Chapter 3
The Visible Computer

Lab Exercises

Every competent tech knows the PC inside and out. Nothing destroys your credibility in the eyes of a client as quickly as not knowing the basics, like the difference between a graceful shutdown and a forced power down. The word "Oops!" doesn't go over well in the real world! In this chapter, you'll be poking and prodding a real PC. You'll begin by exploring the functions of a PC: input, processing, output, and storage. Then you'll examine the typical user-accessible components—for example, what happens when you press the power button? The next lab takes you on a tour of common connectors. The chapter wraps up with four labs that demonstrate the basics of Windows 7, Windows 8.1, and Mac OS X, and review the basics of Windows file management and Control Panel operation.

30 MINUTES

Lab Exercise 3.01: Exploring the Functions and Components of a PC

Everything a computing device does falls into one of five categories: input, processing, output, storage, and network connection. To troubleshoot PC problems successfully, you need a good understanding of these five processes and the components that are involved with each one.

Learning Objectives

In this lab exercise, you will familiarize yourself with the basic functions of a computer.

At the end of this lab, you'll be able to

- Define the four functions of computing devices
- Detail common components involved in each of these four functions

Lab Materials and Setup

The materials you need for this lab are

- A notepad and pencil, to create a five-column table
- Optional: Access to a working computer with a word processing or spreadsheet application installed to aid in creating the table
- The *Mike Meyers' CompTIA A+ Guide to Managing and Troubleshooting PCs* textbook, for reference

✔ Hint

Get used to taking notes and drawing pictures. Even after many years of repairing computers, from mainframes to tablets, I still use a notepad to keep track of what I see and what I change. I recommend that you save your drawings and notes, as you'll find them useful in subsequent labs.

Getting Down to Business

In this exercise, you'll review, list, and define the various components involved in the PC's vital functions.

Step 1 Reread the "The Computing Process" section in Chapter 3 of *Mike Meyers' CompTIA A+ Guide to Managing and Troubleshooting PCs*, paying particular attention to the five stages described in the "Stages" section.

Step 2 For each of the following functions, write a definition and give a brief example:

Input:

_____

_____

Processing:

_____

_____

Output:

_____

_____

Storage:

_____

_____

Network connection:

_____

_____

Step 3 Using the following table, list the components that operate in each of the five functional categories. Try to include as many components as you can; you might take a peek at some of the later chapters in the textbook to see if you can add any other components. Think about how each of the components contributes to the overall workings of the PC, and include as much detail about the component as possible.

Input	Processing	Output	Storage	Network Connection

Step 4 If you completed the table right here in the lab book, you can review it later while finishing the rest of the lessons. If you made a table in your notebook or created an electronic version, make sure you keep it nearby. As you work on later chapters, you'll want to update the table with additional components and extra details. The information in the table (and in your head) will expand as you develop a better understanding of how the components relate to the PC's "big picture."

30 MINUTES

Lab Exercise 3.02: Examining User-Accessible Components

It's been one of those days. You walked into what should have been a simple job interview only to meet a very frantic IT manager dealing with a crisis of epic proportions. She doesn't even bother to interview you. Instead, she shuttles you out of her office, points down the hall, and says, "Go check Jane's PC—fourth cubicle on the left. Her PC's locked up and rebooting itself! I told her to turn it off until you get there. Don't change anything,

and don't open it up. Find out if it will shut down, boot properly, and access the drives." Then the IT manager leaves to deal with her crisis, and you're on the spot.

This exercise looks at the many PC components that you can access without removing the case. Scanning the outside of the PC can help you track down any basic issues. Take your time, and jot down notes when you feel the need. Practice each step until you're confident you can do it on the job as a PC tech.

Learning Objectives

In this lab exercise, you will locate and describe the various user controls and built-in user-accessible devices of a PC system. You *will not* be opening the system case during this lab.

At the end of this lab, you'll be able to

- Recognize and manipulate user controls
- Describe the use of built-in user-accessible devices

Lab Materials and Setup

The materials you need for this lab are

- One fully functioning desktop computer system unit, with monitor
- A working *optical drive* (any drive that reads or records CD, DVD, or Blu-ray Discs)
- One readable data CD with files
- One keyboard
- One mouse or other pointing device
- A paper clip

Getting Down to Business

As a technician, you need to know how everything works on a PC. Let's start with the externally accessible functions. Make sure the computer is turned off.

Step 1 Before you can do much work with a PC, you need a functioning output device, such as a monitor. Check the monitor to see if it has power. If the monitor is not on, find the power button on the monitor and press it. You'll notice a small *light-emitting diode* (*LED*) on or near the monitor's power button. Record the color of the LED when the PC is turned off.

Color of the LED when the system is off: _____

Later in this exercise, we'll check the color of the LED when the PC is turned on. Stay tuned!

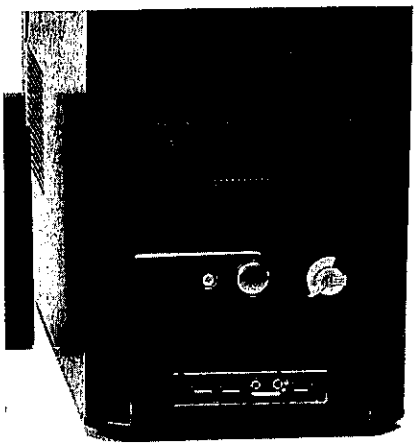


FIGURE 3-1 Recognizing the power button on the front of a PC

Step 2 Look at the front of your system unit. Locate the power button. Compare your button to the one shown in Figure 3-1.

Once you have located the power button on your system, make a note of its appearance. Is it in plain sight, or hidden behind a door or lid? Is it round, square, or some odd shape? Pressing the power button to start a PC when the electricity is off is known as a *cold boot* or sometimes a *hard boot.* Some systems (mostly older ones) also have a reset button, which you can use to restart a PC that is already on. This is also called a *warm boot.*

→ Note

Most PC manufacturers have stopped putting hardware reset buttons on PCs because they don't want to encourage that kind of reset anymore. It was fine to reset with a hardware button back in the days of MS-DOS, but in modern operating systems, such abrupt and unceremonious dumping of memory content can cause problems. Unsaved files may be open, both in applications and in the operating system itself. An abrupt restart that doesn't involve closing them in an orderly way can lead to file errors. It's better to use the Restart command in the operating system.

Describe your power button here (and reset button if you have one):

_____

_____

Sometimes software will lock up your system, in which case the only way to shut the system down is to force a *power down.* This requires that you press and hold the power button for four to six seconds.

Notice the LEDs on the front panel near the power button. The one nearest the power button (usually green) indicates that the PC is powered on, and it stays on all the time while the PC is running. The other LED (usually red) flashes when the hard disk reads or writes. You may also see additional LEDs on specific components, such as on the optical disc drive.

✔ **Hint**

Some systems have two power controls: a power switch located on the back of the case that controls the flow of electricity to the power supply, and a power button on the front that boots and shuts down the PC.

Step 3 Locate the external face of your system's optical drive. It fits comfortably inside an available 5¼-inch slot (or drive bay). How many 5¼-inch drive bays does your PC have? Count both the slots that have components in them, like the optical drive, and the empty slots with blank faceplates. Are there any 3.5-inch external bays? These would be used for floppy drives, although most systems don't have floppy drives anymore.

Number of drive bays: _____

You'll see the front edge of the tray that opens to accept an optical disc. Once you've located this drive, notice that it also has a button in one corner. When the system is on, you can press that button to open or close the tray (see Figure 3-2).

Don't be tempted to force the disc tray to close by pushing it in. Always press the button on the front of the drive to close the tray or to eject a disc. Forcing the tray to close can cause the gears inside to become misaligned, so that the tray no longer closes properly.

Your system may have other devices installed, such as a floppy disk drive, a Blu-ray drive, or a memory card slot. Each of these uses removable media; take care when inserting or removing the media. There may also be devices connected to USB ports, such as USB flash drives and external hard drives.

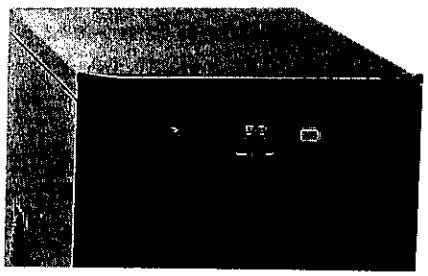


FIGURE 3-2 An optical drive has a tray to hold optical discs.

Step 4 Now it's time to prepare your system for the scenario outlined in the opening text.

Earlier, this exercise referred to the monitor power LED (light), as well as to the two LEDs near the power button. Now, let's watch them in action. Turn on your PC.

a. Color of monitor LED: _____

b. What is the status of the LED closest to the power button? Is it steady, flashing, or intermittent? What color is it?

_____

c. What is the color and status of the other LED near the power button? Is it steady, flashing, or intermittent?

_____

d. Press the eject button on the front of the optical drive. When the tray opens, carefully insert a disc. Press the eject button again to close the tray. If you haven't done this a lot, practice inserting and removing a disc until you feel comfortable with the process. When the optical drive closes, what is the status of its LED? Is it steady, flashing, or intermittent?

_____

✖ Warning

Don't start any applications yet! Close any open applications or open windows before performing Step 5. You're going to force a "power down," and you do not want to corrupt any files.

Step 5 Now you're going to simulate a PC that has become nonresponsive and "locked up." Perform a forced power down as follows:

a. Press *and hold* the power button.

b. While continuing to hold the power button in, count out loud (one–one thousand, two–one thousand, three–one thousand...) until the system powers down and the screen goes blank.

According to your count, how many seconds did it take for the screen to go blank?

_____

✖ Warning

It is possible to configure Windows power management settings so that pressing the power button "normally" (that is, not holding it down) does something other than shutting down. For example, it might put it into Sleep or Hibernate mode. That's only for a regular push-and-release of the power button, though, not for this extended hold-down you're doing here. If you release the power button too soon in Step 5b, you might accidentally trigger whatever action is assigned by the OS to the power button. If that happens, just restart the computer and try again.

Step 6 After the system has been powered down for approximately one minute, do the following:

a. Press the power button and allow the system to boot.

b. Sign in normally, so that you are viewing the operating system desktop.

c. Open the file management utility (such as File Explorer or Windows Explorer on a Windows PC, or Finder in Mac OS X), navigate to a list of drives on the local PC, and double-click the icon that represents the optical drive. This should enable you to view the contents of the disc that was inserted prior to the forced power down.

List some of the contents of the disc:

_____

_____

_____

d. Shut down the PC using the Shut Down command in the operating system. In Windows Vista or 7, select Start | Shut Down. In Windows 8/8.1, click the Power icon on the Start screen and then click Shut Down. In Windows 10, select Start | Power | Shut Down. This performs a graceful shutdown of the system.

✔ Hint

If all the actions in Step 6 were successful, the system likely is stable and you can report to the IT manager that Jane's machine is back up and running. If any of the actions failed, you should issue the Restart command. (It's on the same menu as the Shut Down command in Step 6d.) After the system reboots, complete Steps 6b, 6c, and 6d once more. Sometimes, the forced power down leaves some of the files in a state of flux; restarting properly closes all open files before powering down. This should clear everything up and enable the computer to function properly.

Step 7 While the computer is turned off, take a paper clip and straighten it out, giving yourself a small handle to hold. Find the small hole on the front of your optical drive and insert the end of your paper clip. What happens?

30 MINUTES

Lab Exercise 3.03: Recognizing External Connections

When you walk into a client's office, the first thing you might do is a quick visual assessment. What kind of computer is there, and what connections are possible? What kinds of external monitor connections can you hook up? What types of peripherals? An experienced technician should be able to take a port inventory at a glance.

Learning Objectives

In this lab exercise, you will identify, describe, and explain the functions of the external connections on a standard PC.

At the end of this lab, you will be able to

- Identify the external connectors on a PC and the related cables
- Explain the function of each external connection

Lab Materials and Setup

The materials you need for this lab are

- At least one fully functioning PC that's less than two years old (two or more systems is ideal, with one older than and one newer than two years old)

Cross-Reference

Before you begin this lab, read the section "Computing Hardware" in Chapter 3 of *Mike Meyers' CompTIA A+ Guide to Managing and Troubleshooting PCs.*

Getting Down to Business

Now it's time to learn about all the external things that can be attached to a PC. This lab exercise steps you through identifying and understanding the functions of the various connectors.

✖ Warning

***Shut off the power* to your system and *unplug your PC* from the wall socket before you start the following exercise.**

Step 1 Look at all those wires coming from the back of your PC! There's a power cable, a network cable, a keyboard cable, a mouse cable, and maybe a few others, depending on your system. A decade ago, each type of device used a different kind of connector, by and large. The printer used a parallel (LPT) port, the keyboard and mouse used PS/2 connectors, the monitor used a VGA connector, your digital musical keyboard used the MIDI port, and so on. Nowadays, however, many different device types have gone to the general-purpose USB interface. The keyboard, mouse, and printer that you use today are probably all USB, as are any special-purpose devices like musical devices or webcams. Monitors remain the exception because they require such high data transfer rates; a modern monitor is likely to connect via DVI.

Step 2 Unplug each of your PC's cables one at a time and practice plugging them back in until you get a feel for how each fits. You should not have to force any of the cables, though they may be firm. How is each cable held in place and prevented from coming loose? Is there a screw, clip, or some other fastener that holds the cable connector tight to the system? Is the connector keyed? What does it connect to? What is the shape of the connector on each end? Is it round, rectangular, D-shaped? How many pins or holes does it have? How many rows of pins or holes?

✖ Warning

There are four different USB port standards that you may encounter on computing devices. The higher the standard number, the higher the maximum data throughput rate. Ports and connectors are color-coded: white is USB 1.1, black is USB 2.0, blue is USB 3.0, and teal is USB 3.1. There is basic backward compatibility, but if you connect a device that wants faster data throughput to a slower port, it won't perform to its top potential. As you disconnect and connect USB cables in Step 2, pay attention to the color of the port and the color of the little rectangular tab in the end of the connector that plugs into the port. USB port standards are covered in more detail in Chapter 11 of *Mike Meyers' CompTIA A+ Guide to Managing and Troubleshooting PCs.*

Step 3 Is it possible to plug any cable into the wrong connector? If so, which one(s)? What do you think would happen if you plugged something into the wrong connector?

_____

_____

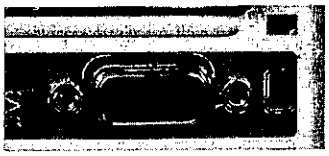


FIGURE 3-3 A VGA connector is an example of a D-sub connector; this one is female because it has holes.

Step 4 Disconnect the cables listed in the following table from the back of your PC and record some information about each in the columns provided. Keep in mind that the table was created for average PCs. Three additional blank spaces are provided for any custom devices in your system. If you don't have a particular connector, don't feel bad. Just write "N/A."

Note that the table has two columns that refer to gender. A cable's *gender* refers to whether it has pins or holes in it. It is mostly an issue with D-sub connectors (that is, connectors with a D-shaped ring around the outside and rows of either pins or holes in it). Figure 3-3 shows a VGA connector. It is a 15-pin connector, and it has holes, so it's female. Such a connector would be called a DB15F (DB because it's D-sub, 15 because there are 15 pins/holes, and F because it's male).

Old-style parallel and serial cables were like that, as well as VGA monitor cables, but new systems may not have them.

	Number of Conductors/Pins	Cable Gender	Name of the Port	Port Gender	Port Color
Mouse					
Keyboard					
Monitor					
Printer					
Network					
Speaker					
Power					

Once you complete this table, know it, live it, and love it. Every great technician should be able to identify these connectors at a glance.

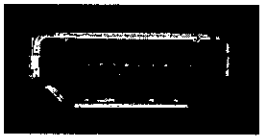
Step 5 If you're working with someone else, play "Flash Cords." Have your partner hold up various cables, and try to guess what they connect to by looking at the connectors on the ends. Then switch roles and quiz your partner. Another really good way to learn the connector names is to have your partner sit behind the computer, while you reach around from the front, feel the various ports with your fingers, and call them out by name. Switch back and forth with each other until you both can easily identify all the ports by touch.

Step 6 Properly reconnect all the cables that you removed and prepare to turn on the system. If you have an On/Off button on the back of the system, be sure it is set to the On position. Make sure the monitor is turned on as well.

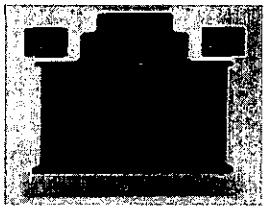
Step 7 Identify the connectors pictured next. What is the name of each connector and what does it connect to?

A. _____

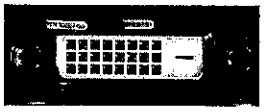
B. _____



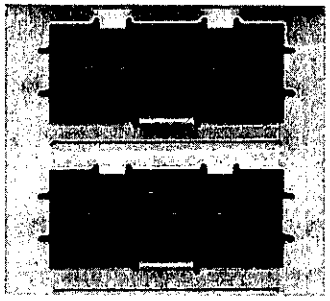
C. _____



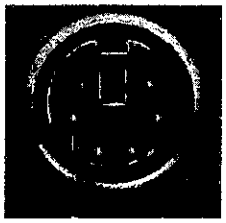
D. _____



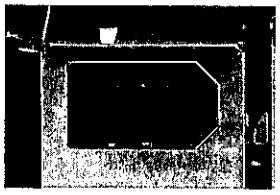
E. _____



F. _____



G. _____



H. _____

I. _____

Use the following list of connector names to correctly identify the ports. You will not use every name listed.

PS/2	HDMI	USB	Serial	FireWire	eSATA
RJ-45	RJ-11	1/8-inch audio	DVI	VGA	S/PDIF

30 MINUTES

Lab Exercise 3.04: The Windows 7 Interface

Windows 7 debuted in 2009. It has held up well, and is still considered a very solid operating system. Many people still use it, so you will likely run into it in tech support calls. Windows 7 features the classic desktop environment featured in previous Windows versions, including a Start menu for running programs, Windows Explorer for managing files, and Control Panel for adjusting settings.

This lab exercise is designed for students with limited or no experience with Windows 7. It provides a basic tour of the interface, including the Desktop, Aero, running an application, browsing the file system, and using a command-line interface.

Learning Objectives

The main objective of this exercise is to familiarize you with the interface of Windows 7.

At the end of this lab, you'll be able to

- Identify the components of the Windows 7 desktop interface
- Run an application in Windows 7
- Browse the file system in Windows 7
- Open a command prompt window and run a command

Lab Materials and Setup

The materials you need for this lab are

- A fully functioning PC with Windows 7 installed

Getting Down to Business

In this lab you'll fire up Windows 7 and perform a few basic tasks. Along the way you'll learn the correct terminology for various elements of Windows; this terminology will be important in later chapters' lab exercises, when you'll work in greater detail with these elements.

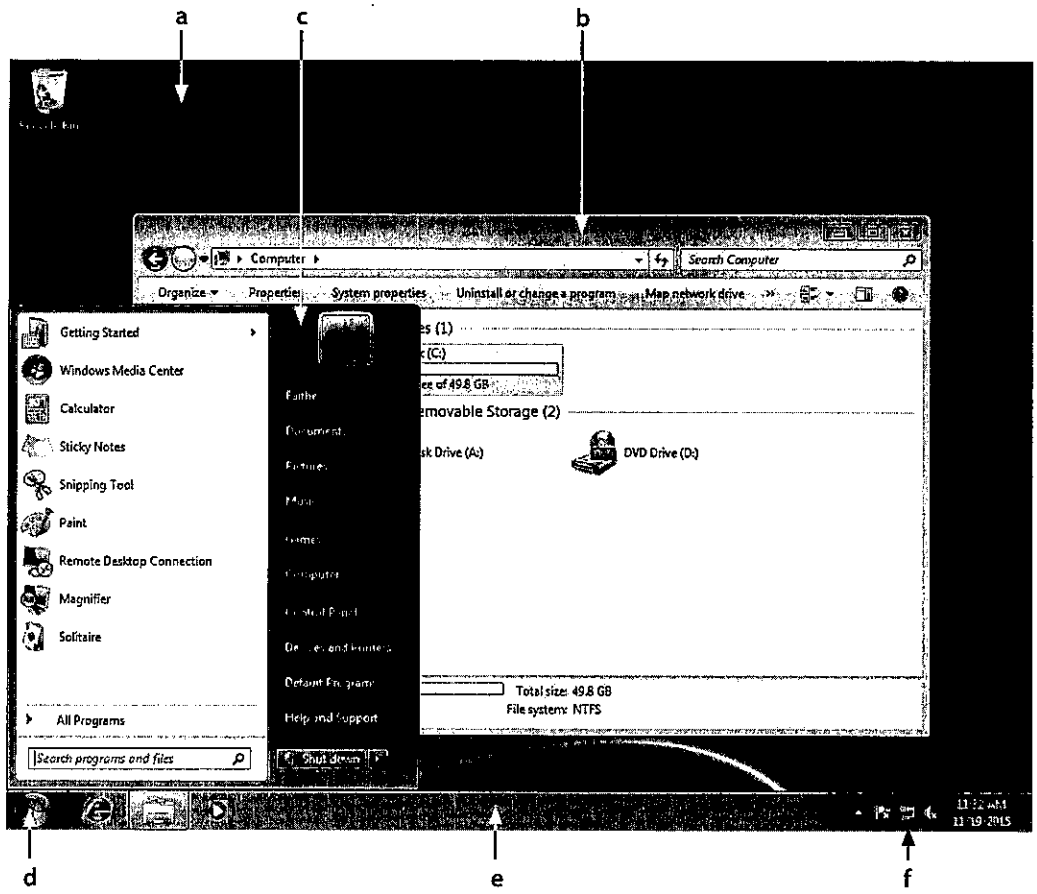


FIGURE 3-4 Label as many of the components of this Windows 7 desktop as you can.

Step 1 Label the components in Figure 3-4 using correct Microsoft terminology. If you don't know the name of one, leave it blank for now. You can come back here and complete your answers later if needed.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

Step 2 Start up the Windows 7 PC, and sign in if prompted to do so. Then click the Start button to open the Start menu. (To close it again after completing this step, press ESC, click it again, or click away from it.)

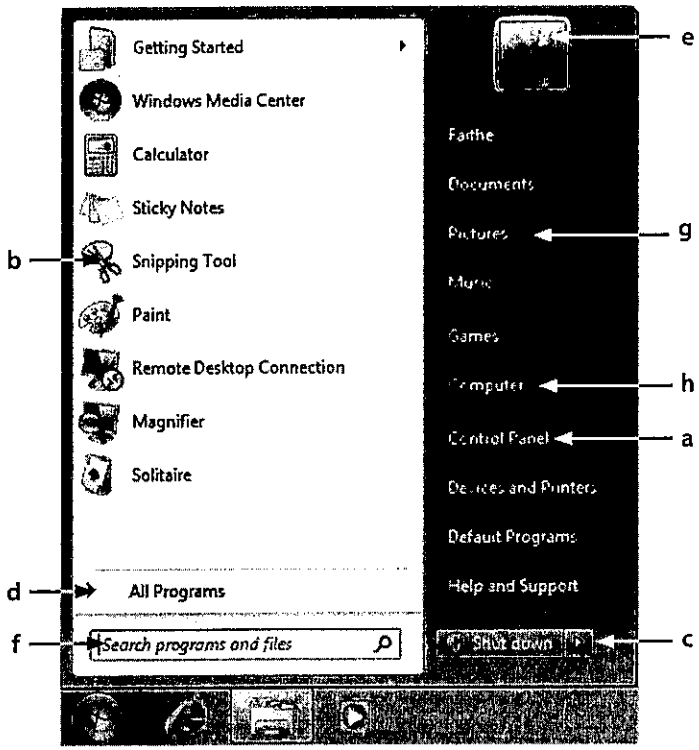


FIGURE 3-5 Key components of the Start menu

Figure 3-5 points out some of the key components of the Start menu. In the following table, draw lines to match each of the labeled components with its corresponding definition. If you don't know what one of the components does, experiment with it to find out.

Component		Description
A.		Click here to make changes to the user account for the signed-in user
B.		Click here to browse the local storage system
C.		Click here to access one of the personal file libraries for the signed-in user
D.		Click here to see a list of installed applications
E.		Click here to find an application or file
F.		Click here to open a menu from which you can choose to restart the computer or sign out
G.		Click here to change system settings
H.		Shortcut to a frequently or recently used application

Step 3 In the following steps you will open several applications, switch among them, and then close them in various ways.

a. Click Start | All Programs | Accessories | Notepad.

b. Click Start | All Programs | Accessories | Paint.

c. Click the Internet Explorer shortcut icon on the taskbar.

Now you have three applications open, each in its own window.

d. Click each application's button on the taskbar to switch to that window in turn.

e. Hold down the ALT key and tap the TAB key. Each time you tap TAB, a different thumbnail image is selected. When the thumbnail for the desired application window is selected, release the ALT key to switch to that window.

f. Right-click the Notepad icon on the taskbar and choose Close window.

g. Click the Close (×) button in the upper-right corner of the Internet Explorer window to close it.

h. In the Paint window, click the File tab (the dark-blue tab near the upper-left corner) and click Exit on the menu that appears.

Step 4 The Aero interface is responsible for the semi-transparent, glass-like look of window frames in Windows 7, as well as some of the handy tricks and animations the taskbar does. If your display adapter doesn't support Aero, it can't be enabled. Because Aero consumes some system resources, people with less powerful computers sometimes turn it off for faster graphics performance.

Follow these steps to enable Aero (if possible):

a. Right-click the Desktop and choose Personalize.

b. Under the Aero Themes heading, click Windows 7 (or one of the other themes under that heading if you prefer). If your display adapter supports Aero, Aero features are enabled.

c. Close the Control Panel window.

➔ NOTE

To turn off Aero, select one of the themes that is *not* under the Aero Themes heading, such as Windows Basic.

Next, do an experiment with an Aero feature:

d. Open Internet Explorer.

e. Click New Tab in Internet Explorer so you have two Web pages open at once.

f. Click the Minimize button in the upper-right corner of the Internet Explorer window to minimize the application window.

g. Point the mouse pointer at the minimized Internet Explorer button on the taskbar. Thumbnail images of each of the two tabs appear; you could click one of these to open the window and switch to that tab. This feature is called Aero Peek. If Aero isn't enabled, instead of these thumbnails you see a text list of the open tabs.

h. Close the Internet Explorer window.

Step 5 Windows 7's file manager is called *Windows Explorer*. You use it to browse files and folders on your local system and also on any network drives you might have access to. In Lab Exercise 3.06, "Managing Files and Folders in Windows," you'll review some basic file management techniques in Windows 8.1, which uses a similar utility called File Explorer. There are some minor differences between them, but they are basically the same application.

Follow these steps to open Windows Explorer and browse a few locations:

a. Click the Windows Explorer icon on the taskbar. The Libraries list opens. These are the personal folders for the logged-in user.

b. In the navigation bar on the left, click Computer. A list of the local drives appears.

c. Click Network. A list of any available network shared locations appears.

d. Click the Back arrow in the upper-left corner of the Windows Explorer window to return to Computer.

e. Close the Windows Explorer window.

Step 6 You'll use the command prompt in a lot more detail in Chapter 16's lab exercises, but for now you should at least be able to open and close that interface.

a. Click the Start button.

b. Type **cmd** and press ENTER. A command prompt window opens.

c. Type **dir** and press ENTER. A listing of the current folder's contents appears.

d. Type **exit** and press ENTER. The window closes. You could also close the window by clicking its Close (x) button.

30 MINUTES

Lab Exercise 3.05: The Windows 8.1 Interface

Windows 8.1 is nobody's favorite OS. Microsoft intended it to be a hybrid of a desktop and tablet OS, suitable for both platforms, but ended up creating something that doesn't serve either platform very well. It's full of quirks and oddities, and people upgrading to it from Windows 7 or earlier versions generally find it confusing

and frustrating. Since Microsoft announced in 2015 free upgrades to Windows 10 for anyone running a legal copy of Windows 7 or 8/8.1, you probably won't run into many people using Windows 8.1 in the field.

Nevertheless, Windows 8.1 is fully covered in the current CompTIA A+ 220-902 exam, so you'll need to be familiar with it. This lab exercise showcases the ways in which Windows 8.1 differs from Windows 7, and points out some of the less-obvious navigation and customization techniques that you may see on the exam. We'll also be using Windows 8.1 for several upcoming lab exercises.

Learning Objectives

The main objective of this exercise is to familiarize you with the interface of Windows 8.1.

At the end of this lab, you'll be able to

- Identify key components of the Windows 8.1 interface
- Run applications in Windows 8.1
- Manage pinned items on the Start screen
- Download new applications from the Windows Store app

Lab Materials and Setup

The materials you need for this lab are

- A fully functioning PC with Windows 8.1 installed

Getting Down to Business

In this lab you'll check out the Windows 8.1 Desktop and Start screen, its two main interfaces. You'll compare Modern (Metro) apps and Desktop apps, and learn how to start, exit, and switch among Modern apps. Finally, you'll learn how to customize the Start screen and how to install more apps from the Windows Store.

Step 1 Let's start at the front door of Windows 8.1: the sign-in screen. When you start Windows 8.1, you see a graphic with the current date and time. That's called the Welcome screen.

a. Press any key or swipe upward to clear the Welcome screen and display a sign-in prompt.

b. Type or select your user name, type your password, and press ENTER to sign in.

c. The Desktop appears by default in Windows 8.1. If you see the Start screen instead, press the ESC key to clear it.

Here's a major change from earlier Windows versions: You can sign into Windows 8.1 with either a Microsoft account or a Local account. A *Microsoft account* is tied to an e-mail address that has been registered with Microsoft; using a Microsoft account gives you access to online capabilities such as OneDrive (your free online storage cloud space). A *Local account* exists only on that one PC, and isn't associated with anything online. In Chapter 14 you'll practice creating and managing accounts, including changing the account type.

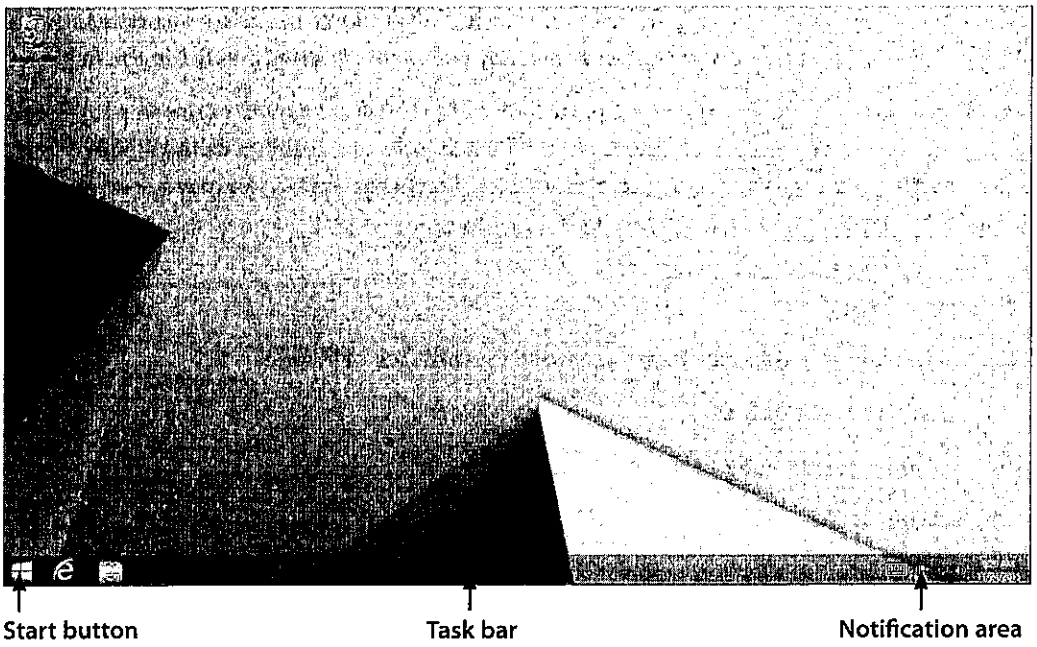


FIGURE 3-6 The Desktop in Windows 8.1

Step 2 Next, you'll learn how to start and exit both Desktop and Modern apps in Windows 8.1, and how to view multiple Modern apps at once in a split screen.

When you boot into Windows 8.1, the Desktop appears by default (see Figure 3-6). It looks a lot like the Windows 7 Desktop (shown previously in Figure 3-4.)

The main difference is that the Start button in Windows 8.1 doesn't open a Start menu (as shown for Windows 7 in Figure 3-5); instead it opens full-screen affair called the Start screen, shown in Figure 3-7.

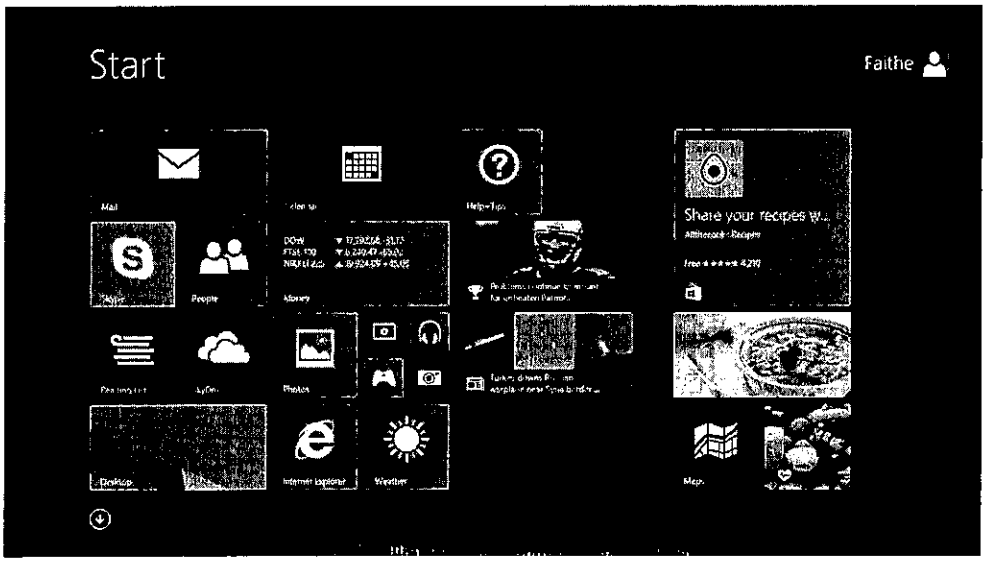


FIGURE 3-7 The Start screen in Windows 8.1

Follow these steps to experiment with the Windows 8.1 environment.

a. Press the WINDOWS key. The Start screen appears. Then press ESC to clear it.

b. Press the WINDOWS key again, and then click the Desktop tile on the Start screen to return to the Desktop.

c. Click the File Explorer shortcut that's pinned to the taskbar. File Explorer opens. This is the equivalent of Windows Explorer in Windows 7 (covered in Lab Exercise 3.04).

d. Press the WINDOWS key to open the Start screen, and then click the down arrow button at the bottom of the screen to open the Apps screen. This screen shows all the installed applications, of both kinds (Desktop and Modern).

e. Scroll to the right (use the scroll bar at the bottom) to locate Notepad, and click it to open Notepad.

f. Click the Close (×) button on the Notepad window to close it.

g. Click the Start button to reopen the Start menu.

h. Click Photo. The Photos app opens.

i. Position the mouse pointer at the top edge of the screen, so that the pointer turns into a hand icon.

j. Holding down the left mouse button, drag downward until the Photos app turns into a smaller image of itself; then drag to the left slightly until a divider appears in the middle of the screen. Release the mouse button to drop the Photos app into the left side.

k. Press the WINDOWS key to return to the Start screen, and click the Weather app. It opens side by side with the Photos app. See Figure 3-8.

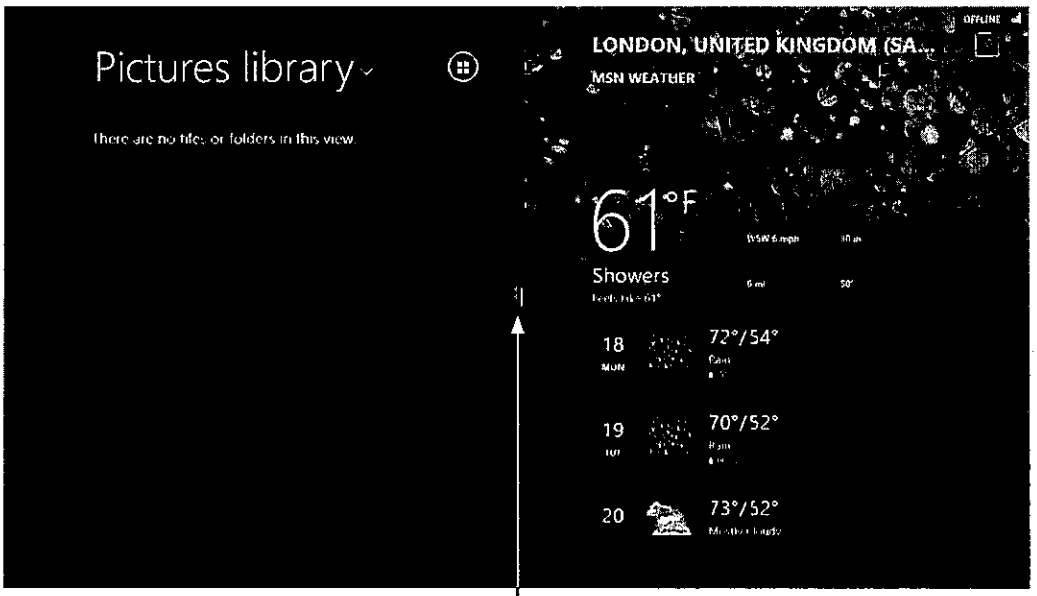


FIGURE 3-8 Two Modern apps side by side

l. Drag the divider line slightly to the right, so the Photos app takes up two-thirds of the screen.

m. Drag the divider all the way to the left, so that the Weather app takes up 100 percent of the screen.

n. Hold down ALT and press TAB (keep holding ALT). Notice that the Photos app doesn't appear in the thumbnail images of apps you can switch to. That's because Windows 8.1 has only one thumbnail for *all* of the Modern apps that are running. You have to switch between various Modern apps in a different way.

o. Move the mouse pointer to the upper-left corner of the screen. A thumbnail image appears.

p. Move the mouse pointer slightly downward, so that a bar of thumbnails appears. See Figure 3-9. The thumbnails here show one for the Desktop (if the Desktop is not active) and one for each individual Modern app that is running.

q. Click the Photos app to switch to it.

r. Move the mouse pointer to the top of the screen, so that the hand pointer appears. Then drag downward, all the way to the bottom of the screen. This closes the Photos app. The Start screen reappears.

s. Repeat steps o through r for the Weather app to close it.

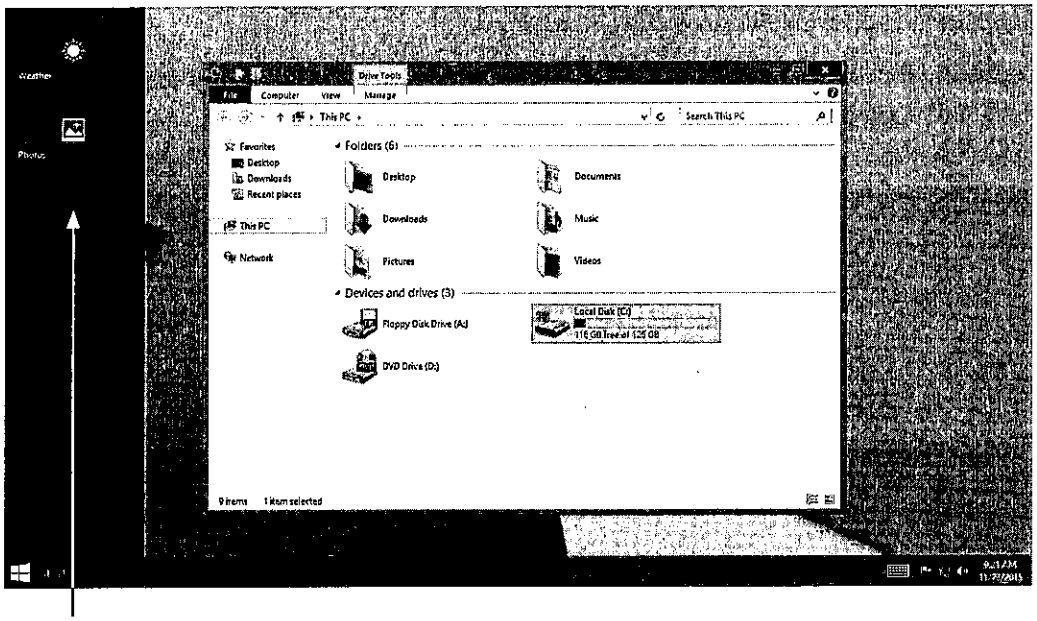


FIGURE 3-9 Modern apps appear in the navigation bar on the left when you point at the upper-left corner of the screen.

Step 3 The Start screen is like a bulletin board, on which you can pin anything you like. It comes with many items already pinned to it, but you have full control. Each item displays in a rectangular block called a *tile*. You can move, resize, add, and remove tiles.

a. Start at the Start screen. Click the Start button on the desktop to open it, if needed.

b. Right-click the Weather tile. A navigation bar appears along the bottom of the screen.

c. Click Resize. A pop-up menu appears.

d. Click Medium. The tile changes size, and other surrounding tiles shift to fill in the space if possible.

e. Click and hold down the left mouse button on the Weather tile for a few seconds. Then drag the Weather tile and drop it in a different spot.

f. Click the down arrow at the bottom of the Start screen to open the Apps list.

g. Right-click the Notepad application. Notice your choices at the bottom of the screen (see Figure 3-10). You can pin it to Start, pin it to the taskbar, open it, run it as an administrator, or open the location where the Notepad executable is located.

h. Click Pin to Start. The Start menu reappears with a tile for Notepad.

i. Right-click the Notepad tile and click Unpin from Start.

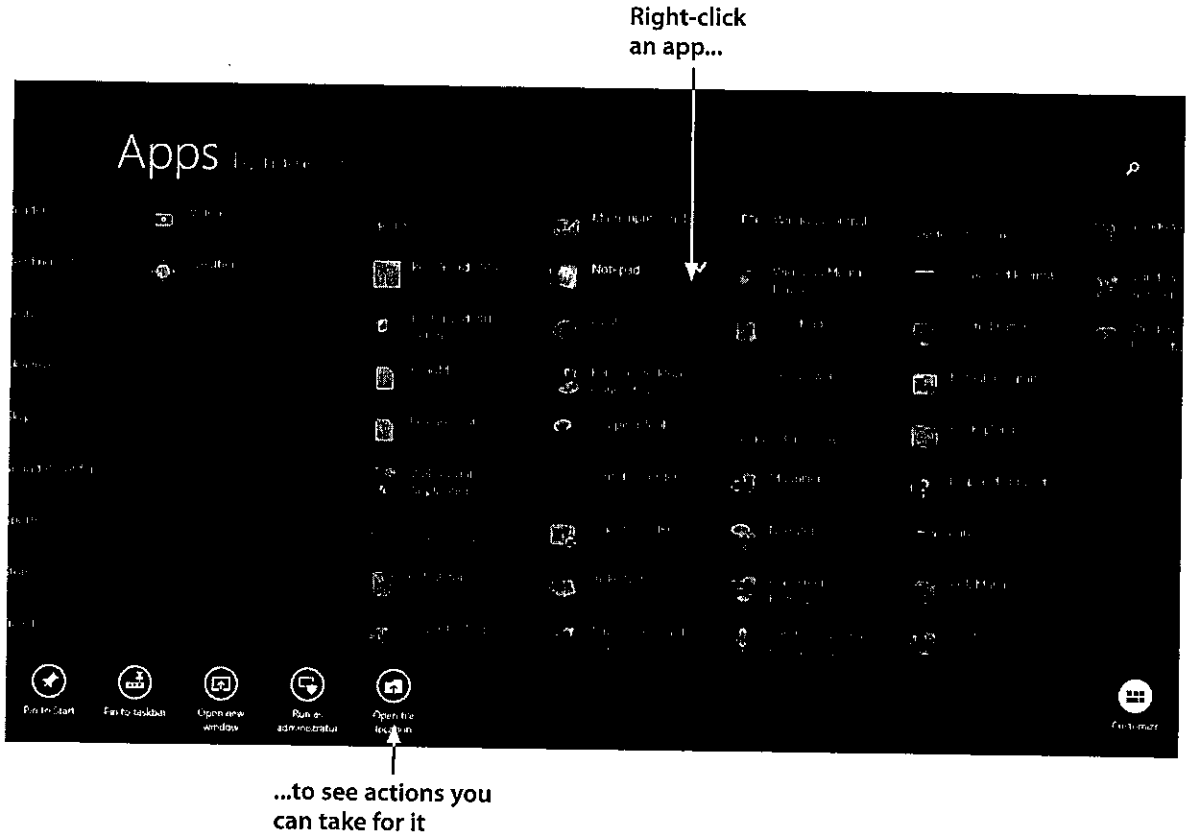


FIGURE 3-10 To manipulate a tile, right-click it and choose an action from the bar at the bottom of the screen.

Step 4 We'll wrap up our Windows 8.1 tour by checking out the Windows Store, from which you can install new Modern applications.

a. From the Start screen, click the Store tile. If you don't see a pinned Store tile, click the down arrow and select Store from the Apps list.

b. Browse the Windows Store. The interface changes periodically, so we can't tell you exactly what to select or click here. Locate a free app that interests you, and follow the prompts to install it.

c. Close the Store app.

d. (Optional) If you don't want to keep the app you downloaded, right-click its tile on the Start screen and choose Uninstall.

30 MINUTES

Lab Exercise 3.06: Managing Files and Folders in Windows

When you work as a computer professional, it's assumed that you know how file systems work and how to manipulate files and folders. This is basic-level stuff, so feel free to skip this exercise if you're already familiar with the procedures. But just in case you aren't up to speed, stick around. You're going to need this remedial lesson to keep up with the rest of the lab exercises in this book.

Learning Objectives

The main objective of this exercise is to familiarize you with file management under Windows. We'll use Windows 8.1 for this lab exercise, but all Windows versions are similar.

At the end of this lab, you'll be able to

- Explain file structures and paths on Windows PCs
- Create, rename, and delete folders
- Create, rename, copy, move, and delete files
- Use the Recycle Bin

Lab Materials and Setup

The materials you need for this lab are

- A fully functioning PC with Windows 8.1 installed (or another Windows version if 8.1 is not available)

Getting Down to Business

In this lab you'll practice file and folder management by creating, deleting, renaming, moving, and copying files and folders. You'll need all these skills in a wide variety of situations, both as a technician and as an ordinary computer user.

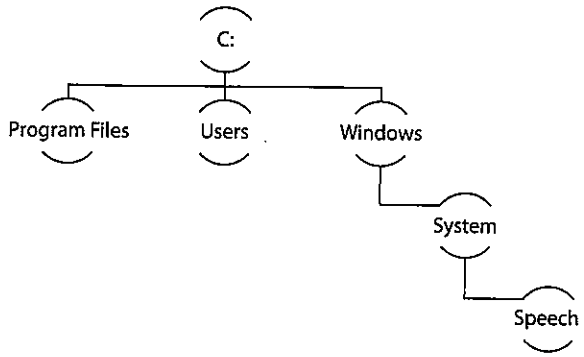


FIGURE 3-11 This folder tree illustrates the path C:\Windows\System\Speech.

In Windows, as in most other computing environments, file storage is hierarchical. You start out on a volume (a drive letter), and within a volume are folders. Individual files can also be stored at the top level of a volume. Within a folder can be other folders, and within them other folders, and so on. When you write out paths, you typically write them with slashes, like this:

C:\Windows\System\Speech.

This hierarchical structure is sometimes called a *folder tree* because when you map it out graphically it looks like the branches or root system of a tree (see Figure 3-11).

In the Address bar in File Explorer, the parts are separated by triangle arrows, like this:

This PC > Local Disk (C:) > Windows > System > Speech

It's basically the same thing as standard path notation, except the triangles offer an extra bit of navigation help, as you will see in Step 2.

Step 1 Familiarize yourself with the following key parts of the File Explorer window, pointed out in Figure 3-12.

- **Navigation pane** The pane along the left side of the window; it offers shortcuts to commonly accessed locations.
- **Preview/Details pane** The pane along the right side of the window. It's optional; you turn it on/off on the View tab on the Ribbon, with the Preview Pane and Details Pane buttons. These two buttons are mutually exclusive; turning on one turns off the other.
- **Ribbon** The multi-tabbed toolbar across the top of the window.
- **Quick Access Toolbar** The little collection of tools in the left corner of the window's title bar.
- **Address bar** The bar showing the path (address) of the active location.

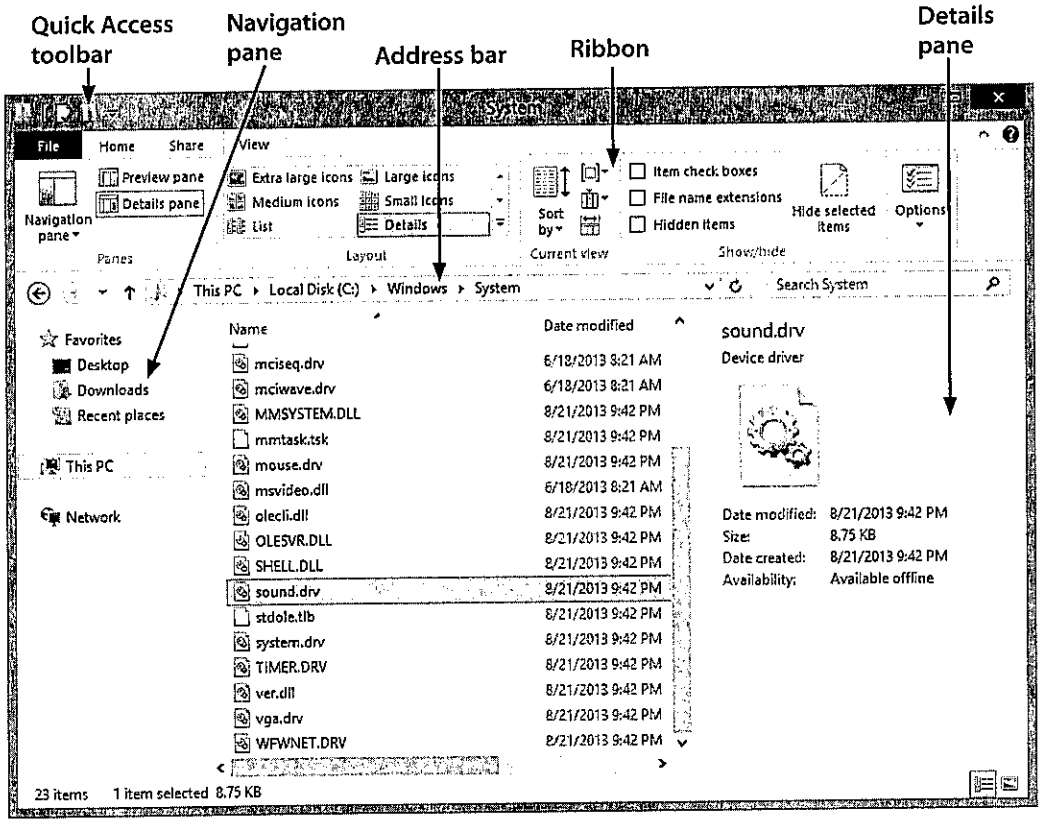


FIGURE 3-12 Parts of a file management window

- **Up button** Takes you up one level in the folder hierarchy. For example, if you're in C:\Files\January, it would take you up to C:\Files.
- **Back button** Takes you back to the last location you viewed.

Step 2 Follow these steps to get some practice moving between locations:

a. Start File Explorer. One way is to click the File Explorer icon pinned to the taskbar.

b. In the navigation pane, click This PC.

c. Double-click the C: drive, double-click the Windows folder, and then double-click the System folder.

d. Check out the path in the address bar. (It should resemble the path in the address bar in Figure 3-12.)

e. Click on a triangle to see a list of all the other folders at the same level as the folder to the right of the triangle, as shown in Figure 3-13.

f. Click the Boot folder to navigate to it.

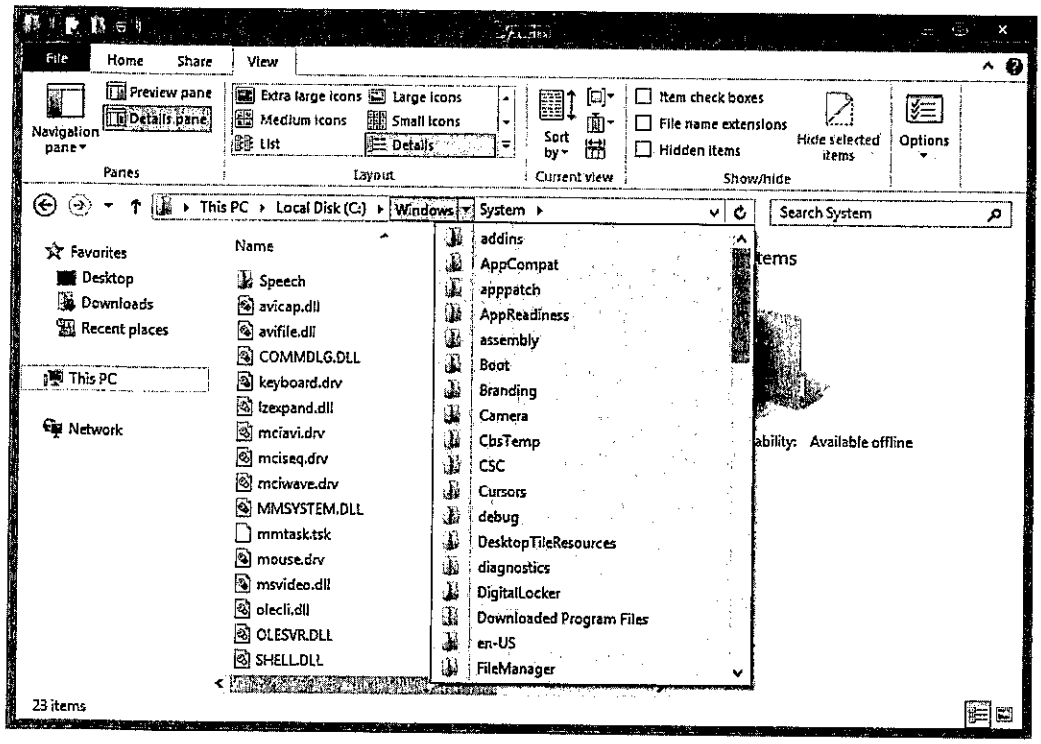


FIGURE 3-13 **Click a triangle in the address bar to see a menu of alternate locations at the same level as the folder to the right of the triangle.**

g. To see the path represented in traditional notation (with slashes), click in the Address bar. Notice that the path is selected, so you could copy it to the Clipboard (CTRL-C) and then paste it somewhere if you wanted to (CTRL-V).

h. Click the Up arrow button to the left of the path. This takes you up one level, to C:\Windows.

i. Click the Back arrow button to return to C:\Windows\Boot.

j. Click This PC in the navigation pane, and then double-click the C: drive. You are now at the top level of the C: drive, also known as the *root directory* or *top-level folder.*

Step 3 Next you'll create two new folders, move one of them into the other, rename a folder, and create a new text file.

a. While viewing the root directory of C:, click the New Folder shortcut on the Quick Access Toolbar. A new folder appears. Type **Work** and press ENTER.

b. Here's another way to create a new folder. On the Home tab of the Ribbon, click new Folder. Type **Play** and press ENTER.

c. Drag the Play folder and drop it on the Work folder. It is moved into that folder, and becomes a subfolder of it.

d. Right-click the Work folder and click Rename. Type **Everything** and press ENTER.

e. Double-click the Everything folder to move into it, and then double-click the Play folder to move into it.

f. Right-click an empty area in the Play folder and point to New, and then click Text Document. To name the file, type **Baseball** and press ENTER.

Step 4 Now you'll copy a file, rename a file, move a file, and delete files and folders.

a. Select the Baseball file and press CTRL-C, or click the Copy button on the Home tab. (You could also right-click the file and choose Copy. So many ways to copy!)

b. Click Everything in the address bar to move to that folder. Then press CTRL-V to paste the copy.

c. Right-click the Baseball file and choose Rename. Type **Basketball** and press ENTER. (You could also press F2 as a shortcut for the Rename command, or choose Rename from the Ribbon.)

d. Right-click the File Explorer icon on the taskbar and choose File Explorer on the menu that appears. This opens another File Explorer window.

e. In the new File Explorer window, navigate to C:\Everything\Play.

f. Drag-and-drop the Basketball file from C:\Everything (the original window) to C:\Everything\Play (the new window).

✔ **Tip**

The file is moved when you drag it because both locations are on the same drive. If they were on different drives, drag-and-drop would copy the file to the new location, rather than move it. To force a move, hold down SHIFT as you drag. To force a copy, hold down CTRL as you drag.

g. In the C:\Everything\Play window, select one file, and then hold down SHIFT and click the other file. Now both are selected.

✔ **Tip**

Pressing SHIFT enables you to select contiguous files; pressing CTRL allows you to select noncontiguous files.

h. Press the DELETE key. The files are moved to the Recycle Bin.

i. In the Address bar, click C: to return to the top level.

j. Select the Everything folder, and then on the Home tab of the Ribbon, click Delete.

k. Close both File Explorer windows.

Step 5 As the final stop on the tour, you'll practice using the Recycle Bin.

a. On the Desktop, double-click the Recycle Bin icon to open the Recycle Bin.

b. Select the Everything folder, and then on the Ribbon, click Restore the Selected Items.

c. Right-click the Baseball file and choose Delete. Click Yes to confirm. Now this file is permanently gone and unrecoverable.

d. Right-click the Basketball file and choose Restore.

e. Close the Recycle Bin window, and reopen File Explorer. Navigate back to the C:\ drive's root directory.

f. Select the Everything folder.

g. On the Ribbon, click the down arrow under the Delete button, and on the menu that appears, click Permanently Delete. Click Yes to confirm.

h. Close the File Explorer window.


30 MINUTES

Lab Exercise 3.07: Using the Control Panel in Windows

The Windows Control Panel is another one of those things that you absolutely, positively need to be familiar with to be a competent technician. You'll be working with it in upcoming chapters extensively, so familiarize yourself with it now if you need to.

Learning Objectives

In this lab exercise, you'll familiarize yourself with the Control Panel. This knowledge will come in handy in later chapters when you'll be called on to open the Control Panel and navigate to a particular section of it. We'll use Windows 8.1 for this, but all Windows versions are similar.

At the end of this lab, you'll be able to

- Switch between views in the Control Panel
- Identify key customization settings
- Identify key system settings
- Identify key hardware settings
- Access the Administrative Tools

Lab Materials and Setup

The materials you need for this lab are

- A fully functioning PC with Windows 8.1 installed (or another Windows version if 8.1 is not available)

Getting Down to Business

In this lab you'll explore four key areas of the Control Panel: Personalization, System, Hardware, and Administrative Tools. Collectively these are the four areas where you will most often need to access utilities and adjust settings as a technician.

Step 1 We'll start by reviewing the basic navigation of the Control Panel and checking out the System category.

a. Open the Control Panel.
In Windows 8.1 and Windows 10, the easiest way is to right-click the Start button and choose Control Panel. In Windows 7, you can click Start and then click Control Panel on the Start menu. In Windows 8, you can display the Charms bar, click Settings, and then click Control Panel.

b. In the upper-right corner of the Control Panel window, open the View by drop-down list and examine the available viewing options. Click Category if it's not already selected. See Figure 3-14.

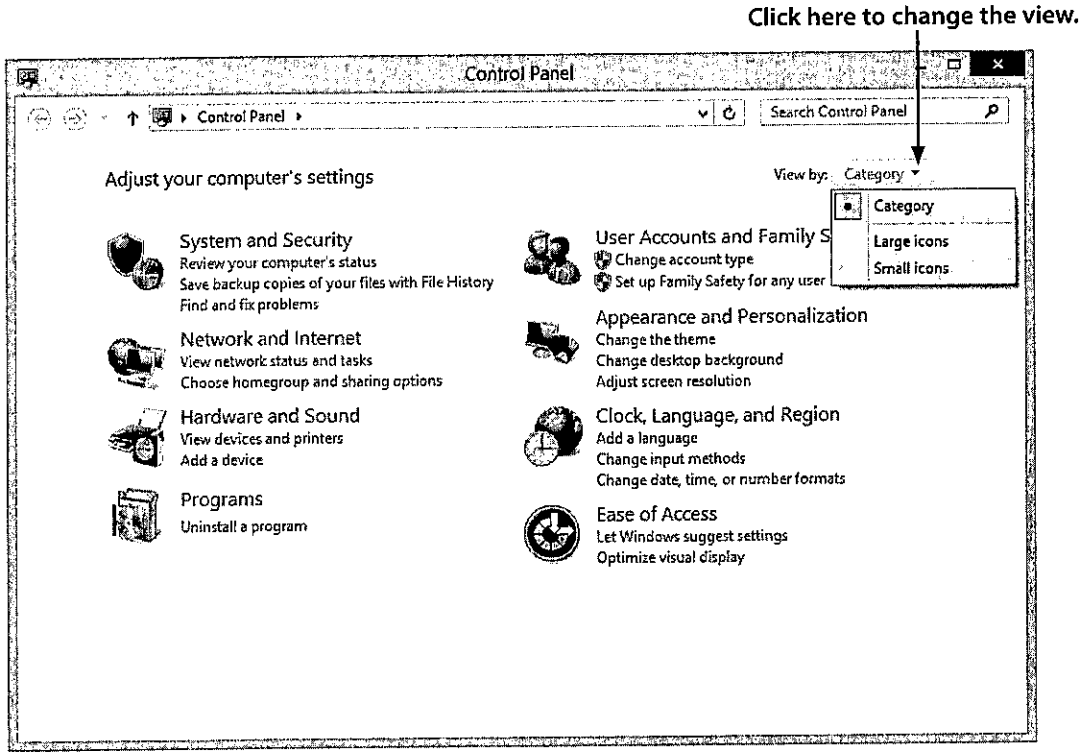


FIGURE 3-14 Choose a view of the Control Panel.

You can choose Category (the default, which is what we'll be using in this lab exercise), Large icons, or Small icons. The icons views are useful if you are trying to locate a particular utility or tool but you can't remember which category it is in.

Another way to locate a particular item is to search for it, as described next.

c. Click in the Search Control Panel box and type **mouse**. A list of all the settings that have to do with the mouse appears.

d. In the search results, under the Mouse heading, click Change mouse settings. The Mouse Properties dialog box opens.

e. Click Cancel to close the dialog box.

f. Click the Back arrow in the upper-left corner of the Control Panel window to return to the Control Panel Home screen.

g. Click the System and Security heading.

h. Click the System heading. System information appears.
Notice the items in the navigation pane on the left (see Figure 3-15); some of them have a shield symbol next to them. These are items that will trigger User Access Control (UAC) intervention when you click them (unless UAC settings are adjusted so that doesn't happen).

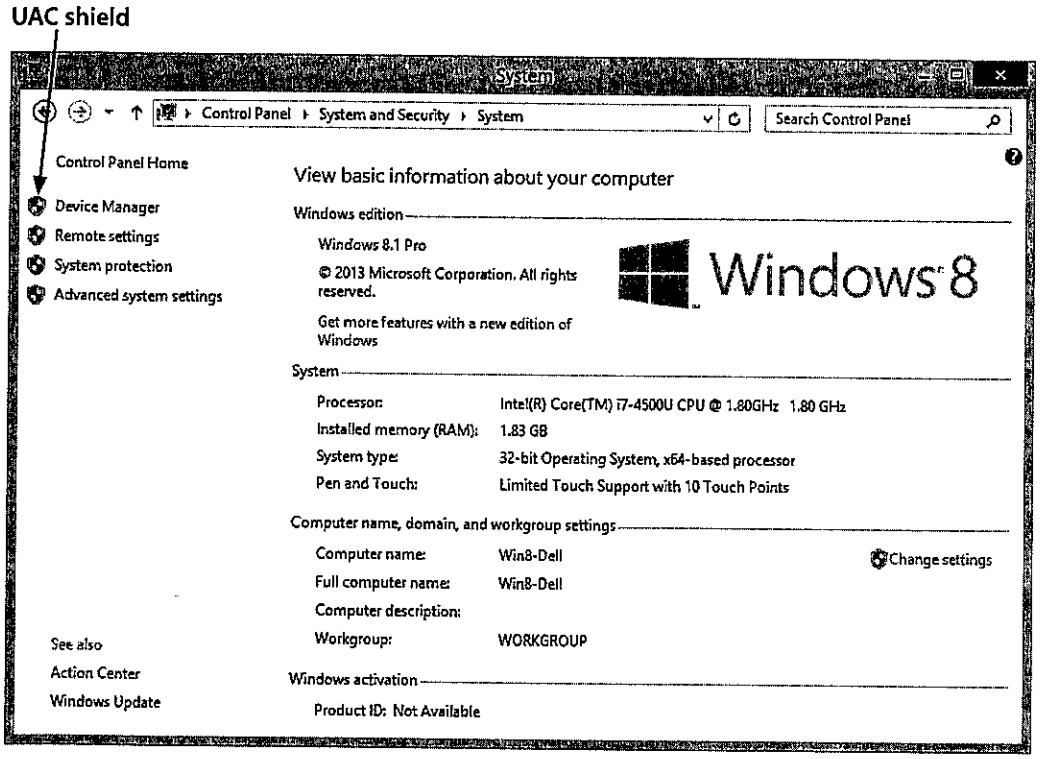


FIGURE 3-15 A shield indicates UAC restricts which users can adjust the settings.

✔ Tip

Notice that the address bar shows the path you have taken to get here. This is sometimes referred to as *breadcrumbs*. You can click any level listed in the address bar to return to it.

i. In the navigation pane, click System protection. Respond to the UAC box if it appears. You might need to type the sign-in information for an administrator user account if you are currently signed in as a standard user.

j. Click through the tabs in the System Properties dialog box to see what's there; when you're finished, click Cancel.

k. Click Control Panel in the address bar to return to the top level of the Control Panel.

Step 2 Next we'll look at some hardware-related settings that are accessible from the Control Panel.

a. Click the Hardware and Sound heading, and check out the items available. From here you can add and remove printers, adjust sound and power options, and change the display settings.

→ Note

Display settings are split between Hardware and Personalization categories. In the Hardware category you'll find the settings that pertain to the screen resolution, icon size, and refresh rate. In the Personalization category are settings for screen colors and other appearance aspects.

b. Click the Sound heading. The Sound dialog box opens.

c. Click through the tabs of the dialog box to see what's available. For example, if you were having a problem with a system that wasn't playing sound through its speakers, you might check the Playback tab here to make sure the expected sound device was selected. Click Cancel when finished.

Step 3 Now let's look at Personalization, the favorite category of most of the end users you will support. Here you can adjust how the desktop looks.

a. In the navigation bar, click Appearance and Personalization to jump to that category.

✔ Tip

Notice that there's a Display category under Appearance and Personalization that duplicates the one in Hardware and Sound. That's for your convenience, because it's easy to forget where those settings are stored.

b. Click the Personalization heading. Personalization options appear. From here you can choose an appearance theme to apply by selecting one of the thumbnails in the center, or customize individual aspects of formatting by using the links at the bottom of the window, such as Desktop Background or Color.

✔ **Tip**

As covered in Lab Exercise 3.05, you can also get to Personalization by right-clicking the Desktop and choosing Personalize. That's a great shortcut to know for times when the Control Panel isn't already open.

c. Click one of the themes to apply it.

d. Click the Color hyperlink at the bottom of the dialog box.

e. Click one of the colored squares to change the color of the window borders and taskbar.

f. Click Cancel to reject the change.

g. (Optional) Return your personalization settings to your own preferences if desired.

Step 4 Administrative Tools is a collection of lesser-known and lesser-used utilities that are mostly reserved for technicians and power users. Since that (hopefully) describes you on both counts, you should know about them.

a. Click Control Panel Home in the navigation pane.

b. Click System and Security, and then scroll down to the bottom of the list and click the Administrative Tools heading.

c. Switch to Medium Icons view (as shown in Figure 3-16) so you can see things more clearly. To do so, click the View tab, and click Medium icons.

Most of the Administrative Tools are covered in upcoming chapters, so we won't get into them in detail here, but let's check out a couple.

d. Double-click Windows Memory Diagnostic. A window opens with a utility that allows you to check for memory problems. Click Cancel to close it.

e. Double-click System Configuration. This opens the System Configuration utility, also known as msconfig.exe.

f. Click through the tabs of this dialog box to see what's available. For example, you can set up a boot into Safe Mode from the Boot tab. Click Cancel when you're finished looking.

g. Double-click System Information. The System Information utility opens, providing detailed information about the hardware and software.

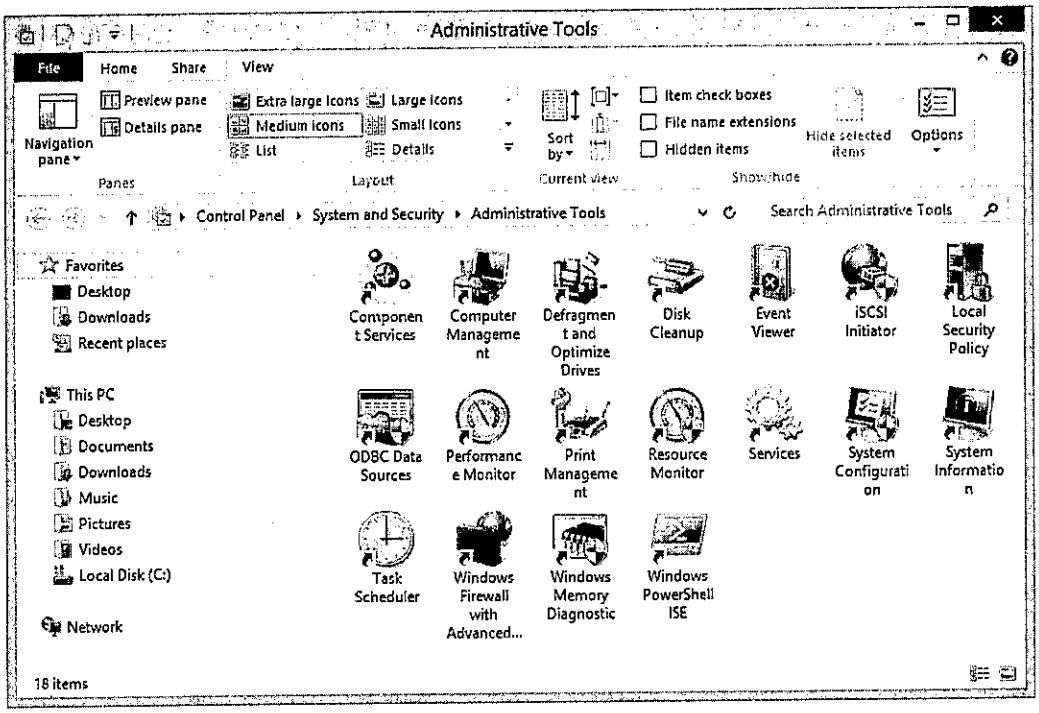


FIGURE 3-16 The icons in the Administrative Tools group

➜ Note

If you are using Windows 7, you won't see System Information in the Administrative Tools. You can run it from the Start menu instead. Click Start, type System Information, and then click System Information in the search results that appear.

h. Click the plus signs in the navigation pane to expand categories, and click categories to examine their content. Click Cancel when you're finished.

You can optionally shut down your Windows PC at this point; the next two labs work with different operating systems.

30 MINUTES

Lab Exercise 3.08: Exploring the Mac OS X Interface

The CompTIA A+ 220-902 exam objectives include some basic Mac OS X features and functionality. You won't see a *lot* of questions on Mac OS X, as the test is still pretty Windows-centric, but you should familiarize yourself with at least its basic operation. In this lab exercise, you'll poke around Mac OS X a bit, figure out what features correspond to Windows features, and locate the Mac features listed in the 902 exam objectives.

Learning Objectives

The main objective of this exercise is to familiarize you with the Mac OS X operating system.

At the end of this lab, you'll be able to

- Understand the Mac OS X desktop
- Use and customize the Dock
- Manage files with Finder
- Understand the Gestures, Spotlight, Keychain, and Boot Camp features

Lab Materials and Setup

The materials you need for this lab are

- A fully functioning PC with Mac OS X installed (preferably Yosemite or later)

Getting Down to Business

In this lab you'll explore the Mac OS X environment, and you'll locate and become familiar with the key Mac OS X features that are covered on the 902 exam.

Step 1 Boot into the Mac OS X desktop environment. Use Figure 3-17 to orient yourself to the Desktop features listed next. Click on each feature to check it out.

✔ **Tip**

From the menu bar at the top, choose Help | Get to Know Your Mac to see a tour of desktop features.

- **Apple menu** Click the apple icon in the upper-left corner of the screen for a system menu from which you can select Sleep, Restart, Shut Down, and Log Out, among other options.

✔ **Tip**

From the Apple menu, you can select Force Quit, which exits a locked-up application. It's equivalent to shutting down an app with Task Manager in Windows.

- **Dock** This is sort of like the pinned icons on the Windows taskbar. Running applications appear at the far right end. We'll look at the tools on the Dock in Step 2.

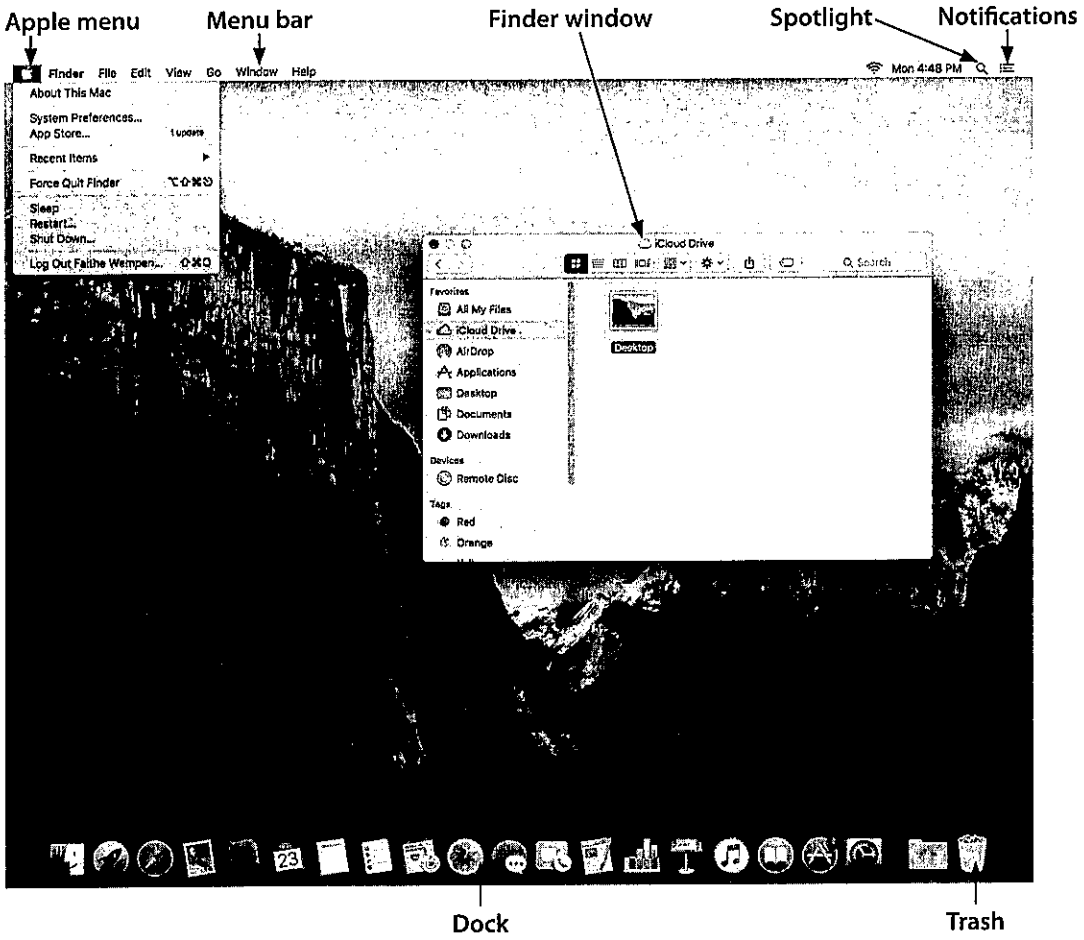


FIGURE 3-17 The Mac OS X Desktop

- **Menu bar** A menu bar across the top of the Desktop provides access to the menu system for whatever program is active. If no program is active, it defaults to Finder (the equivalent of File Explorer in Windows). The first menu on the menu bar (after the Apple menu) is named for the application's name.
- **Spotlight** The magnifying glass opens a Spotlight Search feature, which is equivalent to the Search box in File Explorer.
- **Notifications** Click here to see a sidebar of timely information including the weather, your calendar, and any upcoming events. Windows 8.1 doesn't have anything that's a direct correlation to this, but Windows 10 has a Notifications feature that is very similar.
- **Trash** This is the equivalent of the Recycle Bin in Windows; you can use it to retrieve deleted files and folders.

Step 2 Now let's look at how to launch an application, and find out what the Dock has to offer.

a. On the Dock, click the Launchpad button (the rocket ship). This shows the available applications in icon form, like on an iPad.

✔ **Tip**

At some point you may need to include hidden files in a search. To do so, open Terminal (open Finder, click Applications, double-click Utilities). In Terminal, type the following command and press ENTER: defaults write com.apple.finder AppleShowAllFiles YES. **Then hold down the OPTION key, right-click on the Finder icon, and click Relaunch.**

Step 4 The Keychain feature safely stores your Safari Web site user names and passwords, so you don't have to remember them or continually type them. It can also keep the accounts you use in Mail, Contacts, Calendar, and Messages up to date across all your Mac computers. When you set up your Mac initially, you are asked whether you want to enable the Keychain feature. If you chose not to, you can do so at any time:

a. On the Apple menu, choose System Preferences | iCloud.

b. Scroll down to Keychain, and if there is not a checkmark beside it, click to place one. Enter your Apple ID password if prompted. Go through the process of getting approval for this device to use the app; you may need to use your iCloud security code or request approval from another device.

c. After Keychain has been enabled, close the iCloud window.

➜ **Note**

To access Keychain settings, open Finder, click Applications, double-click Utilities, and double-click Keychain Access.

Step 5 *Gestures* are shortcuts that you can perform to navigate using a touchpad or touchscreen. Here's a good way to learn about them:

a. From Finder, choose Help | Get to Know Your Mac.

b. Click the Next button at the bottom of the Web page that displays until you see information about Gestures. Then read that page to learn how to use Scroll, Navigate, Zoom, and Secondary Click on a touchpad.

➜ **Note**

Secondary Click is analogous to right-click on a Windows PC. To secondary click with gestures, press down with two fingers on the touchpad.

c. Try out the gestures if you have a touchpad or touchscreen. Then close Safari.

Step 6 iCloud is an online storage area, free to Mac users. It's equivalent to OneDrive in Windows. To access iCloud:

a. Open Finder.

b. In the navigation pane, click iCloud Drive.

You can drag-and-drop files to and from your iCloud drive (for example, from the Desktop).

Step 7 Boot Camp is a utility that helps you install Microsoft Windows on a Mac, and then switch between the two operating systems. Super handy! Especially since Windows lacks the corresponding ability. To use Boot Camp:

a. Make sure your Mac has hardware that will pass muster (CPU, RAM, and hard drive). Use the Mac's System Information app to check things out: click Finder, click Applications, double-click the Utilities folder, and double-click System Information.

b. Make sure you have a Windows disk image (ISO) file.

c. Run Boot Camp Assistant: click Finder, click Applications, double-click the Utilities folder, and double-click Boot Camp Assistant.

d. Work through the onscreen instructions to repartition your startup disk, download the needed software drivers, and install Windows.

Lab Analysis Test

1. Joe has just moved his PC to his new office. After hooking up all the cables, he turns on the system, and when it asks for his password, the keyboard will not respond. What could possibly be wrong?
2. Audrey has just returned to her desk after taking a break. She was only gone a few minutes, so she kept her PC on. Now the monitor is blank and the monitor LED is blinking a different color than usual. What might have happened?
3. Jeff has just upgraded from Windows 7 to Windows 8.1 and he is confused. He has started several Modern apps, but he can't figure out how to close them. How would you explain the process for closing a Modern app?
4. Michael wants to use the Event Viewer tool in Windows 8.1. Someone told him it's in Administrative Tools, but he doesn't know where that is. Walk him through the process of accessing the Administrative Tools folder.
5. Sally has just switched from Windows to Mac OS X. She sees a few applications on the Dock, but thinks that there surely must be more applications installed than just those. Explain two different ways she could access a full set of installed applications.

Key Term Quiz

Use the following terms to complete the following sentences. Not all of the terms will be used.

click	Keychain
Dock	light-emitting diode (LED)
double-click	optical drive
File Explorer	right-click
Finder	Windows Explorer
FireWire	

1. The Mac OS X feature used to manage passwords is called _____.
2. A(n) _____ is a visible indicator to tell you that your PC is on or that your hard drive is active.
3. Remember to use the eject button on your _____ when closing the tray so you don't damage anything.
4. On a Windows 8.1 PC, the file management utility is _____; in Windows 7 it is called _____; and in Mac OS X the equivalent utility is _____.
5. To move, resize, or delete pinned shortcuts on the Start screen in Windows 8.1, _____ the tile.