Lesson 1: Installing and Upgrading Client Systems

# Learning Objectives

Students will learn to:

* Understand Windows systems
* Understand installation types

# Objective Domain Skills

* Identify Windows operating system editions 2.1
* Understand operating system architecture 2.4
* Identify upgrade paths 2.2
* Understand installation types 2.3

# Lesson Summary — Lecture Notes

Begin this lesson by introducing yourself and the course.

Lesson 1 focuses on understanding Windows systems and installation types. Therefore, start by explaining 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 10 is the newest client operating system. 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.

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.

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.

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.

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.

The system requirements for Windows 10 include the following:

* Processor: 1 gigahertz (GHz) or faster processor.
* RAM: 1 gigabyte (GB) for 32-bit or 2 GB for 64-bit
* Hard disk space: 16 GB for 32-bit OS or 20 GB for 64-bit OS
* Graphics card: DirectX 9 or later with WDDM 1.0 driver
* Display: 800 × 600

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.

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)

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.

TAKE NOTE: In the OneNote portion of this course, we include a blank space between the backward slashes that indicate the beginning of a network path (\\) and a server address (such as server\share\folder), to prevent them from becoming live links. In actual usage, there would be no space after the slashes.

# Key Terms

**32-bit computer** – A system with a 32-bit central processing unit (CPU). A 32-bit computer can address up to 4 gigabytes (GB) of random access memory (RAM). A 32-bit computer is also designated as x86.

**64-bit computer** – A system with a 64-bit CPU. The amount of RAM a 64-bit computer can address is limited by the computer’s motherboard, but is generally from 8 to 192 GB. A 64-bit computer is also designated as x64.

**activation** - The process of verifying that a copy of Windows is genuine and that it is not in use on other computers other than the number for which the user owns a license.

**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.

**clean installation** – A Windows installation in which no operating system, data, or programs are stored on the hard drive, or in which you perform the installation of Windows while reformatting the current hard drive, so that you are installing Windows on an empty hard drive.

**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.

**cloud** – From a computing perspective, the internet or a server accessible over the internet.

**command-line interface (CLI)** – An interface in which the user performs functions by using a keyboard to enter commands.

**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.

**desktop PC –** The traditional PC that usually consists of a case of system components that may be oriented horizontally or vertically.

**device driver** – A software element that allows a device to communicate with the operating system running on the computer. The device driver provides the operating system with information about a specific device.

**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.

**graphical user interface (GUI)** – An interface in which the user performs functions by clicking and moving buttons, icons, and menus with a pointing device, such as a mouse or track pad.

**Group Policy management** – An infrastructure that allows you to centrally manage computer settings and configuration.

**hardware interrupt request (IRQ)** – A driver communicates with the device through the computer bus or communications subsystem. A hardware interrupt (IRQ) is used by devices that require attention from the operating system.

**High Touch Installation (HTI)** – A method of installation that might include retail media or a standard image (ISO file).

**hybrid computer** – A laptop that can convert to a tablet.

**joining to a domain** – A feature that allows you to join an Active Directory domain.

**kernel mode** – The processor mode that has complete and unrestricted access to the underlying hardware.

**laptop** – A portable computer that provides mobility for traveling users or users who might work from home.

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

**LoadState.exe** – A command that loads the files and settings onto the destination computer.

**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.

**ScanState.exe** – A command that scans the source computer, collects the files and settings, and creates a store that contains the user’s files and settings.

**smartphone** – A cellular phone with a screen that displays information. These devices can be used to read email, keep track of tasks, access calendar information, manage address books, run a wide range of applications, and make and receive phone calls over a cellular network.

**tablet** – A smaller version of the laptop, with a screen that makes up the body of the computer.

**text user interface (TUI)** – An interface in which the user performs functions by using a keyboard to type commands.

**upgrade installation** – An installationof Windows in which 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.

**User Experience control and lockdown** – A feature that allows you to customize and lock down the Windows 10 user interface.

**user interface (UI)** – 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.

**user mode** – The processor mode that does not have direct access to the hardware or reference memory.

**User State Migration Tool (USMT)** – A command-line tool that migrates user data from a previous installation of Windows to a new installation of Windows.

**UsmtUtils.exe** – A command that deletes hardlink folders in use by applications no longer removable through normal measures, checks the store file’s consistency, and restores selected files.

**virtual desktop** – A feature that allows you to run and switch between multiple desktops.

**Windows 10** – The newest client operating system. 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.

**Windows 10 Education** – The Windows edition designed for personal computers and tablets for use in schools (including staff, administrators, teachers, and students).

**Windows 10 Enterprise** – The Windows edition designed for personal computers and tablets for large enterprises.

**Windows 10 Home** – The Windows edition designed for consumer-based personal computers and tablets.

**Windows 10 Media Creation tool** – A tool 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.

**Windows 10 Pro** – The Windows edition designed for personal computers and tablets for small and medium-sized businesses, and for advanced users.

**Windows Deployment Services** – A server role for Windows Server 2008 or higher.

**Windows Hello** – A credential technology that provides multi-factor authentication, including the recognition of a personal identification number (PIN) or biometrics (face, iris, or fingerprint recognition).

**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.

**x64** – See 64-bit computer.

**x86** – See 32-bit computer.

**Zero Touch Installation (ZTI)** – 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.

# Knowledge Assessment

## Multiple Choice

**Select the correct answer(s) for each of the following questions.**

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

**Complete the following sentences by writing the correct word or words in the blanks provided.**

1. A(n) upgrade path is the set of options you have to upgrade from one Windows operating system to another.

2. Activation 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 32-bit computer is also designated as x86.

4. An upgrade installation replaces your current version of Windows with Windows 10 while retaining your files, settings, and programs.

5. The High Touch Installation (HTI) method involves manual installation of Windows 10 from media such as a DVD or USB drive.

6. Windows 10 Pro edition is targeted mainly toward small business users.

7. Windows 10 Enterprise edition includes all Windows 10 features aimed at corporations and advanced users.

8. Zero Touch Installation (ZTI) is a fully automated, touchless method of installing Windows.

9. Windows Deployment Services 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 an operating system as a service, which means that Windows 10 will receive ongoing updates to its features and functionality.

## True / False

**Circle T if the statement is true or F if the statement is false.**

**T F 1.** A custom installation must be performed in order to upgrade from Windows 7 to Windows 10.

**T F** 2.A 1 GHz or faster 32-bit (x86) processor is required to run Windows 10 64-bit edition.

**T F** 3. Windows 10 must be registered before it can be run.

**T F** 4.The purpose of a Windows 10 product key is to help avoid illegal installations.

**T F** 5.Windows 10 will always remain a free upgrade for Windows 8.1 systems.

# Business Case Scenarios

## 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.

Install the new computer with Windows 10. You will also have to install all the user’s programs on the new machine. You can then use USMT to transfer the files and settings from the Windows 7 machine to Windows 10. User State Migration Tool (USMT) requires that you run ScanState to gather the settings and data files and LoadState to copy the settings and data files to the new system.

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

Danielle provides IT support for 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?

Danielle should back up files and settings on all computers. She can then perform in-place upgrade installations to Windows 10 Pro on the computers running Windows 7 and 8.1.

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

The cleaning service 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 web site. 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?

Randi can run a word processor, spreadsheet application, a web browser, and an email client on a computer with a 2 GHz processor, 4 GB of RAM, and at least a 250 GB hard drive. The computer should run Windows 10 Pro. Pooja’s graphics programs may require at least 8 GB of RAM and 500 GB or more of hard disk space, and should run Windows 10 Pro. Danielle should acquire a tablet for Stan. The network would run Windows 10 Pro.

## 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.

The organization will need a total of 175 Windows 10 licenses. The computers can be upgraded to the same edition. Therefore, Windows 7 Pro and Windows 8.1 Pro can be upgraded to Windows 10 Pro. The 32-bit machines can be upgraded to the 32-bit versions of Windows 10 and the 64-bit machines can be upgraded to 64-bit versions of Windows 10.

To deploy Windows, you can use the Windows 10 Media Creation tool to create multiple 32-bit and 64-bit installations of Windows 10 on USB devices. You can then go from system to system to deploy Windows. If you have more experience with Windows servers, you could configure a Windows Deployment Server (WDS).