network printers. Although all users can start the `Printers` folder and can use this application to add a network printer, you must be a member of the Administrators group to use this application to add a local printer.

CROSS-REFERENCE

The `Printers` folder is covered extensively in Chapter 12.

Regional Options

The Regional Options application is useful for configuring local settings, and also for configuring support for multiple languages and multiple locations. For example, this application enables you to configure how certain objects, such as numbers, currency, time, and date are displayed in applications. Regional Options also enables you to configure input locale, language settings, and keyboard layout.

EXAM TIP

The Professional exam has five objectives on configuring a computer for multiple languages and multiple locations. Ensure that you are extremely familiar with the Regional Options application prior to taking this exam.

To start the Regional Options application, double-click the Regional Options icon in Control Panel. Figure 5-43 shows the Regional Options dialog box. Notice the six tabs in the Regional Options dialog box: General, Numbers, Currency, Time, Date, and Input Locales.

TIP

The Input Locales tab in Regional Options is the same as the Input Locales tab in the Keyboard application discussed earlier in this chapter.

In the following sections I'll show you how to use the Regional Options application to configure local settings and how to configure support for multiple languages and multiple locations.

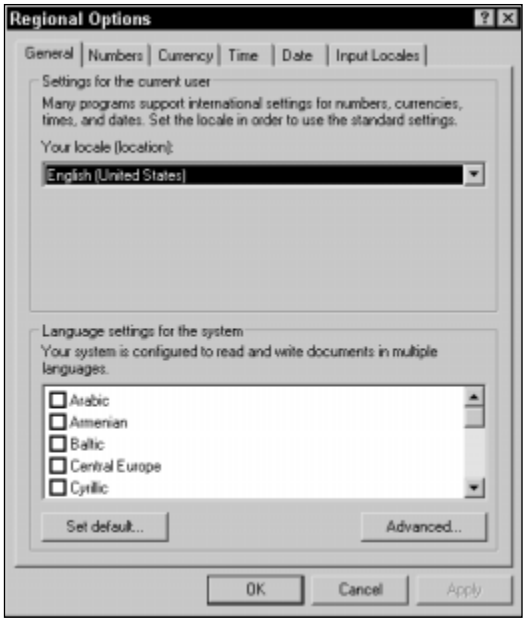

FIGURE 5-43 Regional Options

Configuring Local Settings

Local settings are the way numbers, currency, time, and date are displayed in applications for the currently selected location. Windows 2000 supports international settings and applies a set of preselected settings for each of these items depending on the selected location.

You can configure your location on the General tab in Regional Options, which is shown in Figure 5-43. For example, suppose I work in Guatemala. On the General tab, I select a location of Spanish (Guatemala) in the "Your locale (location)" drop-down list box, and click OK. Once this location is selected, Windows 2000 displays numbers, currency, time, and date the way these items are normally presented in Guatemala. For example, Windows 2000 changes the currency symbol to a Q, representing the Guatemalan quetzal. In addition, Windows 2000 changes the measurement system to metric.

Finally, if I want to customize the way numbers, currency, time, and date appear for the currently selected location, I can easily make the appropriate changes on the Numbers, Currency, Time, and Date tabs.

Adding Support for Your Language and Location

Windows 2000 supports the use of many languages and the way these languages are used in different geographic locations. Language and location settings for the computer are configured on the General tab in Regional Options, which is shown in Figure 5-43.

If you speak and work in one language only, other than English as it is spoken in the U.S., you may need to configure your language and location on the General tab. By default, support for languages and locations in Western Europe and the United States is enabled.

If your language and location combination is *not* listed in the "Your locale (location)" drop-down list box, follow the steps in the next section to install support for the language you use and the location in which you live or work.

STEP BY STEP

ADDING SUPPORT FOR A NEW LANGUAGE AND LOCATION

1. Start the Regional Options application. (Select Start ➪ Settings ➪ Control Panel, then double-click Regional Options.)
2. On the General tab, select the check box next to the language you want to add support for in the "Language settings for the system" box. When you add support for a particular language, you will be able to read and write (type) documents in that language. Click OK.
3. If prompted, insert your Windows 2000 product compact disc into your computer's CD-ROM drive and click OK. When prompted by Windows 2000, click Yes to restart your computer to make the change effective. If your Windows 2000 compact disc is in your CD-ROM drive, remove it now.
4. Start the Regional Options application. Examine the locations listed in the "Your locale (location)" drop-down list box. Your location should now be listed. Select your location and click OK.

TIP

Installing support for a new language, such as Chinese, only provides language support in applications run on this computer—it doesn't turn your operating system into a Chinese version of Windows 2000.

Configuring Support for Multiple Languages and Locations

Up to this point you've enabled support for a single language in a single location. Now I'll explain how to configure support for multiple languages and multiple locations.

If you commonly work with documents created in different languages, and you need to read or edit these documents, you can benefit from installing support for multiple languages and multiple input locales. An *input locale* consists of an input language and location combination (such as English [United States]), a keyboard layout, and local settings for the presentation of numbers, currency, time, and date.

Configuring support for multiple languages and locations is basically a two-step process. First, you configure multiple language support on the General tab in Regional Options. Then, you configure multiple location support on the Input Locales tab. I'll show you how to perform these tasks in the following section.

STEP BY STEP

CONFIGURING SUPPORT FOR MULTIPLE LANGUAGES AND MULTIPLE LOCATIONS

1. Start the Regional Options application. (Select Start ➪ Settings ➪ Control Panel, then double-click Regional Options.)
2. On the General tab, select the check box next to the language or languages you want to add support for in the "Language settings for the system" box. Click OK.
3. If prompted, insert your Windows 2000 product compact disc into your computer's CD-ROM drive. When prompted by Windows 2000, click Yes to restart your computer to make the change or changes effective.
4. Start the Regional Options application again (see Step 1). Click the Input Locales tab.
5. The Input Locales tab appears, as shown in Figure 5-44. Notice that even though support for multiple languages is installed, only the English (United States) input language and US keyboard layout is configured. You must manually add each additional input locale to complete the process of implementing support for each language you have added.

   To add an additional input locale, click Add.

STEP BY STEP *Continued*

6. In the Add Input Locale dialog box, select the first input locale you want to add from the “Input locale” drop-down list box. Then select the keyboard layout you want to use with this input locale from the “Keyboard layout/IME” drop-down list box. Click OK.
7. The Input Locales tab reappears. Repeat Step 6 until you’ve added all of the input locales you need. Figure 5-45 shows the Input Locales tab after two new input locales have been added.

FIGURE 5-44 Adding input locales

Notice in Figure 5-45 that there is a check mark next to the English (United States) input locale. This check mark indicates that this is the default input locale that will be used when an application that supports multiple languages (such as Microsoft Word, Excel, and so on) is started.

To change the default input locale, highlight the locale in the “Installed input locales” list box and click Set as Default.

8. You can also configure hot keys to quickly switch between input locales on the Input Locales tab. To do this, highlight the item for which you want to configure a hot key sequence in the “Hot keys for input locales” list box and click Change Key Sequence. Follow the instructions presented on-screen to configure the hot key sequence you want to use.

STEP BY STEP *Continued*

FIGURE 5-45 Configuring multiple input locales

9. Finally, notice the "Enable indicator on taskbar" check box at the bottom of the Input Locales tab in Figure 5-45. This option, which is selected by default when you add additional input locales, causes an icon for the input locale currently being used to appear on the taskbar, next to the clock. When you click this icon, all installed input locales are displayed and you can quickly switch to a different input locale by clicking the input locale you want to switch to.

   Figure 5-46 shows the menu that appeared on my computer when I clicked the input locale icon in the taskbar. Notice that all of the input locales that I added in Steps 6 and 7 are displayed.

   When you change to a different input locale in this way, only the active application is affected. You can run multiple applications on your computer at the same time and use a different input locale for each application.

10. When you're finished configuring input locales, click OK.

STEP BY STEP *Continued*

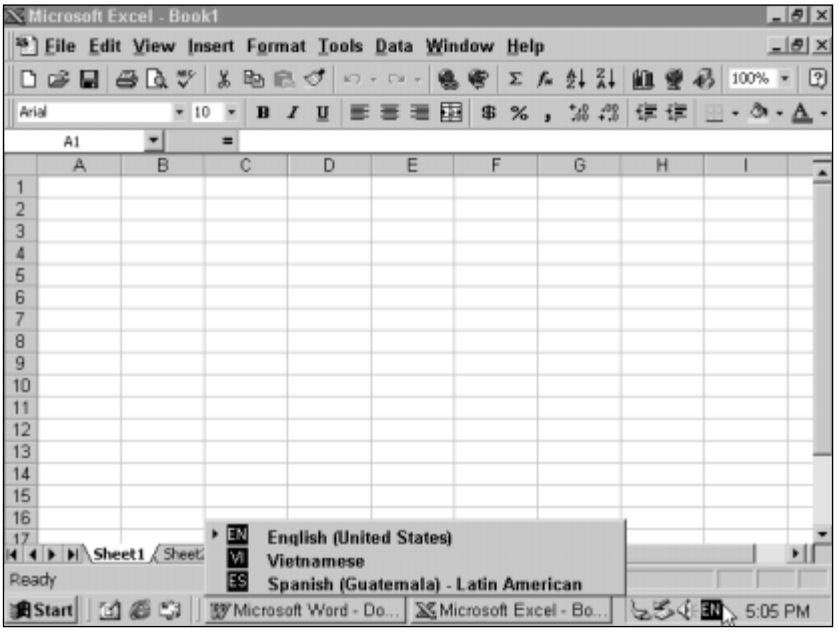

FIGURE 5-46 Selecting an input locale for an application

Scanners and Cameras

The Scanners and Cameras application enables you to install and configure scanners and digital cameras. Although all users can start the Scanners and Cameras application, you must be a member of the Administrators group to add or remove scanners and cameras.

To access the Scanners and Cameras application, double-click the Scanners and Cameras icon in Control Panel.

Adding, Removing, and Configuring Scanners and Cameras

There is only one tab in the Scanners and Cameras Properties dialog box: Devices. On this tab you can add, remove, configure, and troubleshoot

scanners and cameras. If you have an infrared port on your computer, you can also use this tab to configure Windows 2000 to receive images from digital cameras via an infrared/wireless link.

To install a new scanner or camera, click Add on the Devices tab. This brings up the Scanner and Camera Installation Wizard, which is similar to the Add/Remove Hardware Wizard. The advantage of adding a scanner or camera by using this application is that it saves you from having to complete several beginning screens in the Add/Remove Hardware Wizard. Figure 5-47 shows the Scanners and Cameras Properties dialog box after a camera and scanner have been installed.

To remove a scanner or camera, highlight the device you want to remove on the Devices tab and then click Remove. Then click Yes when Windows 2000 asks if you're sure you want to remove this device.

To configure a scanner or camera, highlight the device you want to configure on the Devices tab, and then click Properties. A Properties dialog box specific to the device is displayed. The tabs and possible configuration options vary depending on the model and type of device (scanner or camera) you are configuring. Some of the most common tabs include General, Port Settings, and Color Management.

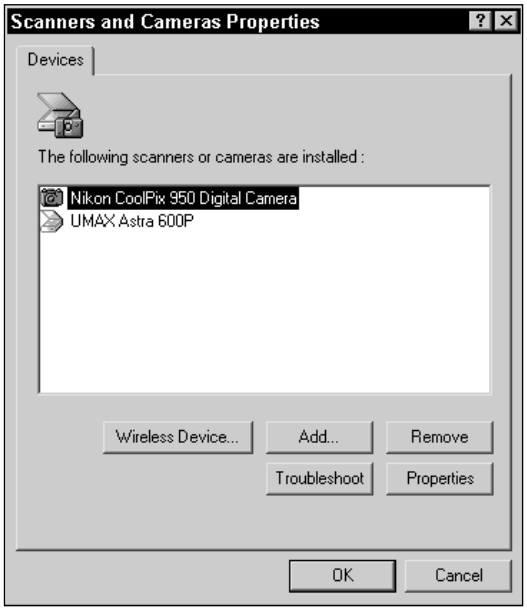

FIGURE 5-47 Working with scanners and cameras

Once you've installed and configured a scanner or camera, you can use the Imaging application (Start ➪ Programs ➪ Accessories ➪ Imaging) to initiate the transfer of images from your scanner or camera to your Windows 2000 computer.

You can also configure Windows 2000 to receive images from a scanner or digital camera via an infrared/wireless link if both your computer *and* your scanner or camera have infrared support. To configure infrared image transfer, click Wireless Device on the Devices tab. This command button is a shortcut to the Wireless Link application in Control Panel.

TIP

If you don't have an infrared port on your computer, the Wireless Device command button will not be displayed.

I'll discuss the Wireless Link application in more depth later in this chapter.

Troubleshooting Scanners and Cameras

Windows 2000 includes a special Help feature, called a Troubleshooter, that is useful for identifying and resolving scanner and camera problems. To access the Troubleshooter, click Troubleshoot on the Devices tab. The Troubleshooter will ask you some questions and take you through some steps. Follow the instructions presented on-screen to resolve the particular problem you're experiencing.

Other resources you can also use to troubleshoot scanners and cameras include the Add/Remove Hardware application, Device Manager, and System Information. Add/Remove Hardware was discussed earlier in this chapter, and I'll cover Device Manager and System Information later in this chapter.

Scheduled Tasks Folder

The `Scheduled Tasks` folder is a tool used to schedule a program, command, script, document, or batch file to run at a specified time. You can schedule multiple tasks in the `Scheduled Tasks` folder. The Scheduled Tasks tool is sometimes called the *Task Scheduler*, particularly in Windows 2000 Help.

The Scheduled Tasks tool includes the functionality of (and interacts with) the `at` command that was first introduced with earlier versions of Windows NT. However, the Scheduled Tasks tool is a graphical utility, whereas the `at` command is a command-line utility. If you're a command-line fan, you can still use the `at` command in Windows 2000, although the `at` command does not have as much capability as the Scheduled Tasks tool. Tasks that are created by using the `at` command are displayed in the `Scheduled Tasks` folder and can be modified by using the Scheduled Tasks tool.

Sometimes tasks created by other applications are also placed in the `Scheduled Tasks` folder. For example, when Advanced Power Management is enabled on a computer, the Low Battery Alarm task and Critical Battery Alarm task will be displayed in the `Scheduled Tasks` folder.

The Scheduled Tasks tool sounds more helpful than it is. Most of the programs an administrator might want to schedule (such as Backup) come with their own scheduling utility, which is often superior to the Scheduled Tasks tool. The main drawback of the Scheduled Tasks tool is that unless you can specify the program's command line, including all parameters and switches, Scheduled Tasks starts the program only, and requires you to interact with the program to actually run and complete the task. So what you end up with, in many cases, is basically a glorified reminder service.

On the other hand, where Scheduled Tasks shines is when you have an application, script, or batch file that fully automates a process that needs to be run periodically, and that requires no user input.

To access the `Scheduled Tasks` folder, double-click the `Scheduled Tasks` folder icon in Control Panel. Figure 5-48 shows the `Scheduled Tasks` folder. Notice the Add Scheduled Task icon in the folder — double-clicking this icon starts the Scheduled Task Wizard, which walks you through the steps necessary to schedule a task.

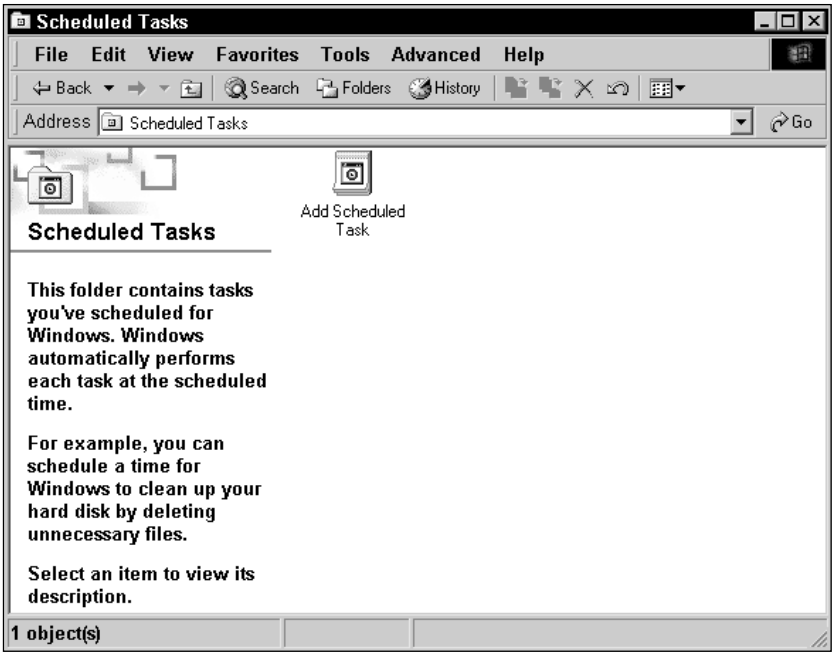

FIGURE 5-48 The Scheduled Tasks folder

Configuring and Managing a Task

Using the Scheduled Tasks tool is simple. I'll explain the steps involved in scheduling a task in the next section.

STEP BY STEP

ADDING AND CONFIGURING A TASK

1. Start the Scheduled Tasks tool. (Select Start ➪ Settings ➪ Control Panel, and then double-click Scheduled Tasks.)
2. In the `Scheduled Tasks` folder, double-click the Add Scheduled Task icon.
3. The Scheduled Task Wizard starts. Click Next.
4. The wizard prompts you to select the program you want to schedule, as shown in Figure 5-49. Several applications are listed, and if you don't find the program you want, you can click Browse to locate the desired program or file on your computer or the network.

   If you selected a program from the list, click Next.

   Or, if you browsed for and selected a file or program, click Open.

STEP BY STEP *Continued*

FIGURE 5-49 Selecting a program to schedule

5. Enter a name for this task, and select how often you want the task to be performed. Figure 5-50 shows this screen after a task and frequency have been selected.

   Click Next.

6. Depending on the frequency you selected in Step 5, an additional screen may be displayed prompting you to enter specific scheduling information, including days, dates, time, and so on. Configure this screen to meet your needs and click Next.
7. Enter a user name and password that Windows 2000 will use to run this task. Ensure that the user name you enter has the necessary rights and permissions to perform this task, especially if the task needs to access data on another computer on your network. Confirm the password, and click Next.

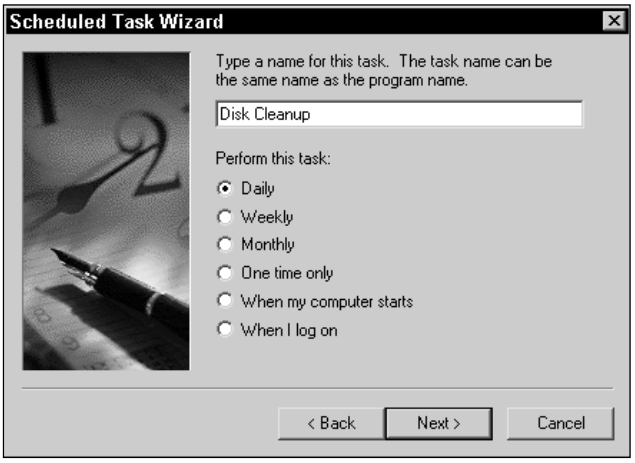

FIGURE 5-50 Naming the task and selecting its frequency

STEP BY STEP *Continued*

CROSS-REFERENCE

For more information on permissions and user rights, see Chapters 8, 9, and 12. Active Directory security is covered in Chapter 8. User rights are covered in Chapter 9. File and folder security is covered in depth in Chapter 12.

8. To configure advanced settings for this task, select the check box next to "Open advanced properties for this task when I click Finish." Click Finish.

   Or, if you don't want to configure advanced settings at this time, click Finish, and skip the remaining steps listed here. (You can set advanced settings later by right-clicking the task's icon in Scheduled Tasks, and then selecting Properties from the menu that appears.)

9. Four tabs are displayed in which you can configure advanced settings: Task, Schedule, Settings, and Security.

   - **On the Task tab,** you can configure command-line switches, specify the appropriate folder to start the task in, and specify a user name and password for the task. You can also temporarily disable a task by clearing the check box next to Enabled.
   - **On the Schedule tab,** you can configure specific scheduling information for the task and create additional schedules for this task.
   - **On the Settings tab,** you can configure various advanced settings, including idle time and Power Management options. For example, you can configure Windows 2000 to start the task only if the computer has been idle for a specified number of minutes, or to not start the task if the computer is running on battery power.
   - **On the Security Tab,** you can configure security permissions so that other users can run the task.

   When you've finished configuring advanced settings, click OK.

After you've added a task to the `Scheduled Tasks` folder you may want to delete the task or to change its configuration settings. To delete a task, right-click the task's icon in the `Scheduled Tasks` folder and select Delete from the menu that appears. To change a task's configuration settings, double-click the task's icon in the `Scheduled Tasks` folder and make the necessary changes in the task's dialog box.

Troubleshooting Scheduled Tasks

There are several common problems that may arise when working with scheduled tasks. Table 5-1 lists common scheduled task problems and recommended solutions.

TABLE 5-1 Scheduled Task Problems and Solutions

Problem	Recommended Solution
The scheduled task starts, but does not complete correctly.	You may need to add command-line switches or options to the Run text box on the Task tab in the Scheduled Tasks tool, or you may need to modify or correct the existing path in this text box. Or, you may need to configure the task to log on by using a different user account that has the necessary rights and permissions to perform the task.
A task scheduled by using the `at` command starts, but does not complete correctly.	You may need to add command-line switches or options to the Run text box on the Task tab in the Scheduled Tasks tool, or you may need to modify or correct the existing path in this text box. Or, because you cannot specify a user account with the `at` command, you may need to use the Task tab in the Scheduled Tasks tool to configure the task to log on by using a user account that has the necessary rights and permissions to perform the task. Or, if you schedule several tasks using the `at` command, you may need to configure the Schedule service to log on using a user account instead of logging on using a system account. This process is explained in Chapter 15.
The scheduled task starts, but not at the time you expected it to start.	Verify the task's schedule on the Schedule tab.
The scheduled task does not start.	Ensure that the task is enabled on the Task tab.
No scheduled tasks run on your computer.	Ensure that the Schedule service is running on your computer. Configuring services is explained in detail in Chapter 15.

Sounds and Multimedia

The Sounds and Multimedia application is used to assign sounds to specific events and to configure sound devices, such as sound cards, microphones, speakers, and so on. Although all users can start and use the Sounds and

Multimedia application, you must be a member of the Administrators group to perform some of the tasks available in this application.

To start the Sounds and Multimedia application, double-click the Sounds and Multimedia icon in Control Panel. Figure 5-51 shows the Sounds and Multimedia Properties dialog box.

Notice in Figure 5-51 that there are three tabs in this dialog box: Sounds, Audio, and Hardware.

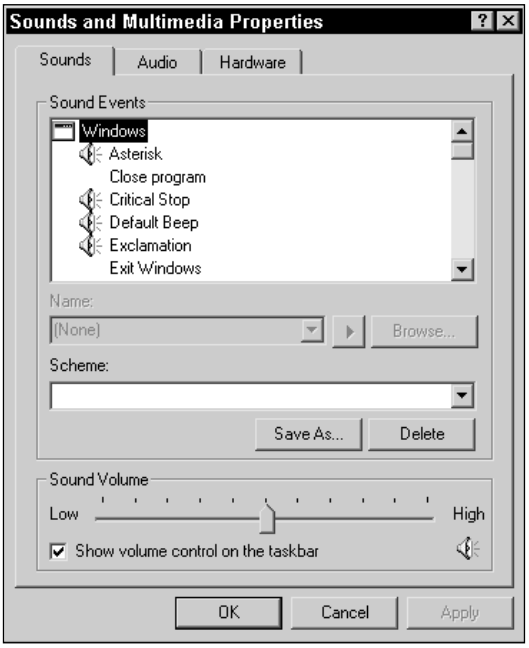

FIGURE 5-51 Sounds and Multimedia Properties

Windows 2000 defines several sound events, such as Default Beep, Exit Windows, New Mail Notification, Incoming Fax, Low Battery Alarm, and so on. On the Sounds tab you can select a sound scheme that Windows 2000 will use when sound events occur. You can also modify the selected sound scheme by changing the default sounds that are assigned to sound events, and you can replace an individual sound within a sound scheme with another sound that you have recorded. You can also select No Sounds for your sound scheme if you don't want Windows 2000 to use sounds. On this tab you can also configure sound volume and whether or not a volume control (speaker) icon is displayed in your taskbar.

On the Audio tab you can set the preferred device to use for sound playback, sound recording, and MIDI music playback. You can also set the

volume and configure advanced settings for each of these devices. So, if you have multiple sound devices in your computer, you can select which device Windows 2000 will use for each sound activity.

On the Hardware tab you can view and configure the properties of sound and multimedia devices that are installed in your computer, and troubleshoot these devices.

If you highlight a device on the Hardware tab and then click Troubleshoot, Windows 2000 starts a Troubleshooter specific to the highlighted device. This Troubleshooter takes you through a series of questions and steps to help you identify and resolve various sound and multimedia device problems. Follow the instructions presented on-screen to resolve the particular problem you're experiencing.

Other resources you can also use to troubleshoot sound and multimedia devices include the Add/Remove Hardware application, Device Manager, and System Information. Add/Remove Hardware was discussed earlier in this chapter, and I'll cover Device Manager and System Information later in this chapter.

System

The System application is a robust tool that enables you to view system information and configure environment settings, including network identification, hardware, user profiles, and advanced settings. Although all users can start the System application and use it to view system properties, you must be a member of the Administrators group to use the System application to change system settings.

To start the System application, double-click the System icon in Control Panel. Or, you can right-click My Computer on the desktop, and then select Properties from the menu that appears. Figure 5-52 shows the System Properties dialog box.

Notice in Figure 5-52 that there are five tabs in this dialog box: General, Network Identification, Hardware, User Profiles, and Advanced.

The General tab in the System Properties dialog box, which is shown in Figure 5-52, displays various system information, including the operating system and version number, the registered owner of the operating system, and information about the computer.

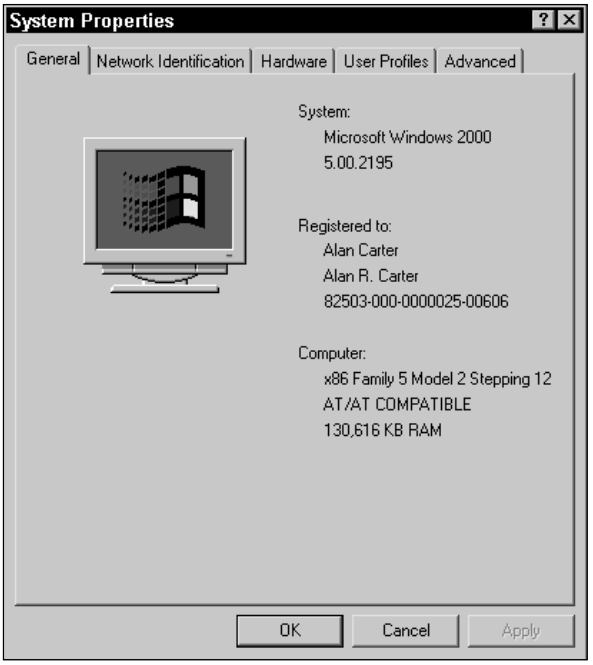

FIGURE 5-52 System Properties

Changing Network Identification

Occasionally you may need to change a computer's name, or its workgroup/domain membership. You can accomplish this task by using the Network Identification tab in the System Properties dialog box.

For example, you might want to change the computer name of a Windows 2000 computer that is assigned to a new employee to match the new user's name, instead of the name of the previous employee who used that computer.

Or, consider a growing company that recently installed a new Windows 2000 Server computer and is converting from a workgroup structure to a domain structure. In this situation, you would need to reconfigure the existing Windows 2000 computers to be members of the new domain. This process is called *joining a domain*. Each Windows 2000 computer must belong to either a workgroup or a domain.

In the following steps I'll explain how to make identification changes on a Windows 2000 computer. Before you change a computer's domain membership, or change the name of a computer that is a member of a domain,

you must disconnect all mapped drives (from the computer you're changing) to domain controllers in that domain.

CAUTION

Because Windows 2000 requires you to reboot the computer after making identification changes, you should perform this task only when you can shut down and restart the computer.

STEP BY STEP

CHANGING A COMPUTER'S NAME AND ITS WORKGROUP/DOMAIN MEMBERSHIP

1. Start the System application. (Select Start ➪ Settings ➪ Control Panel, and then double-click System.)
2. In the System Properties dialog box, click the Network Identification tab.
3. The Network Identification tab appears, as shown in Figure 5-53. Click Properties.

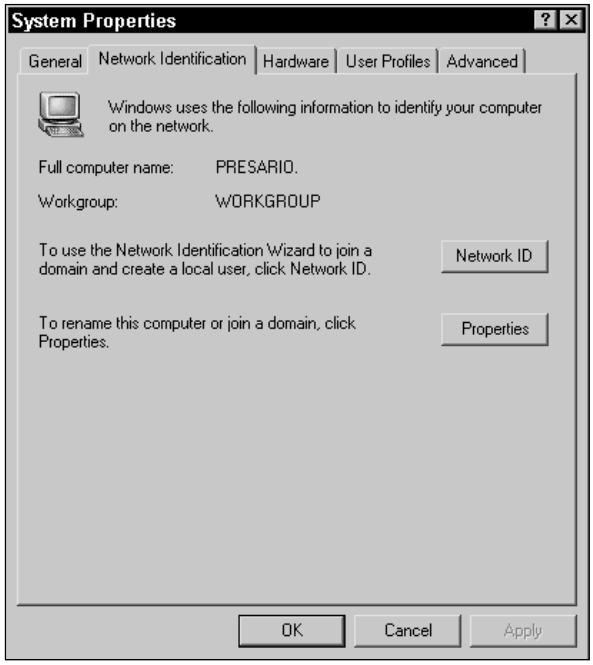

FIGURE 5-53 Network Identification

STEP BY STEP *Continued*

4. The Identification Changes dialog box appears, as shown in Figure 5-54.

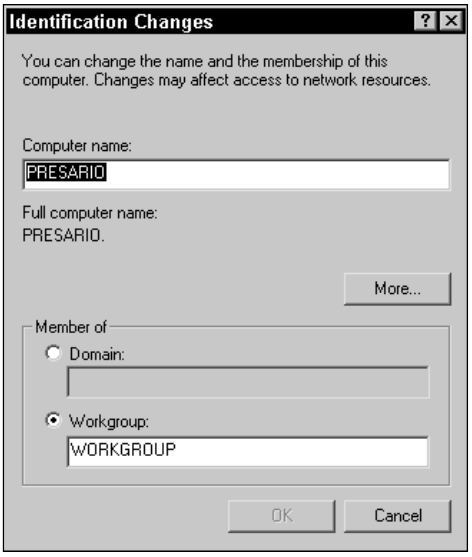

FIGURE 5-54 Making identification changes

To change the computer's name, type over the name that is highlighted in the "Computer name" text box with a new computer name. For backwards compatibility with NetBIOS, you should typically limit a computer name to 15 characters in length, with no special characters or spaces.

To change the computer's workgroup/domain membership, select the appropriate option button, and type in the name of the workgroup or domain you want to make this computer a member of. You must know the name of the workgroup or domain—browsing is not supported in this dialog box.

When you're finished making configuration changes, click OK.

5. If you changed the computer's domain membership in Step 4, or changed the name of a computer that belongs to a domain, a Domain Username and Password dialog box appears. Enter the name and password of a user account that has permission to join the domain, rename this computer in the domain, or both (this is usually the name and password of an administrator). Click OK.
6. If you changed the computer's workgroup or domain membership in Step 4, a Network Identification dialog box appears, welcoming you to the workgroup or domain. Click OK.
7. A Network Identification dialog box appears, stating that you must reboot your computer for the changes to take effect. Click OK. The changes you made will take effect the next time you restart the computer.

STEP BY STEP *Continued*

8. Click OK in the System Properties dialog box.
9. Click Yes in the System Settings Change dialog box to restart your computer.

If you're using Windows 2000 Server, the Network Identification tab doesn't have a Network ID command button. When this button is clicked on a Windows 2000 Professional computer, the Network Identification Wizard starts. This wizard helps you create a local user account and join a domain.

Managing System Hardware

When it comes to managing the hardware devices in a computer, the Hardware tab in the System Properties dialog box is probably the most widely used Windows 2000 tool. Figure 5-55 shows the Hardware tab.

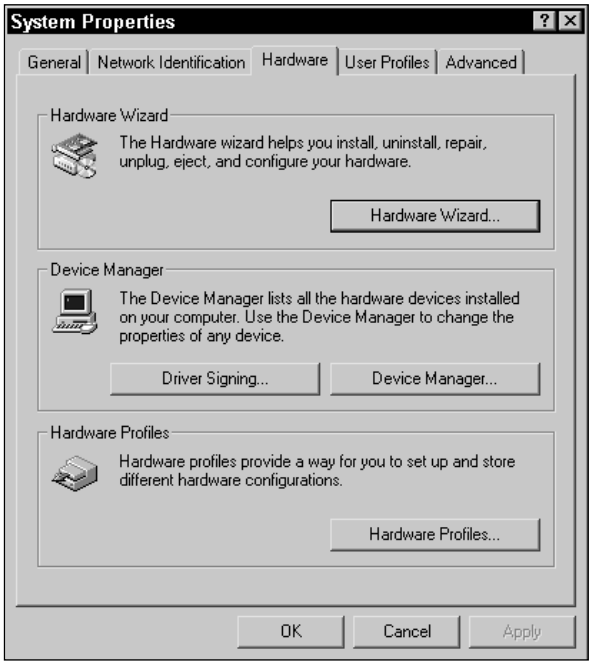

FIGURE 5-55 The Hardware tab

Notice that on the Hardware tab you can start the Hardware Wizard, manage driver signing, start Device Manager, and configure hardware profiles.

Clicking the Hardware Wizard command button starts the Add/Remove Hardware Wizard, which was covered earlier in this chapter. This wizard enables you to add, remove, unplug, and troubleshoot hardware in your computer.

Managing Driver Signing

Clicking the Driver Signing command button causes the Driver Signing Options dialog box to be displayed. In this dialog box you can configure how Windows 2000 handles the installation of system files that are not digitally signed. A *digital signature* is a tag appended to a file by its creator. This tag consists of digitally coded information that identifies the file's creator and enables Windows 2000 to verify that the file has not been altered or corrupted (by a virus or other means) since it was created. All files on the Windows 2000 compact disc, for example, have been digitally signed by Microsoft. The Driver Signing Options dialog box is shown in Figure 5-56.

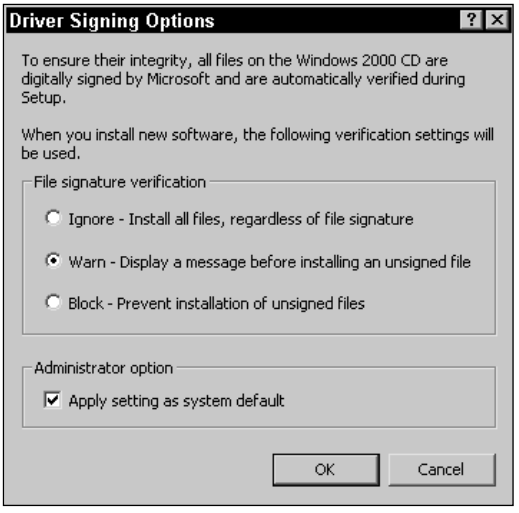

FIGURE 5-56 Configuring driver signing options

Notice that there are three file signature verification options in the Driver Signing Options dialog box:

- **Ignore:** Selecting this option causes Windows 2000 to install all files, whether or not they have been digitally signed. Because all files, signed and unsigned, are installed when this option is selected,

it is the least secure of the three options. Selecting this option leaves you open to two potentially harmful possibilities: First, you could be overwriting perfectly good system files with new, untested, and unsigned files that may render your system unstable or unable to boot. Second, if you install unsigned files, you may unknowingly be introducing a virus to your system.

- **Warn:** Selecting this option causes Windows 2000 to display a dialog box before an unsigned file is installed. You then need to choose whether or not to install each unsigned file. This option is the default setting, and provides the appropriate amount of security for most environments.
- **Block:** Selecting this option causes Windows 2000 to prevent the installation of all unsigned files. This is the most secure and protective of the three options. I recommend that you use this option in environments that are tightly controlled and have high reliability and high data security requirements.

There are a couple of tools you can use to manage and troubleshoot driver signing: `Sigverif.exe` and `Sfc.exe`.

`Sigverif.exe` (which stands for signature verification) is a command-line utility you can use to detect any unsigned files on your computer. In addition to detecting these files, this tool enables you to view specific information about each unsigned file detected, including the file's name, location, last modification date, file type, and version number. To run this utility, select Start ➪ Run, type **sigverif** in the Run dialog box, and click OK. When the program is run, it scans all of the system files in the computer, and produces a list of any unsigned files it detected. Figure 5-57 shows the signature verification results produced by `Sigverif.exe` when unsigned files are detected.

`Sfc.exe` is another command-line utility that scans protected operating system files. This utility, however, unlike `Sigverif.exe`, replaces any unsigned file it finds with the original signed Microsoft version of this file (which it copies from the *`SystemRoot`*`\System32\Dllcache` folder).

TIP

The `Dllcache` folder is hidden from normal view in Windows Explorer.

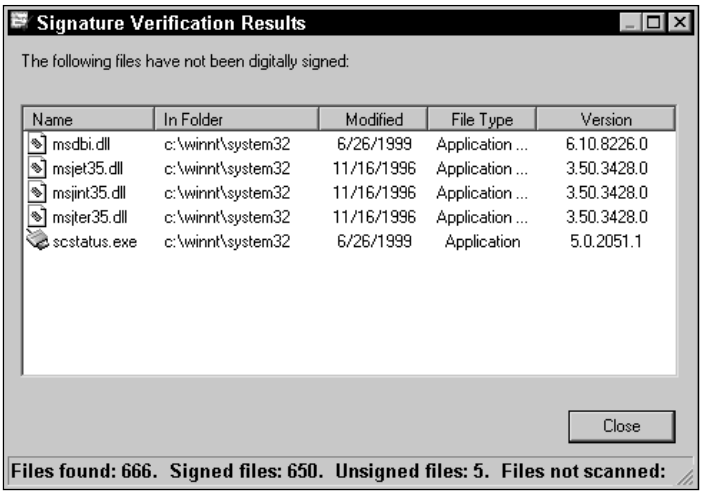

FIGURE 5-57 Unsigned files detected by `Sigverif.exe`

To use the `Sfc.exe` utility, first start a command prompt (select Start ➪ Programs ➪ Accessories ➪ Command Prompt). Then type **sfc** and press Enter to display a list of this utility's command-line switches. Finally, type **sfc** followed by the appropriate command-line switches, and press Enter. Depending on the switches you select, it can take several minutes to an hour or more for this utility to run.

Using Device Manager

Clicking the Device Manager command button on the Hardware tab starts the Device Manager application for the local computer. Device Manager is an invaluable tool that enables you to view a graphical representation of the hardware devices installed in a computer, and also to configure, manage, and troubleshoot these various hardware devices, including:

- Display devices/video adapters
- DVD and CD-ROM devices
- Input/output (I/O) devices, such as:
  - Cameras
  - Keyboard
  - Modems, including fax modems
  - Mouse
  - Multimedia devices
  - Printers

- ▶ Scanners
- ▶ Smart card readers
- ▶ USB devices
- ▶ Wireless devices, such as infrared (IrDA) devices

- Mobile computer hardware, such as PC Card devices
- Network adapter cards

EXAM TIP

Because many of the Professional and Server exam objectives deal with configuring and troubleshooting hardware devices, and because Device Manager is one of the primary tools used for these tasks, I urge you to read the next several sections carefully and practice using this tool.

In the following sections, I'll show you how to use Device Manager to perform several types of tasks, such as viewing and changing the configuration of hardware devices; configuring and managing card services; uninstalling, disabling, enabling, and updating device drivers; and upgrading from a single processor to multiple processors. I'll also explain how to use Device Manager to troubleshoot hardware devices.

Figure 5-58 shows the Device Manager dialog box. Notice that a graphical list of devices installed in a laptop computer is displayed.

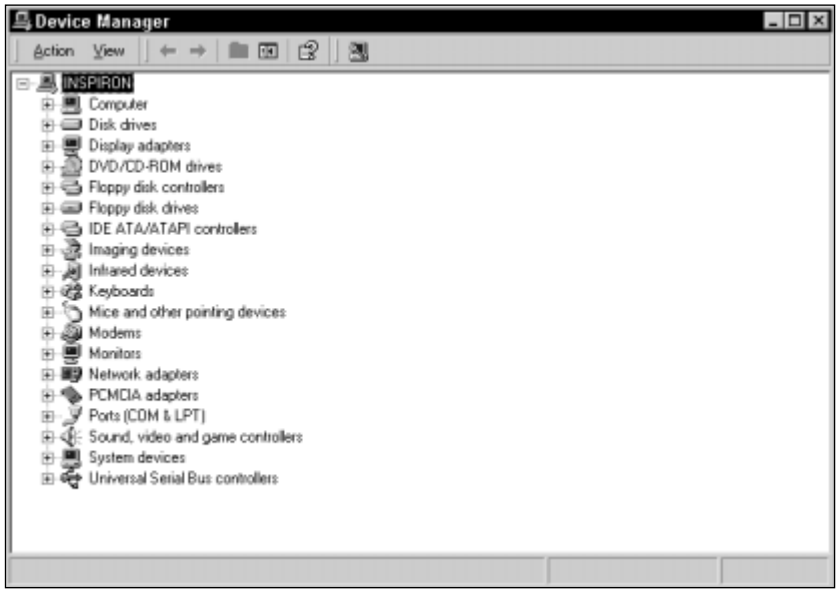

FIGURE 5-58 Device Manager

Viewing and Changing the Configuration of Hardware Devices You can easily obtain more detailed information on the specific devices listed in the Device Manager dialog box. You can also make configuration changes to the devices listed. The following steps explain how to perform these tasks.

STEP BY STEP

USING DEVICE MANAGER TO VIEW AND CHANGE DEVICE CONFIGURATION

1. Start Device Manager. (Select Start ➪ Settings ➪ Control Panel, then double-click System. Click the Hardware tab. Click Device Manager.)
2. In the Device Manager dialog box, click the + next to the type of device you want more detailed information on.
3. A list of the specific devices installed is displayed under the device type heading. Right-click the specific device you want detailed configuration information on, and select Properties from the menu that appears.
4. The device's Properties dialog box appears. Within the Properties dialog box, there are several tabs, which vary depending on the device. Click the Resources tab to view the resources currently being used by the device. Figure 5-59 shows the Resources tab for the built-in infrared device in a laptop computer.

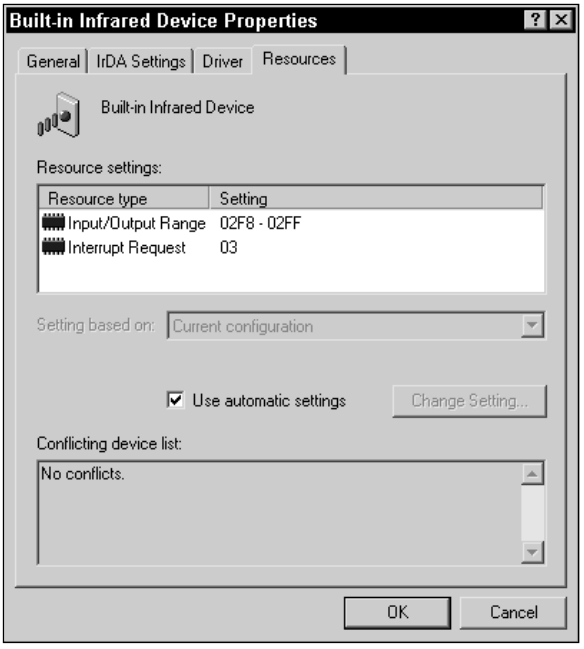

FIGURE 5-59 Built-in Infrared Device Properties

STEP BY STEP *Continued*

Notice in Figure 5-59 that the I/O range and interrupt request used by the built-in infrared device are displayed in the “Resource settings” box. Also notice the “Conflicting device list” box at the bottom of the dialog box, and notice that no conflicts are listed for this particular device.

TIP

If the device you are viewing the properties of conflicts with another device in your computer, is not currently enabled, or can’t find enough free resources that it can use, when you click the Resources tab you may need to click Set Configuration Manually to view the resource settings. The Set Configuration Manually button is only displayed when Windows 2000 is unable to automatically configure a device.

5. If you want to change the resources used by this device (because of a conflict or for any other reason), you can accomplish this by selecting one of the Basic configuration options in the “Settings based on” drop-down list box. Unless the device is Plug and Play, you’ll need to know what settings are configured (by jumpers or switches) on the hardware device in order to select the correct configuration. Each of the Basic configuration options, when selected, will display a different combination of resources used in the “Resource settings” box, and may cause conflicts to appear in the “Conflicting device list” box.

   First, ensure that the check box next to “Use automatic settings” is cleared. Then select each of the Basic configuration options, one at a time, until you find one that displays the correct settings in the “Resource settings” box.

TIP

Windows 2000 permits you to change the resource settings of many, but not all, devices.

When you find the correct setting, no conflicts should be listed in the “Conflicting device list” box. If conflicts are listed, you must resolve them, either by physically changing the hardware settings on the device you are adding, or by using Device Manager to change the resource settings on the conflicting device. Click OK.

If you are unable to find a Basic configuration option that matches your hardware configuration, select the Basic configuration option that most closely matches your hardware configuration. Then highlight the specific resource type in the “Resource settings” box that does not match your hardware configuration, clear the check box next to “Use automatic settings” if it is checked, and click Change Setting. If the “Use automatic settings” check box is grayed out, you won’t be able to manually change individual settings, but you may still be able to select from among the Basic configuration options. Follow the instructions presented on-screen to make the setting match your hardware configuration. Click OK.

STEP BY STEP *Continued*

6. Windows 2000 prompts you to restart your computer so that the configuration changes you've made can take effect. Click Yes.

Configuring and Managing Card Services *Card services* is a term used to refer to the device drivers used by CardBus/PCMCIA controllers. These device drivers make it possible for a laptop/mobile computer to recognize and enable the built-in CardBus/PCMCIA slot(s) in the computer. Card services doesn't include the device drivers associated with the specific PC Cards themselves (such as network adapter cards or fax modem cards), but only includes the device drivers associated with the CardBus/PCMCIA slots.

If your laptop computer is listed in the System/Mobile Uniprocessor section of the Windows 2000 Hardware Compatibility List (HCL), Windows 2000 should automatically detect and install the device drivers for your computer's CardBus/PCMCIA slot(s).

When Windows 2000 automatically detects and installs a CardBus/PCMCIA slot, this slot is displayed as a device under the "PCMCIA adapters" heading in Device Manager. Most laptop computers have two devices listed under this device type heading, one for each of the two slots in the computer. Figure 5-60 shows the Device Manager dialog box with PCMCIA adapters expanded. Notice that there are two CardBus controllers installed.

If Windows 2000 does not automatically detect your computer's CardBus/PCMCIA slot(s), contact the manufacturer of your computer to obtain the latest Windows 2000-compatible drivers, and then use the Add/Remove Hardware Wizard (discussed earlier in this chapter) to install the CardBus/PCMCIA card slot(s).

If you need to view or change the resource settings used by a CardBus/PCMCIA card slot (and its associated drivers), you can use the steps titled "Using Device Manager to view and change device configuration" in the previous section.

Uninstalling, Disabling, Enabling, and Updating Device Drivers In addition to viewing and changing device configuration, Device Manager is also used to uninstall, disable, enable, and update device drivers.

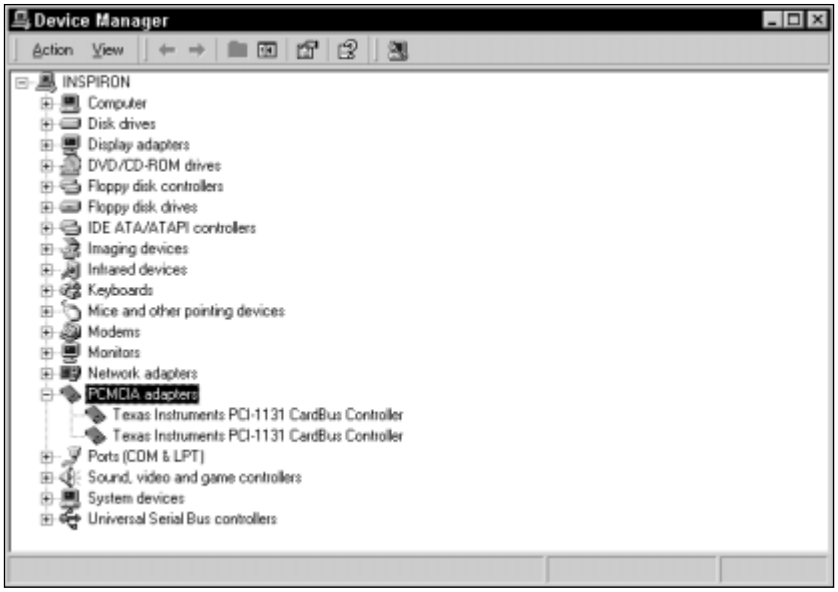

FIGURE 5-60 PCMCIA adapters in a laptop computer

If you want to remove a hardware device, such as an old video card, from your computer permanently, you can use Device Manager to uninstall the device drivers for the hardware device. After you uninstall the device drivers, you should physically remove the hardware device from your computer.

Occasionally you may want to disable the drivers for a hardware device. For example, if a hardware device will be removed from your computer for a period of time, and you don't want to deal with annoying messages each time you start your computer, you can use Device Manager to disable the drivers for the device.

When you disable the drivers for a device, you don't remove the drivers from your computer's hard drive, but you do cause them to not be loaded each time you boot the computer. Because the drivers are still on your computer's hard drive, you can make them available again by enabling the device that you previously disabled.

I'll show you how to use Device Manager to uninstall, disable, or enable device drivers in the following section.

STEP BY STEP

USING DEVICE MANAGER TO UNINSTALL, DISABLE, OR ENABLE DEVICE DRIVERS

1. Start Device Manager. (Select Start➪ Settings➪ Control Panel, and then double-click System. Click the Hardware tab. Click Device Manager.)
2. In the Device Manager dialog box, click the + next to the type of device for which you want to uninstall, disable, or enable device drivers.
3. Right-click the specific device for which you want to disable device drivers, and select Uninstall, Disable, or Enable from the menu that appears.

TIP

Disable only appears in the menu if the device is enabled. Similarly, Enable only appears in the menu if the device is disabled.

4. Windows 2000 may display a warning message or dialog box, depending on the type of device driver action you specified. Click OK or Yes, as appropriate.
5. If prompted by Windows 2000, click Yes to restart your computer so that the configuration changes you've made can take effect.

You can also use Device Manager to update device drivers. You might want to update the device driver for a modem, for example, when the modem's manufacturer releases an updated driver that provides additional uses or stability for the device (or, in some cases, just makes the thing work).

Updated device drivers are usually obtained by downloading them from a third-party manufacturer's Web site. Updating device drivers is also referred to as upgrading device drivers. I'll show you how to update device drivers in the steps that follow.

STEP BY STEP

UPDATING DEVICE DRIVERS

1. Start Device Manager. (Select Start➪ Settings➪ Control Panel, and then double-click System. Click the Hardware tab. Click Device Manager.)
2. In the Device Manager dialog box, click the + next to the type of device for which you want to update device drivers.

STEP BY STEP *Continued*

3. Right-click the specific device for which you want to update device drivers, and select Properties from the menu that appears.
4. In the device's Properties dialog box, click the Driver tab.
5. On the Driver tab, click Update Driver.
6. The Upgrade Device Driver Wizard starts. Click Next.
7. On the Install Hardware Device Drivers screen, you can either instruct Windows 2000 to search for a suitable driver for the device, or to display a list of known device drivers for this device so you can choose a specific driver.

   The recommended option is "Search for a suitable driver for my device." Select the appropriate option and click Next.

   If you select the "Display a list of the known drivers for this device . . ." option and click Next, follow the instructions presented on-screen to manually select and install the updated device driver.
8. If you selected the "Search for a suitable driver for my device" option in Step 7, the Locate Driver Files screen appears, as shown in Figure 5-61. Notice that you can specify one or more specific locations for Windows 2000 to search for device driver files.

FIGURE 5-61 Specifying search locations for driver files

   Select the appropriate search locations for driver files for the device. Click Next.
9. The Driver Files Search Results screen appears, as shown in Figure 5-62.

STEP BY STEP *Continued*

FIGURE 5-62 Results of driver files search

The content of this screen varies substantially, depending on the results of Windows 2000's search.

Windows 2000 may indicate that a suitable driver for the device is already installed, and give you an option to cancel the process or to reinstall this driver.

Or, Windows 2000 may indicate that it found a driver that is a closer match for your device than the current driver. (This is the message displayed in Figure 5-62.) When this message is displayed, Windows prompts you to install the more suitable driver it found.

Or, Windows 2000 may indicate that it found an updated driver for the device. When this message is displayed, Windows prompts you to install the updated driver it found.

Finally, the wizard may give you an option to view and install other device drivers that it found for the specified device.

Select the appropriate option, and follow the instructions presented on-screen to complete the process of updating your device driver.

Upgrading from a Single Processor to Multiple Processors When you upgrade a computer from a single processor to multiple processors, you can

use Device Manager to update the computer's device drivers to support this change.

If you start out with a multiple processor computer, Windows 2000 should automatically detect and install the appropriate drivers, and no upgrading action on your part should be necessary. However, when you start out with a single processor computer (that has the capability to support more than one processor), install Windows 2000, and later on install another processor, you'll probably have to use Device Manager to configure support for the additional processor(s).

STEP BY STEP

CONFIGURING SUPPORT FOR MULTIPLE PROCESSING UNITS

1. Start Device Manager. (Select Start ➪ Settings ➪ Control Panel, and then double-click System. Click the Hardware tab. Click Device Manager.)
2. In the Device Manager dialog box, click the + next to Computer. (This is usually the first or second device type listed under the computer's name.)
3. Right-click the device listed under Computer. (This may be called Standard PC, ACPI Uniprocessor PC, MPS Uniprocessor PC, or a brand-specific name.) Select Properties from the menu that appears.
4. In the device's Properties dialog box, click the Driver tab.
5. On the Driver tab, click Update Driver.
6. The Upgrade Device Driver Wizard starts. Click Next.
7. Select "Display a list of the known drivers for this device so that I can choose a specific driver." Click Next.
8. On the Select a Device Driver screen, select the "Show all hardware of this device class" option.

   Then select the manufacturer and multiprocessor model of your computer in the appropriate boxes on this screen. Figure 5-63 shows a manufacturer and multiprocessor model selected. Click Next.

   If your manufacturer and model don't appear on this screen and you have a disk containing the appropriate drivers, click Have Disk and follow the instructions presented on-screen.

STEP BY STEP *Continued*

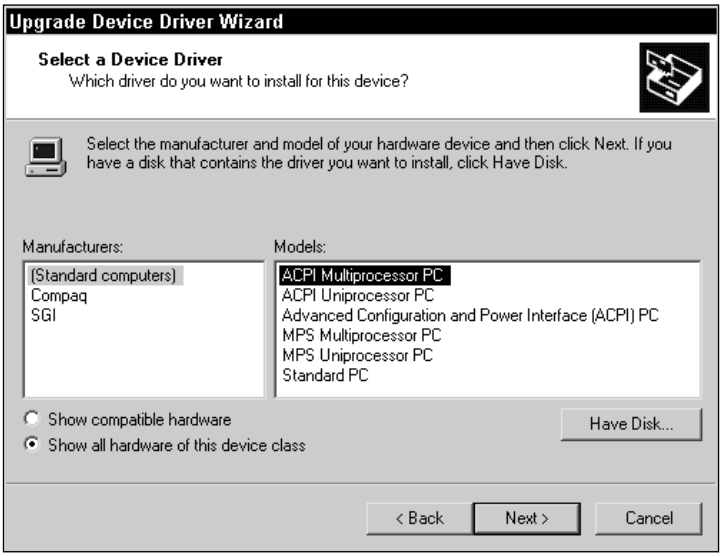

FIGURE 5-63 Configuring multiple processing units

9. In the Start Device Driver Installation screen, click Next to install the new device driver.
10. In the Completing the Upgrade Device Driver Wizard screen, click Finish.
11. Click Close in your computer's Properties dialog box.
12. Click Yes when Windows 2000 prompts you to restart your computer.

Using Device Manager to Troubleshoot Hardware Devices Device Manager is one of Windows 2000's best troubleshooting tools in terms of identifying and resolving hardware problems. You can perform several specific troubleshooting tasks in Device Manager, including:

- **Viewing a device's status:** The "Device status" box on the General tab in the device's Properties dialog box indicates whether or not the device is working properly.
- **Viewing and configuring the resource settings used by a device:** The resource settings currently configured for the device are listed on the Resources tab in the device's Properties dialog box. On this tab you can also view any conflicting devices, and

change resource settings if necessary to resolve configuration conflicts. See the step-by-step section titled "Using Device Manager to view and change device configuration" earlier in this chapter for details.

- **Starting a Troubleshooter to help you diagnose and resolve a hardware problem:** When you click Troubleshooter on the General tab in the device's Properties dialog box, either a general hardware Troubleshooter or a Troubleshooter specific to the hardware device starts. The Troubleshooter takes you through a series of questions and steps to help you identify and resolve various hardware problems. Follow the instructions presented on-screen to resolve the particular problem you're experiencing.

Creating and Managing Hardware Profiles

You can also use the System application to create and manage hardware profiles. A *hardware profile* is a list of devices (and settings for each of these devices) that Windows 2000 starts when you boot your computer. When you first install Windows 2000, the operating system creates an initial hardware profile.

The primary reason for creating hardware profiles is to manage the different hardware configurations used by laptop and other mobile computers. For example, a laptop computer used at the office in a docking station often has a different hardware configuration than the same laptop computer when it is used while traveling or at home without a docking station. Hardware profiles make it possible to create multiple configurations for the same laptop computer.

Clicking Hardware Profiles on the Hardware tab in the System application brings up the Hardware Profiles dialog box, which is shown in Figure 5-64. Notice that the default hardware profile (created by Windows 2000 during installation) is named Profile 1. Also notice that the word (Current) is listed after Profile 1. This indicates that Profile 1 is the hardware profile currently being used.

Creating a new hardware profile is accomplished by copying an existing hardware profile and then modifying it. In the following sections I'll explain how to create a new hardware profile, how to rename a hardware profile, how to set the default hardware profile, how to enable or disable devices within a hardware profile, and how to enable or disable a service within a hardware profile.

FIGURE 5-64 Working with hardware profiles

STEP BY STEP

CREATING A NEW HARDWARE PROFILE

1. Start the System application. (Select Start➪ Settings➪ Control Panel, and then double-click System.)
2. In the System Properties dialog box, click the Hardware tab.
3. On the Hardware tab, click Hardware Profiles.
4. In the Hardware Profiles dialog box, ensure that the profile you want to use to create a new profile is highlighted. Click Copy.
5. In the Copy Profile dialog box, type in a name for the new profile, such as Undocked, or accept the default name displayed. Click OK.
6. Now, to configure the new hardware profile, click Properties in the Hardware Profiles dialog box.
7. The new profile's Properties dialog box appears, as shown in Figure 5-65.

   If this profile is for a laptop computer, select the check box next to "This is a portable computer" and select one of the three possible docking options. If you want this hardware profile to be displayed as an option when Windows 2000 starts, select the check box next to "Always include this profile as an option when Windows starts." Click OK.

STEP BY STEP *Continued*

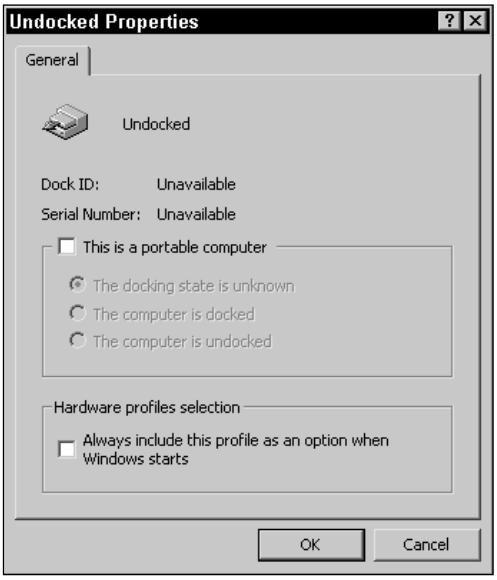

FIGURE 5-65 Configuring a new hardware profile

At this point, it's often a good idea to rename Profile 1 with a more intuitive name for the user, such as "Docked." To rename a profile, highlight the profile in the Hardware Profiles dialog box, then click Rename. Type a new name for the hardware profile in the Rename Profile dialog box, then click OK.

Another configuration you might want to make now is to set the default hardware profile. In the Hardware Profiles dialog box, the default hardware profile is the profile at the *top* of the list in the "Available hardware profiles" box. If the hardware profile used most often is *not* at the top of the list, you can configure it to be the default profile by moving it to the top of the list. To move a profile within the list of available hardware profiles, highlight the profile you want to move, then click the up arrow or down arrow command button to move it up or down in the list.

When more than one hardware profile is configured on a computer, Windows 2000 displays these hardware profiles during the boot process and permits you to manually select the profile you want to use. In the Hardware Profiles dialog box you can configure Windows 2000 to either wait until you manually select a hardware profile or automatically start the

default profile after a specified number of seconds has passed without a hardware profile being selected.

Now that you've created your new hardware profile and configured it, you might want to enable or disable specific devices within your new hardware profile. For example, you might want to disable the network adapter card in your "Undocked" profile for your laptop computer if the network adapter card is only used when the laptop is connected to its docking station at the office.

Disabling the drivers for a device only disables the device in the current hardware profile. Likewise, enabling the drivers for a device only enables the device in the current hardware profile. The status of the device is unaffected in other hardware profiles (if you have more than one) on the computer.

The following steps explain how to enable or disable a specific hardware device within a hardware profile.

STEP BY STEP

ENABLING/DISABLING A DEVICE WITHIN A HARDWARE PROFILE

1. Start your Windows 2000 computer. During the boot process, select the hardware profile for which you want to enable or disable devices.
2. Start the System application. (Select Start ➪ Settings ➪ Control Panel, and then double-click System.)
3. In the System Properties dialog box, click the Hardware tab.
4. On the Hardware tab, click Device Manager.
5. In Device Manager, click the + next to the type of device you want to enable or disable within this hardware profile.
6. Right-click the specific device you want to enable or disable within this hardware profile. From the menu that appears, select Properties.
7. In the device's Properties dialog box, select the appropriate usage for this device in the "Device usage" drop-down list box. The possible configuration settings are:
   - ► Use this device (enable)
   - ► Do not use this device in the current hardware profile (disable)
   - ► Do not use this device in any hardware profiles (disable)

   If you are configuring a hardware profile for a laptop computer in its undocked state, you would typically select "Do not use this device in the current hardware profile (disable)" to disable a device, such as a network adapter card, that is not available when a laptop computer is not docked.

   Select the appropriate device usage option. Click OK.

STEP BY STEP *Continued*

8. Exit Device Manager.
9. Click OK in the System Properties dialog box.

In addition to enabling or disabling specific devices within a hardware profile, you can also enable or disable specific services within a hardware profile. This task is performed by using the Services tool.

STEP BY STEP

ENABLING OR DISABLING A SERVICE WITHIN A HARDWARE PROFILE

1. Start Services. (Right-click My Computer, then select Manage from the menu that appears. In the Computer Management dialog box, click the + next to Services and Applications, then click Services.)
2. In the right pane of the window, right-click the specific service you want to enable or disable within a hardware profile, and then select Properties from the menu that appears.
3. In the service's Properties dialog box, click the Log On tab.
4. On the Log On tab, click the hardware profile you want to enable or disable this service in. Then click Enable or Disable, as appropriate. Click OK.
5. Exit Computer Management.

TIP

If you enabled or disabled a service in the hardware profile you're currently using, you'll need to restart your computer before these changes will take effect.

Working with User Profiles

A *user profile* is a collection of settings, options, and files that specify a user's desktop and all other user-definable settings for a user's work environment. You can use the User Profiles tab in the System application to copy, delete, and change the type of user profiles. The System application is the only application in Windows 2000 that you can use to copy user profiles. You can't copy user profiles by using Windows Explorer.

CROSS-REFERENCE

I'll explain how to work with user profiles in depth in Chapter 9.

Configuring Advanced System and Environment Settings

The Advanced tab in the System application enables you to configure performance options, environment variables, and startup and recovery options, as shown in Figure 5-66.

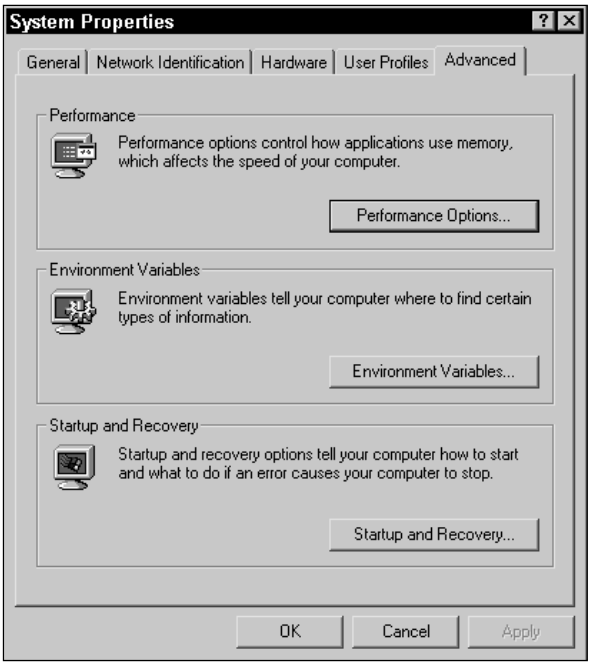

FIGURE 5-66 Advanced system settings

Configuring Application Performance and Virtual Memory

Within Performance Options, there are two primary configurable options: You can optimize application performance for either the foreground application or for programs running in the background, and you can configure virtual memory, including the size of paging files.

To configure performance options, click Performance Options in the System Properties dialog box. The Performance Options dialog box

appears, as shown in Figure 5-67. Notice the "Application response" section in this dialog box.

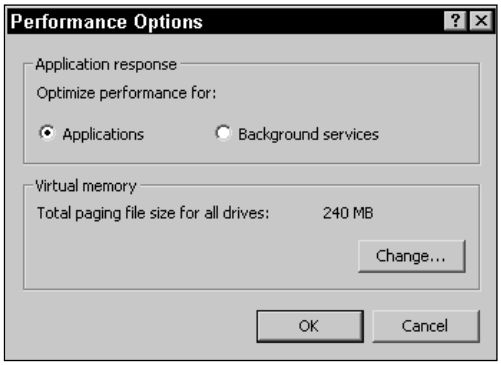

FIGURE 5-67 Configuring performance options

There are two options in the "Application response" section that enable you to choose how Windows 2000 allocates processor time between programs running on your computer:

- **Applications:** Selecting this option causes Windows 2000 to assign a higher priority (in terms of processor time allocated) to the application running in the foreground than to all other programs. This feature is often selected for desktop computers to promote smoother, faster response to user input in the active application. This setting is selected by default on Windows 2000 Professional computers (but is not the default on Windows 2000 Server or Advanced Server computers).
- **Background services:** Selecting this option causes Windows 2000 to assign equal priority to all programs. When this option is selected, the foreground application has the same priority as a program running in the background. This option is generally the most appropriate setting for servers, which don't normally have an interactive user. This setting is selected by default on Windows 2000 Server and Advanced Server computers.

You can also configure virtual memory in the Performance Options dialog box. *Virtual memory*, you may recall, is the physical space on a hard disk that Windows 2000 treats as though it were RAM. Virtual memory is implemented in Windows 2000 by the use of paging files.

You should consider both paging file performance and system recoverability when configuring virtual memory paging files.

If you want to configure your computer for maximum paging file performance, consider doing one or more of the following:

- Place the paging file on any hard disk in your computer that does not contain the Windows 2000 boot partition.
- Place the paging file on the hard disk in your computer that has the least amount of activity.
- Place a small paging file on each hard disk in your computer, except on the disk that contains the Windows 2000 boot partition.
- Place the paging file on a striped volume.

CAUTION

It's not normally a good idea to place the paging file on a RAID-5 volume created by using Disk Management. If you do, you'll improve performance of the paging file, but you'll decrease performance of the computer's processor because of the amount of processor time required to compute the RAID-5 parity information.

If system recoverability is more important to you than paging file performance, you must put a paging file on the Windows 2000 boot partition that is at least as large as the amount of RAM in your computer plus 1MB. This paging file is used by Windows 2000 as a normal paging file, and, additionally, this paging file is required to enable Windows 2000 to write a `Memory.dmp` file when the operating system crashes.

It's up to you to consider the trade-offs between performance and recoverability, and then to determine the best configuration for your paging file(s).

I'll explain how to configure paging files in the next section.

CAUTION

When you modify your computer's current paging file, Windows 2000 requires you to shut down and restart your computer.

STEP BY STEP

CONFIGURING A PAGING FILE(S)

1. Start the System application. (Select Start ➪ Settings ➪ Control Panel, and then double-click System.)
2. In the System Properties dialog box, click the Advanced tab.
3. On the Advanced tab, click Performance Options.
4. In the Performance Options dialog box, click Change.
5. The Virtual Memory dialog box appears, as shown in Figure 5-68. Notice that all logical drives are listed in the Drive list box, regardless of whether or not a paging file exists on the drive.

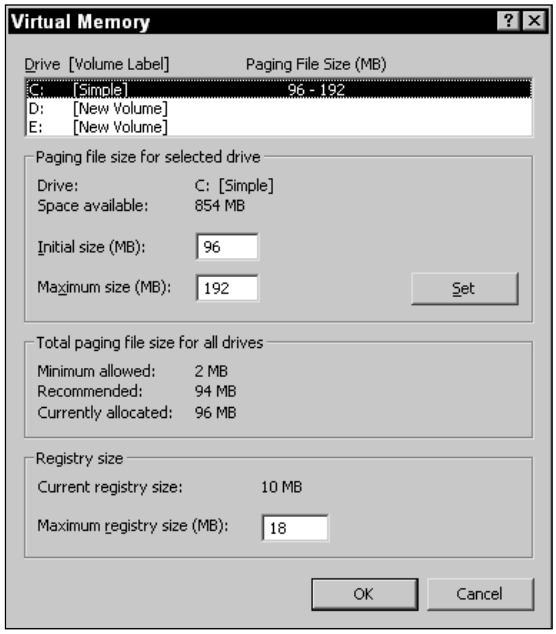

FIGURE 5-68 Configuring a paging file

To create an additional paging file, in the Drive list box, highlight the logical drive on which you want to create the paging file. Then, configure the initial size and maximum size you want the new paging file to be. Then click Set.

STEP BY STEP *Continued*

TIP

To avoid fragmentation of your paging file, configure the file's initial size and maximum size with the same values. The total combined size of all of your paging files should be at least as large as the recommended size displayed in the Virtual Memory dialog box.

To move a paging file to another disk, first, create a new paging file on the target disk. Then configure the initial size and maximum size of the original paging file to zero, and click Set. (This deletes the original paging file.)

6. In the Virtual Memory dialog box, click OK.
7. If you have modified the current paging file, Windows 2000 notifies you that you must restart your computer before the changes you made will take effect. Click OK.
8. In the Performance Options dialog box, click OK.
9. In the System Properties dialog box, click OK.
10. If you modified the current paging file, Windows 2000 prompts you to restart your computer now. Click Yes.

There's one other important configuration you can make in the Virtual Memory dialog box (shown in Figure 5-68). You can configure the maximum size, in MB, that Windows 2000 will allocate to the operating system's Registry database. By default, Windows 2000 allocates enough space to accommodate even the largest anticipated Registry. However, each program that you install on your computer requires space in the Registry. If your current Registry size is approaching the maximum Registry size setting, you might want to manually increase the maximum Registry size in the Virtual Memory dialog box.

Configuring Environment Variables

Environment variables are values that specify information about your computer and operating system. Windows 2000 and applications use environment variables to locate certain types of information, such as the location of system files, or the name of the currently-logged-on user. You can use the System application to configure both user environment variables and system environment variables. *User environment variables* apply only to a

specific user. *System environment variables* apply to all users and to the operating system.

In my experience, administrators don't often have to change environment variables. However, occasionally a legacy application may require you to manually change one or more environment variables.

To change a user environment variable, you must be logged on as the user whose variable you want to modify. To modify a system environment variable, you must be logged on as a user with Administrator rights. The next section explains the steps involved in configuring environment variables.

STEP BY STEP

CONFIGURING USER AND SYSTEM ENVIRONMENT VARIABLES

1. Start the System application. (Select Start ➪ Settings ➪ Control Panel, and then double-click System.)
2. In the System Properties dialog box, click the Advanced tab.
3. On the Advanced tab, click Environment Variables.
4. The Environment Variables dialog box appears, as shown in Figure 5-69. Notice the "User variables for Administrator" and "System variables" list boxes.

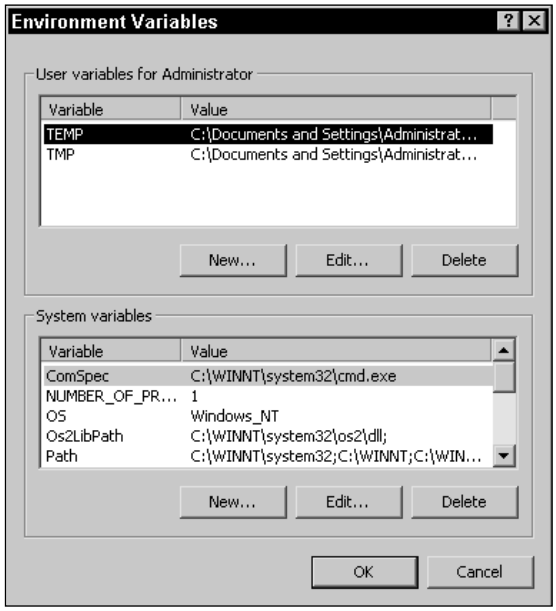

FIGURE 5-69 Configuring environment variables

STEP BY STEP *Continued*

- ▶ **To modify an existing variable** (either user or system), highlight that variable and click Edit. In the Edit User Variable or Edit System Variable dialog box, edit the variable's value as appropriate. Click OK.
- ▶ **To create a new variable,** click New in the "User variables for *Username*" list box if you want to create a new user variable, or click New in the "System variables" list box if you want to create a new system variable. In the New User Variable or New System Variable dialog box, enter a name and value for the new variable. Click OK.
- ▶ **To delete a variable** (either user or system), highlight that variable, and click Delete.

5. To save the variable changes you've made, click OK in the Environment Variables dialog box. If you've made errors or accidentally deleted required variables, click Cancel.
6. Click OK in the System Properties dialog box.

Configuring Startup and Recovery Options

Although Windows 2000's default settings are appropriate for most situations, you can use the System application to configure the default operating system (if more than one operating system is installed on the computer) that Windows 2000 will start, and what action(s) Windows 2000 will take if an unexpected error causes the system to stop (crash). To configure these options, click Startup and Recovery on the Advanced tab in the System Properties dialog box. The Startup and Recovery dialog box appears, as shown in Figure 5-70. Figure 5-70 shows a Windows 2000 Server version of this dialog box. Notice the various system startup and system failure configuration options. The Windows 2000 Professional version of this dialog box has the same configuration options, but has a different set of default settings in the System Failure section.

There are three sections in the Startup and Recovery dialog box: System startup, System Failure, and Write Debugging Information.

In the System startup section there are two configurable options:

- **Default operating system:** If more than one operating system is installed on your computer, you can select the default operating system from this drop-down list box. The default operating system is the operating system that will start if no operating system selection is made during the boot process.

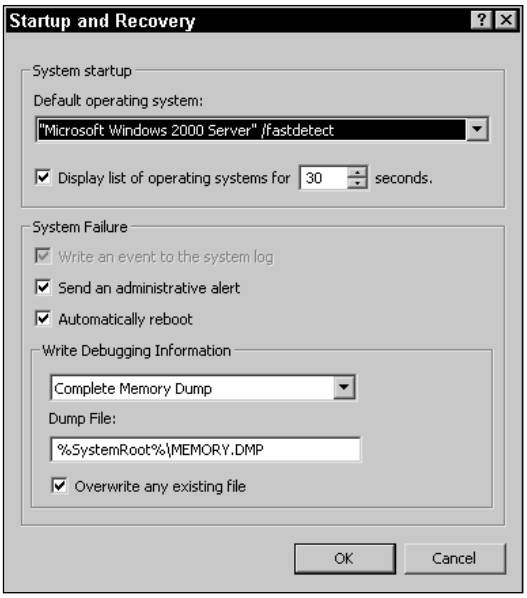

FIGURE 5-70 Configuring startup and recovery options

- **Display list of operating systems for *xx* seconds:** If this check box is selected, during the boot process Windows 2000 will display a list of operating systems that can be started. Windows 2000 will display this list for the number of seconds specified in the spin box. If this check box is cleared, Windows 2000 will start the default operating system without displaying a list. By default (on both Windows 2000 Professional and Windows 2000 Server computers), this check box is selected and the list is displayed for 30 seconds.

In the System Failure section there are three options:

- **Write an event to the system log:** This option is selected and grayed out, by default, on Windows 2000 Server computers because Windows 2000 takes this action every time a Stop error occurs. (A Stop error is an error from which Windows 2000 cannot recover — in other words, a system crash.) This option is not selected, by default, on Windows 2000 Professional computers.
- **Send an administrative alert:** When this check box is selected, Windows 2000 uses the Messenger service to send an alert message to all users on the network that are logged on as Administrator when a Stop error occurs. This option is selected, by default, on Windows 2000 Server computers; but is not selected, by default, on Windows 2000 Professional computers.

- **Automatically reboot:** When this check box is selected, Windows 2000 automatically reboots the computer in the event of a system crash. This option is selected, by default, on Windows 2000 Server computers; but is not selected, by default, on Windows 2000 Professional computers.

In the Write Debugging Information section there are three configurable options:

- **Write Debugging Information:** In this drop-down list box, you can select the amount of information Windows 2000 will write to a dump file in the event of a system crash. The options you can select from are none, small memory dump (64K), kernel memory dump, and complete memory dump. The default setting for Windows 2000 Server is Complete Memory Dump. The default setting for Windows 2000 Professional is none.

TIP

If you want Windows 2000 to write debugging information when the system crashes, remember that you must have a paging file on the boot partition that is at least as large as the amount of RAM in the computer, plus 1MB, in order for Windows 2000 to create a memory dump file.

- **Dump File:** This text box is used to specify the name and location of the file that Windows 2000 will use as a dump file in the event of a system crash. By default, the file is named `Memory.dmp` and is located in the folder Windows 2000 is installed in.
- **Overwrite any existing file:** When this check box is selected (and it is selected by default), Windows 2000 overwrites any previously existing dump file when a Stop error occurs. If this check box is cleared and a dump file exists, Windows 2000 will not write a new dump file in the event of a system crash.

TIP

If you experience recurrent system crashes, the `Memory.dmp` file may be needed when you contact Microsoft Technical Support. Microsoft Technical Support personnel can use a debugger on your `Memory.dmp` file to identify the cause of your system crashes.

Users and Passwords

The Users and Passwords application, which is only available on Windows 2000 Professional computers, enables you to manage users and passwords for the computer. In this application you can grant or deny users access to a computer, change passwords, manage certificates, access the Local Users and Groups tool contained in Computer Management, and require users to press Ctrl+Alt+Delete before logging on.

CROSS-REFERENCE

I'll cover how to use this application when I discuss managing users and groups in Chapter 9.

Wireless Link

The Wireless Link application enables you to configure the infrared device(s) installed in a Windows 2000 computer, including how files and images are transferred to this computer. The Wireless Link application does *not* enable you to configure infrared devices located in other hardware devices.

An infrared device, which is also called a wireless device, is a port in a computer or other piece of hardware (such as a printer, camera, scanner, digital camera, and so on) that is capable of sending and receiving data, images, or both by using infrared light. Standards for infrared/wireless devices are maintained by the Infrared Data Association (IrDA). Because of this, infrared devices are also called IrDA devices.

Infrared devices are commonly used to transfer data between two laptop computers, transfer data between a laptop computer and a personal digital assistant (PDA), send print jobs from a laptop computer to a printer, or to transfer images from a digital camera to a laptop computer.

Although all users can start and use the Wireless Link application, you must be a member of the Administrators group to use this application to change hardware settings.

To access the Wireless Link application, double-click the Wireless Link icon in Control Panel.

TIP

The Wireless Link icon appears in Control Panel only if an infrared device is installed in the computer.

Figure 5-71 shows the Wireless Link dialog box.

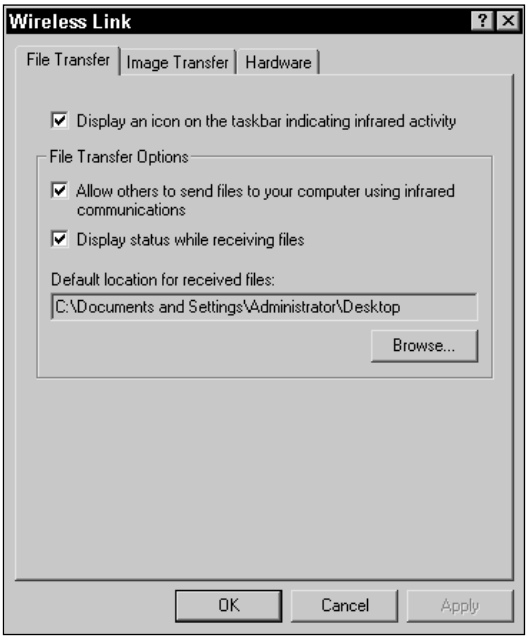

FIGURE 5-71 Configuring a wireless link

Notice in Figure 5-71 that there are three tabs in this dialog box: File Transfer, Image Transfer, and Hardware.

On the File Transfer tab, you can configure how files are received by the infrared device(s) installed in your computer. You can cause an icon to be displayed in the taskbar when the infrared device is in use. You can also configure your computer to accept (or reject) files sent to your infrared device(s). You can configure Windows 2000 to display file transfer status during file transfers. Finally, you can specify the default location where Windows 2000 will save files received through the infrared device(s) on your computer.

On the Image Transfer tab you can enable your computer to accept images transferred from a digital camera over a wireless link. You can also specify the folder in which Windows 2000 will store these digital images, and whether or not Windows 2000 will automatically open Windows Explorer to the specified folder after receiving the images.

TIP

You can't initiate the transfer of images from a digital camera to your computer by using the Wireless Link application—you should either initiate the transfer from the camera, or install and configure the camera on your computer and then use the Imaging application to transfer images.

On the Hardware tab you can view and configure the properties of the infrared device(s) that are installed in your computer. The Properties dialog boxes that you can access here are the same as those you can access by using Device Manager, which was covered earlier in this chapter. If you are having problems with an infrared device in your computer, you can click Troubleshoot on the Hardware tab to start the Hardware Troubleshooter.

Troubleshooting Hardware

Troubleshooting hardware is a common task for network administrators. It is also a strong focus of the Professional and Server exams. In this section, I'll discuss some tips and tools for troubleshooting hardware on Windows 2000 computers.

There are numerous hardware devices, which, when installed in a Windows 2000 computer, may require troubleshooting. Some of these devices include:

- Display devices/video adapters
- Input/output (I/O) devices, such as: cameras; keyboard; modems, including fax modems; the mouse, multimedia devices, printers, scanners, and smart card readers
- Mobile computer hardware
- Network adapter cards

Troubleshooting Common Hardware Problems

Some of the most common hardware problems are configuration problems that occur when two cards installed in the same computer are configured to use the same interrupt, I/O port address, or DMA address. To resolve this type of problem, you should use Device Manager (or Add/Remove Hardware) to reconfigure one of the cards to use a nonconflicting setting.

Another common hardware configuration problem occurs when a card is physically configured in one way (via switches, jumpers, or both), and the software driver for that card is configured with different settings. To resolve this type of problem, you must either change the hardware settings or use Device Manager (or Add/Remove Hardware) to change the software device driver settings so that both the hardware and the software use the same settings.

Recommended Hardware Troubleshooting Tools

Throughout this chapter I've discussed several general tools that are useful for troubleshooting hardware devices, including:

- **Troubleshooters:** These special Help features take you through a series of questions and steps to help you identify and resolve various hardware problems. Follow the instructions presented on-screen to resolve the particular problem you're experiencing. Windows 2000 includes both general and device-specific Troubleshooters.
- **Add/Remove Hardware:** This Control Panel application is useful not only for adding and removing hardware, but also for troubleshooting hardware devices. One nice feature of this application is that it enables you to easily access a Troubleshooter for the device you're trying to fix.
- **Device Manager:** This tool, which is accessed through the System application, enables you to view a graphical representation of the hardware devices installed in a Windows 2000 computer, and also to configure, manage, and troubleshoot various hardware devices. Device Manager is especially useful because it displays resource settings used by a device, including any resource conflicts with other devices, and enables you to resolve these conflicts in the same dialog box. When you use Device Manager you not only have a good chance of identifying the hardware problem, but you can use this tool to resolve the problem, as well.

Another good general tool for troubleshooting hardware is System Information, which I'll cover in the next section.

Finally, in addition to general troubleshooting tools, there are also some device-specific troubleshooting tools you can use. Many of the hardware devices I discussed in this chapter have their own Control Panel applications.

When troubleshooting a specific device (such as a mouse), you can often use its associated application (in this case, Mouse) to view and configure device properties, update drivers, and start a device-specific Troubleshooter.

Using System Information

System Information is a Windows 2000 administrative tool that enables you to view detailed system configuration information, and is often used to troubleshoot system configuration problems. System Information is the Windows 2000 equivalent to Windows NT Diagnostics that shipped with Windows NT 4.0.

To start System Information, right-click My Computer on your desktop, then select Manage from the menu that appears. Then, to expand the System Information components, click the + next to System Information in the left pane of the Computer Management window. Expanding System Information reveals its five primary components: System Summary, Hardware Resources, Components, Software Environment, and Internet Explorer 5. Figure 5-72 shows System Information expanded.

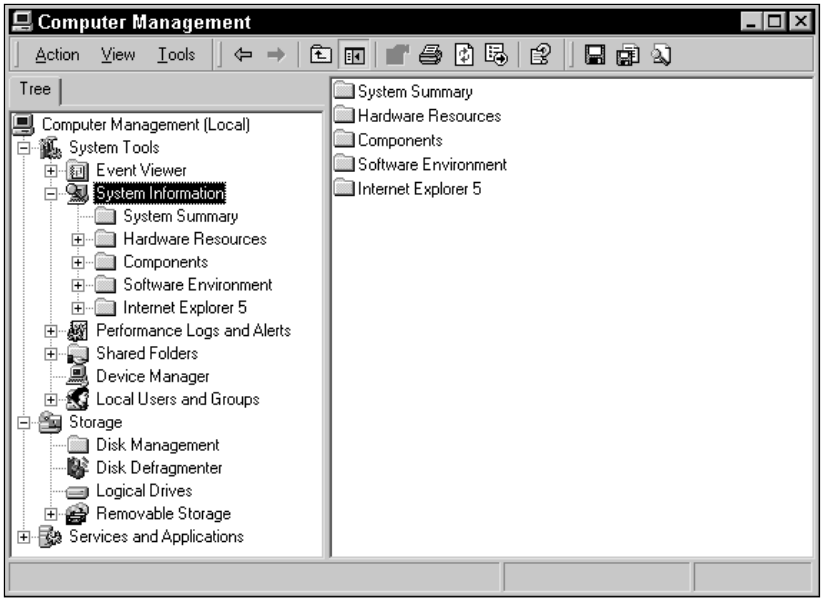

FIGURE 5-72 System Information

To further expand any of the System Information components, click the + next to that component in the left pane of the Computer Management

window. To access a System Information component, click that component in the left pane.

The System Summary component displays the operating system in use, including its version and manufacturer. System Summary also displays various hardware information about the computer, including the system (computer) name, processor type, BIOS version, and amount of RAM in the computer. Figure 5-73 shows System Summary information for a Windows 2000 Server computer in my office. Notice the various information listed.

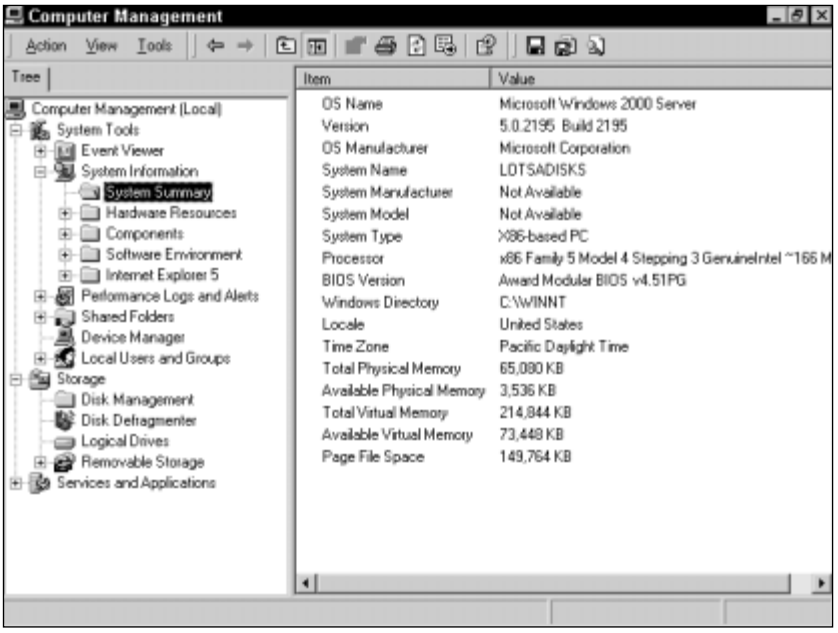

FIGURE 5-73 System Summary

TIP

Once you've displayed information using one of the System Information components, you may want to print it. To print the information displayed, right-click anywhere in the right pane, and select Print from the menu that appears.

The Hardware Resources component displays detailed configuration information on the various hardware devices installed in the computer. You can click any of six different options in Hardware Resources:

- **Conflicts/Sharing:** This option displays a listing of any resource conflicts in the computer, such as interrupt conflicts or I/O address conflicts. This option also displays resources that are shared, such as shared interrupts.
- **DMA:** This option displays a list of direct memory access (DMA) addresses in use by various hardware devices installed in the computer.
- **Forced Hardware:** This option displays a list of hardware devices installed in the computer that has been manually configured (by using Device Manager) by the user. If no devices have been manually configured, "No Forced Hardware" is displayed in the Device column.
- **I/O:** This option displays a list of the input/output (I/O) ports in the computer, and shows whether each I/O port is free or is in use by a specific hardware device.
- **IRQs:** This option displays a list of the interrupts in use on the computer, and the specific hardware device using each interrupt. Figure 5-74 shows a listing of the IRQs in use on a Windows 2000 Server computer.

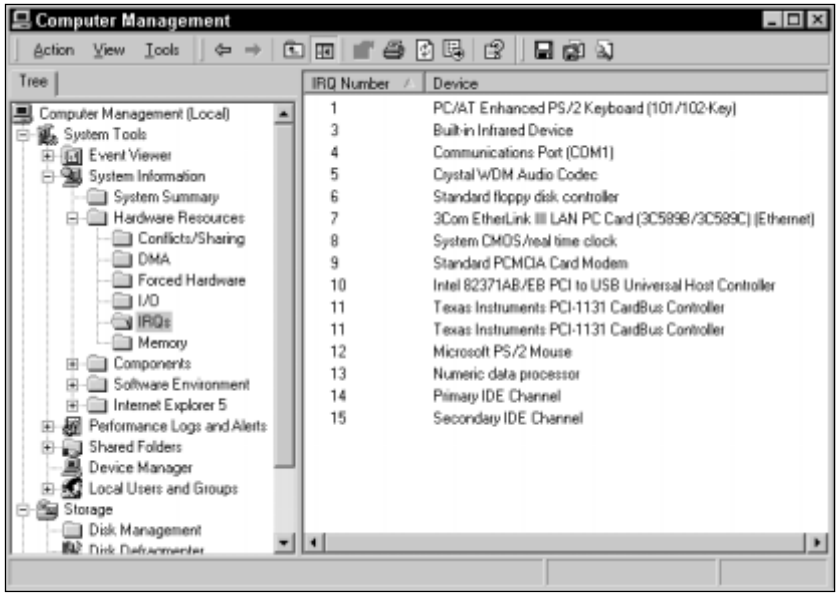

FIGURE 5-74 Hardware Resources—IRQs

- **Memory:** This option displays a list of the memory ranges in use on the computer, and, when known, the specific hardware device that uses each range.

The Components folder displays detailed information about various hardware and software components installed in a Windows 2000 computer. Figure 5-75 shows the numerous options available within Components. Notice that many of the Components options have suboptions.

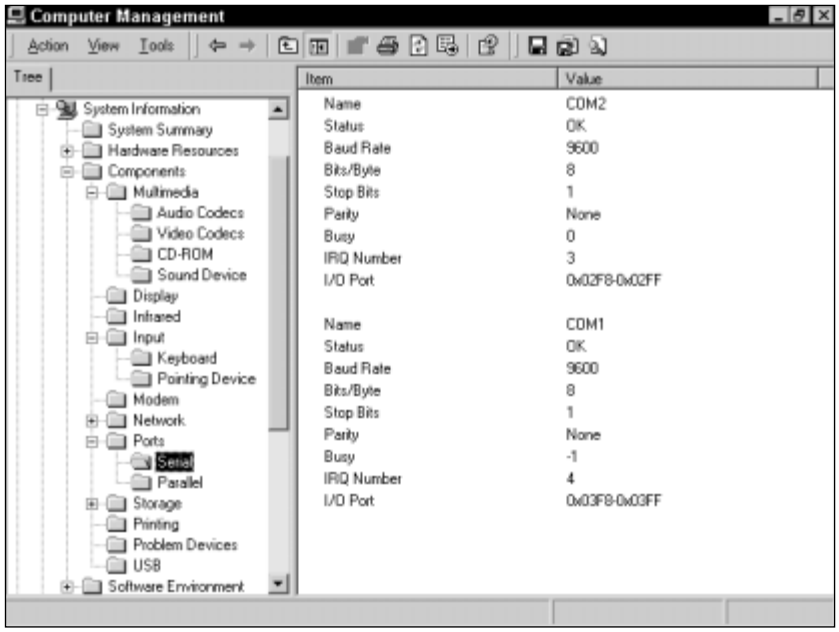

FIGURE 5-75 Components

Also notice in Figure 5-75 that I've highlighted the Serial suboption under Ports. Clicking an option or suboption in the left pane causes the details for the option or suboption to be displayed in the right pane.

The Software Environment component displays detailed information about the software loaded in computer memory. You can use this component to determine whether a driver or process is running, and to view version information. Figure 5-76 shows the options available within the Software Environment component. Notice that the Drivers option is highlighted, and that various driver information, including the driver name, description, type, and state, is shown in the right pane of the window.

The Internet Explorer 5 component displays various information about the Internet Explorer 5 installation on this computer, including version

and build number, a list of files and their version numbers, Internet connectivity settings, cache information, content settings and certificates, and security configuration information.

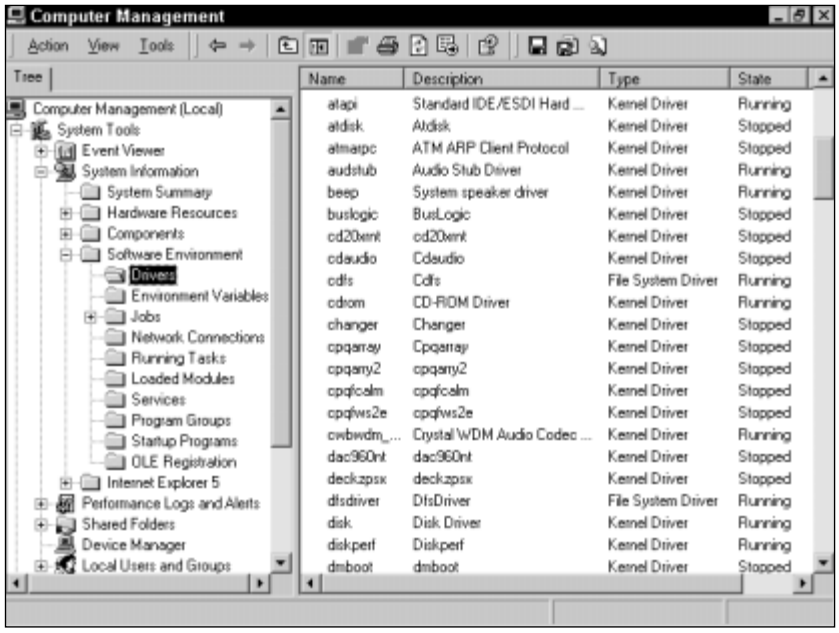

FIGURE 5-76 Software Environment – Drivers

Hardware Troubleshooting Tips

I know that the troubleshooting process is both an art and a science, and that there are as many methods of troubleshooting as there are network administrators. That said, here are a few of my own personal recommendations of things to consider trying when you're faced with a hardware troubleshooting problem:

- Look for (and resolve) hardware device resource conflicts.
- Verify that the correct device driver for the device in question is installed.
- If the device is an external device, verify that it is powered on and that all of its cables are correctly connected to the computer.
- Verify that the device is enabled in the current hardware profile.
- Try rebooting the computer.
- Try removing and reinstalling the device.

- Try replacing the device with a known good device of the same exact type.
- Verify that the device in question is on the Windows 2000 Hardware Compatibility List.

KEY POINT SUMMARY

This chapter explored numerous Control Panel topics. Many of the Control Panel applications are self-explanatory, but a few deserve some final emphasis before I leave this chapter.

- Control Panel is an exhaustive collection of applications. These applications, which are automatically installed during installation of Windows 2000, are used to install,configure, or both install and configure various components, applications, hardware, protocols, and services.
- Add/Remove Hardware is an important application because it is used to add, remove, unplug, and troubleshoot the hardware devices in your computer.
- The Display application is used to configure desktop settings, display settings, and multiple-display support.
- The Folder Options application is particularly useful for configuring offline files.
- The Power Options application is used to configure power schemes, hibernation, Advanced Power Management (APM), and UPS devices.
- The Regional Options application is useful for configuring local settings, and for configuring support for multiple languages and locations.
- The System application is used to perform numerous tasks, including changing network identification, managing driver signing, and creating and managing hardware profiles. The System application also includes Device Manager, a powerful tool for configuring and troubleshooting hardware devices.
- Numerous tools for troubleshooting hardware are covered in this chapter, such as the Add/Remove Hardware application, Device Manager, Troubleshooters, and System Information.

STUDY GUIDE

This section contains several exercises that are designed to cement your knowledge of Control Panel topics and help you prepare for the Professional and Server exams:

- **Assessment questions:** These questions test your knowledge of the Control Panel features and topics covered in this chapter. You can find the answers to these questions at the end of this chapter.
- **Scenario:** The situation-based questions in a scenario challenge you to apply your understanding of the material to solve a hypothetical problem. In this chapter's scenario, you are asked to describe the action you would take to solve a number of troubleshooting problems. You don't need to be at a computer to do the scenario. Answers to this chapter's scenario are presented at the end of this chapter.
- **Labs:** These exercises are hands-on practice activities that you perform on a Windows 2000 computer. The labs in this chapter give you an opportunity to use the Add/Remove Hardware application, to use Device Manager, and to explore several different Control Panel applications.

Assessment Questions

1. You want to install the device drivers for a new infrared device in your Windows 2000 computer. Which tool should you use?
   A. Wireless Link
   B. Device Manager
   C. Scanners and Cameras
   D. Add/Remove Hardware
2. You want to configure multiple language support on your Windows 2000 computer. Which tool should you use?
   A. Fonts
   B. Keyboard
   C. Regional Options
   D. Add/Remove Programs

3. Which Windows 2000 tool can you use to initiate the transfer of images from a digital camera to your Windows 2000 computer?
   A. Imaging
   B. Wireless Link
   C. Scanners and Cameras
   D. Sounds and Multimedia
4. Which tool should you use to manage driver signing on a Windows 2000 computer?
   A. System
   B. Folder Options
   C. Licensing
   D. Add/Remove Programs
5. Which of the following features is supported on Windows 2000 Professional computers but is not supported on Windows 2000 Server computers?
   A. Wireless devices
   B. Multiple displays
   C. Advanced Power Management (APM)
   D. Uninterruptible power supplies (UPSs)
6. You want to change the workgroup membership of a Windows 2000 Professional computer. Which tool should you use?
   A. System
   B. Regional Options
   C. System Information
   D. Network and Dial-up Connections
7. You want to create and configure a hardware profile on your Windows 2000 computer. Which tool should you use?
   A. System
   B. Device Manager
   C. Add/Remove Programs
   D. Add/Remove Hardware
8. You want to configure synchronization settings for your offline files. Which tool should you use?

A. Folder Options
B. Scheduled Tasks
C. Windows Explorer
D. System Information

9. You want to add an additional paging file to your Windows 2000 Server computer. Which tool should you use?
   A. System
   B. Folder Options
   C. Windows Explorer
   D. Add/Remove Programs
10. Which of the following tools are useful for troubleshooting hardware devices on a Windows 2000 computer? (Choose all that apply.)
    A. Device Manager
    B. System Information
    C. Add/Remove Programs
    D. Add/Remove Hardware

Scenarios

The following scenarios provide you with an opportunity to apply the knowledge you've gained in this chapter about troubleshooting several Windows 2000 features that are managed by Control Panel applications.

Many times when a feature fails to perform as expected, the cause of the failure is an underlying configuration problem. For each of the following problems, describe the actions you would take to try to resolve the problem.

1. Yesterday you enabled the StickyKeys option (in Accessibility Options) on a user's Windows 2000 computer. Today the user reports that he is unable to log on.
2. A user reports that the icons displayed on her Windows 2000 desktop are too small to read easily.
3. A user reports that he can't receive faxes by using the fax modem installed in his Windows 2000 computer.
4. An employee at your office uses a Windows 2000 laptop computer both at work and at home. The user recently configured some files for

offline use. The user reports that when working at home she doesn't always have the most current version of the offline files.

5. A user recently scheduled several tasks on his Windows 2000 computer. He reports that he is having problems with one of the scheduled tasks. The task starts, but does not complete correctly.

Lab Exercises

These labs are designed to provide you with hands-on experience using many of the applications and tools in Control Panel. From installing and configuring all the way to troubleshooting, these labs cover it all.

Lab 5-1 Using Add/Remove Hardware

- Professional
- Server

The purpose of this lab is to give you practical experience using the Add/Remove Hardware application. As stated previously, you use this application to add, remove, unplug, and troubleshoot the hardware in your computer, including display devices/video adapters; DVD and CD-ROM devices; input/output (I/O) devices, such as cameras, keyboard, modems (including fax modems), the mouse, multimedia devices, printers, scanners, smart card readers, USB devices, and wireless devices such as infrared (IrDA) devices; mobile computer hardware such as PC Card devices; and network adapter cards.

In this lab, you'll install, configure, and remove a non–Plug and Play infrared device in your computer. *Use these same basic steps no matter which of the devices listed above you want to install, configure, or remove.*

TIP

I don't expect you to go out and buy any hardware to do this lab. You'll be installing device drivers for a nonexistent piece of hardware, and later you'll remove the device drivers to return your computer to its normal state.

The steps that follow walk you through using Add/Remove Hardware on a Windows 2000 Professional computer. The steps for using this application on a Windows 2000 Server computer are identical.

1. Boot your computer to Windows 2000 Professional. Log on as Administrator.
2. Select Start ➪ Settings ➪ Control Panel.
3. In the Control Panel dialog box, double-click Add/Remove Hardware.
4. The Add/Remove Hardware Wizard starts. Click Next.
5. The Choose a Hardware Task screen appears. Select the "Add/Troubleshoot a device" option. Click Next.
6. Windows 2000 attempts to detect the new hardware device. The Choose a Hardware Device screen appears. Click "Add a new device" in the Devices list box. Click Next.
7. The Find New Hardware screen appears. Select the "No, I want to select the hardware from a list" option. Click Next.
8. The Hardware Type screen appears. Click "Infrared devices."

   You're installing, configuring, and removing an infrared (IrDA) device in this lab, but use these same basic steps to install, configure (when appropriate), and remove any hardware device in your computer, including a display device/video adapter; a DVD or CD-ROM device; an input/output (I/O) device, such as a camera, a keyboard, a modem (including a fax modem), a mouse, a multimedia device, a printer, a scanner, a smart card reader, or a USB device; mobile computer hardware such as a PC Card device; or a network adapter card.

   Click Next.
9. The Select Infrared Device screen appears. In the Manufacturers box, highlight (Standard Infrared Port). In the Infrared Device box, highlight Built-in Infrared Device. Click Next.
10. Windows 2000 displays a warning dialog box informing you that Windows 2000 could not detect the settings of the device. Click OK.
11. A Resources tab is displayed. Examine this tab closely. Notice the question marks in the "Resource settings" box. This means that the device is not yet configured.

In the "Setting based on" drop-down list box, select Basic configuration 0001. On most computers, this causes a conflict to be displayed in the "Conflicting device list" box. All conflicts listed in the "Conflicting device list" box must be resolved.

In the "Setting based on" drop-down list box, select Basic configuration 0005. In the "Resource settings" box, click Input/Output Range, then click Change Setting. In the Edit Input/Output Range dialog box, accept the defaults (if no devices are conflicting) and click OK. In the "Resource settings" box, click Interrupt Request, then click Change Setting. In the Edit Interrupt Request dialog box, accept the defaults (if no devices are conflicting) and click OK.

If there are conflicting devices in either the Edit Input/Output Range dialog box of the Edit Interrupt Request dialog box, use the up or down arrow to the right of the Value text box to find a value that does not cause any conflicts. Then click OK.

On the Resources tab, click OK.

12. In the Start Hardware Installation screen, click Next.
13. In the Completing the Add/Remove Hardware Wizard screen, click Finish.
14. A System Settings Change dialog box is displayed, notifying you that you must restart your computer before the new settings will take effect. Click Yes to restart your computer.
15. Boot your computer to Windows 2000 Professional. Log on as Administrator.
16. Start Control Panel (if it is not already displayed on your desktop). Double-click Add/Remove Hardware.
17. When the Add/Remove Hardware Wizard starts, click Next.
18. In the Choose a Hardware Task screen, select the "Uninstall/Unplug a device" option. Click Next.
19. In the Choose a Removal Task screen, select the "Uninstall a device" option. Click Next.
20. In the Installed Devices on Your Computer screen, highlight the Built-in Infrared Device that has a yellow circle containing an exclamation point as part of its icon. (This device is probably at the top of the Devices list.) Click Next.

21. In the Uninstall a Device screen, select the "Yes, I want to uninstall this device" option. Click Next.
22. In the Completing the Add/Remove Hardware Wizard screen, click Finish.

Lab 5-2 Using the System application

- ▶ Professional
- ▶ Server

The purpose of this lab is to give you hands-on experience using the System application. This application is used to perform several configuration, management, and troubleshooting tasks.

This lab has three parts:

- Part 1: Managing and Troubleshooting Driver Signing
- Part 2: Using Device Manager
- Part 3: Creating and Managing Hardware Profiles

The steps that follow take you through these tasks on a Windows 2000 Professional computer. The steps are identical on a Windows 2000 Server computer.

Part 1: Managing and Troubleshooting Driver Signing

In this section you use the System application to configure driver signing, and then run `Sigverif.exe` to troubleshoot the presence of unsigned driver files.

1. Boot your computer to Windows 2000 Professional. Log on as Administrator.
2. Start Control Panel. (From the desktop, select Start ➪ Settings ➪ Control Panel.)
3. In the Control Panel dialog box, double-click System.
4. In the System Properties dialog box, click the Hardware tab.
5. On the Hardware tab, click Driver Signing.
6. In the Driver Signing Options dialog box, notice the three configuration options. Select the "Block — Prevent installation of unsigned files" option, and click OK.

7. On the Hardware tab, click OK.
8. Close Control Panel.
9. Now you'll troubleshoot driver signing by running `sigverif.exe` to detect any unsigned system files on your computer. Select Start ➪ Programs ➪ Accessories ➪ Command Prompt.
10. At the command prompt, type **sigverif** and press Enter.
11. In the File Signature Verification dialog box, click Start to have Windows 2000 search for any unsigned system files.
12. Windows 2000 displays the SigVerif dialog box, indicating that your files have been scanned and verified. Click OK.
13. In the File Signature Verification dialog box, click Close.
14. At the command prompt, type **exit** and press Enter.

Part 2: Using Device Manager

In this section, you use Device Manager to configure, manage, and troubleshoot hardware devices, such as: display devices/video adapters; DVD and CD-ROM devices; input/output (I/O) devices, such as cameras, keyboard, modems (including fax modems), mouse, multimedia devices, printers, scanners, smart card readers, USB devices, and wireless devices such as infrared (IrDA) devices; mobile computer hardware such as PC Card devices; and network adapter cards. (Steps 1 through 12)

You'll also use Device Manager to update device drivers and configure multiple processing units. (Steps 13 through 23)

Finally, you'll use Device Manager to implement and manage mobile computer hardware, by configuring and managing card services. (Steps 24 through 34) *This section of the lab is optional because it requires a laptop or other mobile computer.*

1. Start Control Panel. (From the desktop, select Start ➪ Settings ➪ Control Panel.)
2. In the Control Panel dialog box, double-click System.
3. In the System Properties dialog box, click the Hardware tab.
4. On the Hardware tab, click Device Manager.
5. In the Device Manager dialog box, click the + next to Network adapters. Right-click the device listed under Network adapters, and select Properties from the menu that appears.

You're using Device Manager to configure, manage, and troubleshoot a network adapter card in this section, but use these same basic steps to configure, manage, and troubleshoot any hardware device in your computer, including a display device/video adapter; a DVD or CD-ROM device; an input/output (I/O) device, such as a camera, an infrared (IrDA) device, a keyboard, a modem (including a fax modem), a mouse, a multimedia device, a printer, a scanner, a smart card reader, or a USB device; or mobile computer hardware such as a PC Card device.

6. In the device's Properties dialog box, click the Resources tab. Notice the resource settings used by the network adapter in your computer.

   If conflicts are listed in the "Conflicting device list" box, highlight the conflicting resource (in the "Resource settings" box) and click Change Setting. Configure a nonconflicting setting and click OK.

   Click the General tab.

7. On the General tab, note the device status. The status probably displayed is "This device is working properly." However, humor me for a minute and assume the device is *not* working properly. I want you to experience troubleshooting the device. Click Troubleshooter.
8. The Hardware Troubleshooter starts. Notice the many types of problems that the Troubleshooter can help you identify and resolve. Click the "My network adapter doesn't work" option, and click Next at the bottom of the screen.
9. Select the "Yes, my device is on the HCL" option, and click Next.
10. Notice the options presented on the screen. If a hardware problem actually existed, you could continue working through the Troubleshooter for some time. But for now, select the "Yes, my network adapter works" option, and click Next.
11. Close Windows 2000 Help.
12. In the network adapter's Properties dialog box, click OK.
13. In the next several steps you'll learn how to update device drivers and configure multiple processing units.

TIP

You don't need to have a computer with multiple processors to perform this lab.

In the Device Manager dialog box, click the + next to Computer. (This is usually the first or second device type listed under the computer's name.)

14. Notice the name of the device listed under Computer, and write it down for future use. (It may be called Standard PC, ACPI Uniprocessor PC, MPS Uniprocessor PC, or a brand-specific name.) Right-click this device and select Properties from the menu that appears.
15. In the device's Properties dialog box, click the Driver tab.
16. On the Driver tab, click Update Driver.
17. The Upgrade Device Driver Wizard starts. Click Next.
18. Select the "Display a list of the known drivers for this device so that I can choose a specific driver" option. Click Next.
19. On the Select a Device Driver screen, select the "Show all hardware of this device class" option. Accept the default manufacturer of your PC highlighted in the Manufacturers box. Ensure that the model highlighted in the Models box matches the name you wrote down in Step 14.

TIP

Normally you would select one of the *multiprocessor* models to configure support for multiple processing units. However, I'm assuming that you *don't* have a multiprocessor computer, but still want to experience the basic steps in the process.

Click Next.

20. In the Start Device Driver Installation screen, click Next to install the device driver you selected.
21. In the Completing the Upgrade Device Driver Wizard screen, click Finish.
22. Click Close in your computer's Properties dialog box.
23. Click Yes when Windows 2000 prompts you to restart your computer.
24. In the next several steps you configure card services on a mobile computer. *The rest of the steps in this section are optional because they require that you have a laptop computer.*

    Boot your computer to Windows 2000 Professional. Log on as Administrator.

25. Start Control Panel if it is not displayed on your desktop. (From the desktop, select Start ➪ Settings ➪ Control Panel.)
26. In the Control Panel dialog box, double-click System.
27. In the System Properties dialog box, click the Hardware tab.
28. On the Hardware tab, click Device Manager.
29. In the Device Manager dialog box, click the + next to PCMCIA adapters. Right-click any device listed under this heading, and select Properties from the menu that appears.
30. In the PCMCIA adapter's Properties dialog box, view the information displayed on the General tab, including the device type and device status. Click the Resources tab.
31. On the Resources tab, notice the resource settings used by the PCMCIA adapter in your computer.

    If conflicts are listed in the "Conflicting device list" box, highlight the conflicting resource (in the "Resource settings" box) and click Change Setting. Configure a nonconflicting setting and click OK. Windows 2000 may not permit you to change the resource settings used by this device — if this is the case, and if the PCMCIA adapter conflicts with another device, you'll probably have to change the resource settings for the other device to resolve the conflicts.

    Click OK.
32. Close Device Manager.
33. In the System Properties dialog box, click OK.
34. If you made configuration changes to your PCMCIA adapter, Windows 2000 will prompt you to restart your computer now.

Part 3: Creating and Managing Hardware Profiles

In this section, you use the System application to create and configure a hardware profile.

1. Boot your computer to Windows 2000 Professional. Log on as Administrator.
2. Start Control Panel. (From the desktop, select Start ➪ Settings ➪ Control Panel.)
3. In the Control Panel dialog box, double-click System.
4. In the System Properties dialog box, click the Hardware tab.

5. On the Hardware tab, click Hardware Profiles.
6. In the Hardware Profiles dialog box, highlight Profile 1 (Current), and click Copy.
7. In the Copy Profile dialog box, type **Undocked** over the default name in the To text box. Click OK.
8. In the Hardware Profiles dialog box, highlight Profile 1 (Current), and click Rename.
9. Type **Docked** over the default name in the To text box. Click OK.
10. In the Hardware Profiles dialog box, highlight Undocked, and click Properties.
11. In the Undocked Properties dialog box, select the check box next to "This is a portable computer." Then select "The computer is undocked" option. Click OK.
12. In the Hardware Profiles dialog box, click OK.
13. In the System Properties dialog box, click OK.
14. Select Start ➪ Shut Down. In the Shut Down Windows dialog box, select Restart, and click OK.
15. When your computer reboots, notice that you are given an option to select from your Docked or Undocked hardware profile. Windows 2000 will use the Docked profile, by default, unless you select the Undocked profile during the boot process.

Lab 5-3 Exploring Control Panel

► Professional
► Server

The objective of this lab is to give you hands-on experience using several Control Panel applications.

This lab has eight parts:

- Part 1: Configuring Accessibility Services
- Part 2: Configuring Fax Support
- Part 3: Configuring and Managing the Task Scheduler

- Part 4: Managing the Use and Synchronization of Offline Files
- Part 5: Configuring Local Settings and Support for Multiple Languages and Locations
- Part 6: Configuring Desktop Settings and Multiple-Display Support
- Part 7: Configuring Advanced Power Management
- Part 8: Using Miscellaneous Control Panel Applications

The steps that follow take you through these tasks on a Windows 2000 Professional computer. The steps are identical on a Windows 2000 Server computer, except for Part 7, which can't be performed because Windows 2000 Server doesn't support APM.

Part 1: Configuring Accessibility Services

In this part you use the Accessibility Options application to configure accessibility services.

1. Boot your computer to Windows 2000 Professional. Log on as Administrator.
2. Select Start ➪ Settings ➪ Control Panel.
3. Double-click Accessibility Options.
4. On the Keyboard tab, select the check box next to Use StickyKeys. Click the Sound tab.
5. On the Sound tab, view the possible configuration options. Click the Display tab.
6. On the Display tab, notice the high contrast option. Click the Mouse tab.
7. On the Mouse tab, notice that you can configure the computer to use MouseKeys. Click the General tab.
8. On the General tab, select the check boxes next to "Apply all settings to logon desktop" and "Apply all settings to defaults for new users." Click OK.

Part 2: Configuring Fax Support

In this part you use the fax application to configure personal information for a fax cover page and enable your fax modem to receive faxes. *This section is optional because a fax modem must be installed in the computer in order to perform this task.*

1. In the Control Panel dialog box, double-click Fax.
2. In the Fax Properties dialog box, complete the information on the User Information tab. Click the Advanced Options tab.
3. On the Advanced Options tab, click Open Fax Service Management Console.
4. In the Fax Service Management dialog box, click Devices in the left pane. In the right pane, right-click the fax modem device listed, and select Receive from the menu that appears. This enables your fax modem to receive faxes. (It is configured only to send faxes by default.) After a few seconds, notice that the Receive status changes from No to Yes. Close Fax Service Management.
5. In the Fax Properties dialog box, click OK.

Part 3: Configuring and Managing the Task Scheduler

In Part 3 you use the Scheduled Tasks tool to schedule the Disk Cleanup application to run once a week.

1. Start the Scheduled Tasks tool. (In Control Panel, double-click Scheduled Tasks.)
2. In the `Scheduled Tasks` folder, double-click the Add Scheduled Task icon.
3. The Scheduled Task Wizard starts. Click Next.
4. In the list of applications, click Disk Cleanup. Click Next.
5. Accept the default name for this task. Select the Weekly option. Click Next.
6. In the next screen, configure the start time and day of the week that you want to run this task. Click Next.
7. Enter the password for Administrator in the "Enter the password" text box. Retype the password in the "Confirm password" test box. Click Next.
8. Click Finish.
9. Notice that the task is displayed in the Scheduled Tasks dialog box. Close Scheduled Tasks.

Part 4: Managing the Use and Synchronization of Offline Files

In Part 4 you use Windows Explorer to select a file for offline use and configure synchronization settings. *This section is optional because it requires that your computer be connected to a network server.*

1. From the desktop, start Windows Explorer. (Select Start ➪ Programs ➪ Accessories ➪ Windows Explorer.)
2. In Windows Explorer, select Tools ➪ Map Network Drive.
3. In the Map Network Drive dialog box, accept the default drive letter listed in the Drive text box. Then, in the Folder text box, type the name of your network server and the name of any shared folder on this server in the format `\\server_name\share_name` and click Finish.
4. Windows Explorer connects your computer to the shared folder, and displays the contents of that folder. Right-click any file in this folder that you want to make available for offline use, and select Make Available Offline from the menu that appears.
5. If this is the first time you have configured offline files, Windows 2000 starts the Offline Files Wizard. Click Next.
6. Select the check box next to "Automatically synchronize the Offline Files when I log on and log off my computer." Click Next.
7. On the next screen, click Finish. Windows 2000 copies the selected offline file from the network server to the `Offline Files` folder on your computer.
8. Close the shared folder. Close Windows Explorer.

Part 5: Configuring Local Settings and Support for Multiple Languages and Locations

In this part you use the Regional Options application to configure local settings, and to configure support for multiple languages and multiple locations.

1. Select Start ➪ Settings ➪ Control Panel.
2. Double-click Regional Options.
3. In the Regional Options dialog box, select the check box next to Japanese in the "Language settings for the system" box. Click OK.
4. When prompted, insert your Windows 2000 Professional compact disc into your computer's CD-ROM drive, and then click OK.

5. When prompted, click Yes to restart your computer. Remove the compact disc from your computer's CD-ROM drive.
6. Reboot your computer to Windows 2000 Professional. Log on as Administrator.
7. In the Control Panel dialog box, double-click Regional Options.
8. In the Regional Options dialog box, click the Numbers tab. Note the local settings for numbers for the English (United States) locale, including the measurement system.

   Click the Currency tab. Note the local settings for currency for the English (United States) locale.

   Click the Time tab. Note the local settings for time for the English (United States) locale.

   Click the Date tab. Note the local settings, and make any desired changes. Click the Input Locales tab.
9. On the Input Locales tab, click Add.
10. In the Add Input Locale dialog box, select Japanese from the "Input locale" drop-down list box. Accept the default keyboard layout. Click OK.
11. On the Input Locales tab, click OK. Notice that an additional icon (the letters EN in a blue box) appears in your taskbar next to the clock. This icon indicates that your current input locale is English (United States).

Part 6: Configuring Desktop Settings and Multiple-Display Support

In Part 6 you use the Display application to configure desktop settings and display properties. You also use the Display Troubleshooter and configure multiple-display support. *The last portion of Part 6 (Steps 9 through 11) is optional because it requires multiple display adapters and multiple monitors.*

1. In the Control Panel dialog box, double-click Display.
2. In the Display properties dialog box, notice the backgrounds you can select from on the Background tab. Click the Screen Saver tab.
3. On the Screen Saver tab, select any screen saver from the Screen Saver drop-down list box. Select the check box next to "Password protected." Click the Appearance tab.

4. On the Appearance tab, try out several schemes (by selecting them, one at a time) in the Scheme drop-down list box until you find one you like. Click the Web tab.
5. On the Web tab, notice that you can enable Web content on your Active Desktop. Click the Effects tab.
6. On the Effects tab, notice the many visual effects you can configure. Click the Settings tab.
7. On the Settings tab, notice that you can set the number of colors used and the screen area. Click Troubleshoot.
8. The Display Troubleshooter starts. Notice that this is a special Troubleshooter just for display problems. Close Windows 2000 Help.

   If you *don't* have multiple display devices, click OK and stop here.

   If you have multiple video adapters and multiple monitors, continue on to Step 9.
9. If you have multiple video adapters and multiple monitors, your Settings tab should be similar to Figure 5-77.

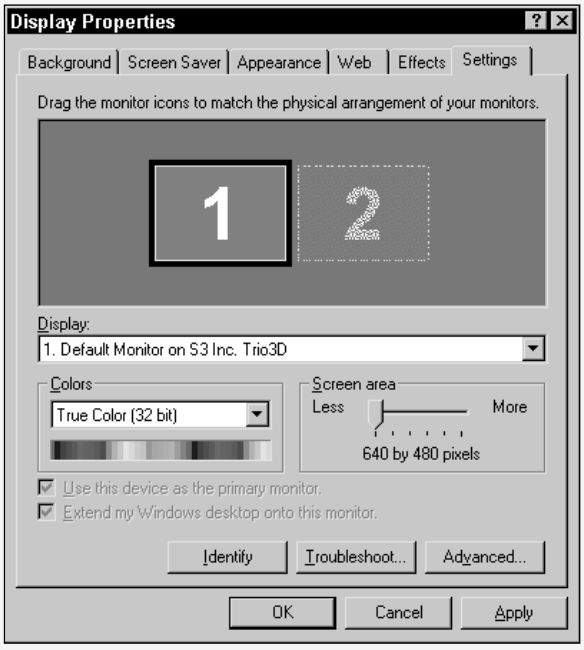

FIGURE 5-77 Configuring multiple display support

Click the icon representing your second monitor and select the check box next to "Extend my Windows desktop onto this monitor." Then configure the monitor icons to match the physical arrangement of your monitors. For example, if you have two monitors, stacked one on top of the other, you can click and drag one monitor under the other, so that the picture on the screen coincides with the actual physical arrangement. Click OK.

10. If you've changed any display settings, Windows 2000 prompts you to apply the new settings. Click OK.
11. In the Monitor Settings dialog box, click Yes to keep your new settings. Click No if you want to revert to your original settings.

Part 7: Configuring Advanced Power Management

In this part you use the Power Options application to configure Advanced Power Management on a laptop computer. *Part 7 is optional because it requires a computer that supports Advanced Power Management. Many laptops support APM.*

1. Start Control Panel if it is not already displayed on your desktop.
2. In the Control Panel dialog box, double-click Power Options.
3. In the Power Options Properties dialog box, click the APM tab.
4. On the APM tab, select the check box next to "Enable Advanced Power Management support." Click OK. A Found New Hardware dialog box may appear while Windows 2000 detects your laptop computer's battery.
5. In the Control Panel dialog box, double-click Power Options.
6. In the Power Options Properties dialog box, notice that the tabs have changed. Also notice that the Power Schemes tab now shows settings for when the computer is plugged into AC power and when it is running on batteries. Click the Alarms tab.
7. On the Alarms tab, notice that both a low battery alarm and critical battery alarm are enabled. Click the Alarm Action button for the critical battery alarm.
8. In the Critical Battery Alarm Actions dialog box, select the check box next to "When the alarm goes off, the computer will," and accept the default option of Standby in the drop-down list box. Click OK.
9. On the Alarms tab, click OK.

Part 8: Using Miscellaneous Control Panel Applications

In this part you use several miscellaneous Control Panel applications, including Keyboard, Mouse, Scanners and Cameras, Sounds and Multimedia, and Wireless Link. You also explore the Troubleshooters available in each of these applications.

1. Start Control Panel if it is not already displayed on your desktop. Double-click Keyboard.
2. On the Speed tab, configure keyboard settings to meet your needs. Click the Input Locales tab.
3. On the Input Locales tab, notice that this is the same tab as the Input Locales tab you previously worked with in Regional Options. Click the Hardware tab.
4. On the Hardware tab, click Troubleshoot.
5. The Keyboard Troubleshooter starts. This Troubleshooter is designed specifically for diagnosing and resolving keyboard problems. Close Windows 2000 Help.
6. In the Keyboard Properties dialog box, click OK.
7. In the Control Panel dialog box, double-click Mouse.
8. In the Mouse Properties dialog box, view the various configuration options on the four tabs. Configure your mouse to meet your needs. Click the Hardware tab.
9. On the Hardware tab, notice the Troubleshoot command button. Clicking this button starts the Mouse Troubleshooter, a Troubleshooter designed specifically for troubleshooting mouse problems. Click OK.
10. In the Control Panel dialog box, double-click Scanners and Cameras.
11. In the Scanners and Cameras Properties dialog box, notice that you can add, remove, troubleshoot, and configure the properties of scanners and cameras. If you click Troubleshoot, a Troubleshooter that is designed specifically to identify and help you resolve problems with scanners and cameras starts. Click OK.
12. In the Control Panel dialog box, double-click Sounds and Multimedia.
13. In the Sounds and Multimedia Properties dialog box, view the various configuration options on the three tabs. Configure any sounds and multimedia devices in your computer as appropriate. Notice the

Troubleshoot command button on the Hardware tab. As with other Control Panel applications, clicking Troubleshoot starts a device-specific Troubleshooter. Click OK.

14. If you have an infrared port in your computer, double-click Wireless Link in the Control Panel dialog box.
15. In the Wireless Link dialog box, view the various configuration options on the three tabs. Notice the Troubleshoot command button on the Hardware tab. Clicking Troubleshoot starts the Hardware Troubleshooter. Click OK.
16. Close Control Panel.

Answers to Chapter Questions

Chapter Pre-Test

1. Windows 2000 *Control Panel* is an exhaustive collection of applications, sometimes called applets. These applications, which are automatically installed during installation of Windows 2000, are used to install, configure, or both install and configure various components, applications, hardware, protocols, and services.
2. Add/Remove Hardware is used to add, remove, unplug, and troubleshoot the hardware devices in your computer.
3. A device driver
4. Up to 10
5. Driver signing refers to system files, device drivers, or both that have digital signatures. A digital signature is a special tag appended to a file by its creator.
6. IrDA stands for the Infrared Data Association. This organization sets standards for infrared/wireless devices.
7. There are several tools used to troubleshoot hardware devices on Windows 2000 computers. Some of the most common tools include the Windows 2000 Help Troubleshooters, Device Manager, Add/Remove Hardware, and System Information.

Assessment Questions

1. **D.** Add/Remove Hardware is the only Windows 2000 application that can be used to add/install an infrared device.
2. **C.** Regional Options is the only Windows 2000 application that can be used to configure support for multiple languages.
3. **A.** The Imaging application (Start ➪ Programs ➪ Accessories ➪ Imaging) is the only Windows 2000 application that can be used to initiate image transfer. You can use Wireless Link to configure how Windows 2000 will handle received image files, but you can't use Wireless Link to initiate the image transfer.
4. **A.** The System application is used to configure and manage driver signing.
5. **C.** Of the four features listed, all are supported on both Windows 2000 Professional and Windows 2000 Server computers except APM. APM is only supported on Windows 2000 Professional computers.
6. **A.** The System application in Control Panel is used to make network identification changes.
7. **A.** The System application is used to create, configure, and manage hardware profiles.
8. **C.** Use Windows Explorer to configure a synchronization schedule for offline files. (Select Tools ➪ Synchronize to start this process.) You can also access the same synchronization tool by selecting Start ➪ Programs ➪ Accessories ➪ Synchronize.
9. **A.** The System application is used to create, configure, and manage paging files.
10. **A, B, D.** All of the tools listed are commonly used to troubleshoot hardware devices *except* Add/Remove Programs.

Scenarios

1. The most likely cause of this problem is that the check box next to "Apply all settings to logon desktop" on the General tab in the Accessibility Options application is *not* selected. Ensure that this check box is selected, and click OK. The user should now be able to log on to the computer.

2. There are few things you can try to fix this problem. You can try decreasing the monitor resolution on the Settings tab in the Display application. Or, you can try selecting a different appearance scheme such as Windows Classic (large) or Windows Standard (extra large) on the Appearance tab in the Display application. Finally, you can try selecting the check box next to "Use large icons" on the Effects tab in the Display application.
3. The most likely cause of this problem is that the computer isn't configured to receive faxes. By default, Windows 2000 computers are configured to send faxes, but must be manually configured to receive faxes. Configure the device to receive faxes by using the Fax Service Management Console on the user's computer.
4. Ensure that the user's laptop computer is configured to synchronize offline files both when she logs on and logs off the computer. Instruct the user to always log off before powering off the computer for the night.
5. You may need to add command-line switches or options to the Run text box in the task's Properties dialog box. Or, you may need to modify or correct the existing path in this text box. Or, you may need to configure the task to log on by using a different user account that has the necessary rights and permissions to perform the task.

MCSE
EXAM
MATERIAL