CHAPTER 7

Installing Windows

In this chapter, you will learn:

- How to plan a Windows installation
- How to install Windows 7
- What to do after the installation
- About special concerns when installing Windows in a large enterprise

Windows 7, Vista, and XP all share the same basic Windows architecture, and all have similar characteristics. Windows 7 is available for purchase, but you can no longer purchase Vista or XP. However, because many individual users and corporations still rely on Vista and XP, you need to know how to support them.

At the time this book went to print, Windows 8 Beta is available. Microsoft releases beta versions of software so that the user community can test the software before retail versions become available. How to install and support Windows 8 is not covered in this book.

This chapter discusses how to plan a Windows installation and the steps to perform a Windows 7 installation, including what to do after the OS is installed. You also learn about what to expect when installing Windows on computers in a large enterprise.

Vista Differences The details of a Windows 7 installation are covered in this chapter. For details about a Vista installation, see Appendix B, and for details about installing XP, see Appendix C.

HOW TO PLAN A WINDOWS INSTALLATION

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As a PC support technician, you can expect to be called on to install Windows in a variety of situations. You might need to install Windows on a new hard drive, after an existing Windows installation has become corrupted, or to upgrade from one OS to another. Many decisions need to be made before the installation. Decisions to consider about Windows 7 are covered in this part of the chapter and most of these decisions apply to any Windows operating system.

CHOOSE THE EDITION, LICENSE, AND VERSION OF WINDOWS 7

When buying Windows 7, know the price is affected by the Windows edition and type of license you purchase. You also need to decide between the 32-bit and 64-bit version. In this part of the chapter, you learn about your options when purchasing Windows 7 and how to make sure your computer qualifies for Windows 7.

EDITIONS OF WINDOWS 7

Microsoft has produced several editions of Windows 7 designed to satisfy a variety of consumer needs:

- **Windows 7 Starter** has the most limited features and is intended to be used on netbooks or in developing nations. In the United States, it can only be obtained preinstalled by the manufacturer on a new netbook computer. Windows 7 Starter comes only in the 32-bit version. All other editions of Windows 7 are available in either the 32-bit or 64-bit version.
- **Windows 7 Home Basic** has limited features and is available only in underdeveloped countries and can only be activated in these countries.
- **Windows 7 Home Premium** is similar to Windows 7 Home Basic, but includes additional features.
- **Windows 7 Professional** is intended for business users. You can purchase multiple site licenses (also called volume licensing) using this edition.
- **Windows 7 Enterprise** includes additional features over Windows 7 Professional. The major additional features are BitLocker Drive Encryption used to encrypt an entire hard drive and support for multiple languages. The edition does not include Windows DVD Maker. Multiple site licenses are available.
- **Windows 7 Ultimate** includes every Windows 7 feature. You cannot purchase multiple licenses with this edition.

Notes An antitrust ruling (a ruling to break up monopolies) in Europe required that Microsoft must offer editions of Windows that do not include multimedia utilities. Windows 7, therefore, comes in N and KN editions that do not include Windows Media Player, Windows Media Center, and Windows DVD Maker. For example, Windows 7 Home Premium N, Windows 7 Ultimate N, and Windows 7 Professional KN do not include these multimedia utilities. If you have an N or KN edition of Windows 7, you can, however, legally download the utilities from the Microsoft web site.

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The major features for all editions are listed in Table 7-1. You will learn how to use and support many of these features later in the book.

A+ Exam Tip Before you sit for the A+ 220-802 exam, take a little time to memorize the features included in each edition of Windows 7 that are listed in Table 7-1.

Feature	Starter	Home Basic	Home Premium	Professional	Enterprise	Ultimate
Aero user interface			X	X	X	X
Create homegroups			X	X	X	X
Scheduled backups	X	X	X	X	X	X
Backup to network				X	X	X
BitLocker Drive Encryption					X	X
Encrypting File System (EFS)				X	X	X
Windows DVD Maker			X	X		X
Windows Media Center			X	X	X	X
Join a domain				X	X	X
Group Policy				X	X	X
Remote Desktop host				X	X	X
Multiple languages					X	X
Windows XP Mode				X	X	X
Processor: 32-bit or 64-bit		X	X	X	X	X

Table 7-1 Windows 7 editions and their features

Notes The Windows 7 setup DVD contains only one edition of Windows 7. When you install Windows 7, setup knows which edition to install even if you do not enter the product key during the installation. On the other hand, the Vista setup DVD includes all editions of Vista. The edition of Vista that you can install depends on the product key you use.

OEM, FULL RETAIL, OR UPGRADE RETAIL LICENSE

When buying Windows 7, know that you can purchase a retail license or an **OEM (Original Equipment Manufacturer) license**. The OEM license costs less but can only be installed on a new PC for resale. The boxed retail package contains the 32-bit DVD and 64-bit DVD (see Figure 7-1). You can also purchase and download Windows 7 from the Microsoft online store at *microsoftstore.com*. The retail license costs less if you purchase a license to upgrade from Vista or XP to Windows 7. You are required to purchase the Windows 7 full license for a new computer or any computer that has an OS other than Vista and XP installed.

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Figure 7-1 A Windows 7 DVD contains either a 32-bit version or a 64-bit version of Windows

Notes The Windows 7 setup DVD is the same regardless of the full or upgrade license you purchase. This DVD can be used to perform a clean installation or an upgrade. The difference is in the product key, which is tied to the full or upgrade license you purchase. When installing Windows 7, if you use a product key purchased for an upgrade license, setup will verify that the system qualifies to use this license. You cannot use an OEM disc for an upgrade installation.

32-BIT OR 64-BIT VERSIONS

Recall that an operating system can process 32 bits or 64 bits. A 64-bit installation of Windows generally performs better than a 32-bit installation if you have enough RAM. Table 7-2 shows how much RAM each edition and version of Windows 7 can support. Another advantage of 64-bit installations of Windows is they can support 64-bit applications, which run faster than 32-bit applications. Even though you can install 32-bit applications in a 64-bit OS, for best performance, always choose 64-bit applications. Keep in mind that 64-bit installations of Windows require 64-bit device drivers.

Notes All processors (CPUs) used in personal computers today are hybrid processors and can handle a 32-bit or 64-bit OS. However, the Intel Itanium and Xeon processors used in high-end workstations and servers are true 64-bit processors and require a 64-bit OS.

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Operating System	32-bit Version	64-bit Version
Windows 7 Ultimate	4 GB	192 GB
Windows 7 Enterprise	4 GB	192 GB
Windows 7 Professional	4 GB	192 GB
Windows 7 Home Premium	4 GB	16 GB
Windows 7 Home Basic	4 GB	8 GB
Windows 7 Starter	2 GB	NA

Table 7-2 Maximum memory supported by Windows 7 editions and versions

Notes How much memory or RAM you can install in a computer depends not only on the OS installed but also on how much memory the motherboard can hold. To know how much RAM a motherboard can support, see the motherboard documentation.

VERIFY YOUR SYSTEM QUALIFIES FOR WINDOWS 7

The minimum hardware requirements for Windows 7 are listed in Table 7-3. (These minimum requirements are also the Microsoft recommended requirements.) The requirements are the same as those for Windows Vista. Know, however, that Microsoft occasionally changes the minimum and recommended requirements for an OS.

Hardware	For 32-bit Windows 7	For 64-bit Windows 7
Processor	1 GHz or faster	1 GHz or faster
Memory (RAM)	1 GB	2 GB
Free hard drive space	16 GB	20 GB
Video device and driver	DirectX 9 device with WDDM 1.0 or higher driver	DirectX 9 device with WDDM 1.0 or higher driver

Table 7-3 Minimum and recommended hardware requirements for Windows 7

The simplest way to find out if a system can be upgraded to Windows 7 is to download, install, and run the Windows 7 Upgrade Advisor. You can find the software and instructions on how to use it at *windows.microsoft.com/en-US/windows/downloads/upgrade-advisor*. Microsoft also offers the Windows 7 Compatibility Center at *www.microsoft.com/windows/compatibility* (see Figure 7-2). You can search under both software and hardware to find out if they are compatible with Windows 7. The site sometimes offers links to patches or fixes for a program or device so that it will work with Windows 7.

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Figure 7-2 Use the Windows 7 Compatibility Center to find out if your hardware and software qualify for Windows 7

To understand if your system qualifies for Windows 7, it helps to understand how Windows relates to hardware by using device drivers and system BIOS, as shown in Figure 7-3. (In the figure, the kernel is that part of Windows responsible for relating to hardware.)

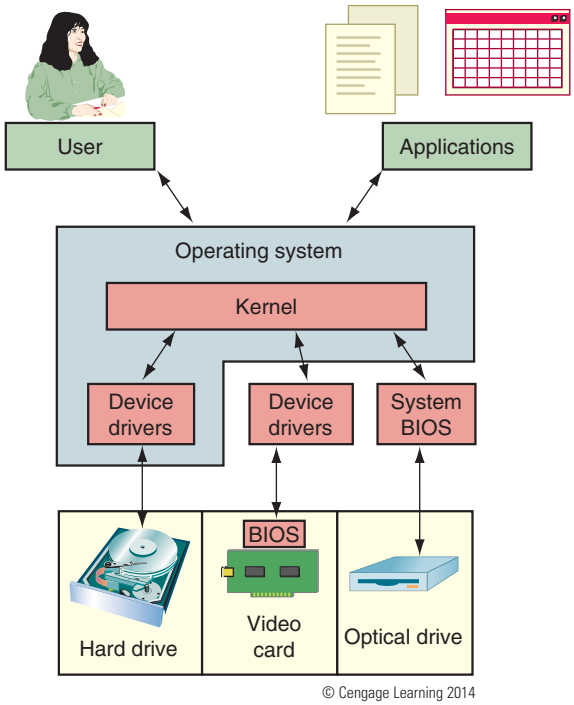

Figure 7-3 Windows relates to hardware by way of device drivers or system BIOS

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When a computer is first turned on, it uses some devices such as the keyboard, monitor, and hard drive before the OS starts up. The motherboard BIOS is contained on a chip on the motherboard (see Figure 7-4) and manages these essential devices. This chip is called a firmware chip because it holds programs.

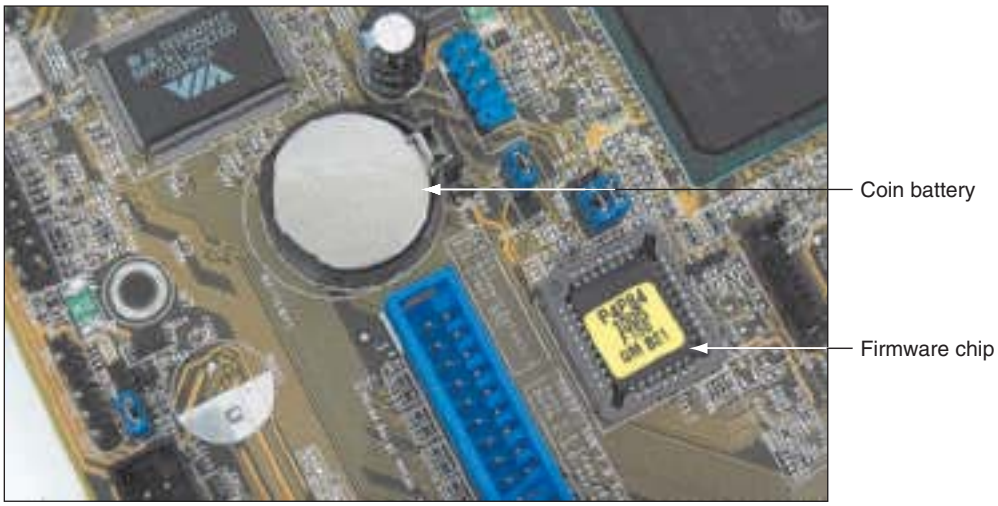

Figure 7-4 A chip on a motherboard contains BIOS used to start the computer, hold motherboard settings, and run essential devices. The chip retains power from a nearby coin battery when the computer is turned off.

The motherboard BIOS provides three main functions:

- The **system BIOS (basic input/output system)** contains instructions for running essential hardware devices before an operating system is started. After the OS is started, it might continue to use system BIOS or use device drivers to communicate with these devices.
- The **startup BIOS** starts the computer and finds a boot device (hard drive, CD drive, or USB flash drive) that contains an operating system. It then turns the startup process over to this OS.
- The **setup BIOS** is used to change motherboard settings. You can use it to enable or disable a device on the motherboard (for example, network port, video port, or USB ports), change the date and time that is later passed to the OS, and select the order of boot devices for startup BIOS to search when looking for an operating system to load.

Recall that device drivers are small programs stored on the hard drive that tell the computer how to communicate with a specific hardware device such as a printer, network card, or scanner. These drivers are installed on the hard drive when the OS is first installed, or when new hardware is added to the system. A device driver is written to work for a specific OS, such as Windows 7 or Vista. In addition, a 32-bit OS requires 32-bit drivers, and a 64-bit OS requires 64-bit drivers.

Windows provides some device drivers, and the manufacturer of the hardware device provides others. When you purchase a printer, video card, digital camera, scanner, or other hardware device, a CD that contains the device drivers is usually bundled with the device along with a user manual (see Figure 7-5). You can also download the drivers for a device from the manufacturer's web site.

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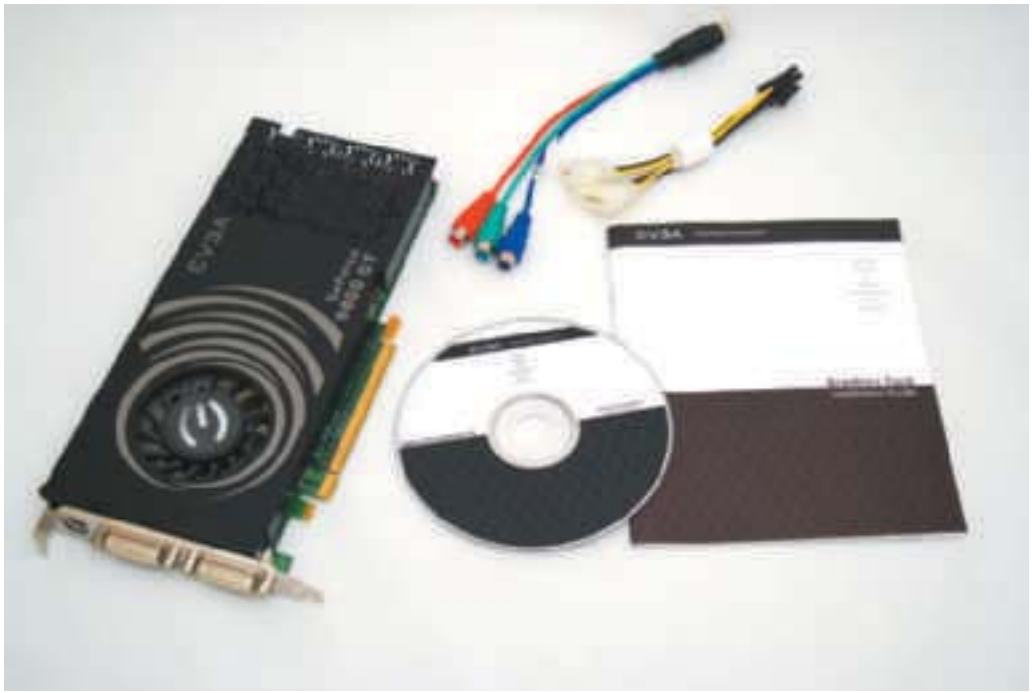

Figure 7-5 A device such as this video card comes packaged with its device drivers stored on a CD

Be sure you have Windows 7 device drivers for all your critical devices such as your network card or motherboard. To find the drivers, look on the CD that came bundled with the device or check the web site of the device manufacturer. Remember that a 64-bit OS requires all 64-bit drivers.

If you are not sure if your devices will work with Windows 7, one solution is to set up a dual boot. A **dual boot**, also called a **multiboot**, allows you to install the new OS without disturbing the old one so you can boot to either OS. After the installation, you can test your software or hardware. If they work under the new OS, you can delete the old one. If they don't work, you can still boot to the old OS and use it. How to set up a dual boot is covered later in the chapter.

If you have applications written for Vista or XP that are not compatible with Windows 7, you can use compatibility mode or Windows XP Mode to solve the problem. **Compatibility mode** is a group of settings that can be applied to older drivers or applications that might cause them to work in Windows 7. **Windows XP Mode** is a Windows XP environment installed in Windows 7 that can be used to support older applications. You learn more about compatibility mode and Windows XP Mode later in the chapter.

Hands-on Project 7-1 Preparing for an Upgrade

On a PC with Windows Vista or XP installed, access the Microsoft web site (*www.microsoft.com*) and locate and run the Windows 7 Upgrade Advisor to find out if the PC is ready for a Windows 7 installation. Make a list of any hardware or software components found incompatible with Windows 7, and draw up a plan for getting the system ready for a Windows 7 upgrade.

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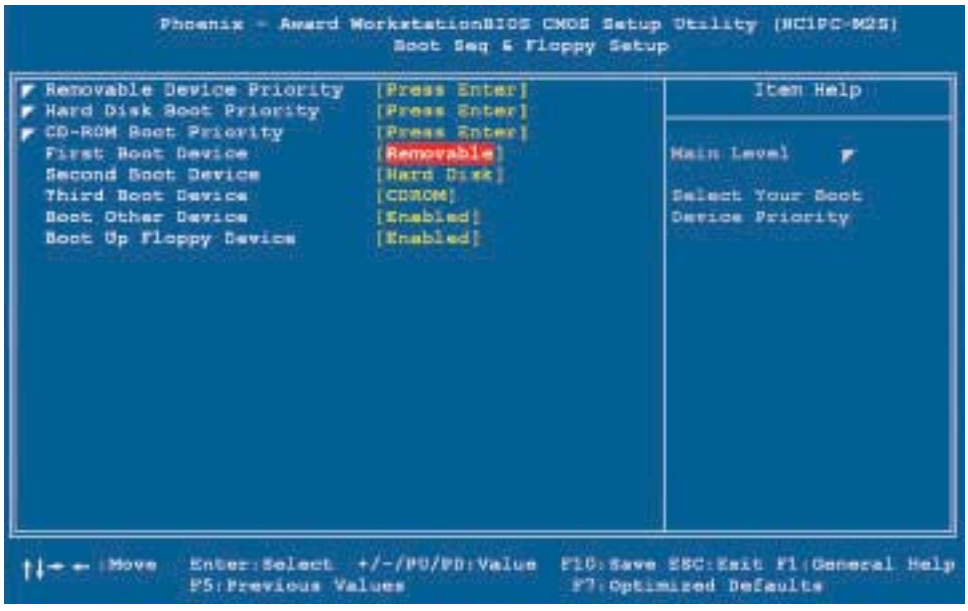
INSTALLATIONS WITH SPECIAL CONSIDERATIONS

Depending on the circumstances and the available hardware, you might be faced with an installation on a computer that does not have a DVD drive, a computer that needs a factory recovery, and an installation in a virtual computer. All these special considerations are discussed next.

WHEN THE COMPUTER DOES NOT HAVE A DVD DRIVE

You can buy Windows 7 on DVD or download it from the Internet. If the computer does not have a DVD drive, consider these options:

- ***Download Windows 7 from the Microsoft web site:*** Purchase Windows 7 on the Microsoft web site (*www.microsoftstore.com*) and download it to your computer's hard drive and install it from there. This option assumes the computer already has a working OS installed.
- ***Use an external DVD drive.*** Use an external DVD drive that will most likely connect to the PC by way of a USB port. If the PC does not already have an OS installed, you must boot from this USB port. To do so, access BIOS setup and set the boot order for the USB as the first boot device. The boot order is the order of devices that startup BIOS looks to for an OS. To enter BIOS setup, you press a key, such as F2 or Del, as the computer is booting and before the OS begins to load. To know which key to press, look for a message on-screen during the boot, such as *Press DEL to enter setup*. Then locate the appropriate BIOS setup screen. For example, the BIOS setup screen shown in Figure 7-6 shows a removable device as the first boot device. You can then boot from the external DVD drive and install Windows.



Source: Phoenix Technologies

Figure 7-6 Set the boot order in BIOS setup

- ***Copy the installation files to a USB flash drive.*** This method is easy to use if you don't need to boot from the flash drive. If you do need to boot from the flash drive, you need to install software that makes the USB flash drive bootable and also copy Windows setup files to the drive.

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- ***Use a DVD drive on another computer on the network.*** Share the DVD drive on another computer on the network. Then go to the computer that is to receive the Windows installation and locate the DVD drive on the network. Double-click the setup.exe program to run the installation across the network. Alternately, you can copy the files on the DVD from the other computer to your hard drive. Again, this option assumes the computer already has a working OS installed. How to share folders and drives on a network is covered in Chapter 17.

If you are upgrading many computers to Windows 7 in a large enterprise, more automated methods are used. Installation files are made available over the network or on bootable USB flash drives or DVDs. These automated methods are discussed later in the chapter.

FACTORY RECOVERY PARTITION

If you have a notebook computer or a brand-name computer, such as a Dell, IBM, or Gateway, and you need to reinstall Windows, follow the recovery procedures given by the computer manufacturer. A hard drive is divided into one or more **partitions**, and the hard drive on a brand-name computer is likely to have a hidden recovery partition that contains a recovery utility and installation files.

To access the utilities on the hidden partition, press a key during startup. The key to press is displayed on the screen early in the boot before the OS is loaded. If you don't see the message, search the web site of the computer manufacturer to find the key combination. For one Dell laptop, you press Ctrl and F11 to start the recovery. One Gateway computer displays the message *Press F11 to start recovery*. When you press these keys, a menu displays, giving you the opportunity to reinstall Windows from setup files kept in the hidden partition.

Sometimes a manufacturer puts a utility in this hidden partition that can be used to create recovery discs (see Figure 7-7). However, the discs must have already been created if they are to be there to help you in the event the entire hard drive fails. You might also be able to purchase these CDs or DVDs on the notebook manufacturer's web site.

Source: Lenovo

Figure 7-7 Use the recovery utility on this laptop to create DVDs that can be used to recover the system in the event the hard drive fails

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Notes In general, it's best to not upgrade an OS on a notebook unless you want to use some feature the new OS offers. For notebooks, follow the general rule, "If it ain't broke, don't fix it." Many hardware components in a notebook are proprietary, and the notebook manufacturer is the only source for these drivers. If you are considering upgrading a notebook to Windows 7, check the notebook manufacturer's web site for advice and to download Windows 7 drivers. It's very important you have a Windows 7 driver for your network port available without having to depend on the network or Internet to get one after Windows 7 is installed. Also know that many Vista drivers also work with Windows 7.

INSTALLATION IN A VIRTUAL COMPUTER

Another type of Windows installation is when you install Windows in a virtual computer. A virtual computer or **virtual machine (VM)** is software that simulates the hardware of a physical computer. Using this software, you can install and run multiple operating systems at the same time on a PC. These multiple instances of operating systems can be used to train users, run legacy software, and support multiple operating systems. For example, help-desk technicians can run a virtual machine for each OS they support on a single PC and quickly and easily switch from one OS to another by clicking a window. Another reason to use a virtual machine is that you can capture screen shots of the boot process in a virtual machine, which is the way the screen shots during the boot were made for this book.

Some popular virtual machine programs for Windows are Virtual PC by Microsoft (*www.microsoft.com*), VirtualBox by Oracle (*www.virtualbox.org*), and VMware by VMware, Inc. (*www.vmware.com*). Virtual PC, VirtualBox, and VMware Player are freeware. Be aware that virtual machine programs require a lot of memory and might slow down your system. Figure 7-8 shows two virtual machines running under Virtual PC.

Source: Virtual PC

Figure 7-8 Two virtual machines running under Virtual PC

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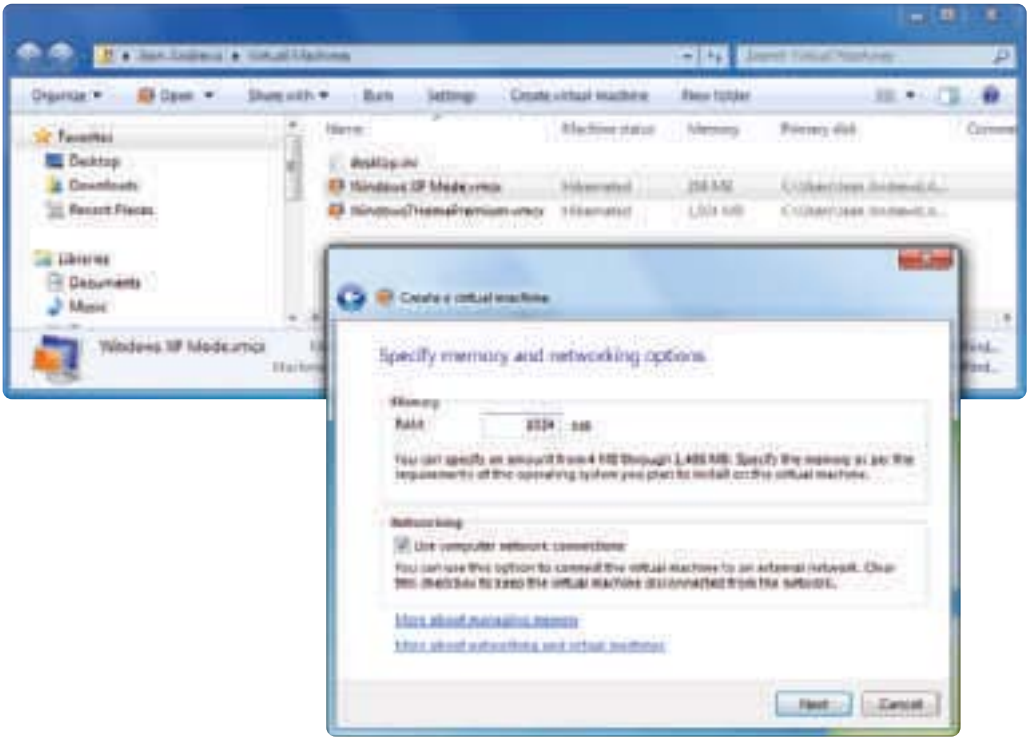
Windows XP Mode is a Windows XP installation that runs under Virtual PC, and can be installed on a Windows 7 Professional, Enterprise, or Ultimate computer. When you install an OS in Virtual PC, normally you must have a valid product key for the installation, but an XP product key is not required for Windows XP Mode.

To use Virtual PC, go to the Microsoft web site and download and install the software. If you plan to use Windows XP Mode, you need to download this software at the same time. To set up a new virtual machine in Virtual PC, click **Start**, **All Programs**, and **Windows Virtual PC**. (You might need to click Windows Virtual PC a second time.) The Explorer window shown at the top of Figure 7-9 appears. In the menu bar, click **Create virtual machine**. A wizard launches and steps you through the process of creating a new machine. During the process, you can select the name of the virtual machine, how much memory the machine has installed, and the hard drive size. The bottom of Figure 7-9 shows one window in the wizard where you select how much RAM the machine will have. When you complete the wizard, the new virtual machine is listed in the Explorer window.



Source: Virtual PC

Figure 7-9 Using Virtual PC to set up a new virtual machine

To start this virtual machine and install an OS in it, first insert the operating system setup disc in the DVD drive. Then double-click the VM in Explorer. The VM boots up, finds the DVD, and starts the OS installation, as shown in Figure 7-10.

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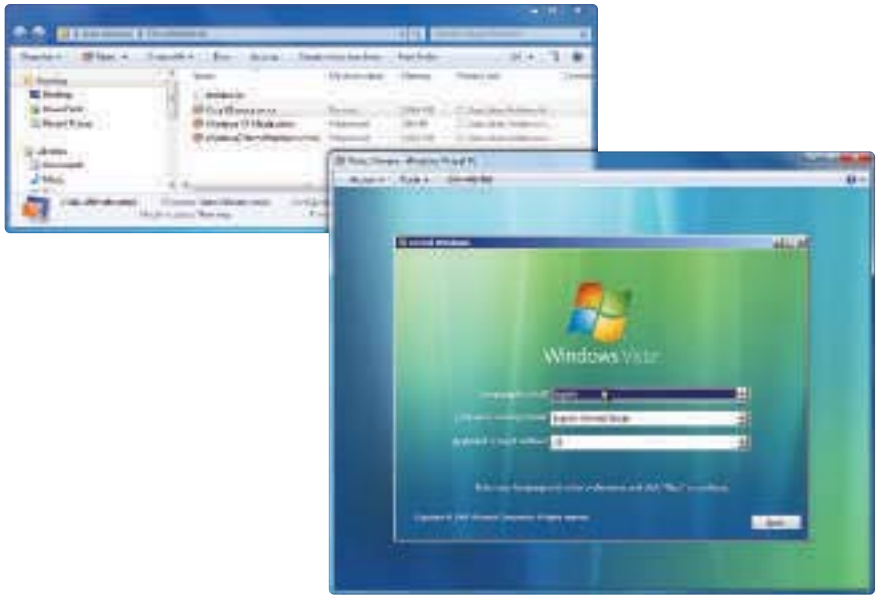


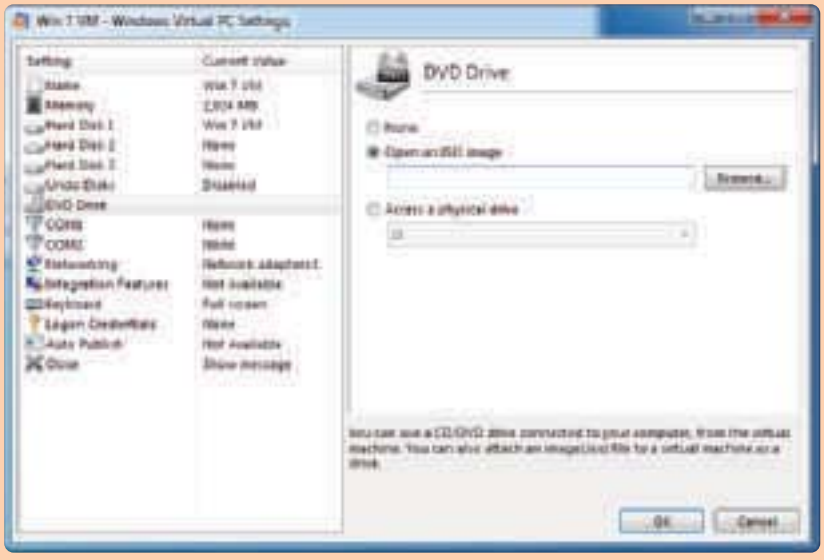
Source: Virtual PC

Figure 7-10 A new VM is installing Windows Vista

APPLYING CONCEPTS

Windows can also be installed in a VM by using an **ISO image**. An International Organization for Standardization image, also called an ISO image or disc image, contains an image of a disc including the file system used. When downloaded from the web, an ISO image is usually stored in a file with an .iso file extension. An ISO image of the Windows setup DVD can be downloaded as an .iso file. To create a bootable Windows setup DVD from the image, right-click the .iso file and select **Burn disc image** from the shortcut menu. Using a virtual machine, you can mount an ISO image to the VM, which treats the image as though it is a disc. The ISO image file then works like a virtual disc.

To mount an ISO image to a VM, you must change the hardware configuration of the VM. For Virtual PC, first shut down the VM. Then in Explorer, select the VM and click **Settings** in the menu bar. The Settings dialog box appears (see Figure 7-11). To mount an ISO image to the VM, select DVD Drive in the figure and navigate to the ISO file. Make your changes and click **OK**.



Source: Microsoft Windows Virtual PC

Figure 7-11 Change the hardware configuration for a virtual machine in Virtual PC

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Hands-on Project 7-2 Installing and Running Microsoft Virtual PC

Go to the Microsoft web site (*www.microsoft.com*) and download Virtual PC. Install Virtual PC on your computer. Later in the chapter, in Project 7-6, you install Windows in a VM.

CHOOSE THE TYPE OF INSTALLATION: IN-PLACE UPGRADE, CLEAN INSTALL, OR DUAL BOOT

If you are installing Windows on a new hard drive, you must perform a clean install. If an OS is already installed on the hard drive, you have three choices:

- ***Clean install:*** You can perform a **clean install**, overwriting the existing operating system and applications. In the Windows 7 setup program, a clean install is called a **custom installation**. The main advantage of a clean install is that problems with the old OS are not carried forward and you get a fresh start. During the installation, you will have the option to reformat the hard drive, erasing everything on the drive. If you don't format the drive, the data will still be on the drive, but the previous operating system settings and applications will be lost. After Windows is installed, you will need to install the applications.
- ***In-place upgrade:*** If the upgrade paths allow it, you can perform an in-place upgrade installation. An **in-place upgrade** is a Windows installation that is launched from the Windows desktop and the installation carries forward user settings and installed applications from the old OS to the new one. A Windows OS is already *in place* before you begin the new installation. An in-place upgrade is faster than a clean install and is appropriate if the system is generally healthy and does not have problems.

  In order to perform an in-place upgrade, Microsoft requires that certain editions and versions of Windows be installed. These qualifying OSs are called **upgrade paths**. Table 7-4 outlines the acceptable upgrade paths for Windows 7. Notice in the table that there is no upgrade path from Windows XP to Windows 7 or for certain editions and versions of Vista to Windows 7. Even though you can purchase an upgrade license to install Windows 7 on these systems, you must perform a clean install.

From OS	To OS
Vista Home Basic	Windows 7 Home Basic, Home Premium, or Ultimate
Vista Home Premium	Windows 7 Home Premium or Ultimate
Vista Business	Windows 7 Professional, Enterprise, or Ultimate
Vista Enterprise	Windows 7 Enterprise
Vista Ultimate	Windows 7 Ultimate
Windows 7 any edition	Can be repaired by performing an in-place upgrade of the same OS
Windows 7 Starter	Anytime Upgrade to Windows 7 Home Premium, Professional or Ultimate
Windows 7 Home Basic	Anytime upgrade to Windows 7 Home Premium, Professional or Ultimate
Windows 7 Premium	Anytime upgrade to Windows 7 Professional or Ultimate
Windows 7 Professional	Anytime upgrade to Windows 7 Ultimate

Table 7-4 In-place upgrade paths to Windows 7

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- ***Dual boot:*** You can install Windows in a second partition on the hard drive and create a dual-boot situation with the other OS. Don't create a dual boot unless you need two operating systems, such as when you need to verify that applications and hardware work under Windows 7 before you delete the old OS. Windows 7/Vista/XP all require that they be the only operating system installed on a partition. So to set up a dual boot, you'll need at least two partitions on the hard drive or a second hard drive.

Notes An Anytime Upgrade is used to upgrade an edition of Windows 7 to another edition, such as when you upgrade Windows 7 Starter to Windows 7 Home Premium. The upgrade is easy to do and does not require your going through the entire upgrade process.

In addition to the information given in Table 7-4, keep in mind these tips:

- A 64-bit version of Windows can only be upgraded to a 64-bit OS. A 32-bit OS can only be upgraded to a 32-bit OS. If you want to install a 64-bit version of Windows on a computer that already has a 32-bit OS installed, you must perform a clean install.
- You can only upgrade Windows Vista to Windows 7 after Vista Service Pack 1 or later has been installed in Vista.

UNDERSTAND THE CHOICES YOU'LL MAKE DURING THE INSTALLATION

While Windows is installing, you must choose which drive and partition to install Windows, the size of a new partition, and how Windows will connect to the network. These three choices are discussed next.

THE SIZE OF THE WINDOWS PARTITION

A hard drive is divided into one or more partitions. When a partition is formatted with a file system and assigned a drive letter (such as drive C:), it is called a **volume**. A **file system** is the overall structure an OS uses to name, store, and organize files on a volume, and Windows is always installed on a volume that uses the NTFS file system. For most installations, you install Windows on the only hard drive in the computer and allocate all the space on the drive to one partition that Windows setup calls drive C: and installs Windows in the C:\Windows folder.

For a clean install or dual boot, you can decide to not use all the available space on the drive for the Windows partition. Here are reasons to not use all the available space:

- *You plan to install more than one OS on the hard drive, creating a dual-boot system*: For example, you might want to install Windows 7 on one partition and leave room for another partition where you intend to later install Windows 8, so you can test software under both operating systems. (When setting up a dual boot, always install the older OS first.)
- *Some people prefer to use more than one partition or volume to organize data on their hard drives*: For example, you might want to install Windows and all your applications on one partition and your data on another. Having your data on a separate partition makes backing up easier. In another situation, you might want to set up a volume on the drive that is used exclusively to hold backups of data on another computer on the network. The size of the partition that will hold Windows 7 and its applications should be at least 20 GB, but a larger volume is preferred.

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Caution It's convenient to back up one volume to another volume on a different hard drive. However, don't back up one volume to another volume on the same hard drive, because when a hard drive fails, quite often all volumes on the drive are damaged and you will lose both your data and your backup.

Windows can handle up to four partitions on a drive. In Chapter 10, you learn to use Disk Management to create partitions from unallocated space and to resize, delete, and split existing partitions.

ADMINISTRATOR ACCOUNT

Recall from Chapter 3 that Windows supports two types of accounts, standard accounts and administrator accounts. These accounts are **local accounts**, meaning they are only recognized by the local computer. Every Windows computer has two local administrator accounts:

- During the Windows 7 installation, you are given the opportunity to enter an account name and password to a local user account that is assigned administrator privileges. This account is enabled by default.
- A built-in **administrator account** is created by default. The built-in administrator account is named Administrator, does not have a password, and is disabled by default. In Chapter 17, you learn how to enable this administrator account.

You can log on as an administrator after the OS is installed and create local user accounts that apply to this one computer. How to set up a local account is covered later in the chapter.

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NETWORK CONFIGURATION

Three ways Windows supports accessing resources on a network are to use a Windows homegroup, workgroup, or domain.

Windows Workgroup and Homegroup

A homegroup and workgroup are examples of a **peer-to-peer (P2P)** network, which is a network that is managed by each computer without centralized control. They form a logical group of computers and users that share resources (see Figure 7-12), where administration, resources, and security on a workstation are controlled by that workstation.

Notes When looking at the diagrams in Figure 7-12 and later in Figure 7-13, know that the connecting lines describe the logical connections between computers and not the physical connections. Both networks might be physically connected the same way, but logically, resources are controlled by each computer on the network or by using a centralized database. In network terminology, the arrangement of physical connections between computers is called the **physical topology**. The logical way the computers connect on a network is called the **logical topology**.

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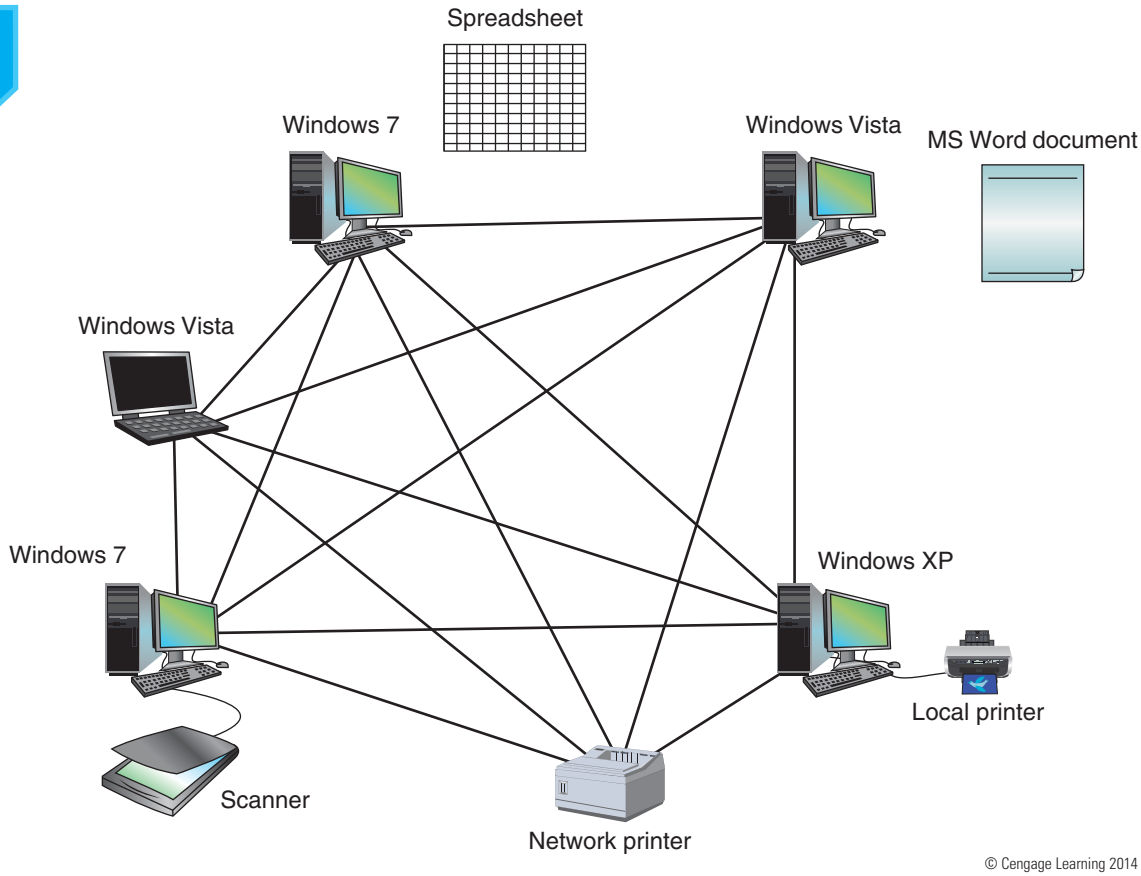

Figure 7-12 A Windows workgroup is a type of peer-to-peer network where no single computer controls the network and each computer controls its own resources

In a Windows **workgroup**, each computer maintains a list of users and their rights on that particular PC. The computer allows a user on the network to access local resources based on these rights she has been given. In a **homegroup**, each computer shares files, folders, libraries, and printers with other computers in the homegroup. A homegroup provides less security than a workgroup because any user of any computer in the homegroup can access homegroup resources.

A homegroup is new to Windows 7 and cannot be used with earlier versions of Windows. If you need to share resources with Windows Vista or XP computers or you need better security so you can share resources with specific users, use workgroup sharing rather than a homegroup. You can also use a combination of homegroup and workgroup sharing on the same computer.

During the Windows installation, if you set the network location to a home network, you are given the opportunity to create or join a homegroup. If the homegroup already exists on the network, you will need the homegroup password to join.

Notes Windows 7 Starter and Home Basic can join a homegroup, but they cannot create one.

A+ 220-802 1.1, 1.2, 1.6

Windows setup automatically joins the computer to a workgroup named WORKGROUP. If necessary, you can change the workgroup name after the installation. How to change a workgroup name is covered later in the chapter. Using workgroup sharing, you must set up a user account for each user and share resources with these users. Chapter 17 covers the details of securing and managing homegroups, workgroups, user accounts, and shared resources.

Windows Domain

A Windows **domain** is a logical group of networked computers that share a centralized directory database of user account information and security for the entire group of computers (see Figure 7-13). A Windows domain is a type of **client/server** network, which is a network where resources are managed by centralized computers. Using the client/server model, the directory database is controlled by a Network Operating System (NOS). Examples of network operating systems are Windows Server 2011, UNIX, and Linux.

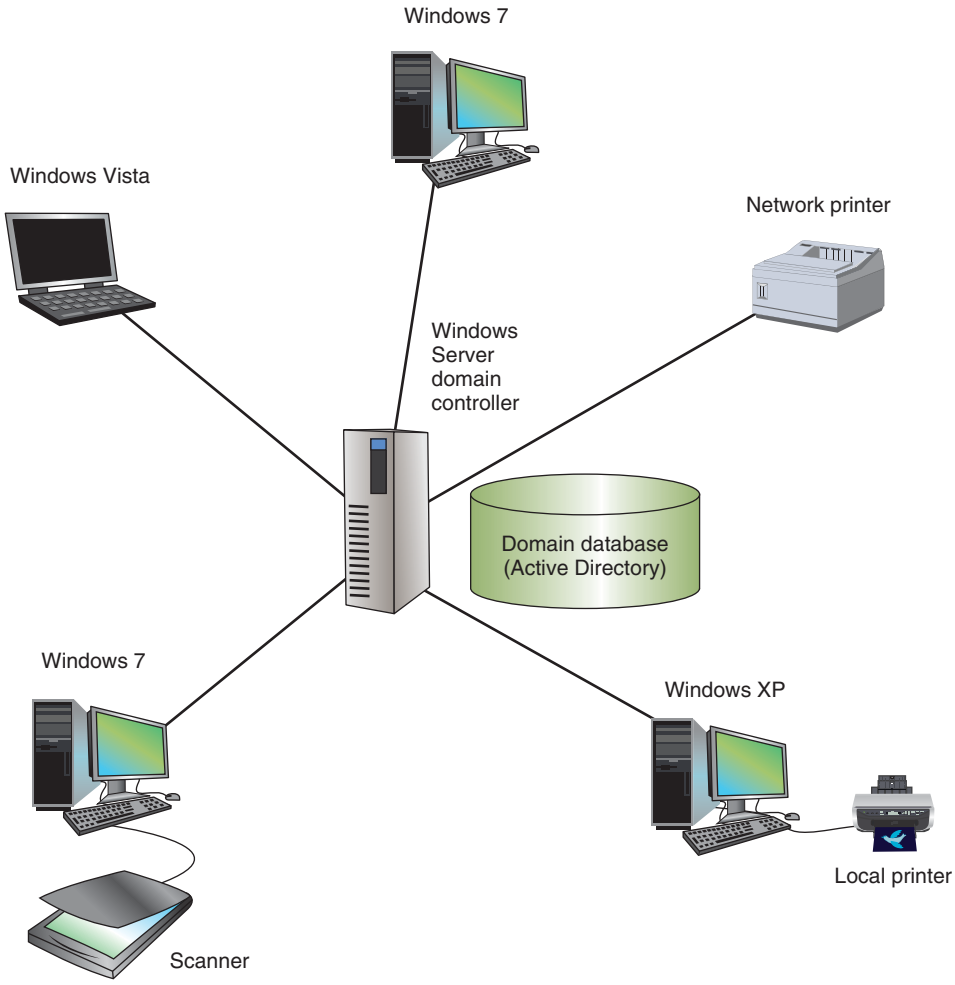

Figure 7-13 A Windows domain is a type of client/server network where security on each PC or other device is controlled by a centralized database on a domain controller

Notes Windows Home Editions do not support joining a domain. If you plan to join a domain on your network, install Windows 7 Professional, Enterprise, or Ultimate editions.

A+ 220-802 1.1, 1.2, 1.6

Windows Server controls a network using the directory database called **Active Directory**. Each user on the network must have his own domain-level account called a **global account**, global username or network ID, which is kept in Active Directory and assigned by the network or system administrator. If you are installing Windows on a PC that belongs to a domain, the administrator will tell you the domain name and computer name so you can join the domain during the installation. You will also need a network ID and password to the domain that you can use to log onto the network after Windows is installed.

Notes If your computer is part of a domain, when Windows starts up, press Ctrl+Alt+Del to display a logon screen, and then enter your network ID and password.

The Windows installation process usually has no problems connecting to the network and the Internet without your help. However, you might need to know how the IP address is assigned. An IP address uniquely identifies a computer on the network. It might be assigned dynamically (IP address is assigned by a server each time it connects to the network) or statically (IP address is permanently assigned to the workstation). If the network is using static IP addressing, you need the IP address for the workstation.

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FINAL CHECKLIST BEFORE BEGINNING THE INSTALLATION

Before you begin the installation, complete the final checklist shown in Table 7-5 to verify that you are ready.

Questions to Answer	Further Information
Does the PC meet the minimum or recommended hardware requirement?	CPU: RAM: Hard drive partition size: Free space on the partition:
Do you have in hand the Windows device drivers for your hardware devices and application setup CDs?	List hardware and software that need to be upgraded:
Do you have the product key available?	Product key:
How will users be recognized on the network?	Homegroup password: Workgroup name: Domain name: Computer name:
How will the PC be recognized on the network?	Static or dynamic IP addressing: IP address (for static addressing):
Will you do an upgrade or clean install?	Current operating system: Does the old OS qualify for an upgrade?
For a clean install, will you set up a dual boot?	List reasons for a dual boot: For a dual boot Size of the second partition: Free space on the second partition:
Have you backed up important data on your hard drive?	Location of backup:

Table 7-5 Checklist to complete before installing Windows

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Notes For new installations, look for the product key written on the cover of the Windows setup DVD or affixed to the back of the Windows documentation booklet, as shown in Figure 7-14. If you are reinstalling Windows on an existing system, look for the product key displayed in the System window. Click **Start**, right-click **Computer**, and select **Properties** from the shortcut menu. If Windows will not start, look for the product key sticker mounted on the side of a desktop or bottom of a laptop.

Figure 7-14 The Windows 7 product key found on the inside of a retail package or on the outside of an OEM

Before we get into the step-by-step instructions of installing an OS, here are some general tips about installing Windows:

- Verify that you have all application software CDs or DVDs available and all device drivers.
- Back up all important data on the drive. How to perform backups is covered in Chapter 10.
- For upgrade installations and clean installs where you do not plan to reformat the hard drive, run antivirus software to make sure the drive is free from malware. If Windows will not start and you suspect malware might be a problem, plan to reformat the hard drive during the installation so you know the hard drive is clean of malware.
- If you want to begin the installation by booting from the Windows DVD or other media such as a USB device, use BIOS setup to verify that the boot sequence is first the optical drive or USB device, and then the hard drive.
- In BIOS setup, disable any virus protection setting that prevents the boot area of the hard drive from being altered.
- For a notebook computer, connect the AC adapter and use this power source for the complete OS installation, updates, and installation of hardware and applications. You don't want the battery to fail in the middle of the installation process.

Notes If your current installation of Windows is corrupted, you might be able to repair the installation rather than reinstalling Windows. Chapter 14 covers what to do to fix a corrupted Windows installation.

A+ 220-802 1.1, 1.2

Hands-on Project 7-3 Preparing for Windows 7

Use the Windows 7 Compatibility Center at *www.microsoft.com/windows/compatibility/windows-7/en-us/default.aspx* to research whether a home or lab PC that does not have Windows 7 installed qualifies for Windows 7. Fill in the following table and print the web pages showing whether each hardware device and application installed on the PC qualifies for Windows 7.

Hardware Device or Application	Specific Device Name or Application Name and Version	Does It Qualify for Windows 7?
Motherboard or BIOS		
Video card		
Modem card (if present)		
Sound card (if present)		
Printer (if present)		
Network card (if present)		
CD-ROM drive (if present)		
DVD drive (if present)		
SCSI hard drive (if present)		
Other device		
Application 1		
Application 2		
Application 3		

7

INSTALLING WINDOWS 7

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In this part of the chapter, you learn the steps to install Windows 7 as an in-place upgrade, clean install, and dual boot, and what to do after the installation. As you install and configure software, be sure to document what you did. This documentation will be helpful for future maintenance and troubleshooting. In a project near the end of this chapter, you will develop a documentation template.

Let's begin with how to perform an in-place upgrade of Windows Vista to Windows 7.

STEPS TO PERFORMING A WINDOWS 7 IN-PLACE UPGRADE

Recall that an in-place upgrade begins after you have booted the system to the Windows desktop. An upgrade from Windows Vista to Windows 7 carries applications and user settings forward into the new installation. Follow these steps:

1. Close any open applications. If you have not already backed up important data and used antivirus software to scan the system for viruses, do so now. After the scan is finished, close the antivirus software so that it does not run in the background. Close other third-party software such as backup software that might be running in the background.

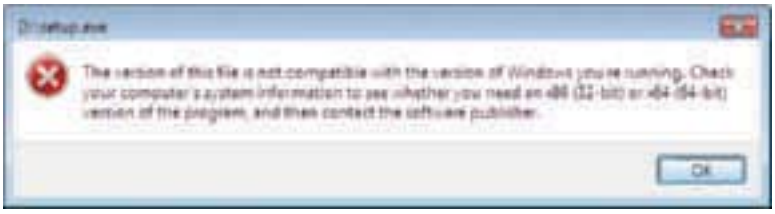
A+ 220-802 1.2, 1.6, 4.6

2. Insert the Windows 7 DVD in the DVD drive. You can then launch Windows setup from the AutoPlay dialog box that appears (see Figure 7-15). If it does not appear, enter this command in the search box: **D:\setup.exe**, substituting the drive letter for your DVD drive for D. Respond to the Vista UAC (User Account Control) box.

Source: Microsoft Windows 7

Figure 7-15 Begin the Windows 7 installation from the AutoPlay box

Notes Figure 7-16 shows the error message that appears when you try to upgrade a 32-bit OS to a 64-bit version of Windows 7.



Source: Microsoft Windows 7

Figure 7-16 Error when running the 64-bit Windows 7 setup program from within a 32-bit operating system

3. The opening menu shown in Figure 7-17 appears. If you have not yet performed the Windows 7 Upgrade Advisor process, you can do so now by clicking *Check compatibility online*. To proceed with the installation, click **Install now**.

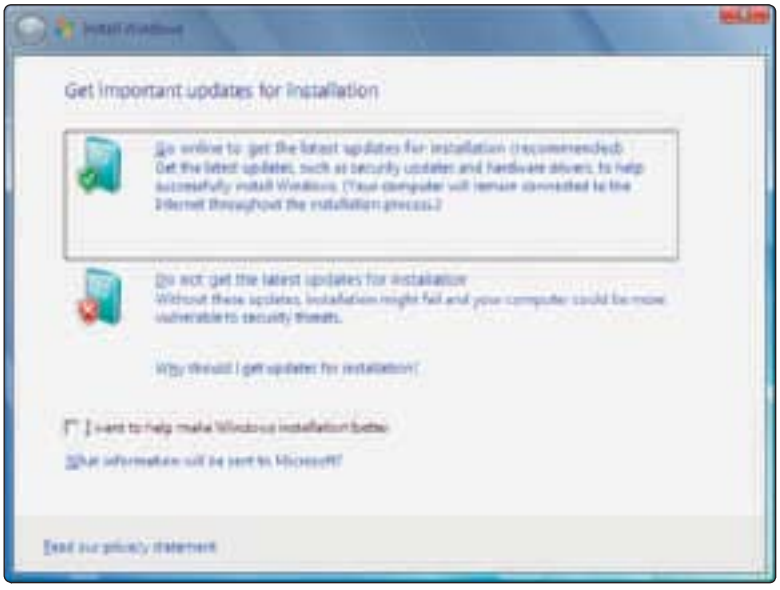
Notes If your computer refuses to read from the DVD, verify that your optical drive is a DVD drive. Perhaps it is only a CD drive. If this is the case, refer to the section "When the Computer Does Not Have a DVD Drive" earlier in the chapter.

A+ 220-802 1.2, 1.6, 4.6

Source: Microsoft Windows 7

Figure 7-17 Opening menu when you launch Windows 7 setup from within Windows

4. On the next screen, you can choose to allow the setup program to download updates for the installation (see Figure 7-18). If you have Internet access, click **Go online to get the latest updates for installation (recommended)**. Setup will download the updates. When using this option, you'll need to stay connected to the Internet throughout the installation.

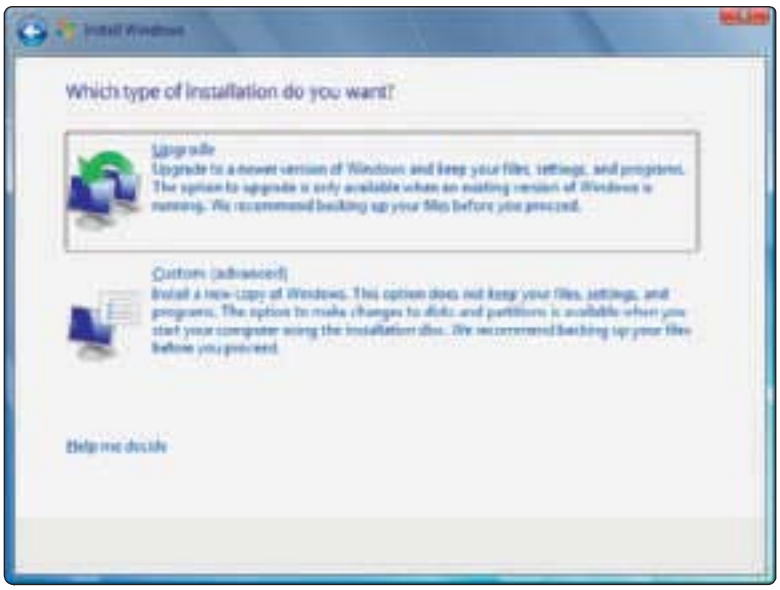


Source: Microsoft Windows 7

Figure 7-18 Allow setup to download updates for the installation process

5. On the next screen, accept the license agreement and click **Next**.
6. On the next screen, shown in Figure 7-19, select the type of installation you want, either Upgrade or Custom (advanced). The Upgrade option is only available when an existing version of Windows Vista or 7 is running. The Custom installation is a clean install. Select **Upgrade**.

A+ 220-802 1.2, 1.6, 4.6



Source: Microsoft Windows 7

Figure 7-19 Select the type of installation you want

7. Setup will check for any compatibility issues. It will verify that the edition of Vista installed can be used as an upgrade path to the edition of Windows 7 you are installing according to the rules outlined earlier in Table 7-4. It will also verify that Windows Vista has a service pack applied. If setup finds a problem, an error message or a warning message appears. An error message requires that you end the installation and resolve the problem. A warning message allows you to click **Next** to continue with the installation.
8. The installation is now free to move forward. The PC might reboot several times. At the end of this process, a screen appears asking you for the product key (see Figure 7-20). Enter the product key and click **Next**.

Source: Microsoft Windows 7

Figure 7-20 Enter the product key

A+ 220-802 1.2, 1.6, 4.6

Notes Notice in Figure 7-20 the check box *Automatically activate Windows when I'm online*. Normally, you would leave this option checked so that Windows 7 activates immediately. However, if you are practicing installing Windows 7 and intend to install it several times using the same DVD, you might choose to uncheck this box and not enter the product key during the installation. You can later decide to enter the product key and activate Windows after the installation is finished. You have 30 days before you must activate Windows.

9. On the following screen, you are asked how you want to handle Windows updates (see Figure 7-21). Unless your company has a different policy, click **Use recommended settings.**

Source: Microsoft Windows 7

Figure 7-21 Decide how to handle Windows Updates

10. On the next screen, verify the time and date settings are correct and click **Next.**
11. On the next screen, select the network location (see Figure 7-22). Click the option that is appropriate to your network connection. If you need to change this setting later, use the Network and Sharing Center that you learned about in Chapter 3.

Source: Microsoft Windows 7

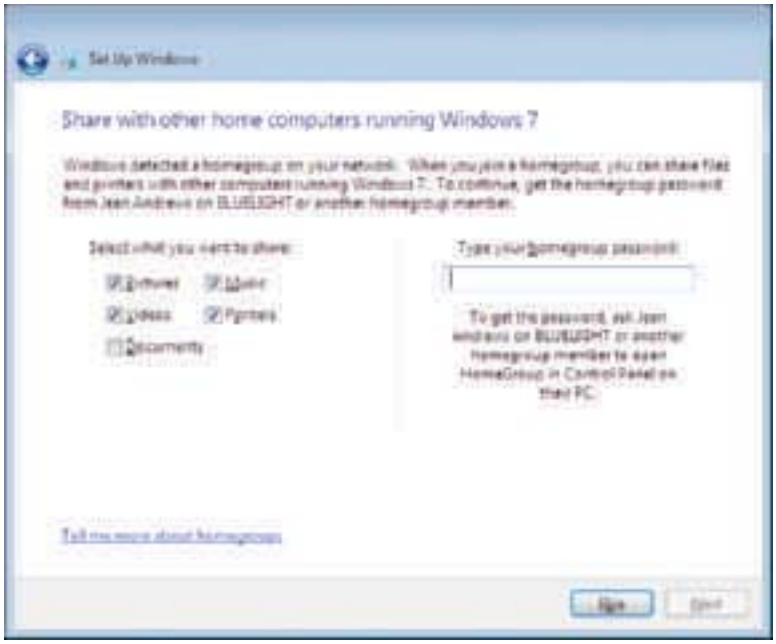
Figure 7-22 Select network settings

A+ 220-802 1.2, 1.6, 4.6

Here is an explanation of each option:

- ***Home network.*** Network Discovery is turned on and you can join a homegroup. Network Discovery is a setting that allows this computer to see other computers on the network and other computers can see this computer.
- ***Work network.*** Network Discovery is turned on, you can join a domain, but you cannot join a homegroup.
- ***Public network.*** Network Discovery is turned off and you cannot join a homegroup or domain. This option is the most secure.

12. If you selected Home network in the previous step, the screen shown in Figure 7-23 appears when a homegroup already exists and allows you to configure your homegroup settings. In the figure, you are told that the user, Jean Andrews, has assigned a homegroup password on the computer BLUELIGHT. If setup does not find a homegroup on the network, it suggests a password for the new homegroup. Check what you want to share with others in the homegroup. Enter the password for an existing homegroup or verify/change the password for the new homegroup. Then click **Next** to create or join the homegroup. If you don't want to use a homegroup, click **Skip** to continue.



Source: Microsoft Windows 7

Figure 7-23 Configure your homegroup settings and password

Notes To know what password has been assigned to an existing homegroup, go to a computer on the network that belongs to this homegroup. Open Control Panel and click **Choose homegroup and sharing options** under the Network and Internet group. On the next screen, click **View or print the homegroup password**.

13. Near the end of the installation, Windows Update downloads and installs updates and the system restarts. Finally, a logon screen appears. Log in with your user account and password. The Windows 7 desktop loads and the installation is complete.

A+ 220-802 1.2, 1.6, 4.6

STEPS TO PERFORM A CLEAN INSTALL OR DUAL BOOT

To perform a clean install of Windows 7 or a dual boot with another OS, you can begin the installation from the Windows 7 DVD or from the Windows desktop:

- ***If no operating system is installed on the PC, begin the installation by booting from the Windows 7 DVD:*** Using this method, the Upgrade option is not available and you are forced to do a Custom installation, also called a clean install.
- ***If an operating system is already installed on the PC, you can begin the installation from the Windows desktop or by booting from the Windows 7 DVD:*** Either way, you can perform a Custom installation. If you are using an upgrade license of Windows 7, setup will verify that a Windows OS is present, which qualifies you to use the upgrade license. This is the method to use when upgrading from Windows XP to Windows 7; you are required to perform a clean install even though setup verifies that Windows XP is present.
- ***If you are installing a 64-bit OS when a 32-bit OS is already installed or vice versa, you must begin the installation by booting from the DVD:*** Setup still allows you to use the less expensive upgrade license even though you are performing a clean install because it is able to verify a Windows installation is present.

Notes When setting up a dual boot, you might need to shrink a partition to make room for a second partition to hold Windows 7. If so, use Disk Management in Windows Vista to shrink the partition before you begin the Windows 7 installation. You can also use Disk Management to create a new partition to hold the Windows 7 installation and format that partition. The Windows 7 volume must be formatted using the NTFS file system. How to use Disk Management is covered in Chapter 10.

Follow these steps to begin the installation by booting from the Windows 7 DVD:

1. Insert the Windows 7 DVD in the DVD drive and start the system, booting directly from the DVD. If you have trouble booting from the disc, go into BIOS setup and verify that your first boot device is the optical drive. On the first screen (see Figure 7-24), select your language and other preferences and click **Next**.

Source: Microsoft Windows 7

Figure 7-24 Select language, time, and keyboard options

A+ 220-802 1.2, 1.6, 4.6

Notes When installing Windows XP, you have to install third-party drivers at the beginning of the XP installation if your computer is using an array of hard drives working together (called RAID) or a hard drive with a SCSI hardware interface. However, Windows 7 or Vista setup has its own drivers for these situations, so no extra third-party drivers are needed. If you encounter a problem when installing Windows 7 using RAID or SCSI drives, such as a RAID or SCSI hard drive is not detected, know that the problem is a hardware or firmware problem and not a Windows setup problem.

2. The opening menu shown in Figure 7-25 appears. Click **Install now**.

Source: Microsoft Windows 7

Figure 7-25 Screen to begin the Windows 7 installation

3. On the next screen, accept the license agreement.
4. On the next screen, shown earlier in Figure 7-19, select the type of installation you want. Choose **Custom (advanced)**.
5. On the next screen, you will be shown a list of partitions on which to install the OS. For example, the computer shown in Figure 7-26 has one partition on one hard drive. If you want to use this partition for a clean install, click **Next**, which will cause Windows 7 to replace whatever other OS might be installed on this partition. If you are performing a dual boot and need to create a new partition, click **Drive options (advanced)**; setup will step you through the process of creating a new partition.

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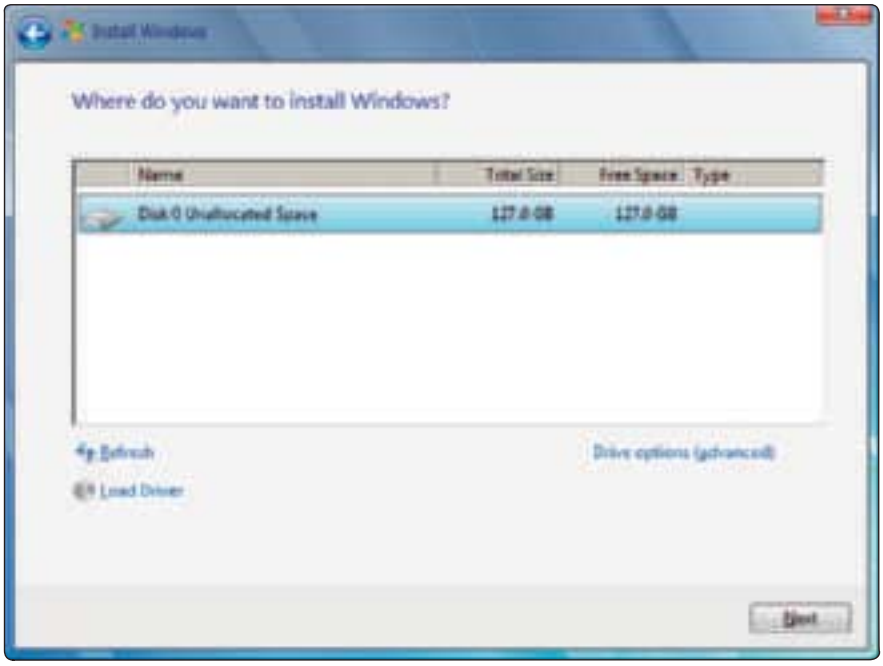


Source: Microsoft Windows 7

Figure 7-26 Select a partition to install Windows 7 in a clean install or dual-boot environment

6. The installation is now free to move forward. At the end of this process, the window in Figure 7-27 appears asking for a username and computer name. Enter these values and click **Next**. On the next screen, you can enter a password for your user account by entering the password twice followed by a password hint. Then click **Next**.

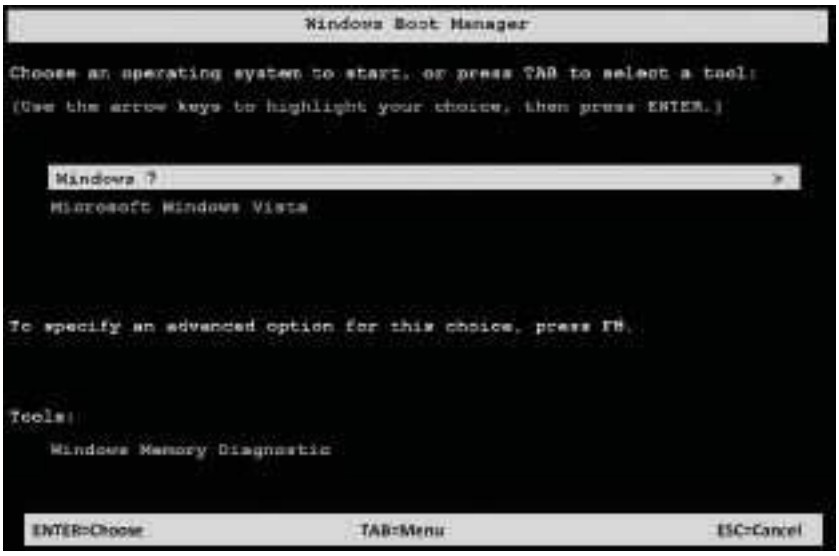
Source: Microsoft Windows 7

Figure 7-27 Choose a username and computer name

A+ 220-802 1.2, 1.6, 4.6

7. The installation now continues the same way as an upgrade installation. You are asked to enter the product key, Windows update settings, time and date settings, and network settings. Windows Update downloads and installs updates and you are asked to restart the system. After the restart, the logon screen appears. After you log in, the Windows 7 desktop loads and the installation is complete.

After the installation, when you boot with a dual boot, the **boot loader menu** automatically appears and asks you to select an operating system, as shown in Figure 7-28.



Source: Microsoft Windows 7

Figure 7-28 Boot loader menu in a dual-boot environment

When using a dual boot, you can execute an application while Windows 7 or Vista is loaded even if the application is installed under the other OS. If the application is not listed in the Start menu, locate the program file in Windows Explorer. Double-click the application to run it from Windows 7 or Vista. You should not have to install an application twice under each OS.

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USE THE WINDOWS 7 UPGRADE DVD ON A NEW HARD DRIVE

Windows 7 setup expects that an old OS is installed if you use the upgrade license DVD. This requirement presents a problem when you are replacing a hard drive. You have two options in this situation:

- *Install Vista or XP first and then install Windows 7*: You must also install a service pack under Vista or XP before you install Windows 7. This first option takes a long time!
- *Install Windows 7 twice*: Follow these steps:

1. Use the Windows 7 upgrade DVD to perform a clean install. When you get to the installation window that asks you to enter your product key, don't enter the key and uncheck **Automatically activate Windows when I'm online**. Complete the installation.

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2. From the Windows 7 desktop, start the installation routine again, but this time as an upgrade. Enter the product key during the installation and Windows 7 will activate with no problems.

Notes If you have problems installing Windows, search the Microsoft web site (*support.microsoft.com*) for solutions. Windows 7 setup creates several log files during the installation that can help you solve a problem. The list can be found in the Microsoft Knowledge Base Article 927521 at this link: *support.microsoft.com/kb/927521*.

Vista Differences Editions of Windows Vista are **Windows Vista Starter**, **Windows Vista Home Basic**, **Windows Vista Home Premium**, **Windows Vista Business**, **Windows Vista Enterprise**, and **Windows Vista Ultimate**. A Vista installation works the same as a Windows 7 installation. To find out about the editions of Vista and the differences in planning a Vista installation, see Appendix B.

XP Differences Windows XP comes in **Windows XP Home Edition**, **Windows XP Professional**, **Windows XP Professional x64 Edition**, **Windows XP Media Center Edition**, and **Windows XP Tablet PC Edition**. An XP installation begins by booting from the XP setup CD or executing the Winnt32.exe program from the Windows desktop. To find out more about the features of XP editions and how to install and configure XP, see Appendix C.

Hands-on Project 7-4 Using the Internet for Problem Solving

Access the *support.microsoft.com* web site for Windows 7 support. Print one article from the Knowledge Base that addresses a problem when installing Windows 7.

Hands-on Project 7-5 Installing Windows 7

Follow the instructions in the chapter to install Windows 7 as either an upgrade or clean install. Write down each decision you had to make as you performed the installation. If you get any error messages during the installation, write them down and list the steps you took to recover from the error. How long did the installation take? If you have virtual machine software installed on your computer, you can do this project in the VM.

A+ 220-802 1.2

Hands-on Project 7-6 Installing Windows 7, Vista, or XP in a VM

Earlier in the chapter, in Hands-on Project 7-2, you installed Virtual PC on your computer. Use it to install a 32-bit version of Windows 7, Vista, or XP. (Virtual PC does not support a 64-bit OS.) You do not have to activate the OS and you will have 30 days to use it before it will not work. You can use this VM installation of Windows 7 in a project in Chapter 10.

WHAT TO DO AFTER A WINDOWS INSTALLATION

A+ 220-802 1.2, 1.5

After you have installed Windows, you need to do the following:

- Verify that you have network access.
- Activate Windows.
- Install updates and service packs for Windows
- Verify automatic updates are set as you want them.
- Install hardware.
- Install applications, including antivirus software.
- Set up user accounts and transfer or restore from backup user data and preferences to the new system.
- Turn Windows features on or off.

Notes To protect your computer, don't surf the web for drivers or applications until you have installed Windows updates and service packs and also installed and configured antivirus software.

In addition, if you are installing Windows on a laptop, you will want to use Control Panel to configure power management settings. If you are installing an OEM (Original Equipment Manufacturer) version of Windows 7, look for a sticker on the outside of the DVD case. This sticker contains the product key and is called the **Certificate of Authenticity**. Put the sticker on the bottom of a laptop or the side or rear of a desktop computer (see Figure 7-29).

Figure 7-29 Paste the Windows 7 Certificate of Authenticity sticker on a new desktop

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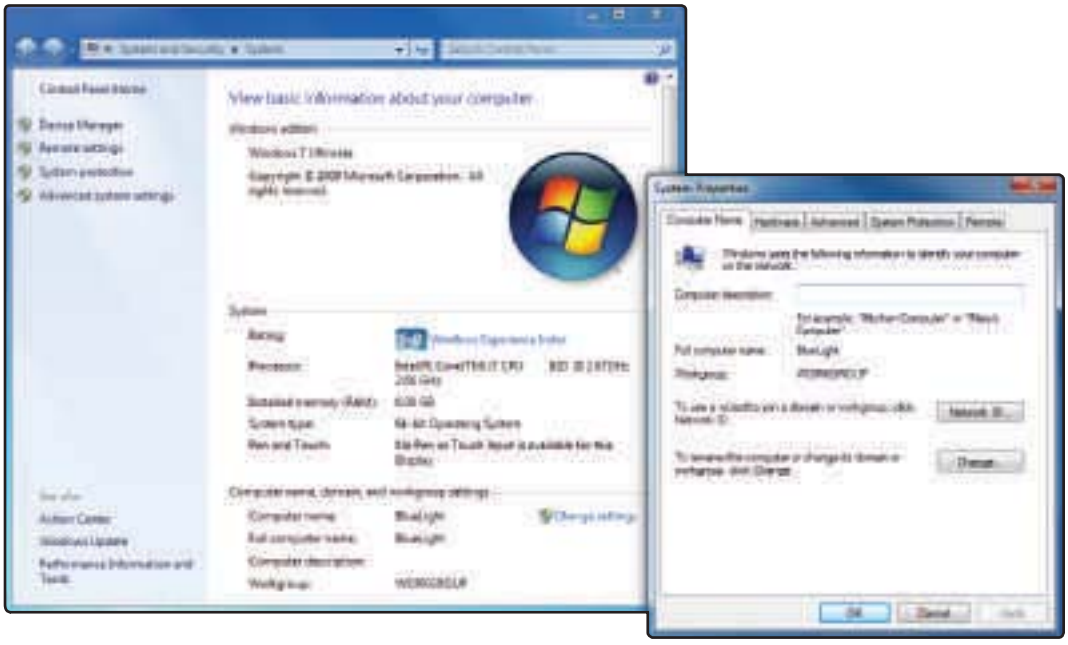
1.2, 1.5

Now let's look at the details of the items in the preceding list.

VERIFY THAT YOU HAVE NETWORK ACCESS

When you install Windows 7, the setup process should connect you to the local network and to the Internet, if available. If you are working on a computer in a corporate environment using a Windows domain, follow these steps to join the computer to a domain:

1. Click the **Start** button, right-click **Computer**, and select **Properties** from the shortcut menu. The System window opens (see the left side of Figure 7-30).



Source: Microsoft Windows 7

Figure 7-30 Use the System window to change computer settings

2. Scroll down to the *Computer name, domain, and workgroup settings* group. Click **Change settings**. The System Properties dialog box displays, as shown in the right side of Figure 7-30. (If you are installing a Windows 7 Home edition, the Network ID button in the figure will be missing because these editions cannot join a domain.)
3. To join a domain, click **Network ID** and follow the directions on-screen to join the domain. To join the domain, you will need your username and password on the domain, the computer name, and the name of the domain. Your network administrator will have all that information. You will need to restart the computer before your changes will take effect.

Notes If your computer is part of a Windows domain, when Windows starts up, it displays a blank screen instead of a logon screen. To log onto the domain, press Ctrl+Alt+Del to display the logon screen. If you want to log onto the local machine instead of the domain, type **.*username***. For example, to log onto the local machine using the local user account "Jean Andrews," type **.\Jean Andrews**.

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To verify that you have access to the local network and to the Internet, do the following:

1. Open Windows Explorer and verify that you can see other computers on the network (see Figure 7-31). Try to drill down to see shared resources on these computers.

Source: Microsoft Windows 7

Figure 7-31 Use Windows Explorer to access resources on your network

2. To verify that you have Internet access, open Internet Explorer and try to navigate to a couple of web sites.
3. If Windows Explorer does not show other computers on your network or you cannot access the Internet, use the Network and Sharing Center that you learned about in Chapter 3 to resolve the problem.

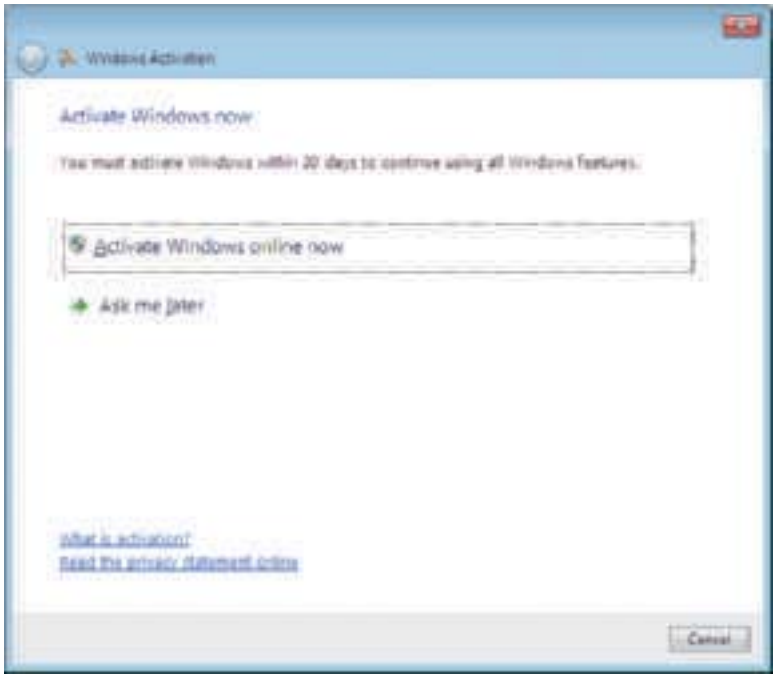
If the problem persists after you have tried the simple things suggested in Chapter 3, consider the problem might be the IP address, wireless network, or Network Discovery settings are wrong. How to configure network settings and troubleshoot network connections are covered in Chapters 15 and 17.

ACTIVATE WINDOWS 7

In order to make sure a valid Windows license has been purchased for each installation of Windows, Microsoft requires **product activation**. If you don't activate Windows 7 during the installation, you have 30 days to do so. To view the activation status and product key, open the System window. From this window, you can also change the product key before you activate the installation. If you fail to activate Windows after 30 days, the Windows desktop will not load and an error message appears forcing you to activate the OS.

A+ 220-802 1.2, 1.5

To activate Windows 7, click the **Start** button and enter **activate** in the *Search* box and press **Enter**. The Windows Activation window opens (see Figure 7-32). Click **Activate Windows online now** to begin the process. If you have not yet entered a product key, the next screen allows you to do that.



Source: Microsoft Windows 7

Figure 7-32 The system has 28 days left before you must activate the installation

Notes If you change the product key after Windows is activated, you must activate Windows again because the activation is tied to the product key and the system hardware. If you replace the motherboard or replace the hard drive and memory at the same time, you must also reactivate Windows.

If you install Windows from the same DVD on a different computer, and you attempt to activate Windows from the new PC, a dialog box appears telling you of the suspected violation of the license agreement. You can call a Microsoft operator and explain what caused the discrepancy. If your explanation is reasonable (for example, you uninstalled Windows from one PC and installed it on another), the operator can issue you a valid certificate. You can then type the certificate value into a dialog box to complete the boot process.

INSTALL WINDOWS UPDATES AND SERVICE PACKS

The Microsoft web site offers patches, fixes, and updates for known problems and has an extensive knowledge base documenting problems and their solutions. It's important to keep these updates current on your system to fix known problems and plug up security holes that might allow viruses and worms in. Be sure to install updates before you attempt to install software or hardware.

To download and apply Windows updates, click **Start, All Programs**, and **Windows Update**. The Windows Update window appears, as shown in Figure 7-33. If important updates are available, a message displays. Click **important updates** to select updates to install. A list of updates appears. Select the ones you want to install.

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Source: Microsoft Windows 7

Figure 7-33 Download and install updates for your computer

Windows selects the updates in the order the system can receive them, and will not necessarily list all the updates you need on the first pass. After you have installed the updates listed, go back and start again until Windows Updates tells you there is nothing left to update. If Windows requests a restart after an update, do that before you install more updates. It might take two or more passes to get the PC entirely up to date.

If you see a service pack listed in the updates, install all the updates listed above it. Then install the service pack as the only update to install. It takes about 30 minutes and a reboot to download and install a service pack. Only the latest service pack for an OS will install because the latest service pack includes all the content from previous service packs.

Hands-on Project 7-7 Updating Windows

On a Windows 7 system connected to the Internet, click **Start**, **All Programs**, and **Windows Update**. Windows Update searches the Microsoft web site and recommends Windows updates. Print the web page showing a list of recommended updates. For a lab PC, don't perform the updates unless you have your instructor's permission.

CONFIGURE AUTOMATIC UPDATES

During the Windows installation, you were asked how you want to handle Windows updates. To verify or change this setting, in the left pane of the Windows Update window, click **Change settings**. From the Change settings window, shown in Figure 7-34, you can decide how often, when, and how you want Windows to install updates. The recommended setting is to allow Windows to automatically download and install updates daily. However,

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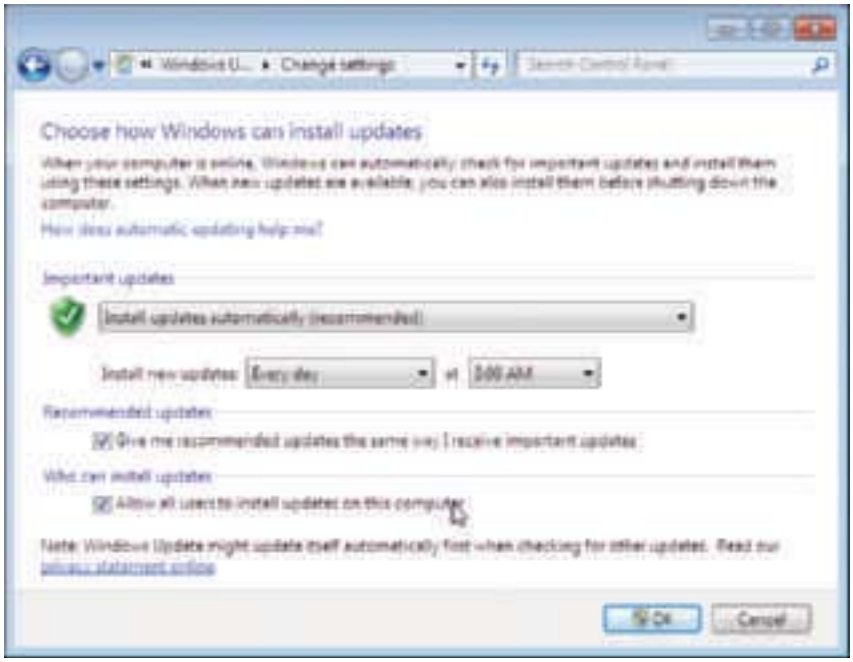
if you are not always connected to the Internet, your connection is very slow, or you want more control over which updates are installed, you might want to manage the updates differently.



Source: Microsoft Windows 7

Figure 7-34 Manage how and when Windows is updated

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INSTALL HARDWARE

You're now ready to install the hardware devices that were not automatically installed during the installation. As you install each device, reboot and verify that the software or device is working before you move on to the next item. Most likely, you will need to do the following:

- ***Install the drivers for the motherboard:*** If you were not able to connect to the network earlier in the installation process, it might be because the drivers for the network port on the motherboard are not installed. Installing the motherboard drivers can solve the problem. These drivers might come on a CD bundled with the motherboard, or you can use another computer to download them from the motherboard manufacturer's web site. To start the installation, double-click a setup program on the CD or a program that was previously downloaded from the web.
- ***Even though Windows has embedded video drivers, install the drivers that came with the video card so that you can use all the features the card offers:*** These drivers are on disc or downloaded from the video card manufacturer's web site.
- ***Install the printer:*** For a network printer, run the setup program that came with the printer and this program will find and install the printer on the network. Alternately, you can click **View devices and printers** in Control Panel to open the Devices and Printers window (see Figure 7-35). Then click **Add a printer** and follow the directions on-screen. To install a local USB printer, all you have to do is plug in the USB printer, and Windows will install the printer automatically.

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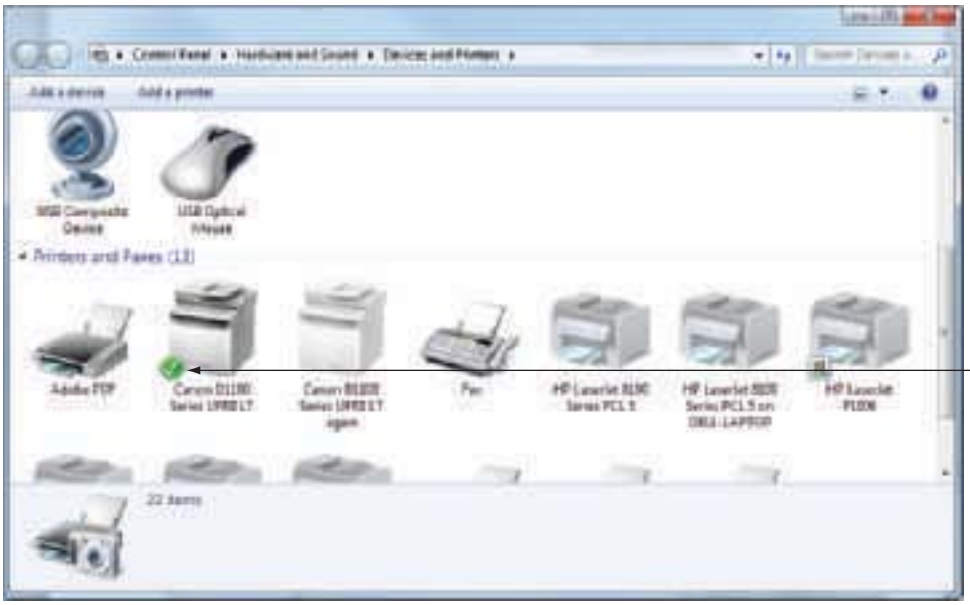
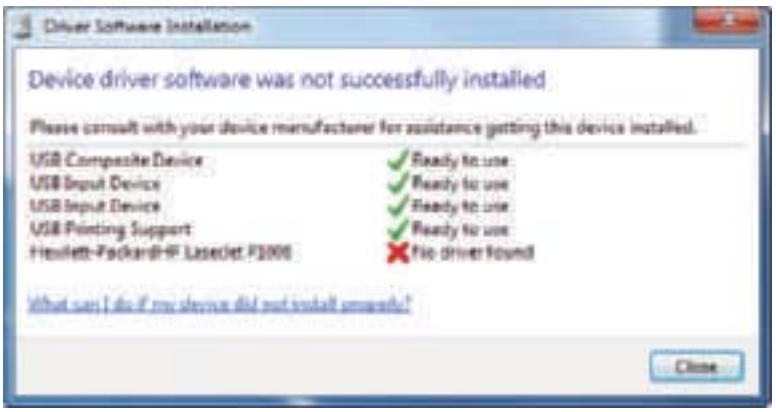
- ***For other hardware devices, always read and follow the manufacturer's directions for the installation:*** Sometimes you are directed to install the drivers before you connect the device, and sometimes you will first need to connect the device.



Source: Microsoft Windows 7

Figure 7-35 Installed devices and printers

If a problem occurs while Windows is installing a device, it automatically launches the Action Center to help find a solution. For example, Figure 7-36 shows the error message window that appeared when a USB keyboard and USB printer were connected to a computer following a Windows 7 installation.



Source: Microsoft Windows 7

Figure 7-36 Windows 7 reports a problem with a driver for a USB printer

Immediately after this first window appeared, the window in Figure 7-37 appeared that is provided by the Action Center. When the user clicked **Click to download and install the new driver from the Hewlett-Packard Company website**, the driver was immediately downloaded and installed with no errors.

Recall from Chapter 3 that you can also open the Action Center at any time to see a list of problems and solutions. If the problem is still not resolved after following the solutions offered by the Action Center, turn to Device Manager.

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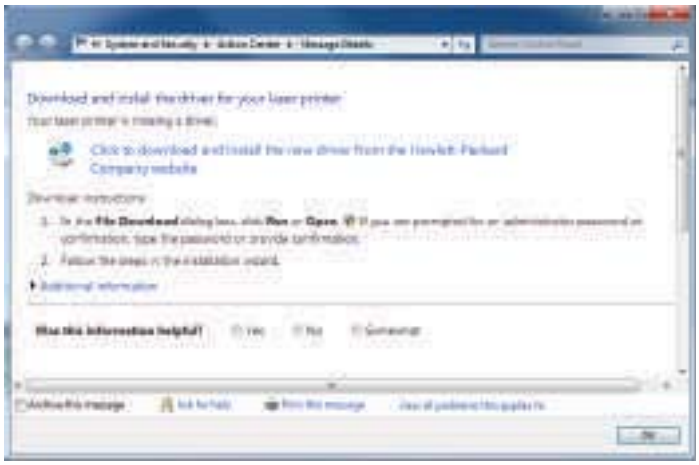


Source: Microsoft Windows 7

Figure 7-37 Windows offers to find the missing USB printer driver

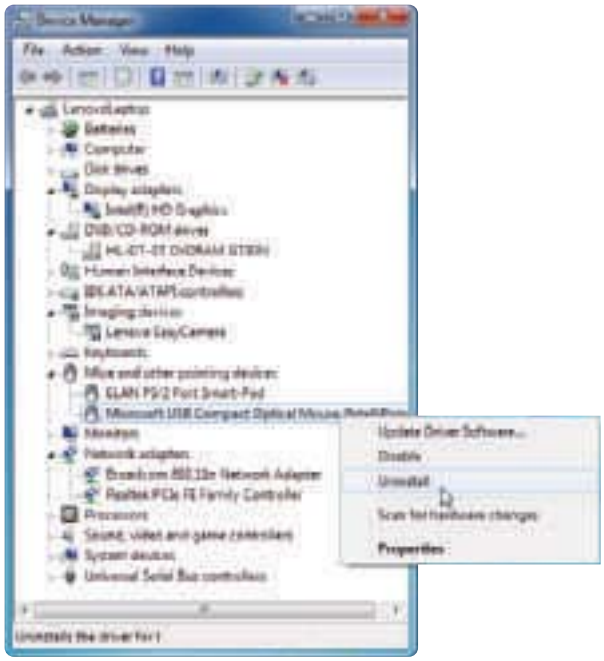
USE DEVICE MANAGER

Device Manager (its program file is named devmgmt.msc) is your primary Windows tool for managing hardware. It lists all installed hardware devices and the drivers they use. Using Device Manager, you can disable or enable a device, update its drivers, uninstall a device, and undo a driver update (called a driver rollback).

A+ Exam Tip The A+ 220-802 exam expects you to know in what scenario it is appropriate to use Device Manager. You also need to know how to use the utility and how to evaluate its results.

To access Device Manager, use one of these methods:

- Click **Start**, right-click **Computer**, and select **Properties**. The System window appears. Click **Device Manager**. The Device Manager window opens.
- Enter **Device Manager** or **Devmgmt.msc** in the search box and press **Enter**. A Device Manager window is shown in Figure 7-38.



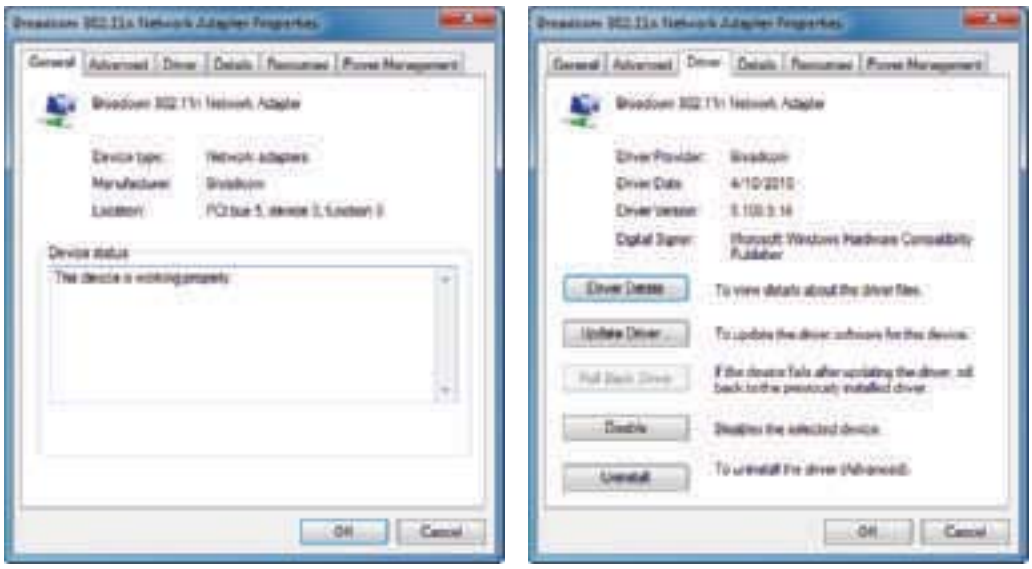
Source: Microsoft Windows 7

Figure 7-38 Use Device Manager to uninstall, disable, or enable a device

A+ 220-802 1.2, 1.4, 1.5

Click a white arrow to expand the view of an item, and click a black arrow to collapse the view. Here are ways to use Device Manager to solve problems with a device:

- ***Try uninstalling and reinstalling the device:*** To uninstall the device, right-click the device and click **Uninstall** on the shortcut menu, as shown in Figure 7-38. Then reboot and reinstall the device, looking for problems during the installation that point to the source of the problem. Sometimes reinstalling a device is all that is needed to solve the problem. Notice in Figure 7-38 that the device selected is a USB mouse. Sometimes USB devices are listed in Device Manager and sometimes they are not.
- ***Look for error messages offered by Device Manager:*** To find out more information about a device, right-click the device and select **Properties** on the shortcut menu. The left side of Figure 7-39 shows the Properties box for the onboard wireless network adapter. Many times, a message shows up in this box reporting the source of the problem and suggesting a solution.



Source: Microsoft Windows 7

Figure 7-39 Use the device Properties box to solve problems with device drivers

- ***Update the drivers:*** Click the **Driver** tab (see the right side of Figure 7-39) to update the drivers and roll back (undo) a driver update.

APPLYING CONCEPTS

Follow these steps to use Device Manager to update device drivers:

1. For best results, locate and download the latest driver files from the manufacturer's web site to your hard drive. Be sure to use 64-bit drivers for a 64-bit OS and 32-bit drivers for a 32-bit OS. If possible, use Windows 7 drivers for Windows 7 and Vista drivers for Vista.
2. Using Device Manger, right-click the device and select **Properties** from the shortcut menu. The Properties window for that device appears. Select the **Driver** tab and click **Update Driver**. The Update Driver Software box opens (see Figure 7-40).

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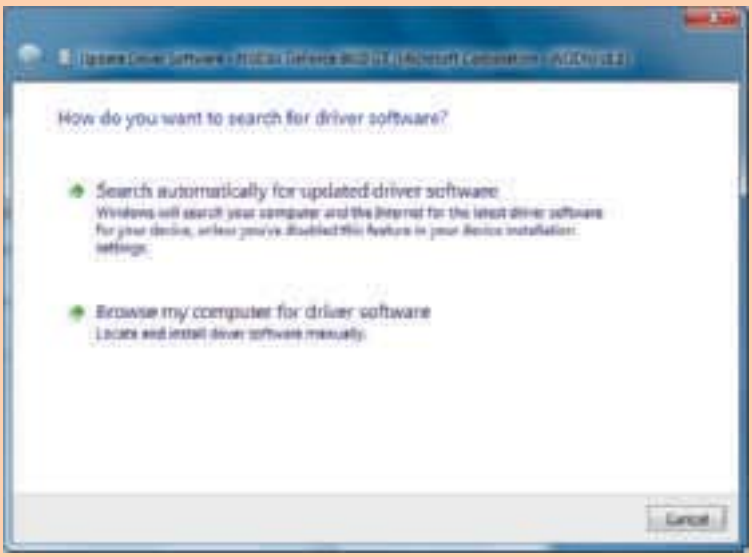
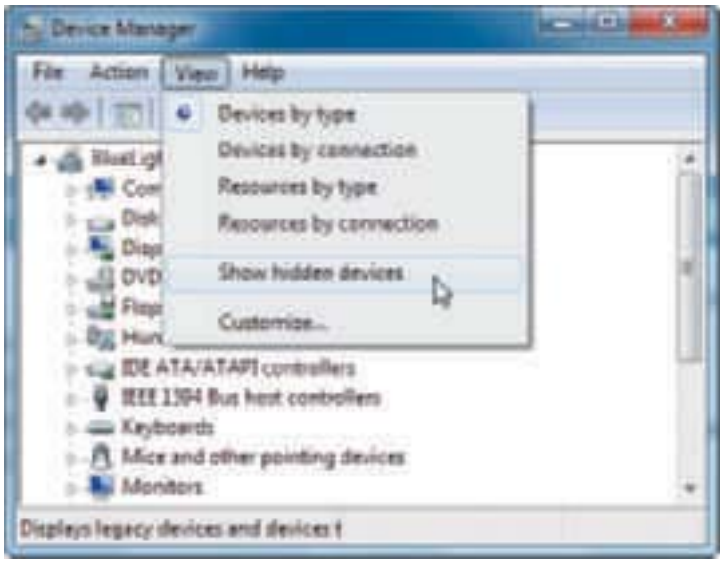


Source: Microsoft Windows 7

Figure 7-40 Decide where Windows should look for the new drivers

3. To search the Internet for drivers, click **Search automatically for updated driver software**. (Windows 7/Vista searches the Microsoft web site and the manufacturer's web site, but XP searches only the Microsoft web site for drivers.) If you have already downloaded drivers to your PC, click **Browse my computer for driver software,** and point to the downloaded files. Note that Windows is looking for an .inf file to identify the drivers. Continue to follow the directions on-screen to complete the installation.

Notes By default, Device Manager hides legacy devices that are not Plug and Play. To view installed legacy devices, click the **View** menu of Device Manager, and check **Show hidden devices** (see Figure 7-41).



Source: Microsoft Windows 7

Figure 7-41 By default, Windows does not display legacy devices in Device Manager; you show these hidden devices by using the View menu

A+ 220-802 1.2, 1.4, 1.5

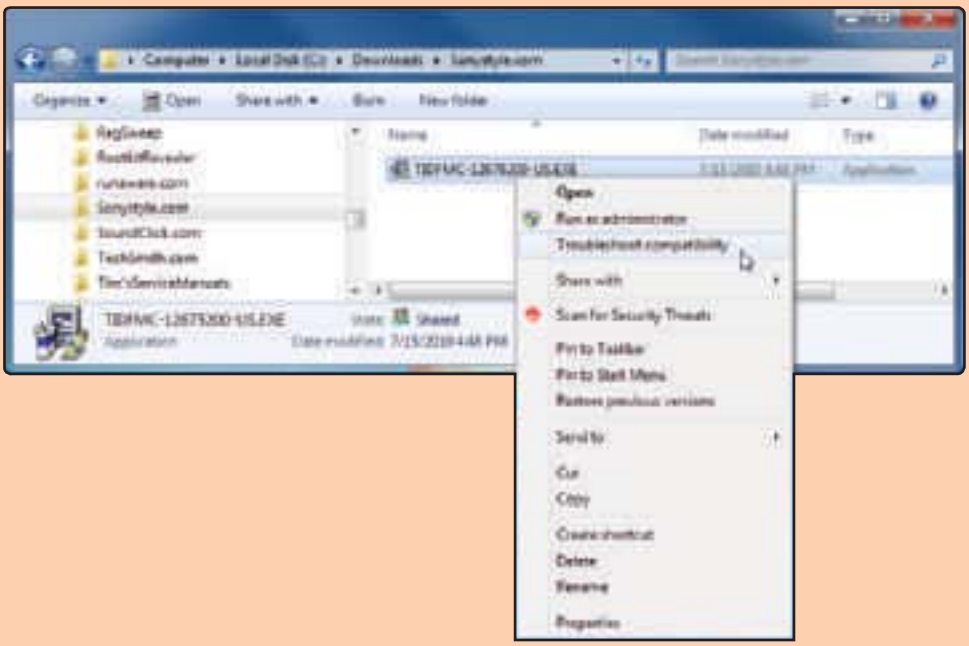
PROBLEMS WITH LEGACY DEVICES

Older hardware devices might present a problem. A Windows Vista driver is likely to work in the Windows 7 installation because Vista and Windows 7 are so closely related. If the driver does not load correctly or gives errors, first search the web for a Windows 7 driver. If you don't find one, try running the Vista driver installation program in compatibility mode.

APPLYING CONCEPTS

In the example that follows, we're using the installation program for a memory card reader/writer that worked under Vista but did not load correctly when we installed Windows 7. Follow these steps to use compatibility mode with the driver installation program:

1. Using Windows Explorer, locate the program file with an .exe file extension for the driver installation program. Right-click the program file and select **Troubleshoot compatibility** from the shortcut menu (see Figure 7-42). The Program Compatibility utility launches.



Source: Microsoft Windows 7

Figure 7-42 Run the Program Compatibility utility from the shortcut menu of the program that is giving a problem

2. On the first screen of the troubleshooter utility (see Figure 7-43), select **Troubleshoot program**.

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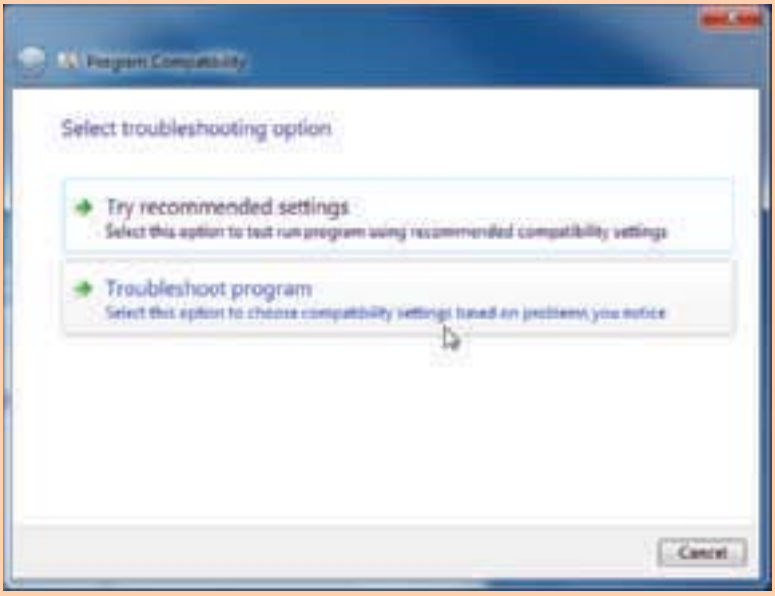
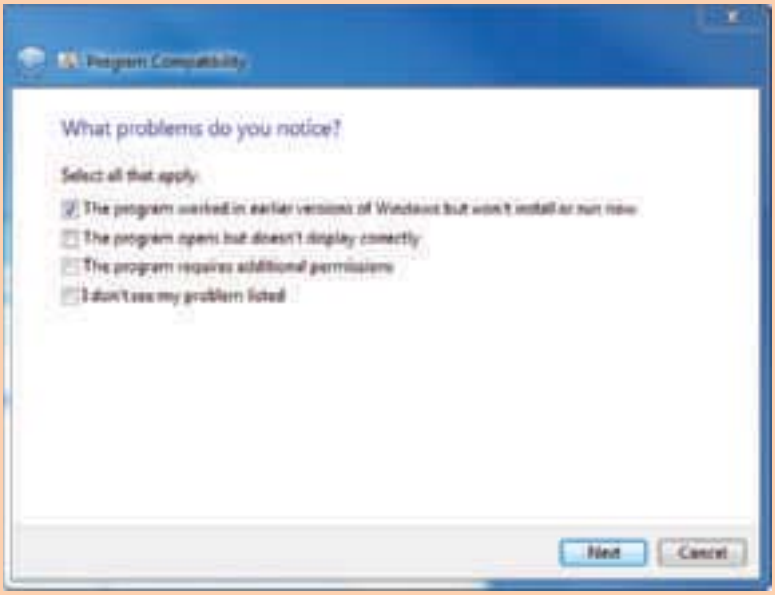


Source: Microsoft Windows 7

Figure 7-43 Troubleshoot the problem with the legacy installation program

3. On the next screen, check the problems that apply (see Figure 7-44). In the example, the driver worked fine in Windows Vista, so select **The program worked in earlier versions of Windows but won't install or run now**. Click **Next**.

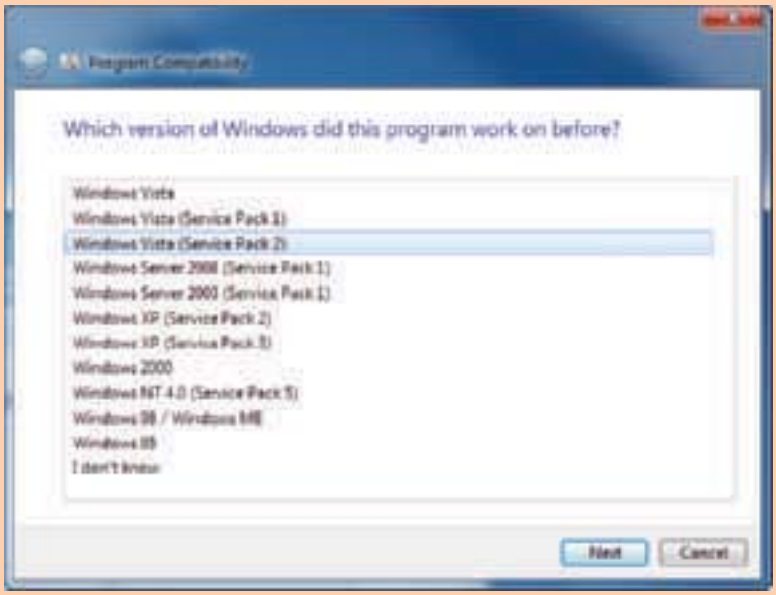


Source: Microsoft Windows 7

Figure 7-44 Select all the problems that apply

A+ 220-802 1.2, 1.4, 1.5

4. On the next screen, the troubleshooter asks for the OS with which the program worked (see Figure 7-45). For this example, you would select **Windows Vista (Service Pack 2)** and click **Next**.



Source: Microsoft Windows 7

Figure 7-45 Select the operating system with which the program worked

5. On the next screen, click **Start the program** and respond to the UAC box. The program runs and successfully installs the drivers for the memory card device. Checking Device Manager shows no errors with the device. When you test the device, it can both read and write data to a memory card. Compatibility mode worked for this particular driver.

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INSTALL APPLICATIONS

One application you want to be sure to install is antivirus software. To install applications, insert the setup CD or DVD, and follow the directions on-screen to launch the installation routine. For software downloaded from the Internet, open Windows Explorer and double-click the program filename to begin the installation. If you get errors, know that Chapter 12 covers what to do when an installation fails. After an application is installed, you might also need to install any updates available for the application on the manufacturer's web site.

If you need to uninstall an application, open Control Panel and click **Uninstall a program**. The **Programs and Features** window appears listing the programs installed on this computer where you can uninstall, change, or repair these programs. Select a program from the list. Based on the software, the buttons at the top of the list will change. For example, in Figure 7-46, the Camtasia Studio 7 software offers the option to Uninstall, Change, or Repair the software.

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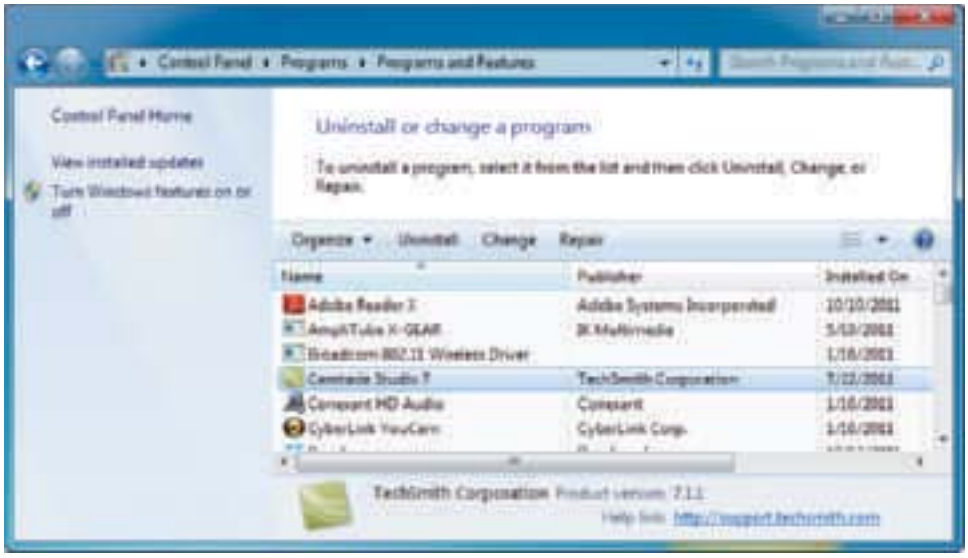

Source: Microsoft Windows 7

Figure 7-46 Select a program from the list to view your options to manage the software

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SET UP USER ACCOUNTS AND TRANSFER USER DATA

To set up a new user account, first log on using an administrator account and then do the following:

1. Open Control Panel and click **Add or remove user accounts**. In the Manage Accounts window, click **Create a new account**.
2. In the next window, enter the username (see Figure 7-47). Select if the account will be a standard user or administrator account. Click **Create Account**.

Source: Microsoft Windows 7

Figure 7-47 Decide the privilege level for the new account

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3. To create a password for the account, in the Manage Accounts window, click the account icon and then click **Create a password**. Enter the new password and click **Create password**. The first time a user logs onto the account, user files and folders (called the user profile) are created in the C:\Users folder.

For individuals or small organizations, use **Windows Easy Transfer** in Windows 7/Vista or **Files and Settings Transfer Wizard** in Windows XP to copy user data and settings from one computer to another. How to use either utility can be found in Windows Help and Support for each operating system. For large corporations that use a Windows domain, a more advanced tool is required, the User State Migration Tool (USMT). This tool is discussed later in the chapter.

Notes After moving user data and settings from one PC to another, the best practice is to leave the user data and settings on the original PC untouched for at least two months. This practice gives the user plenty of time to make sure everything has been moved over.

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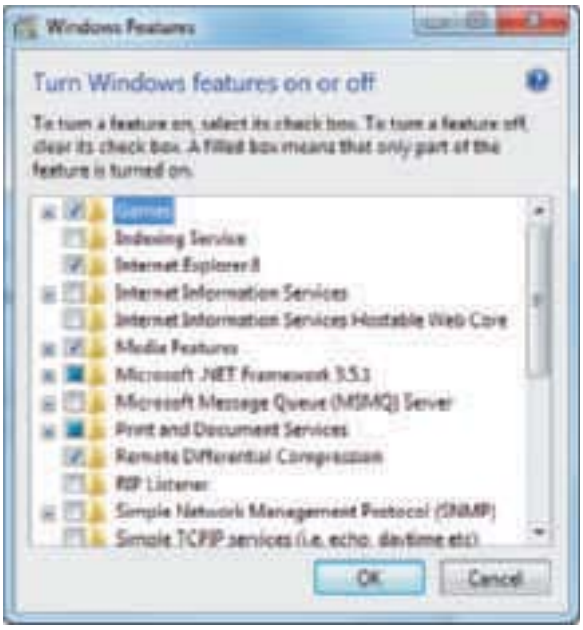
TURN WINDOWS 7 FEATURES ON OR OFF

You can save on system resources by turning off Windows features you will not use, and you might need to turn on some features that are, by default, turned off. To control Windows features, in the left pane of the Programs and Features window, click **Turn Windows features on or off** (refer to Figure 7-46). The Windows Features box opens (see Figure 7-48). Check or uncheck the features you want or don't want and then click **OK**.



Source: Microsoft Windows 7

Figure 7-48 Turn Windows features on or off

The Windows installation, devices, applications, and user accounts should now be good to go. Restart the computer and make one last check that all is well. Now would be a good time to complete your documentation and make a backup of the entire Windows volume in the event of a hard drive failure or corrupted installation. How to make backups is covered in Chapter 10.

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Hands-on Project 7-8 Creating a Documentation Form

Create a document that technicians can use when installing Windows 7 and performing all the chores mentioned in the chapter that need doing after the installation. The document needs a checklist of what to do before the installation and a checklist of what to do after the installation. It also needs a place to record decisions made during the installation, the applications and hardware devices installed, user accounts created, and any other important information that might be useful for future maintenance or troubleshooting. Don't forget to include a way to identify the computer, the name of the technician doing the work, and when the work was done.

SPECIAL CONCERNS WHEN WORKING IN A LARGE ENTERPRISE

7

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Working as a PC support technician in a large corporate environment is different from working as a PC support technician for a small company or with individuals. In this part of the chapter, you will learn how Windows is installed on computers in an enterprise and a little about providing ongoing technical support for Windows in these organizations.

DEPLOYMENT STRATEGIES FOR WINDOWS 7

Earlier in the chapter, you learned how to install Windows 7 using the setup DVD or using files downloaded from the Microsoft web site. You perform the installation while sitting at the computer, responding to each query made by the setup program. Then you must configure Windows and install device drivers and applications. If, however, you were responsible for installing Windows 7 on several hundred PCs in a large corporation, you might want a less time-consuming method to perform the installations. These methods are called deployment strategies. A deployment strategy is a procedure to install Windows, device drivers, and applications on a computer and can include the process to transfer user settings, application settings, and user data files from an old installation to the new installation.

Microsoft suggests four deployment strategies; the one chosen depends on the number of computers to be deployed and determines the amount of time you must sit in front of an individual computer as Windows is installed (this time is called the touch time). As a PC support technician in a large corporation, most likely you would not be involved in choosing or setting up the deployment strategy. But you need to be aware of the different strategies so that you have a general idea of what will be expected of you when you are asked to provide desk-side or help-desk support as Windows is being deployed in your organization.

The four deployment strategies are discussed next.

HIGH-TOUCH WITH RETAIL MEDIA (RECOMMENDED FOR FEWER THAN 100 COMPUTERS)

The **high-touch with retail media** strategy is the strategy used in the installations described earlier in the chapter. All the work is done by a technician sitting at the computer. To save time doing multiple installations, you can copy the setup files on the Windows setup DVD to a file server on the network and share the folder. Then at each computer, you can execute the Setup program on the server to perform a clean install or upgrade of the OS. A server used in this way is called a **distribution server**. Except for upgrade installations, applications must be manually installed after the OS is installed.

To transfer (called migrating) user settings, application settings, and user data files to a new installation, you can use Windows 7/Vista Windows Easy Transfer (a manual process

A+ 220-802 1.2, 1.4, 1.5

that is easy to use) or the User State Migration Tool (more automated and more difficult to set up and use). Windows Easy Transfer is part of Windows 7/Vista, and XP offers a similar tool called the Files and Settings Transfer Wizard. The **User State Migration Tool (USMT)** is a command-line tool that works only when the computer is a member of a Windows domain. USMT is included in the **Windows Automated Installation Kit (AIK)** that can be downloaded from the Microsoft web site. The Windows AIK for Windows 7 contains a group of tools used to deploy Windows 7 in a large organization.

HIGH-TOUCH WITH STANDARD IMAGE (RECOMMENDED FOR 100 TO 200 COMPUTERS)

To use the **high-touch using a standard image** strategy, a system administrator prepares an image called a **standard image** that includes Windows 7, drivers, and applications that are standard to all the computers that might use the image. A standard image is hardware independent, meaning it can be installed on any computer. (In Chapter 10, you learn to use Windows Backup and Restore to create another type of image, called a system image that can only be used on the computer that created it.)

A+ Exam Tip The A+ 220-802 exam expects you to know about creating a standard image.

Drive-imaging software is used to clone the entire hard drive to another bootable media in a process called **drive imaging** or **disk cloning**. Tools included in the Windows AIK or third-party software can be used. Examples of third-party drive-imaging software are True Image by Acronis (*www.acronis.com*), Norton Ghost by Symantec Corp (*www.symantec.com*), and Clonezilla, freeware managed by NCHC (*www.clonezilla.org*). A standard image is usually stored on an 8 GB or larger bootable USB flash drive (UFD) or on a bootable DVD along with Windows setup files. How to create a standard image using the Windows AIK is covered in Appendix D. The process uses several tools that you will learn to use in Chapters 10 and 14.

Notes To see an introduction to creating a standard image, check out this video at the Microsoft Technet site: *technet.microsoft.com/en-us/windows/ee530017.aspx*.

Installing a standard image on another computer is called **image deployment**, which always results in a clean install rather than an upgrade. To begin, boot the computer from the bootable UFD or DVD that contains the image. A menu appears to begin the Windows installation. When you finish this Windows installation, the standard image is installed. USMT can then be used to transfer user settings, user data files, and application settings to the new installation.

The high-touch using a standard image strategy takes longer to set up than the previous strategy because a system administrator must prepare the image and must set up USMT, but it takes less time to install on each computer and also assures the administrator that each computer has a standard set of drivers and applications that are configured correctly.

LITE-TOUCH, HIGH-VOLUME DEPLOYMENT (RECOMMENDED FOR 200 TO 500 COMPUTERS)

The **lite-touch, high-volume deployment** strategy uses a deployment server on the network to serve up the installation after a technician starts the process. The files in the installation include Windows, device drivers, and applications, and collectively are called the **distribution share**.

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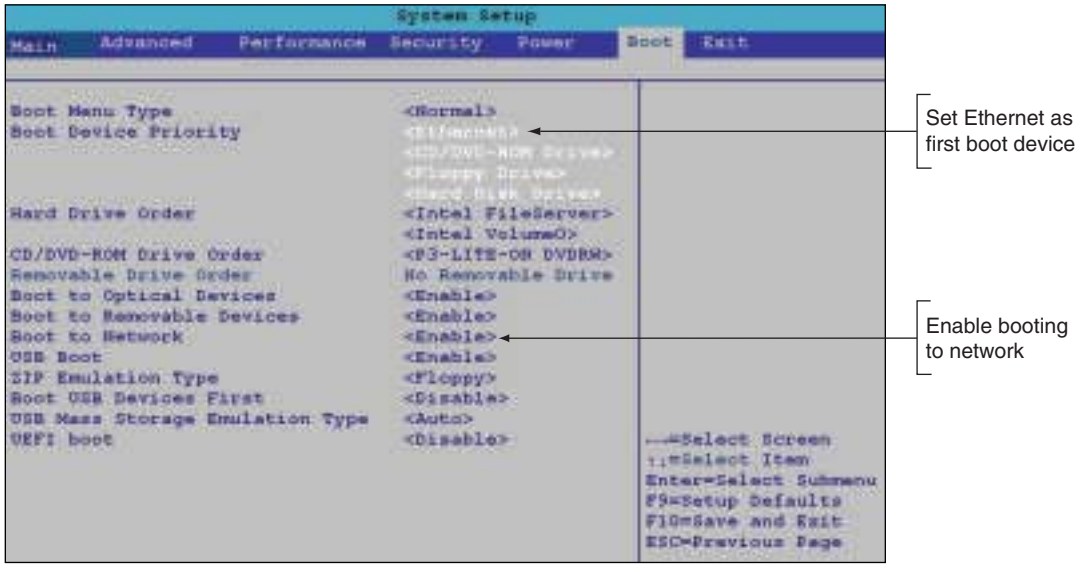
The technician starts the installation by booting the computer to Windows PE. **Windows Preinstallation Environment (Windows PE)** is a minimum operating system used to start the installation. It is included in the Windows AIK and can be installed on a USB flash drive, CD, or DVD to make the device bootable. The technician boots from the device, which might be configured to display a menu to choose from multiple distribution shares available on the deployment server.

The technician can also boot the PC directly to the network to receive Windows PE from the deployment server. To boot to the network, use BIOS setup to set the first item in the boot device priority to be Ethernet (see Figure 7-49). Then reboot the system. Startup BIOS boots to the **Preboot eXecution Environment (PXE, also known as the Pre-Execution Environment)** that is contained in the BIOS code on the motherboard. PXE searches for a server on the network to provide a bootable operating system (Windows PE on the deployment server).



Source: Intel

Figure 7-49 Configure BIOS setup to boot to the network

After the installation begins, the technician is not required to respond to prompts by the setup program, which is called an **unattended installation**. These responses, such as the administrator password or domain name, are stored in an **answer file**. The User State Migration Tool is then used to transfer user settings, user data files, and application settings to the new installation.

For high-touch strategies, a technician would normally sit at a computer and use the Windows 7 Upgrade Advisor to determine if the system qualifies for Windows 7 before Windows 7 is installed. Using lite-touch deployments, a more automated method of qualifying a computer is preferred. The **Microsoft Assessment and Planning (MAP) Toolkit** can be used by a system administrator from a network location to query hundreds of computers in a single scan. The software automatically examines hardware and applications on each computer to verify compatibility with Windows 7. The MAP software might also be used by the system administrator before deciding to deploy a new OS to determine what computer hardware upgrades or application software upgrades are required that must be included in the overall deployment budget.

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ZERO-TOUCH, HIGH-VOLUME DEPLOYMENT (RECOMMENDED FOR MORE THAN 500 COMPUTERS)

The **zero-touch, high-volume deployment** strategy is the most difficult to set up and requires complex tools. The installation does not require the user to start the process (called **pull automation**). Rather, the installation uses **push automation**, meaning that a server automatically pushes the installation to a computer when a user is not likely to be sitting at it. The entire **remote network installation** is automated and no user intervention is required. The process can turn on a computer that is turned off and even works when no OS is installed on the computer or the current OS is corrupted.

Notes PC support technicians find that large enterprises appreciate quick and easy solutions to desktop or laptop computer problems. Technicians quickly learn their marching orders are almost always "replace or reimage." Little time is given to trying to solve the underlying problem when hardware can quickly be replaced or a Windows installation can quickly be reimaged.

USING THE USMT SOFTWARE

Let's look briefly at what to expect when using the USMT software. The Windows 7 version of USMT is version 4.0, is much improved over earlier versions, and is included in the Windows AIK software. To prepare to use USMT, a system administrator must first install the AIK software on his computer. In Microsoft documentation, this computer is called the technician computer. The source computer is the computer from which the user settings, application settings, and user data files are taken. The destination computer is the computer that is to receive this data. Sometimes the source computer and the destination computer are the same computer. An example is when you perform a clean installation of Windows 7 on a computer that has Windows XP installed and you want to transfer user files and settings from the XP installation to the Windows 7 installation.

Notes USMT 4.0 is the first version of USMT to use hard-link migration of user files and settings when the source computer and the destination computer are the same computer. Hard-link migration does not actually copy files and settings, but leaves them on the hard drive without copying. This method makes USMT extremely fast when the hard drive is not formatted during the Windows installation.

The USMT software uses two commands: the **scanstate** command copies settings and files from the source computer to a safe location, and the **loadstate** command applies these settings and files to the destination computer. Here are the general steps to use USMT:

1. Download and install the AIK software on the technician computer.
2. Copy the USMT program files from the technician computer to the source computer.
3. Run the scanstate command on the source computer to copy user files and settings to a file server or other safe location.
4. Install Windows 7, device drivers, and applications on the destination computer.
5. Run the loadstate command to apply user files and settings from the file server to the destination computer.

A+ 220-802 1.2, 1.4, 1.5

A+ Exam Tip The A+ 220-802 exam expects you to know about the User State Migration Tool (USMT) and the scanstate and loadstate commands.

The details of the parameters for the scanstate and loadstate commands are not covered in this book. Most likely these commands are stored in batch files provided by the system administrator. A **batch file** has a .bat file extension and contains a list or batch of OS commands that are executed as a group. These batch files might be automatically executed as part of a zero-touch installation or manually executed in a lite-touch or high-touch installation. To manually execute a batch file, you type the name of the batch file at a command prompt.

Notes For detailed instructions on using USMT that a system administrator might use, go to *technet.microsoft.com* and search on *using USMT for IT professionals*.

Hands-on Project 7-9 Investigating the Windows Automated Installation Kit (AIK)

The Windows Automated Installation Kit (AIK) is a group of tools and documentation that IT professionals can use to deploy Windows and can be downloaded for free from the Microsoft web site. Here are the tools included in the AIK:

- User State Migration Tool (USMT) that you learned about in this chapter
- **ImageX**, used to create and modify standard images
- Deployment Image Servicing and Management (DISM), used to apply updates, drivers, and language packs to an existing Windows image
- Windows System Image Manager (SIM), used to create answer files and manage distribution shares and images
- Windows Preinstallation Environment (Windows PE), the minimal operating system that is used to install Windows. Place it on a DVD, USB flash drive, or other media to make the media bootable.

Search the Microsoft TechNet Library at *technet.microsoft.com/en-us/library/default.aspx* for information about each tool. Write a short paragraph about each tool that you think would be helpful to someone learning about the tool or how to use it. Share this information with others in your class. As you share with others, everyone gets a better understanding of these tools used to automate a Windows deployment.

>> CHAPTER SUMMARY

How to Plan a Windows Installation

- The Windows 7 editions are Windows 7 Starter, Home Basic, Home Premium, Professional, Enterprise, and Ultimate.
- Windows can be purchased as the less expensive OEM version or the more expensive retail version. The OEM version can only be installed on a new PC for resale.

- Each edition of Windows 7 can be purchased using 32-bit or 64-bit code, except the Starter edition uses 32-bit code.
- A 32-bit OS cannot address as much memory as a 64-bit OS. A 64-bit OS performs better and requires more memory than a 32-bit OS.
- Before purchasing Windows, make sure your system meets the minimum hardware requirements and all the hardware and applications will work under the OS. A 64-bit OS requires 64-bit drivers.
- Windows can be installed from the setup DVD, from files downloaded from the Internet, from a hidden partition on the hard drive (called a factory recovery partition), or in a virtual machine.
- Windows can be installed as an in-place upgrade, a clean installation, or in a dual boot environment with another OS.
- A hard drive contains one or more partitions or volumes. Normally, Windows is installed on the C: volume in the C:\Windows folder.
- Windows supports two types of user accounts. An administrator account has more rights than a standard account.
- A Windows computer can use a homegroup, workgroup, or domain configuration to join a network. Using a workgroup or homegroup, each computer on the network is responsible for sharing its resources with other computers on the network. In a domain, the domain controller manages network resources. Windows Home editions cannot join a domain. Windows Starter and Home Basic can join a homegroup but cannot create one.

Installing Windows 7

- A technician needs to know how to perform Windows 7 as an in-place upgrade, a clean install, or a dual boot. In addition, you need to know how to install Windows on a new hard drive when using an upgrade license of the Windows setup DVD.
- Editions of Windows Vista are Vista Starter, Home Basic, Home Premium, Business, Enterprise, and Ultimate. A Vista installation works the same as a Windows 7 installation.
- Editions of XP are Home Edition, XP Professional, XP Professional x64 Edition, Media Center Edition, and Tablet PC Edition.

What to Do After a Windows Installation

- After a Windows installation, verify you have network access, activate Windows, install any Windows updates or service packs, verify automatic updates is configured correctly, install hardware and applications, create user accounts, and turn Windows features on or off.

Special Concerns When Working in a Large Enterprise

- Four deployment strategies for installing Windows are high-touch with retail media, high-touch with a standard image, lite-touch with high volume, and zero-touch with high volume. Which strategy to use depends on the number of computers to deploy. Zero-touch deployments require the most time to set up, but do not require a technician to be at the computer when the installation happens.

>> KEY TERMS

For explanations of key terms, see the Glossary near the end of the book.

Active Directory
administrator account
answer file
batch file
boot loader menu
Certificate of Authenticity
clean install
client/server
compatibility mode
custom installation
Device Manager
disk cloning
distribution server
distribution share
domain
drive imaging
dual boot
file system
Files and Settings Transfer Wizard
global account
high-touch using a standard image
high-touch with retail media
homegroup
image deployment
ImageX
in-place upgrade
ISO image
lite-touch, high-volume deployment
loadstate
local account
logical topology
Microsoft Assessment and Planning (MAP) Toolkit
multiboot
OEM (Original Equipment Manufacturer) license
partition
peer-to-peer (P2P)
physical topology
Preboot eXecution Environment (PXE, also known as the Pre-Execution Environment)
product activation
Programs and Features
pull automation
push automation
remote network installation
scanstate
setup BIOS
standard image
startup BIOS
system BIOS (basic input/output system)
unattended installation
upgrade paths
User State Migration Tool (USMT)
virtual machine (VM)
volume
Windows 7 Enterprise
Windows 7 Home Basic
Windows 7 Home Premium
Windows 7 Professional
Windows 7 Starter
Windows 7 Ultimate
Windows Automated Installation Kit (AIK)
Windows Easy Transfer
Windows Preinstallation Environment (Windows PE)
Windows Vista Business
Windows Vista Enterprise
Windows Vista Home Basic
Windows Vista Home Premium
Windows Vista Starter
Windows Vista Ultimate
Windows XP Home Edition
Windows XP Media Center Edition
Windows XP Mode
Windows XP Professional
Windows XP Professional x64 Edition
Windows XP Tablet PC Edition
workgroup
zero-touch, high-volume deployment

>> REVIEWING THE BASICS

1. Which edition of Windows 7 comes only in a 32-bit version?
2. What is the maximum amount of memory a 64-bit version of Windows 7 Home Premium can support?
3. How much free space on the hard drive is required to install a 64-bit version of Windows 7?
4. How do you start the process to reinstall an OS on a laptop computer using the backup files stored on a recovery partition?
5. What are three free applications mentioned in the chapter that can be used to create virtual machines?

6. When upgrading from Windows XP to Windows 7, can you perform an in-place upgrade of Windows 7?
7. What must be installed in Windows Vista before you can perform an in-place upgrade from Vista to Windows 7?
8. Which file system is used on the volume where Windows is installed?
9. What is the minimum number of partitions required on a hard drive that is to be set up as a dual boot with Windows 7 and Windows XP?
10. Is the built-in administrator account in Windows 7 enabled or disabled by default? In Windows XP?
11. Which gives better security, workgroup sharing or homegroup sharing? Why?
12. Why will homegroup sharing not work on a network that has a mix of Windows XP, Vista, and 7 computers?
13. During a Windows 7 installation, what network location should you choose when you intend to join the computer to a domain? When you intend to join a homegroup?
14. What is the name of the domain controller database used by Windows Server 2011?
15. If you suspect a PC is infected with a virus, why is it not a good idea to perform an upgrade installation of Windows rather than a clean install?
16. After setting up a dual boot installation with Windows 7 and Vista, how do you boot the system into Vista?
17. What dialog box can you use to change the computer name after Windows 7 is installed?
18. Is the Windows 7 setup disc a CD or DVD? Vista setup disc? XP setup disc?
19. After a Windows installation, what is the easiest way to determine that you have Internet access?
20. How many days do you normally have after a Windows installation to activate the OS?
21. What window in Windows 7 is used to solve connectivity problems on the network?
22. What Windows 7 tool can you use to migrate user data and settings from a Windows Vista installation on one computer to the new Windows 7 installation on a different computer?
23. What is your primary Windows tool for managing hardware devices?
24. What window is used to uninstall an application in Windows 7?
25. Are you required to enter the product key during the Windows 7 installation? During the XP installation?
26. Using an unattended installation of Windows, what is the name of the file that holds the responses a technician would normally give during the installation?
27. What are the two commands used by the User State Migration tool?
28. To use the User State Migration tool, how must a computer join the network?

29. Where is the PXE programming code stored that is used to boot a computer when it is searching for an OS on the network?

30. Which boot device should be set as the first boot device in BIOS setup when a technician is configuring a computer to launch Windows PE on the deployment server?

>> THINKING CRITICALLY

1. You are planning an upgrade from Windows Vista to Windows 7. Your system uses a network card that you don't find listed on the Microsoft Windows 7 list of compatible devices. What do you do next?
   a. Abandon the upgrade and continue to use Windows Vista.
   b. Check the web site of the network card manufacturer for a Windows 7 driver.
   c. Buy a new network card.
   d. Install a dual boot for Windows Vista and Windows 7 and only use the network when you have Windows Vista loaded.
2. You have just installed Windows 7 and now attempt to install your favorite game that worked fine under Windows XP. When you attempt the installation, you get an error. What is your best next step?
   a. Purchase a new version of your game, one that is compatible with Windows 7.
   b. Download any service packs or patches to Windows 7.
   c. Reinstall Windows XP.
   d. Install Windows XP Mode to run the game.
3. If you find out that Windows 7 does not support one of your applications and you still want to use Windows 7, what can you do to solve this incompatibility problem?
4. Is it possible to install Windows 7 on a system that does not have a DVD drive? Explain your answer.

>> REAL PROBLEMS, REAL SOLUTIONS

REAL PROBLEM 7-1: A Corrupted Windows Installation

As a PC support technician for a small organization, it's your job to support the PCs, the small network, and the users. One of your coworkers, Jason, comes to you in a panic. His Windows 7 system won't boot, and he has lots of important data files in several locations on the drive. He has no idea in which folder some of the files are located. Besides the applications data he's currently working on, he's especially concerned about losing email addresses, email, and his Internet Explorer Favorites links.

After trying everything you know about recovering Windows 7, you conclude the OS is corrupted beyond repair. You decide there might be a way to remove the hard drive from Jason's computer and connect it to another computer so that you can recover the data. Search the Internet and find a device that you can use to connect Jason's hard drive to another computer using a USB port on that computer. The hard drive uses a SATA hard drive interface. Print the web page showing the device and its price.

REAL PROBLEM 7-2: Troubleshooting an Upgrade

Your friend, Thomas, has upgraded his Windows Vista laptop to Windows 7. After the installation, he discovers his media card reader does not work. He calls you on the phone asking you what to do. Do the following to plan your troubleshooting approach:

1. List the questions you should ask Thomas to help diagnose the problem.
2. List the steps you would take if you were sitting at the computer solving the problem.
3. What do you think is the source of the problem? Explain your answer.