MICROSOFT
TRAINING
AND CERTIFICATION

Microsoft Official Curriculum

Module 3: Configuring Hardware on a Computer Running Microsoft Windows XP Professional

Contents

Microsoft®

Instructor Notes

Presentation:
45 Minutes

Lab:
30 Minutes

This module provides students with an overview of how Microsoft® Windows® XP Professional supports hardware. The module provides information about installing, configuring, and troubleshooting hardware devices.

After completing this module, students will be able to:

- Install and configure new hardware devices.
- Update and then roll back a device driver.
- Describe how Device Manager can assist you with troubleshooting hardware devices.

Materials and Preparation

This section provides the materials and preparation tasks that you need to teach this module.

Required Materials

To teach this module, you need Microsoft PowerPoint® file 2272A_03.ppt.

Preparation Tasks

To prepare for this module, you should:

- Read all of the materials for this module.
- Complete the labs.
- Review the Delivery Tips and Key Points for each section and topic.
- Study the review questions and prepare alternative answers for discussions.
- Anticipate student questions about material and write out answers to those questions.

Instructor Setup for a Lab

This section provides setup instructions that are required to prepare the instructor computer or classroom configuration for a lab.

Lab 3A: Using Driver Rollback to Restore a Device Driver

► **To prepare for the lab**

1. Choose an alternate Display Adapter driver to use in Lab A. If the Display Adapter hardware is different on the student machines choose an alternate for each different adapter type.
2. Test the alternate Display Adapter driver (or drivers) to ensure that the results are as outlined in this lab.
3. Test the driver rollback to ensure that it's functioning correctly.

Lab 3B: Adding and Removing Devices Using the Hardware Wizard

► **To prepare for the lab**

- There are no setup tasks for this lab.

Module Strategy

Use the following strategy to present this module:

- Installing and Configuring Hardware Devices

  This section describes how to install and configure hardware devices. Begin by defining Plug and Play devices and then describing how to install Plug and Play devices. Point out that Windows XP Professional automatically configures system resources for Plug and Play devices. Next describe the installation requirements and process for non-Plug and Play devices. Contrast how system resources are assigned during installation of non-Plug and Play devices with Plug and Play devices. Demonstrate how to view installed devices by using Device Manager.

  The remainder of the section focuses on installing and configuring a local printer and multiple monitors. Describe installing a local printer when it is Plug and Play. Alternatively, discuss when and how to add a printer by using the Add Printer Wizard. Discuss setting printer preferences. Finally, describe installing multiple monitors including changing the primary monitor and how to arrange multiple monitors.

- Lab A: Adding and Removing Hardware Devices Using the Add Hardware Wizard

  In this lab, students use the Add Hardware Wizard to simulate the installation of a Plug and Play device. Students then use the Add Hardware Wizard to install a non-Plug and Play modem. Students will not be installing the physical device, just the modem software. Finally, students will use Device Manager to disable, enable, and then remove the modem.

- Working with Drivers

  This section presents several topics relevant to device drivers. Review when and why you rollback or update a device driver. Explain the benefits of using signed drivers and where to obtain the latest drivers available from Microsoft. Demonstrate how to identify unsigned drivers. Next, discuss when and how to update drivers. Finally describe when and why you would rollback a driver and demonstrate driver rollback.

- Lab B: Rolling Back a Device Driver

  In this lab, students install an updated driver then rollback the driver to the previously installed version.

- Troubleshooting Hardware Devices

  This section focuses on using Device Manager to assist you with troubleshooting devices. Describe the hardware information provided by Device Manager and demonstrate how to display device information including information for hidden devices. Next, describe how Windows XP Professional enables the easy removal of Plug and Play devices. Introduce the Safe Removal Application for those devices where Windows XP Professional must be notified prior to removal. Finally, describe how to manually configure system resources by using Device Manager. Discuss caveats concerning the manual assignment of system resources to devices along with cautions about using Registry Editor for this same purpose.

Customization Information

This section identifies the lab setup requirements for a module and the configuration changes that occur on student computers during the labs. This information is provided to assist you in replicating or customizing Training and Certification courseware.

Important The labs in this module are also dependent on the classroom configuration that is specified in the Customization Information section at the end of the *Classroom Setup Guide* for Course 2272A, *Implementing and Supporting Microsoft Windows XP Professional (Course Beta)*.

Lab Results

There are no configuration changes on student computers that affect replication or customization.

Overview

Topic Objective
To provide an overview of the module topics and objectives.

Lead-in
After installing Windows XP Professional, you may need to add new hardware to your computer, update a driver, or modify your hardware configuration. In this module, you will learn how to install, configure, and troubleshoot hardware.

- **Installing and Configuring Hardware Devices**
- **Working with Drivers**
- **Troubleshooting Hardware Devices**

Hardware describes any physical device that is connected to a computer and controlled by the computer's microprocessor. Hardware includes both equipment that was connected to the computer when it was manufactured, and peripheral equipment that is added later. Examples of hardware devices include modems, disk drives, CD-ROM (compact disc read-only memory) drives, print devices, network adapters, keyboards, and display adapter cards.

It is important that you know how to install hardware devices, and how to configure them after they are installed. Also, if issues arise with hardware devices, understanding how to troubleshoot and knowing possible solutions to issues can save you time and resources.

After completing this module, you will be able to:

- Install and configure new hardware devices.
- Update and then roll back a device driver.
- Describe how Device Manager can assist you with troubleshooting hardware devices.

◆ Installing and Configuring Hardware Devices

Topic Objective
To explain and demonstrate hardware installation on a computer running Windows XP Professional.

Lead-in
Windows XP Professional simplifies the process of installing computer hardware by fully supporting Plug and Play devices.

- **Installing Plug and Play Devices**
- **Installing Non-Plug and Play Devices**
- **Viewing Installed Devices**
- **Adding a Local Printer**
- **Configuring Multiple Monitors**

Before installing any hardware device, ensure that the device is listed on the Hardware Compatibility List (HCL). The HCL is located on the Microsoft Windows® XP Professional CD (compact disc); however, for the most up-to-date version of the HCL, see www.microsoft.com/HCL.

When installing a new device, or reconnecting a previously installed device, several factors affect a device's installation and operation:

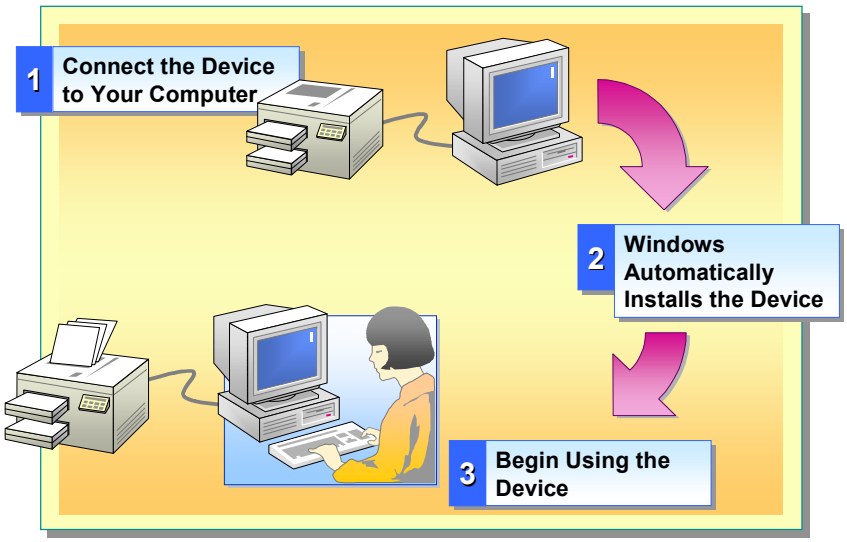
- Is the device Plug and Play or non-Plug and Play? *Plug and Play* is an independent set of computer architecture specifications that hardware manufacturers use to produce computer devices that can be configured without requiring user intervention.
- Are you using a signed device driver, and is the driver the latest version available? A *device driver* is software that enables the operating system on a computer to communicate with the hardware device.

In most cases, it is easy to install hardware on computers running Windows XP Professional. You simply plug in the new hardware device. Windows XP Professional then automatically detects the device, installs any necessary drivers, and updates the system. If Windows XP Professional does not automatically detect new hardware during installation, you can use the Add Hardware Wizard to install and configure the new hardware.

Installing Plug and Play Devices

Topic Objective
To explain the installation of Plug and Play devices.

Lead-in
Installation of Plug and Play devices greatly simplifies adding new hardware to your configuration.



When you install a new device, Windows XP Professional will detect and configure the device. How the detection occurs depends on the type of device that you install:

- For USB (universal serial bus), IEEE 1394, SCSI (small computer system interface), and other devices that are Plug and Play compliant, just plug in the device. Detection is automatic.
- For PCI and ISA Plug and Play cards, turn the computer off, and then install the device. When you restart the computer, Windows XP Professional detects the device and starts the Plug and Play installation procedures.

When you install a Plug and Play device, Windows XP Professional automatically configures the device so that it will work properly with the other devices that are installed on your computer. If prompted, follow the instructions on the screen to choose a destination path to load the appropriate device driver, and then restart your computer, if prompted.

As part of that configuration process, Windows XP Professional assigns a unique set of system resources to the device that you are installing. System resources are specific channels and addresses used by the device and the computer to communicate with each other. For Plug and Play devices, Windows XP Professional automatically ensures that these resources are configured properly.

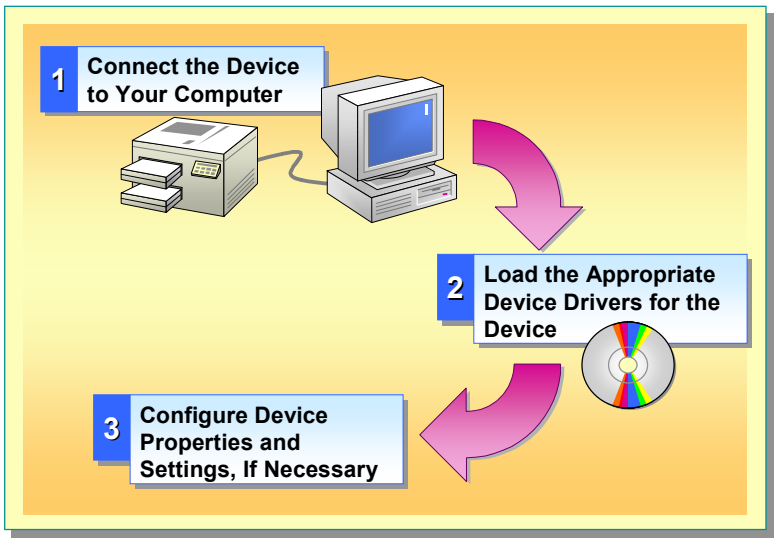
Some Plug and Play devices take advantage of Advanced Power Management features available in Windows XP Professional, however, this is not a requirement for a device to be Plug and Play.

To install a Plug and Play device, you must be logged on as Administrator or a member of the local Administrators group.

Installing Non-Plug and Play Devices

Topic Objective
To explain the installation of non-Plug and Play devices.

Lead-in
Installing a non-Plug and Play device involves loading the appropriate device drivers.



If you have non-Plug and Play devices, obtain the device drivers from either the Microsoft Windows XP Professional CD-ROM, the Windows Web site at windowsuppdate.microsoft.com, or the setup program or drivers from the device manufacturer. Then, to install the device:

1. Connect the device to the appropriate port, or insert the device into a slot on your computer, according to the device manufacturer's instructions.
2. Use the Add Hardware Wizard to identify the type of device that you are installing.
3. Insert the Windows XP Professional CD-ROM or the manufacturer's disk so that Windows XP Professional can load the proper device drivers.
4. After you load the device drivers onto your system, Windows XP Professional configures the properties and settings for the device. If instructed by the setup program or documentation, you may need to configure the resources manually.

To open the Add Hardware Wizard:

1. Click **Start**, right-click **My Computer**, and then click **Properties**.
2. On the **Hardware** tab, click **Add Hardware Wizard**.

Note You must be logged on as an administrator or a member of the Administrators group to use the Add Hardware Wizard or Device Manager to configure a device. If your computer is connected to a network, group policy settings may also prevent you from installing certain types of hardware.

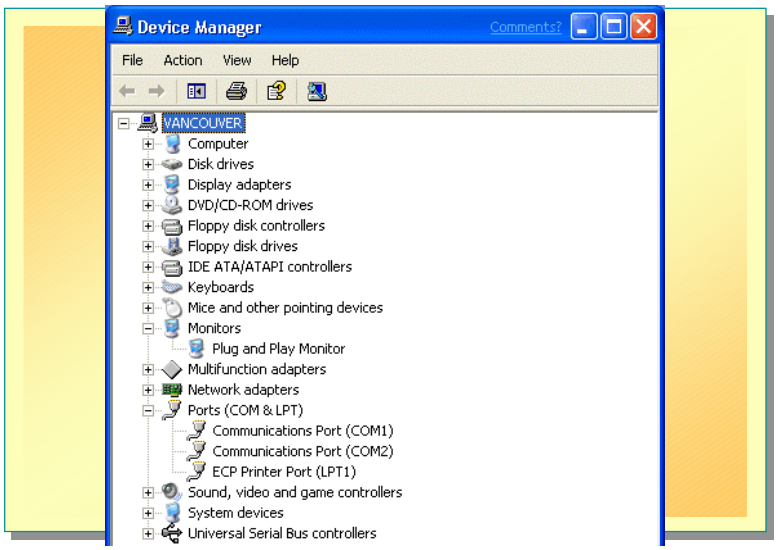
When you install a non-Plug and Play device, the setup program that comes with the device will specify what resources are required for the device to communicate with Windows XP Professional. If these resources are available to the operating system, the installation is successfully completed. Depending on the type of device that you are installing, you may need to manually configure these resource settings in Device Manager. The resource settings should be supplied in the documentation that comes with your device.

You normally would not manually change resource settings, because doing so causes the settings to become fixed; that is, Windows XP Professional does not reassign resources that have been manually changed. Windows XP Professional will then have less flexibility when allocating resources to other devices. If too many resources become fixed, Windows XP Professional may be unable to install additional Plug and Play devices.

Viewing Installed Devices

Topic Objective
To view device settings using Device Manager.

Lead-in
Device Manager enables you to view device settings and configuration information.



With Device Manager, you can view a list of installed devices, enable or disable devices, troubleshoot devices, update drivers, and use Driver Rollback.

Delivery Tip
Demonstrate Device Manager, how to expand the tree, and how to view the device property sheet.

To run Device Manager:

1. Click **Start**, right-click **My Computer**, and then click **Manage**.
2. Under **System Tools,** click **Device Manager**.

Device Manager displays a list of the active devices as detected from the configuration information in the registry. The list, also known as the *device tree*, is recreated each time the computer is started, or whenever a dynamic change occurs to the computer configuration. An example of a dynamic change is the installation of a Plug and Play device.

Each element in the device tree, or branch in the tree, is referred to as a *device node*. Double-click on a node, Monitors for example, and the installed device or devices under the node are displayed.

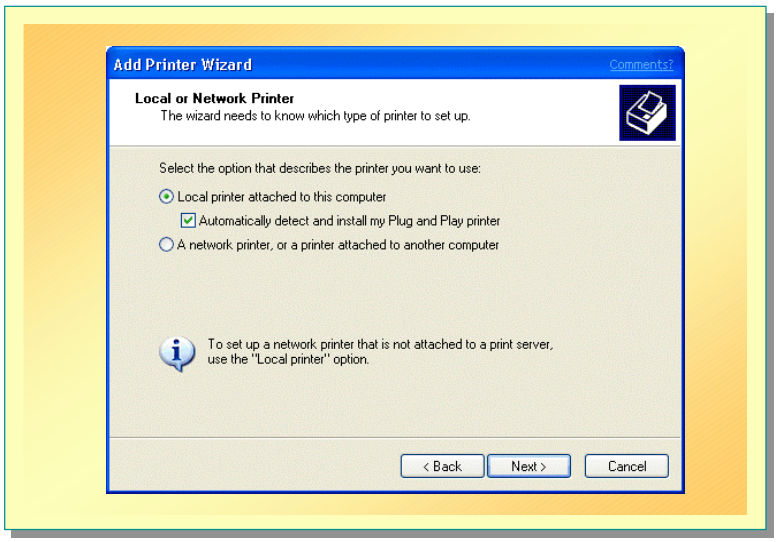
The device tree indicates whether the device node is a bus device. Each bus device in the tree has additional device nodes under it. Specific icons indicate the device type and any device conflicts on the computer. If an error state exists, an error code or icon is also displayed.

To update the driver for the device, disable or uninstall the device, scan for hardware changes, or view the device properties, you can right-click the device, and then make your selection on the menu. Double-click on the device, and the device's properties sheet displays.

Adding a Local Printer

Topic Objective
To install a local printer and set printing preferences.

Lead-in
If the printer is Plug and Play, installation is as simple as plugging it into the computer.



To start Plug and Play printer installation, plug your printer into your computer. In most cases, Windows XP Professional automatically configures the printer and activates it. During this process, Plug and Play installs the appropriate drivers, and you do not need to restart your computer. If the installation fails, you can enable detection for Plug and Play by using the Add Printer Wizard.

Using the Add Printer Wizard

Delivery Tip
Demonstrate how to run the Add Printer Wizard.

To install a local printer by using the Add Printer Wizard:

1. Open **Control Panel**, click **Printers and Other Hardware**, and then click **Printers and Faxes**.
2. Under Printer Tasks, click **Add a Printer**, and then follow the instructions in the Add Printer Wizard.

Plug and Play is available only for printers that are connected directly to your computer. Plug and Play is not available for networked printers.

Although Windows XP Professional includes drivers for many popular printers, you must provide the driver if your printer uses a driver that is not included with Windows XP Professional. If Plug and Play detects that your computer does not have a driver for your printer, you are prompted to provide it.

Typically, Plug and Play automatically detects printers that use USB ports. Plug and Play also detects printers that use parallel or serial ports, but then you must install these printers by using the Add Printer Wizard. You can also enable detection of Plug and Play using the Add Hardware Wizard.

Note The minimum required permissions for installing local printers is Power User.

Printing Preferences

Delivery Tip
If you have a printer installed on your instructor computer, open the print dialog box and show the Preferences tab. Point out the contents of the Printing Preferences is dependent on the type of printer.

For some printers, advanced options are available. Refer to the documentation that is provided with your printer for a list of these additional features. To view or gain access to Printing Preferences:

1. Open **Control Panel**, click **Printers and Other Hardware**, and then click **Printers and Faxes**.
2. Right-click the printer that you want to set preferences on, and then click **Open**.
3. On the **Printer** menu, click **Printing Preferences**.

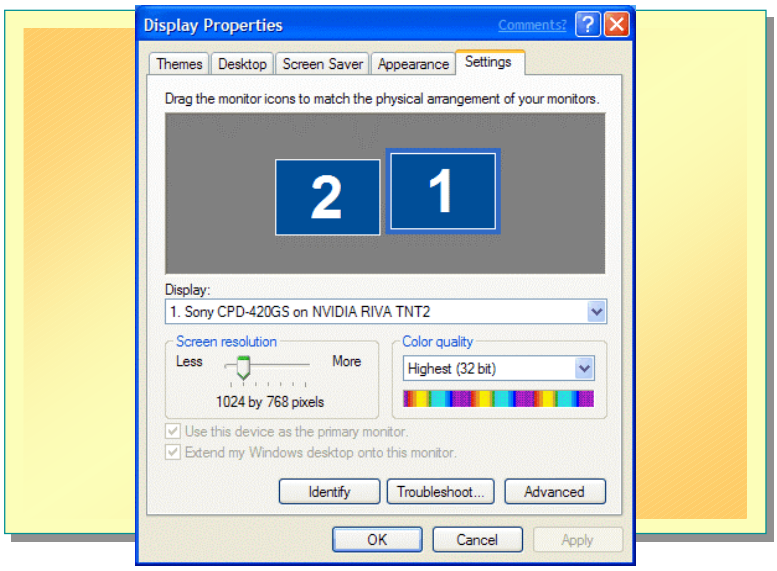
   Printing Preferences settings are maintained across different documents, so you can establish a standard output for all documents. Printing Preferences determine default print job settings, but you can override these defaults in the **Print** dialog box.

By using the Printing Preferences, each user can set different preferences for a printer. Because Printing Preferences are preserved for each user, preferences do not need to be reset each time the printer is used.

Configuring Multiple Monitors

Topic Objective
To illustrate the interface for configuring multiple monitors.

Lead-in
Windows XP Professional supports the use of multiple monitors.



Key Point
To be compatible with multiple monitor support, the display adapter must be PCI or AGP.

Using multiple monitors is desirable for users who work with multiple applications and need to view their interaction with these applications simultaneously. By using multiple monitors, you can configure up to ten monitors so that the Windows XP Professional desktop display can be spread across all of the monitors. For each display, you can adjust the position, resolution, and color depth.

To use the multiple monitor features, a monitor must:

- Have an installed PCI (Peripheral Component Interconnect) or AGP (Accelerated Graphics Port) device.
- Run in graphical user interface (GUI) mode or without using Video Graphics Array (VGA) resources.
- Have a Windows XP Professional driver that enables it to be a secondary display.

If you have an onboard display device, it must be used as the VGA device. Some computers cannot activate the onboard display when a VGA-capable PCI display device is present. In this case, disable the hardware VGA for secondary devices so that the onboard device runs a Power-on Self Test (POST) routine. You can also disable the hardware VGA for the secondary displays.

If your computer has a video adapter built on the computer's system board, contact the computer's manufacturer to determine if multi-monitor capability is supported. If it is not supported, disable the existing onboard adapters and install new video adapters before continuing with the multiple monitor installation.

Installing Additional Video Adapters

To install additional monitors:

1. Turn off your computer.
2. Insert your additional PCI or AGP video adapter into an available slot.
3. Plug your additional monitor into the card.
4. Turn on your computer. Windows XP Professional will detect the new video adapter and install the appropriate drivers.
5. Open Control Panel, and then double-click **Display**.
6. On the **Settings** tab, click the monitor icon that represents the monitor that you want to use in addition to your primary monitor.
7. Select the **Extend my Windows desktop onto this monitor** check box, and then click **Apply**.
8. Select the color depth and resolution for the secondary display.
9. Repeat steps 6 through 8 for each additional display, and then click **OK** to close the **Display Properties** dialog box.

In the **Display Properties** dialog box, one monitor is designated as the primary display. This is the default display used for prompts and pop-up windows and has full hardware Microsoft DirectX® Graphics acceleration. It is also the only display that can run DirectX applications in full-screen mode.

Changing the Primary Monitor

When you start the computer, the primary monitor serves as the central focus for all activity. By default, any logon screen appears on the primary monitor. When you open a program, the opening windows also appear on the primary monitor until you move them.

To change the primary monitor:

1. Double-click **Display** in Control Panel.
2. On the **Settings** tab, click the monitor icon that represents the monitor you want to designate as primary.
3. Select the **Use this device as the primary monitor** check box and then click **OK**.

Note that this check box is unavailable when you select the monitor icon that is currently set as your primary monitor.

Arranging Multiple Monitors

You can arrange the position of multiple monitors to represent their physical arrangement. This simplifies your ability to move items around from one monitor to another. To arrange multiple monitors:

1. Double-click **Display** in Control Panel.
2. On the **Settings** tab, click **Identify** to display an identification number that corresponds to each of the monitor icons.
3. Drag the monitor icons to arrange them, and then click **OK**.

The icon positions determine how you move items from one monitor to another. For example, if you are using two monitors and you want to move items from one monitor to the other by dragging left and right, place the icons side by side. To move items between monitors by dragging up and down, place the icons one above the other.

Lab 3A: Using Driver Rollback to Restore a Device Driver

Topic Objective
To introduce the lab.

Lead-in
In this lab, you will use the Update Driver option in Device Manager to update to a newer or different device driver and use the Roll Back Driver option in Device Manager to roll back to a previously installed device driver.

Objectives

After completing this lab, you will be able to:

- Update to a newer or different device driver by using the Update Driver option in Device Manager.
- Roll back to a previously installed device driver by using the Roll Back Driver option in Device Manager.

Lab Setup

To complete this lab, you need a computer running Windows XP Professional configured as a member of the nwtraders domain.

Estimated time to complete this lab: 15 minutes

Working with Drivers

Topic Objective
To identify the features that Windows XP Professional provides to assist you with the installation and management of device drivers.

Lead-in
Windows XP Professional provides a number of features that assist you in managing device drivers.

- **Driver Signing**
- **Updating Drivers**
- **Driver Rollback**

For a device to work properly with Windows, *device drivers* must be loaded onto the computer. A device driver is software that enables the operating system on a computer to communicate with the hardware device. Hardware devices are supported by one or more device drivers, which are typically supplied by the manufacturer. However, some device drivers are included with Windows XP Professional. For a complete list of supported drivers, see http://windowsupdate.microsoft.com.

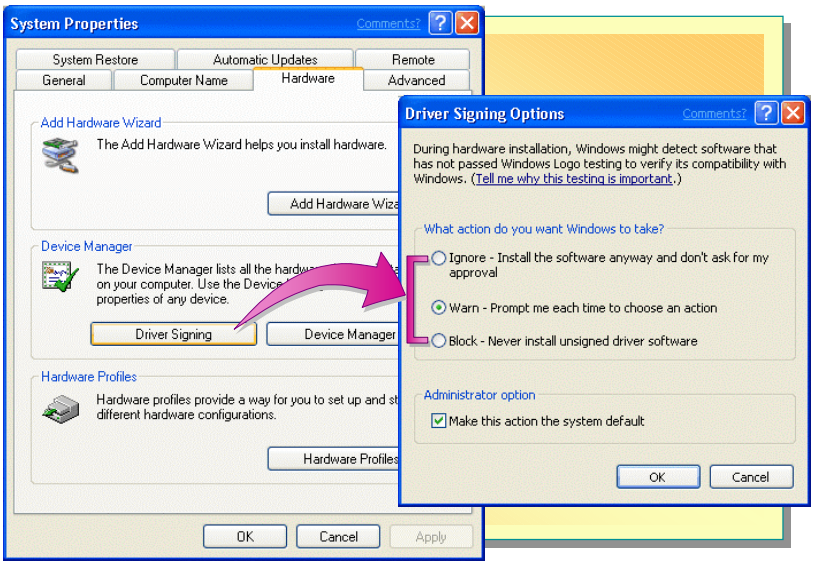
There are a number of features that Windows XP Professional provides that makes it easy to install, update, and manage device drivers. These features are:

- Driver signing.
- Automatic updates.
- Driver rollback.

Driver Signing

Topic Objective
To identify the properties that you use to configure digital signing options.

Lead-in
The system files that are provided with Windows XP Professional have a digital signature from Microsoft, which ensures that a particular file has met a certain level of testing, and that the file has not been altered or overwritten by another program's installation process.



If a driver is digitally signed, it has been tested and verified for a particular operating system by the signing authority. Software for hardware products with the Designed for Windows XP logo have been digitally signed indicating that the product has been tested by Microsoft, and has not been altered. For the best performance, Microsoft recommends using hardware products that display the Designed for Windows XP logo on the external packaging and on the device itself.

The driver files that are provided with Windows XP Professional have a digital signature from Microsoft. These signatures ensure that the file:

- Has passed compatibility tests administered by the Windows Hardware Quality Lab.
- Has NOT been altered or overwritten by another program's installation process.

Sometimes, when you install new software on your computer, the software installation process overwrites system files with older and sometimes incompatible versions of system files. The incompatible files can cause system instability.

Digital signatures are required for all vendor-provided drivers that are available on the Windows XP Professional CD-ROM, and for drivers published on the Windows Update Web site.

Driver signing uses cryptographic technology to store identifying information in a catalog (.cat) file. This information identifies the driver as having passed testing by Windows Hardware Quality Labs. No change is made to the binary file of the driver. Instead, a .cat file is created for each driver package and the .cat file is signed with a digital signature from Microsoft. The relationship between the driver package and its .cat file is referenced in the driver's .inf file and is maintained by the system after the driver is installed.

Controlling Unsigned Drivers

You can configure driver-signing options to control how Windows XP Professional responds if an installation program attempts to add unsigned drivers to the system. To configure driver signing options:

Delivery Tip
Demonstrate the steps for controlling unsigned drivers.

1. Click **Start**, right-click **My Computer**, and then click **Properties**.
2. On the **Hardware** tab, click **Driver Signing**, click one of the following options, and then click **OK**:
   - **Ignore**. Installs all device drivers, regardless of whether they have a digital signature.
   - **Warn**. Displays a warning when it detects device drivers that are not digitally signed. This is the default setting.
   - **Block**. Prevents users from installing device drivers that do not have digital signatures.

Identifying Unsigned Files

Use file signature verification to identify unsigned files on your computer and specify verification options. These tasks are useful when determining whether to update a driver or when troubleshooting a problem you suspect is related to a driver.

To use file signature verification:

Delivery Tip
Demonstrate the steps for identifying unsigned files.

1. Click **Start**, click **Run**, type **sigverif** in the **Open** box, and then click **OK**.
2. Click **Start** to identify any files that are not signed.

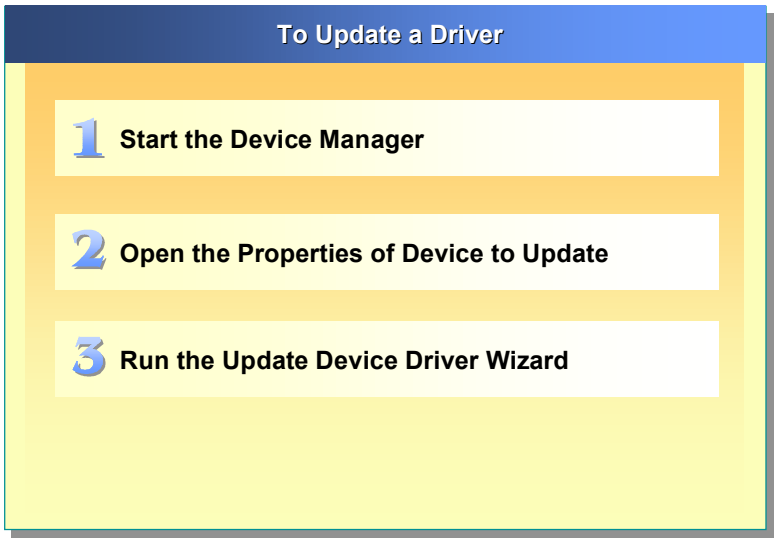
   A list of files that have not been digitally signed appears.
3. To set verification options, click **Advanced**. The **Advanced File Signature Verification Settings** dialog box appears.

   You can choose to be notified if any system files are not signed, or you can search for files that are not digitally signed.
4. To create, save, or view a log file, click the **Logging** tab. The log file contains the results of the search. This log file can be archived and used during troubleshooting to compare driver settings from one point in time to another point in time.

Updating Drivers

Topic Objective
To discuss and demonstrate how to updating drivers.

Lead-in
Windows XP Professional provides a Web site for updating certain system files including device drivers.



Windows XP Professional users can install or update drivers from the Windows Update Web site, which is an online extension of Windows XP Professional, and provides a central location to find product enhancements, such as Service Packs, device drivers, and system security updates. When a user accesses the Windows Update Web site, Microsoft ActiveX® controls compare the drivers that are installed on the user's system with the latest updates available. If newer drivers are found, Windows Update downloads and installs them automatically.

The drivers that are offered to users from Windows Update are high quality and reliable. These drivers are assigned a unique, four-part identification number, referred to as the *hardware ID*, which ensures standard quality.

Delivery Tip
Demonstrate the steps for updating device drivers.

To update a device driver:

1. Click **Start**, right-click **My Computer**, and then click **Manage**.
2. Under **System Tools**, click **Device Manager**.
3. In Device Manager, right-click the device that you want to update, and then click **Properties**.
4. On the **Driver** tab, click **Update Driver** to open the Hardware Update Wizard, and then follow the instructions in the wizard.

Administrative rights are not required to update a driver from Windows Update if the driver installation requires no user interaction, which depends on the type of driver being installed. By using the Automatic Updates feature, you can configure your computer to download new updates when they become available.

To start Windows Update, you can do any one of the following:

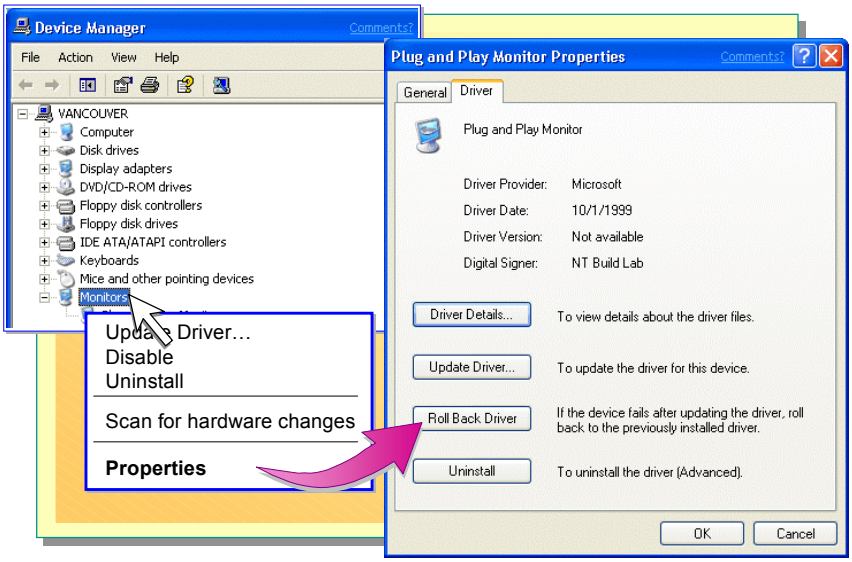
- Point your browser to the Windows Update Web site.
- On the **Start** menu, click **All Programs**, and then click **Windows Update**.
- Use the Update Driver feature in Device Manager.
- Run the Add Printer Wizard for printer drivers.

Windows Update only updates drivers that have the exact hardware ID as the installed devices. If an exact hardware ID match exists, Windows Update determines if the driver version that is being offered is more recent than the existing driver version. If an updated driver on Windows Update is available, the .cab file is downloaded. Windows XP Professional device drivers are stored in a single cabinet file named Driver.cab. This file is used by Setup and other system components as a driver file source.

Driver Rollback

Topic Objective
To introduce the function of the Driver Rollback tool.

Lead-in
Driver Rollback is a tool that makes damaged drivers easier to repair.



Driver Rollback is a system recovery feature that is available in Windows XP Professional. Driver Rollback enables you to reinstall the last device driver that was functioning before the installation of the current device driver. This reinstallation enables users to recover from system problems that result from the installation or update of a particular driver.

Unlike some other system restore tools, Driver Rollback restores only the previous driver of the specified device, and does not affect other system settings. Only use this tool when you are certain that a particular driver is causing a problem, and you want to revert to the previously installed driver.

Rolling Back a Driver

If you experiences system problems after installing or updating to a new driver, you can roll back to the previous driver. To roll back a driver:

1. Open **Device Manager**.
2. In the details pane, expand the hardware category to which the device driver belongs, right-click the device driver, and then click **Properties**.
3. On the **Driver** tab, click **Roll Back Driver**.
4. In the dialog box, click **Yes**, and then click **OK**.

If no backed-up driver is available, then Driver Rollback is not a possible option. In this case, a dialog box states that a rollback is not possible, and offers the user the opportunity to troubleshoot the driver.

Windows XP Professional will back up drivers that are active and functional. It will not back up inactive or dysfunctional drivers.

Note Driver Rollback is available for any device except printers. Printers cannot use Driver Roll Back because the drivers are not configured through Device Manager; they are configured through Printers and Faxes.

When rolling back to an unsigned driver package, SetupAPI will prompt the user before overwriting the newer driver. The prompt does not appear when rolling back to a signed driver package.

Driver Storage

In the event that you need to restore a version of the driver from a backup or from another computer, Windows XP Professional stores the original driver files:

- .sys file is the system configuration file.
- .inf file is the device information file and contains scripts used to control hardware operations.

The files for the original driver package are stored in the following folder structure: %systemroot%\system32\reinstallbackups\. The ReinstallBackups folder is created the first time a user updates an existing driver package on the system.

Lab 3B: Adding and Removing Devices Using the Hardware Wizard

Topic Objective
To introduce the lab.

Lead-in
In this lab, you will use the Hardware Wizard to install Plug and Play devices, and non-Plug and Play devices. You will also enable and disable hardware devices by using Device Manager.

Objectives

After completing this lab, you will be able to:

- Use the Hardware Wizard to install Plug and Play devices.
- Use the Hardware Wizard to install non-Plug and Play devices.
- Enable and disable hardware devices by using Device Manager.

Prerequisites

Before working on this lab, you must have experience logging on and off Microsoft Windows XP Professional.

Lab Setup

To complete this lab, you need a computer running Windows XP Professional configured as a member of the Nwtraders domain.

Estimated time to complete this lab: 15 minutes

Troubleshooting Hardware Devices

Topic Objective
To Introduce troubleshooting topics.

Lead-in
When a system problem occurs and you suspect the origin of the problem is hardware, Device Manager provides information and services to assist you in troubleshooting the problem.

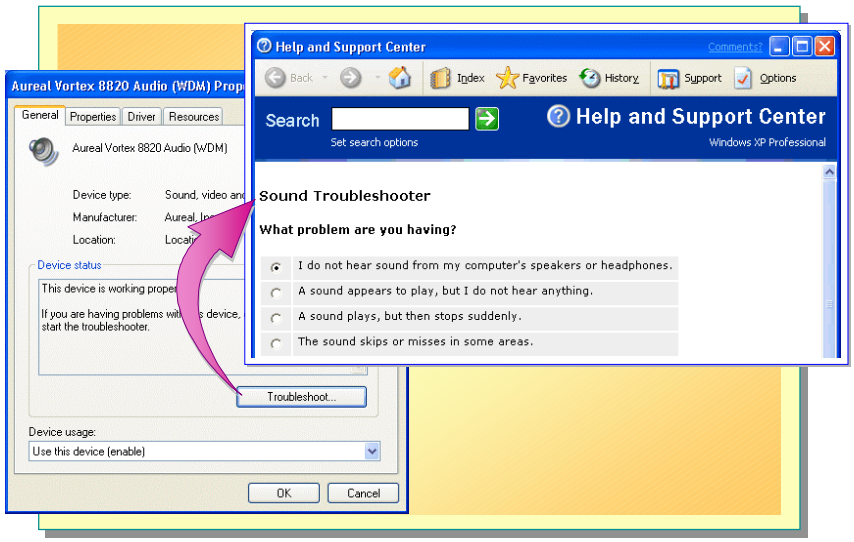
- Using Device Manager to Troubleshoot Devices
- Removing Devices
- Configuring Resources

Any device that is installed on your system can cause startup and stability problems. Device Manager provides valuable information and services that can assist you in troubleshooting hardware devices. For example, devices that have resource conflicts or other problems are marked with a yellow exclamation point in the device tree. Also, you can fix problems with device drivers by updating or uninstalling the driver from Device Manager. When you are not sure of the origin of the problem, you can disable a device using Device Manager to see which device might be causing a problem.

Using Device Manager to Troubleshoot Devices

Topic Objective
Introduce Hardware Device Troubleshooter available in Device Manager.

Lead-in
Device Manager provides information about the installed devices in your configuration. Additionally, it provides information about the operating status of the device.



The list of devices that appear in Device Manager can provide valuable information about problems that you may be encountering with hardware. For example, devices that have such problems as resource conflicts are marked with a yellow exclamation point.

Delivery Tip
Provide a brief tour of Device Manager and demonstrate opening the Troubleshooting Wizard.

You can fix problems with device drivers by updating or rolling back the driver from Device Manager. You can view a device's properties and system resources to establish where a conflict originates. You can disable a device by using Device Manager to see which device might be causing a problem.

Device Manager provides a hardware device troubleshooter to help resolve device problems. To troubleshoot hardware devices:

1. Click **Start**, right-click **My Computer**, and then click **Manage**.
2. Under **System Tools**, click **Device Manager**.
3. In Device Manager, right-click the device that you want to update, and then click **Properties**.
4. On the **General** tab, view the device status. If you are having problems with the device, click **Troubleshoot**.

   Follow the instructions provided in the Help and Support Center.

Viewing Hidden Devices

Device Manager does not display all devices by default. Non–Plug and Play devices and devices that were previously attached to the computer are hidden. Previously attached devices are those devices whose drivers are on the computer even though the hardware is no longer attached to the computer. You can set Device Manager to view currently attached hidden devices or previously attached devices, also known as *nonpresent* devices, to review their status or to troubleshoot problems.

To view currently attached hidden devices, in Device Manger, click the **View** menu, and then click **Show hidden devices**.

Viewing Nonpresent Devices

To set Device Manager to always show previously attached, or nonpresent, devices:

1. Click **Start**, right-click **My Computer**, and then click **Properties**.
2. On the **Advanced** tab, click **Environment Variables**.

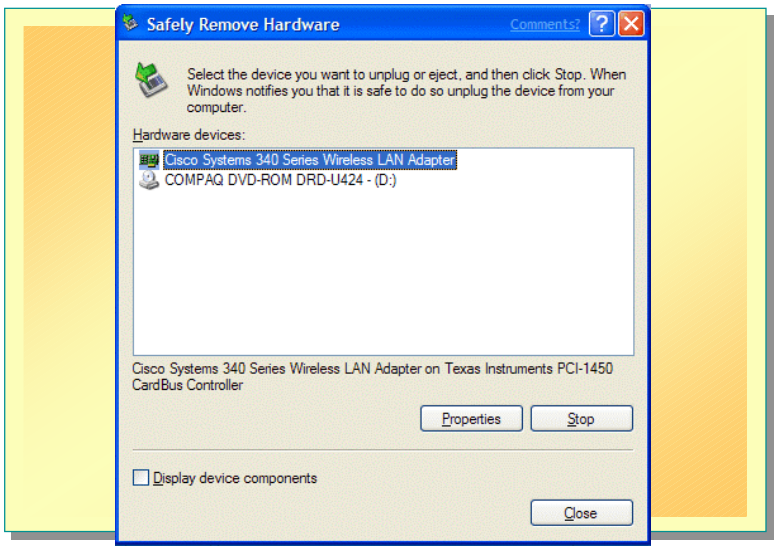
   The **Environment Variables** dialog box appears, and contains two sections: **User variables for** *user_name* (where user name is the name of the user that is currently logged on) and **System variables**. The changes that are made by adding a variable in the **User variables for** *user_name* section will apply only to the specific user. In other words, if another user logs on to the computer, this variable will not be set for that user. If you want this variable to apply to all users that log on to the computer, add the variable to **System variables**.
3. Click **New** to enter a variable in either the **User variables for** *user_name* or **System variables** dialog box.
4. In the **New User Variable** dialog box, in the **Variable name** box, type:

   DEVMGR_SHOW_NONPRESENT_DEVICES
5. In **Variable Value**, type **1**
6. Click **OK**, and then click **OK** in the **Environment Variables** dialog box to apply this change.

Removing Devices

Topic Objective
To describe and demonstrate safe removal of hardware devices.

Lead-in
Some devices can be unplugged from the computer without any warning to the operating system. However, some devices must be removed by using a specific procedure to avoid problems that can result in either data loss or system shutdown.



Plug and Play devices can be plugged in or removed while the system is running. Windows XP Professional detects the device and configures the system appropriately. However, it is recommended that you first turn off the computer before plugging in or removing any device, because the device may not be designed to be removed while the system is running, and removal might cause problems. For example, if data transfers are in progress when certain devices are removed, or if the operating system tries to gain access to particular types of devices that have been removed, the result may be data loss, data corruption, or a system shutdown.

Devices that are designed to be removed while the system is turned on are:

- All USB devices.
- IEEE 1394 devices, except removable storage devices.
- PC Card devices.
- CardBus devices.

Surprise Removal of Devices

If you remove devices from a computer without first stopping the device, it is called a *surprise removal*, because the action is a surprise to the operating system. Typically, Windows XP Professional can function normally with a surprise removal because the device drivers are designed to notify the operating system when removal occurs. Surprise removal frequently occurs when the device's connection does not physically prevent the user from removing the hardware, such as when the hardware is not inside the computer case or secured with a mechanical interlock.

Surprise removal of portable computers from docking stations is also common, especially when the computers are in low-power states. For more information about surprise removal and undocking for portable computers, see Module 10, "Supporting Remote Users," in Course 2272A, *Implementing and Supporting Microsoft Windows XP Professional (Course Beta)*.

The impact that surprise removal has on the operating system varies, depending on the hardware. The following list describes the effects that surprise removal has on various types of hardware:

- Removable Storage Devices.

  Removal of some removable storage devices during data transfer can cause data loss or data corruption. The device driver for supported removable storage devices enables the operating system to determine if a specific storage device is removable while the system is turned on. For all removable storage devices that can be safely be removed while the system is on, the operating system will, by default, disable write caching so that the devices can be removed without the risk of data loss. The disabling of write caching means that data written to the storage device is written immediately instead of stored to be written in larger chunks. Because the data is written immediately, the performance of the storage device may be slower.

- PC Card, CardBus Cards, Parallel and COM port devices.

  Removal of any of these devices while the driver is writing to its ports can cause the system to stop, which will require that the system be restarted. While it is recommended that you first turn off the computer before plugging in or removing any device, it is especially true for these types of devices.

- Applications.

  Applications that are running might stop responding or "hang" as a result of a surprise removal. Before removing a device that is communicating with an application, first quit the application then proceed with removing the device.

Safe Removal Application

Before you remove a Plug and Play device, see if the Safe Removal icon appears in your notification area. If it does, it is recommended that you use the Safe Removal application to notify the operating system that the device is about to be unplugged.

To notify the operating system about removing a Plug and Play device, you can right click on the Safe Removal icon in the notification area and select the device you wish to remove. You can also:

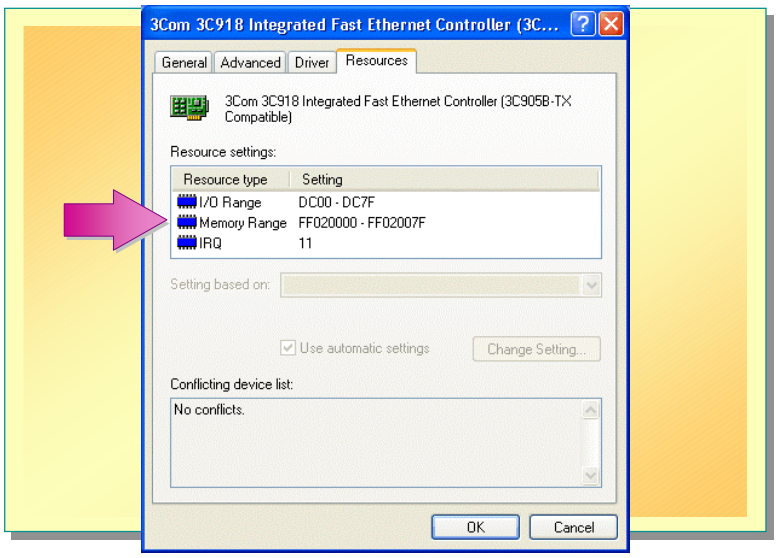
1. Click the Safely Remove Hardware icon in the notification area, which displays a dialog box listing the devices currently attached to the system.
2. Select the device you wish to remove from the list of devices.
3. Click **Stop** to tell the operating system that you will be unplugging the device.
4. In the **Stop a Hardware device** dialog box, click **OK**.

   You will see a notification, which tells you that it is safe to remove hardware. The requested device can now be safely removed from the system.

Configuring Resources

Topic Objective
To describe how and when to manually configure resources.

Lead-in
Each installed device is allocated a set of resources.



Each installed device must be allocated a set of resources to operate properly. Some of these resources can be shared, while others cannot, depending upon the capabilities of the hardware and drivers. These resources, such as channel addresses, enable hardware components to gain access to the CPU and memory resources without conflicting with one another.

Plug and Play devices have no default settings of their own. Instead, Windows XP Professional identifies devices and their resource requests and arbitrates the requests among them. If more than one device requests the same resource, Windows XP Professional might change the settings of those devices to accommodate the request.

After a hardware device is installed, if it does not initialize or operate properly, you might need to change its resource settings so that the device initializes correctly.

Changing Resource Settings

You must not change resource settings for a Plug and Play device unless it is absolutely necessary to fix a problem with a device. Changing resource settings permanently assigns the resources, making it impossible for Windows XP Professional to grant another device's request to use that same resource.

If you must manually change the configuration of a device, use Device Manager instead of using Registry Editor. Before making any changes to your device configuration, back up your System State Data so that you can restore your original settings, if necessary.

Use the following strategies when using Device Manager to resolve device conflicts manually:

- Identify a free resource and assign it to the device that requires the resources.
- Disable a conflicting Plug and Play device to free its resources.
- Disable a non-Plug and Play device to free its resources by both the non-Plug and Play device and its associated drivers.
- Rearrange resources used by one or more devices to free the resources that the conflicting device requires.

Caution Change resource settings only if absolutely necessary. Changing resource settings can cause conflicts and cause you to lose Plug and Play functionality. Also, before changing resource settings make sure that the problem is a resource conflict and not a missing driver.

To change resource settings for a device by using Device Manager:

1. In Device Manager, expand the device class to show the available devices.
2. Right-click the device, and then click **Properties**.
3. On the **Resources** tab, notice that the **Conflicting device list** shows conflicting values for resources used by other devices.
4. In the **Resource type** list, select the setting that you want to change, clear the **Use automatic settings** box, and then click **Change Setting**.

   If there is a conflict with another device, an error message will appear, stating that the resource setting cannot be modified. Browse for a configuration that you can use to change resource settings without conflicting with other devices.
5. Click **OK**, and then restart Windows XP Professional.
6. Open Device Manager and verify that the settings are correct for the device.

Caution Do not use Registry Editor to edit the registry directly unless you have no alternative. The registry editors bypass the standard safeguards provided by administrative tools. These safeguards prevent you from entering conflicting settings and settings that are likely to degrade performance or damage your system. Editing the registry directly can have serious, unexpected consequences that can prevent the system from starting and require that you reinstall Windows XP Professional.

In the event that you want to obtain and archive a hardcopy of your computer and device resource settings, Windows XP Professional generates a report that captures these settings. This type of report can be used to assist you in restoring computer settings to a previous configuration, or in duplicating settings from one computer to another. To create a hard copy of the resource setting:

1. In Device Manager, highlight the device that you are interested in, and on the **Action** menu, click **Print**.
2. In the **Report type** section, select a system summary report, a report of the selected class or device, or a report of all devices and a system summary.
3. Click **Print** to send the report to the printer.

Restoring Resources to Original Settings

If necessary, you can restore resource settings that have been changed, back to the original values. To restore settings:

1. Open **Device Manager**, right-click the desired device, and then click **Properties**.
2. On the **Resources** tab, select the **Use automatic settings** box, and then click **OK**.

Review

Topic Objective
To reinforce module objectives by reviewing key points.

Lead-in
The review questions cover some of the key concepts taught in the module.

- Installing and Configuring Hardware Devices
- Working with Drivers
- Troubleshooting Hardware Devices

1. You are the administrator for 100 Windows XP Professional computers, and a user reports that their DVD (digital video disc) drive has stopped working. Upon further questioning you discover the user has recently updated the driver for their DVD-ROM drive. How do you easily fix this issue?

   The best method would be to utilize the driver rollback feature to restore the original driver.

2. A user in your graphics department is trying to use their USB based digital camera, but they are not able to see the camera from Windows Explorer. What utility is best used to verify that the camera is present and the proper drivers are installed on this computer?

   By using Device Manager, you can see if the device is working properly and that the correct drivers are installed.

3. A user that uses a USB-based PC Camera for video conferencing, and needs to move the camera between 2 PC's during each day, reports that it takes too long to reboot each machine when the camera is moved from PC to PC. What can you say to this user to help with their problem?

   USB has hot plug-in capability and there is no need to reboot the computer when plugging and unplugging a USB device.

4. You are the administrator of 100 Windows XP Professional computers. Over the last month, a dozen occurrences have been reported of invalid device drivers being applied to various devices in the network causing hardware to quit functioning properly. What can be done to enforce the installation of only known good device drivers?

   Set the driver signing options to block any unsigned driver software.