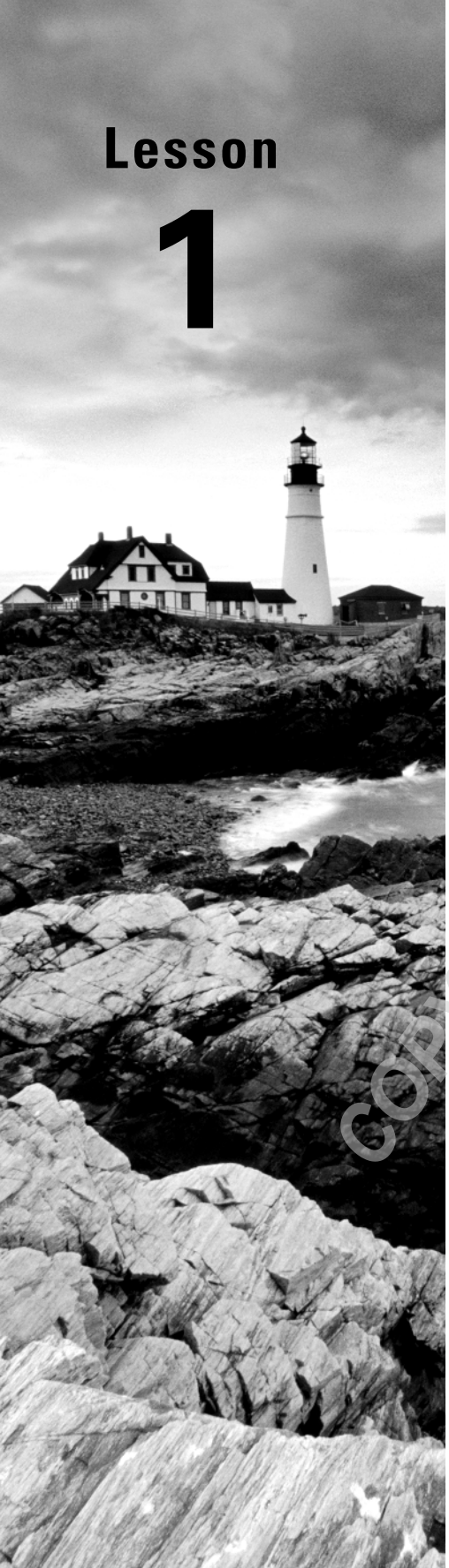


Lesson

1

Installing and Upgrading Client Systems

Objective Domain Matrix

Technology Skill	Objective Domain Description	Objective Domain Number
Understanding Windows Systems	Identify Windows operating system editions	2.1
	Understand operating system architecture	2.4
Understanding Installation Types	Understand installation types	2.3
	Identify upgrade paths	2.2

Key Terms

AppLocker
Assigned Access 8.1
BitLocker
BranchCache
Business Store
clean installation
Client Hyper-V
cloud
command-line interface (CLI)
Continuum
Cortana
Credential Guard
Current Branch for Business
desktop PC
device driver
Device Guard
DirectAccess
Encrypting File System (EFS)
Enterprise Mode Internet Explorer (EMIE)
graphical user interface (GUI)
Group Policy management
hardware interrupts (IRQ)
High Touch Installation (HTI)
hybrid computer
joining to a domain
kernel mode
laptop
Lite Touch Installation (LTI)
LoadState.exe
Long-Term Servicing Branch
Private catalog
Remote Desktop
RemoteApp
ScanState.exe
smartphone
tablet
text user interface (TUI)
upgrade installation
User Experience control and lockdown
user interface (UI)
user mode
User State Migration Tool (USMT)
UsmtUtils.exe
virtual desktops
Windows 10
Windows 10 Education
Windows 10 Enterprise
Windows 10 Home
Windows 10 Media Creation tool
Windows 10 Pro
Windows Deployment Services

Windows Hello	Windows Update for Business
Windows Spotlight	x64
Windows To Go	x86
Windows Update	Zero Touch Installation (ZTI)

Real World Scenario

Lesson 1 Case

You work as an IT technician for Interstate Snacks, Inc., a mid-market food service and vending company. Management has decided to standardize on Windows 10 Pro and has asked your IT group to evaluate all existing computers to determine if they can support the operating system. Any newly acquired computers should have Windows 10 Pro installed. You need to learn as much as possible about Windows 10 system requirements, types of installations, and upgrade paths.

Understanding Windows Systems

The client version of Windows is the version that is purchased and installed on personal computers such as desktop computers, laptops, workstations, and tablets. Windows Server operating systems are purchased and installed on stand-alone physical servers, blade servers, and virtual machines.

Windows XP merged the consumer-oriented Windows 9x series with Windows NT/2000, while introducing a redesigned user interface that included the Start menu, Internet Explorer 6, and Remote Assistance functionality. As a result, Windows XP became one of the most popular client operating systems in history.

Microsoft attempted to replace Windows XP with Windows Vista, which had an updated graphical user interface and improved security. Unfortunately, Windows Vista was not well received, and it failed to overtake Windows XP. To overcome the shortcomings of Windows Vista, Microsoft released Windows 7, which offered increased performance, a more intuitive interface, and fewer User Account Control pop-ups. Windows 7 included some terrific new features as well, such as large and animated task thumbnails, HomeGroups, Jump Lists, libraries, and Windows XP Mode.

The next version of Windows introduced was Windows 8, which was upgraded to support desktop computers, mobile computers, and tablets, while optimized for touch screens. Windows 8 replaced the Start button and menu with the Start screen, a new platform for developing apps, and the Windows Store. Unfortunately, the new interface made it confusing and difficult to learn. To address some of these concerns, Microsoft released Windows 8.1, which improved the Start screen.

There are some common threads throughout all editions of Windows. For example, every edition contains the same integrated applications, such as Network and Sharing Center, Control Panel, and Windows Media Player. The different editions also include many of the same multimedia features. All Windows editions support 32-bit systems, and all editions except Windows 7 Starter support 64-bit systems.

Windows 10 is the newest client operating system. After the failure of Windows 8, Microsoft listened to customer complaints to develop Windows 10. To distance the new version of Windows from Windows 8/8.1, Microsoft skipped Windows 9 and went to Windows 10. Unlike previous versions of Windows, Windows 10 is released as an "operating system as a service," which means that it will receive ongoing updates to its features and functionality.

As client operating systems are developed and released, Microsoft also develops and releases server operating systems, as shown in Table 1.1. Until Windows 10, the client operating system and server operating system were introduced together. While both client and server operating systems can provide and request services, server operating systems can provide additional services and can service many more clients simultaneously.

TABLE 1.1 Client and Server Operating Systems

Client Operating Systems	Server Operating Systems	Version Number
Windows 10	Windows Server 2016	10.0
Windows 8.1	Windows Server 2012 R2	6.3
Windows 8	Windows Server 2012	6.2
Windows 7	Windows Server 2008 R2	6.1
Windows Vista	Windows Server 2008	6.0
Windows XP	Windows Server 2003/Windows Server 2003 R2	5.1/5.2
Windows 2000 Professional	Windows 2000 Server	5.0
Windows NT 4.0 Workstation	Windows NT 4.0 Server	4.0

Understanding User Interfaces

A *user interface (UI)* is the part of the operating system, program, or device that users use to input and receive data, and to tell the computer what to do. For example, to play a video, navigate to the folder where the video file is located, and double-click the file. Windows typically identifies the program, opens a video player, and plays the file.

User interfaces are organized into two types:

- *Graphical user interface (GUI)*: Performs functions by clicking and moving buttons, icons, and menus with a pointing device, such as a mouse or track pad.
- *Text user interface (TUI)/command-line interface (CLI)*: Performs functions by using a keyboard to type commands.

Most operating systems have a GUI, as do Windows 10 and Windows Server 2016. These operating systems include a Start menu with program groups, a taskbar showing the programs currently in use, a desktop, and various icons and quick-launch icons.

Early operating systems, such as UNIX and Microsoft DOS, were text user interface operating systems, in which you would type commands to perform tasks. However, even GUI operating systems include a text user interface that you can access to perform functions that may or may not also be available with the GUI. For example, when using Windows 10, you can use the command prompt (which allows you to type commands similar to Microsoft DOS) or Windows PowerShell. Use the command prompt or Windows PowerShell to create scripts, which can be used for repetitive tasks or for automation.

Determining Appropriate Editions Per Device Type

Like previous client version operating systems, Windows 10 offers multiple editions. The barest version is Windows 10 Home, which has the fewest number of features. Windows 10 Pro includes more features, and Windows 10 Enterprise and Windows 10 Education have the most features. Of course, Windows 10 Home is the least expensive edition, whereas Windows 10 Enterprise is the most expensive edition.

Before installing Windows, you should do a little bit of planning and ask the following questions:

1. What will the computer be used for?
2. What type of environment will the computer run in?
3. Does the computer need to be portable?

Determining what the computer will be used for will help you determine what hardware you need. For example, for a computer-aided design (CAD) system, you need a fast processor, lots of memory, and a fast video card. In addition, a CAD system would greatly benefit from a solid-state drive.

Examining the computer's environment will help you determine if you need special equipment to keep the computer clean. If the computer is in a dusty environment, dust will accumulate, which can cause systems to overheat.

Today, being mobile brings its own challenges. You want a system that can give you long battery life as well as sufficient power to perform the necessary tasks. In addition, your requirements will help determine what portable hardware you might need. For example, does the system need external or high-quality loud speakers, or do you need to work with a large screen? In some situations, you might only need a smaller computer (such as a small laptop or notepad) that enables you to check emails, take notes, write reports, and construct spreadsheets.

Now that you understand how the computer will be used, you can determine its form factor, which specifies the size, configuration, and physical arrangement of a computing device. Common form factors include:

- ***Desktop PC*** A desktop PC is the traditional PC that comes in a box and either lies down (desktop) or stands upright (tower). Desktops can be inexpensive systems that handle basic office tasks, or they can be very expensive systems that provide maximum performance for uses such as CAD or video editing. Because desktop PCs tend to be large, they are not very portable.
- ***Laptop*** A laptop is a portable computer that provides mobility for traveling users or users who might work from home. Although laptops tend not to be as powerful as desktop PCs, today's laptops can provide superior performance. Laptops can be enhanced with docking stations, external keyboards, mice, and monitors. Recently, laptop sales have surpassed desktop PC sales.
- ***Tablet*** A tablet is a smaller version of the laptop, with a screen that makes up the body of the computer. Tablets can be used for reading emails, doing presentations, creating reports, taking notes, and so forth.
- ***Hybrid Computer*** A hybrid computer is a laptop that can convert to a tablet. These devices typically offer better performance than tablets and include a keyboard for faster typing.
- ***Smartphone*** A smartphone is a small device with a screen that can be used to read email, keep track of tasks, access calendar information, manage address books, and run a wide range of applications.

Another device worth mentioning is a gaming console, such as Xbox. Although this system is designed to run games, it might also have additional applications and features.

Windows 10 has multiple editions and versions. The desktop editions of Windows 10 include:

- ***Windows 10 Home*** The Home edition is designed for consumer-based personal computers and tablets.
- ***Windows 10 Mobile*** Windows 10 Mobile is designed to deliver user experience on smaller, mobile, touch-centric devices like smartphones and tablets. It offers the same Windows apps that are included in Windows 10 Home, as well as a version of Office.
- ***Windows 10 Pro*** The Pro edition is designed for personal computers and tablets for small and medium-sized businesses, and for advanced users. It is similar to Windows 10 Home, but has extra features to meet the needs of small businesses. It includes BitLocker Drive Encryption, Encrypting File System (EFS), domain join, and Group Policy Management.
- ***Windows 10 Enterprise*** The Enterprise edition is designed for personal computers and tablets for large enterprises. It builds on Windows 10 Pro by adding advanced features designed to meet the demands of medium- and large-sized organizations. It includes AppLocker, BranchCache, and DirectAccess. Windows 10 Enterprise is only available to Volume Licensing customers.

- ***Windows 10 Education*** The Education edition is designed for personal computers and tablets aimed at schools (including staff, administrators, teachers, and students). Windows 10 Education has the same features as Windows 10 Enterprise. Windows 10 Education is only available through academic Volume Licensing.
- ***Windows 10 Mobile Enterprise*** Windows 10 Mobile Enterprise is designed to deliver an outstanding experience to business customers using smartphones and tablets. It is available to Volume Licensing customers.

Some of the features that are available in Windows 10 include:

- ***AppLocker*** A feature that allows you to specify which groups or users can run, or not run, a particular application in your organization
- ***Assigned Access 8.1*** A setting that lets you restrict a specific standard account to using only one Windows Store app, for use as a kiosk station
- ***BitLocker*** A feature that encrypts a volume to protect a system from being accessed if the system is lost or stolen
- ***BranchCache*** A wide area network bandwidth optimization technology that allows the local caching of shared folders and websites so that you don't always have to access data over a slower WAN link
- ***Business Store*** A feature that allows administrators to find, acquire, manage, and distribute apps to Windows 10 devices
- ***Client Hyper-V*** Virtualization technology that allows you to run virtual machines so that you can run older applications on older operating systems or run a different operating system on the same machine as Windows 10
- ***Continuum*** A feature that allows you to turn your phone into a big-screen projector or attach a keyboard or mouse to your phone
- ***Cortana*** A voice-activated personal assistant
- ***Credential Guard*** A feature that stores credentials, such as NTLM hashes and Kerberos tickets, and provides them to the necessary applications; the credentials are stored in a secured isolated container, which uses Hyper-V and virtualization-based security (VBS).
- ***Current Branch for Business*** A feature that allows you to delay upgrades (new versions) and updates, so that you can perform pilot testing before deploying updates
- ***Device Guard*** A feature that helps protect a system by locking a device so that it can only run trusted applications
- ***DirectAccess*** An advanced VPN technology that allows remote users to securely access internal network file shares while connected to the Internet
- ***Encrypting File System (EFS)*** A feature that provides transparent file-level encryption
- ***Enterprise Mode Internet Explorer (EMIE)*** A compatibility mode that runs Internet Explorer 11 or higher and lets websites render using a modified browser configuration

that's designed to emulate either Windows Internet Explorer 7 or 8, avoiding the common compatibility problems associated with Web Apps written and tested on older versions of Internet Explorer

- ***Group Policy Management*** An infrastructure that allows you to centrally manage computer settings and configuration
- ***Joining to a Domain*** A feature that allows you to join an Active Directory domain
- ***Long-Term Servicing Branch*** An option for organizations that only want to receive features updates every two to three years, so that the current systems can be stable
- ***Private Catalog*** A feature that provides a list of applications that users within the organization can download apps from
- ***Remote Desktop*** A program or feature that allows you to connect to a remote computer and access the desktop and applications as if you were accessing the machine directly
- ***RemoteApp*** A feature that enables you to run a program remotely through Remote Desktop Services, although the application appears to be running on your local machine
- ***User Experience Control and Lockdown*** A feature that allows you to customize and lock down the Windows 10 user interface
- ***Virtual Desktops*** A feature that allows you to run and switch between multiple desktops
- ***Windows Hello*** A credential technology that provides multi-factor authentication, including a personal identification number (PIN) or biometrics (face, iris, or fingerprint)
- ***Windows Spotlight*** An option that displays a new image on the lock screen each day
- ***Windows To Go*** A feature that allows you to boot and run Windows from USB mass storage devices such as USB flash drives and external hard disk drives
- ***Windows Update for Business*** A free service for Windows 10 Pro, Enterprise, and Education editions that can provide updates to your users based on distribution rings

Table 1.2 shows some of the common features available for the various editions of Windows 10.

TABLE 1.2 Features Based on Windows 10 Editions

Feature	Windows 10 Home	Windows 10 Pro	Windows 10 Enterprise	Windows 10 Education
AppLocker	No	No	Yes	Yes
Assigned Access 8.1	No	Yes	Yes	Yes
BitLocker	No	Yes	Yes	Yes
BranchCache	No	No	Yes	Yes
Business Store	No	Yes	Yes	Yes

Feature	Windows 10 Home	Windows 10 Pro	Windows 10 Enterprise	Windows 10 Education
Client Hyper-V	No	64-bit SKUs only	64-bit SKUs only	64-bit SKUs only
Continuum	Yes	Yes	Yes	Yes
Cortana*	Yes	Yes	Yes	Yes
Credential Guard	No	No	Yes	Yes
Current Branch for Business	No	Yes	Yes	Yes
Device Guard	No	No	Yes	Yes
DirectAccess	No	No	Yes	Yes
Encrypting File System (EFS)	No	Yes	Yes	Yes
Enterprise Mode Internet Explorer (EMIE)	No	Yes	Yes	Yes
Group Policy management	No	Yes	Yes	Yes
Joining to a domain	No	Yes	Yes	Yes
Long-Term Servicing Branch	No	No	Yes	No
Private catalog	No	Yes	Yes	Yes
Remote Desktop	Client only	Client and host	Client and host	Client and host
RemoteApp	Client only	Client only	Client and host	Client and host
User Experience control and lockdown	No	No	Yes	Yes
Virtual desktops	Yes	Yes	Yes	Yes
Windows Hello	Yes	Yes	Yes	Yes
Windows Spotlight	Yes	Yes	Yes	Yes
Windows To Go	No	No	Yes	Yes
Windows Update for Business	No	Yes	Yes	Yes

*Cortana is currently available in Windows 10 only for the United States, United Kingdom, China, France, Italy, Germany, and Spain.

Understanding Processor and Memory Architecture

The processor of a Windows computer runs in two different modes: kernel mode and user mode. The *kernel mode* has complete and unrestricted access to the underlying hardware, while the *user mode* does not have direct access to the hardware or reference memory.

Certification Ready

What is the advantage of having programs run in user mode instead of kernel mode? Objective 2.4

Kernel mode is generally reserved for the most trusted part of the operating system. Code that crashes in kernel mode will cause catastrophic errors such as the dreaded Stop error or "blue screen of death."

Most programs that you install and use on a daily basis are stored in user mode. When programs run in user mode, they are isolated from other programs. Therefore, when a program crashes, it usually only affects the individual program.

Windows 10 supports two platforms:

- IA-32—Designed to run on systems with the 32-bit x86 processors. IA-32 can only access up to 4 GB of memory.
- X86-64—Designed to run on the x86-64 processors. Windows 10 can support up to 128 GB of memory, while the other desktop editions can support up to 2048 GB of memory.

Windows runs on a desktop computer that has an Intel or Intel-compatible processor based on the *x86* (32-bit) or *x64* (64-bit) architecture.

32-bit and 64-bit refer to the CPU, or processor. Computer processors are typically rated by speed. The speed of the processor is rated by the number of clock cycles that can be performed in 1 second. This is usually conveyed in gigahertz (GHz). One GHz is one billion cycles per second.

The 32-bit and 64-bit architectures determine how data is processed and how much memory can be accessed. A 64-bit architecture can process larger numbers or larger chunks of data, allowing for faster processing. In addition, a 32-bit processor can access up to 4 GB of memory, while a 64-bit processor can theoretically access up to 16 exabytes (16 billion gigabytes) of memory, although you will most likely be limited by the motherboard and software. The 32-bit versions of Windows 10 support up to 4 GB of memory. The 64-bit version of Windows 10 Home supports up to 128 GB of memory and the 64-bit versions of Windows 10 Pro and Windows 10 Enterprise editions support up to 512 GB.

To install a 32-bit version of Windows, you can use an x86 or x64 processor. To install a 64-bit version of Windows, you can use only a 64-bit processor. Software written for a 64-bit architecture does not work on a 32-bit architecture. Most programs designed for 32-bit versions of Windows will work on a 64-bit version of Windows by using Windows on Windows 64 (WoW64). However, some 32-bit system software, such as an antivirus program, does not operate on a 64-bit architecture. In addition, 64-bit hardware requires 64-bit drivers. Drivers designed for 32-bit versions of Windows do not

run on 64-bit versions of Windows, and drivers designed for 64-bit versions of Windows do not run on 32-bit versions of Windows. If you transition from a 32-bit version architecture to a 64-bit architecture, you may not find 64-bit drivers for all your devices, particularly for older devices.

If you want to use 64-bit Windows, keep the following in mind:

- 16-bit applications (applications generally written for Windows 9x) or 32-bit kernel drivers will fail to start or function properly on a 64-bit edition of Windows 10.
- Installation of 32-bit kernel drivers will fail on the 64-bit system.
- Installation of 64-bit unsigned drivers will fail by default on the 64-bit system.

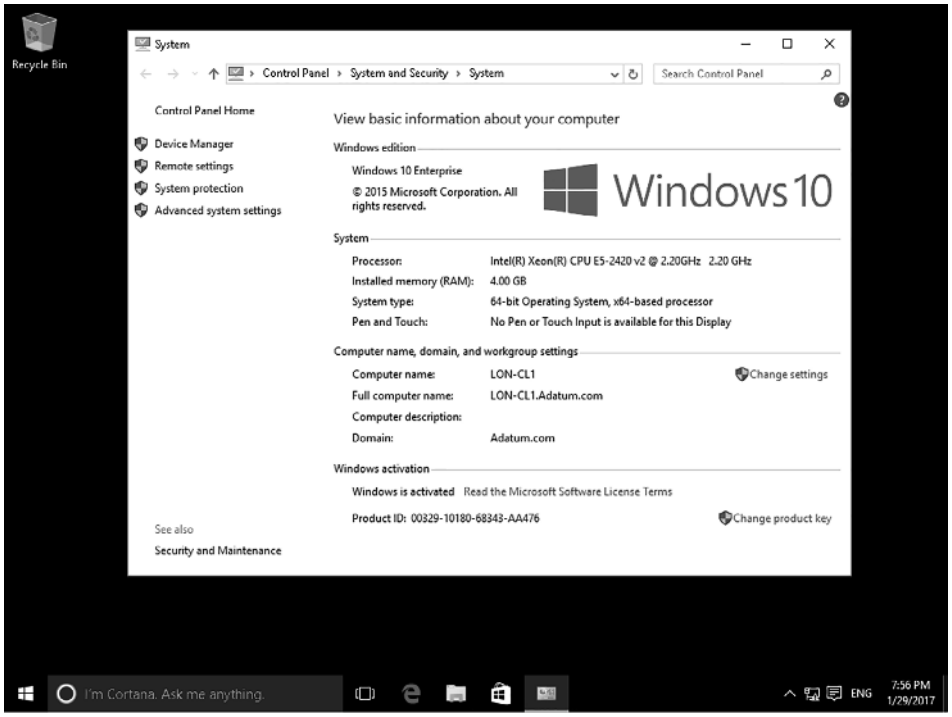
Finally, many computers today have multi-core processors. A 32-bit version of Windows 10 supports up to 32 processor cores; a 64-bit version of Windows 10 supports up to 256 processor cores.

Determine Whether Your PC Is Running 32-Bit Windows or 64-Bit Windows

To find out if your computer is running a 32-bit version of Windows 10 or a 64-bit version of Windows 10, perform the following steps:

1. Right-click Start and choose System. The System window opens.
2. Look in the System area to view the system type (see Figure 1.1).

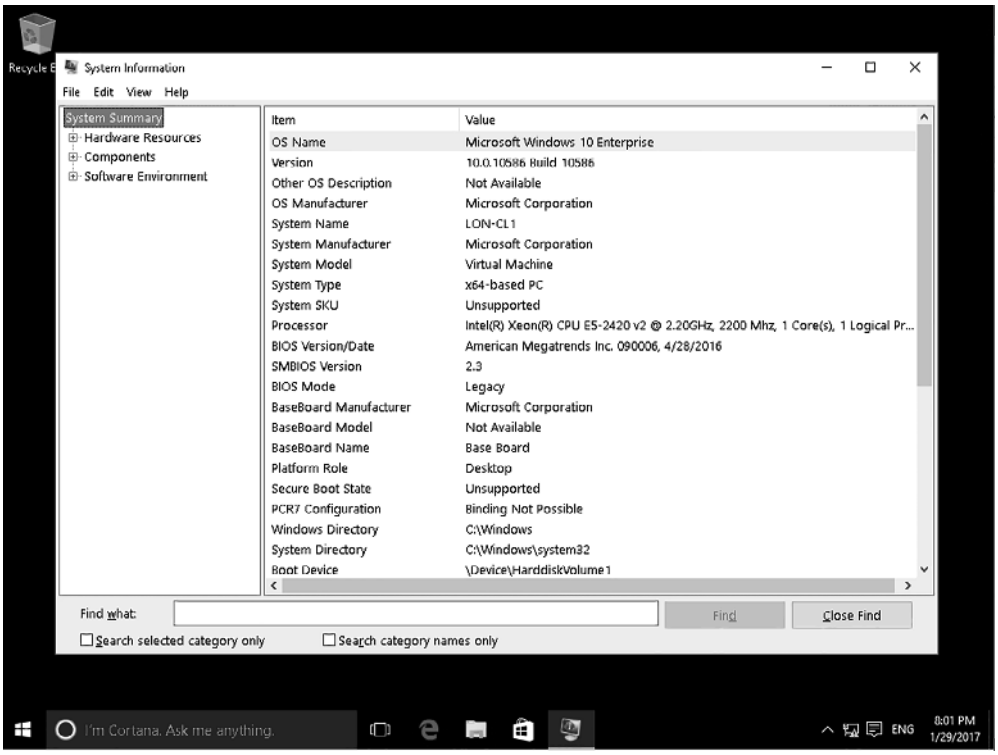
FIGURE 1.1 Viewing system information



An alternative method is to check the System Information window. To do so, perform the following steps:

1. Click Start, type system info in the Search programs and files search box, and then click System Information in the resulting list.
2. Make sure System Summary is selected in the Navigation pane on the left.
3. Look at the System Type value in the right pane (see Figure 1.2):
   - "x86-based PC" displays for a 32-bit operating system.
   - "x64-based PC" displays for a 64-bit operating system.

FIGURE 1.2 Viewing the System Type value in the System Information window



Understanding Drivers

A computer is a collection of hardware devices, each of which requires a piece of software called a device driver in order to function. Windows 10 includes a large library of device drivers, but it is still sometimes necessary to obtain them yourself.

Certification Ready

How does a device get the attention of the processor? Objective 2.4

Certification Ready

Which software component allows a hardware component to interface with the operating system? Objective 2.4

As most people know, a PC is a collection of hardware devices, all of which are connected together and installed in a single case. Disk drives, keyboards, mice, modems, and printers are all types of devices. To communicate with the operating system running on the computer, each device also requires a software element called a *device driver*. The device driver provides the operating system with information about a specific device.

For example, when you use a word-processing application to save a file to a hard disk, the application issues a generic WriteFile function call to the operating system. The application knows nothing specific about the disk drive hardware; it just issues an instruction to store a particular file there. When the operating system processes the function call, it accesses the device driver for the hard disk drive, which provides detailed information about how to communicate with the drive. If the user selects a different target location for the file, the operating system accesses the device driver for that location, whether it's a hard drive, a floppy drive, or a USB flash drive.

Device drivers run in the kernel mode or in user mode. A driver that runs in user mode provides for a more stable system, because poorly written user mode device drivers cannot crash the entire system. However, drivers that run in user mode are slower than drivers that run in kernel mode.

A driver communicates with the device through the computer bus or communications subsystem. *Hardware interrupts (IRQ)* are used by devices that require attention from the operating system. For example, every time you press a key on a keyboard or move the mouse, you trigger a hardware interrupt that causes the processor to read and process the keystroke or mouse position. So, basically, a hardware interrupt is used by devices to communicate that they need attention from the operating system. Interrupts are also used for asynchronous events, such as the arrival of data from an external network. Hardware interrupts are delivered straight to the CPU by using a small network of interrupt management and routing devices.

Understanding Windows 10 System Requirements

Software manufacturers, including Microsoft, list the system requirements needed to run their products. The specifications are usually minimum requirements; recommended requirements—which allow for much better performance of the OS and applications—are

often much higher (in the case of memory, processor speed, or hard disk space) or involve more recent technology.

Certification Ready

What is the minimum amount of RAM a computer must have in order to run Windows 10 on a 32-bit processor? Objective 2.1

The system requirements for Windows 10 include the following:

- Processor: 1 GHz or faster processor
- RAM: 1 GB for 32-bit or 2 GB for 64-bit
- Hard disk space: 32 GB or larger hard disk
- Graphics card: DirectX 9 or later with WDDM 1.0 driver
- Display: 800 × 600
- Internet connection: Internet connectivity is necessary to perform updates and to download and take advantage of some features.

Regarding the hard disk space needed for Windows 10, the size of the Windows operating system that comes with a device and the amount of space needed to download and install Windows updates are variable, as they depend on a wide variety of factors. The factors include:

- The versions of Windows that were previously installed on the machine
- The amount of disk space available to reuse from Windows files, such as the virtual memory pagefile or hibernation file
- What applications are installed on the device and how those applications store data

Starting with the May 2019 Update, the system requirements for hard drive size for clean installs of Windows 10 as well as new PCs changed to a minimum of 32 GB. The 32 GB or larger drive requirement is to allow for users to install apps and to keep data on the device.

Installing Windows or updating from a previous version of Windows on devices with less than 32 GB storage will still work, but only if the device has enough free space available. Windows will attempt to automatically free up enough hard drive space and walk the user through the process of freeing up more space if the automatic cleanup is not sufficient during an update.

A *clean installation* of Windows is when you install Windows where there are no operating system, data, or programs stored on the hard drive, or you perform the installation of Windows while reformatting the current hard drive, so that you are installing Windows on an empty hard drive. An *upgrade installation* of Windows is when you have a system that is running Windows 7 or Windows 8/8.1, and you run the Windows installation program, replacing the Windows 7 or Windows 8/8.1 operating system with Windows 10.

The minimum hardware specifications usually mean the software will run, but might not result in an optimal user experience. When preparing to run Windows 10, it's best to exceed the processor, RAM, and hard disk space requirements, if possible. For example, a user who wants to simultaneously run a web browser, an email client, and productivity software (such as a word processor and a spreadsheet application) will have a good user experience on a computer with a 2 GHz dual-core processor, 4 GB of RAM, and at least a 250 GB hard drive. A user who needs to run memory-intensive graphic programs along with other applications will find the computer highly responsive with at least 8 GB of RAM and 500 GB or more of hard disk space. Computers that don't have access to shared storage space on a network may also need secondary storage, such as an external flash hard drive. This is especially important if the user has a large number of image, video, or audio files, which tend to consume much more disk space than ordinary document files require.

In addition, Microsoft lists the following items as required for using specific features or for optimal performance:

- BitLocker Drive Encryption (available with Windows 10 Pro or Windows 10 Enterprise only)—requires a Trusted Platform Module (TPM) 1.2 or higher and Trusted Computing Group (TCG)-compliant BIOS or UEFI. BitLocker can be used on devices without TPM, but you will need to save a startup key on a removable device such as a USB flash drive. TPM 2.0 and InstantGo support are required when you want to automatically encrypt the local drive when joining a device to Azure Active Directory (AAD). Check with your PC manufacturer to confirm if your device supports the correct TPM version and InstantGo for the scenario you want to enable.
- BitLocker To Go—requires a USB flash drive (available in Windows 10 Pro and Windows 10 Enterprise only)
- Client Hyper-V—requires a 64-bit system with second level address translation (SLAT) capabilities and an additional 2 GB of RAM (available in Windows 10 Pro and Windows 10 Enterprise only)
- Cortana—is only currently available on Windows 10 for the United States, United Kingdom, China, France, Italy, Germany, Brazil, Mexico, Japan, Canada, Spain, Australia and India.
- A Microsoft account—is required for some features.
- Miracast—requires a display adapter which supports Windows Display Driver Model (WDDM) 1.3 and a Wi-Fi adapter that supports Wi-Fi Direct.
- Movies & TV application—is not available in all regions.
- Secure boot—requires firmware that supports UEFI v2.3.1 Errata B and has the Microsoft Windows Certification Authority in the UEFI signature database.
- Skype—is available only in select countries and regions. Calling to select countries and regions only.
- Snap—the number of applications that can be snapped will depend upon the minimum resolution for the application with a limit of two applications in Tablet mode and four applications in Desktop mode.

- Speech recognition—will vary by device microphone. For a better experience will need a high fidelity microphone array and a hardware driver with microphone array geometry exposed.
- Tablet mode—is available on tablets and 2-in-1s with GPIO indicators, or those who have a laptop and slate indicator will be able to be configured to enter "tablet mode" automatically.
- Touch—To use touch, you need a tablet or a monitor that supports multi-touch.
- Two-factor authentication—requires the use of a PIN, biometric (fingerprint reader or illuminated infrared camera), or a phone with Wi-Fi or Bluetooth capabilities.
- Windows Hello—requires a camera configured for near infrared (IR) imaging or fingerprint reader for biometric authentication. Devices without biometric sensors can use Windows Hello with a PIN or a portable Microsoft compatible security key.
- Xbox application—requires an Xbox Live account, which is not available in all regions.
- Wi-Fi Direct Printing—requires a Wi-Fi adapter that supports Wi-Fi Direct and a device that supports Wi-Fi Direct Printing.

Feature Deprecations and Removals

When upgrading to Windows 10 from a previous version of Windows, such as Windows 7 or Windows 8.1, or when installing a newer update to Windows 10, some features have been deprecated or removed. These include:

Desktop Messaging App The messaging app on Desktop has a sync feature that can be used to sync SMS text messages received from Windows Mobile and keep a copy of them on the Desktop. Starting with the May 2019 Update (Windows 10, version 1903), the sync feature has been removed from all devices. Due to this change, you will only be able to access messages from the device that received the message.

Wi-Fi WEP and TKIP Starting with the May 2019 Update (Windows 10, version 1903), a warning message will appear when connecting to Wi-Fi networks secured with WEP or TKIP, which are not as secure as those using WPA2 or WPA3. In a future release, any connection to a Wi-Fi network using these old ciphers will be disallowed. Wi-Fi routers should be updated to use AES ciphers, available with WPA2 or WPA3.

Windows To Go This feature is no longer being developed. It does not support feature updates and requires a specific type of USB that is no longer supported by many device manufacturers.

Phone Companion As of the October 2018 Update (Windows 10, version 1809), Phone Companion is removed from your PC. Use the Phone page in the Settings app to sync your mobile phone with your PC. It includes all the Phone Companion features.

HomeGroup HomeGroup was removed starting with the April 2018 Update (Windows 10, version 1803), but you still have the ability to share printers, files, and folders. When you

update from an earlier version of Windows 10, you won't see HomeGroup in File Explorer, the Control Panel, or Troubleshoot (Settings ➢ Update & Security ➢ Troubleshoot). Any printers, files, and folders you shared using HomeGroup will continue to be shared. Instead of using HomeGroup, you can now share printers, files, and folders by using features that are built into Windows 10:

- Share your network printers
- Share files in File Explorer
- For Xbox 360 and HomeGroup users

People App In Windows 10, the People app shows mail from Office 365 contacts and contacts from your school or work organization under Conversations. Starting with the April 2018 Update (Windows 10, version 1803), in order to see new mail in the People app from these specific contacts, you need to be online, and you need to have signed in with either an Office 365 account or, for work or school organization accounts, through the Mail, People, or Calendar apps. Please be aware that you'll only see mail for work and school organization accounts and some Office 365 accounts.

Reader App The Reader app was removed from Windows 10 starting with the Fall Creators Update (Windows 10, version 1709). For reading PDF files, Microsoft Edge is the recommended replacement app and offers similar functionality as well as additional features, including improved accessibility support, improved Inking, and support for AskCortana. Similarly, Windows XPS Viewer is recommended when reading XPS files and the Windows Photos app for viewing TIFF files. Note that users of earlier Windows 10 versions can continue using the Reader app.

Windows Journal Windows Journal was removed starting with the Windows 10 Anniversary Update (Windows 10, version 1607). After Windows Journal is removed, you will no longer be able to open or edit Journal files (with .JNT or .JTP extensions). In place of Windows Journal, we encourage you to switch to OneNote. If you need to open or edit your journal files, more information is available here.

Windows Media Digital Rights Management (WMDRM) WMDRM is no longer supported starting with the Windows 10 Anniversary Update (Windows 10, version 1607). You are no longer able to play music or video files that were protected by this rights management technology.

For an updated list of Windows 10 specifications, systems requirements, and deprecations/removals, go to `https://www.microsoft.com/en-us/windows/windows-10-specifications`.

Understanding Installation Types

There are many different types of Windows 10 installations, from the manual DVD method to a fully automated setup effort over a network. Learn the various ways in which you can install Windows 10 and select the most efficient method for your needs.

Microsoft provides many different ways to install Windows 10, from manual methods like inserting a DVD to fully automated, "non-touch" installations performed over a network or even via the cloud. (The *cloud* generally refers to the Internet or to a server accessible over the Internet.) The method you choose depends mainly on the number of computers on which you need to install Windows and how much time you have to devote to the project.

Certification Ready

Perform a network installation. Objective 2.3

Installing Windows 10

Windows 10 can be installed either from the bootable DVD or by using a network installation by using files that have been copied to a network share point or USB device. Can also use the setup.exe file to upgrade the operating system.

To start the installation, just restart the computer and boot to the DVD. The installation process will begin automatically. The installation will guide you through the steps.

If installing Windows 10 from the network, you need a distribution server and a computer that has a network connection. A distribution server is a server that has the Windows 10 distribution files copied to a shared folder. The following steps are used to install Windows 10 over the network:

1. Boot the target computer.
2. Attach to the distribution server and access the share that has the files copied to it.
3. Launch `setup.exe`.
4. Complete the Windows 10 installation using either the clean install method or the upgrade method.

Installing Windows 10 from removable media is common in smaller enterprise or home environments. When you think of removable media, you might think of DVDs, but many installations are performed from USB drives as well. Using a DVD or USB drive is considered a manual method of installation. If you're installing Windows on one, two, or even ten computers, a manual method works well. If you must install Windows on many computers, you'll want to understand automated methods, in order to save time (and, thus, money).

Certification Ready

What are the types of removable media installations? Objective 2.3

The following are categories that correspond to the level of interaction required during an installation:

- High Touch Installation (HTI)
- Lite Touch Installation (LTI)
- Zero Touch Installation (ZTI)

High Touch Installation (HTI) may include retail media or a standard image (ISO file). Using this method, you use an installation DVD or USB drive and manually install the operating system on every computer. You must then also manually configure each system.

An image file is an exact replica of the contents of a hard disk, saved to a file with an .iso extension or a .wim extension if it's a Windows Imaging Format image.

In a larger environment, where you have, say, 25 or more computers that require Windows 10 installations, you could use a tool called the Windows Assessment and Deployment Kit (ADK) to create bootable media. ADK includes Deployment Image Servicing and Management (DISM), which allow you to modify disk images. You would perform these general steps:

1. Install Windows 10 on a clean hard disk.
2. Configure it with settings that will apply to all computers.
3. Use the Sysprep utility to create an image of the installation.
4. Boot to the Windows Preinstallation Environment (WinPE) and use DISM to save the image to a DVD, a USB drive, or whatever type of media you plan to use.
5. Install the image on the remaining computers.

Lite Touch Installation (LTI) requires some human intervention in the early phase of the installation but is automated (or unattended) from that point on. This installation method works well in environments with more than 150 computers.

You need the Windows ADK, Windows Deployment Services, and the Microsoft Deployment Toolkit for LTIs. *Windows Deployment Services* is a server role for Windows Server 2008 or higher. It allows a user to press the F12 key, log on, and select an image for installation. After that, the installation can be automated. For example, you can use an answer file to configure Windows settings during installation. The answer file contains all the settings that are required for an unattended installation. The Microsoft Deployment Toolkit is a free download used to automate high-volume operating system deployments.

Zero Touch Installation (ZTI) is a fully automated, "touchless" method of installing Windows. You need System Center Configuration Manager (SCCM) for ZTIs. You use SCCM to deploy and update servers, client computers, and all kinds of devices on a network.

The ZTI method is geared for environments with more than 500 computers, involves a fairly steep learning curve, and requires a considerable budget compared to HTIs.

Performing a Clean Install of Windows 10

The simplest way to perform a clean install (a new installation) of Windows 10 is to boot from a bootable Windows 10 installation disk or USB drive, which will start the setup program. You can also search for and find the *Windows 10 Media Creation tool*, which can be used to create a copy of your Windows 10 ISO file on a USB flash drive or DVD. You can then use the USB flash drive to install Windows 10.

A clean installation of Windows 10 allows you to start as if the machine were new. If you decide to perform a clean installation on a machine that already has Windows 7 or Windows 8/8.1 installed, you will remove any existing corrupted files, problem programs, or erroneous settings. However, if you perform a clean installation, you have to then install all programs, copy over desired data files from a backup, and reconfigure the system.

Install Windows 10 from a Windows 10 Installation DVD

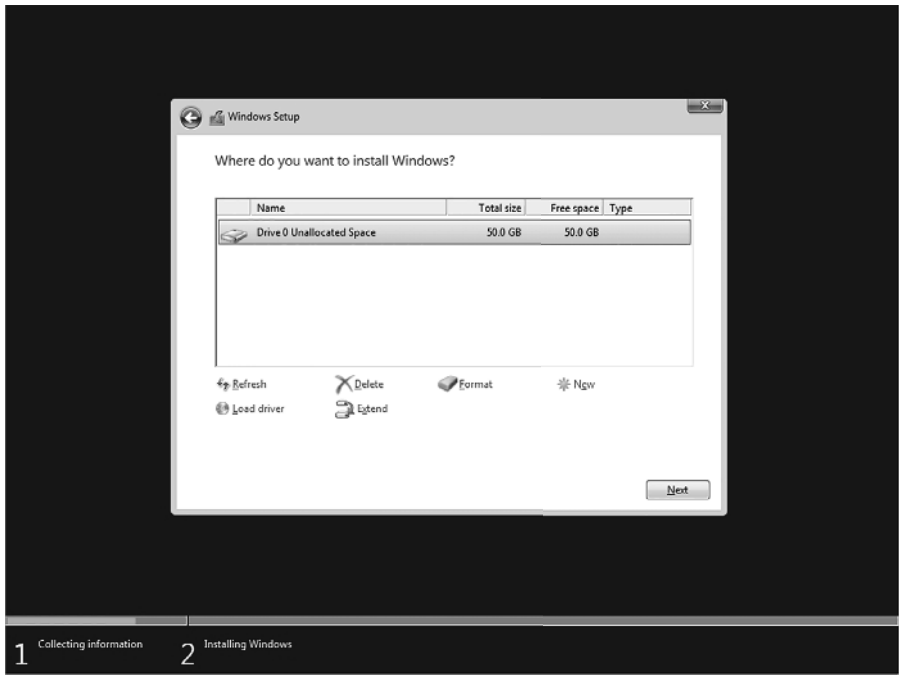
To install Windows 10 from a Windows 10 installation DVD, perform the following steps:

Before you start, you need to make sure that your system can boot from the DVD drive, which may need to be configured using the BIOS Setup program. The BIOS Setup program is usually accessed by pressing the Del key, F10 key, or similar key during boot up.

1. Turn on the computer and insert the Windows 10 installation disc into the DVD drive. Press any key to boot from the DVD (if necessary).
2. The computer switches to the Windows graphical interface and the Windows Setup page appears, as shown in Figure 1.3. Using the drop-down lists, choose the appropriate "Language to install," the "Time and currency format," and the "Keyboard or input method." Click Next.
3. On the Windows 10 Install now page, click Install Now.
4. On the License Terms page, select the "I accept the license terms" check box and click Next.
5. Click the "Custom: Install Windows only (advanced)" option.
6. On the License Terms page, select the "I accept the license terms" check box and click Next.
7. The "Where do you want to install Windows?" page appears, as shown in Figure 1.4. From the list, click the partition on which you want to install Windows 10, or click an area of unallocated disk space where the Setup program can create a new partition. Click Next.

FIGURE 1.3 The Windows Setup page

FIGURE 1.4 The "Where do you want to install Windows?" page



8. After several minutes, during which time the Setup program installs Windows 10, the computer reboots and the "Get going fast" page appears. Click Use Express Settings.
9. On the "Choose how you'll connect" page, click Join A Domain and click Next.
10. On the "Create an account for this PC" page, in the "Who's going to use this PC?" text box, type User1.
11. In the Enter Password text box and the Re-enter Password text box, type **Pa$$w0rd**. In the Password Hint box, type **Default**. Click Next.
12. The Networks pane opens on the right side of the Windows desktop. When you are prompted to confirm that you want to allow your PC to be discoverable by other PCs and devices on the network, click Yes.

At this point, you can remove the installation disc from the drive.

If you need to upgrade from Windows 7 or Windows 8/8.1, you can navigate to `https://www.microsoft.com/en-us/software-download/windows10` and click the Download Tool Now button. You would then launch the Download Tool to create installation media or to upgrade a PC with the older operating system.

After you install Windows, you should activate Windows 10. Activation helps verify that the copy of Windows is genuine, and that it is not in use on more devices than the number for which you own licenses.

Depending on how you got your copy of Windows 10, you'll need either a 25-character product key or a digital license to activate it. A digital license (called a digital entitlement in Windows 10, Version 1511) is a method of activation in Windows 10 that doesn't require you to enter a product key. Digital licenses are associated with your hardware and linked to your Microsoft account, so there's nothing to find on your PC. You're all set once your PC is connected to the Internet and you log in to your Microsoft account. However, without one of these, you won't be able to activate your device.

If you have a retail, OEM, or some volume license keys, you will need to type a valid 25-character product key.

A Windows 10 product key looks similar to:

xxxxx-xxxxx-xxxxx-xxxxx-xxxxx

but is composed of letters and numbers. It is usually located:

- On the installation disc holder inside the Windows package
- On a sticker on the back or bottom of your computer if the operating system came preinstalled on the computer
- In a confirmation email if you purchased and downloaded Windows 10 online

During installation, you must enter the product key exactly as printed. (If you are off by even one character, the installation fails.) After you enter the product key correctly, the product key is then written to the Windows registry in an encrypted format, making it unreadable (for security purposes). Therefore, it's important to keep your Windows 10

installation media and printed product key in a safe location after initial installation, in case you need to reinstall or repair the operating system at some point.

Activate Windows 10 Using a Product Key

To activate Windows 10, perform the following steps:

1. Click Start ➢ Settings.
2. In the Settings window, click Update & Security ➢ Activation. In the Activate Windows section, click the Activate button.

   Alternatively, you can open System Properties by right-clicking Start and choosing Control Panel, then clicking System and Security ➢ System. In the System window, click Activate Windows.
3. Click Change Product Key.
4. In the Enter A Product Key window, in the Product Key text box, type the 25-character product key. The system will automatically activate over the Internet.

Upgrading to Windows 10

If you need to upgrade from Windows 7 or Windows 8/8.1 to Windows 10, you can use a Windows 10 bootable DVD or bootable USB drive. You can also upgrade Windows 10 by using the Windows 10 Media Creation tool.

Certification Ready

Which type of upgrade path is necessary to upgrade from Windows 7 or 8/8.1 to Windows 10? Objective 2.2

Before you upgrade to Windows 10, you need to ensure that your software will run on Windows 10. To help check application compatibility, you can visit the Windows Dev Center site (`https://developer.microsoft.com/en-us/windows/ready-for-windows#/`), and search for the desired software.

An upgrade to Windows 10 is a time-saving feature that will allow you to keep your programs, files, and settings. After the upgrade, you will be able to use the same programs and access your data. However, if you have corrupt non-Windows files, problematic programs, or erroneous settings, you may still experience those problems after the upgrade. Sometimes, the upgrade does not go smoothly (usually caused by incompatible programs or device drivers), and it could make your system unusable. If you are using a legacy device, the device may not run under Windows 10. Of course, before you perform an upgrade, you should always make sure you have a current backup in case you need to roll back device drivers or recover lost programs and data.

You can upgrade from Windows 7 or Windows 8/8.1 to like versions of Windows 10. For example:

- If you have Windows 7 Starter, Windows 7 Home Basic, Windows 7 Home Premium, Windows 8, or Windows 8.1, you can upgrade to Windows 10 Home.
- If you have Windows 7 Pro, Windows 7 Ultimate, Windows 8.1 Pro, or Windows 8.1 Pro for Student, you can upgrade to Windows 10 Pro.
- If you have Windows 7 Enterprise or Windows 8/8.1 Enterprise, you can upgrade to Windows 10 Enterprise.

If you want to migrate to a different edition (such as from Windows 8.1 Pro to Windows 8.1 Enterprise), you will have to perform a clean installation.

In addition, you can only upgrade from a 32-bit version of Windows 7 or Windows 8/8.1 to a 32-bit version of Windows 10; or from a 64-bit version of Windows 7 or Windows 8/8.1 to a 64-bit version of Windows 10. If you want to have a 64-bit version, and you want to upgrade to a newer 32-bit version, or from a 32-bit version to a newer 64-bit version, you will have to perform a clean installation.

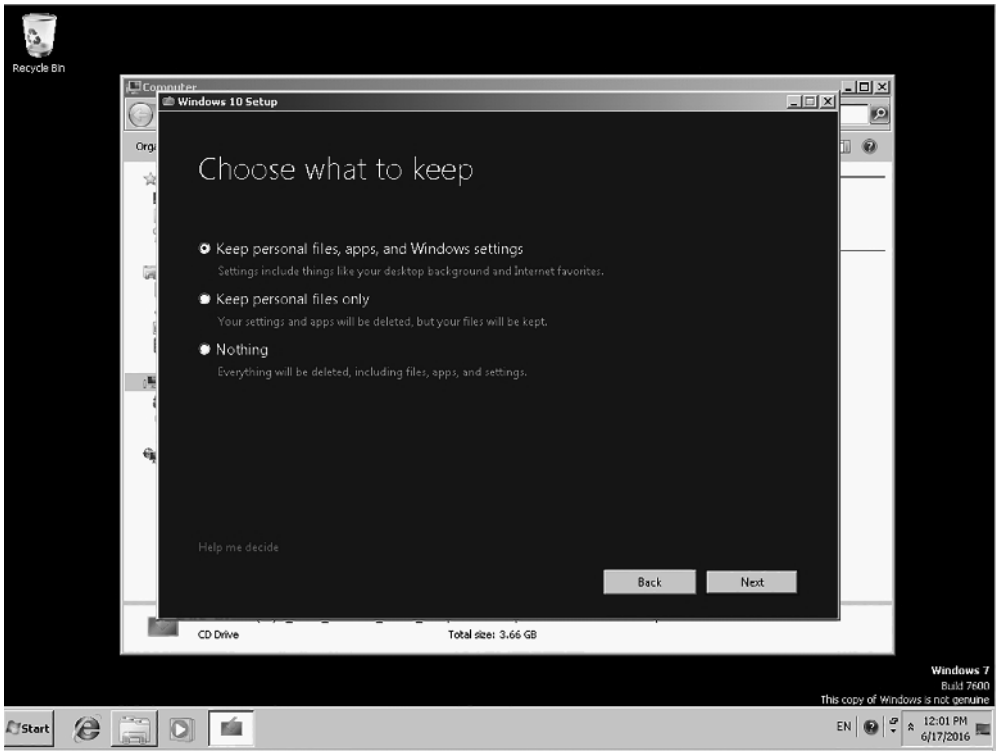
Before you perform any upgrade, you should always make sure that you have a current backup of all programs, settings, and data files. You should also make sure that the backup is stored away from the machine you are trying to upgrade.

Upgrade to Windows 10 from a Windows 10 Installation DVD

To upgrade from Windows 7 or Windows 8/8.1 to Windows 10 using a Windows 10 installation DVD, perform the following steps:

1. Turn on the computer and log on to the computer that is running Windows 7 or Windows 8/8.1.
2. Insert the Windows 10 installation disc into the DVD drive.
3. Click Start ➢ Computer. The Computer window opens.
4. Double-click the DVD/Blu-Ray drive.
5. In the Windows 10 Setup program, on the Get Important Updates page, keep the "Download and install updates (recommended)" option selected, and click Next.
6. On the License Terms page, click Accept. The Windows 10 Setup program will download any available updates.
7. On the Ready To Install page, click "Choose what to keep."
8. On the Choose What To Keep page (as shown in Figure 1.5), click one of the following options and click Next:
   - Keep personal files, apps, and Windows settings
   - Keep personal files only
   - Nothing

FIGURE 1.5 Specifying what to keep during a Windows 10 upgrade



9. On the Ready to install page, click Install.

   After a few minutes, Windows will reboot and complete the upgrade.

When Windows 10 was initially released, Microsoft offered a free upgrade from Windows 7 or Windows 8/8.1 to Windows 10 for the first year. These free upgrades are done over the Internet with Windows Update. In addition, because Windows 10 is released as an "operating system as a service," Windows 10 machines will receive ongoing updates to its features and functionality.

Using Windows Update

Windows Update is a utility that connects to the Microsoft website and checks if a machine has the most up-to-date versions of Microsoft products. Some of the common update categories include:

- Critical updates
- Drivers
- Service packs

Use the following steps to configure Windows Update:

1. Select Start ➢ Control Panel.
   - From Windows Icons View, select Windows Update.
   - From Windows Category View, select System And Security ➢ Windows Update.
2. Configure the options you want to use by clicking the Advanced Options link. The options for Windows Update include:
   - Choose how updates are installed
   - Give me updates for other Microsoft products
   - Defer Upgrades
   - View Update History
   - Choose how updates are delivered
   - Get Insider Builds

When you click on the Check For Updates button, Windows Update will retrieve a list of available updates. You can then click View Available Updates to see what updates are available. Updates are marked as Important, Recommended, or Optional.

There are two ways a user can receive updates:

- Directly from Microsoft
- Using Microsoft Windows Server Update Service (WSUS)

WSUS runs on a Windows server and goes out to the Microsoft website and downloads the updates for you. This allows client machines to receive their updates from a local server. A few advantage to using WSUS is that administrators can approve the updates prior to being deployed to the client machines and the clients only need to download updates locally, without using the Internet bandwidth.

Migrating to Windows 10 from Previous Versions of Windows

Sometimes, you might want to move a user from one system to another, including moving a user from a computer running Windows 7 or Windows 8/8.1 to a computer running Windows 10. One of the most time-consuming tasks you will perform as an administrator is to move user files and settings between computers and operating systems. The User State Migration Tool (USMT) eases this burden. The USMT 10 tool is part of the Windows Assessment and Deployment Kit for Windows 10.

Certification Ready

How can you migrate from previous versions of Windows? Objective 2.2

The *User State Migration Tool (USMT)* is a command-line tool that migrates user data from a previous installation of Windows to a new installation of Windows. It provides you with the ability to customize the user-profile migration experience. This means you can copy selected user data and exclude any data that you do not want to migrate. USMT captures user accounts, user files, operating system settings, and application settings to migrate to your new Windows installation.

The USMT includes three command-line tools:

- *ScanState.exe* scans the source computer, collects the files and settings, and creates a store that contains the user's files and settings.
- *LoadState.exe* loads the files and settings onto the destination computer.
- *UsmtUtils.exe* deletes hardlink folders in use by applications no longer removable through normal measures, checks the store file's consistency, and restores selected files. A hardlink folder provides a way for the New Technology File System (NTFS) to point to the same file from multiple locations on the same volume. The store file contains the user state migration data. UsmtUtils can be used to check for corrupted files or a corrupted catalog in the store file.

The ScanState.exe and LoadState.exe programs use a similar syntax, in which you specify the location of the migration store, the scripts you want to use to specify what to migrate, which user accounts you want to migrate, and how the program should store the data.

Table 1.3 lists some of the most common command-line options for ScanState and LoadState and their functions.

TABLE 1.3 SMT Command-Line Options

Command-Line Option	ScanState or LoadState	Description
`StorePath`	Both	Specifies the location where the program should create or from which it should read the migration store
`/o`	ScanState	Overwrites any existing data in the migration store
`/vsc`	ScanState	Uses the Volume Shadow Copy Service to migrate files that are locked open, eliminating some errors
`/hardlink`	ScanState	Creates a hardlink migration store at the location specified in the StorePath variable
`/encrypt:`*`algorithm`*	ScanState	Creates an encrypted migration store, using the specified algorithm
`/decrypt`	LoadState	Decrypts the migration store as it restores the user state

TABLE 1.3 SMT Command-Line Options *(continued)*

Command-Line Option	ScanState or LoadState	Description
/key:*keystring*	Both	Uses the key specified by the *keystring* variable to encrypt or decrypt the migration store
/keyfile:*filename*	Both	Uses the key specified in the file identified by the filename variable to encrypt or decrypt the migration store
/nocompress	ScanState	Disables the default data compression used when creating a migration store
/i:*filename*	Both	Specifies the name of an XML file that the program should use to determine what to migrate
/genconfig:*filename*	ScanState	Creates a Config.xml file containing all of the migratable data on the computer, but does not create the migration store
/config:*filename*	Both	Specifies the Config.xml file the program should use when creating or reading the migration store
/localonly	ScanState	Creates a migration store containing only the files on local, fixed drives
/c	Both	Causes the program to continue running, even if nonfatal errors occur
/all	Both	Migrates all user accounts on the computer
/ui:*domain\user* /ui:*computer\user*	Both	Migrates a specific user account
/ue:*domain\user* /ue:*computer\user*	Both	Excludes a specific account from migration
/uel:<*numberofdays*> /uel:<*YYYY/MM/DD*> /uel:0	Both	Migrates only the users who have logged on to the computer within a specified number of days or since a specific date or who are currently logged on to the computer

USMT also includes the following modifiable .xml files. Use these files with `ScanState` and `LoadState` if you want to perform a targeted migration:

- MigApp.xml includes rules to migrate application settings.
- MigDocs.xml includes rules to migrate user documents from the source computer.
- MigUser.xml includes rules to migrate user profiles and user data.

When you use USMT, you should use the following three-step process:

Step 1: Plan the migration.

- Determine whether to refresh or replace your system, identify what you want to migrate (application settings, operating system settings, files, and/or folders), determine where to store it (remotely, locally in a hardlink migration store, or directly on the destination computer), and determine which files will be included in the migration.
- If necessary, modify the MigApp.xml and MigDocs.xml files or create and modify a config.xml file. In general, it's best to leave the original .xml files in place and create and modify a config.xml file to keep your changes separate from the default .xml files.

Step 2: Collect the files and settings from the source computer.

- Back up the source computer and close all applications before running `ScanState`; otherwise, USMT might not be able to migrate all the data.
- Run `ScanState` to collect the files and settings using an account with administrative privileges. Specify all .xml files you want the command to use:

```
ScanState \\server\migration\mystore /config:config.xml /i:migdocs.xml
/:migapp.xml /v:13 /l:scan.log
```

- After the store is completed, run `UsmtUtils` with the `/verify` switch to ensure that the store you created was not corrupted. Replace `X` with the store location and `mystore` with the actual name of the store:

```
UsmtUtils /verify x:\mystore\store.img
```

Step 3: Prepare the destination computer and restore the files and settings.

- Install the operating system on the destination computer, install any applications that were on the source computer, and then close any open applications.
- Run the `LoadState` command on the destination computer to migrate the files and settings. Make sure you specify the same .xml files you used when you ran `ScanState` during the collection process in Step 2:

```
LoadState \\server\migration\mystore /config:config.xml /i:migdocs.xml
/i:migapp.xml /v:13 /l:load.log
```

- After completing the `LoadState` process, you must log off and then log back on the machine to see if some of the settings changed (for example, the screen saver, the fonts, the wallpaper, and so on).

Create a Custom Config.xml File and Exclude Content from the My Pictures Folder

To create a custom config.xml file and exclude content from the My Pictures folder, log on as an administrator to a computer running Windows 10 Enterprise, and then perform the following steps:

To complete this exercise, you must have USMT installed on your Windows 10 Enterprise computer.

1. On LON-CL1, press the Windows logo key+r. In the Run dialog box, in the Open text box, type **cmd**. Click OK.
2. From the search results list, right-click Command Prompt and choose Run As Administrator.
3. Change to the directory that contains the USMT tools. In a default installation, this would be found by executing the cd command as shown.
   - For 32-bit machines:

     ```
     cd "c:\Program Files\Windows Kits\10.0\Assessment and Deployment Kit\User State Migration Tool\x86"
     ```

   - For 64-bit machines:

     ```
     cd "c:\Program Files (x86)\Windows Kits\10.0\Assessment and Deployment Kit\User State Migration Tool\amd64"
     ```

4. To create a `config.xml` file, execute the following command:

   ```
   scanstate /i:migapp.xml /i:miguser.xml /genconfig:config.xml /v:13
   ```

   Log messages regarding the creation of the file will be sent to the scanstate.log file. Both the log file and the config.xml file will be created in the directory from which you ran the `ScanState` command.
5. To exclude the My Pictures folder from the migration, change migrate="yes" to **migrate="no"**. (The following code is an excerpt from the `config.xml` file created in Step 4.)

   ```
   <?xml version="1.0" encoding="UTF-8"?>
   <Configuration>
   <Documents>
   <component displayname="My Pictures" migrate="yes" ID="http://www.microsoft.com/migration/1.0/migxmlext/miguser/my pictures/data"/>
   </Documents>
   ```

6. Save the file.

This file can now be used with `ScanState` to collect information from the source computer and with `LoadState` to prepare the destination computers.

Skill Summary

In this lesson, you learned:

- Windows 10 is the newest client operating system. Unlike previous versions of Windows, Windows 10 is released as an "operating system as a service," which means that it will receive ongoing updates to its features and functionality.
- Windows 10 supports two platforms: IA-32 and X86-64. IA-32 is designed to run on systems with the 32-bit x86 processors. IA-32 can only access up to 4 GB of memory. X86-64 is designed to run on the x86-64 processors. Windows 10 can support up to 128 GB of memory, while the other desktop editions can support up to 2048 GB of memory.
- A clean installation of Windows is when you install Windows where there is no operating system, data, or programs stored on the hard drive, or you perform the installation of Windows while reformatting the current hard drive, so that you are installing Windows on an empty hard drive.
- An upgrade installation of Windows is when you have a system that is running Windows 7 or Windows 8/8.1, and you run the Windows installation program, replacing the Windows 7 or Windows 8/8.1 operating system with Windows 10. You can upgrade from Windows 7 or Windows 8/8.1 to like versions of Windows 10.
- The User State Migration Tool (USMT) is a command-line tool that migrates user data from a previous installation of Windows to a new installation of Windows. Installation methods fall into three main categories: High Touch Installation (HTI), Lite Touch Installation (LTI), and Zero Touch Installation (ZTI). HTI is mostly manual, and ZTI is almost completely automated.

Knowledge Assessment

You can find the answers to the following sections in the Appendix.

Multiple Choice

1. Which of the following Windows 10 editions allow you to join the system to a domain? (Choose all that apply.)
   - **A.** Windows 10 Home
   - **B.** Windows 10 Pro
   - **C.** Windows 10 Enterprise
   - **D.** Windows 10 Education
2. Which of the following tools can be used to download Windows 10 installation files and create a bootable USB flash drive so that it can be used to install Windows 10?
   - **A.** Windows 10 Media Creation tool
   - **B.** Setup.exe program
   - **C.** USB Create tool
   - **D.** Express tool
3. Which edition of Windows 10 requires a volume license agreement with Microsoft? (Choose all that apply.)
   - **A.** Home
   - **B.** Pro
   - **C.** Education
   - **D.** Enterprise
4. Which of the following features is not included in Windows 10 Pro?
   - **A.** Encrypting File System
   - **B.** BranchCache
   - **C.** Support for joining domains
   - **D.** BitLocker
5. Which of the following tools or features can be used to determine if a copy of Windows is genuine?
   - **A.** An antivirus program
   - **B.** Activation
   - **C.** USB/DVD Download tool
   - **D.** Device Manager

6. Which Windows 10 installation method uses System Center Configuration Manager for deployment across a network?
   - **A.** HTI
   - **B.** LTI
   - **C.** ZTI
   - **D.** Windows Anytime Upgrade

7. Which Windows 10 installation method requires some human interaction but uses Windows Deployment Services to automate most of the installation?
   - **A.** HTI
   - **B.** LTI
   - **C.** ZTI
   - **D.** Windows Anytime Upgrade

8. The upgrade installation method can be used when upgrading from Windows 7 Home Premium to which of the following? (Choose all that apply.)
   - **A.** Windows 10 Enterprise
   - **B.** Windows 10 Home
   - **C.** Windows 10 Pro
   - **D.** Windows 10 Education

9. Which of the following are common methods for determining whether your computer is running a 32-bit version of Windows 10 or a 64-bit version of Windows 10? (Choose two answers.)
   - **A.** Run Windows 7 Upgrade Advisor.
   - **B.** Open the Computer window.
   - **C.** Open the System window.
   - **D.** Run the System Information utility.

10. Which of the following describes where you might find a Windows 10 product key? (Choose all that apply.)
    - **A.** On the installation disc holder inside the Windows package
    - **B.** On a sticker on the back or bottom of your computer
    - **C.** On the installation media itself
    - **D.** In a confirmation email received after purchasing and downloading Windows 10 online

Fill in the Blank

1. A(n) _____ is the set of options you have to upgrade from one Windows operating system to another.
2. _____ is the process of verifying that your copy of Windows is genuine and that it is not in use on more computers than the number for which you own licenses.
3. A _____-bit computer is also designated as x86.
4. A(n) _____ installation replaces your current version of Windows with Windows 10 while retaining your files, settings, and programs.
5. The _____ method involves manual installation of Windows 10 from media such as a DVD or USB drive.
6. Windows 10 _____ edition is targeted mainly toward small business users.
7. Windows 10 _____ edition includes all Windows 10 features aimed at corporations and advanced users.
8. _____ is a fully automated, touchless method of installing Windows.
9. _____ is a server role for Windows Server 2008 or higher that allows for mostly automated installation of Windows 10 over a network.
10. Windows 10 is released as a(n) _____, which means that Windows 10 will receive ongoing updates to its features and functionality.

True/False

1. A custom installation must be performed in order to upgrade from Windows 7 to Windows 10.
2. A 1 GHz or faster 32-bit (x86) processor is required to run Windows 10 64-bit edition.
3. Windows 10 must be registered before it can be run.
4. The purpose of a Windows 10 product key is to help avoid illegal installations.
5. Windows 10 will always remain a free upgrade for Windows 8.1 systems.

Case Scenarios

You can find the answers to the following sections in the Appendix.

Scenario 1-1: Troubleshooting a Compatibility Problem

You need to replace an aging Windows 7 computer with a new computer that runs Windows 10, ensuring the programs, settings, and data files are transferred to the new computer. Describe your recommended solution.

Scenario 1-2: Converting a Small Office to Windows 10

Danielle provides IT support for Swish It Away, a small cleaning service in the Pacific Northwest. The company has eight computers. Four of the computers run Windows 8.1 Pro and the other four computers run Windows 7 Pro. The company president has asked her to make sure all eight computers are running Windows 10 Pro by the beginning of the next quarter. What type of installations must Danielle perform, and what additional steps (if any) must Danielle take to retain the users' files and settings?

Scenario 1-3: Selecting the Right Computer and Operating System

Swish It Away is beginning to grow. The president now wants Danielle to acquire computers for three new staff members. Randi has been hired as the president's personal assistant and will need to run a word processor, spreadsheet application, a web browser, and an email client. Pooja will provide marketing and graphics services, such as press releases, brochures, flyers, advertisements, and graphics for the new website. Stan is the new salesperson who will travel locally each day. When he's in the office, he will share a desktop computer with another salesperson, but Stan needs to be able to check email and access the Internet while he's out of the office. Which computer specifications should be recommended, and which editions of Windows 10 should run on each computer?

Scenario 1-4: Installing Windows 10

You are an administrator of an organization that has 150 client computers. 60 systems are running Windows 7 Enterprise, 60 systems are running Windows 7 Pro, and 30 systems are running Windows 8.1 Pro. You also need to purchase 25 more systems, which will run Windows 10. Which edition and version of Windows 10 should be recommended? Describe how to deploy Windows 10.