

Chapter 10

Configuring Hardware and Printers

Getting hardware up and running in today's operating systems is not usually a problem. With Plug and Play technology, the initial installation and configuration will typically go smoothly. However, most of the time the software controlling the hardware (drivers) will need to be updated over time and might have to be rolled back in case of an issue in a new package. There will also be times when the drivers need to be installed manually for legacy hardware. You might also have to verify hardware configuration and make adjustments. The utility provided to perform these functions is Device Manager.

Device Manager displays all installed hardware, including input/output (I/O) devices like your mouse, keyboard, and monitor. It also displays information on storage, both removable and fixed, and communication devices like network interface cards and wireless and Bluetooth devices. What you won't see for hardware in Device Manager are printers (unless they're USB; in that case, you'll see the USB port and thus the printer will be identified, but you won't be able to configure the printer from here). You'll use the Devices And Printers applet for configuring and troubleshooting printers. New functionality in Windows 7 integrates some Device Manager functionality into Devices And Printers. This new functionality is known as Device Stage.

In this chapter, you'll learn how to:

- ◆ Use Device Manager
- ◆ Manage and update device drivers
- ◆ Install, uninstall, and disable hardware
- ◆ Manage I/O and removable storage devices
- ◆ Install and configure printers

Configuring Hardware

Device Manager in Windows 7 works the same way as it did in Vista and XP. Device Manager is designed to display information about the hardware installed on your computer, provides an interface to add new hardware, and lets you configure the hardware. Hardware today follows the Plug and Play standard, so simply connecting most hardware will allow Device Manager (well, the OS processes controlling devices that are displayed to you) to automatically configure

them. If you have devices that are not Plug and Play, you can install them manually from Device Manager as well. Windows 7 introduces a new functionality known as Device Stage, which is an enhanced graphic output that gives better details and functionality to installed devices such as cameras.

You can use Device Manager to ensure that all devices are working properly and to troubleshoot misbehaving devices. For each device installed, you can view specific properties of each device down to the resources being used, such as the input/output (I/O) port and interrupt requests (IRQs). The specific actions that you can take with Device Manager include the following:

- ◆ Viewing a list of all hardware installed on your computer
- ◆ Determining which device driver is installed for each device
- ◆ Managing and updating device drivers
- ◆ Installing new devices
- ◆ Disabling, enabling, and uninstalling devices
- ◆ Using driver rollback returning to a previous version of a driver
- ◆ Troubleshooting device problems

Although many of the features of Device Manager in Windows 7 work similarly to Device Manager in older versions of Windows, a new feature has been added to make configuration and use of some devices easier: Device Stage.

Introducing Device Stage

Throughout the evolution of technologies and PCs, one of the greatest features is how PCs let us use such a wide array of devices. Device Manager lets us see all the hardware connected and make configuration changes, but utilizing the features of the devices themselves has been left up to alternate programs outside the Windows interface. Windows 7 introduces a new specification for hardware vendors (knowing that most hardware comes with software for the user to interface with) that allows them to provide user access within Windows. The new feature and specification is known as Device Stage. Windows 7 Devices And Printers is the interface for displaying and accessing hardware that supports Device Stage. The Windows 7 Devices And Printers screen is shown in Figure 10.1.

Take the example of a digital camera. When you connect the camera to the PC, the PC recognizes the device (which is Plug and Play) and typically displays the camera as a mass storage device. The user wanting advanced features like downloading or editing the photos uses another program. When you plug in a device like a camera supporting Device Stage technology, Device Stage displays a single window that gives you easy access to common device tasks, such as importing pictures, launching the vendor-supplied editing program, or simply browsing all from one interface. With Windows 7, you'll be able to access all of your connected and wireless devices from the single Devices And Printers screen as well as the clicking the device that displays in the Windows 7 enhanced Taskbar and using the menu as shown in Figure 10.2. From this device menu, you can work with your devices, browse files on them, or manage device settings.

Device Stage-supported devices also include wireless and Bluetooth devices that make managing these resources for the end user more efficient than ever. As portable devices are disconnected and reconnected, the Device Stage-driven Devices And Printers screen updates in real time.

FIGURE 10.1
Devices And Printers

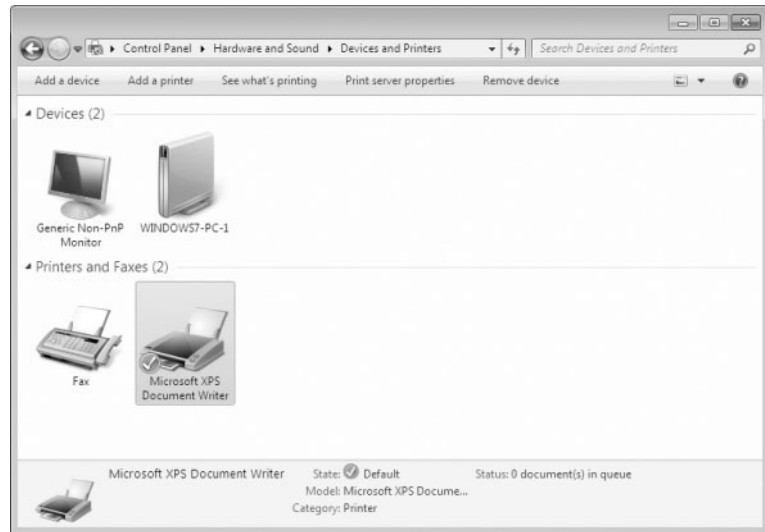
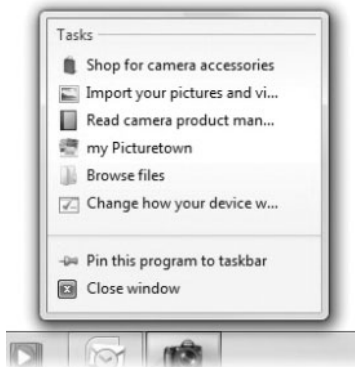


FIGURE 10.2
Device options appear in the Taskbar.



The following procedures will guide you through opening and viewing devices recognized on your Windows 7 machine.

Perform the following steps to find Devices And Printers in Control Panel:

1. Choose Start > Control Panel > Hardware And Sound.
2. Choose Devices And Printers from the main window.
3. Right-click a device to see functions specific to that device.

Perform the following steps to open Devices And Printers from the Start menu:

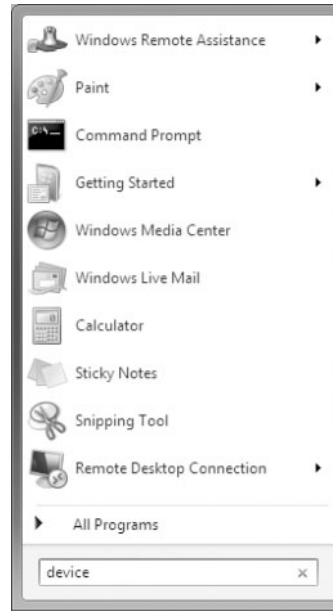
1. Click Start > Control Panel > Devices And Printers.
2. Right-click a device to see functions specific to that device.

Or you can do the following:

- ◆ Click the Start button and type **device** in the Start menu's search box, as shown in Figure 10.3, to launch Devices And Printers, the first applet in the search list.

FIGURE 10.3

Type the word *device* in the Start menu's search box.



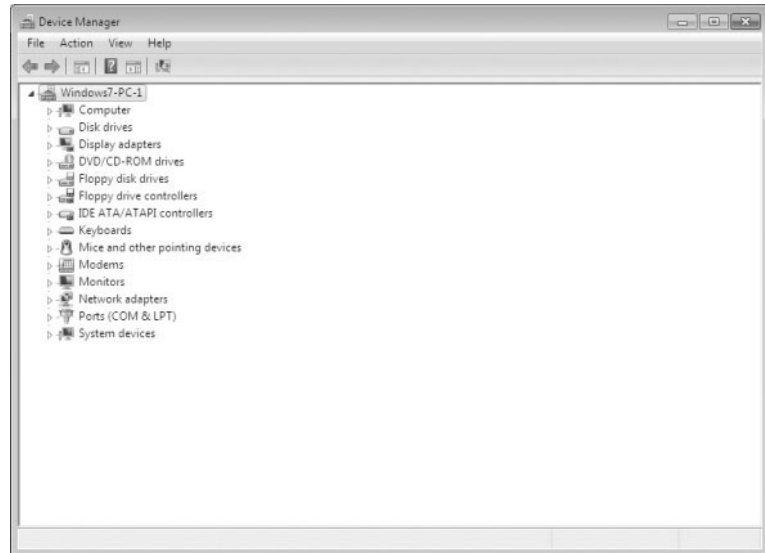
Using Device Manager

Device Manager is this first-line component in Windows 7 to display which devices are connected to your machine. More appropriately (and importantly) is the ability to see which devices Windows 7 has recognized. If you install or connect a new piece of hardware, you won't see it in Device Manager if Windows 7 doesn't recognize it. This would be an unusual occurrence given the sophistication of today's hardware vendors and the standards like Plug and Play that have been implemented. However, this is an important step in seeing just which devices are known to Windows 7.

In some cases, Windows 7 doesn't recognize a device but can tell what *type* of device it is. Device Manager adds an Unknown Device item with as much information about the device that it can present. Hopefully, this will give you enough information about the hardware so that you can manually install the device driver. Keep in mind that we've been using Device Manager for many versions of Windows, so what we're discussing is applicable to legacy versions as well. Device Manager has a fairly simple opening screen but a lot of functionality behind it. Open Device Manager in Windows 7 quickly by typing **Device Manager** in the Start menu's search bar and view the opening screen as shown in Figure 10.4.

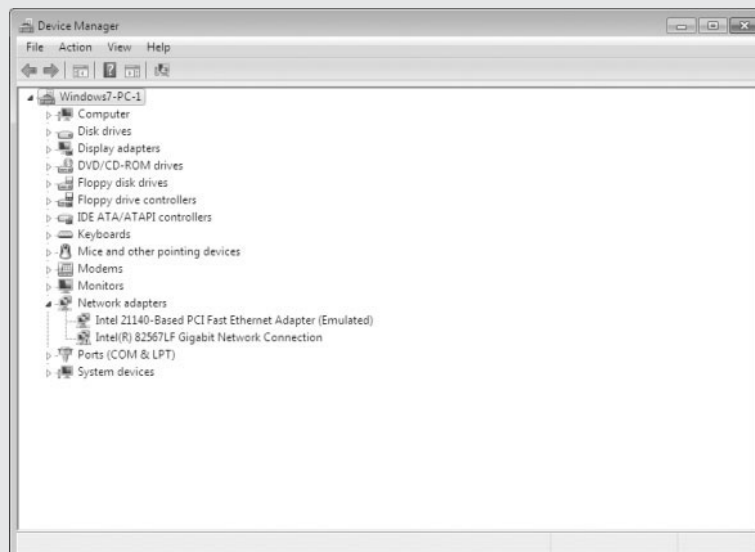
On the opening screen, you get a good first feeling for the hardware installed and recognized, as well as a glimpse at any major issues such as a device that's recognized but does not have its drivers installed or working correctly. How do you see that? A warning symbol is displayed over the misbehaving device. For example, say you have just installed a new network adapter but the device does not seem to be working. You can open Device Manager and click the Network Adapters option to start the troubleshooting.

FIGURE 10.4
Device Manager opening
screen



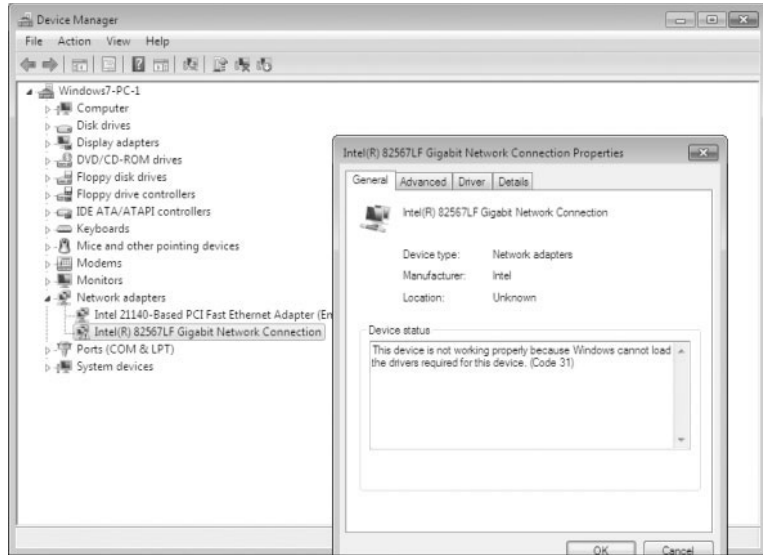
NOTIFICATION ICONS

When something occurs that's outside the normal functionality in a Windows interface, an additional notification icon appears. As shown in the following graphic, the yellow triangle with the exclamation point icon is the indicator that a device is experiencing difficulty. Informational notifications consist of a blue circle with a question mark. A critical error displays as a red circle with an X through it.



To continue troubleshooting a network adapter in Device Manager, you right-click the misbehaving adapter and select Properties to open the dialog box shown in Figure 10.5. This is just the start to the functionality within Device Manager.

FIGURE 10.5
Device Manager network
adapter properties
window

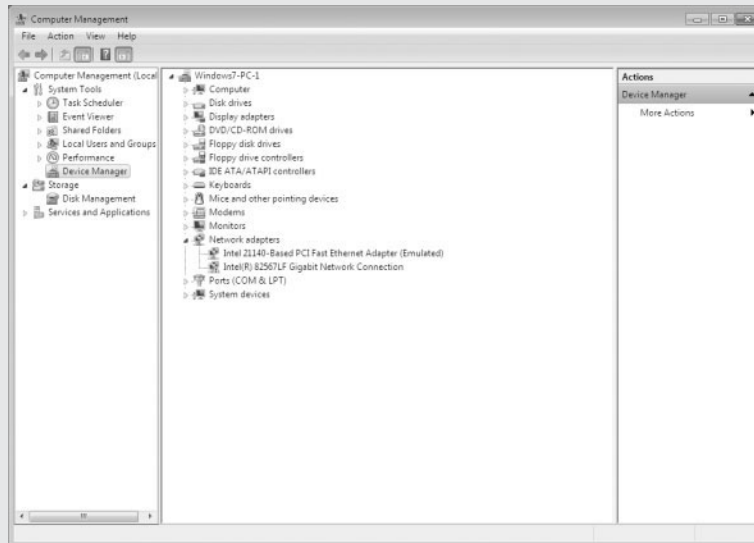


LAUNCHING DEVICE MANAGER AND VIEWING NETWORK ADAPTERS

There are many reasons to view the devices installed and configured on a machine. One reason is to verify hardware type and status. Suppose someone in your organization has given you documentation for a user's machine with the machine's hardware specifications. You're concerned that the stated network adapter for the machine may not be the one installed.

Follow these steps if you want Device Manager on the machine in question to show you the recognized network adapters in the machine:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (under Devices And Printers).
2. Click the triangle next to Network Adapters (or double-click Network Adapters) to expand Network Adapters, as shown here:



Here's another way to launch Device Manager:

1. Click Start.
2. Type **Device Manager** in the Start menu's search box.
3. Press Enter.

Or you can:

1. Click Start and then right-click Computer.
2. Select Manage.
3. In the navigation pane of the Microsoft Management Console (MMC), select Device Manager.

The latter method puts Device Manager into a functional interface, MMC, that allows access to several administrative tools from one location.

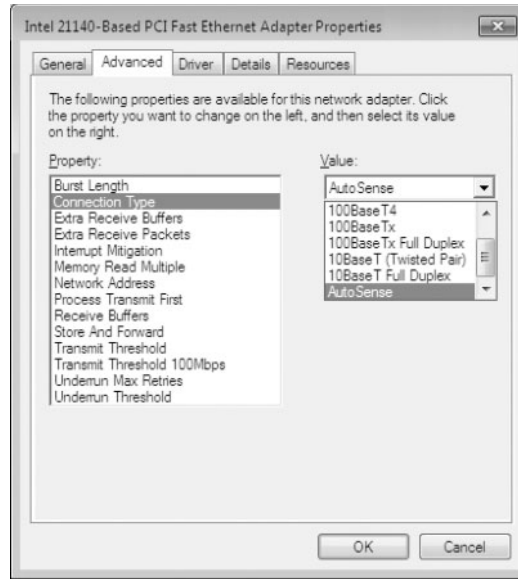
Device Properties Available Within Device Manager

After you open Device Manager and have access to the installed devices on your machine, you might want to view the properties for the hardware. The properties dialog box lets you view and change configuration parameters if necessary. The tabs in the dialog box vary from device to device.

Many device properties dialog boxes include an Advanced tab, as shown in Figure 10.6.

FIGURE 10.6

You can click the Advanced tab to see additional properties specific to the device.



Configuring Network Adapter Advanced Properties

If you need to change the hardware configuration properties, Device Manager is the best way to access the parameters.

Perform the following steps to access the advanced properties of your network adapter where you can make configuration changes if necessary:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (under Devices and Printers).
2. Click the triangle next to Network Adapters (or double-click Network Adapters) to expand Network Adapters.
3. Right-click your network adapter and select Properties.
4. Choose the Advanced tab.
5. Select various properties and view the parameters.

After installing a new piece of hardware, you might need to update the drivers to a later version than those shipped with the hardware.

Installing and Updating Device Drivers

Device drivers are the controlling code that interfaces the hardware components with the operating system. The commands issued to a piece of hardware are specific to each piece of hardware and might be different commands, memory locations, or actions even within the same type of hardware. A network interface card (NIC) from one vendor might have a different set of instructions necessary for its operation than a NIC from a different manufacturer.

This doesn't work well for an operating system or software vendor who would like to be able to issue a standard command and have the same functionality across the hardware, regardless of the vendor. This is where the driver comes in; the driver takes a standard instruction from the operating system and issues the command to the hardware to perform the desired function.

Why do we update drivers? There are cases where a command set for the driver might perform a function incorrectly. This might produce errors in some cases and has to be fixed. The hardware vendor will update the driver to fix the problem. It might also be the case that new or better functionality is desired and the hardware vendor needs to change the driver code to allow added functionality or provide better performance; this will also lead to an update.



Real World Scenario

DRIVER CODE CAUSING AN ARBITRARY NONREPRODUCIBLE ERROR

While working on a consulting job for a company where we were installing a new program and hardware that provided bar-code scanning for a company, we were plagued with random failures of the bar-code readers connected to PCs. The bar-code readers seemed to install correctly and they showed as functioning properly within Device Manager. However, periodically, the hardware readers would fail to input data into the application we were using. We could reboot the affected machine and the bar-code reader would work fine again (for a while).

It was easy to blame the operating system because the reboot seemed to fix the problem, but this was not the case. After several days of troubleshooting and working with the manufacturer, we determined that the driver interfacing the operating system with the hardware was not releasing memory resources correctly and was causing the driver to fail. We received an updated driver, applied the update to the machines, and the problem was resolved.

Be careful not to blame the operating system prematurely and investigate other areas for possible problems.

Typical first-time installation of drivers today happens automatically, thanks to the Plug and Play specification. After installation of the hardware, Windows 7 will recognize the new hardware and will launch the driver installation program. Take, for example, the connection of a digital camera to the USB port of your computer. Windows 7 will recognize that a device has been plugged in and will gather the information about the USB device. Windows 7 will then install the best driver it knows about (and if it doesn't know about the device, it will ask you how to proceed). Figure 10.7 shows the message that indicates the operating system found a driver and is installing it automatically.

The installation completes and the device is now available in Device Manager. Figure 10.8 shows the digital camera as a hardware item you can now access as you did previously with the network adaptor.

If you need to review the driver details for your newly installed device — the digital camera in our example — you can right-click the device in Device Manager and choose Properties. Figure 10.9 shows the right-click menu (also known as the context menu); note the top choice in this menu is a faster way to access the Update Driver Software command — rather than selecting Properties and clicking the Update Driver button — if that's what you're trying to do.

FIGURE 10.7
Automatic driver
installation

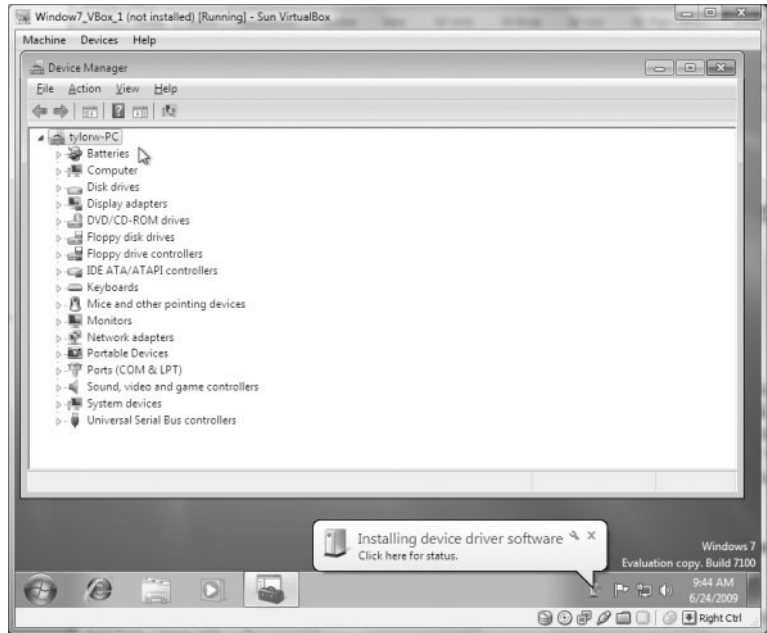


FIGURE 10.8
New device availability
in Device Manager



You might want to verify the driver general information such as the driver provider or version; you can see that information on the Driver tab of the Properties window. You can also choose to view the driver details, which are the supporting files and associated paths. Figure 10.10 shows our digital camera's Properties window with the Driver tab selected, along with the Driver File Details dialog box that opened when we clicked the Driver Details button.

FIGURE 10.9
The right-click menu
for a device in Device
Manager

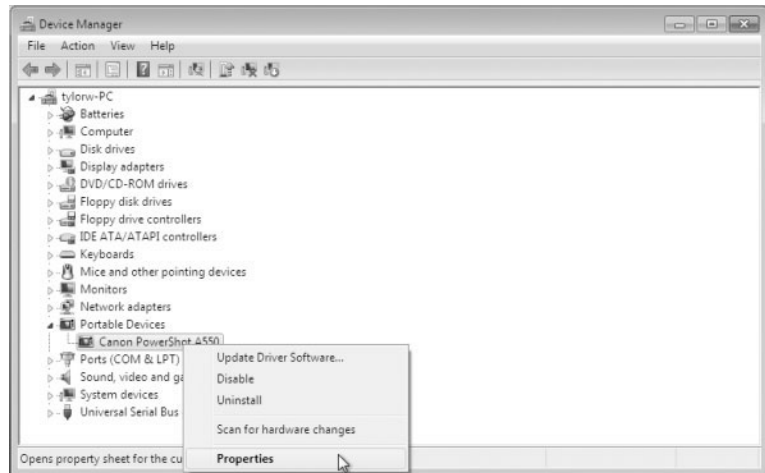
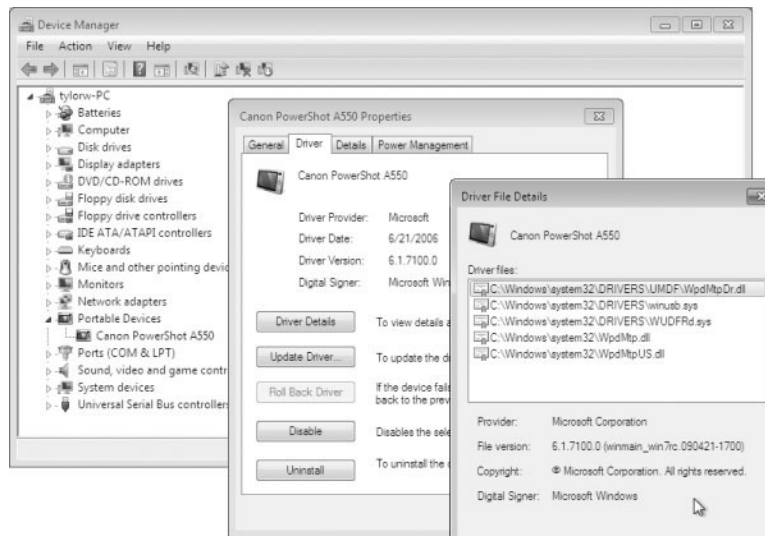


FIGURE 10.10
Verifying the driver
details



VIEWING DRIVER DETAILS

When you're having issues with a hardware device, you can go online and read forums or query search engines for ideas. A lot of the time someone will say, "We had a terrible time with driver version 2.1.1 but version 2.1.2 fixed it," referencing your exact problem.

Perform the following steps to see your device driver information:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (or type **device manager** in the Start menu's search box).
2. Click the triangle next to the category you're interested in to expand the item list; you can also double-click the category name (for example, double-click the Portable Devices category to see the portable devices connected to the machine).

3. Right-click the hardware item and select Properties.
4. Select the Driver tab and view the Driver Version setting.
5. Click the Driver Details button to see the files associated with the hardware.

UPDATING DRIVERS

Perform the following steps to update drivers:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (or type **device manager** in the Start menu's search box).
2. Click the triangle next to the category you're interested in to expand the item list.
3. Right-click the hardware item and select Properties.
4. Select the Driver tab.
5. Click the Update Driver button; a window launches and asks how you want to update the driver.
6. Choose Search Automatically For Updated Driver Software to have Windows 7 search for you, or you can choose Browse My Computer For Driver Software if you already have the new drivers. Windows 7 searches for and updates the drivers or reports back that you have the most current version.

WHY UPDATE A DEVICE DRIVER?

You might install a new driver for new or updated functionality even if you're not having issues. You can receive notification from the manufacturer if you have let them know you're interested by registering your hardware. Otherwise, visit the manufacturer's website periodically to see if updates are available.

Occasionally an update breaks a piece of functioning hardware or doesn't solve a problem. In that case, you'll want to go back to the previous version, or "roll back" the driver.

ROLLING BACK TO A PREVIOUS VERSION OF A DEVICE DRIVER

Perform the following steps to roll back to a previous version of an updated driver:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (or type **device manager** in the Start menu's search box).
2. Click the triangle next to the category you're interested in to expand the item list.
3. Right-click the hardware item and select Properties.
4. Select the Driver tab.
5. Click the Roll Back Driver button. The previous driver will be installed and the hardware will return to its previous state of functionality.

THE ROLLBACK OPTION MAY NOT BE AVAILABLE

If the Roll Back Driver button is grayed out, there isn't a previous version available to roll back to.

The Driver tab for a piece of installed hardware in Device Manager also provides functionality for disabling and uninstalling a driver. Why would you want to disable a driver? There are several possibilities, but troubleshooting is in the forefront. Disabling the driver effectively disables the hardware; it will no longer function as designed. Uninstalling the device driver also has a similar effect, but if the hardware is still installed, you can uninstall it, perform a hardware scan to ensure the hardware is still recognized, and then reinstall.

Many times we have disabled a device from Device Manager to eliminate one piece of a problem we are having with a system. If we're confident the problem exists with the hardware, we'll uninstall the driver and let the operating system reinstall it as part of the troubleshooting procedure. This works much of the time.

DISABLING A DEVICE

Perform the following steps to disable a device:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (or type **device manager** in the Start menu's search box).
2. Click the triangle next to the category you're interested in to expand the item list.
3. Right-click the hardware item and select Properties.

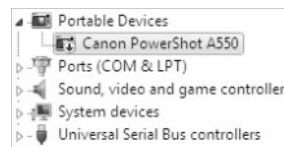
You can select Disable directly from the context menu if you want.

4. Select the Driver tab.
5. Click the Disable button (this is a toggle button; it will say Disable if the device is enabled, or Enable if the device is disabled).

The device driver and thus the device will be disabled and will no longer function. A down arrow appears on the item in Device Manager, as shown in Figure 10.11, and the General tab will show the device as disabled.

FIGURE 10.11

The down arrow indicates the device is disabled.



ENABLING A DEVICE

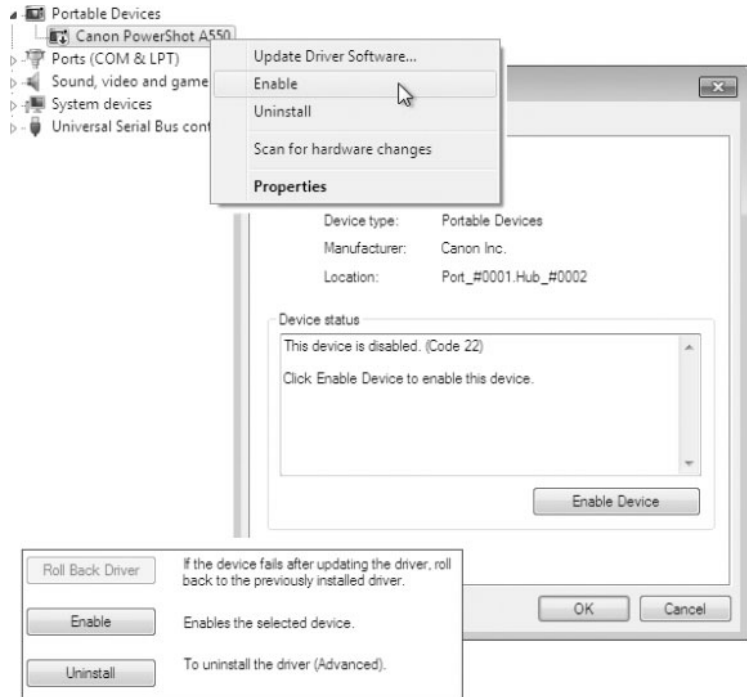
Perform the following steps to enable a device:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (or type **device manager** in the Start menu's search box).
2. Click the triangle next to the category you're interested in to expand the item list.
3. Right-click the hardware item and select Properties. (Alternatively, select Enable from the context menu.)
4. Choose the Driver tab. (Alternatively, click Enable Device on the General tab).

- Click the Enable button (Figure 10.12). This is a toggle button; it will say Enable if the device is disabled, or Disable if the device is enabled.

The device driver will become enabled and the hardware will work as designed (barring any other issues).

FIGURE 10.12
Enabling a device



It might be beneficial at times to uninstall and reinstall a device driver. By uninstalling and reinstalling a device driver, many times the default configuration parameters will be reset to their original specifications. Therefore, any changes you have made will need to be reconfigured. You might also consider using a different device driver than Windows 7 is set up to use via Plug and Play. Uninstalling the device driver and manually installing a different version might be a solution as well. Keep in mind that uninstalling a device driver does not delete the driver files from the machine; uninstalling the device drivers removes the operating system configuration for the hardware. You might want to find the files and delete them manually in some cases. Remember, you can find the files (and thus the filenames) by clicking the Driver Details button on the Driver tab of the hardware device's Properties pages.

UNINSTALLING A DEVICE DRIVE

If you have determined the device driver for a misbehaving hardware is potentially the problem you are having, you can uninstall the device driver. Windows 7 will detect the device again (assuming that it found the device the first time) and reinstall the driver. You have the option of letting Windows 7 search and install the driver, or you can manually choose where to install it from.

Perform the following steps to uninstall a device driver:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (or type **device manager** in the Start menu's search box).
2. Click the triangle next to the category you're interested in to expand the item list.
3. Right-click the hardware item and select Properties. (You can select Uninstall directly from the context menu if you want.)
4. Select the Driver tab.
5. Click the Uninstall button.
6. Click OK in the Confirm Device Uninstall dialog box. A progress box will appear as the device driver is uninstalled. Device Manager will no longer show the hardware.

REINSTALLING A DEVICE DRIVER AUTOMATICALLY

You can have Windows 7 automatically reinstall an uninstalled driver. To begin, from the Device Manager click Action > Scan For Hardware Changes. Alternatively, you can right-click the machine name in Device Manager and select Scan For Hardware Changes from the context menu.

Windows 7 initiates the process of discovering the Plug and Play device and reinstalls the device driver configuration into the operating system. The hardware will be available again within Device Manager.

Some hardware manufacturers would like you to install the driver files and some software for their device before the operating system has a chance to discover it. This might be just so the software program controlling some of the hardware functionality will be installed first; that way, its configuration file can accurately reference the installed drivers. Another reason might be to add the driver files to the driver configuration directories of the operating system before the OS discovers the device. This is usually done by inserting and running a setup program from a provided CD or DVD. Following the manufacturer's recommendations will most often produce a better result.



Real World Scenario

FOLLOW THE HARDWARE VENDOR'S RECOMMENDATION

We once installed a new wireless USB adaptor into a machine by just plugging it in despite the big red sticker that said "Run the setup on the CD first!" Sure enough, Windows found the adapter and proceeded to install the drivers. The hardware showed up in Device Manager but would not work. We decided to run the setup program on the CD. It turns out the driver files on the CD were a different version (actually older) than the installed files and Windows would not replace the installed drivers. Even after manually uninstalling them, we had to go back and find five different files in numerous locations and delete each one. Finding those files was not the simplest operation; a lot of online research went into solving this problem and several hours of our time was wasted.

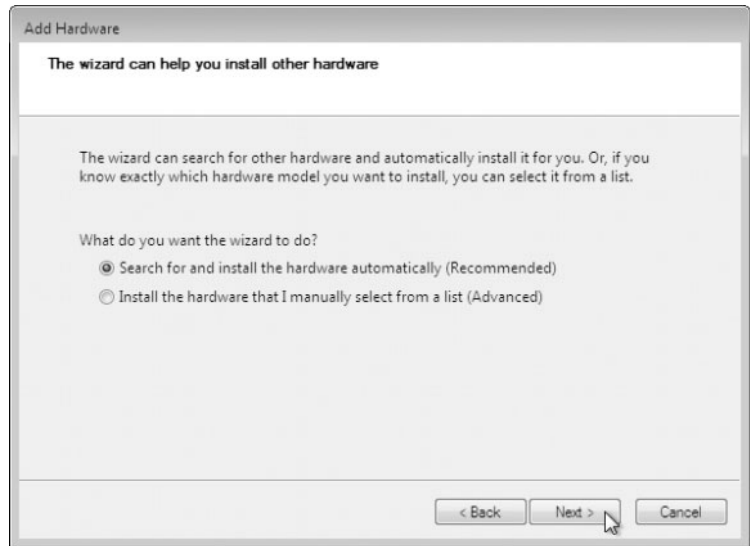
Simply following the hardware vendor instructions would have been much easier. We did the same installation on another machine following the vendor recommendations, and everything worked perfectly.

There are also situations we run into that require a manual installation of hardware. This might be for legacy hardware you are using, for drivers not supplied in the operating system distribution files, or drivers that might perform different functions from the default drivers available. You can also perform a manual driver installation in Windows 7 by using the Add Hardware Wizard.

In the manual installation process, you can have Windows 7 access a Microsoft online database with available drivers to find a current driver, or you can specify a location of your choosing locally.

From Device Manager, launch the Add Hardware Wizard by choosing Add Legacy Hardware from either the Action menu or the context menu of the machine. The next step is to tell Windows 7 where to look for the driver. The next screen of the Add Hardware Wizard shows the default selection, as shown in Figure 10.13.

FIGURE 10.13
Select this option to have the wizard install the hardware for you.

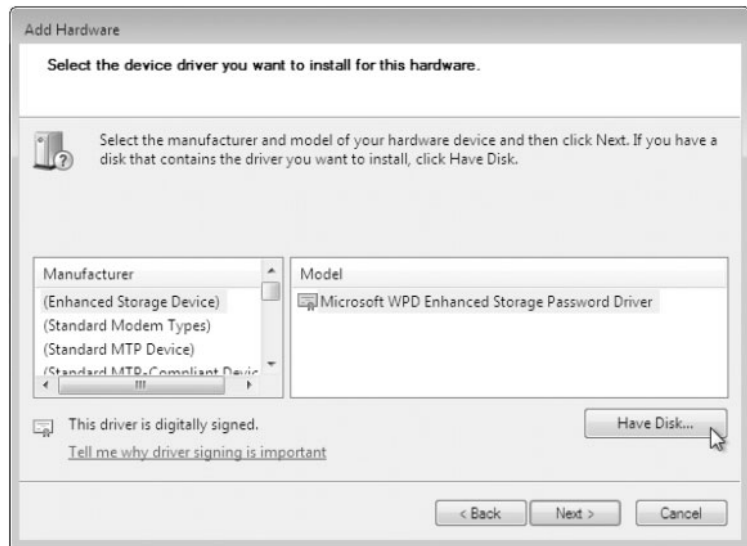


In order to choose a piece of hardware from a list of supplied drivers, or more importantly, to choose a specific path, you select the option Install The Hardware That I Manually Select For A List (Advanced) and click Next. This allows you to select a device or choose Show All Devices; if you choose Show All Devices, click Next to choose a location.

If you have a disk or have the appropriate drivers stored in an accessible location, click the Have Disk button, as shown in Figure 10.14, and browse to the driver files you need to install. If all goes as planned, the hardware device drivers will be installed and Device Manager will display the newly installed hardware.

The devices you use to get information into and out of your Windows 7 machine are your I/O devices. I/O devices include your keyboard, mouse, scanner, and printer. These devices are also configurable through Device Manager, as you'll learn in the next section.

FIGURE 10.14
Click the Have Disk button.



Managing I/O Devices

Your I/O devices might be connected to your computer by standard cabling or via USB, or you might use a wireless technology such as IrDA (infrared) or RF (radio frequency). Most of the time you will not have to (or want to) change the configuration of these devices. However, doing so is possible, and in this section we'll show you how to make changes.

Configuring the Keyboard

Most of the time you can leave the keyboard settings at their default values. There are ease-of-access properties as well as advanced keyboard options you can configure if desired. Accessing the ease-of-access features for the keyboard by choosing Start > Control Panel > Ease Of Access and clicking the Change How Your Keyboard Works link, as shown in Figure 10.15. You can also click the Ease Of Access Center link (from Ease of Access) and then choose Make The Keyboard Easier To Use. Either way, you get to the same window and can access the advanced properties from this window by selecting Keyboard Settings in the See Also section.

The advanced properties for the keyboard allow you to change the character repeat delay and the character repeat rate. The delay is how long Windows 7 waits before repeating characters when a key is held down, and the repeat rate is how quickly the characters repeat after the delay interval has expired. The keyboard properties also include a setting for the cursor blink rate. Figure 10.16 shows the Keyboard Properties window. The Hardware tab allows you to access the device driver properties (as found in Device Manager).

If you have an issue where your typing style has you hold down a key on your keyboard a little too long sometimes and the characters start to repeat, you can change the amount of time Windows 7 waits before repeating the character.

FIGURE 10.15
Keyboard Ease of Access
Center

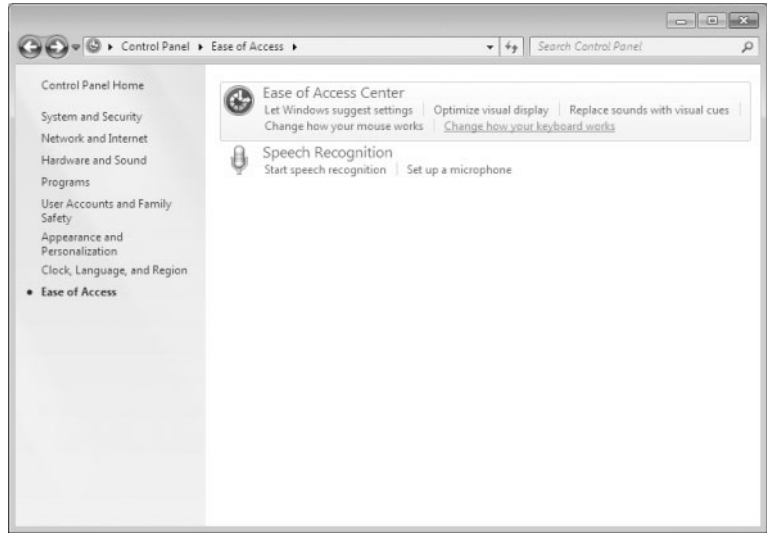
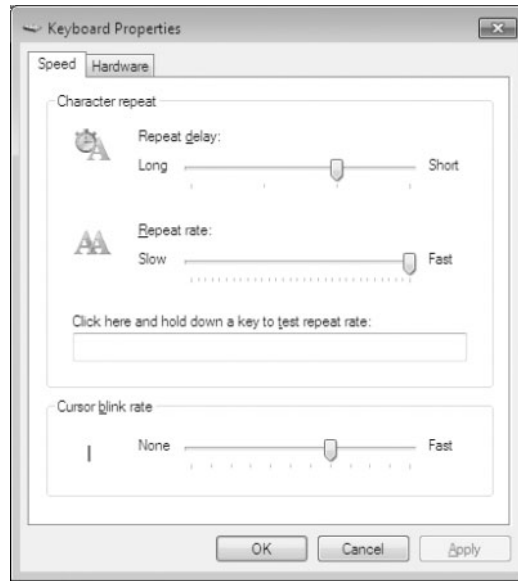


FIGURE 10.16
Keyboard Properties
window



Changing the Repeat Delay for Your Keyboard

Perform the following steps to modify the repeat delay for your keyboard:

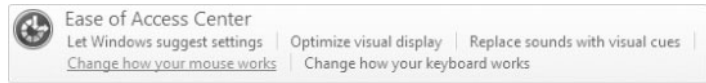
1. Choose Start > Control Panel > Ease Of Access.
2. Click Change How Your Keyboard Works.
3. Scroll down to the See Also section and choose Keyboard Settings to open the Keyboard Properties window.
4. Select the Repeat Delay slider and adjust the repeat delay to a longer value.

Configuring the Mouse

As with many I/O devices, you probably won't need to change your mouse configuration. Once you know you can, you might try out a few different options, just because you are able to. To check out the mouse options, open Control Panel, select Ease Of Access, and click Change How Your Mouse Works, as shown in Figure 10.17.

FIGURE 10.17

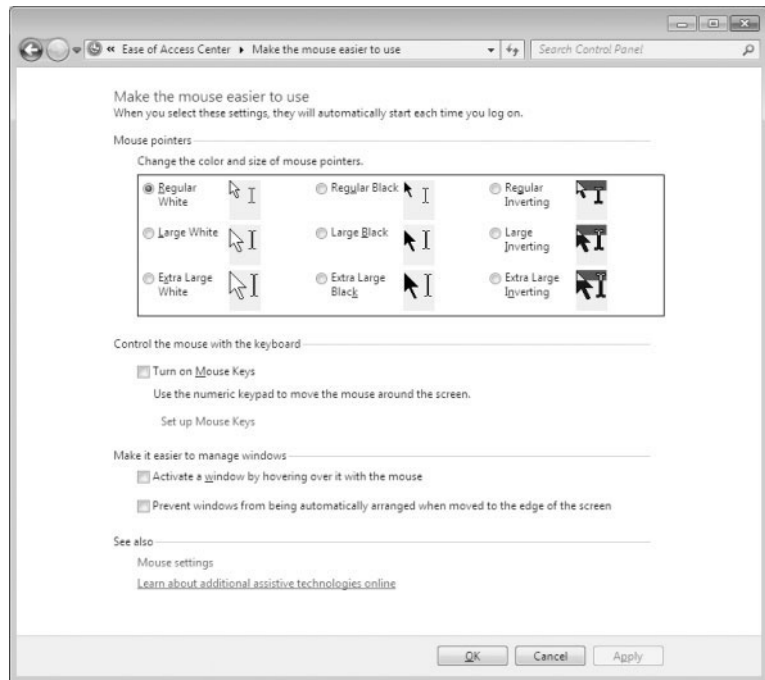
In Ease Of Access, click Change How Your Mouse Works.



The Make The Mouse Easier To Use window opens, displaying several options we used to refer to as Accessibility options in previous versions of Windows. The Ease Of Access options include changing the color or size of the mouse pointer, controlling the mouse with the keyboard, managing windows with the mouse, as well as having access to the mouse properties dialog box. You access the mouse properties by choosing Mouse Settings in the See Also section at the bottom of the Make The Mouse Easier To Use window, as shown in Figure 10.18.

FIGURE 10.18

The Make The Mouse Easier To Use window

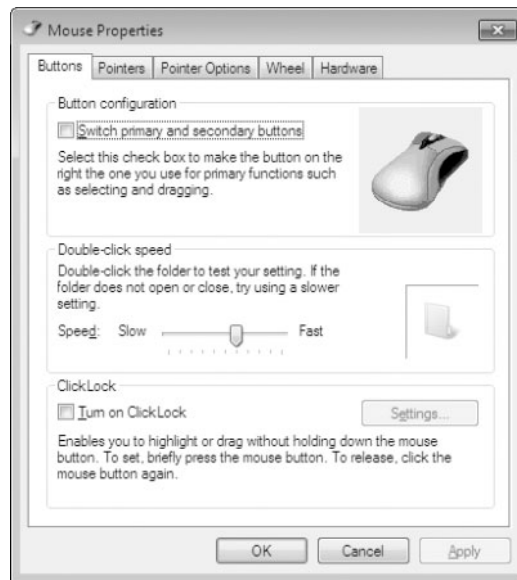


After you select Mouse Settings, the Mouse Properties window opens, where you can configure more of your mouse functionality and display options. The Mouse Properties window provides five tabs of options for you work with. The first tab on the left, as shown in Figure 10.19, is labeled Buttons.

This tab allows you to switch the primary and secondary buttons. These are what we refer to as the left and right mouse buttons; the left is the primary and the right is the secondary. This is the default setup the way a person using the mouse on the right side (physically “right

side” in lieu of the “correct side”) would normally and intuitively think of the functions. If a user uses their mouse on the left side of the keyboard, it would be more reasonable to have the right and left (primary and secondary) functions reversed. The Buttons tab also allows you to change the double-click speed and set up a function called ClickLock. With ClickLock enabled, a single click acts as a click and hold — like when you want to drag a window, you “click and hold” and then drag, releasing to drop. ClickLock has you click and release on a window, drag it to where you want it, and click a second time to drop it. You can modify the setting for the length of time you hold the initial click before the window is grabbed; that way, a casual click to change cursor position will not attach the window to the mouse pointer.

FIGURE 10.19
The Buttons tab of
the Mouse Properties
window



The Pointers tab of the Mouse Properties window, as shown in Figure 10.20, allows you to change the pointer properties. The pointer is the image we normally just refer to as the mouse.

You might not have considered the importance of the mouse pointer; it gives us feedback to what is going on within the operating system. You can check out the Customize section of the Pointers tab to get an idea of just how many different feedback pointers there are. The pointers available do (or can) change with the user interface (UI) scheme, and you have the option to change them as a whole on the Pointers tab as well.

Figure 10.21 shows the Pointer Options tab of the Mouse Properties window. These options allow you to change the Motion parameters and Visibility options. There’s an option to set up Snap To, which will automatically move the mouse to the default button in a dialog box.

Depending on the style of mouse you are using, you might have a scroll wheel. This wheel allows vertical scrolling as well as horizontal scrolling. The Mouse Properties dialog box’s Wheel tab allows you to change the Vertical Scrolling and Horizontal Scrolling configuration, as you can see in Figure 10.22.

As a network administrator, you need to provide the best environment for your users to be productive. Sometimes this involves changing a user’s I/O environment. There are cases where the user will use their mouse on the left side of their keyboard instead of the right and

might need to have the primary and secondary functions reversed. The user may also use a more condensed screen and need the mouse pointers to be a larger size so they can see them better. Because of the type of work being done on the machine, the user would also be better served having the scroll wheel scroll pages (screens) instead of lines for each roll of the wheel.

FIGURE 10.20

The Pointers tab of the Mouse Properties window

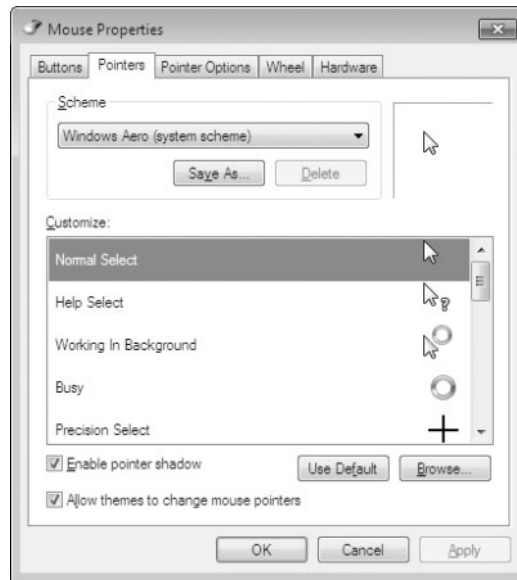


FIGURE 10.21

The Pointer Options tab of the Mouse Properties window

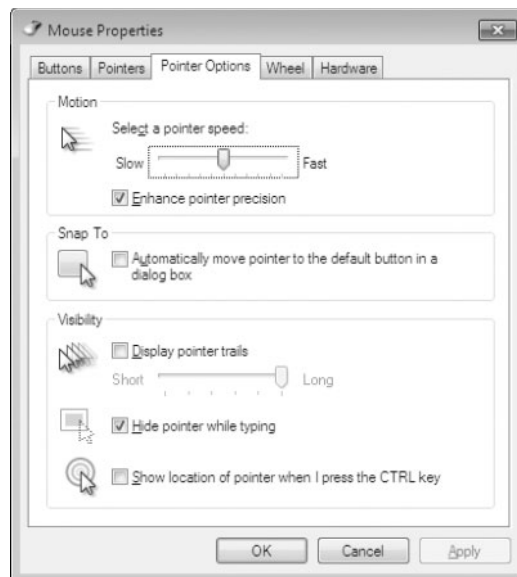
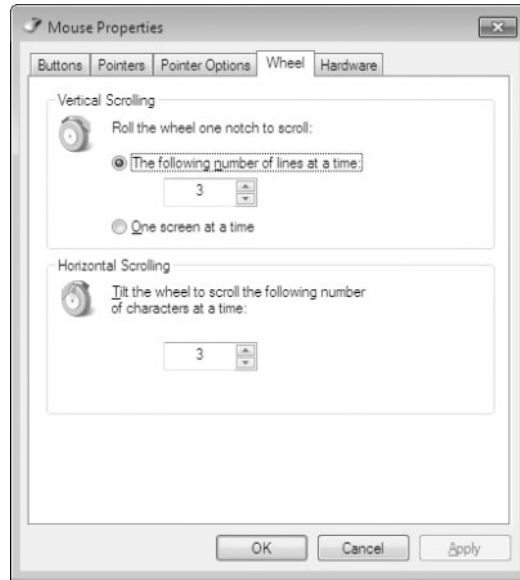


FIGURE 10.22
The Wheel tab of
the Mouse Properties
window



REVERSING THE PRIMARY AND SECONDARY BUTTONS FROM THE DEFAULT

Perform the following steps to change the primary and secondary buttons to a keyboard left-style mouse:

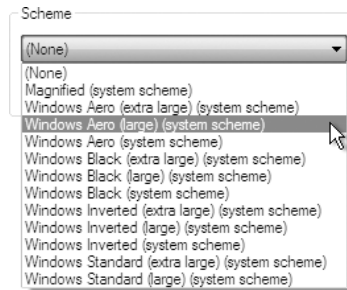
1. Choose Start > Control Panel > Ease Of Access.
2. Click Change How Your Mouse Works.
3. Select Mouse Settings in the See Also section.
4. On the Buttons tab, click the Switch Primary And Secondary Buttons check box.
5. Click OK to close the Mouse Properties window.
6. Click OK to close the Change How Your Mouse Works window.
7. Close the Ease Of Access Center window.

CHANGING THE POINTER TO THE LARGE-SIZED WINDOWS AERO SCHEME

Perform the following steps to change the mouse pointer and Windows Aero scheme:

1. Choose Start > Control Panel > Ease Of Access.
2. Click Change How Your Mouse Works.
3. Click Mouse Settings in the See Also section.
4. On the Pointers tab, open the Scheme drop-down list, as shown in Figure 10.23.

FIGURE 10.23
The Scheme drop-down
list



5. Select the Windows Aero (Large) (System Scheme) option from the Scheme drop-down list.
6. Click OK to close the Mouse Properties window.
7. Click OK to close the Change How Your Mouse Works window.
8. Close the Ease Of Access Center window.

CHANGING THE MOUSE WHEEL FUNCTION TO SCROLL SCREENS RATHER THAN LINES

Follow these steps to change the mouse wheel functionality to scroll screens as opposed to lines:

1. Choose Start > Control Panel > Ease Of Access.
2. Click Change How Your Mouse Works.
3. Click Mouse Settings in the See Also section.
4. On the Wheel tab, select the One Screen At A Time radio button in the Vertical Scrolling section.
5. Click OK to close the Mouse Properties window.
6. Click OK to close the Change How Your Mouse Works window.
7. Close the Ease of Access Center window.

Today we have to deal with removable storage devices being connected to our machines; it's rare to have a user on our Windows machine who doesn't want to save something to a memory stick. Next, you'll learn how to configure removable storage devices.

Configuring Removable Storage Devices

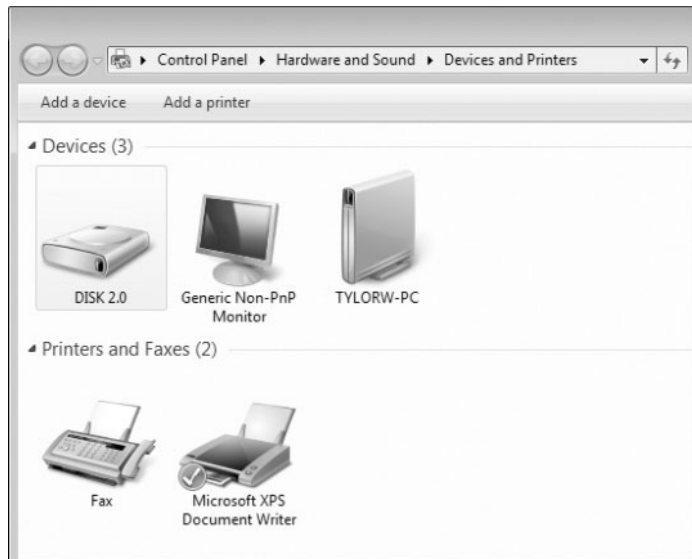
Removable storage devices have been part of our computing world since the beginning. CDs, DVDs, and floppy disks are examples of removable storage. Today, we're using other types of removable storage as well, including flash-based electronics such as USB sticks, memory cards, USB or FireWire external rotating hard drives, cameras, phones, and so on. These devices (or media) are discovered automatically as the devices are connected.

CONNECTING REMOVABLE DEVICES

We'll concentrate on dynamically connected devices in this section utilizing the USB/FireWire connectivity and memory cards. These devices present challenges to the administrative team because end users utilizing the technology might not follow the guidelines (loss as well as security guidelines) for protecting their data.

Windows 7 includes improvements to the Safely Remove Hardware (Eject) menu. For example, it's now possible to eject just one memory card at a time and physically remove it, whereas previously ejecting one card removed all the memory cards from the software interface. You have to physically reinstall any cards you still want to access (from a single hub) and keep the ports available for future use. Removable media is now listed under its own label through Devices And Printers, as shown in Figure 10.24, rather than just its drive letter, as it was in previous versions of Windows. This is also part of the new Device Stage functionality of Windows 7, where the hardware vendors can include configuration information about portable devices and give users more resources from one location.

FIGURE 10.24
Devices And Printers
with USB stick installed



You must consider certain factors related to data access performance with the portable devices as well. To improve data access and make saves faster, it's possible to have the operating system cache the data and write it to the portable device later (when there's free processor time). However, this increases the possibility of a user removing the portable device before the write is made; this would mean a loss of data. Windows 7 defaults to writing the data immediately, which minimizes the chance of data loss and the cost of performance. The configuration for optimizing the portable device for Quick Removal or Better Performance is found on the Policies tab for the hardware in Device Manager.

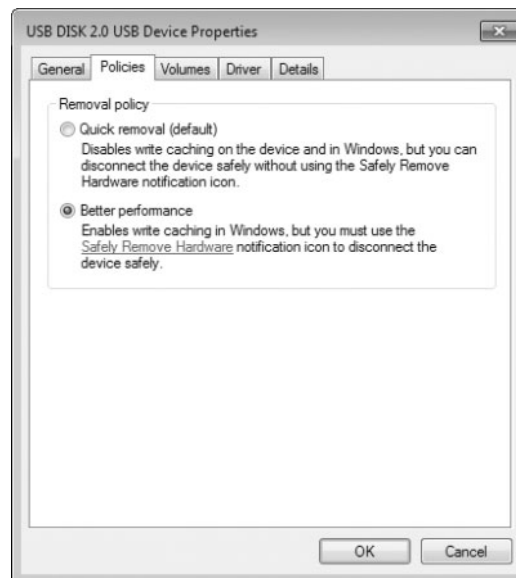
Depending on how your portable storage device is used, you might want to change the write cache policy for better operating system performance.

MODIFYING THE WRITE CACHE POLICY FOR A PORTABLE STORAGE DEVICE

Perform these steps to change the write cache policy for a USB memory stick attached to a Windows 7 machine:

1. Choose Start > Control Panel > Hardware And Sound > Device Manager (under Devices And Printers) or type **Device Manager** in the Start menu's search box.
2. Click the triangle next to Disk Drives (or double-click Disk Drives) to expand that item.
3. Right-click USB Disk Hardware and select Properties.
4. Choose the Policies tab.
5. Select the Better Performance radio button, as shown in Figure 10.25, and then click OK.

FIGURE 10.25
Click the Better Performance radio button.



REMOVING A PORTABLE HARDWARE DEVICE

In our next example, we've changed the USB portable storage device write cache policy for better performance; this means writes to the portable device may be saved and written at a later time (when the processor has clock cycles available). To ensure no loss of data, it is fairly important to eject the device through Windows 7 before physically removing the device.

Click the icon in the Taskbar to eject the device, as shown in Figure 10.26, which initiates a stop for the hardware, forcing any cached writes in memory to be written to the device.

Stopping the portable hardware device can also be done from the Devices And Printers window by choosing Eject from the context menu of the device. The device will close, meaning the writes have been made, and you are presented with a window saying it's safe to remove the hardware.

FIGURE 10.26
Clicking the Taskbar
icon to eject the device



Another device that administrators have to deal with on a regular basis is the corporate printer. Next, we'll explore printer management.

Managing Printers

Printers have long been an issue for IT teams. Every new version of an operating system has new software intelligence to make the installation and maintenance easier, but printer technology continues to grow and hardware vendors continue to make changes. The driver base for all the different printers out there is huge, and even for the same printer, there are numerous variations. Each printer itself might have lots of options that can be made available, and this all has to be controlled by the operating system through the printer drivers.

MICROSOFT DEFINITIONS IN THE PRINTER WORLD

When we use the term *printer*, we're referring to the physical piece of hardware and the functions of that hardware. In the Windows world, we need to distinguish between the functionality of the hardware and of the software (both the driver software and the controlling software). In the Windows world, the physical device that has paper in it is the *print device*, not the printer. The *printer* is the software application on the local machine controlling the print device. The printer driver is the software shim between the operating system and the locally installed software (the printer).

You will find in most organizations that a print device is not attached to every computer. We share the print devices between users. This is cost effective on many levels, but it tends to cause issues. We don't know very many users who do not have a need to print something once in a while, and so we send our documents or web pages to be printed to the print device. The print device might be connected to someone's machine and shared for others to use, or it might be a stand-alone. You might have a server on your network to which one or more print devices are attached and everyone sends their documents to a central location. Each user machine has a printer installed and the appropriate drivers to allow Windows 7 to send the document to the print device through the printer with the appropriate instructions.

Do you think the print device can physically print a document at the same speed the printer can send to the data to it? No, of course not. This is where a software component called the spool (spooler or print spool) comes in. You need a software component that can buffer the print job until the print device can complete it. In fact, there might be more than one user sending documents to be printed to the same print device at the same time — and yes, the spool handles this as well.



Real World Scenario

WHAT, NO SPOOL?

We were working on a networking problem for a local veterinary clinic. They were complaining about issues they were having with their PCs being extremely slow at times but normal other times, and they were sure the network hardware was causing them issues.

We asked about any recent hardware or software changes, and they said they had upgraded a piece of their software package to allow more functionality, which included having a couple of centralized printers for the doctors and technicians to use. It seems as though every time someone printed, the network bogged down to a point of uselessness. Casual discussions ensued, and we determined that the network bog-down only affected the machine (or machines) actively sending a print job. Hmmm! Looking into the problem a little further showed the vendor installation defaulted to printing directly to the print device, with no spooling. Each machine had to wait for the print job to complete before releasing any local resources (yes, that's right — not even background printing), and the other machines on the network ended up waiting as well. Allowing the machines to spool their print jobs solved the problem of slow networking (clearly not a networking issue in the end).

Installing Printers

You install printers to a machine in two distinct ways; one where the print device is physically connected to the machine and one where it is not (it's connected over the network). There has to be software drivers in either case, and these can be located on a CD/DVD, on a network share, or even in the Windows distribution files. Printers in Windows 7 will be located in the Devices And Printers window and will allow the Device Stage configuration to accommodate a full range of functionality from this one location. To add a printer to a machine locally, you'll usually run the setup program on the CD/DVD (following the manufacturer's instructions). The manufacturer's setup program in a wizard format asks the appropriate questions. You can set up the printer through Windows 7 as well by using the Add Printer functionality of Devices And Printers. To add a printer using the Windows 7 functionality, choose Start > Devices And Printers and then choose Add Printer. USB printers will be automatically detected and have their drivers installed (or at least searched for automatically).

Choosing Add Printer launches the Add Printer Wizard and brings up the screen where you make the choice of installing the printer and print device locally or installing the printer locally to access a print device remotely.

From the opening screen, you can follow the next example to install the printer for a physically connected print device to a machine. We're going on the premise that the setup program on the CD/DVD (if one existed) was not run and we're installing the printer from the wizard associated with Windows.

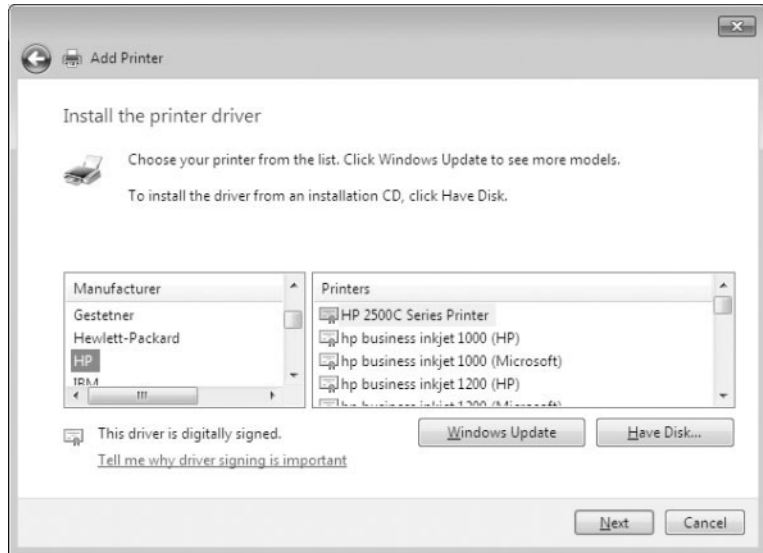
Installing a Printer for a Locally Connected Print Device

Perform the following steps to install a printer to your local machine's parallel port (lpt1):

1. Choose Start > Devices And Printers.
2. Choose Add Printers.

3. Select the Add A Local Printer option.
4. In the Add Printer window, choose the Use An Existing Port radio button and use the drop-down window to select LPT1: (Printer Port); then click Next.
5. Select the manufacturer of your print device and the printer model you want to install in the Install A Printer Driver window, as shown in Figure 10.27.

FIGURE 10.27
The Install The Printer
Driver window



WHAT IF YOUR DEVICE IS NOT AVAILABLE?

If you don't find your model in list, it wasn't included in the distribution files; you can select the Windows Update button to get more choices from Microsoft. If you still don't have your model available and you have the original disk, you can choose Have Disk and browse to the driver files. (OK, if you had the disk, wouldn't you have just run the setup? Ah, you didn't have the disk — you went onto the Internet and downloaded the drivers. . .) Use the Have Disk option to browse to the folder with the .inf file for the printer drivers.

6. If there was a driver previously installed, you will be given the option to use the existing driver or replace it.
7. After choosing the appropriate device driver or using the existing driver and clicking Next, you choose the name of the printer. An intuitive name is always a good choice here. Enter the name and click Next.
8. You can make the print device available on the network by sharing it. The next page of the Add Printer Wizard gives you the opportunity to share it. For most of the options

within the wizard, you can change the values or function from the properties pages (if, for example, you change your mind later). After making your choice, click Next.

9. On the final page of the Add Printer Wizard, select the Set As The Default Printer check box (to make this the default printer for any application on the machine) and click Print A Test Page. After the test page prints, click Finish and the wizard completes. The locally connected print device has its printer installed on the local machine.

SAVE THE PRINTER

Do not remove this printer; we'll use it in a later example.

After you complete the Add Printer Wizard (or let the hardware vendor's setup program install your printer), you can open the Devices And Printers window and see the printer(s) available. The context menu gives you access to the properties pages as well as some of the standard printing functions we've had in Windows past. As hardware vendors start implementing functionality for Windows 7, you'll have a full array of access to software components from the Devices And Printers window, at least for the vendors who are going to participate in the Device Stage specification.

What about installing a printer on a machine that needs to access a print device connected to another machine? That's fine — that is the functionality we want. You launch the Add Printer Wizard and go through the process of installing the printer, but point to a share or stand-alone network printer. Knowing that not all machines on any company's network are going to have print devices physically attached, there is functionality to allow sharing of networked devices and printers (software) to be installed on client machines.

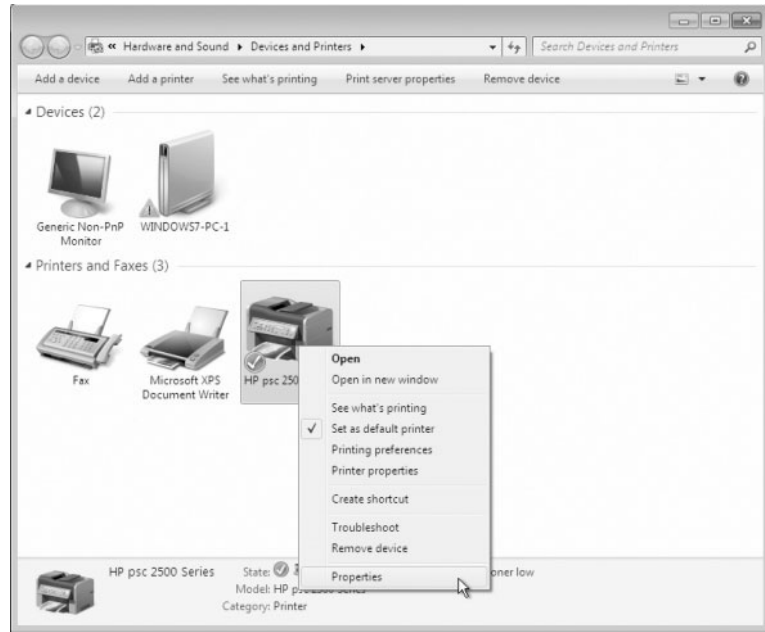
Installing a Printer to Connect to a Shared Network Print Device

Perform the following steps to install printer client software (and drivers) for a network printer:

1. Choose Start > Devices And Printers.
2. Click Add Printers.
3. Click Add A Network, Wireless Or Bluetooth Printer.
4. The Add Printers Wizard searches the locally available network for print devices that are available.
5. Select the networked print device from the Select A Printer section. If the device is not listed, you can choose The Printer That I Want Is Not Listed and enter the parameters for the networked print device.
6. The print device is detected, the driver is discovered and installed, and you are able to use the printer. Open Devices And Printers and you'll see this print device is available.

Once the printer is installed for a print device physically connected on the local machine (or if it's a network-connected printer), you can view the configuration parameters and modify them if necessary from the properties dialog box. Access the properties dialog box from Devices And Printers. Right-click the printer, as shown in Figure 10.28, and select Properties for the hardware properties and Printer Properties for the software components.

FIGURE 10.28
Printer context menu
from Devices And
Printers



Printer properties follow a standard Microsoft has in place, but the content is up to the manufacturer. Some vendors supply more information than others. Most printers provide a basic set of tabs, as follows:

General Tab The printer name, location, and comment are displayed here. The model is typically shown as well as the features of the specific print device and available paper. The Printer Preferences page is available by clicking the Preferences button, and you can print a test page by clicking the Print Test Page button.

Sharing Tab The Sharing tab allows you to share a printer if it wasn't shared during its installation, or to stop sharing it if it were previously shared. You can also add drivers for other flavors of operating systems so the printer installed locally and shared can supply drivers for other machines attempting to connect and use the locally connected printer.

Ports Tab You can view available ports and print devices connected to them on the Ports tab. You can add a port, delete a port, and configure ports on this tab as well. You can also configure bidirectional support for print devices supporting this functionality (sending codes back from the print device to the printer for control) on the Ports tab. Printer pooling is also available here; printer pooling is the ability of the IT staff to configure multiple print devices (using identical drivers) to appear as one printer to connected users. The print jobs are printed on one of the devices in the pool (the first available prints the job). If a print device fails, the others keep working, which makes life better for the users.

Security Tab Group or user access permissions are controlled on the Security tab. You can specify advanced permissions here as well.

Advanced Tab The Advanced tab provides various configuration parameters to control the printer and print device functions. The time period a printer is available is a configuration parameter on the Advanced tab. You can install drivers for the print device as well as add a new driver (by launching an Add Printer Driver Wizard). Spool options include whether or

not to spool, and whether to start printing immediately upon job submission or start printing after the last page is spooled.

The following buttons are available on the Advanced tab:

Printing Defaults Button Launches the Printer Properties window for the vendor as it applies to the documents.

Print Processor Button Lets you choose whether to use the vendor-supplied print processor or the built-in Windows print processor and to choose the default data type to be sent to the print device.

Separator Page Button Allows a specific page to be inserted between print jobs, making the separation of different documents easier.

Device Settings Specific parameters for each print device are set up on the Device Settings tab. Items like form to tray assignment, font substitution, or other installable options for the print device are configurable here.

After the configuration is complete and the printer and print device are working in harmony, life is good. You can see the status of the document currently being printed as well as documents waiting to be printed (the print queue). The queue was previously viewed by selecting the Queue option from the context menu for the printer; Windows 7 now calls it See What's Printing, as shown in Figure 10.29.

FIGURE 10.29
See What's Printing



Selecting See What's Printing opens the window that shows you what's going on with your printer (as far as document/job control).

To take a look at the better functionality of Device Stage, you can select the context menu from Devices And Printers. To observe a graphical view of Device Stage, double-click the printer in Devices And Printers and get a consolidated view and the popular (as decided by the vendor) menu choices. Figure 10.30 shows a popular printer and its options when you double-click Devices And Printers.

We've installed printers in previous examples for both a locally connected and a network connected printer. Let's take a look at sending a print job to the locally connected printer from a previous example and view the document properties.

FIGURE 10.30
Printer window from
Devices And Printers



First, you might not actually have the print device available and the printer won't be able to send the job anywhere. We'll go to the Printer window and pause printing so the job will simply stay in the queue and not attempt to be sent to the print device. We'll use the Device Stage interface to perform our tasks.

Pausing Printing for the Locally Connected Printer

Follow these steps to pause printing for a locally connected printer:

1. Choose Start > Devices And Printers.
2. Double-click the printer previously installed as the locally connected printer. You will have a window similar to Figure 10.30. If you haven't installed the printer yet, you can return and complete the previous steps in the section "Installing a Printer for a Locally Connected Print Device."
3. To pause printing, open the Printer window; double-click the See What's Printing area in the body of the window or single-click the Printer item in the top of the window.
4. Choose Printer > Pause Printing.
5. View the status bar of the printer to verify the printer is paused; there will also be a check mark next to Pause Printing in the menu.

Sending a Test Document to the Paused Locally Connected Printer

Perform the following steps to send a document to a locally connected printer:

1. In the Printer window, select Printer > Properties.
2. On the General tab of the Properties dialog box, click the Print Test Page button.

3. An information box appears stating a test page was sent to the printer; click the Close button.
4. Click OK in the printer's Properties window.
5. The Printer window displays the print job in the queue.

Viewing Document Properties from a Job in the Print Queue

Follow these steps to view a document's properties from the print queue:

1. In the Printer window, click the specific document you want to view.
2. Choose Document > Properties to view the document properties; you can also right-click the print job and select Properties from the context menu. The General tab shows you the document properties; the other tabs are vendor supplied to control additional printer functionality for the document.
3. Click OK or Cancel to close the Properties window. OK saves any changes made and closes the window; Cancel closes the window without saving any changes. If you have made any configuration changes, the Apply button becomes available; selecting Apply saves any changes that you made but it does not close the window.

There might be times when managing a printer that you will need to delete a document from the print queue. Let's take a look.

Deleting a Document from the Queue

Perform the following steps to delete a document from the printer:

1. In the Printer window, click the specific job you want to delete from the queue.
2. Choose Document > Cancel from the Printer window menu structure to delete the document. You can also right-click the document and select Cancel to delete the print job. Either method prompts a confirmation message box that asks Are You Sure You Want To Cancel The Document? Click Yes. The document will no longer appear in the queue in the Printer window.
3. Choose Printer > Close to close the Printer window.

There might also be times when you want to delete a printer, either locally connected or a network printer, from your Windows 7 machine. This might be due to a replacement of an older print device, or perhaps you're moving a user to a new print device and the old one is no longer needed.

Removing a Printer from Windows 7

Follow these steps to remove a printer (to remove the software configuration in the operating system) from Windows 7:

1. Choose Start > Devices And Printers.
2. Right-click the printer you want to remove and select Remove Device from the context menu; alternatively, choose Remove Device from the Devices And Printers menu to unpair the printer from the machine.

3. Click Yes when you see the prompt Are You Sure You Want To Remove This Device? You are presented with a status box during the removal process, and then the device is no longer available in Devices And Printers.

The Bottom Line

Use Device Manager. Device Manager is the primary management tool for installing, configuring, troubleshooting, and updating hardware devices and their associated driver components.

Master It You recently updated a piece of hardware on one of your servers; you have added a video capture card that will be tied in to the security system in the server room. You did all the necessary due diligence before installing the hardware and verifying prerequisites successfully. The card seems to have installed correctly from the manufacturer's setup program. Now that you're trying to use the connected camera to capture video, you cannot get it to work correctly. You need to verify that Windows 7 sees the device and believes the status is good. How will you do it?

Manage and update device drivers. Device Manager shows you the driver status as seen by Windows 7 for the hardware installed in your machine. If there is a problem, you should be able to see that a problem exists.

Master It After installing a video capture card into one of your servers, you find that it is misbehaving. You see in Device Manager that the device driver is not communicating with the device. Researching the manufacturer's website, you find they have identified a bug in the driver code and offer an updated device driver. How will you install the new device driver on your server?

Install, uninstall, and disable hardware. Device Manager in Windows 7 gives you the ability to install, uninstall, and disable hardware installed in your machines. Troubleshooting hardware issues many times requires actions to be performed from Device Manager.

Master It You have recently changed a piece of hardware you had installed to a device with more functionality from a different vendor. You physically disconnected the old device and installed the new device. You are using a server health program that monitors your servers, including the one with the new hardware. Your health program is now showing the old hardware as failed (although it does not even exist in the machine now). You must uninstall the old device's software components so Windows will not try to report its status.

Manage I/O and removable storage devices. Device Manager is the central application for controlling hardware installed in your machines, which includes I/O devices such as your keyboard and mouse. Ease Of Access features allow you to control keyboard and mouse behavior.

Master It Managing I/O devices for users is not normally a concern, but you are now opening an office and have inexperienced users who are having problems following the mouse they are learning to use. You need to turn on the option to have mouse trailers available and would also like the users to be able to find the mouse on the screen easily. How will you do it?

Install and configure printers. Printers and print devices can be one of the most problematic areas for IT staff to handle. Every user will need to have at least one printer installed on their machine. Although many times this is an automated process, it is possible to manually install the software printer on the end user's machine.

Master It You are completing the installation of several new machines in a remote office. The last Windows 7 machine you are setting up has a specific requirement to connect to a network printer in the main office, which is not part of your automated installation. How do you install the network printer in the local machine?