3.1 SECTION REVIEW

CHECK YOUR UNDERSTANDING

1. Convert this hex code into its binary equivalent: 0xF6A9
2. Convert this binary code into its hex equivalent: 1101101010011
3. What is the name of a program that converts higher-level programming language into machine language?
4. What is the difference between a compiler and an interpreter?
5. What is the basic diffference between a linear algorithm and an interative algorithm?

IC3 CERTIFICATION PRACTICE

The following question is a sample of the type of questions presented on the IC3 exam.

1. A memory address is stated as 0x14DE. What is the binary equivalent?

BUILD YOUR VOCABULARY

As you progress through this course, develop a personal IT glossary. This will help you build your vocabulary and prepare you for a career. Write a definition for each of the following terms and add it to your IT glossary.

American Standard Code for Information Interchange (ASCII)
assembly language
bit
byte
bytecode
code
compiler
computer algorithm
data type
encoding
high-level programming language
interpreter
low-level programming language
machine language
object-oriented languages
procedural languages
programs
unicode

SYSTEM SOFTWARE

There are similar tasks common to most applications, such as saving data, retrieving documents, and printing. This is why operating systems were created. The operating system, or OS for short, sits between the hardware and the applications to handle all common tasks in one way. For a visual metaphor, think of a road as the hardware. The cars driving on the road are the applications. The drivers are the users, and the crossing guard is the operating system. It is the operating system that keeps all of the applications running smoothly and connected with the CPU and the peripherals.

System software contains the operating system, utilities, device drivers, and programs. Utilities help with housekeeping tasks. Device drivers provide instructions for how the operating system is to use peripheral devices. Programs are the applications that users run to complete the desired tasks.

?E ssential Question

Which operating system is the best to use?

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LEARNING GOALS

- Explain operating systems.
- Identify system utility programs.
- Describe device drivers.
- Discuss programs.

TERMS

accessibility options
desktop theme
device driver
hibernation
language packs
platform
power down
power options
power states
sleep
system software
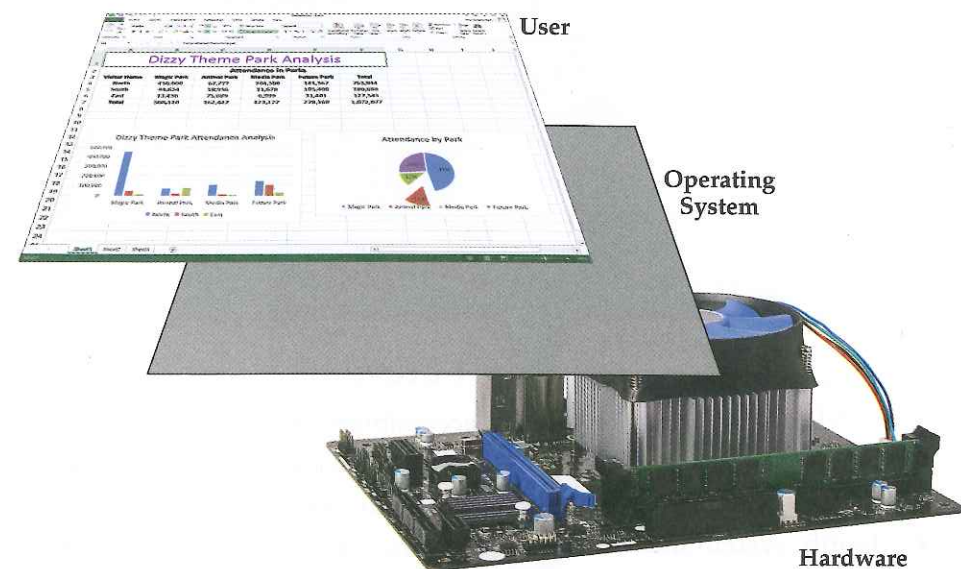user account
utility programs

Operating Systems

System software includes four types of software: the operating system, utility programs, device drivers, and programs. All computers that run more than one program must have an operating system. The operating system (OS) performs communication with the user and the hardware. See Figure 3-5. The OS works behind the scenes. Most of the time it is silently working in the background to monitor system activity and optimize its own efficiency.

Figure 3-6 shows a photograph of the Apollo Guidance Computer on a display at the Smithsonian Institution. This computer used a real-time operating system. Astronauts entered simple commands as pairs of nouns and verbs. These commands were used to control the spacecraft. Today, operating systems are advanced software that must communicate with the user, multiple hardware devices, and multiple software programs as well as manage all of the interactions and functions of the computer system.

Some tasks performed by the OS are powering on and off the system; logging in, logging out, or switching users; and locking and unlocking the interface. The OS also controls the order of processing events, manages the movement of files to and from storage devices, and interacts with the peripheral devices such as the keyboard and the printer. The OS manages the allocation of memory for programs and data as well as system security through the use of passwords.

The OS is generally preinstalled on a computer when the hardware is purchased. A computer's processor determines what operating systems can be used. For example, Microsoft Windows operating systems work with processors in the Intel family. The computer **platform** is the combination of the operating system and the processor. Figure 3-7 shows a comparison of operating systems currently in use.

Reduced-instruction chips called ARM microprocessors, produced by ARM Holdings, power most mobile devices. These chips allow processing speeds that could support a desktop or laptop. The idea is that the fewer instruction types to process, the faster a chip can run. Windows 8 is an OS that runs on the ARM chip.

Operating systems changed with the introduction of a graphical user interface (GUI), which is usually pronounced *goo-ey*. Users did not have to behave like programmers and enter commands. With a GUI, users could use a mouse to select options from menus. Personal computers then became very popular. The Apple Macintosh was the first commercially successful computer with a GUI OS. The OS for this computer was called System Software, which was eventually changed to Mac OS. GUI versions of Windows soon followed the introduction of the Macintosh computer.

GNU 1.2/Creative Common 3.0 (Tamorlan)

Figure 3-6. This is the user interface of the Apollo Guidance Computer on display in the Smithsonian National Air and Space Museum in Washington, DC.

Goodheart-Willcox Publisher; Denis Dryashkin/Shutterstock.com

Figure 3-5. The operating system sits between the hardware and the software providing communication between them, facilitating the execution of the software programs, and managing the hardware resources.

Operating System	Platforms	Distinctions
Windows	PCs, Microsoft phones, and tablets Apple products in a Windows partition	Most widely used OS Multiple versions Proprietary
iOS	Apple mobile products, iPhone, iPad, iTouch, etc.	Proprietary Distribution of apps limited to Apple App Store No Macromedia products are supported, e.g. Flash Player
Mac OS	Macintosh computers	Proprietary No Macromedia products are supported, e.g. Flash Player
Unix	PCs, large mainframe computers, supercomputers, web servers	Open source Free to use Stable, less downtime than Windows Better security Greater processing power Generally found on networked systems
Linux	PCs, several mobile devices, large mainframe computers, web servers	Open source, based on Unix Free to use Low resource requirements High security level Generally found on networked systems
Android	Google mobile OS based on Linux	Open Source Open distribution of apps via Internet

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Figure 3-7. Several operating systems are available. The platforms on which each is used varies by application.

Windows Operating System

The operating system contains all directions for working with the hardware. As new hardware is introduced, the OS must be updated. Microsoft Windows has gone through several versions since it was introduced. For example, a very old version, Windows 3.1, did not know how to tell a CD to play or how to read data from a USB port. Newer versions have most of the functionality of the older versions plus more. There are many computers that still run on older versions of Windows, such as Windows XP or Windows Vista. However, Windows 7 and Windows 8 are more common.

Windows Interface Overview

The Windows desktop is a virtual workspace for the operating system. Program icons and document files can be placed on the desktop for easy access. In Windows 8, you are automatically switched to the desktop when a program is launched. You can also manually display the desktop by clicking **Desktop** in the main menu. In Windows 7, the desktop is automatically displayed when the OS starts up.

When something is placed on the desktop, it appears as an icon. An icon contains a definition of what to launch when it is double-clicked. It appears as a small graphic on the desktop. The icon for a document file will launch the program associated with the file type and load the file in the program. The icon for a program will launch the program.

One of the keys to the Windows OS is the ability to have multiple programs running at the same time. The user sees each program in a frame called a window. Each program window appears as a tab in the task bar. To switch between windows, either click the tab on the task bar or use the [Alt][Tab] key combination.

Starting Programs in Windows

There are several ways to start, or *launch,* a program in Microsoft Windows. The most common ways are to use an icon in the **Apps** or **Start** menu or a desktop icon. If the program appears as an icon on the desktop, double-click the icon to launch the program.

In Windows 8, click or tap the **Apps** button at the bottom of the **Start** screen. The screen changes to display icons for installed programs, which are listed by categories, as shown in Figure 3-8. Locate the icon for the program to launch, and click or tap it.

In Windows 7, click the **Start** button on the taskbar at the bottom of the screen. Some program icons may be displayed in this portion of the menu, or you may need to click **All Programs** in the menu and browse to the icon of the program. Once the program icon is located, click it to launch the program.

Another way to launch a program is to double-click the icon for a document file, either on the desktop or in a file folder. Most documents are associated with a program based on the file extension of the document. Double-clicking on a document file will launch the associated program and load the document.

Categories
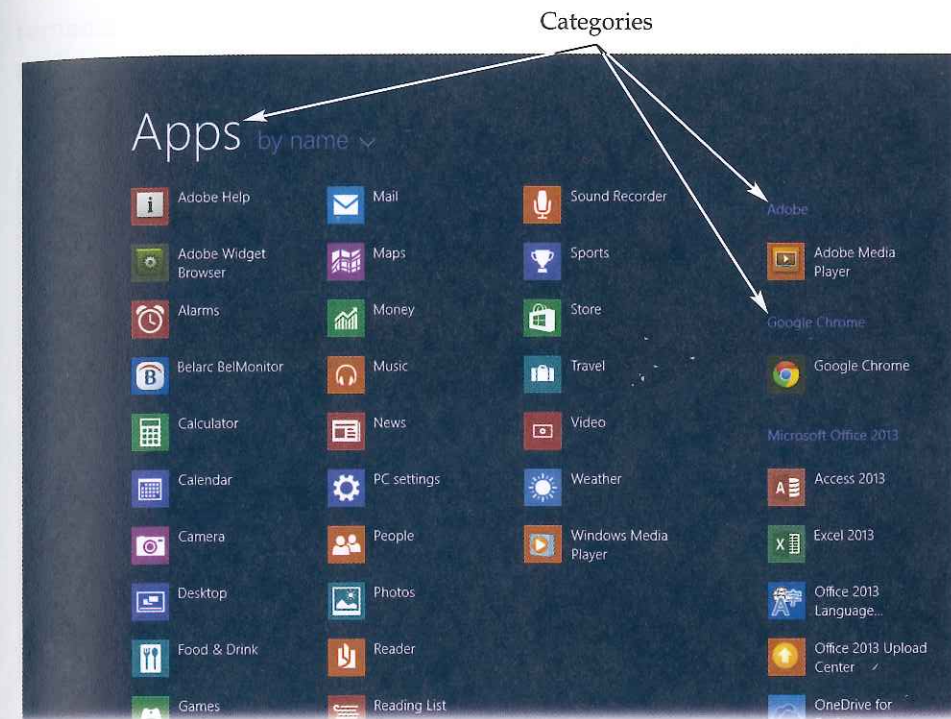
Goodheart-Willcox Publisher

Figure 3-8. Clicking the **Apps** button in Windows 8 displays a screen containing icons for installed programs. Programs are grouped by category.

Common Tasks Using Windows

There are several key combinations and mouse clicks that behave in the same manner no matter what program windows are open. As discussed in Chapter 2, these are clicking, double-clicking, dragging, and right-clicking. There are standard key combinations as well.

The [Ctrl][A] key combination is used to select all items in the current view, such as all words in a document or all files in a folder. The [Ctrl][C] key combination copies the current selection to the system clipboard. The [Ctrl][X] key combination removes, or cuts, the current selection and places it on the system clipboard. The [Ctrl][V] key combination pastes the contents of the system clipboard in the current location. The [Ctrl][Z] key combination reverses the last operation, which is called an *undo.*

The [Alt][Tab] key combination is used to navigate through open program windows. Holding down the [Alt] key while repeatedly pressing the [Tab] key selects which window will be made active, as shown in Figure 3-9. When the correct icon is highlighted, release the [Alt] key to make that window active. The desktop is treated as a window in this navigation.

All open windows can be arranged for better viewing and use. Right-click on the taskbar, but not on an icon, to display a shortcut menu. This menu contains choices to **Cascade windows, Show windows stacked**, and **Show windows side by side**. Cascading windows are displayed one on top of another offset slightly so a small portion of each window underneath can be seen. Stacked windows are displayed over the width of the desktop and top to bottom, but the windows do not overlap. Side-by-side

Computing
Fundamentals
1.2.2

Key Applications
1.3.4

Currently
active window   Window to
make active   Desktop
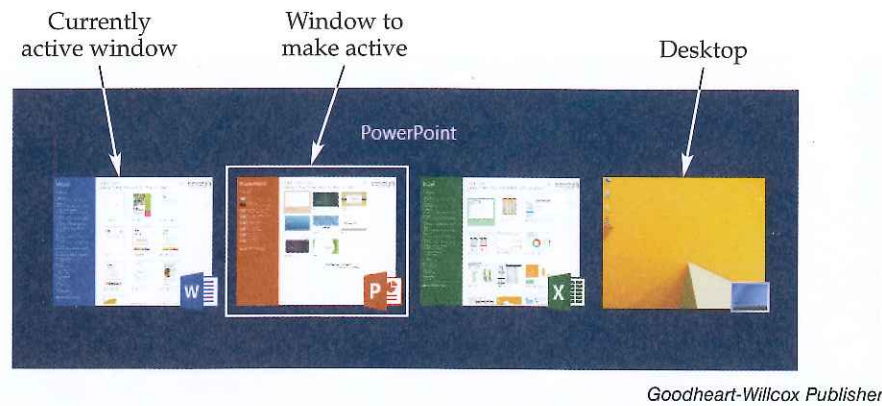
Goodheart-Willcox Publisher

Figure 3-9. The [Alt][Tab] key combination is used to switch between windows.

windows are displayed over the height of the desktop and side-by-side, but the windows do not overlap. See Figure 3-10.

Starting and Exiting the OS

Unlike a light switch that can be instantly turned on or off, a computer must perform an orderly power up and shut down. Additionally, different users may work on a computer. The Windows OS has some functions for allowing these actions:

- power on and off
- log on and off
- switch user
- lock and unlock

When the computer is powered on, the boot process starts the OS. Software programs are loaded and run before the user can begin to input requests or data. When the computer is powered off, or powered down, programs must be closed according to their programming, and the OS must perform shut-down procedures. Always use the OS shut-down function to turn off the computer. Do not use the computer's power button to power off the computer. Computer programs need to follow a sequence to close all files.

When there is more than one user for a computer, each user should have a separate account. This maintains a level of security and privacy between users. Logging on is the process of a user signing into his or her account on the computer. Once logged on, the user has access to all of the software and files that have been made available to that account. Logging off closes any programs that are running and signs out the user, but the computer remains on with the OS is functioning in the background.

Switching a user is similar to logging off. The current user is signed out, however programs that are running are not closed. This allows a different user to log on and use the system, but the work session of the original user is maintained. The original user can continue where he or she stopped once logged on again.

Locking the computer prevents another person from using it without requiring the current user to log off. The user's current work session

Ethics

Code of Ethics

Most companies establish a set of ethics that employees must follow. The code of ethics outlines acceptable behavior when interacting with coworkers, suppliers, and customers. Some businesses even post their code of ethics on their websites. Employees must be familiar with the code in order to make correct decisions on behalf of the company.

remains running, but only the current user or an administrator can unlock and use the computer. For security reasons, the machine should be locked whenever the current user steps away from it.
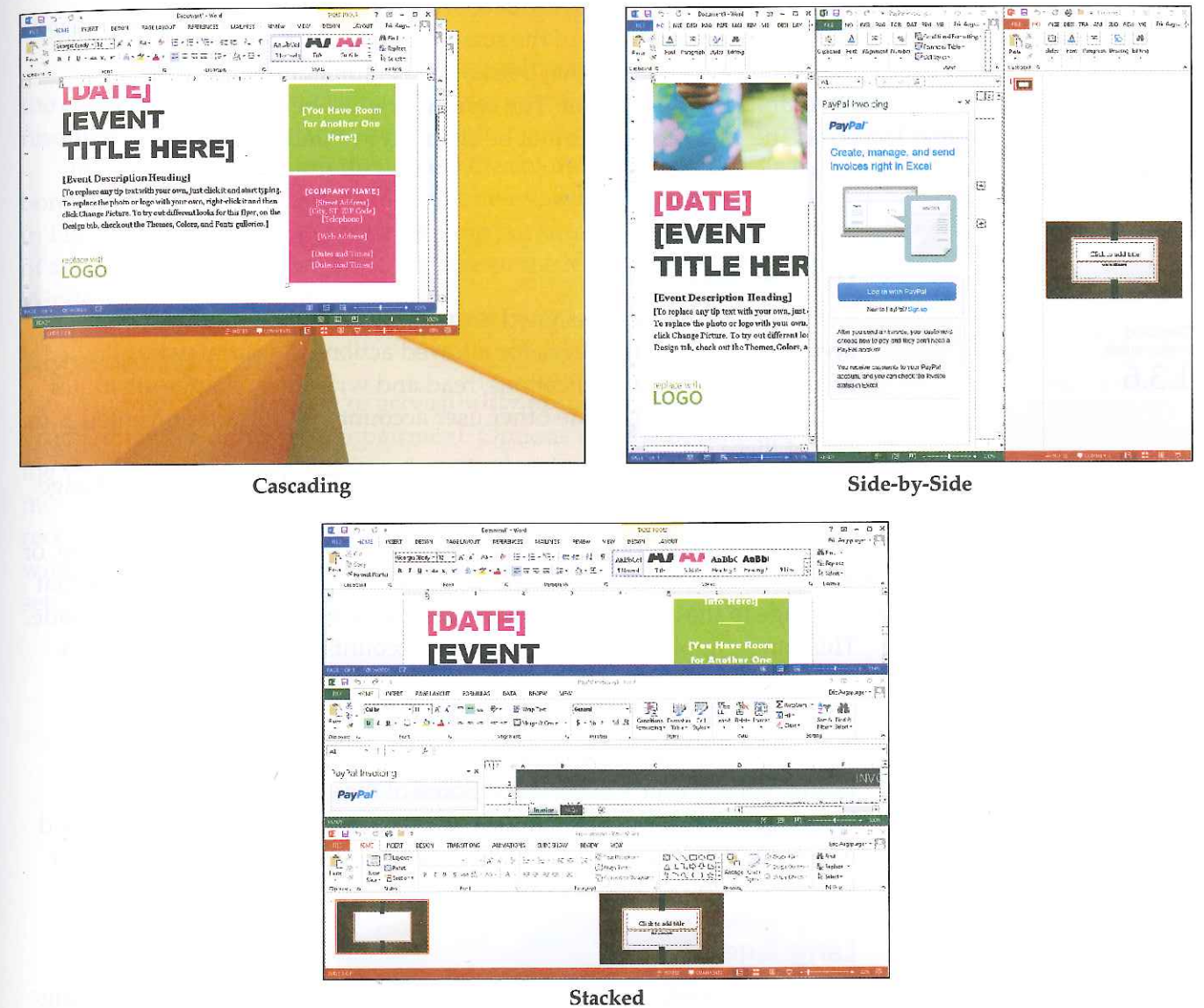

Cascading

Side-by-Side

Stacked

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Figure 3-10. Windows can be displayed full-screen, cascading, side-by-side, or stacked.

HANDS-ON EXAMPLE 3.2.1

LOCKING THE COMPUTER

To prevent somebody else from using a computer, lock it. To use the computer again, unlock it with a password.

1. In Windows 8, click or tap the user name in the upper-right corner of the **Start** screen. In Windows 7, click the **Start** menu button, and click the arrow next to the **Shutdown** button.

HANDS-ON EXAMPLE 3.2.1 (CONTINUED)

2. Click **Lock** in the menu that appears. The screen displays a message indicating the computer is locked along with the name of the account that locked it.
3. In Windows 8, swipe up from the bottom of the screen or press any key to terminate the lock screen. In Windows 7, press the [Ctrl][Alt][Delete] key combination.
4. Enter the password to unlock the computer. The computer must be unlocked by the account that locked it. The user account cannot be changed in Windows 8, but can be changed in Windows 7.

User Accounts

Computing
Fundamentals
1.3.6

User accounts are assigned for privacy and system security. A **user account** is a set of privileges for allowed actions. A user may be allowed to install and delete applications, read and write files, change attributes for files and folders, create other user accounts, or may be prevented from any of these actions.

A *group policy* provides the ability for the IT administrator to change permissions and configurations of all or some user accounts for the devices within a group of devices. The devices may be desktop, laptop, or mobile computers. For example, an IT administrator may determine that a change to the access permission for a file or new folder should be made. This can be applied to a group of user accounts through a group policy.

Basic Desktop Configuration

Computing
Fundamentals
1.3.1

The OS provides a wide range of configurations that can be used to customize a user's experience. Some of these choices include which language is used, the time zone, how the computer display appears, and which accessibility options are used. Most of these options are accessed via the Windows Control Panel.

Languages

Windows supports a wide range of languages. The language setting is used for the text and instructions, displayed on the desktop. The keyboard can also be set for a different language. The default language is set at the factory based on where the computer or operating system will be sold.

Normally, the language used in the interface is set during the Windows OS installation. It is not easy to change after the OS has been installed. However, **language packs** can be downloaded from Microsoft and installed to change the language of the OS interface.

Date and Time

The date and time are calculated in Coordinated Universal Time (UTC) and distributed to 24 time zones around the world. UTC is the standard by which countries around the world regulate time.

Windows provides an option to configure the time zone where the user resides. In addition, synchronization can be configured so that the time automatically updates to match the UTC value.
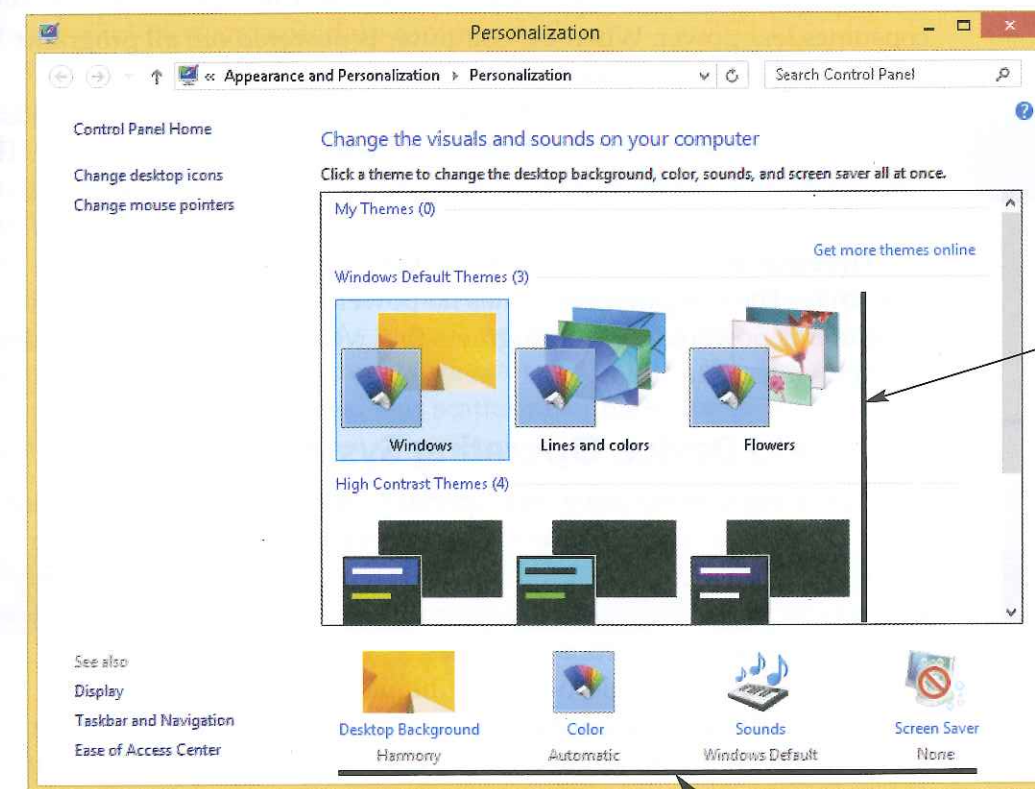
Visual Options

The display can be configured in one of the resolutions available with the combination of the computer's graphics card and monitor. The screen resolution controls how large the text and images appear on the display.

In Windows, a **desktop theme** sets the colors used for window borders, the desktop background, and other visual qualities, as shown in Figure 3-11. A user can select a desktop background image from one of several defaults or from a file. The size of the icons displayed in the Windows taskbar is also an option.

Accessibility Options

Windows provides a set of **accessibility options** to assist users with vision, mobility, or hearing impairment. Options include optimizing the visual display, replacing sounds with visual cues, changing how the mouse works, changing how the keyboard works, and enabling speech-recognition input. The accessibility options are set in the Control Panel window. Click the **Ease of Access** heading to review and change the settings.

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Figure 3-11. A desktop theme controls the visual qualities of the desktop, such as color, background image, and sounds.

Power Configuration Options

Windows offers several **power options** for managing how the computer uses electricity. This is important for computers that run on a battery, such as a laptop or mobile computer. Conserving power is a tradeoff with computer performance. By lowering performance, the electrical charge in the battery can be extended.

There are three **power states**, or *power plans*, for conserving the power consumed by the CPU:

- power saver
- balanced
- high performance

The power use is low, medium, and high, respectively. Programs such as Microsoft Word or other Microsoft Office applications usually do not require high performance from the CPU. When running these programs, the power saver setting is often acceptable. However, programs such as video editing, graphic manipulation, and video games require high performance from the CPU. When running these programs, the computer should be set to high performance. Power conservation will be minimal with this setting.

The OS can be configured to **power down** the computer when it is idle for a period of time. The display may simply dim, the computer may go into a sleep or hibernation mode, or it may power off. When the display is dimmed, all programs continue to run, but the display consumes less power. When the computer is powered off, all programs are closed and the computer is turned off.

Sleep saves all settings and running programs in memory using just a small amount of power. Think of sleep mode as like pausing a DVR. The computer will wake from sleep mode very quickly, often in one or two seconds.

Hibernation saves all settings and running programs to the hard disk drive. The computer consumes no power in this state. When the computer is powered up, all programs that were running are returned to their previous state.

FYI
There may be a hybrid power-down option, which is a combination of sleep and hibernation.

Handheld Device Operating Systems

Operating systems have been specially created for handheld devices such as smartphones and tablets. These operating systems are simpler because they are designed to work on smaller devices. The OS of these devices can run limited sets of programs, allow input from a touch screen, and facilitate communication functions, as shown in Figure 3-12.

The OS for a handheld device is unique to the device. For example, an iPhone will not run the Android operating system. When a smartphone is purchased, its specific OS is preinstalled. Examples of operating systems for handheld devices are:

- Android for Google Nexus Phone and other devices;
- iOS for Apple iPhone, iPad, and other Apple devices;
- Windows Phone for Nokia, HTC, and Samsung smartphones and other devices; and
- BlackBerry for BlackBerry smartphones and tablets.

The Android OS accounts for the largest portion of the handheld device market, about 85 percent. This is because the Android OS runs on devices manufactured by many companies, including Samsung, Motorola, and HTC. There are different versions of the Android OS just as there are different versions of other operating systems. The iOS represents about 10 percent of the market. The Windows Phone OS represents about 3 percent of the market. The BlackBerry OS represents about 1 percent of the market. The rest of the handheld market is made up of several, mostly open-source operating systems.

Georgejmclittle/Shutterstock.com

Figure 3-12. The operating system on a mobile device is simpler than one designed for a desktop or laptop computer due to the fact it is designed to run on a smaller device.

System Utility Programs

In terms of system software, **utility programs** assist in managing and optimizing a computer's performance. These programs can add extra protection against viruses and malware, assist in installing or removing software, find files, and speed up communication.

An example of a Windows system utility is the disk defragmenter. The disk defragmenter, or *defrag*, reorganizes the files stored on a disk so, as much as possible, files are not divided among different storage locations. Each time the file is saved, a new piece of the file is stored. This new piece, or segment, may not be stored next to all of the other segments of the file. Segments of the file are stored in free space throughout the hard drive. As a result, the file may not be one piece in a single location on the disk. As files are deleted, space is freed between files and segments. When segments are scattered, it takes the disk drive longer to read and use the files. This scattering of file segments is called fragmentation.

### HANDS-ON EXAMPLE 3.2.2
WINDOWS SYSTEM UTILITIES

Many of the Windows system utilities are accessed via the Control Panel window. Other system utilities are accessed through the **Start** screen or menu.

1. In Windows 8, click the **Apps** button at the bottom of the **Start** screen. In Windows 7, click the **Start** menu button.
2. Click **Control Panel** in the menu to display the Control Panel window.

HANDS-ON EXAMPLE 3.2.2 (CONTINUED)

3. Hover the cursor over a category. A tool tip will appear to identify what the utilities in that category can do. Help is available at every step to explain the process.

4. Click the **Uninstall a program** link below the **Programs** category. A list of the currently installed programs is displayed in the Control Panel window. Review the list to see what programs are installed. Do *not* uninstall any programs without permission.

5. Close the Control Panel window.

6. Display the **Start** screen or menu.

7. In Windows 8, move the cursor to the upper-right corner and click **Search** when the menu appears. In Windows 7, the search box is located at the bottom of the **Start** menu.

8. Click in the search box, and enter cttune.exe.

9. In the search results, click the cttune.exe program file. The **ClearType Text Tuner** dialog box is displayed, as shown. This is a wizard to adjust the clarity of the text display.

Check to turn on ClearType

Click to continue with the wizard
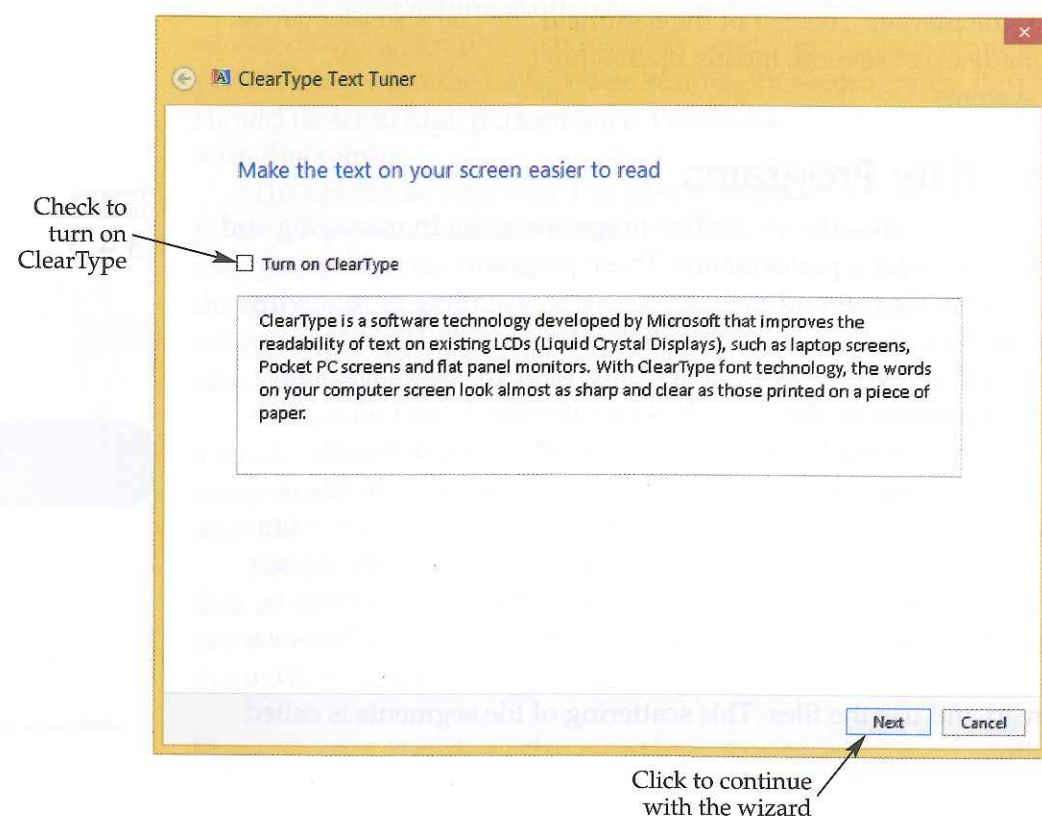
10. Check the **Turn on ClearType** check box, and click the **Next** button to move to the next page of the wizard.

11. The next four pages of the wizard give you a choice of sample text. Click the sample text that appears best to you, and click the **Next** button.

12. The final page of the wizard indicates it is finished. Close the program by clicking the **Finish** button.

Device Drivers

Computing Fundamentals
4.3.3

A **device driver** is a special software program that provides instructions to the operating system for how to use a specific peripheral. All peripherals require this type of system software, including printers, monitors, graphics cards, sound cards, and scanners, as shown in Figure 3-13. The use of device drivers makes it possible for software developers to write code that lets the user choose from a wide range of peripheral devices. Hardware developers write the device driver to a set of specifications. Software developers write programs that address those specifications. This simplifies the writing of application software because specific instructions do not need to be included to address every device that the software may possibly use.

For example, consider printing a document from a word processing program. The programmers of the word processor only need to write instructions for how to print, not how to communicate with every possible printer. When the user selects which printer to use, the operating system calls up the device driver for that printer. The OS then conducts the communication between the word processing software and the printer hardware to finish the print job.

When installing a new peripheral device, the Windows OS will detect new hardware. In many cases, the driver is automatically installed. However, in some cases Windows will run a wizard to help install the new device. Installing the device driver sets up the communication between the CPU and the new hardware.

Driver details

Click to update the driver
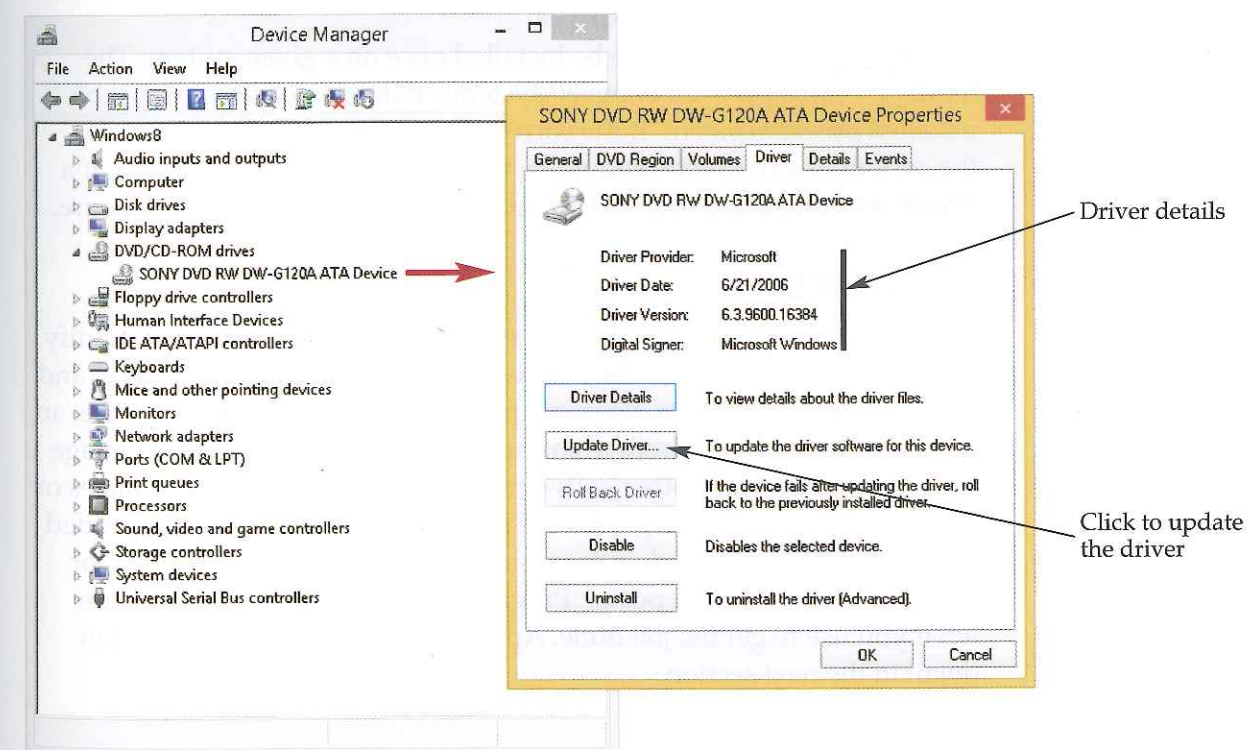
Figure 3-13. All peripherals have device drivers that provide instructions to the operating system on how to use the device.

TITANS OF TECHNOLOGY

Grace Murray Hopper made many key contributions to software development in the early stages of digital computers. Formerly an instructor at Vassar College, Hopper earned her PhD in mathematics from Yale University. She joined the Naval Reserve during World War II. Because of her high intelligence and innovative spirit, she was tapped to work on the Mark series of digital computers at Harvard. She rose to the rank of Rear Admiral in the US Navy, the first woman to reach that rank. Her programming career started by rearranging wires on circuit planes to provide instructions for the Mark I computer. After tiring of rewiring the same set of instructions and then having to move them to accommodate new instructions, Dr. Hopper invented relocatable code. This provided for her inventions of compilers and human-readable code. She wrote the first compiler, which was B-O for the Univac. It was created to accept human-readable code and translate it into computer code. Eventually, she coauthored the COBOL language, which is still used in some business applications to this day. Her most far-reaching contribution was the standardization of compilers. She directed teams at the Navy to develop procedures and eventually automated the process for validation of COBOL compilers. Often called the Grand Lady of Software, Dr. Hopper's impact on the field of software development is still felt today.

Peripheral devices often include a CD containing the device driver. The installation wizard may ask you for the location of the device driver. If this happens, specify the CD as the location. However, there may have been updates to the driver since the CD was created. It is best to download device drivers from the manufacturer's website. During the installation process, specify the folder that contains the downloaded driver as the location of the driver.

A peripheral only has to be installed once on a given system. The hardware can be moved between systems, but a device driver must be installed on each system. If the correct device driver already exists on the system, the hardware should be ready to use once it is attached. If a driver is not installed, the system will treat the device as new hardware.

Programs

Personal computers make it possible to organize, create, and modify documents, spreadsheets, slide shows, digital images, music, videos, and many other types of data. For example, with the appropriate software, an image can be captured from a smartphone or digital camera. This image then can be opened in other software and combined with other images or text and exported. The exported file can be placed in a newsletter, added to a slide show, enhanced with music in a digital media application, or output in hardcopy as a poster. Programs, or application software, are what you use to get the job done. Application software is discussed in detail in the next section.

3.2 SECTION REVIEW

CHECK YOUR UNDERSTANDING

1. What is the basic function of the operating system?
2. What is a computer platform?
3. Which type of system software assists in managing and optimizing a computer's performance?
4. What are special system software programs that provide instructions to the operating system for using a peripheral device?
5. Which type of system software is used to complete specific activities?

IC3 CERTIFICATION PRACTICE

The following question is a sample of the type of questions presented on the IC3 exam.

1. Which of the following is *not* a feature of an operating system?
   A. Communicate between the application software and the peripheral devices.
   B. Allocate memory.
   C. Save and retrieve files and data.
   D. Edit a photo.
   E. Provide utilities.

BUILD YOUR VOCABULARY

As you progress through this course, develop a personal IT glossary. This will help you build your vocabulary and prepare you for a career. Write a definition for each of the following terms and add it to your IT glossary.
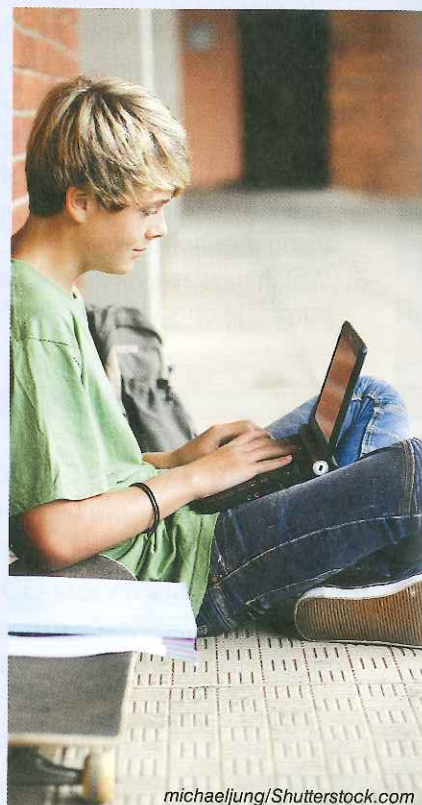
accessibility options
desktop theme
device driver
hibernation
language packs
platform
power down

power options
power states
sleep
system software
user account
utility programs

APPLICATION SOFTWARE

?E ssential
Q uestion

How does application software affect your daily life?

Application software is what you use to make the computer work for you. This may mean creating a letter or editing a photograph. You may wish to play an MP3 file or watch a movie. All of these tasks are done with application software.

All software must be used in a legal manner. In order to do so, the user must understand the license assigned to the software. Additionally, it is important to understand how software developers keep track of different versions of software. When installing software, a user must know the system requirements of the software version and be able to determine if his or her computer system can run the software.

michaeljung/Shutterstock.com

TERMS

application software
bugs
desktop publishing (DTP)
end user license agreement (EULA)
file format
for-purchase software
freeware
integrated development environment (IDE)
open-source software

podcasting
proprietary software
raster-based software
shareware
system requirements
template
vector-based software

LEARNING GOALS

- Explain software licenses.
- Describe application software.
- Install application software.

Software Licenses and Versions

Writing software requires time, talent, and dedication from programmers. When a company develops software, it makes money by selling a license to use the software. In some cases, advertising may be embedded in the software to earn money for the developer. Then, the software is made available for free.

Licenses

Software programs are governed by an end user license agreement. The **end user license agreement (EULA)** is a contract outlining the set of rules that every user must agree to before using the software. Some EULAs allow the software to be installed only once on one machine. Other agreements may allow the software to be installed multiple times on the same machine to allow for reinstallation after a hard drive failure. A *site license* allows the software to be installed on any machine owned by the company that purchased the software. Large organizations, such as school systems or large companies, will purchase a site license to receive a volume discount. Single-seat licenses generally have higher per-seat fees than site licenses.

One type of software license is proprietary software or closed software. **Proprietary software** or *closed software* is owned by the creator and cannot be sold, copied, or modified by the user without permission from the creator. The actual code written by the programmers is not available to the user.

Open-source software is software that has no licensing restrictions. The base code is available for anyone to distribute, copy, and modify, as shown in Figure 3-14. However, part or all of the code of open-source

Computing Fundamentals
3.2.1, 3.2.2, 3.2.3, 3.2.4

Living Online
4.2.6

FYI

If open-source software is the basis for a new application, credit should be given to the original programmers even if it is not required.
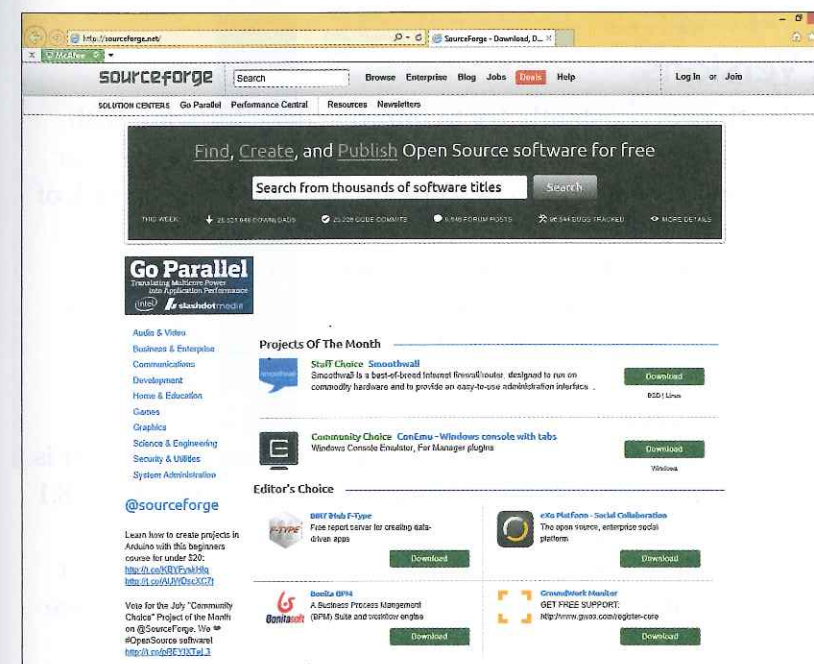
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Figure 3-14. SourceForge is an online community for open-source software.

software may be owned by an individual or organization. Generally, attribution must be made to the original software developers. Open-source software can be an alternative to proprietary software. Unlike proprietary software, these applications may not offer technical support. Open-source software depends on the members of the user community to assist each other and offer solutions.

Alternative-usage rights for software programs are typically covered by the GNU General Public License. The GNU General Public License (GNU GPL) guarantees all users the freedom to use, study, share, and modify the software. Open-source software usually has the GNU GPL assigned to it.

There may be shareware, freeware, and for-purchase options for software. **Shareware** is software that can be installed and used, then purchased if you decide to continue using it. Shareware usually has a notice screen, time-delayed startup, or reduced features. Purchasing the software removes these restrictions. **Freeware** is fully functional software that can be used forever without purchasing it. To be considered freeware, the software should not be a restricted version of for-purchase software. If it does, the software is considered shareware. **For-purchase software** is software you must buy to use, although you can often download a timed or limited-use demo.

The difference between a demo of for-purchase software and shareware is subtle. Typically, shareware software is not time-limited, meaning that the software remains functional forever with the restrictions in place. Shareware is based on the honor system where those who continue to use the software purchase the software. A demo of for-purchase software, however, typically stops working after a period of time. In the case of a limited-feature demo, the best features are either not functional or functional for a limited time.

Software Versions

Software developers constantly try to improve their software with new features and by eliminating bugs. **Bugs** are programming errors or oversights. Developers use a system of software versions to keep track of what has changed and when.

The first version of a software program is generally given the number 1. Later versions are given higher numbers. For example, there are several versions of Windows. The first version was Windows 1.0, which was released in late 1985. Windows 8 was released in late 2010, while Windows 8.1 was released in late 2013.

When small changes are made to the software, the version number is assigned a number following a decimal point. For example, Windows 8.1 is the second version of Windows 8, with the original version being Windows 8.0. Generally, these "point releases" or "dot releases" correct bugs that are discovered after the general public has had a chance to use the software.

FYI

There are many versioning systems used by software developers. Some are based on dates, numbers, or letters.

HANDS-ON EXAMPLE 3.3.1

SOFTWARE VERSIONS

Programmers include notation of the software version within the software. When troubleshooting problems with the software, technical support staff will ask the user to identify which version he or she is using. In this activity, you will find the version of Windows and Microsoft Office installed on your computer.

1. In Windows 8, click the **Apps** button. In Windows 7, click the **Start** button on the taskbar.
2. Click **Control Panel** in the menu. The Control Panel window is displayed.
3. Click **System and Security** in the Control Panel window. Note: if you do not see this option, click the **View by:** link at the top of the dialog box, and click **Category** in the drop-down menu.
4. Click the **System** heading. The Control Panel window displays information about the computer system, including information about Windows.
5. Close the Control Panel window.
6. Launch Microsoft Word.
7. In Microsoft Word 2013, click **Account** on the **File** tab of the ribbon. In Microsoft Word 2010 or 2007, click the **Office** button and click **Word Options** in the menu to display the **Word Options** dialog box.
8. In Microsoft Word 2013, click the **About Word** button in the backstage view. In Microsoft Word 2010 or 2007, click **Resources** in the **Word Options** dialog box.
9. Locate the version of Microsoft Word, as shown.
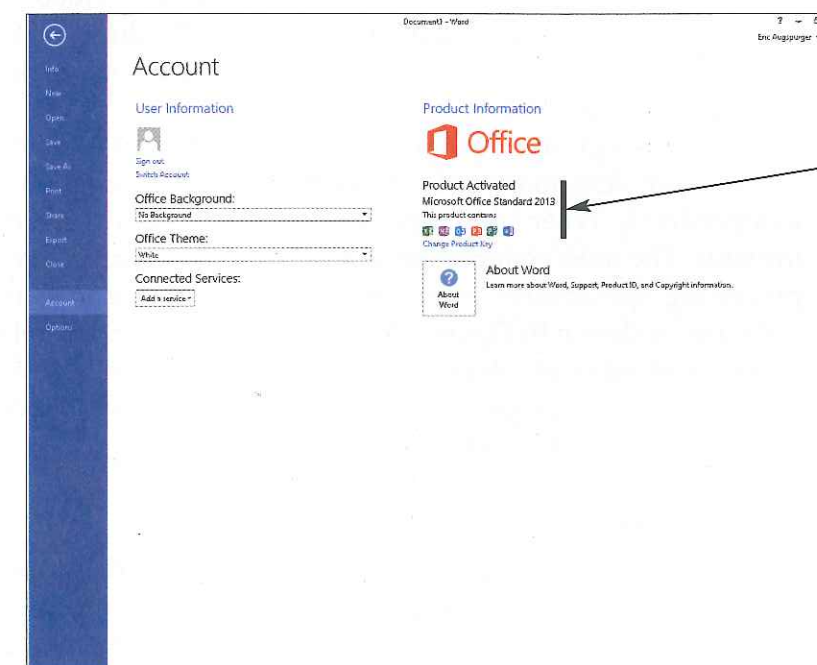
Version information

Application Software

Application software allows the user to perform specific activities, such as writing term papers, sending e-mail, paying taxes, editing photos, playing games, and taking online courses. There are four general types of application software: productivity, entertainment and educational, utility, and development.

Most application software can save information in various file formats. The **file format** indicates the manner in which the data the file contains are stored on the disk. The primary file format for given software is said to be the software's *native format*. There is usually a header portion of the file that contains information about the document. The content of the header is determined by the software that created the file. The header may contain information on what program was used to create the file; what language it is written in; and formatting settings, such as margins and fonts. Following the header is the body of the file. This contains the data the user added to the file. The purpose of the file format is to make it easy to reopen the file and arrange it on the screen. On a Windows system, the file name extension indicates the file format.

Productivity Software

Productivity software is software that supports the completion of tasks. This group includes software for word processing, creating spreadsheets and presentations, editing graphics and video, and managing databases, among many other tasks. Productivity software often contains templates to help the user get started on a task or wizards to simplify complex tasks.

A *suite* is a group of programs, usually with similar interfaces, that provide complementary tasks. All of the individual programs function independently. When used together, data can be easily shared across the suite. The most common programs in an "office suite" are word processing, spreadsheet, presentation, and database management software, as shown in Figure 3-15. Microsoft Office and Corel Office are examples of suites of integrated productivity software. The software in these two suites is proprietary. Open-source alternatives for office suites are OpenOffice and LibreOffice.

Documents

When personal computers became popular, word processors were one of the first types of programs written for them. Word-processing software assists the user with composing, editing, designing, printing, and publishing documents. All modern word-processing software makes it possible to quickly enter text, complete insertions and deletions, correct mistakes, make revisions, check for spelling and grammar, combine documents, and add illustrations. Word processors are the most common type of application software.
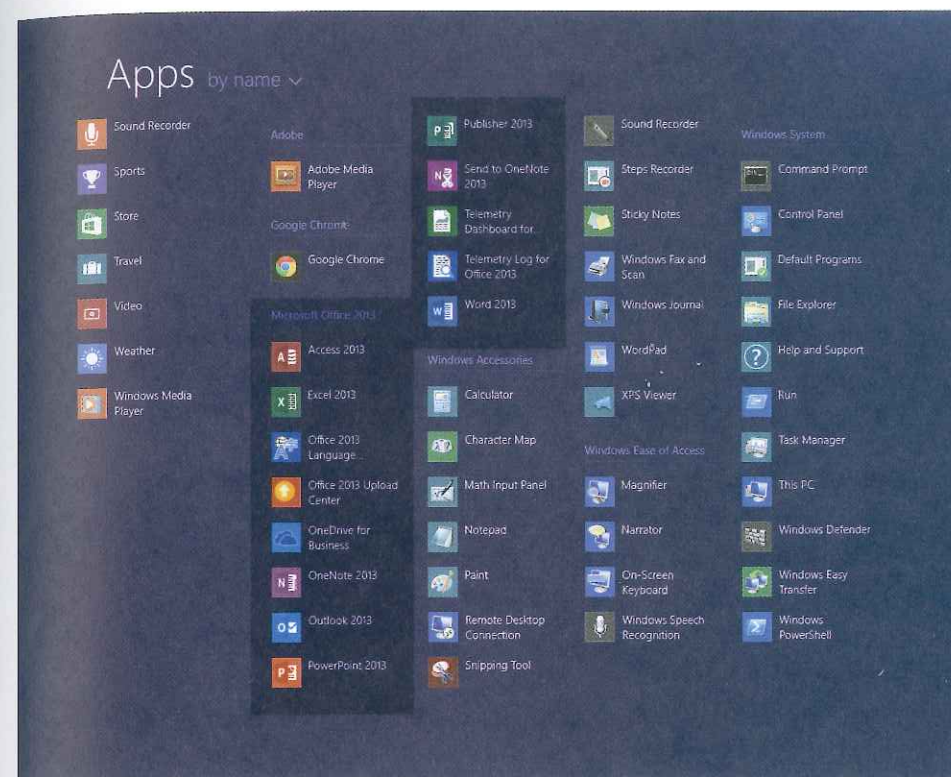
When a word processor is launched, it creates a blank document or offer the option to select a template. A **template** has formatting and

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Figure 3-15. The Microsoft Office suite contains many programs. Depending on which version of Microsoft Office you have, there may be other programs not shown here or some of the programs shown here may not be included.

organizational suggestions that can help the user create a professional-looking document. For example, Microsoft Word offers templates for letters, flyers, faxes, meeting agendas, budgets, and many more.

Microsoft Word is a common word processor. LibreOffice Write and AbiWord are open-source alternatives. These word-processing programs can read each other's data. When opening a file created in one of the other word processors, all text will be present, but the document may not look exactly the same. This is because the programs support different features. The native file format for Microsoft Word is the DOCx format. The native file format for LibreOffice Write is the ODT format. The native file format for AbiWord is the ABW format.

While word processors may offer some basic page-layout functions, they are not desktop publishing software. **Desktop publishing (DTP)** is the process of using a computer to typeset text and place illustrations to create, edit, and publish documents. Desktop-publishing software offers complex features for setting up text boxes and manipulating artwork. It is used to create newspapers, newsletters, brochures, advertisements, books, and many other types of documents.

Web-authoring software provides tools for designing and creating web pages. A web page is simply a text document that contains the code for how the page will appear and function. Web-authoring software, such as Adobe Dreamweaver, reduces or eliminates the need to write lines of code to create web pages.

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3.3.3

Spreadsheets

Spreadsheet software is used to create, organize, and edit data in a table composed of rows and columns, as shown in Figure 3-16. The cells in the table can contain text, numbers, or mathematical equations. Each table or grid, which is the spreadsheet, is called a worksheet. Each spreadsheet document file may contain multiple worksheets.

Spreadsheet software is very popular with accountants, payroll administrators, and financial managers. It can perform complex calculations. It makes keeping a grade book, balancing a checkbook, or computing the monthly payment on a car loan easy. Spreadsheet software is also very useful in creating colorful graphs based on data entered in table format.

Microsoft Excel is an example of spreadsheet software. An open-source alternative is LibreOffice Calc. The native file format for Microsoft Excel is the XLSx format. The native file format for LibreOffice Calc is the ODS format.

Data Management

A database is information stored in tables. Database software is used for tracking large amounts of data. It is useful because it can retrieve a small part of the data that the user requests.

Businesses use databases to monitor all of the information about clients. The benefit of a database is seen when the user asks, or *queries*, the database to show a specific piece of information. For example, the user could request just the information of clients in one particular location.

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Figure 3-16. A spreadsheet contains data arranged in rows and columns.

Most businesses also use database software to track their employees and related data, such as address, job title, salary, and certifications. Schools use database software to track information about students, including courses, grades, and attendance.

The most common database software includes Microsoft Access, SQL Server, MySQL, and Oracle. The native file format for Microsoft Access databases is the ACCDB format.

Presentations

Presentation software provides tools to combine text, photographs, clip art, video, and graphs into a series of slides for playback. A presentation allows a speaker to visually enhance the topic of the speech. Enhancing the experience of the audience can make the event more memorable. Slide shows are used extensively in classroom lectures, business presentations, company meetings, sales events, and conferences.

Presentations, or slide shows, are normally projected onto a large screen for viewing by a group of people. Sometimes presentations are intended for individual viewing on a computer screen. Often, a slide show presented to a group is later posted to the Internet for individual viewing.

Presentation software includes tools to add transitions between slides. The elements on each slide can be animated to add movement. Speaker notes can also be included to help the presenter.

Common presentation software includes Microsoft PowerPoint, Google Slides, and Zoho Show. Google Slides and Zoho Show are cloud-based solutions. LibreOffice Impress is an open-source alternative. The native file format for Microsoft PowerPoint data is the PPTx format. The native file format for LibreOffice Impress is the ODP format.

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## HANDS-ON EXAMPLE 3.3.2

OFFICE SUITE SOFTWARE

The programs in the Microsoft Office suite of software share a similar interface. It is common for the software in a suite to have similar functions in similar locations.

1. Close any open applications.
2. Open Microsoft Word, and start a blank document.
3. Open Microsoft Excel, and start a blank workbook.
4. Open Microsoft PowerPoint, and start a blank presentation.

HANDS-ON EXAMPLE 3-2-2 (CONTINUED)

5. Right-click on the Windows taskbar, and click **Show windows stacked** in the shortcut menu, as shown.

Right-click   Click
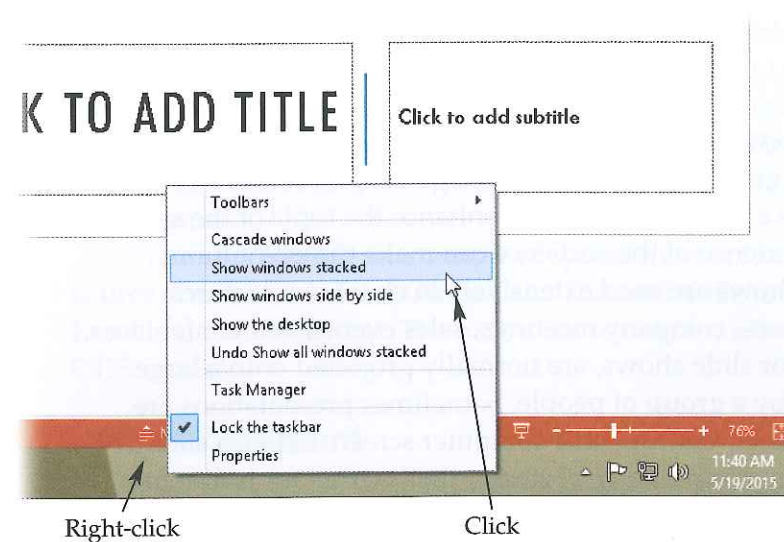
6. List the ribbon tabs that are in all three programs. For example, all three programs have a **Home** tab.
7. Click the **Home** tab in each program.
8. List the group names on the **Home** tab that are in all three programs. For example, all three programs have a **Clipboard** group on the **Home** tab.
9. Which one group on the **Home** tab contains the same tools in all three programs?

Graphics

Graphics are pictures, drawings, photographs, and images used as decoration or to enhance or illustrate a topic. Generally, graphics can be called artwork. Graphics software is used to create, edit, print, and distribute the artwork. Professional artists use graphics software as a primary tool. However, there is graphics software designed for novice users as well. There are two types of graphics software: raster and vector.

Raster-based software creates graphics composed of dots or pixels, as shown in Figure 3-17. Each pixel is assigned a specific color and location. All of the colored pixels are mapped to form the image. Therefore, a raster image is often called a *bitmap*. As a raster image is scaled up or down, there is a loss of quality because the computer must calculate the changes in color for each pixel.

Raster-based software is used to edit digital photographs and similar graphics. Artwork created as a raster image may include commercial logos, advertisements, images for CD covers, and backgrounds for magazine and book covers. An example of basic raster-based software

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FYI

All digital photographs and scanned images are raster images.

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Figure 3-17. Raster images become pixilated when enlarged, but vector images can be infinitely scaled without loss of clarity.

is Microsoft Paint, which is included in the Windows OS. Advanced raster-based software contains tools for adjusting color, brightness, and contrast; removing red-eye; applying filters for artistic effect; and other functions. Advanced raster-based software includes Adobe Photoshop, Corel Painter, Picasa, and GIMP. Picasa is freeware from Google. GIMP is an open-source alternative.

Vector-based software creates graphics composed of lines, curves, and fills based on mathematical formulas. Instead of storing the image definition as a map of colored pixels, each element in the image is created by its mathematical definition. Since the image is defined by a mathematical formula, it can be infinitely scaled up or down without loss of quality.

Vector-based software is used to create line drawings. Artwork created as line drawings may include diagrams, cartoons, logos, and floor plans. Vector-based software generally falls into one of two categories, creating illustrations and drafting. Examples of vector-based software used to create illustrations include Adobe Illustrator, Corel Designer, Inkscape, and LibreOffice Draw. Inkscape and LibreOffice Draw are open-source alternatives. Examples of vector-based software used for computer-aided drafting and design (CAD) include AutoCAD, LibreCAD, and SketchUp. LibreCAD is an open-source alternative.

Graphics can be saved in many different file formats. Common raster file formats include JPEG, TIFF, GIF, and PNG. Common vector file formats include EPS, AI, SVG, WMF, and DXF.
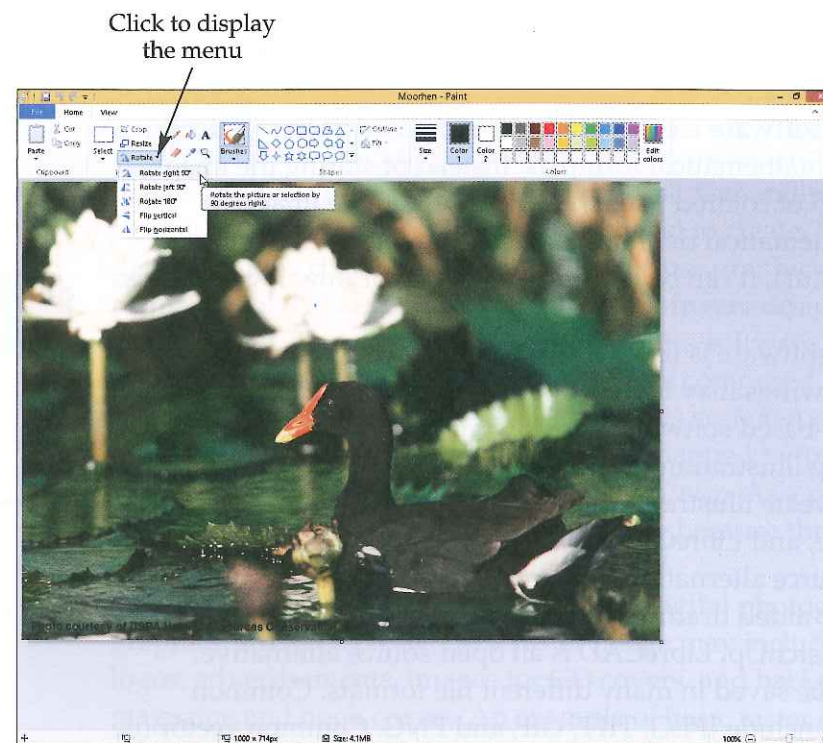
HANDS-ON EXAMPLE 3.3.3

RASTER IMAGE EDITING

Microsoft Paint is basic raster-based software. It contains basic tools for creating and editing raster images, such as digital photographs.

1. Insert your PRINC-OF-IT flash drive into the computer.
2. Create a folder on the flash drive named Chap03.
3. Navigate to the student companion website at www.g-wlearning.com, download the data files for this chapter, and save them in the Chap03 folder on your flash drive.
4. In Windows 8, click the **Apps** button, followed by **Paint** in the **Windows Accessories** category. In Windows 7, click the **Start** menu button, followed by **All Programs>Accessories>Paint**. Microsoft Paint is launched.
5. In Windows 8, click the **File** tab followed by **Open**. In Windows 7, click the **Paint** button to the left of the **Home** tab, and click **Open** in the menu. A standard Windows open dialog box is displayed.
6. Navigate to your working folder where the data files for this class were downloaded.
7. Select the Moorhen.tif image file, and click the **Open** button. The photograph is opened in Paint.
8. Maximize the Paint window by clicking the **Maximize** button. This button is located in the upper-right corner of the window to the left of the **Close** button (X).
9. Click the **View** tab, and then click the **Zoom out** button. The display size of the image is reduced, but the actual size of the image is unchanged.
10. Click the **Home** tab, and then click **Rotate** button. A drop-down menu is displayed.
11. Click **Rotate right 90°** in the drop-down menu. The image is rotated 90 degrees clockwise, as shown.

Click to display the menu

HANDS-ON EXAMPLE 3.3.3 (CONTINUED)

12. Experiment with other features of Paint.
13. Click the **Close** button (X). When prompted to save changes, click the **Don't Save** button.

Digital Audio

Digital-audio software is used to create and edit music, narration, and other sounds in digital format. The resulting audio files can be played on computers, portable music players, or entertainment centers or added to videos or web pages. Podcasting is another use for digital audio. **Podcasting** is the distribution of audio files, such as episodes of radio or music broadcasts, over the Internet via automated or subscribed downloads.

Software for composing music includes MAGIX Music Maker, Apple GarageBand, and LMMS. LMMS is an open-source alternative. These programs have instruments built into the software. They can also edit the audio. Audio-editing software includes Sony ACID Pro, Sony Sound Forge, and Audacity. Audacity is an open-source alternative.

Two common audio file formats are waveform audio file (WAV) and MP3. The WAV format is the primary format used in Windows for uncompressed audio. The MP3 format is highly compressed. This allows the size of recordings to be reduced. For example, if a CD holds 10 uncompressed songs, it may be able to hold over 100 of those songs if they are compressed in the MP3 format.

Videos

Video software is used to create, edit, and publish digital video recordings. Using this software, titles, animation, audio, and effects can be added to video recordings. Additionally, the video itself can be trimmed and spliced to remove unwanted footage. Many video-editing programs use drag-and-drop techniques that make it possible to create professional-looking products with little training.

The equipment necessary to create digital video recordings is small, light, and portable. It uses built-in hard drives, flash drives, or DVDs to record many hours of video. Digital camcorders are available in a range of prices and features. Smartphones can also be used to record video, typically at a lower quality than a digital camcorder can create.

Several programs are available, from ones that offer full-scale special effects to more moderately priced options. Adobe After Effects, Apple Final Cut Pro, Apple iMovie, Microsoft Live Movie Maker, and Avidemux are examples of full-feature video software. Avidemux is an open-source alternative.

Entertainment and Educational Software

Some application software is designed for entertainment and educational purposes. This software is not used to create an end product,

like productivity software does. Rather the software is used for the joy of using it or to learn new information.

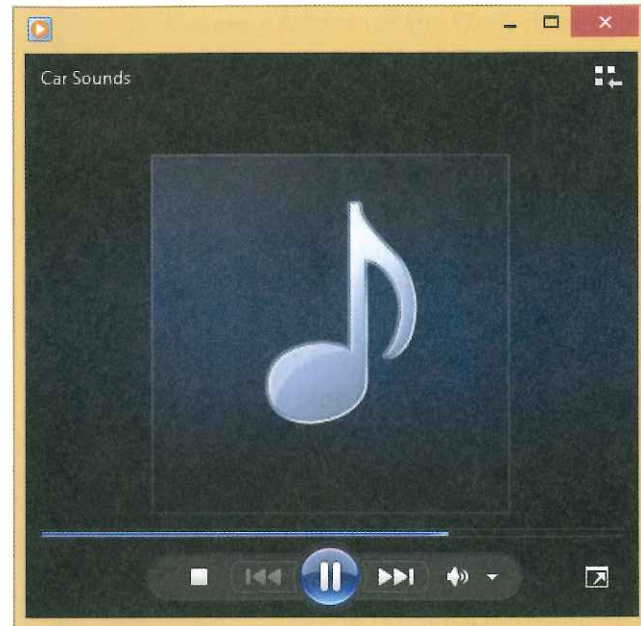### Entertainment

Computing Fundamentals 3.3.6

Entertainment software provides amusement to the person using it. This software may be a video game, allow the user to watch movies or listen to music, or simulate a realistic environment, as shown in Figure 3-18. Video games are perhaps the most popular type of entertainment software.

Video games have evolved into many different categories, including simulations, action, puzzles, and sports, among others. Multiplayer games make it possible for two or more players to participate in the same game. Online games use the Internet to allow players to participate and communicate while they play from different locations. Video games can create virtual realities that are sophisticated, artificial environments, which in turn create realistic experiences for the players.

Entertainment software often requires a fast CPU, a high-powered video card, a significant amount of RAM, and a large hard disk. Some digital games require unique hardware that is sold with the software, such as a controller in the shape of a musical instrument. Internet-based entertainment software often requires a high-speed Internet connection.

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Figure 3-18. Windows Media Player is an example of entertainment software. It can be used to play music, sound files, or videos.

Education

Educational software teaches the user a new skill or provides new knowledge. This software may teach users how to type, speak a foreign language, or play a musical instrument.

Personal computers and the Internet provide an opportunity for mass education. Taking classes online is becoming more popular. Online courses allow students to attend a class when it is convenient for them and eliminates having to travel to a physical site.

Simulation programs allow users to practice skills in a virtual environment instead of a real-world environment. This is a benefit since users can experience a potentially hazardous environment without suffering the consequences of a mistake. Examples include simulating landing a helicopter, piloting a ship into a narrow harbor, using surgical instruments, and performing a complex machine operation.

Simple tutorial programs can teach users how to use new software. There are also tutorial programs for preparing students for national exams, such as SAT, ACT, MCAT, LSAT, GRE, and GMAT.

Application Utility Software

A certain number of small application utilities are supplied with the Windows operating system. They include a calculator, a clock and calendar, a basic text editor, and others. The calculator and notepad are located in Windows Accessories group of the **Apps** menu in Windows 8 or the Accessories folder in the **Start** menu in Windows 7. Other programs are accessed through the system tray. The system tray, or *systray*, is located on the right-hand side of the taskbar. The clock and calendar and speaker volume control are located in the systray.

Development Software

Development software is a program used to create new software programs. Software programs are written in a high-level language and then compiled into machine language. An **integrated development environment (IDE)** provides editing capability to write and correct program codes, compilers to convert the code into machine language, and linkers to make executable files. An IDE may contain a software development kit (SDK), library of code snippets, toolkit, application programming interface (API), and overall framework.

Microsoft Visual Studio (VS) is one such IDE. VS supports programming in a variety of languages and generates executable programs for Microsoft systems. Game engines are another example of IDEs. These programs provide the tools needed to design and implement video games. Unity and Multimedia Fusion are just two examples of the dozens of game engines that are IDEs.

Installing Software

When a user chooses what software to use, the software program must be placed on the system. This is called *installing* the software or *setup*. The process for installing software is created by the programmers who developed the software. Simple applications might just require copying the program files to the hard drive. More complex software generally requires an advanced procedure that modifies the operating system, as shown in Figure 3-19.

Before attempting to install software, the user should verify that the software and the computer are compatible. This means checking that the software is made for the installed operating system and that there is enough space to install the program files. Each software program should list the **system requirements**, which are specifications for the processor speed, RAM, hard drive space, and any additional hardware or software needed to run the software.

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Figure 3-19. Most programs have an installer that is used to properly set up the software on the computer.

New Installation

For Windows-compatible products, a standard setup procedure is dictated by Microsoft. This procedure performs several steps:

- determine if the software already exists
- look for enough space to install
- copy the program files onto the disk
- set up data files and folders
- create shortcuts to the program in the **Apps** or **Start** menu and optionally on the taskbar or desktop
- enter a file association for each file type that is created by the new program

Some installation utilities offer options for the advanced user. For example, a software program may allow a full or partial installation. A full installation would consist of all files required for the program to work plus other files such as samples or a library. A partial installation consists of only the files required for the program to work. In some cases, a partial installation will allow the user to select some of the additional files to be installed.

FYI

If you are unsure of what features to install, it is generally safe to accept the default settings.

HANDS-ON EXAMPLE 3.3.4

SYSTEM REQUIREMENTS

Memory and storage specifications are two common system requirements. In Windows, it is easy to find out how much memory and storage exist on the system.

1. In Windows 8, click the **Apps** button, and click **This PC** in the **Windows System** group. In Windows 7, click the **Start** menu button, and click **Computer** in the right-hand pane. Windows Explorer is launched with the computer selected.
2. Scroll down until the local hard drive (C:) is visible in the right-hand pane, as shown. Write down the amount of free space reported. This is the amount of space available for software installation, although never allow a hard drive to be completely full.

Available space
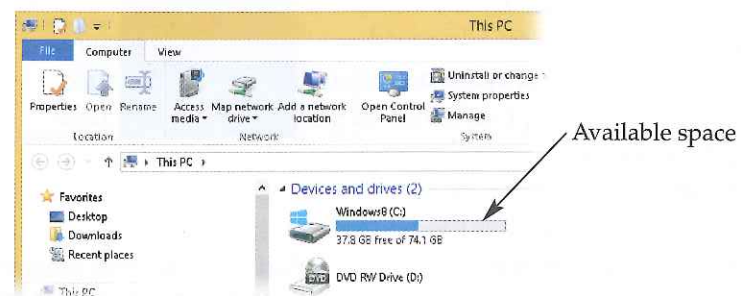
HANDS-ON EXAMPLE 3.3.4 (CONTINUED)

3. Click **System properties** in the ribbon or on the menu bar. Windows Explorer displays basic information about the computer in the right-hand pane, as shown.

Information about the computer
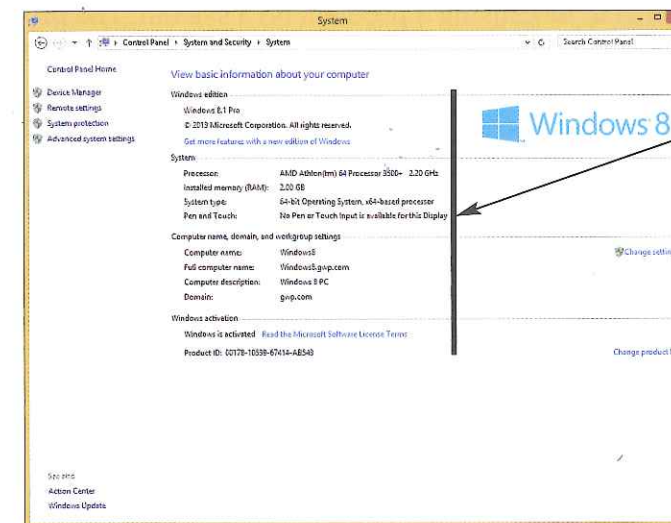
4. In the **Windows** section of the information, determine the operating system. Record this information.
5. In the **System** section of the information, determine the amount of memory installed. Record this information.
6. Go to a store, either online or a physical store, that sells software. Select a program that interests you. Determine if your computer system meets the operating system, memory, and storage system requirements of the software.

Updates

Updates, sometimes called *patches* or *service packs*, are fixes to the software to correct bugs, remove security issues, or otherwise improve a version of a software program. When a software update becomes available, it is a good idea to apply it.

Microsoft automatically handles updates on its operating systems. Part of the shutdown process involves connecting with the Microsoft website to see if any updates need to be loaded. If an update is available, the system will automatically download and install it. Microsoft will report to the user how many updates are being applied as well as the progress of the installation. In some cases, an update requires the system to be restarted to activate the upgrade.

Some PCs are rarely turned off. In this case, Windows can be configured to automatically install updates without a shutdown. It is common in business and school settings for computers to remain on overnight so that updates can be installed without interrupting work.

Most software will have updates throughout the life of a version. If the software is registered, the developer will generally send a notification

FYI

The computer should not be turned off until the update procedure is complete.

when a new update is available. Many software programs automatically check for updates whenever the computer is connected to the Internet.

Uninstallation

A software program should be removed when it is no longer needed or seems to be causing a problem on a system. The process of removing software is called *uninstallation*. Often, this is referred to as performing an *uninstall*.

When a program is installed, many files are copied to the hard drive, often in many locations. Many installations also alter the operating system. The proper way to remove software is to use the uninstall option that came with the software. Running this option will remove all of the files that were installed, reverse any alterations to the OS, and remove shortcuts to the program. If an uninstall feature is not included with the software, use the **Add or Remove Programs** function in the Windows Control Panel to remove the program, as shown in Figure 3-20.

Reinstallation

Reinstallation is the process of reloading a software program on the computer system, usually in the same location as an existing installation of that software. Reinstallation, often called *performing a reinstall*, is
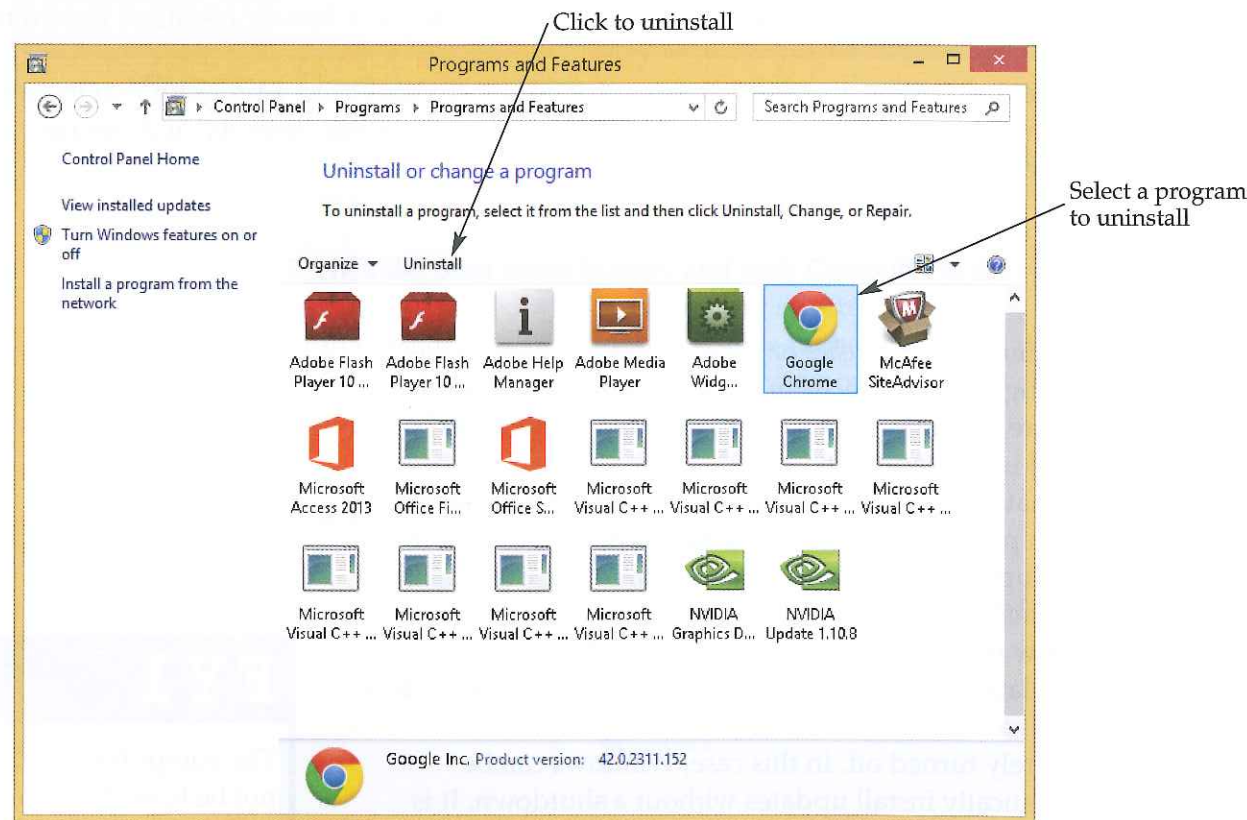
Figure 3-20. Windows contains a utility that is used to remove installed programs from the computer.

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usually done to reset an installed program to its defaults or to fix the program if it has become corrupted.

To reinstall software, take the same steps as installing new software. Follow the installation program wizard. Many installation programs will detect if the software is already installed and give the user the option to repair or fully reinstall the software. In some cases, the software cannot be reinstalled unless the previous version has been removed. The installation wizard should step through whatever process is needed to reinstall or repair the software.

3.3 SECTION REVIEW

CHECK YOUR UNDERSTANDING

1. What is the name given to the permission to use a software program?
2. What does the file format indicate?
3. Describe the difference between raster and vector graphics.
4. What should be listed in the system requirements for software?
5. Describe the purpose of a patch or service pack.

IC3 CERTIFICATION PRACTICE

The following question is a sample of the type of questions presented on the IC3 exam.

1. Determine whether each feature is a function of the OS or the application software.

OS	App	Feature
		Restart system
		Format a document
		Communicate with the peripheral devices
		Install or Uninstall a program
		Start a program

BUILD YOUR VOCABULARY

As you progress through this course, develop a personal IT glossary. This will help you build your vocabulary and prepare you for a career. Write a definition for each of the following terms and add it to your IT glossary.

application software
bugs
desktop publishing (DTP)
end user license agreement (EULA)
file format
for-purchase software
freeware
integrated development environment (IDE)
open-source software
podcasting
proprietary software
raster-based software
shareware
system requirements
template
vector-based software

Chapter Summary

Section 3.1
Language of Computers

- Communication inside a computer is conducted through a series of on-off signals. These signals are electrical in an electronic computer and represent either 1 or 0.
- There are various number systems in the world. Computers are based on the binary and hexadecimal systems.
- Code is computer-readable instructions. Programs are compiled to create computer-readable code.

Section 3.2
System Software

- The operating system performs communication with the user and the hardware. There are several different operating systems supporting several platforms.
- System utility programs assist in managing and optimizing a computer's performance. These programs may provide security, assistance, or communication, among other things.
- Device drivers provide instructions to the operating system for particular hardware. Device drivers are used to simplify the process of creating compatible hardware and software.
- Programs are what you use to get the job done. Programs may allow you to create and edit documents, play music, create images, and many other tasks.

Section 3.3
Application Software

- The software license specifies how the software may be legally used. Versions

of software are created to correct bugs or offer new features.

- Application software allows the user to perform specific activities. The software may be related to productivity, entertainment, education, or other tasks.
- Software must be installed in order for it to be used. Once installed, software may need to be updated, uninstalled, or reinstalled.

Now that you have finished this chapter, see what you know about information technology by scanning the QR code to take the chapter posttest. If you do not have a smartphone, visit www.g-wlearning.com.

Chapter 3 Test

Multiple Choice

Select the best response.

1. Programs written in a high-level language are always:
   A. interpreted at run-time.
   B. readable by the CPU.
   C. translated into machine language.
   D. linked for all computers.

2. The value 3.1415926 would belong to which data type?
   A. integer
   B. floating point
   C. string
   D. date

3. Languages are used in computer programming to:
   A. speak with a computer.
   B. write computer instructions at a human level.
   C. segment the hard drive.
   D. communicate with the hardware.

4. Small files that facilitate the operating system's communication with peripherals are _____.
   A. utilities
   B. boot procedures
   C. help files
   D. device drivers

5. Open source software is characterized by:
   A. proprietary copyright.
   B. free distribution of derivative applications.
   C. publicly available programming development files.
   D. costly software updates.

Completion

Complete the following sentences with the correct word(s).

6. Decimal, binary, and hexadecimal are examples of _____.

7. Object-oriented programming languages are known as _____-level languages.

8. The _____ performs communication with the hardware.

9. _____ software has no licensing restrictions.

10. _____ supports the completion of tasks, such as creating documents or spreadsheets.

Matching

Match the correct term with its definition.

A. base-16 arithmetic
B. data type
C. operating system
D. device driver
E. proprietary software

11. Hexadecimal notation.

12. Manages the activities on a computer such as communicating with the hardware and running the software.

13. Cannot be sold, copied, or modified by the user without permission from the creator.

14. Description of values or information that can be accepted.

15. Used by OS to communicate with hardware.

Application and Extension of Knowledge

1. Research the history of the Hindu-Arabic numeral system. Write a one-page paper describing the origin of this system and its spread throughout the world.

2. Identify five computer programming languages. Classify each as a high- or low-level language. Prepare for a class discussion explaining why you classified each as you did.

3. Use the search function in the Windows **Start** screen or menu to search for resmon. This is the Resource Monitor utility. Launch it. Click the **Overview** tab in the Resource Monitor. Examine what information is displayed in the graphs on the right. Identify the percentage of CPU usage. Speculate how this utility can help examine the performance of the computer system.

4. Write a one-page paper that compares and contrasts the various types of software licenses. Provide examples of software available for each type of license. Speculate why a business may consider each type of license when obtaining software.

5. Identify three application software programs on your computer. Compare and contrast their functions and why you use them. Prepare for a class discussion on the importance of application software to your daily life.

Online Activities

Complete the following activities, which will help you learn, practice, and expand your knowledge and skills.

Certification Practice. Complete the certification practice test for this chapter.

Vocabulary. Practice vocabulary for this chapter using the e-flash cards, matching activity, and vocabulary game until you are able to recognize their meanings.

Communication Skills

College and Career Readiness

Speaking. Most people in the United States act as responsible and contributing citizens. How can a person demonstrate social and ethical responsibility in a digital society? Can you think of ways that are not discussed in this chapter?

Listening. Passive listening is casually listening to someone speak. Passive listening is appropriate when you do not have to interact with the speaker. Listen to a classmate as he or she is having a conversation with you. Focus attention on the message. Ask for clarification for anything that you do not understand. Provide verbal and nonverbal feedback while the person is talking.

Writing. Generate your own ideas relevant to using digital technology in the appropriate manner. Use multiple authoritative print and digital sources and document each. Write several paragraphs about your findings to demonstrate your understanding of digital citizenship.

Internet Research

Personal Information Management (PIM). Research personal information management (PIM) applications using various Internet resources. Identify a system that would work for you. Explain how you can apply a PIM system to your daily schedule.

Teamwork

Working with your team, research e-mail software. Make a chart showing at least five options, the system requirements, and the cost to purchase. One of the software options should be freeware. Write a memo to your supervisor (your teacher) listing the options and recommending an e-mail software program.

Portfolio Development

College and Career Readiness

Hard Copy Organization. As you collect material for your portfolio, you will need an effective strategy to keep the items clean, safe, and organized for assembly at the appropriate time. Structure and organization are important when working on an on-going project that includes multiple pieces. A large manila envelope works well to keep hard copies of documents, photos, awards, and other items. A three-ring binder with sleeves is another good way to store your materials.

Plan to keep similar items together and label the categories. For example, store sample documents that illustrate your writing or technology skills together. Use notes clipped to the documents to identify each item and state why it is included in the portfolio. For example, a note might say, "Newsletter that illustrates desktop publishing skills."

1. Select a method for storing hard copy items you will be collecting.

2. Create a master document to use as a tracking tool for the components of your portfolio. You may list each document alphabetically, by category, date, or other convention that helps you keep track of each document that you are including.

3. Record the name of each item and the date that you stored it.

CTSOs

EVENT PREP
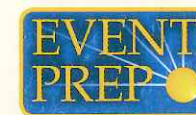
Objective Test. Some competitive events for CTSOs require that entrants complete an objective component of the event. This event will typically be an objective test that includes terminology and concepts related to a selected subject area. Participants are usually allowed one hour to complete the objective test component of the event. The Global Business event may also include a team activity, case, or role play. To prepare for an objective test, complete the following activities.

1. Read the guidelines provided by your organization.

2. Visit the organization's website and look for objective tests that were used in previous years. Many organizations post these tests for students to use as practice for future competitions.

3. Look for the evaluation criteria or rubric for the event. This will help you determine what the judge will be looking for in your presentation.

4. Create flash cards for each vocabulary term with its definition on the other side. Ask a friend to use these cards to review with you.

5. Ask your instructor to give you practice tests for this chapter of the text that would prepare you for the subject area of the event. It is important that you are familiar with answering multiple choice and true/false questions. Have someone time you as you take a practice test.