

# PROGRAMS AND APPS: Productivity, Graphics, Security, and Other Tools

# 4



People use a variety of programs and apps on their computers and mobile devices.

**“I use my computer and mobile devices to complete homework assignments, pay bills, edit digital photos, post social media updates, and play games. I also use an antivirus program. What other programs and apps could I need?”**

**While you may be familiar with some of the content in this chapter, do you know how to ...**

- Determine safe websites for downloading software?
- Ensure you are not plagiarizing Internet content?
- Safely use a personal finance app?
- Use project management software?
- Avoid risks when using payment apps?
- Edit and share photos?
- Use voice command personal assistant apps?
- Identify different types of viruses and malware?
- Recognize a virus hoax?
- Protect your smartphone against malware threats?
- Recognize a phishing message?
- Uninstall a program or remove an app?
- Compress and uncompress files and folders?

In this chapter, you will discover how to perform these tasks along with much more information essential to this course. For additional content available that accompanies this chapter, visit the free resources and premium content. Refer to the Preface and the Intro chapter for information about how to access these and other additional instructor-assigned support materials.

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## Objectives

### After completing this chapter, you will be able to:

- 1 Identify the general categories of programs and apps
- 2 Describe how an operating system interacts with applications and hardware
- 3 Differentiate among the ways you can acquire programs and apps: retail, custom, web app, mobile app, mobile web app, shareware, freeware, open source, and public-domain
- 4 Identify the key features of productivity applications: word processing, presentation, spreadsheet, database, note taking, calendar and contact management, project management, accounting, personal finance, legal, tax preparation, document management, support services, and enterprise computing
- 5 Identify the key features of graphics and media applications: computer-aided design, desktop publishing, paint/image editing, photo editing and photo management, video and audio editing, multimedia and website authoring, media player, and disc burning
- 6 Identify the uses of personal interest applications: lifestyle, medical, entertainment, convenience, and education
- 7 Identify the purpose of software used in communications
- 8 Identify the key features of security tools: personal firewall, antivirus programs, malware removers, and Internet filters
- 9 Identify the key features of file, disk, and system management tools: file manager, search, image viewer, uninstaller, disk cleanup, disk defragmenter, screen saver, file compression, PC maintenance, and backup and restore

## Programs and Apps

Using programs and apps, you can accomplish a variety of tasks on computers and mobile devices (Figure 4-1). Recall from Chapter 1 that a **program**, or **software**, consists of a series of related instructions, organized for a common purpose, that tells the computer what tasks to perform and how to perform them. An **application**, or **app**, sometimes called *application software*, consists of programs designed to make users more productive and/or assist them with personal tasks.

An *operating system* is a set of programs that coordinates all the activities among computer or mobile device hardware. Other programs, often called *tools* or *utilities*, enable you to perform maintenance-type tasks usually related to managing devices, media, and programs used by computers and mobile devices. The operating system and other tools are collectively known as *system software* because they consist of the programs that control or maintain the operations of the computer and its devices.

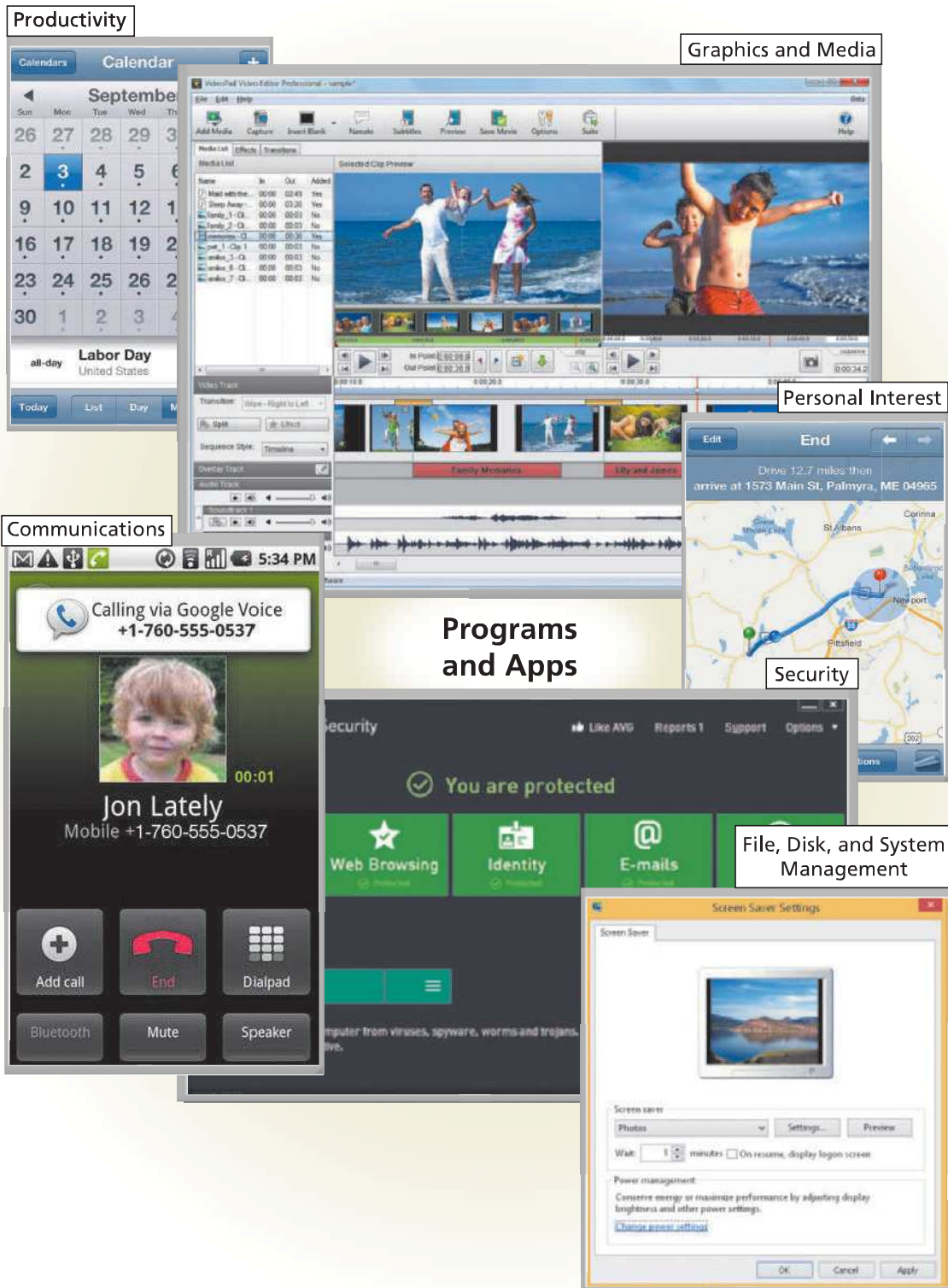
### Role of the Operating System

To use applications, such as a browser or word processing program on a desktop or laptop, your computer must be running an operating system. Similarly, a mobile device must be running an operating system to run a mobile app, such as a navigation or payment app. Desktop operating systems include Mac OS, Windows, Linux, and Chrome OS. Mobile operating systems include Android, iOS, and Windows Phone. The operating system, therefore, serves as the interface between the user, the applications and other programs, and the computer's or mobile device's hardware (Figure 4-2).

#### Internet Research

Which mobile operating system is the most widely used?

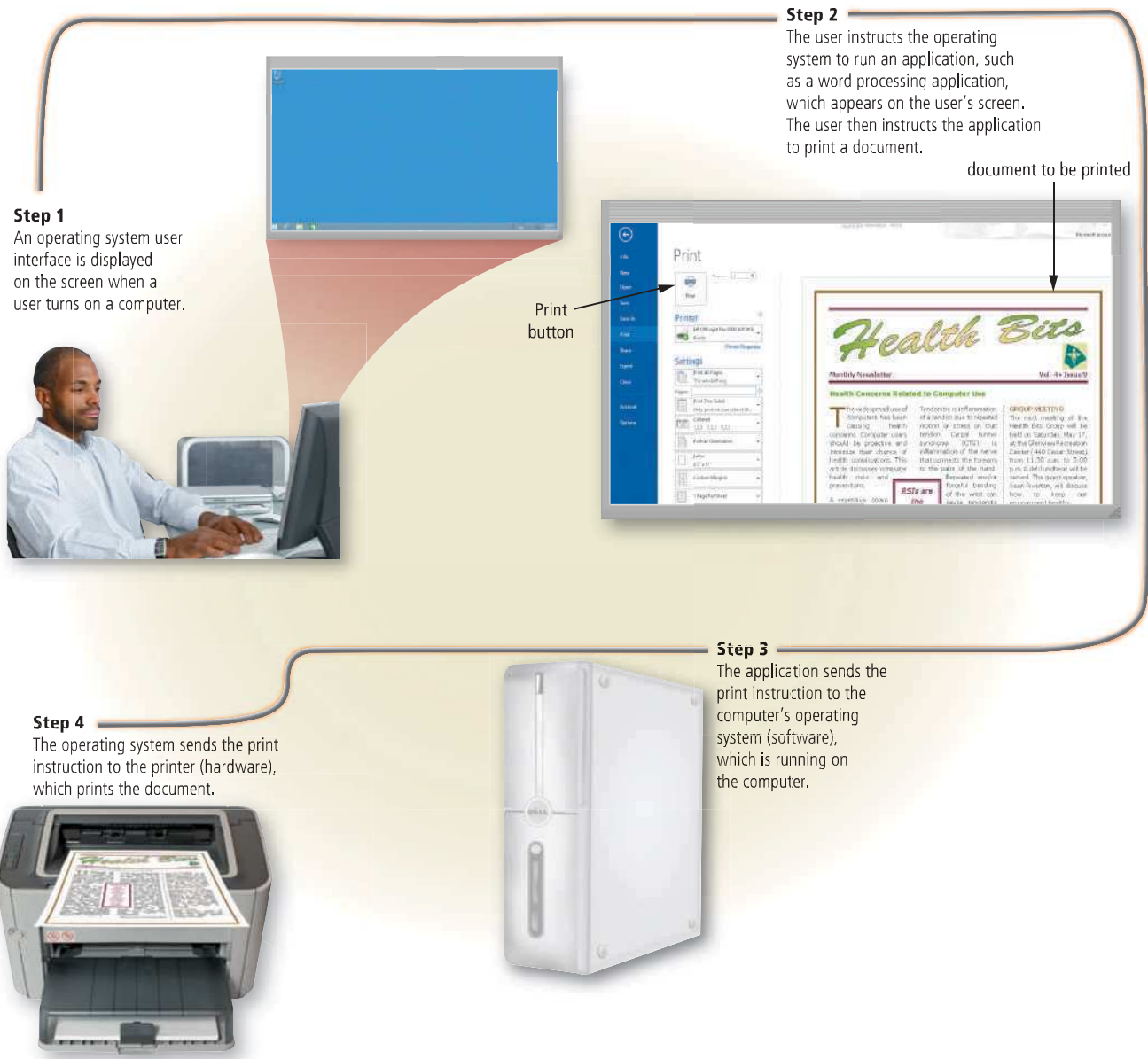
Search for: mobile operating system market share



**Figure 4-1** Users work with a variety of programs and apps, some of which are shown in this figure.

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**An Example of How an Operating System Interacts with a User, an Application, and Hardware**



**Figure 4-2** This figure shows how the operating system is the interface between the user, the application, and the hardware.  
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Each time you start a computer or mobile device, the operating system is loaded (copied) from the computer's hard drive or mobile device's storage media into memory. Once the operating system is loaded, it coordinates all the activities of the computer or mobile device. This includes running applications and transferring data among input and output devices and memory. While the computer or mobile device is running, the operating system remains in memory.

**Discover More:** Visit this chapter's free resources to learn more about desktop and mobile operating systems.

## Obtaining Software

Software is available in a variety of forms: retail, custom, web app, mobile app, mobile web app, shareware, freeware, open source, and public domain.

- *Retail software* is mass-produced, copyrighted software that meets the needs of a wide variety of users, not just a single user or company. Some retail software, such as an operating system, is preinstalled on new computers and mobile devices. You also can purchase retail software from local stores and on the web. With online purchases, you may be able to download purchased programs immediately instead of waiting for the software to arrive by mail.
- *Custom software* performs functions specific to a business or industry. Sometimes a company cannot locate retail software that meets its unique requirements. In this case, the company may use software developers to create tailor-made custom software. Custom software usually costs more than retail software.
- A *web app* is an application stored on a web server that you access through a browser. Users typically interact with web apps directly by visiting a website, but some web apps also can be accessed locally offline. Many websites provide free access to their apps. Some charge a one-time fee, while others charge recurring monthly or annual subscription fees. You may be able to use part of a web app free and pay for access to a more comprehensive program or pay a fee when a certain action occurs.
- A *mobile app* is an application you download from a mobile device's app store, sometimes called a *marketplace*, or other location on the Internet to a smartphone or other mobile device. Some mobile apps are preinstalled on a new mobile computer or device. Many mobile apps are free; others have a minimal cost — often less than a few dollars.
- A *mobile web app* is a web app that is optimized for display in a browser on a mobile device, regardless of screen size or orientation. Many app developers opt for web delivery because they do not have to create a different version for each mobile device's app store. Many web apps use a responsive design, which means the app displays properly on any computer or device.
- *Shareware* is copyrighted software that is distributed at no cost for a trial period. To use a shareware program beyond that period, you send payment to the software developer or you might be billed automatically unless you cancel within a specified period of time. Some developers trust users to send payment if software use extends beyond the stated trial period. Others render the software useless if no payment is received after the trial period expires. In some cases, a scaled-down version of the software is distributed free, and payment entitles the user to the fully functional product.
- *Freeware* is copyrighted software provided at no cost by an individual or a company that retains all rights to the software. Thus, software developers typically cannot incorporate freeware in applications they intend to sell. The word, free, in freeware indicates the software has no charge.
- *Open source software* is software provided for use, modification, and redistribution. This software has no restrictions from the copyright holder regarding modification of the software's internal instructions and its redistribution. Open source software usually can be downloaded from a web server on the Internet, often at no cost. Promoters of open source software state two main advantages: users who modify the software share their improvements with others, and customers can personalize the software to meet their needs.
- *Public-domain software* has been donated for public use and has no copyright restrictions. Anyone can copy or distribute public-domain software to others at no cost.



### Trial Versions

Some retail and other programs have a *trial version*, which is an application you can use at no charge for a limited time, to see if it meets your needs. Some trial versions have limited functionality.



### Copyright

A copyright gives authors, artists, and other creators of original work exclusive rights to duplicate, publish, and sell their materials.

Thousands of shareware, freeware, and public-domain programs are available on the Internet for users to download. Examples include communications, graphics, and game programs. Read Secure IT 4-1 for tips about safely downloading shareware, freeware, or public-domain software.

**Discover More:** Visit this chapter's free resources to learn more about software availability.

### SECURE IT 4-1

#### Safe Downloading Websites

Websites tempt potential customers with catchy offers for software promising to speed up the computer or to obtain the latest versions of games and music. The temptation to download shareware, freeware, and public-domain software is high, especially when the cost of such useful or fun programs is free or extremely reasonable. This action could be dangerous, however, because some of these websites are filled with virus-infected software just waiting to be installed on an unsuspecting user's computer or mobile device.

Before downloading any software, consider these factors when locating and evaluating shareware, freeware, or public-domain websites:

- Search for popular shareware, freeware, and public-domain download websites.


The software generally is organized into evaluation categories, such as outstanding and recommended, or grouped into purpose, such as tools and gaming.

- Look for websites with programs for your particular type of computer or mobile device. Some websites exclusively offer Windows- or Apple-based products.
- Obtain the latest versions of shareware, freeware, and public-domain software. Many developers update their programs frequently in an effort to include new features and to thwart viruses. The newest versions, therefore, often are safer and easier to use than previous versions.
- Locate websites with a variety of programs in a specific category. For example, if you need antivirus software, you can search

to find which shareware, freeware, and public-domain software is available.

- Read ratings for and reviews of products. Often, comments from users provide guidance in selecting the most desirable software for your needs.

If you follow these tips, you may find shareware, freeware, and public-domain software to be one of the best software bargains in the marketplace.

 **Consider This:** Have you ever used or downloaded programs or apps from a shareware, freeware, or public-domain software website? If so, what software did you acquire? If not, would you consider locating shareware, freeware, or public-domain software for your particular needs? Why or why not?

### CONSIDER THIS

#### What is software as a service?

*Software as a service (SaaS)* describes a computing environment where an Internet server hosts and deploys applications. Editing projects or photos, sending email messages, and managing finances are common consumer tasks of SaaS applications. For an exercise related to SaaS, see the Internet Research: Cloud Services exercise at the end of this chapter.

## Installing Software

Recall from Chapter 1 that you typically need to install desktop apps on a computer. Installing is the process of setting up the software to work with a computer, printer, and other hardware. Mobile apps typically install automatically after you download the app from the device's app store. You usually do not need to install web apps before you can use them, but you may need to install plug-ins, such as Java or Flash, so that the web apps work.

During installation of software or before the first use, a program or app may ask you to register and/or activate the software. *Software registration* typically is optional and usually involves submitting your name and other personal information to the software manufacturer or developer. Registering the software often entitles you to product support. *Product activation* is a technique that some software manufacturers use to ensure that you do not install the software on more computers than legally licensed. Usually, the software can be run a preset number of times, has limited



#### BTW Syncing Apps

When you install an app on one computer or device, it also will install automatically on any other computers and devices on the same subscription plan.

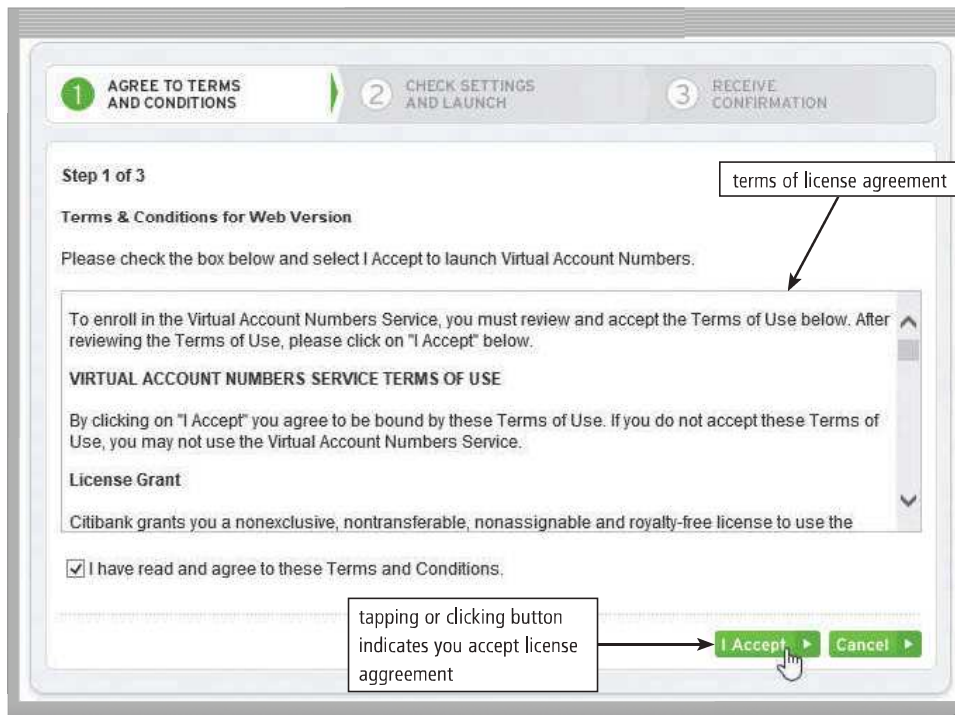
functionality, or does not function until you activate it via the Internet or by phone. Thus, activation is a required process for programs that request it. Some software allows multiple activations; for example, you can install it and run it on a laptop and a desktop. Registering and/or activating software also usually entitles you to free program updates for a specified time period, such as a year.

Many desktop and mobile apps use an *automatic update* feature, where the updates can be configured to download and install automatically. With web apps, by contrast, you always access the latest version of the software.

### CONSIDER THIS

#### What is a license agreement?

A *license agreement*, sometimes called an end-user license agreement (*EULA*), is the right to use a program or app. The license agreement provides specific conditions for use of the software, which a user typically must accept before using the software (Figure 4-3). Unless otherwise specified by a license agreement, you do not have the right to copy, loan, borrow, rent, or in any way distribute programs or apps. Doing so is a violation of copyright law; it also is a federal crime.



**Figure 4-3** A user must accept the terms in a license agreement before using the software.

Source: Citigroup Inc

## Categories of Programs and Apps

With programs and apps, you can work on a variety of projects — such as creating letters, memos, reports, and other documents; developing presentations; preparing and filing taxes; drawing and altering images; recording and enhancing audio and video clips; obtaining directions or maps; playing games individually or with others; composing email and other messages; protecting computers and mobile devices from malware; organizing media; locating files; and much more. Table 4-1 categorizes popular categories of programs and apps by their general use.

**Table 4-1 Programs and Apps by Category**

Category	Types of Programs and Apps	
<b>Productivity (Business and Personal)</b>	<ul style="list-style-type: none"> <li>• Word Processing</li> <li>• Presentation</li> <li>• Spreadsheet</li> <li>• Database</li> <li>• Note Taking</li> <li>• Calendar and Contact Management</li> <li>• Project Management</li> </ul>	<ul style="list-style-type: none"> <li>• Accounting</li> <li>• Personal Finance</li> <li>• Legal</li> <li>• Tax Preparation</li> <li>• Document Management</li> <li>• Support Services</li> <li>• Enterprise Computing</li> </ul>
<b>Graphics and Media</b>	<ul style="list-style-type: none"> <li>• Computer-Aided Design (CAD)</li> <li>• Desktop Publishing</li> <li>• Paint/Image Editing</li> <li>• Photo Editing and Photo Management</li> <li>• Clip Art/Image Gallery</li> </ul>	<ul style="list-style-type: none"> <li>• Video and Audio Editing</li> <li>• Multimedia and Website Authoring</li> <li>• Media Player</li> <li>• Disc Burning</li> </ul>
<b>Personal Interest</b>	<ul style="list-style-type: none"> <li>• Lifestyle</li> <li>• Medical</li> <li>• Entertainment</li> <li>• Convenience</li> <li>• Education</li> </ul>	
<b>Communications</b>	<ul style="list-style-type: none"> <li>• Blog</li> <li>• Browser</li> <li>• Chat Room</li> <li>• Online Discussion</li> <li>• Email</li> <li>• File Transfer</li> </ul>	<ul style="list-style-type: none"> <li>• Internet Phone</li> <li>• Internet Messaging</li> <li>• Mobile Messaging</li> <li>• Videoconference</li> <li>• Web Feeds</li> </ul>
<b>Security</b>	<ul style="list-style-type: none"> <li>• Personal Firewall</li> <li>• Antivirus</li> <li>• Malware Removers</li> <li>• Internet Filters</li> </ul>	
<b>File, Disk, and System Management</b>	<ul style="list-style-type: none"> <li>• File Manager</li> <li>• Search</li> <li>• Image Viewer</li> <li>• Uninstaller</li> <li>• Disk Cleanup</li> </ul>	<ul style="list-style-type: none"> <li>• Disk Defragmenter</li> <li>• Screen Saver</li> <li>• File Compression</li> <li>• PC Maintenance</li> <li>• Backup and Restore</li> </ul>

**CONSIDER THIS****Are the categories of programs and apps shown in Table 4-1 mutually exclusive?**

Programs and apps listed in one category may be used in other categories. For example, photo editing applications, which appear in the graphics and media category, often also are used for business or personal productivity. Additionally, the programs and apps in the last three categories (communications; security; and file, disk, and system management) often are used in conjunction with or to support programs and apps in the first three categories (productivity, graphics and media, and personal interest). For example, email appears in the communications category but also is a productivity application.



## Productivity Applications

*Productivity applications* can assist you in becoming more effective and efficient while performing daily activities at work, school, and home. Productivity applications include word processing, presentation, spreadsheet, database, note taking, calendar and contact management, project management, accounting, personal finance, legal, tax preparation, document management, and enterprise computing.

A variety of manufacturers offer productivity apps in each of these areas, ranging from desktop to mobile to web apps. Many have a desktop version and a corresponding mobile version adapted for smaller screen sizes and/or touch screens.

### Developing Projects

With productivity applications, users often create, edit, format, save, and distribute projects. Projects include documents, presentations, spreadsheets, notes, calendars, contact lists, budgets, and more.

During the process of developing a project, you likely will switch back and forth among the following activities.

1. When you *create* a project, you enter text or numbers, insert images, add contacts, schedule appointments, and perform other tasks using a variety of input methods, such as a keyboard, a mouse, touch, or voice.
2. To *edit* a project means to make changes to its existing content. Common editing tasks include inserting, deleting, cutting, copying, and pasting.
  - a. Inserting involves adding text, images, or other content.
  - b. Deleting involves removing text, images, or other content.
  - c. Cutting is the process of removing content and storing it in a temporary storage location, called a *clipboard*.
  - d. Copying is the process of placing content on a clipboard, with the content remaining in the project. Read Ethics & Issues 4-1 for a discussion about unethical copying.
  - e. Pasting is the process of transferring content from a clipboard to a specific location in a project.



#### ETHICS & ISSUES 4-1



##### What Can Schools and Employers Do to Prevent Internet Plagiarism?

The Internet has made it easier for students and employees to plagiarize; in contrast, it also provides tools that schools and employers can use to detect illegal copying. Schools often have specific rules about what constitutes plagiarism. Employees, such as journalists, are expected to follow ethical guidelines when copying or citing content.

The Internet offers many ways for students to cheat intentionally, including websites that allow you to purchase a research paper. Students may not realize that copying information without properly citing it also is plagiarism. Students who intentionally plagiarize blame competition. Teachers have several tools to catch plagiarists,

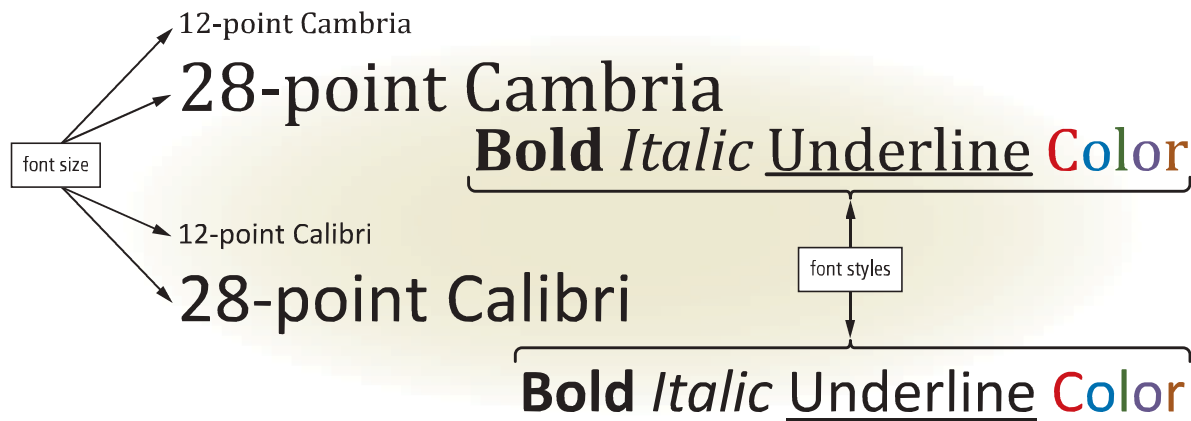
including services that compare papers to others on the Internet and produce a report highlighting content resembling previously published writing.

A journalist might be expected not only to produce multiple articles daily but also to use social media to keep readers engaged. This pressure tempts some journalists to copy content, sometimes without giving credit or linking to the original source. The laws against plagiarism are the same whether copying content from a respected news source, a personal blog, or social media. The pressures of time and expectations of content can create high-profile cases of plagiarism that affect not only the journalist but the news source for which he or she writes.

Some argue that the best way to prevent cheating is to educate. First, teach the values and discuss the consequences of cheating. Next, teach how to cite sources properly and summarize information. Before copying or paraphrasing another person's work, contact him or her to request permission. When in doubt, check with a librarian, editor, or instructor.

**Consider This:** How should educators and employers deal with plagiarism? Should schools use a paper-comparison service in an attempt to stop cheating? Why or why not? Does linking to the original source excuse a journalist who copies content? Why or why not?

3. When users *format* a project, they change its appearance. Formatting is important because the overall look of a project significantly can affect its capability to communicate information clearly. Examples of formatting tasks are changing the font, font size, and font style (Figure 4-4).
  - a. A *font* is a name assigned to a specific design of characters. Cambria and Calibri are examples of fonts.
  - b. *Font size* indicates the size of the characters in a particular font. Font size is gauged by a measurement system called points. A single point is about 1/72 of an inch in height.
  - c. A *font style* adds emphasis to a font. Bold, italic, underline, and color are examples of font styles.
4. During the process of creating, editing, and formatting a project, the computer or mobile device holds it in memory. To keep the project for future use requires that you save it. When you *save* a project, the computer transfers the project from memory to a local storage medium, such as a USB flash drive or hard drive, or cloud storage, so that you can retrieve it later.
5. You can distribute a project as a hard copy or electronically. A *hard copy* is information that exists on a physical medium, such as paper. To generate a hard copy, you *print* a project. Sending electronic files via email or posting them for others to view, on websites for example, saves paper and printer supplies. Many users opt for electronic distribution because it contributes to green computing.



**Figure 4-4** The Cambria and Calibri fonts are shown in two font sizes and a variety of font styles.

© Cengage Learning



#### CONSIDER THIS

##### How often should you save a project, and why do some apps not require you save?

Saving at regular intervals, such as every 5 or 10 minutes, ensures that the majority of your work will not be lost in the event of a power loss or system failure. Many programs have an AutoSave feature that automatically saves open projects at specified time intervals, such as every 10 minutes.

Some web and mobile apps, such as online productivity apps, save your work instantly as you type. These apps and the document both are stored on the cloud. Thus, the app automatically saves your changes to a cloud server with every keystroke.



#### CONSIDER THIS

##### What is a clip art/image gallery?

Applications often include a **clip art/image gallery**, which is a collection of clip art and photos. Some applications contain links to additional clips available on the web or are available as web apps. You also can purchase clip art/image gallery software that contains thousands of images.

In addition to clip art and photos, many clip art/image galleries provide fonts, animations, sounds, video clips, and audio clips. You can use the images, fonts, and other items from the clip art/image gallery in all types of projects, including documents, brochures, worksheets, and slide shows.

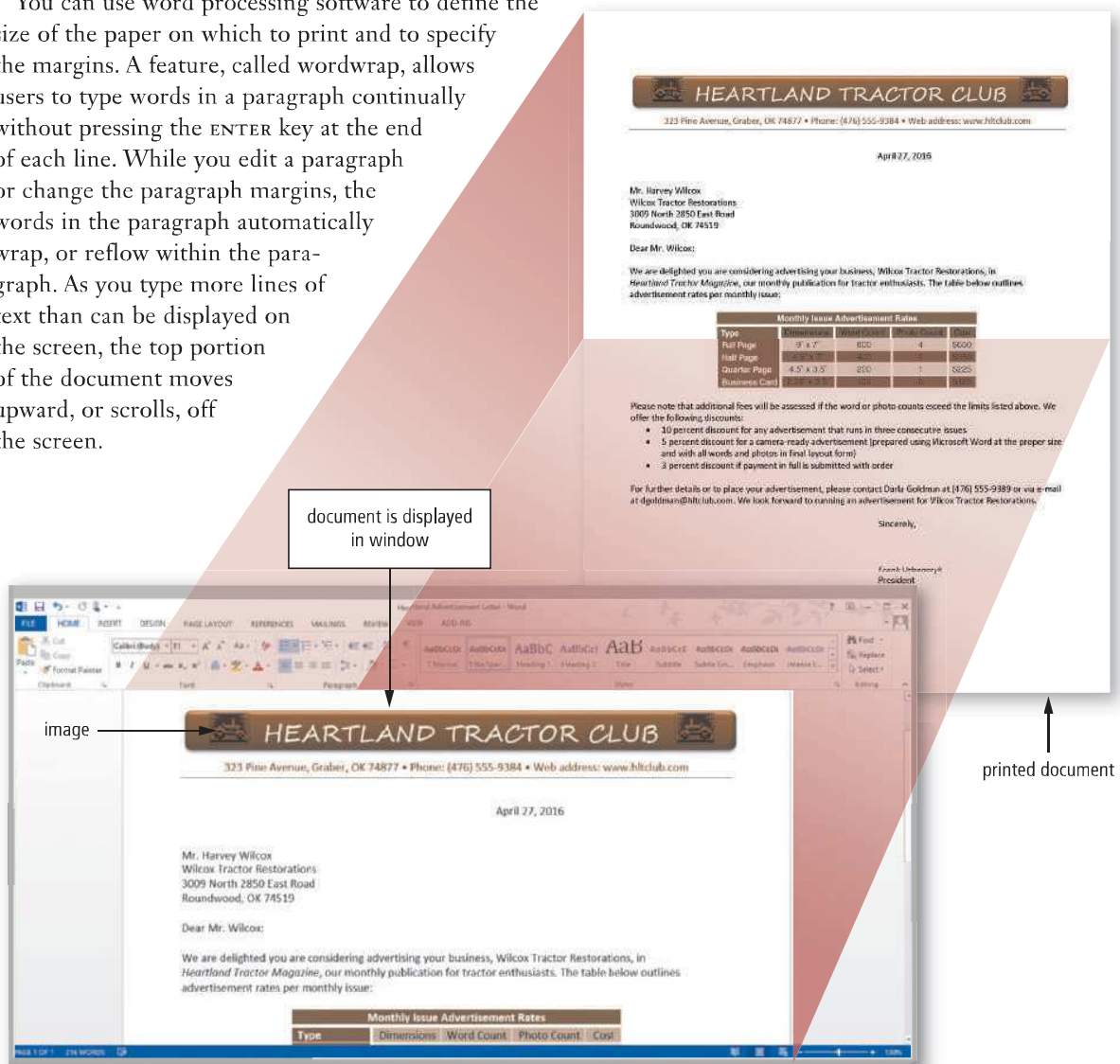
## Word Processing

**Word processing software**, sometimes called a word processor, is an application that allows users to create and manipulate documents containing mostly text and sometimes graphics (Figure 4-5). Millions of people use word processing software on their computers and mobile devices every day to develop documents such as letters, memos, reports, mailing labels, newsletters, and webpages.

A major advantage of using word processing software is that it enables users to change their written words easily. Word processing software also has many features to make documents look professional and visually appealing. For example, you can change the font, size, and color of characters; apply special effects, such as three-dimensional shadows; use built-in styles to format documents; and organize text in newspaper-style columns.

Most word processing software allows users to incorporate graphics, such as digital photos and clip art, in documents. In Figure 4-5, a user inserted an image of a tractor in the document. With word processing software, you easily can modify the appearance of an image after inserting it in the document.

You can use word processing software to define the size of the paper on which to print and to specify the margins. A feature, called wordwrap, allows users to type words in a paragraph continually without pressing the ENTER key at the end of each line. While you edit a paragraph or change the paragraph margins, the words in the paragraph automatically wrap, or reflow within the paragraph. As you type more lines of text than can be displayed on the screen, the top portion of the document moves upward, or scrolls, off the screen.



**Figure 4-5** Word processing software enables users to create professional and visually appealing documents.

Microsoft; © Cengage Learning

## Internet Research

What are the guidelines for writing business letters?

Search for: business letter writing



**Figure 4-6** This presentation created with presentation software consists of five slides.

Source: Microsoft; © Cengage Learning

Word processing software typically includes tools to assist you with the writing process. For example, a spelling checker reviews the spelling of individual words, sections of a document, or the entire document. A grammar checker detects passive voice, run-on sentences, and grammatical errors. A format checker identifies extraneous spaces, capitalization errors, and more.

**Discover More:** Visit this chapter's free resources to learn more about word processing software and features.

## Presentation

**Presentation software** is an application that allows users to create visual aids for presentations to communicate ideas, messages, and other information to a group. The presentations can be viewed as slides, sometimes called a *slide show*, that are displayed on a large monitor or on a projection screen from a computer or mobile device (Figure 4-6).

Presentation software typically provides a variety of predefined presentation formats that define complementary colors for backgrounds, text, and graphical accents on the slides. This software also provides a variety of layouts for each individual slide such as a title slide, a two-column slide, and a slide with clip art, a chart, a table, or a diagram. In addition, you can enhance any text, charts, and graphics on a slide with 3-D effects, animation, and other special effects, such as shading, shadows, and textures.

When building a presentation, users can set the slide timing so that the presentation automatically displays the next slide after a preset delay. Presentation software allows you to apply special effects to the transition between slides. One slide, for example, might fade away as the next slide appears.

Presentation software typically includes a clip gallery that provides images, photos, video clips, and audio clips to enhance presentations. Some audio and video editing applications work with presentation software, providing users with an easy means to record and insert video, music, and audio commentary in a presentation.

You can view or print a finished presentation in a variety of formats, including a hard copy outline of text from each slide and handouts that show completed slides. Presentation software also incorporates features such as checking spelling, formatting, researching, and creating webpages from existing slide shows.

**Discover More:** Visit this chapter's free resources to learn more about presentation software.

## Spreadsheet

**Spreadsheet software** is an application that allows users to organize data in columns and rows and perform calculations on the data. These columns and rows collectively are called a **worksheet**. Most spreadsheet software has basic features to help users create, edit, and format worksheets. A spreadsheet file also is known as a workbook because it can

contain thousands of related individual worksheets. Data is organized vertically in columns and horizontally in rows on each worksheet (Figure 4-7).

Each worksheet usually can have thousands of columns and rows. One or more letters identify each column, and a number identifies each row. Only a small fraction of these columns and rows are visible on the screen at one time. Scrolling through the worksheet displays different parts of it on the screen.

A cell is the intersection of a column and row. The spreadsheet software identifies cells by the column and row in which they are located. For example, the intersection of column B and row 4 is referred to as cell B4. As shown in Figure 4-7, cell B4 contains the number, \$1,000.29, which represents the wages for January.

Many of the worksheet cells shown in Figure 4-7 contain a number, called a value, that can be used in a calculation. Other cells, however, contain formulas that generate values. A formula performs calculations on the data in the worksheet and displays the resulting value in a cell, usually the cell containing the formula. When creating a worksheet, you can enter your own formulas. In Figure 4-7, for example, cell B17 could contain the formula =B9+B10+B11+B12+B13+B14+B15+B16, which would add (sum) the contents of cells B9, B10, B11, B12, B13, B14, B15, and B16. That is, this formula calculates the total expenses for January.

A *function* is a predefined formula that performs common calculations, such as adding the values in a group of cells or generating a value such as the time or date. For example, the function =SUM(B9:B16) instructs the spreadsheet application to add all of the numbers in the range of cells B9 through B16. Spreadsheet applications contain many built-in functions.

One of the more powerful features of spreadsheet software is its capability to recalculate the rest of the worksheet when data in a cell changes. Spreadsheet software's capability of recalculating data also makes it a valuable budgeting, forecasting, and decision-making tool. Another standard feature of spreadsheet software is charting, which depicts the data in graphical form, such as bar charts or pie charts. A visual representation of data through charts often makes it easier for users to see at a glance the relationship among the numbers.

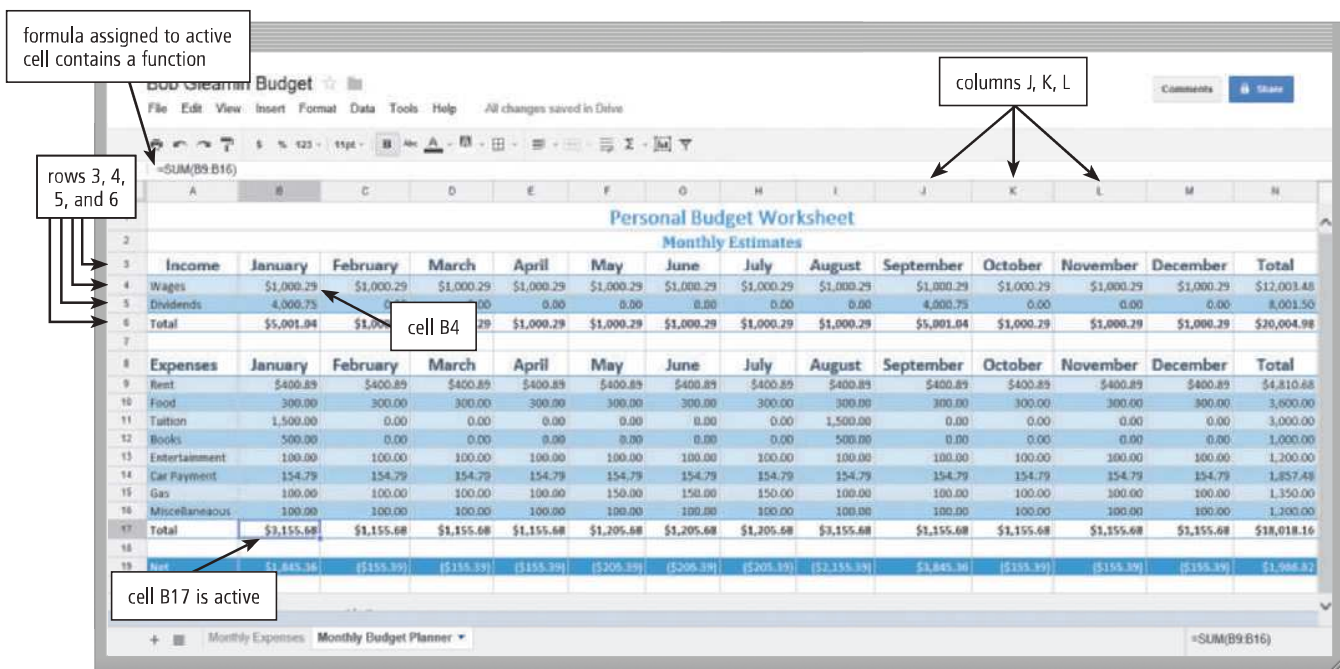
**Discover More:** Visit this chapter's free resources to learn more about spreadsheet software and built-in functions.

**BTW**  
**Formulas**

In many spreadsheet apps, a formula begins with an equal sign (=).

**BTW**  
**Technology Innovator**

**Discover More:** Visit this chapter's free resources to learn about Dan Bricklin (cocreator of the first spreadsheet program).



**Figure 4-7** With spreadsheet software, you create worksheets that contain data arranged in columns and rows, and you can perform calculations on the data in the worksheets.

Source: Google Inc.

**BTW**

**Web Databases**

You likely interact with many databases without realizing it. For example, much of the information you access on the web — including photos, videos, movies, job listings, reservation details, and class registrations — is stored in databases.

**BTW**

**High-Tech Talk**

**Discover More:** Visit this chapter's free resources to learn how to filter data in database and spreadsheet programs.

**Database**

A **database** is a collection of data organized in a manner that allows access, retrieval, and use of that data. In a manual database, you might record data on paper and store it in a filing cabinet. With a database stored electronically, such as the one shown in Figure 4-8, the computer stores the data on a storage medium, such as a hard drive or optical disc, or on cloud storage.

**Database software** is an application that allows users to create, access, and manage a database. Using database software, you can add, change, and delete data in a database; sort and retrieve data from the database; and create forms and reports using the data in the database.

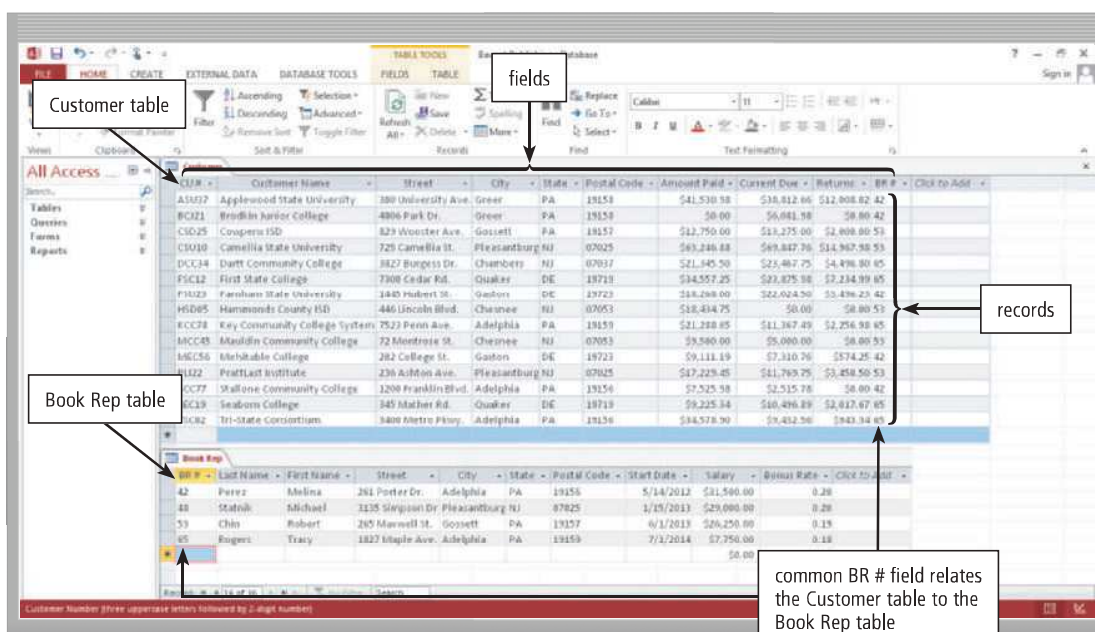
With most personal computer database programs, a database consists of a collection of tables, organized in rows and columns. Each row, called a record, contains data about a given item in the database, which is often a person, product, object, or event. Each column, called a field, contains a specific category of data within a record. The Publishing database shown in Figure 4-8 consists of two tables: a Customer table and a Book Rep table. The Customer table contains 15 records (rows), each storing data about one customer. The customer data is grouped into 10 fields (columns): CU # (customer number), Customer Name, Street, City, State, Postal Code, Amount Paid, Current Due, Returns, and BR # (book rep number). The Current Due field, for instance, contains the amount of money the customer owes the publisher. The Customer and Book Rep tables relate to each other through a common field, BR # (book rep number).

Users run queries to retrieve data. A query is a request for specific data from the database. For example, a query might request a list of customers whose balance is greater than \$20,000. After obtaining the results of a query, database applications can present them on the screen, send them to a printer, or save them in a file.

**CONSIDER THIS**

**When should you use a database instead of a spreadsheet program?**

Although databases and spreadsheets both store data, these programs have different purposes and capabilities. Spreadsheet programs are ideal for calculating results or creating charts from value in the worksheet. You should use a database program, however, if want to collect, reorganize and filter data, and/or create reports from the data.



**Figure 4-8** This database contains two tables: one for customers and one for book reps. The Customer table has 15 records and 10 fields; the Book Rep table has 4 records and 10 fields.  
Source: Microsoft

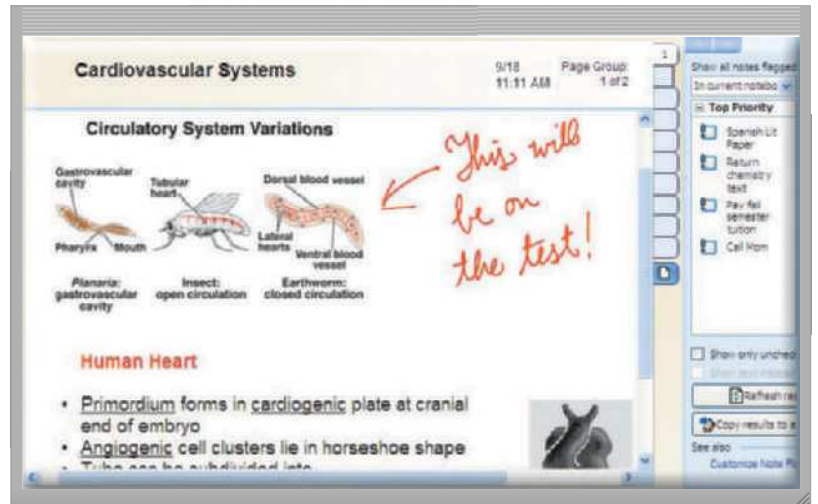
**Discover More:** Visit this chapter's free resources to learn more about personal computer database programs.

## Note Taking

**Note taking software** is an application that enables users to enter typed text, handwritten comments, drawings, sketches, photos, and links anywhere on a page and then save the page as part of a notebook (Figure 4-9). Users also can include audio recordings as part of their notes. Some enable users to sync their notes to the cloud so that they can access the notes on any computer or mobile device. Many note taking applications also include a calendar feature.

Users find note taking software convenient during meetings, class lectures and conferences, and in libraries and other settings that previously required pencil and paper for recording thoughts and discussions.

**Discover More:** Visit this chapter's free resources to learn more about note taking applications.



**Figure 4-9** With note taking software, mobile users can handwrite notes, draw sketches, insert photos and links, and type text.

Source: Microsoft

## Calendar and Contact Management

**Calendar and contact management software** is an application that helps you organize your calendar, keep track of contacts, and share this information with other users, who can view it on their computers and mobile devices (Figure 4-10). This software provides a way for individuals and workgroups to organize, find, view, and share appointment and contact information easily. Although sometimes available separately, calendar and contact management software often exists as a unit in a single program. Many email applications include calendar and contact management features.



### Technology Trend

**Discover More:** Visit this chapter's free resources to learn about the note taking app, Evernote.



**Figure 4-10** Users can share schedules with other users via calendar and contact management applications.

Google Inc.

Calendar and contact management applications enable you to synchronize information. This means that all of your computers and mobile devices, along with your organization’s server or cloud storage, have the latest version of any updated information.

**Discover More:** Visit this chapter’s free resources to learn more about calendar and contact management applications.



**Forms and Surveys**

Some online productivity suites support creating online forms for surveys, which store their results in online spreadsheets.

**Software Suite**

A **software suite** is a collection of individual related applications available together as a unit. Productivity software suites typically include, at a minimum, word processing, presentation, spreadsheet, and email applications. While several productivity suites are designed to be installed on a local computer, some are web apps and/or mobile web apps that enabling you to share and collaborate with projects stored on the cloud.

**CONSIDER THIS**

**Why would you use a software suite instead of a stand-alone application?**

Software suites offer three major advantages: lower cost, ease of use, and integration.

- When you purchase a software suite, the suite usually costs significantly less than purchasing each application individually, or as stand-alone applications.
- Software suites provide ease of use because the applications in the suite normally use a consistent interface and share features, such as clip art and spelling checker.
- Applications in a software suite often are integrated, which makes it easy to share information among them. For example, you can copy a chart created from a worksheet in a spreadsheet program and paste it into a slideshow in the presentation software.



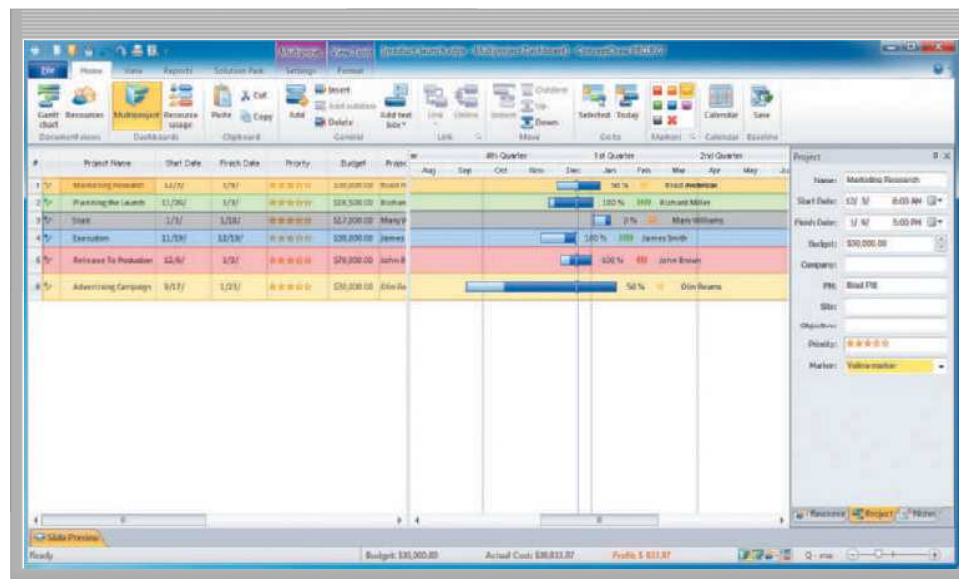
**Technology Innovators**

**Discover More:** Visit this chapter’s free resources to learn about Google and its founders, Sergey Brin and Larry Page.

**Discover More:** Visit this chapter’s free resources to learn more about software suites.

**Project Management**

**Project management software** is an application that allows a user to plan, schedule, track, and analyze the events, resources, and costs of a project. Project management software helps users manage project variables, allowing them to complete a project on time and within budget. A marketing manager, for example, might use project management software to schedule the processes required in a product launch (Figure 4-11). Read How To 4-1 to learn how you can manage a project using project management software.



**Figure 4-11** With project management software, you can plan and schedule the tasks and processes required in a project.

Courtesy of CS Odessa



### HOW TO 4-1

#### Manage a Project Using Project Management Software

Several project management programs and apps exist that are both free and fee based. Project management programs and apps are designed for projects of specific sizes, so be sure to research the various programs and apps on the market and choose one that best suits your needs. To manage a project using project management software, follow these steps:

1. Make sure you understand the project in its entirety, as well as the steps you must take to bring the project to completion.
2. Determine the date by which the project must be completed.
3. Verify you have the appropriate resources (people and materials) to complete the project. If you do not have the necessary resources, you should obtain them.
4. Determine the order of the steps that must be taken to bring the project to completion. Identify steps that must be taken before other steps, as well as steps that can be completed at the same time as other steps.
5. Verify the feasibility of the plan.
6. During the project, it will be necessary to update the progress and possibly adjust dates. Changes to the project and its dates should be communicated to the entire project team.

**Consider This:** Do you think project management software can help individuals complete a project more quickly? Why or why not?

### CONSIDER THIS

#### Does the term, project, have two meanings in the technology field?

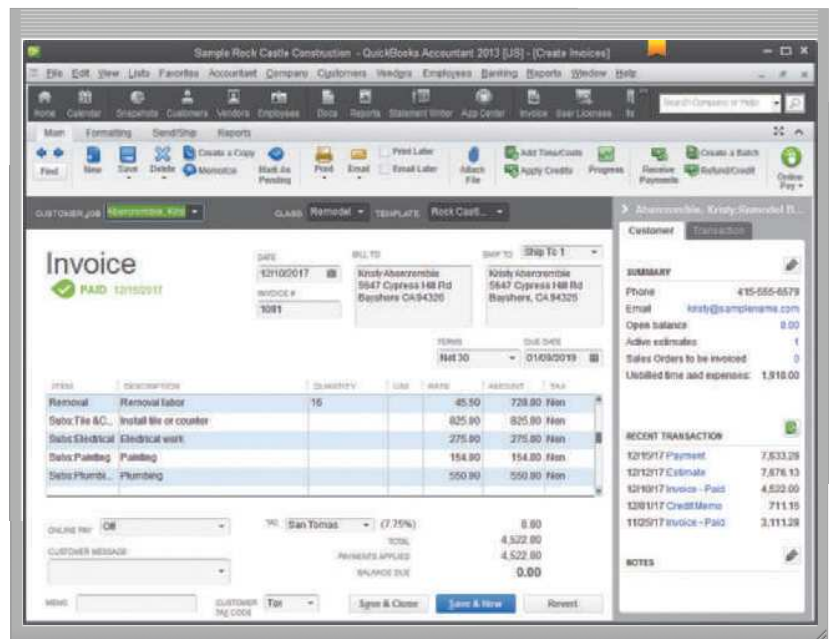
Yes. As discussed earlier in this chapter, a project can be a deliverable you create using application software, such as a document, presentation, spreadsheet, notes, calendar, contact list, budget, and more. A project also describe the collection of tasks and processes required to develop a solution to a problem.

## Accounting

**Accounting software** is an application that helps businesses of all sizes record and report their financial transactions. With accounting software, business users perform accounting activities related to the general ledger, accounts receivable, accounts payable, purchasing, invoicing (Figure 4-12), and payroll functions. Accounting software also enables business users to write and print checks, track checking account activity, and update and reconcile balances on demand.

Most accounting software supports online credit checks, bill payment, direct deposit, and payroll services. Some offer more complex features, such as job costing and estimating, time tracking, multiple company reporting, foreign currency reporting, and forecasting the amount of raw materials needed for products. The cost of accounting software for small businesses ranges from less than one hundred to several thousand dollars. Accounting software for large businesses can cost several hundred thousand dollars.

**Discover More:** Visit this chapter's free resources to learn more about accounting software.

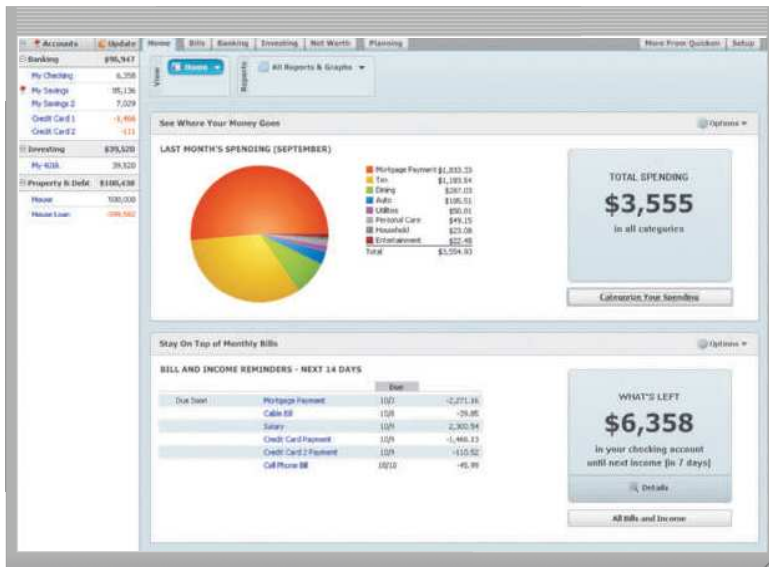


**Figure 4-12** Accounting software helps businesses record and report their financial transactions.

Courtesy of Intuit

## Personal Finance

**Personal finance software** is a simplified accounting application that helps home users and small/home office users balance their checkbooks, pay bills, track personal income and expenses, verify account balances, transfer funds, track investments, and evaluate financial plans (Figure 4-13). Personal finance software helps determine where, and for what purpose, you are spending money so that you can manage your finances.



**Figure 4-13** Personal finance software assists home users with tracking personal accounts.

Courtesy of Intuit

### SECURE IT 4-2



#### Using Personal Finance Apps Safely

Personal finance apps offer convenient and easy methods to pay bills, deposit checks, examine account balances, verify payments, and transfer funds. They also are a magnet for cybercriminals to snatch an unsuspecting user's personal information and send it to someone else anywhere in the world, who then can use the information for monetary transactions. Nearly one-third of malware banking apps target customers in the United States with malicious instructions that invade their smartphones and gain access to information stored on their devices. Users in Brazil, Australia, and France also are becoming extremely popular targets for banking thieves. By using caution and common sense, however, users can take steps to safeguard their funds and their identities by following these practices:

- **Evaluate the apps.** Fraudulent apps may resemble legitimate apps from financial

institutions. They often, however, are riddled with misspellings and awkward sentences. In addition, legitimate companies rarely promote downloading an app from a pop-up or pop-under advertisement. If you desire an app from a bank or other financial institution, visit that company's website for instructions about downloading and installing its authentic apps.

- **Use strong passwords to access the apps.** Many of the more secure personal finance apps have dual passwords that involve typing a string of characters and also validating a picture. In addition, be certain to password protect your mobile device.
- **Guard your smartphone.** At least 100 smartphones are lost or stolen every minute in the United States according to MicroTrax, an asset protection company. With that figure in mind, store as little

personal information as possible on your phone so that if the mobile device is lost, the chance of having your identity stolen and your accounts compromised is lessened. Also install software to locate your lost or stolen device and to erase its content remotely.

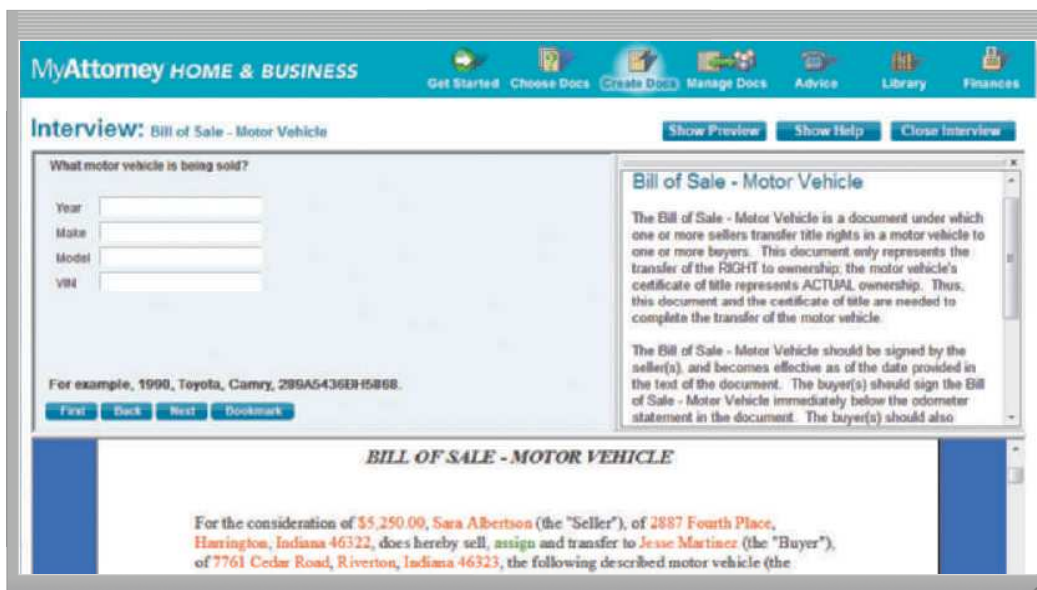
- **Verify the transactions.** Always verify your transactions by scrutinizing monthly statements. In addition, periodically check balances and alert your financial institution if any activity seems abnormal.

**Consider This:** Have you used finance apps? If so, which ones? When making transactions, do you follow some of the tips described in this box? If not, would you consider downloading an app to complete some common banking transactions? Why or why not?

## Legal

**Legal software** is an application that assists in the preparation of legal documents and provides legal information to individuals, families, and small businesses (Figure 4-14). Legal software provides standard contracts and documents associated with buying, selling, and renting property; estate planning; marriage and divorce; and preparing a will or living trust. By answering a series of questions or completing a form, the legal software tailors the legal document to specific needs. Read Ethics & Issues 4-2 to consider whether an attorney should review documents created with legal software.

**Discover More:** Visit this chapter's free resources to learn more about legal software.



**Figure 4-14** Legal software assists individuals, families, and small businesses in the preparation of legal documents.

Source: Avanquest Software

### ETHICS & ISSUES 4-2

#### Should an Attorney Review Documents Created with Legal Software?

If you want to sublet your apartment or buy or sell a used car, should you seek legal help? Hiring an attorney to create a lease or sale agreement can cost hundreds of dollars. Legal software or website services, on the other hand, typically cost less than \$100 and sometimes are free. While it is tempting to opt for the route that will save money, you should evaluate the program to make sure it is up to date, addresses the latest laws and provisions that are specific to your state, and includes a legal dictionary. If you use a program that is out of date or creates an incomplete or invalid legal document, the cost for an attorney to correct the document

could exceed the amount you originally spent on the program.

A lease that you create or sign regarding subletting or renting an apartment should have provisions for payment of any damages, breaking or extending the agreement, and who is responsible for routine maintenance and repair. In some states, the property owner must disclose any mold, lead paint, or water quality issues. Sales agreements, such as for used cars, should include language that protects the buyer from undisclosed damage to the car, as well as clearly specify any further responsibility of the car seller.

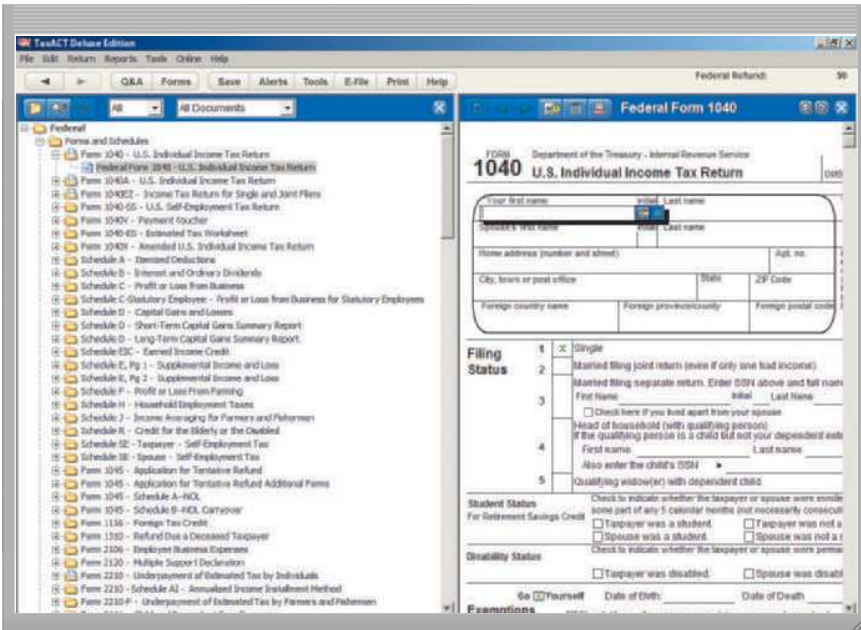
Attorneys caution against using legal software unless you intend to have an attorney review the document. Not only can

they validate the accuracy of the document, attorneys claim they can provide for gaps in the software; further, they are versed in laws specific to your state or circumstance. Others argue that any legal document is better than a verbal agreement and can protect both parties.

**Consider This:** Would you use legal software to create a legal document? Why or why not? Would you sign a legal document created with software without consulting an attorney? Why or why not? How do mistakes made as a result of using legal software differ from mistakes that result from human error?

### Tax Preparation

Tax preparation software is an application that can guide individuals, families, or small businesses through the process of filing federal and state taxes (Figure 4-15). These programs forecast tax liability and offer money-saving tax tips, designed to lower your tax bill.



**Figure 4-15** Tax preparation software guides individuals, families, or small businesses through the process of filing federal taxes.  
Source: 2nd Story Software

After you answer a series of questions and complete basic forms, the software creates and analyzes your tax forms to search for missed potential errors and deduction opportunities.

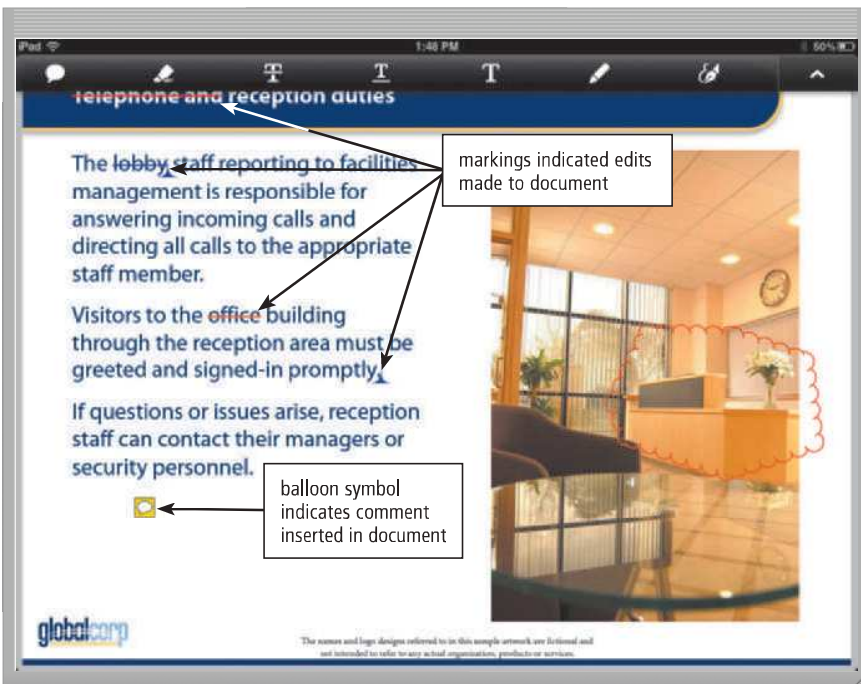
Once the forms are complete, you can print any necessary paperwork; then, they are ready for filing. Some tax preparation programs also allow you to file your tax forms electronically, a process called *e-filing*.

**Discover More:** Visit this chapter's free resources to learn more about tax preparation programs.

### Document Management

Document management software is an application that provides a means for sharing, distributing, and searching through documents by converting them into a format that can be viewed by any user. The converted document, which mirrors the original document's appearance, can be viewed and printed without the software that created the original document. Some document management software allows users to edit content and add comments to the converted document (Figure 4-16).

Many businesses use document management software to share and distribute company brochures, literature, and other documents electronically. Home users distribute flyers, announcements, and graphics electronically. A popular electronic image file format that document management software uses to save converted documents is **PDF** (Portable Document Format), developed by Adobe Systems.



**Figure 4-16** Users can edit content and add comments to a converted document.  
Source: Adobe Systems Incorporated

To view and print a PDF file, you need Adobe Reader software, which can be downloaded free from Adobe's website.

**Discover More:** Visit this chapter's free resources to learn more about document management software.

### CONSIDER THIS

#### Can you create a PDF file only in document management applications?

No. Many productivity applications, such as word processing and spreadsheet programs, provide a method of saving a project as a PDF. This enables other users to view your document without requiring the application that created the project.

## Enterprise Computing

A large organization, commonly referred to as an enterprise, requires special computing solutions because of its size and geographic distribution. A typical enterprise consists of a wide variety of departments, centers, and divisions — collectively known as functional units. Nearly every enterprise has the following functional units: human resources, accounting and finance, engineering or product development, manufacturing, marketing, sales, distribution, customer service, and information technology.

Software used in functional units is not mutually exclusive; however, each functional unit in an enterprise uses specific software, as outlined below.

- Human resources software manages employee information, such as pay rate, benefits, personal information, performance evaluations, training, and vacation time.
- Accounting software manages everyday transactions, such as sales and payments to suppliers. Finance software helps managers budget, forecast, and analyze.
- Engineering or product development software allows engineers to develop plans for new products and test their product designs.
- Manufacturing software assists in the assembly process, as well as in scheduling and managing the inventory of parts and products.
- Marketing software allows marketing personnel to create marketing campaigns, target demographics, and track their effectiveness.
- Sales software enables the salesforce to manage contacts, schedule meetings, log customer interactions, manage product information, and take customer orders.
- Distribution software analyzes and tracks inventory and manages product shipping status.
- Customer service software manages the day-to-day interactions with customers, such as phone calls, email messages, web interactions, and messaging sessions.
- Information technology staff use a variety of programs and apps to maintain and secure the hardware and software in an enterprise.

**Discover More:** Visit this chapter's free resources to learn more about software used in an enterprise.

### Mini Feature 4-1: Web and Mobile Apps for Personal and Business Productivity

A variety of applications provide a service intended to make business or personal tasks easier to accomplish. Some applications focus on a single service, while others provide several services in a single application. Read Mini Feature 4-1 to learn about some popular web and mobile apps for personal and business productivity.

### Internet Research

Are alternatives to Adobe Reader available?

*Search for:* adobe reader alternatives

### BTW

#### Technology Innovator

**Discover More:** Visit this chapter's free resources to learn about Adobe Systems.

### BTW

#### Technology Innovator

**Discover More:** Visit this chapter's free resources to learn about eBay and PayPal, each with apps that can be used for personal and business productivity.


**MINI FEATURE 4-1**

## Web and Mobile Apps for Personal and Business Productivity

Whether you are checking appointments, sending or reading email messages, arranging travel, banking or looking up information online, making a purchase, scanning QR (quick response) codes or bar codes, or checking in with friends on online social networks, web and mobile apps can assist your personal and business productivity.

### Calendar and Email

Maintaining a calendar and checking email messages are common tasks of calendar and email web and mobile apps. Calendar apps keep track of your appointments and synchronize information entered on a mobile device with your online or desktop calendar software. Email mobile apps integrate with your device's address book to display names from your device's contact list that match a recipient's name as you type it, and with your device's photo gallery for sending photos.

### Travel

Purchasing flights, hotels, rental cars, or travel services is a common online task for personal and business travelers. Travel apps display available options and allow you to filter results. Many allow you to share travel plans with your online social networks.

### Financial

You can access bank accounts or investments using a financial app. Financial mobile apps track expenses as you spend money and notify you when a bill is due. To help secure information, financial mobile apps can disable access if your device is stolen or lost. Some banking mobile apps allow you to upload a photo of a check taken with the device's camera to process the deposit.

### Reference

Dictionaries, encyclopedias, books, and directories are available online as reference apps. Many have associated mobile apps that format information for mobile devices, or take advantage of their features. For example, rather than typing a search term in a dictionary web app to look up its definition, a mobile app also might offer voice input. On the mobile version of an encyclopedia app, you might shake the device to display random topics or redisplay the app's home

screen. Some reference mobile apps also can download information directly to your phone for offline access.

### Retail

Online marketplaces and payment services support buying and selling items and transferring funds from one party to another. Marketplace apps enable customers to research products, enter or examine product reviews, and make purchases. A retail store mobile app might use a device's GPS to offer special deals closest to the customer's location. You also might use a device's camera to scan a product's bar code and then place the item in a shopping cart. Payment services allow customers to send money or pay for items using mobile devices. Read Secure IT 4-3 for safety tips when using payment apps.

### Scanning


Scanning apps use a mobile device's camera to scan a QR code or bar code. A **QR code** is a square-shaped graphic that represents a web address or other information. A QR code reader app scans a QR code, and then displays its corresponding information. A bar code scanner reads a bar code and may provide product information, price, or reviews. Some supermarkets provide shopping apps for customers to scan bar codes of items they purchase. These apps create a customized shopping list, ordering items by their aisle location in the store, to provide a more efficient shopping experience.



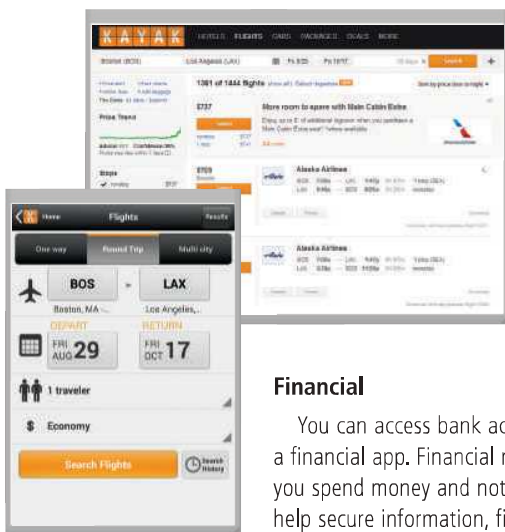
© StockPhoto / francreporter

### Online Social Networks

Many users connect with family, friends, and coworkers using online social network mobile apps. Online social network web apps often integrate instant messaging and video chat communications. Online social network mobile apps allow users to include photos and videos from their device in their updates easily.

 **Consider This:** Compare the web and mobile versions of the same app for personal and business productivity. Which features are common to both? Which features in the mobile version are not found in the web version? Which features in the web version are not found in the mobile version? Why do you think the developers made these decisions? Which features would you like to see that are missing from either version of the app?

**Discover More:** Visit this chapter's free resources to learn more about web and mobile apps for personal and business productivity.



Source: Kayak

### SECURE IT 4-3

#### Avoiding Risks Using Payment Apps

Paying for coffee at the local coffee shop or buying tools at the hardware store has become streamlined with the advent of mobile payment apps. More than 15 percent of Starbucks transactions are accomplished using a smartphone app instead of using cash or credit card, and many merchants are accepting this form of payment as mobile wallet apps become more secure. The users enjoy the convenience of maintaining control when they scan their phone at the checkout counter instead of handing a credit card to a clerk. This security factor becomes even more pronounced at restaurants, where unscrupulous employees can take credit cards away from the table and then have full access to the personal information on the cards.

Mobile payment providers state that using their apps is more secure than using plastic

credit cards. The apps use a payment system on phones equipped with an *NFC chip*, which stores data that is transmitted to a contactless terminal and verified as a legitimate sale. A smartphone user never enters an account number at the cash register because all financial information is stored on the mobile payment system. If, however, an unauthorized charge is made, the Electronic Fund Transfer Act protects users as long as the claim is made promptly, generally within two days.

If you use your smartphone to make purchases, follow this advice from the security experts:

- Use a password on your phone.
- Select a payment app that requires you to enter a password to start the transaction.
- Choose a payment app that issues a receipt so that you can verify every purchase.

- Be vigilant about checking mobile transactions against monthly statements from the credit card company.

**Consider This:** Should additional merchants allow payments using mobile apps? Should merchants be required to pay when customers use payment apps, like they do when customers use credit cards? Why or why not? Where would you like to pay for transactions using your smartphone?



Google Inc.

### NOW YOU SHOULD KNOW

Be sure you understand the material presented in the sections titled Programs and Apps and Productivity Applications as it relates to the chapter objectives.

*Now you should know ...*

- What categories of programs and apps you might find on a computer or mobile device (Objective 1)
- Why you need an operating system on computers and mobile devices (Objective 2)
- How you can obtain software (Objective 3)
- Which productivity applications might be suited to your needs (Objective 4)

**Discover More:** Visit this chapter's premium content for practice quiz opportunities.

## Graphics and Media Applications

In addition to productivity applications, many people work with software designed specifically for their field of work. Power users, such as engineers, architects, desktop publishers, and graphic artists, often use sophisticated software that allows them to work with graphics and media. Many of these applications incorporate user-friendly interfaces or scaled-down versions, making it possible for the home and small business users also to create projects using these types of programs.

Graphics and media applications include computer-aided design, desktop publishing, paint/image editing, photo editing and photo management, video and audio editing, multimedia and website authoring, media players, and disc burning.



**Figure 4-17** Architects use CAD software to design building structures.  
© iStockPhoto / GordanD

## Computer-Aided Design

**Computer-aided design (CAD)** software is a type of application that assists professionals and designers in creating engineering, architectural, and scientific designs and models. For example, engineers create design plans for vehicles and security systems. Architects design building structures and floor plans (Figure 4-17). Scientists design drawings of molecular structures.

Three-dimensional CAD programs allow designers to rotate designs of 3-D objects to view them from any angle. Some CAD software even can generate material lists for building designs.

Home and small business users work with less sophisticated design and modeling software. These applications usually contain thousands of predrawn plans that users can

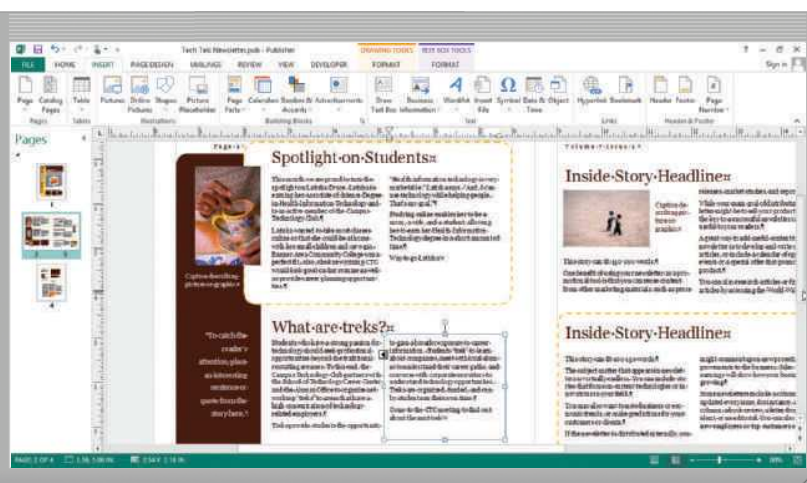
customize to meet their needs. For example, *home design/landscaping software* is an application that assists users with the design, remodeling, or improvement of a home, deck, or landscape.

**Discover More:** Visit this chapter's free resources to learn more about CAD software.

## Desktop Publishing

**Desktop publishing software (DTP software)** is an application that enables designers to create sophisticated publications that contain text, graphics, and many colors. Professional DTP software is ideal for the production of high-quality color projects such as textbooks, corporate newsletters, marketing literature, product catalogs, and annual reports. Designers and graphic artists can print finished publications on a color printer, take them to a professional printer, or post them on the web in a format that can be viewed by those without DTP software.

Home and small business users create newsletters, brochures, flyers, advertisements, postcards, greeting cards, letterhead, business cards, banners, calendars, logos, and webpages using personal



**Figure 4-18** With personal DTP software, such as Microsoft Publisher shown here, home users can create newsletters.  
Courtesy of Joy Starks; Source: Microsoft

DTP software (Figure 4-18). Although many word processing programs include DTP features, home and small business users often prefer to create DTP projects using DTP software because of its enhanced features. These programs typically guide you through the development of a project by asking a series of questions. Then, you can print a finished publication on a color printer or post it on the web.

Many personal DTP programs also include paint/image editing software and photo editing and photo management software (discussed next), enabling users to embellish their publications with images.

**Discover More:** Visit this chapter's free resources to learn more about professional and personal DTP software.



## Paint/Image Editing

Graphic artists, multimedia professionals, technical illustrators, and desktop publishers use paint software and image editing software to create and modify graphics, such as those used in DTP projects and webpages. **Paint software**, also called *illustration software*, is an application that allows users to draw pictures, shapes, and other graphics with various on-screen tools, such as a pen, brush, eyedropper, and paint bucket. **Image editing software** is an application that provides the capabilities of paint software and also includes the capability to enhance and modify existing photos and images. Modifications can include adjusting or enhancing image colors, adding special effects such as shadows and glows, creating animations, and image stitching (combining multiple images into a larger image).

Paint/image editing software for the home or small business user provides an easy-to-use interface; includes various simplified tools that allow you to draw pictures, shapes, and other images (Figure 4-19); and provides the capability of modifying existing graphics and photos. These products also include many templates to assist you in adding images to projects, such as greeting cards, banners, calendars, signs, labels, business cards, and letterhead.

**Discover More:** Visit this chapter's free resources to learn more about paint and image editing software.

## Photo Editing and Photo Management

**Photo editing software** is a type of image editing software that allows users to edit and customize digital photos. With photo editing software, users can retouch photos, crop images, remove red-eye, erase blemishes, restore aged photos, add special effects, enhance image quality, change image shapes, color-correct images, straighten images, remove or rearrange objects in a photo, add layers, and more (Figure 4-20). Many applications also provide a means for creating digital photo albums.



### Built-In Image Editing

Word processing, presentation, and other productivity applications usually include basic image editing capabilities.



**Figure 4-19** Home users can purchase affordable paint/image editing programs that enable them to draw images.

DrawPlus X5 © Serif (Europe) Ltd, | www.serif.com



**Figure 4-20** With photo editing software, users can edit digital photos, such as by adjusting the appearance of images as shown here.

PhotoPlus X6 © Serif (Europe) Ltd | www.serif.com

When you purchase a digital camera, it usually includes photo editing software. Many digital cameras also include basic photo editing software so that you can edit the image directly on the camera. Read How To 4-2 for instructions about editing and sharing photos. Read Ethics & Issues 4-3 to consider issues related to altering digital photos.

With **photo management software**, you can view, organize, sort, catalog, print, and share digital photos. Some photo editing software includes photo management functionality. Many online photo storage services enable you to create scrapbooks — selecting photos, adding captions, selecting backgrounds, and more.



### Technology Trend

**Discover More:** Visit this chapter's free resources to learn about the photo sharing app, Instagram.

## HOW TO 4-2

### Edit and Share Photos

When you take a photo using a digital camera or smartphone, you sometimes may want to edit the photo to remove unwanted areas, correct imperfections, or change its file size. Many apps allow you to edit photos easily. Several are simple to use and do not require advanced photo editing experience. Before editing a photo, you first should make a backup of the original photo. The table below describes common ways to edit photos using a photo editing app.

After you have edited a photo to your satisfaction, you may want to share the

photo with others. Many mobile devices, such as smartphones and tablets, as well as most photo editing apps, have built-in options that allow you to share photos. To share a photo on a mobile device or from within a photo editing app, follow these steps:

1. Open the photo to share.
2. Select the sharing option in the photo editing app or on the mobile device.
3. Choose the method by which to share the photo. Common ways to share

photos include sending the photo as an email attachment, posting the photo to an online social network or photo sharing site, and sending the photo as a picture message to another mobile device.

**Consider This:** Examine your digital camera or other mobile device with a camera feature. Which of the photo editing features discussed here does it have? Did you notice any photo editing features in addition to those listed here?

ACTION	PURPOSE	STEPS
<i>Crop</i>	Removes unwanted areas of a photo	<ol style="list-style-type: none"> <li>1. Select cropping tool.</li> <li>2. Adjust photo border to define area(s) of the photo to keep and discard.</li> </ol>
Remove <i>red-eye</i>	Removes the appearance of red eyes caused by the camera flash	<ol style="list-style-type: none"> <li>1. Select red-eye removal tool.</li> <li>2. Tap or click areas of the photo with the red-eye effect <i>or</i> drag a border around the affected areas.</li> </ol>
<i>Resize</i>	Changes the physical dimensions of the photo	<ol style="list-style-type: none"> <li>1. Select resizing tool.</li> <li>2. Drag sizing handles to increase or decrease the photo's dimensions <i>or</i> type the desired height and width in the appropriate text boxes.</li> </ol>
<i>Compress</i>	Decreases the photo's file size	<ol style="list-style-type: none"> <li>1. Select option to compress photo.</li> <li>2. Choose desired level of compression.</li> </ol>
Adjust <i>sharpness</i>	Increases or decreases crispness of objects in the photo	<ol style="list-style-type: none"> <li>1. Select option to adjust sharpness.</li> <li>2. Drag sharpness slider to desired value <i>or</i> type the desired sharpness level into appropriate text box.</li> </ol>
Adjust <i>brightness</i>	Adjusts lightness or darkness in the photo	<ol style="list-style-type: none"> <li>1. Select option to adjust brightness.</li> <li>2. Drag brightness slider to desired value <i>or</i> type the desired brightness level into appropriate text box.</li> </ol>
Adjust <i>contrast</i>	Adjusts the difference in appearance between light and dark areas of the photo	<ol style="list-style-type: none"> <li>1. Select option to adjust contrast.</li> <li>2. Drag contrast slider to desired value <i>or</i> type the desired contrast level into appropriate text box.</li> </ol>

## ETHICS & ISSUES 4-3

### Is It Ethical to Alter Digital Photos?

Many commercial artists, photojournalists, and creators of magazine covers and billboards use photo editing software to alter digital photos. Artists use photo editing software to enhance digital photos by changing colors, adding or removing objects, and more. When does photo manipulation become unethical?

In several high-profile cases, news sources published intentionally altered photos that misrepresented the facts, in one case publishing photos of an aging world leader edited to remove his hearing aid. One school received criticism when it altered necklines on yearbook photos to be more modest.

Real estate agents on occasion have altered photos of homes for online listings or print brochures. Also making news are celebrity or model photos that artists retouch to change their physical appearance.

The National Press Photographers Association expresses reservations about digital altering and subscribes to the following belief: “As [photo]journalists we believe the guiding principle of our profession is accuracy; therefore, we believe it is wrong to alter the content of a photo in any way ... that deceives the public.” Yet, some insist that the extent to which a photo “deceives the public” is in the eye of the beholder. Many differentiate between

technical manipulation to improve photo quality and an intent to deceive. Some governments are attempting to legislate photo manipulation. One country banned a magazine in which a celebrity’s appearance appeared visibly altered. Some celebrities refuse to allow airbrushing or other manipulation of photos of them.

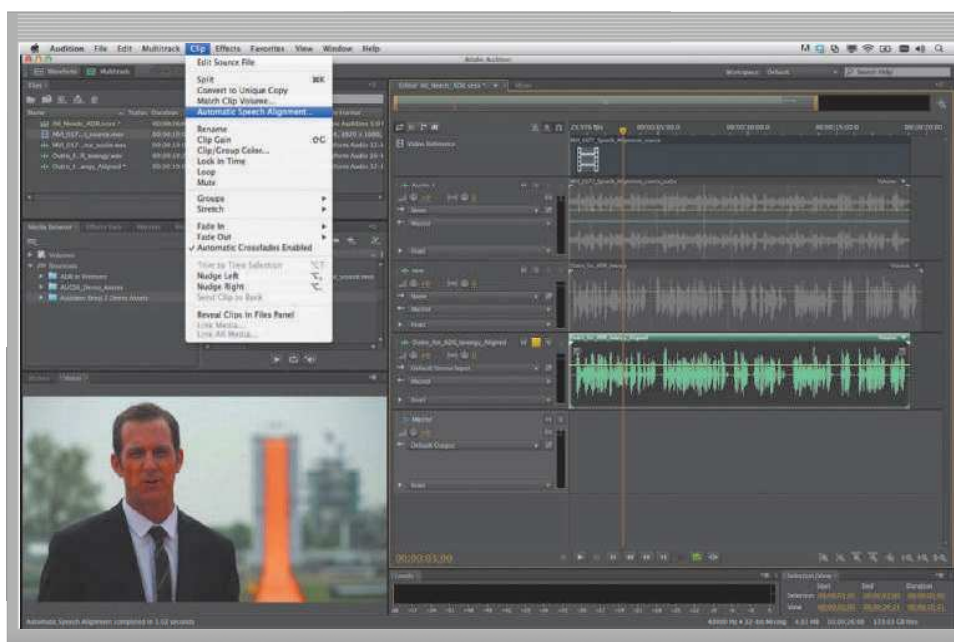
**Consider This:** Is it ethical to alter digital photos? Why or why not? Does the answer depend on the reason for the alteration, the extent of the alteration, or some other factor? Should magazines stop altering pictures of people to change their appearance? Why or why not?

## Video and Audio Editing

**Video editing software** is an application that allows professionals to modify a segment of a video, called a clip. For example, users can reduce the length of a video clip, reorder a series of clips, or add special effects such as words that move across the screen. Video editing software typically includes audio editing capabilities. **Audio editing software** is an application that enables users to modify audio clips, produce studio-quality soundtracks, and add audio to video clips (Figure 4-21). Most television shows and movies are created or enhanced using video and audio editing software.

Many home users work with easy-to-use video and audio editing software, which is much simpler to use than its professional counterpart, for small-scale movie making projects. With these programs, home users can edit home movies, add music or other sounds to the video, and share their movies on the web. Some operating systems include video editing and audio editing applications.

**Discover More:** Visit this chapter’s free resources to learn more about video and audio editing software.



**Figure 4-21** With audio editing software, users modify audio clips.

Source: Adobe Systems Incorporated

## Multimedia and Website Authoring

**Multimedia authoring software** allows users to combine text, graphics, audio, video, and animation in an interactive application (Figure 4-22). With this software, users control the placement of text and images and the duration of sounds, video, and animation. Once created, multimedia presentations often take the form of interactive computer-based presentations or web-based presentations designed to facilitate learning, demonstrate product functionality, and elicit direct user participation. Training centers, educational institutions, and online magazine publishers use multimedia authoring software to develop interactive applications. These applications may be distributed on an optical disc, over a local area network, or via the Internet as web apps.

**Website authoring software** helps users of all skill levels create related webpages that include graphics, video, audio, animation, special effects with interactive content, and blog posts. In addition, many website authoring programs allow users to organize, manage, and maintain websites. Website authoring software often has capabilities of multimedia authoring software.



### CONSIDER THIS

#### What is computer-based or web-based training?

*Computer-based training (CBT)* is a type of education in which students learn by using and completing exercises with instructional software. *Web-based training (WBT)* is a type of CBT that uses Internet technology to deliver the training. CBT and WBT typically consist of self-directed, self-paced instruction about a topic so that the user becomes actively involved in the learning process instead of being a passive recipient of information. Beginning athletes use CBT programs to learn the intricacies of participating in a sport. The military and airlines use CBT simulations to train pilots to fly in various conditions and environments. WBT is popular in business, industry, and schools for teaching new skills or enhancing existing skills of employees, teachers, and students.

**Discover More:** Visit this chapter's free resources to learn more about multimedia and website authoring software.



**Figure 4-22** Multimedia authoring software allows you to create dynamic presentations that include text, graphics, audio, video, and animation.

Courtesy of Matchware Inc.

## Media Player

A **media player** is a program that allows you to view images and animations, listen to audio, and watch video files on your computer or mobile device (Figure 4-23). Media players also may enable you to organize media files by genre, artist, or other category; create playlists; convert files to different formats; connect to and purchase media from an online media store or market-place; stream radio stations' broadcasting over the Internet; download podcasts; burn audio CDs; and transfer media to portable media players.

**Discover More:** Visit this chapter's free resources to learn more about media players.



**Figure 4-23** A media player.

Source: Rhapsody

## Disc Burning

**Disc burning software** writes text, graphics, audio, and video files on a recordable or rewritable disc. This software enables home users easily to back up contents of their hard drive on an optical disc (CD/DVD) and make duplicates of uncopyrighted music or movies. Disc burning software usually also includes photo editing, audio editing, and video editing capabilities.

## Personal Interest Applications

Countless desktop, mobile, and web apps are designed specifically for lifestyle, medical, entertainment, convenience, or education activities. Most of the programs in this category are relatively inexpensive; many are free. Some applications focus on a single service, while others provide several services in a single application.

- **Lifestyle applications:** Access the latest news or sports scores, check the weather forecast, compose music, research genealogy, find recipes, or locate nearby restaurants, gas stations, or points of interest.
- **Medical applications:** Research symptoms, establish a fitness or health program, track exercise activity, refill prescriptions, count calories, or monitor sleep patterns.

### Internet Research

What is geocaching?

Search for: geocaching basics

### BTW

#### Technology Trend

**Discover More:** Visit this chapter's free resources to learn about the education app, iTunes U.

- **Entertainment applications:** Listen to music or the radio, view photos, watch videos or shows, read a book or other publication, organize and track fantasy sports teams, and play games individually or with others.
- **Convenience applications:** Obtain driving directions or your current location, remotely start your vehicle or unlock/lock the doors, set an alarm or timer, check the time, calculate a tip, use your phone as a flashlight, or use a personal assistant that acts on your voice commands (read How To 4-3 for instructions about using personal assistant apps).
- **Education applications:** Access how-to guides, learn or fine-tune a particular skill, follow a tutorial, run a simulation, assist children with reading and other elementary skills, or support academics.

### HOW TO 4-3

#### Use Features in Voice Command Personal Assistant and Mobile Search Apps

Many mobile operating systems include a virtual personal assistant that processes voice commands and performs certain tasks. Some mobile search apps also act on spoken commands. For example, you can issue voice commands to set an alarm, add an appointment to your calendar, send a text message, or run an app. The following table describes ways to use features in voice command personal assistant apps:

Task	Sample Voice Command(s)
Change phone settings	"Turn on Wi-Fi." "Turn off Bluetooth."
Dial a number	"Call Madelyn's Cell." "Call Mom Home." "Dial 407-555-8275."
Obtain information	"When was George Washington born?" "How many ounces are in a pound?" "What is the closest Chinese restaurant?"
Obtain driving instructions	"Navigate to 123 Main Street, Orlando, Florida." "Navigate to The Home Depot." "Navigate to Manchester, New Hampshire."
Perform a search	"What is the gas mileage for a Ford Explorer?" "Search butterfly lifespan."
Run an app	"Run calendar." "Run email."
Schedule a meeting	"Schedule a meeting with Traci at the library at 3:00 p.m. tomorrow."
Send a text message	"Text Samuel meet me at the pool."
Set a reminder	"Remind me to go grocery shopping tomorrow."
Set a timer	"Set timer for five minutes."
Set an alarm	"Set an alarm for 6:00 a.m. tomorrow." "Set an alarm for 6:30 a.m. every weekday."

**Consider This:** What other voice commands are available on your phone? Do you use voice commands? Why or why not?

#### Mini Feature 4-2: Web and Mobile Apps for Media and Personal Interest

A variety of applications provide a service intended to make media and personal interest tasks easier to accomplish. Some applications focus on a single service, while others provide several services in a single application. Read Mini Feature 4-2 to learn about some popular web and mobile apps for media and personal interests.

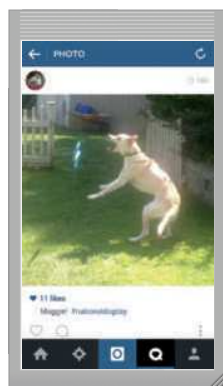
## MINI FEATURE 4-2

# Web and Mobile Apps for Media and Personal Interests

Whether sharing, viewing, and purchasing media, such as photos; streaming audio and video; or playing games by yourself or with others, countless web and mobile apps are available to meet your needs. You also can use web and mobile apps to look up news, sports, and weather; obtain maps and directions; help you reach your health and fitness goals; and assist you with academic objectives.

### Media Sharing

With media sharing mobile apps, you use the digital camera on your mobile device to take quality photos and/or videos and then instantly can share the photos or videos on online social networks. Using the corresponding media sharing web app, you can categorize, tag, organize, and rank the media posted by you, your friends, and your contacts.



Instagram

### Streaming Audio and Video

Podcasts, video blogs, clips or episodes from a television show, or even entire movies are available through a variety of streaming media web and mobile apps. Some services are available only with membership, and may charge a monthly fee. Others are free, but include ads. Streaming media enables you to view and listen to content without downloading it to your computer or device, saving valuable disc or media storage space.

### Gaming

Game web and mobile apps often offer a social component, enabling you to chat within the game environment, find friends who play the same game apps, and post your scores on social media. Word, puzzle, and board games are just some examples of apps you can play by yourself or with friends or others using the same apps.

### News, Sports, and Weather

Many apps provide access to the latest news, stories, current events, sports scores, sporting events, and weather forecasts. Some of these mobile apps use GPS technology to provide current or customized information based on the location of your mobile device. You also can configure these apps to deliver text messages and other types of alerts to your device when certain events occur, such as when a football team scores a touchdown or when severe weather is near.

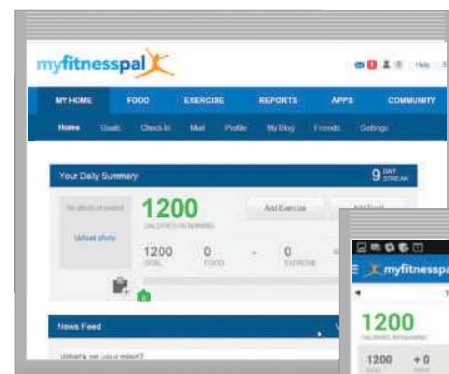
### Mapping

Using your mobile device's GPS capability, you can use mapping mobile apps to obtain directions, maps, and recommendations for restaurants or other points of interest based on your current location. Some mapping apps even help you to locate friends based on their GPS signals (if they enable you to do so). Others allow you to share your current location on social media using a check-in feature. Web apps help you decide on a route, print directions or a map, and even find amenities along your route, such as public rest stops or restaurants.

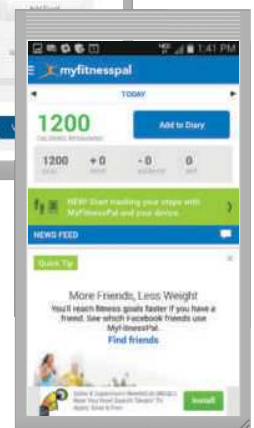
### Health and Fitness

Losing weight, training for a race, or following a low-calorie diet are some uses of health and fitness apps.

Using a mobile device as a pedometer or GPS receiver can help you count your steps or create a map of a route you run and then update your profile with the data it tracked. You can use corresponding web apps to chart and analyze your progress, schedule your next workout, or determine the next steps to reach your goals. These apps also can help plan your meals and track the nutritional value of food you consume.



MyFitnessPal LLC



### Academic

If you need to study terms or topics, flash card apps can provide reinforcement. This book's premium content for example, has an accompanying Flash Cards app designed to improve your retention of chapter key terms. Schools often subscribe to educational apps that provide students with games, quizzes, and lessons about course topics. Using these apps, teachers can keep track of students' progress and pinpoint areas where they may need extra help. You also can access complete college or high school courses and take advantage of free or fee-based digital content provided by publishers and teachers.

**Discover More:** Visit this chapter's free resources to learn more about web and mobile apps for media and personal interests.

**Consider This:** Which web and mobile apps have you used for media sharing; streaming audio and video; gaming; news, sports, and weather; mapping; health and fitness; and education? Will you try others after reading this mini feature? Why or why not?



### Mobile Communications Apps

Most of the communications apps in Table 4-2 are available as mobile apps, as well.

## Communications Applications

One of the main reasons people use computers is to communicate and share information with others. Earlier chapters presented a variety of communications applications, which are summarized in Table 4-2. Read Ethics & Issues 4-4 to consider whether your email provider should be allowed to read or scan your email messages.



**Table 4-2 Communications Applications**

### Blog

- Time-stamped articles, or posts, in diary or journal format, usually listed in reverse chronological order
- Bloggers (author) use blogging software to create/maintain blog
  - Some blog services provide blogging software so users do not have to install it on their own servers

### Browsing

- Allows users to access and view webpages on the Internet
- Requires browser
  - Integrated in most operating systems
  - Alternative browsers are available on the web for download, usually for free

### Chat

- Real-time, online typed conversation with one or more users
- Requires chat client software
  - Integrated in some operating systems and most browsers
  - Available for download on the web, usually for free
  - Included with some paid ISPs
  - Built into some websites

### Online Discussion

- Online areas where users have written discussions
- May require a reader program
- Integrated in some operating systems, email programs, and browsers

### Email

- Messages and files sent via a network, such as the Internet
- Requires an email program
  - Integrated in many software suites and operating systems
  - Available free at portals on the web
  - Included with a paid ISP
  - Can be purchased separately

### File Transfer

- Method of uploading files to and downloading files from servers on the Internet
- May require an FTP client program
  - Integrated in some operating systems
  - Available for download on the web; many free or open source alternatives are available
  - Many applications (such as web editing software) that require frequent transfer of files to the Internet have built-in FTP capabilities

### Internet Phone

- Allows users to speak to other users via an Internet connection
- Requires a microphone, a speaker, a high-speed Internet connection, and VoIP software
  - Some subscription services also require a separate phone and VoIP router
  - With a webcam, some services also support video chat or videoconferences

### Internet Messaging

- Real-time exchange of messages, files, images, audio, and/or video with another online user
- Requires messaging software
  - Integrated in some operating systems
  - Available for download on the web, usually for free, or available as a browser plug-in
  - Included with some paid ISPs

### Mobile Messaging

- Short text, picture, or video messages sent and received, mainly on mobile devices
- May require messaging plan from mobile service provider
  - Requires messaging software
  - Integrated in most mobile devices
  - Available for download on the web, usually for free

### Videoconference

- Meeting between geographically separated people who use a network to transmit video/audio
- Requires videoconferencing software, a microphone, a speaker, and a webcam

### Web Feeds

- Keeps track of changes made to blogs by checking feeds
- Requires a feed reader
  - Integrated in some email programs and browsers
  - Available for download on the web, usually for free



## ETHICS & ISSUES 4-4

### Should Your Email Provider Be Allowed to Read or Scan Your Email?

When using any email program or service, you expect the app to scan incoming and outgoing mail to prevent the spread of malware. One web-based email service recently released a service update that includes automatic scanning of all email messages in order to provide targeted advertisements. Privacy experts point out that the scan includes all email messages sent or received, whether or not both the sender and recipient subscribe to the service.

Ad-supported web services, including email, often collect information in your profile, as well as your search results and other Internet activity. When you agree to

use these services, you give consent to this type of monitoring. In this case, the extent of the monitoring exceeds the policies of other web-based services. In a court filing, one email provider stated that users of web-based services have no “reasonable expectation” of privacy with respect to the content of email messages.

A further complication to this instance is that many educational institutions use this service for email, collaboration software, and more. The service admits to collecting data from students, even when the school has opted out of ad displays. Laws are unclear whether collecting student data is legal. Several schools have joined to create a class-action lawsuit against the provider. Many

argue that collection of student data, which could include grades received and more, is a violation of the Family Educational Rights and Privacy Act (FERPA). Although FERPA predates cloud-based Internet services, it states that “schools must have written permission from the parent or eligible student in order to release any information from a student's education record.”

**Consider This:** Should an email service provider disclose data collection practices? Why or why not? Is it ethical for an email provider to scan email sent by a nonsubscriber? Why or why not? Is collecting student data a violation of FERPA? Why or why not?

## NOW YOU SHOULD KNOW

Be sure you understand the material presented in the sections titled Graphics and Media Applications, Personal Interest Applications, and Communications Applications, as it relates to the chapter objectives.  
*Now you should know ...*

- When you might use a graphics or media application (Objective 5)
- Which personal interest applications you would find useful (Objective 6)
- When you are interacting with communications applications (Objective 7)

**Discover More:** Visit this chapter's premium content for practice quiz opportunities.

## Security Tools

To protect your computers and mobile devices, you can use one or more security tools. Security tools include personal firewalls, antivirus programs, malware removers, and Internet filters. Although some of these tools are included with the operating system, you also can purchase stand-alone programs that offer improvements or added functionality.

### Personal Firewall

A **personal firewall** is a security tool that detects and protects a personal computer and its data from unauthorized intrusions (Figure 4-24). Personal firewalls constantly monitor all transmissions to and from a computer or mobile device and may inform a user of attempted intrusions. When connected to the Internet, your computer or mobile device is vulnerable to attacks from



**Figure 4-24** This personal firewall detected a threat to the computer and provided a means to remove the threat.

Courtesy of Checkpoint Software Technologies Ltd.

**Security Suites**

A *security suite* is a collection of individual security tools available together as a unit. These programs often are called Internet security programs.

hackers who try to access a computer or network illegally. These attacks may destroy your data, steal information, damage your computer, or carry out some other malicious action.

**CONSIDER THIS****What is a hardware firewall?**

A *hardware firewall* is a device intended to stop network intrusions before they attempt to affect your computer or network maliciously. Many routers also can function as a hardware firewall.

**Discover More:** Visit this chapter's free resources to learn more about personal firewalls.

**Mini Feature 4-3: Viruses and Malware**

A computer **virus** is a potentially damaging program that affects a computer or device negatively by altering the way it works. This occurs without the user's knowledge or permission. Once the virus is in a computer or device, it can spread and may damage your files, programs and apps, and operating system. Read Mini Feature 4-3 to learn more about viruses and other malware.

**MINI FEATURE 4-3****Viruses and Malware**

Viruses do not generate by chance. The programmer of a virus, known as a virus author, intentionally writes a virus program. Writing a virus program usually requires significant programming skills. The virus author ensures the virus can replicate itself, conceal itself, monitor for certain events, and then deliver its payload. A *payload* is the destructive event or prank the virus delivers. Viruses can infect all types of computers and devices. Most variations of viruses have two phases involved in their execution: infection and delivery.

The first step in the infection phase is activation of the virus. The most common way viruses spread is by users running infected programs or apps. During the infection phase, viruses typically perform one or more of the following actions:

1. First, a virus replicates by attaching itself to program files. A macro virus hides in a macro, which is a standard feature of many productivity applications, such as word processing and spreadsheet apps. A boot sector virus targets the computer's start-up files. A file virus attaches itself to program files. The next time an infected program or app is run, the virus executes and infects the computer or device.
2. Viruses conceal themselves to avoid detection. A stealth virus disguises itself by hiding in fake code sections, which it inserts within working code in a file. A polymorphic virus actually changes its code as it delivers the infection.
3. Finally, viruses watch for a certain condition or event and activate when that condition or event occurs. The event might be starting the computer or device, or reaching a date on the system clock. A logic bomb activates when it detects a specific condition

(say, a name deleted from the employee list). A time bomb is a logic bomb that activates on a particular date or time. If the triggering condition does not exist, the virus simply replicates.

During the delivery phase, the virus unleashes its payload, which might be a harmless prank that displays a meaningless message — or it might be destructive, corrupting or deleting data and files. The most dangerous viruses do not have an obvious payload. Instead, they quietly modify files. One way antivirus software detects computer viruses is by monitoring files for unknown changes.

In addition to viruses, other malware includes worms, trojan horse programs, and rootkits.

- A *worm* resides in active memory and replicates itself over a network to infect computers and devices, using up system resources and possibly shutting down the system.
- A *trojan horse* is a destructive program disguised as a real program, such as a screen saver. When a user runs a seemingly innocent program, a trojan horse hiding inside can capture information, such as user names and passwords, from your computer or enable someone to control your computer remotely. Unlike viruses, trojan horses do not replicate themselves.
- A *rootkit* is a program that easily can hide and allow someone to take full control of your computer from a remote location, often for nefarious purposes. For example, a rootkit can hide in a folder on your computer. The folder appears empty because the rootkit has instructed your computer not to display the contents of the folder. Rootkits can be very dangerous and often require special software to detect and remove.

Studies show that malware can infect an unprotected computer within minutes after connecting to the Internet. Due to the increasing threat of viruses attacking your computer, it is more important than ever to protect your computer from viruses and other malware. Secure IT 1-2 in Chapter 1 lists steps you can follow to protect your computer from a virus infection.

**Discover More:** Visit this chapter's free resources to learn more about file viruses, polymorphic viruses, rootkits, and antivirus software.

**Consider This:** If your computer or mobile device is infected with a virus or malware, how will you know? How will you find instructions for removing a virus?

### Signs of Virus Infection

- An unusual message or image is displayed on the computer screen.
- An unusual sound or music plays randomly.
- The available memory is less than what should be available.
- A program or file suddenly is missing.
- An unknown program or file mysteriously appears.
- The size of a file changes without explanation.
- A file becomes corrupted.
- A program or file does not work properly.
- System properties change.
- The computer operates much slower than usual.

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### Antivirus Programs

To protect a computer from virus attacks, users should install an antivirus program and keep it updated by purchasing revisions or upgrades to the software. An **antivirus program** protects a computer against viruses by identifying and removing any computer viruses found in memory, on storage media, or on incoming files (Figure 4-25). Antivirus programs scan for programs that attempt to modify a computer's start-up files, the operating system, and other programs that normally are read from but not modified. In addition, many antivirus programs automatically scan files downloaded from the web, email attachments, opened files, and all types of removable media inserted in the computer or mobile device.

If an antivirus program identifies an infected file, it attempts to remove the malware. If the antivirus program cannot remove the infection, it often quarantines the infected file.

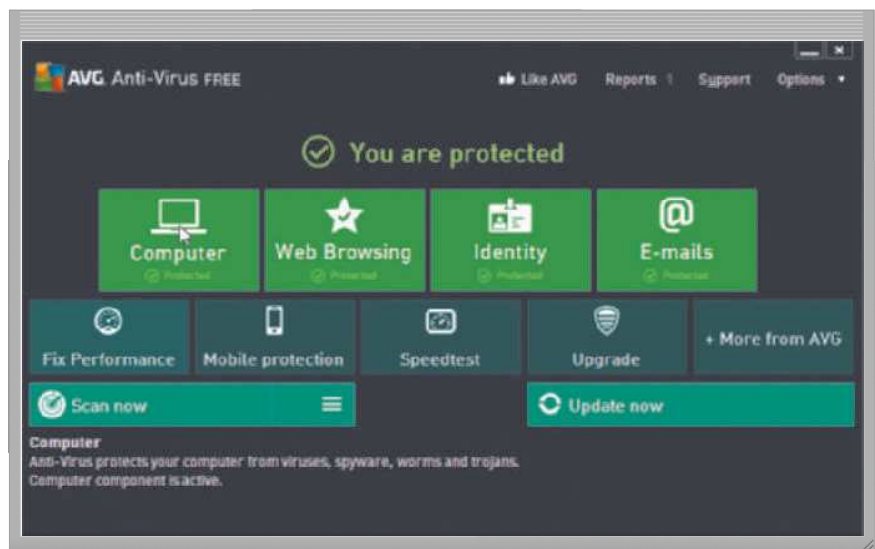
A *quarantine* is a separate area of a hard drive that holds the infected file until the infection can be removed. This step ensures other files will not become infected. Quarantined files remain on your computer or mobile device until you delete them or restore them.

Most antivirus programs also include protection against other malware, such as worms, trojan horses, and spyware. When you purchase a new computer, it may include a trial version of antivirus software. Many email servers also have anti-virus programs installed to check incoming and outgoing email messages for viruses and other malware. Read Secure IT 4-4 for tips about recognizing virus hoaxes.




#### Antivirus and Malware Detection Programs

You should run only one antivirus program on your computer but can run more than one malware detection program.



**Figure 4-25** An antivirus program scans memory, media, and incoming email messages and attachments for viruses and attempts to remove any viruses it finds.

Courtesy of Checkpoint Software Technologies Ltd.

 **SECURE IT 4-4**
 **Recognizing Virus Hoaxes**

Computer hoaxes spread across the Internet in record time and often are the source of urban legends. These hoaxes take several forms and often disappear for months or years at a time, only to resurface some time later.


Most alarming to some users are the computer virus hoaxes that warn the computer is infected and needs immediate attention. Some warnings state the problem is so severe that the computer or device will

explode or that the entire hard drive will be erased in a matter of seconds. The warnings cite prominent companies, such as Microsoft and Intel Security. These messages claim to offer a solution to the problem, generally requesting a fee for a program to download. Snopes.com compiles these hoaxes and describes their sources and histories.

In reality, these fake messages are generated by unscrupulous scammers preying upon gullible people who panic and follow the directions in the message. These users

divulge credit card information and then often download files riddled with viruses.

If you receive one of these virus hoaxes, never respond to the message. Instead, delete it. Most importantly, never forward it to an unsuspecting friend or coworker. If you receive the virus hoax from someone you know, send him or her a separate email message with information about the hoax.

 **Consider This:** Have you ever received a virus hoax? If so, what action did you take?

 **CONSIDER THIS**
**How do antivirus programs detect viruses?**

Many antivirus programs identify viruses by looking for virus signatures. A *virus signature*, also called a virus definition, is a known specific pattern of virus code. Computer users should update their antivirus program's signature files regularly. This extremely important activity allows the antivirus program to protect against viruses written since the antivirus program was released and/or its last update. Most antivirus programs contain an automatic update feature or regularly prompts users to download the updated virus signatures, usually at least once a week. The vendor usually provides this service to registered users at no cost for a specified time.

**Discover More:** Visit this chapter's free resources to learn more about antivirus programs.

**Spyware, Adware, and Other Malware Removers**

*Spyware* is a type of program placed on a computer or mobile device without the user's knowledge that secretly collects information about the user and then communicates the information it collects to some outside source while the user is online. Some vendors or employers use spyware to collect information about program usage or employees. Internet advertising firms often collect information about users' web browsing habits. Spyware can enter your computer when you install a new program, through a graphic on a webpage or in an email message, or through malware.

*Adware* is a type of program that displays an online advertisement in a banner or pop-up or pop-under window on webpages, email messages, or other Internet services. Sometimes, Internet advertising firms hide spyware in adware.

A **spyware remover** is a type of program that detects and deletes spyware and similar programs. An **adware remover** is a program that detects and deletes adware. Malware removers detect and delete spyware, adware, and other malware. Read Secure IT 4-5 for measures you can take to protect your mobile device from malware.

 **CONSIDER THIS**
**Are cookies spyware?**

A *cookie* is a small text file that a web server stores on your computer. Cookie files typically contain data about you, such as your user name, viewing preferences, or shopping cart contents. Cookies are not considered spyware because website programmers do not attempt to conceal the cookies.

**Discover More:** Visit this chapter's free resources to learn more about malware removers.

## SECURE IT 4-5



### Malware Risks to Mobile Devices

Practically every smartphone is vulnerable to hacking attacks. Threats to smartphones and mobile devices are growing in record numbers due to the rising popularity of these products and the variety of marketplace sources for downloading apps.

Often the malware is disguised as a popular app and steals personal and sensitive information and phone numbers. It also can allow hackers to control the mobile device from remote locations. Once the hacker takes over the device, all the information on it is available, including passwords and account numbers. One of the fastest growing threats within mobile apps is *toll fraud malware*,

which is a malicious mobile app that uses a variety of fraudulent schemes to charge unsuspecting users for premium messaging services.

Smartphone users can take several precautions to guard against malware threats. They include:

- Read reviews of apps and the companies that create them before downloading the apps to your mobile device.
- Use mobile malware and antivirus protection.
- Turn off location-based apps that track your movements.
- Do not connect to unknown wireless networks.
- Keep the operating system up to date.
- Enable the screen lock feature, and use a strong password to unlock the device.
- Reset the mobile device before selling or trading it in.
- Practice the same safe computing measures you take on your home computer.

**Consider This:** Which of these guidelines do you follow now when using your smartphone or mobile device? How will you modify your usage after reading these tips?

## Internet Filters

Filters are programs that remove or block certain items from being displayed. Four widely used Internet filters are anti-spam programs, web filters, phishing filters, and pop-up and pop-under blockers.

**Anti-Spam Programs** **Spam** is an unsolicited email message or posting sent to many recipients or forums at once. Spam is considered Internet junk mail. The content of spam ranges from selling a product or service, to promoting a business opportunity, to advertising offensive material. Spam also may contain links or attachments that contain malware.

An **anti-spam program** is a filtering program that attempts to remove spam before it reaches your inbox or forum. If your email program does not filter spam, many anti-spam programs are available at no cost on the web. ISPs often filter spam as a service for their subscribers.

**Web Filters** **Web filtering software** is a program that restricts access to certain material on the web. Some restrict access to specific websites; others filter websites that use certain words or phrases. Many businesses use web filtering software to limit employee's web access. Some schools, libraries, and parents use this software to restrict access to websites that are not educational.

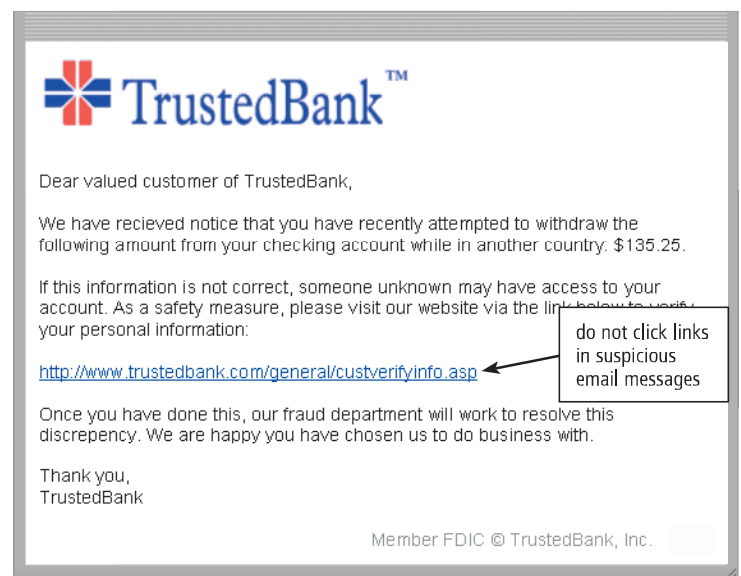
**Phishing Filters** **Phishing** is a scam in which a perpetrator sends an official looking email message that attempts to obtain your personal and/or financial information (Figure 4-26). Some phishing messages ask you to reply with your information; others direct you to a phony website or a pop-up or pop-under window that looks like a legitimate website, which then collects your information.

A **phishing filter** is a program that warns or blocks you from potentially fraudulent or suspicious websites. Some browsers include phishing filters.

### Internet Research

What are current phishing scams?

Search for: recent phishing scams



**Figure 4-26** An example of a phishing email message.

Source: Andrew Levine

**Pop-Up and Pop-Under Blockers** A *pop-up ad* is an Internet advertisement that suddenly appears in a new window on top of a webpage. Similarly, a *pop-under ad* is an Internet advertisement that is hidden behind the browser window so that it will be viewed when users close their browser windows. A **pop-up blocker** or **pop-under blocker** is a filtering program that stops pop-up or pop-under ads from displaying on webpages. Many browsers include these blockers. You also can download pop-up and pop-under blockers from the web at no cost.

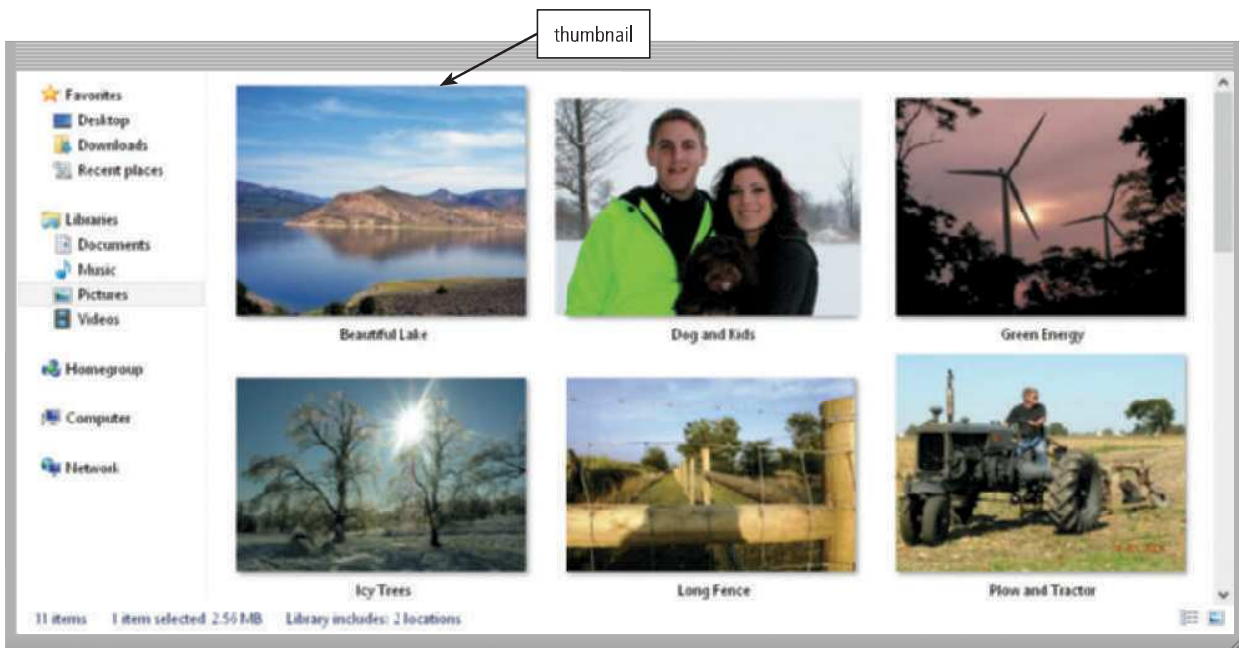
**Discover More:** Visit this chapter's free resources to learn more about Internet filters.

## File, Disk, and System Management Tools

To perform maintenance-type tasks related to managing a computer, its devices, or its programs, you can use one or more file, disk, and system management tools. Functions provided by these tools include the following: managing files, searching, viewing images, uninstalling software, cleaning up disks, defragmenting disks, setting up screen savers, compressing files, maintaining a personal computer, and backing up files and disks. Although some of these tools are included with the operating system, you also can purchase stand-alone programs that offer improvements or added functionality.

### File Manager

A **file manager** is a tool that performs functions related to file management. Some of the file management functions that a file manager performs are displaying a list of files on a storage medium (Figure 4-27); organizing files in folders; and copying, renaming, deleting, moving, and sorting files. A **folder** is a specific named location on a storage medium that contains related files. Operating systems typically include a file manager.



**Figure 4-27** With a file manager, you can view files containing documents, photos, and music. In this case, thumbnails of photos are displayed.

Source: Microsoft

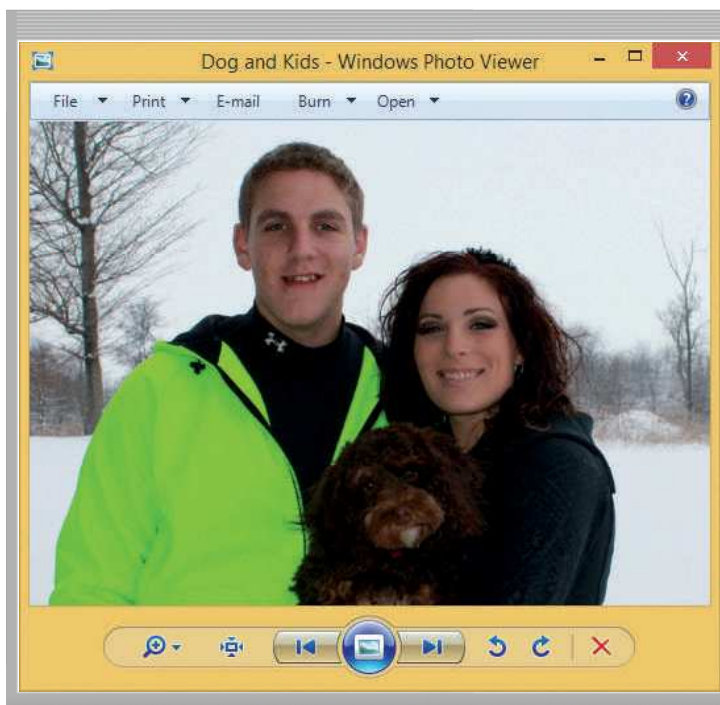
## Search

A **search tool** is a program, usually included with an operating system, that attempts to locate a file, contact, calendar event, app or any other item stored on your computer or mobile device based on criteria you specify (Figure 4-28). The criteria could be a word(s), date, location, and other similar properties. Search tools can look through documents, photos, music, calendars, contacts, and other items on your computer or mobile device and/or on the Internet, combining search results in a single location.

Search tools typically use an index to assist with locating items quickly. An *index* stores a variety of information about a file, including its name, date created, date modified, author name, and so on. When you enter search criteria, instead of looking through every file and folder on the storage medium, the search tool looks through the index first to find a match. Each entry in the index contains a link to the actual file on the storage media for easy retrieval.

## Image Viewer

An **image viewer** is a tool that allows users to display, copy, and print the contents of a graphics file, such as a photo (Figure 4-29). With an image viewer, users can see images without having to open them in a paint or image editing program. Many image viewers include some photo editing capabilities. Most operating systems include an image viewer.



**Figure 4-29** An image viewer allows users to see the contents of a photo file.

Source: Microsoft

## Uninstaller

An **uninstaller** is a tool that removes a program, as well as any associated entries in the system files. When you install a program, the operating system records the information it uses to run the software in the system files. The uninstaller deletes files and folders from the hard drive, as well as removes program entries from the system files. Read How To 4-4 for instructions about uninstalling programs and removing apps from your computers and mobile devices.



**Figure 4-28** This search displays all files on the mobile device that match the search criteria, Map. Notice the search results show map apps, email with a map, and a calendar event.

Source: Apple Inc

### HOW TO 4-4

#### Uninstall a Program or Remove an App

You may choose to uninstall a program or remove an app from your computer or mobile device for a variety of reasons. For example, you may uninstall a program if you need more space on your hard drive, or if you no longer have a use for that program. Uninstalling unwanted programs and apps will keep your hard drive free from clutter and maximize your computer or mobile device's performance. The following steps describe how to uninstall a program or remove an app.

#### Windows

1. Open the Control Panel.
2. Tap or click the option to uninstall a program.

3. Tap or click to select the program to uninstall.
4. Tap or click the Uninstall button and then follow the prompts on the screen.

#### Mac

1. Open the Finder.
2. Tap or click Applications in the left pane.
3. Scroll to display the app you wish to uninstall.
4. Drag the app's icon to the Trash.

#### iPhone, iPad, or iPod Touch

1. Press and hold the icon for the app you wish to delete until the app icons begin to animate.

2. Tap the X on the icon for the app you wish to delete to remove the app from your device.

#### Android

1. Display the Settings menu.
2. Tap the command to display a list of installed applications.
3. Tap the application to uninstall.
4. Tap the Uninstall button.
5. Tap the OK button.

**Consider This:** In addition to the reasons stated here, what other reasons might you choose to uninstall an app from your computer or mobile device?

### CONSIDER THIS

#### Can you use a file manager to delete a program?

If an uninstaller exists and you remove software from a computer by deleting the files and folders associated with the program without running the uninstaller, the system file entries might not be updated. This may cause the operating system to display error messages when you start the computer.

### Disk Cleanup

A **disk cleanup** tool searches for and removes unnecessary files (Figure 4-30). Unnecessary files may include downloaded program files, temporary Internet files, deleted files, and unused program files. Operating systems usually include a disk cleanup tool.



**Figure 4-30** A disk cleanup tool searches for and removes unnecessary files.

Source: Microsoft



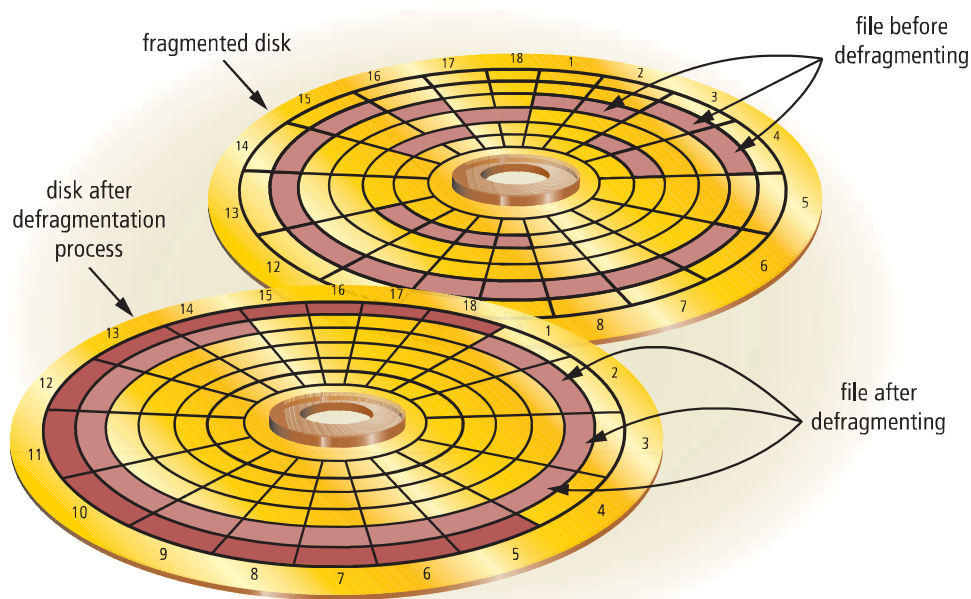
## Disk Defragmenter

A **disk defragmenter** is a tool that reorganizes the files and unused space on a computer's hard disk so that the operating system accesses data more quickly and programs run faster. When an operating system stores data on a disk, it places the data in the first available sector (a storage location on a disk in the shape of an arc). The operating system attempts to place data in sectors that are contiguous (next to each other), but this is not always possible. When the contents of a file are scattered across two or more noncontiguous sectors, the file is fragmented.

Fragmentation slows down file access and, thus, the performance of the entire computer. Defragmenting the disk, or reorganizing it so that the files are stored in contiguous sectors, solves this problem (Figure 4-31). Operating systems usually include a disk defragmenter.



Defragmenting is necessary only on hard disks. You do not need to defragment an SSD (solid-state drive).



**Figure 4-31** A fragmented disk has many files stored in noncontiguous sectors. Defragmenting reorganizes the files so that they are located in contiguous sectors, which speeds access time.  
© Cengage Learning

## Screen Saver

A **screen saver** is a tool that causes a display device's screen to show a moving image or blank screen if no keyboard or mouse activity occurs for a specified time. When you press a key on the keyboard, tap the screen, or move the mouse, the screen saver disappears and the screen returns to the previous state.

### CONSIDER THIS

#### What is the purpose of a screen saver?

Screen savers originally were developed to prevent a problem called ghosting, in which images could be etched permanently on a monitor's screen. Although ghosting is not as severe of a problem with today's displays, manufacturers continue to recommend that users install screen savers for this reason. Screen savers also are popular for security, business, and entertainment purposes. To secure a computer, users configure their screen saver to require a password to deactivate.



### High-Tech Talk

**Discover More:** Visit this chapter's free resources to learn about compression algorithms

## File Compression

A **file compression tool** shrinks the size of a file(s). A compressed file takes up less storage space than the original file. Compressing files frees up room on the storage media. You may need to compress a file so that it will fit on a smaller storage medium, such as a USB flash drive. Attaching a compressed file to an email message, for example, reduces the time needed for file transmission. Uploading and downloading compressed files to and from the Internet reduces the file transmission time.

Compressed files sometimes are called **zipped files**. When you receive or download a compressed file, you must uncompress it. To **uncompress** (or unzip or expand) a file, you restore it to its original form. Some operating systems include file compression and uncompression capabilities.

**Discover More:** Visit this chapter's free resources to learn more about file compression tools.

## PC Maintenance

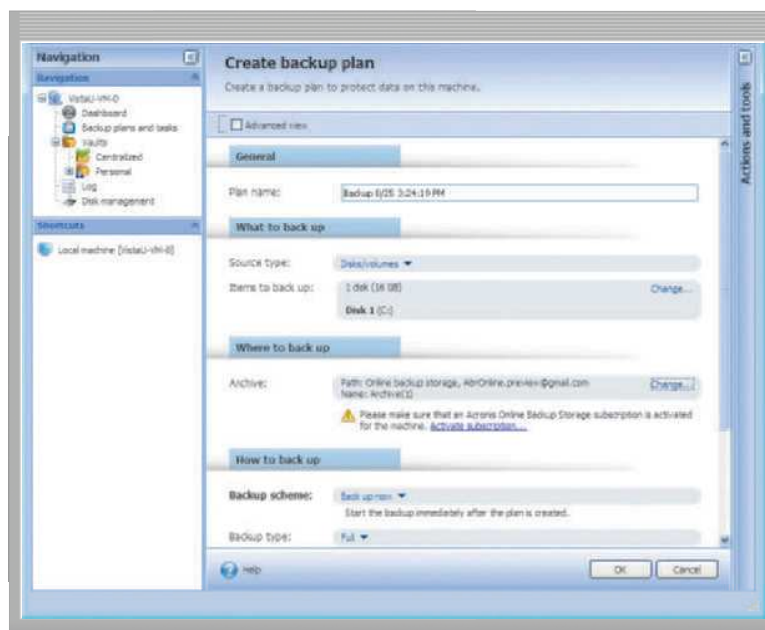
A **PC maintenance tool** is a program that identifies and fixes operating system problems, detects and repairs drive problems, and includes the capability of improving a computer's performance. Additionally, some personal computer maintenance utilities continuously monitor a computer while you use it to identify and repair problems before they occur.

## Backup and Restore

A **backup tool** allows users to copy, or back up, selected files or the contents of an entire storage medium to another storage location, such as another hard drive, optical disc, USB flash drive, or cloud storage (Figure 4-32). During the backup process, the backup tool monitors progress and alerts you if it needs additional media, such as another disc. Many backup programs compress files during the backup process. By compressing the files, the backup program requires less storage space for the backup files than for the original files.

Because they are compressed, you usually cannot use backup files in their backed up form. In the event you need to use a backup file, a **restore tool** reverses the process and returns backed up files to their original form. Backup tools work with a restore tool. You should back up files and disks regularly in the event your originals are lost, damaged, or destroyed.

**Discover More:** Visit this chapter's free resources to learn more about backup tools.



**Figure 4-32** A backup tool allows users to copy files, folders, or the entire contents from one storage medium to another location.

Source: Acronis

## NOW YOU SHOULD KNOW

Be sure you understand the material presented in the sections titled Security Tools and File, Disk, and System Management Tools as it relates to the chapter objectives.

*Now you should know ...*


- Why you should use personal firewalls, antivirus programs, malware removers, and Internet filters (Objective 8)
- Which file, disk, and system management tools you would find useful (Objective 9)

**Discover More:** Visit this chapter's premium content for practice quiz opportunities.

## Chapter Summary

This chapter presented a variety of programs and apps available for computers and mobile devices. You learned about the role of the operating system and the various ways software is distributed. The chapter presented the features of a variety of productivity applications, graphics and media applications, and personal interest applications. It reviewed several communications applications and then presented features of a variety of security tools and file, disk, and system management tools.

**Discover More:** Visit this chapter's free resources for additional content that accompanies this chapter and also includes these features: Technology Innovators: Dan Bricklin, Google/Sergey Brin/Larry Page, Adobe Systems, and eBay/PayPal; Technology Trends: Evernote, Instagram, and iTunes U; and High-Tech Talks: Filtering Data and Compression Algorithms.

-  Test your knowledge of chapter material by accessing the Study Guide, Flash Cards, and Practice Test resources from your smartphone, tablet, laptop, or desktop.

## TECHNOLOGY @ WORK

### Entertainment

Do you wonder how music on the radio sounds so perfectly in tune, how animated motion pictures are created, or how one controls and technology lighting during a concert? Not only does the entertainment industry rely on computers and technology to advertise and sell their services, computers also assist in other aspects, including audio and video composition, lighting control, computerized animation, and computer gaming.

Entertainment websites provide music and movies you can purchase and download to your computer or mobile device; live news broadcasts, performances, and sporting events; games you can play with other online users; and much more.

As early as 1951, computers were used to record and play music. Today, computers play a much larger role in the music industry. For example, if you are listening to a song on the radio and notice that not one note is out of tune, it is possible that a program or app was used to change individual notes without altering the rest of the song.

Many years ago, creating cartoons or animated motion pictures was an extremely time-consuming task because artists were responsible for sketching thousands of drawings by hand. Currently, artists use computers to create these drawings in a fraction of the time, which significantly reduces the time and cost of development. Technology also is used in other areas of movie production to add visual effects.

Technology also is used in the gaming industry. While some game developers create games from scratch, others might use game engines that simplify the development process. For example, LucasArts created the GrimE game engine, which is designed to create adventure games.

During a concert, lighting technicians use computer programs to control lights by turning them off and on, changing their color, or changing their placement at specified intervals. In fact, once a performance begins, the technicians often merely are standing by, monitoring the computer as it performs most of the

work. A significant amount of time and effort, however, is required to program the computer to execute its required tasks during a live show.

The next time you listen to a song, watch a movie, play a game, or attend a concert, think about the role technology plays in contributing to your entertainment.

-  **Consider This:** How else might computers and technology be used in the entertainment industry?



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## Study Guide

The Study Guide exercise reinforces material you should know for the chapter exam.

**Discover More:** Visit this chapter's premium content to **test your knowledge of digital content** associated with this chapter and **access the Study Guide resource** from your smartphone, tablet, laptop, or desktop.

**Instructions:** Answer the questions below using the format that helps you remember best or that is required by your instructor. Possible formats may include one or more of these options: write the answers; create a document that contains the answers; record answers as audio or video using a webcam, smartphone, or portable media player; post answers on a blog, wiki, or website; or highlight answers in the book/e-book.

- List categories of programs and apps. \_\_\_\_\_ is another word for program.
- Define these terms: operating system, tools, and system software.
- List examples of desktop and mobile operating systems.
- Describe how an operating system interacts with the computer.
- \_\_\_\_\_ software performs functions specific to a business or industry.
- Differentiate among web apps, mobile apps, and mobile web apps.
- List any restrictions for shareware, freeware, open source, and public-domain software.
- Explain considerations for safely downloading software and apps.
- Describe steps to register and activate software.
- Explain the purpose of a license agreement.
- List types of productivity applications.
- Describe the activities that occur during project development.
- Differentiate among font, font size, and font style.
- Explain the impact of the Internet on plagiarism.
- Applications often include a(n) \_\_\_\_\_ gallery, which is a collection of clip art and photos.
- Identify functions of the following software: word processing, presentation, spreadsheet, database, note taking, calendar and contact management, software suite, project management, accounting, personal finance, legal, tax preparation, and document management.
- Identify tools word processing programs provide that can assist you when writing.
- Define the following terms: worksheet and function.
- Describe when you should use a database and when to use a spreadsheet.
- List advantages of using a software suite.
- Identify ways you can manage a project using project management software.
- List safety considerations when using personal finance apps.
- Describe issues that might arise when using legal software.
- Name the types of software used by various functional units in an enterprise.
- Identify functions of the following apps: calendar and email, scanning, financial, reference, retail, travel, and online social networks.
- Identify risks when using payment apps.
- Identify functions of the following software: computer-aided design, desktop publishing, paint/image editing, photo editing and photo management, video and audio editing, multimedia and website authoring, media player, and disc burning.
- List ways to edit digital photos. Identify issues surrounding altered digital photos.
- \_\_\_\_\_ authoring software allows users to combine text, graphics, audio, video, and animation in an interactive application.
- Define the terms, CBT and WBT.
- List types of personal interest applications.
- Describe ways to use voice command personal assistant apps.
- Identify functions of the following apps: media sharing; streaming audio and video; game; news, sports, and weather; mapping; health and fitness; and academic.
- Identify types of communications applications.
- List issues surrounding an email provider scanning users' emails.
- Identify functions of the following tools: personal firewalls, hardware firewalls, antivirus programs, malware removers, and Internet filters.
- Describe ways a virus infects programs or apps.
- List types of malware. Identify signs of a virus infection.
- Explain the risks of and how to avoid computer virus hoaxes.
- A virus \_\_\_\_\_ is a known specific pattern of virus code. Differentiate between spyware and adware.
- Identify ways to avoid malware when using a mobile device.
- List and describe four types of Internet filters.
- Identify functions of the following tools: file manager, search, image viewer, uninstaller, disk cleanup, disk defragmenter, screen saver, file compression, PC maintenance, and backup and restore.
- Define the terms, folder and index.
- List steps to uninstall a program or remove an app.
- Describe the disk defragmentation process.
- Compressed files are sometimes called \_\_\_\_\_ files.
- List storage media for backups.
- Describe uses of technology in the entertainment industry.

You should be able to define the Primary Terms and be familiar with the Secondary Terms listed below.

## Key Terms

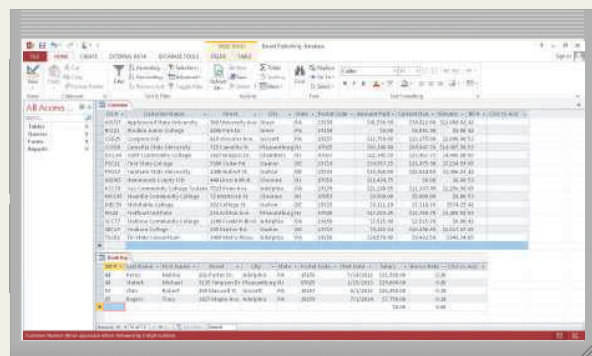
**Discover More:** Visit this chapter's premium content to view definitions for each term and to access the Flash Cards resource from your smartphone, tablet, laptop, or desktop

### Primary Terms (shown in bold-black characters in the chapter)

accounting software (173)	disc burning software (185)	PDF (176)	software suite (172)
adware remover (192)	disk cleanup (196)	personal finance software (174)	spam (193)
anti-spam program (193)	disk defragmenter (197)	personal firewall (189)	spreadsheet software (168)
antivirus program (191)	document management software (176)	phishing (193)	spyware remover (192)
app (158)	file compression tool (198)	phishing filter (193)	tax preparation software (176)
application (158)	file manager (194)	photo editing software (181)	uncompress (198)
audio editing software (183)	folder (194)	photo management software (182)	uninstaller (195)
backup tool (198)	image editing software (181)	pop-under blocker (194)	video editing software (183)
calendar and contact management software (171)	image viewer (195)	pop-up blocker (194)	virus (190)
clip art/image gallery (166)	legal software (175)	presentation software (168)	web filtering software (193)
computer-aided design (180)	media player (185)	program (158)	website authoring software (184)
database (170)	multimedia authoring software (184)	project management software (172)	word processing software (167)
database software (170)	note taking software (171)	QR code (178)	worksheet (168)
desktop publishing software (180)	paint software (181)	restore tool (198)	zipped files (198)
	PC maintenance tool (198)	screen saver (197)	
		search tool (195)	
		software (158)	

### Secondary Terms (shown in *italic* characters in the chapter)

<i>adware</i> (192)	<i>hard copy</i> (166)	<i>resize</i> (182)	<i>system software</i> (158)
<i>application software</i> (158)	<i>hardware firewall</i> (190)	<i>retail software</i> (161)	<i>toll fraud malware</i> (193)
<i>automatic update</i> (163)	<i>home design/landscaping software</i> (180)	<i>rootkit</i> (190)	<i>tools</i> (158)
<i>brightness</i> (182)	<i>illustration software</i> (181)	<i>save</i> (165)	<i>trial version</i> (161)
<i>clipboard</i> (165)	<i>index</i> (195)	<i>security suite</i> (189)	<i>trojan horse</i> (190)
<i>compress</i> (182)	<i>license agreement</i> (163)	<i>shareware</i> (161)	<i>utilities</i> (158)
<i>computer-based training (CBT)</i> (184)	<i>marketplace</i> (161)	<i>sharpness</i> (182)	<i>virus signature</i> (192)
<i>contrast</i> (182)	<i>mobile app</i> (161)	<i>slide show</i> (168)	<i>web app</i> (161)
<i>cookie</i> (192)	<i>mobile web app</i> (161)	<i>software as a service (SaaS)</i> (162)	<i>web-based training (WBT)</i> (184)
<i>create</i> (165)	<i>NFC chip</i> (179)	<i>software registration</i> (162)	<i>worm</i> (190)
<i>crop</i> (182)	<i>open source software</i> (161)	<i>spyware</i> (192)	
<i>custom software</i> (161)	<i>operating system</i> (158)		
<i>edit</i> (165)	<i>payload</i> (190)		
<i>e-filing</i> (176)	<i>pop-under ad</i> (194)		
<i>EULA</i> (163)	<i>pop-up ad</i> (194)		
<i>font</i> (166)	<i>print</i> (166)		
<i>font size</i> (166)	<i>product activation</i> (162)		
<i>font style</i> (166)	<i>productivity applications</i> (165)		
<i>format</i> (166)	<i>public-domain software</i> (161)		
<i>freeware</i> (161)	<i>quarantine</i> (191)		
<i>function</i> (169)	<i>red-eye</i> (182)		



database software (170)

## Checkpoint

The Checkpoint exercises test your knowledge of the chapter concepts. The page number containing the answer appears in parentheses after each exercise. The Consider This exercises challenge your understanding of chapter concepts.

**Discover More:** Visit this chapter's premium content to **complete the Checkpoint exercises** interactively; complete the **self-assessment in the Test Prep resource** from your smartphone, tablet, laptop, or desktop; and then **take the Practice Test**.

### True/False

Mark T for True and F for False.

- \_\_\_\_\_ 1. Application software serves as the interface between the user, the apps, and the computer's or mobile device's hardware. (158)
- \_\_\_\_\_ 2. While a computer or mobile device is running, the operating system remains in memory. (160)
- \_\_\_\_\_ 3. Open source software is mass-produced, copyrighted software that meets the needs of a wide variety of users. (161)
- \_\_\_\_\_ 4. When downloading shareware, freeware, or public-domain software, it is good practice to seek websites with ratings for and reviews of products. (162)
- \_\_\_\_\_ 5. With web apps, you always access the latest version of the software. (163)
- \_\_\_\_\_ 6. With database software, users run functions to retrieve data. (170)
- \_\_\_\_\_ 7. Software suites offer three major advantages: lower cost, ease of use, and integration. (172)
- \_\_\_\_\_ 8. A PDF file can be viewed and printed without the software that created the original document. (176)
- \_\_\_\_\_ 9. The military and airlines use CBT simulations to train pilots to fly in various conditions and environments. (184)
- \_\_\_\_\_ 10. A router also can function as a hardware firewall. (190)
- \_\_\_\_\_ 11. A worm is a destructive program designed as a real program. (190)
- \_\_\_\_\_ 12. Cookies typically are considered a type of spyware. (192)

### Multiple Choice


Select the best answer.

1. \_\_\_\_\_ software performs functions specific to a business or industry. (161)
  - a. Retail
  - b. Open source
  - c. Shareware
  - d. Custom
2. A(n) \_\_\_\_\_ is the right to use a program or app. (163)
  - a. license agreement
  - b. product activation
  - c. software registration
  - d. automatic update
3. \_\_\_\_\_ software is an application that allows users to organize data in columns and rows and perform calculations on the data. (168)
  - a. Spreadsheet
  - b. Database
  - c. Presentation
  - d. Document management
4. Mobile payment apps use a payment system on phones equipped with a(n) \_\_\_\_\_, which stores data that is transmitted to a contactless terminal and verified as a legitimate sale. (179)
  - a. QR chip
  - b. EULA
  - c. NFC chip
  - d. trojan horse
5. \_\_\_\_\_ is a type of application that assists professionals and designers in creating engineering, architectural, and scientific designs and models. (180)
  - a. Enterprise software
  - b. CAD software
  - c. Public-domain software
  - d. A software suite
6. The term \_\_\_\_\_ refers to removing unwanted areas of a photo. (182)
  - a. crop
  - b. snip
  - c. compress
  - d. shrink
7. A(n) \_\_\_\_\_ is a device intended to stop network intrusions before they attempt to affect your computer or network maliciously. (190)
  - a. anti-spam program
  - b. pop-under blocker
  - c. hardware firewall
  - d. quarantine drive
8. \_\_\_\_\_ is a small text file that a web server stores on your computer. (192)
  - a. A pop-under blocker
  - b. A cookie
  - c. Adware
  - d. Spyware

## Checkpoint

**Matching** Match the terms with their definitions.

- |                                      |  |
|--------------------------------------|--|
| _____ 1. tools (158)                 | a. destructive event or prank a virus was created to deliver   |
| _____ 2. shareware (161)             | b. copyrighted software that is distributed at no cost for a trial period  |
| _____ 3. software as a service (162) | c. malware that resides in active memory and replicates itself over a network to infect computers and devices, using up the system resources and possibly shutting down the system |
| _____ 4. QR code (178)               | d. program that enables you to perform maintenance-type tasks usually related to managing devices, media, and programs used by computers and mobile devices                        |
| _____ 5. CBT (184)                   | e. computing environment where an Internet server hosts and deploys applications   |
| _____ 6. personal firewall (189)     | f. security tool that detects and protects a personal computer and its data from unauthorized intrusions   |
| _____ 7. payload (190)               | g. type of education in which students learn by using and completing exercises with instructional software   |
| _____ 8. worm (190)                  | h. scam in which a perpetrator sends an official looking email message that attempts to obtain personal and/or financial information   |
| _____ 9. quarantine (191)            | i. square-shaped graphic that represents a web address or other information  |
| _____ 10. phishing (193)             | j. separate area of a hard drive that holds an infected file until the infection can be removed  |

 **Consider This** Answer the following questions in the format specified by your instructor.

1. Answer the critical thinking questions posed at the end of these elements in this chapter: Ethics & Issues (165, 175, 183, 189), How To (173, 182, 186, 196), Mini Features (178, 187, 190), Secure IT (162, 174, 179, 192, 193), and Technology @ Work (199).
2. What is the role of the operating system? (158)
3. What is system software? (158)
4. What are the advantages of open source software? (161)
5. Why do app developers opt for web delivery? (161)
6. What is the difference between software registration and product activation? (162)
7. What activities does a license agreement restrict? (163)
8. What does it mean to edit a project? (165)
9. What is the clipboard? (165)
10. What is meant by font style? (166)
11. How often should you save a project? (166)
12. How does a spreadsheet organize data? (169)
13. How are cells identified in a spreadsheet? (169)
14. When might you choose to use a database instead of a spreadsheet? (170)
15. What features are included in personal finance software? (174)
16. What steps can you take to safeguard your funds and identity when using personal finance apps? (174)
17. Who might use CAD? (180)
18. Should journalists edit or enhance digital photos? Why or why not? (183)
19. What tasks can you accomplish using mapping apps? (187)
20. How does a personal firewall protect your computer? (189)
21. What happens during the delivery phase of a virus? (190)
22. How do a virus, worm, trojan horse, and rootkit differ? (190)
23. In reference to malware, what is a quarantine? (191)
24. What is a phishing scam? (193)
25. Why is spam potentially dangerous? (193)
26. What are the different types of file, disk, and system management tools? (194)
27. How does a search tool locate a file on your computer or mobile device? (195)
28. What is a fragmented disk? (197)
29. How does fragmentation affect a computer's performance? (197)
30. What tasks does a PC maintenance tool perform? (198)

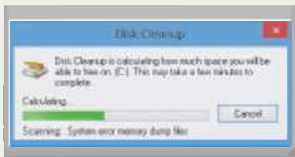
## Problem Solving

The Problem Solving exercises extend your knowledge of chapter concepts by seeking solutions to practical problems with technology that you may encounter at home, school, work, or with nonprofit organizations. The Collaboration exercise should be completed with a team.

**Instructions:** You often can solve problems with technology in multiple ways. Determine a solution to the problems in these exercises by using one or more resources available to you (such as a computer or mobile device, articles on the web or in print, blogs, podcasts, videos, television, user guides, other individuals, electronics or computer stores, etc.). Describe your solution, along with the resource(s) used, in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

### Personal

- 1. Antivirus Program Not Updating** You are attempting to update your antivirus program with the latest virus definitions, but you receive an error message. What steps will you take to resolve this issue?
- 2. Operating System Does Not Load** Each time you turn on your computer, the operating system attempts to load for approximately 30 seconds and then the computer restarts. You have tried multiple times to turn your computer off and on, but it keeps restarting when the operating system is trying to load. What are your next steps?
- 3. Unwanted Programs** When you displayed a list of programs installed on your computer so that you could uninstall one, you noticed several installed programs that you do not remember installing. Why might these programs be on your computer?



Source: Microsoft

- 4. News Not Updating** Each morning, you run an app on your smartphone to view the news for the current day. For the past week, however, you notice that the news displayed in the app is out of date. In fact, the app now is displaying news that is nearly one week old. Why might the app not be updating? What are your next steps?
- 5. Incompatible App** You are using your Android tablet to browse for apps in the Google Play store. You found an app you want to download, but you are unable to download it because a message states it is incompatible with your device. Why might the app be incompatible with your device?

### Professional

- 6. Videoconference Freezes** While conducting a videoconference with colleagues around the country, the audio sporadically cuts out and the video freezes. You have attempted several times to terminate and then reestablish the connection, but the same problem continues to occur. What might be the problem?
- 7. License Agreement** You are planning to work from home for several days, but you are unsure of whether you are allowed to install a program you use at work on your home computer. What steps will you take to determine whether you are allowed to install the software on your home computer?
- 8. Low on Space** The computer in your office is running low on free space. You have attempted to remove as many files as possible, but the remaining programs and files are necessary to perform your daily job functions. What steps might you take to free enough space on the computer?
- 9. Unacceptable File Size** Your boss has asked you to design a new company logo using a graphics application installed on your computer. When you save the logo and send it to your boss, she responds that the file size is too large and tells you to find a way to decrease the file size. What might you do to make the image file size smaller?
- 10. Disc Burning Not Working** While attempting to back up some files on your computer on an optical disc, the disc burning software on your computer reports a problem and ejects the disc. When you check the contents of the disc, the files you are trying to back up are not there. What might be wrong?

## Collaboration

- 11. Technology in Entertainment** The film department at a local high school is considering developing a movie and has asked for your help. The film teacher would like to incorporate technology wherever possible, in hopes that it would decrease the cost of the movie's production. Form a team of three people to determine what technology can be used to assist in the movie's production. One team member should research the type of technology that can be used during the filming process. Another team member should research the types of hardware and software available for editing footage, and the third team member should research the hardware and software requirements for producing and distributing the media.



**The How To: Your Turn exercises present general guidelines for fundamental skills when using a computer or mobile device and then require that you determine how to apply these general guidelines to a specific program or situation.**

## How To: Your Turn

**Discover More:** Visit this chapter's premium content to challenge yourself with **additional How To: Your Turn exercises**, which include App Adventure.

**Instructions:** You often can complete tasks using technology in multiple ways. Figure out how to perform the tasks described in these exercises by using one or more resources available to you (such as a computer or mobile device, articles on the web or in print, online or program help, user guides, blogs, podcasts, videos, other individuals, trial and error, etc.). Summarize your 'how to' steps, along with the resource(s) used, in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

### 1 Obtain Help about Programs and Apps

Multiple ways are provided to obtain help while using the programs and apps on a computer or mobile device. The program or app developer usually includes a Help feature in the program and/or online. In addition, third parties often post resources online that can provide further assistance. The following steps describe how to obtain help about various programs and apps using various methods.

#### Help System

You typically can access help in a program or app using one of the following methods:

- Tap or click the Help or Information icon in the program or app. The appearance of Help or Information icons may vary, but typically they are identified by a question mark or the letter 'i' formatted in italic.
- Navigate the program or app's menu to locate the Help command.
- If you are using a program or app on a Windows laptop or desktop, press the F1 key on the keyboard to display Help content.

#### Online Help

Online help usually is available from the program or app developer. The following steps describe how to obtain online help.

- a. Navigate to the program or app developer's website.
- b. Locate, and then tap or click a Help or Support link.
- c. Select the program or app for which you wish to obtain help to display the help information.

#### Searching for Help

In addition to obtaining help from within a program or app or on the developer's website, you also can search the web for help as described in the following steps.

- a. Navigate to a search engine, such as google.com or yahoo.com.
- b. Type the program or app name, as well as the type of help for which you are searching, as the search text, and then press the ENTER key or tap or click the Search (or a similar) button.
- c. Scroll through the search results and then tap or click the search result to display more information. Be aware that not all help originates from reputable or accurate sources.

### Exercises

1. Under what circumstances would you use each of these methods to obtain help with a program or app you are using?
2. Compare and contrast the different methods of obtaining help. Which method do you think is the best? Why?
3. What are some reputable websites that can provide you with help for the operating system installed on your computer? Why do you consider them reputable?

### 2 Compress/Uncompress Files and Folders

You may want to compress files if your hard drive is running out of available space. While the operating system may be able to compress some files by 50 percent or more, other files' sizes may not decrease significantly when they are compressed. Compressed files typically are stored by default in a file with a .zip file extension. The following steps describe how to compress a file or folder and then uncompress (expand or extract) the compressed file.

- a. Press and hold or right-click the file(s) or folders you wish to compress to display a shortcut menu.
- b. Tap or click the option to compress the file(s) or folder(s). (You may need to select a Send to or other command to display the compression options.)
- c. If necessary, type the desired file name for the compressed file.

Uncompressing (or expanding) compressed files or folders returns them to their original form. The following steps uncompress a compressed file.

- a. Double-tap or double-click the compressed file.
- b. If necessary, tap or click the option to uncompress (expand or extract) the file.

*or*

- a. Press and hold or right-click the compressed file to display a shortcut menu.
- b. Tap or click the option to uncompress (expand or extract) the file.

## ☀ How To: Your Turn

### Exercises

1. In addition to the operating system's built-in functionality to compress files and folders, what other programs and apps exist that can compress files and folders?
2. In addition to trying to free space on your storage device, for what other reasons might you want to compress files and folders?
3. Try compressing various types of files on your hard drive, such as a Word document and an image. Compare the file sizes before and after compression. What did you notice with each type of file?

### 3 View Current Virus Threats

One important way to protect your computer or mobile device from viruses is to be aware of current threats. Several websites exist that not only provide a list of current virus threats but also describe how best to protect your computer or mobile device from these threats. As new virus threats are introduced, it is important to make sure your antivirus program is updated and running properly. The following steps describe how to view a list of current virus threats.

- a. Run a browser and then navigate to a search engine of your choice.
- b. Perform a search for websites that display current virus threats.
- c. Review the search results and visit at least two websites that display current virus threats.
- d. View the list of virus threats on each of these websites.

or

- a. Run a browser and then navigate to a search engine of your choice.
- b. Perform a search for websites created by companies that make antivirus software. Some companies that make antivirus software include Symantec, McAfee, and Microsoft.
- c. Navigate to one of these company's websites and then search for a link to a webpage displaying current virus threats.
- d. Tap or click the link to display current virus threats.



Courtesy of Checkpoint Software Technologies Ltd.

### Exercises

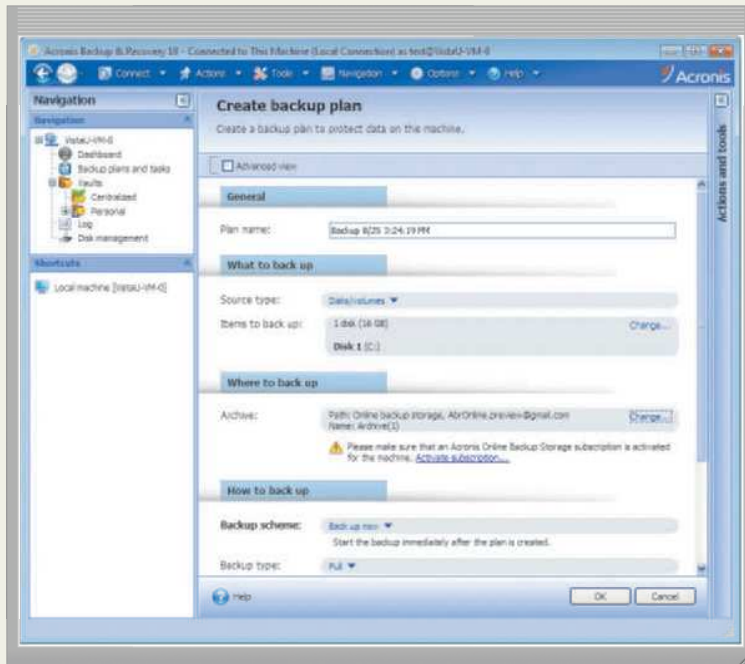
1. Which websites did you access? Compare these websites and determine which you think provided the most helpful information. Why, in your opinion, does the website you chose provide the best information?
2. Has your computer or mobile device ever been infected with a virus? If so, what steps have you taken to remove the virus?
3. Is your computer or mobile device adequately protected from viruses? What steps do you take to keep your computer safe?

### 4 Back Up Your Computer

Backing up your computer is an important way to protect your programs, apps, and data from loss. The frequency at which people back up their computers can vary. For instance, if you create and modify a lot of files on your computer, you may choose to back up your computer frequently. If you rarely use your computer or primarily use your computer for answering email messages and browsing the web, you might not back up your computer as often. The following steps guide you through the process of backing up a computer.

- a. Decide which backup program you wish to use. Some operating systems have built-in tools you can use to back up a computer, or you can install a third-party program.
- b. Run the program you will use to back up the computer.
- c. If necessary, connect the storage device, such as an external hard drive, you will use to store the backup. If you plan to store the backup on an optical disc or another hard drive that already is installed, you will not need to connect an additional storage device.
- d. Make sure the storage medium has enough available space for the backed up files. If you are storing the backup on optical discs, make sure you have enough optical discs for the backup.
- e. Select the type of backup (full, incremental, differential, or selective) you wish to perform.
- f. If you are performing a selective backup, choose the files, programs, and apps you wish to include in the backup.
- g. Run the backup. The backup process may take up to several hours, depending on the number of files you are including in the backup.
- h. If you are storing the backup on optical discs, the backup program may prompt you to insert new, blank optical discs throughout the backup process.

- i. When the backup is complete, store the backup in a safe location. In the event you lose data or information on the computer, you will need to retrieve the backup.



Source: Acronis

## Exercises

1. How often do you feel you should back up your computer? Justify your answer.
2. Which storage medium do you feel is most appropriate for your backup? Justify your answer.
3. Research at least three programs that you can use to back up your computer. Which programs did you research? Which program or app do you feel is the best? Why?

## 5 Share Your Online Calendar

If you keep track of your meetings, appointments, and other obligations using an online calendar, you might want to share your calendar with others so that they know when you are available. For instance, you might want to share your calendar with fellow employees so that they can verify your availability before scheduling meetings. Your family members may share their calendars with one another so that it is easier to plan family events when everyone is available. The

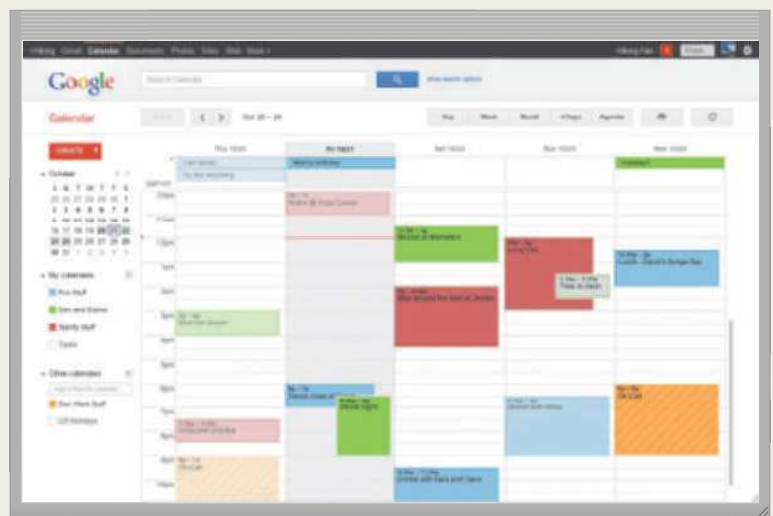
## How To: Your Turn

following steps describe how to share your online calendar.

- a. If necessary, run a browser and navigate to an online calendar.
- b. Display the calendar's settings.
- c. Select the option to display the calendar's sharing settings.
- d. Specify with whom you want to share the calendar.
- e. Determine your sharing settings for each person. For example, you may select whether a person only can view your calendar or view and edit your calendar. You also can select the level of detail you want to share with others. For example, you can share the times you are free or busy, or you can share the specific details for each appointment.
- f. If necessary, repeat the two previous steps for each additional person with whom you wish to share the calendar.
- g. Save the settings.
- h. Verify the people with whom you shared the calendar are able to access the calendar.

## Exercises

1. For what other reasons might you share your calendar?
2. In addition to the steps outlined previously, in what other ways can you share your calendar online?
3. In addition to sharing online calendars, is it possible to share calendars you create in programs such as Microsoft Outlook? If so, how?



Google Inc.

## Internet Research

The Internet Research exercises broaden your understanding of chapter concepts by requiring that you search for information on the web.

**Discover More:** Visit this chapter's premium content to **challenge yourself with additional Internet Research exercises**, which include Search Sleuth, Green Computing, Ethics in Action, You Review It, and Exploring Technology Careers.

**Instructions:** Use a search engine or another search tool to locate the information requested or answers to questions presented in the exercises. Describe your findings, along with the search term(s) you used and your web source(s), in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

### 1 Making Use of the Web Website Creation and Management

Retailers and organizations realize the importance of having a website to promote their goods and services. An online presence helps a business connect with an audience and ultimately builds trust and respect. Innovative and dynamic websites deliver information to current and potential customers and clients. Creating these websites requires a methodology of planning, designing, creating, hosting, and maintaining. A business must identify the website's purpose, demographics of the target audience, appropriate content and functionality, page layout, and usability. Once the website is implemented, it must be monitored to determine usage. Logs list the number of visitors, the browsers they used, and usage patterns. In addition, the website should be maintained to update content and features.

Products are available to help build and manage a website. Most offer well-designed templates that can be customized to accommodate specific personal and business needs. They can include calendars, photos, videos, maps, and blogs. Some of these design and management tools, such as those offered on Google Sites, are available at no cost, while others require fees for specific features, such as technical support or exclusive designs.

**Research This:** Visit Google Sites and two other online content management systems for building websites. Compare these web apps by creating a table using these headings: Name, Number of Templates, Price, Maximum Storage, Customer Support, and Features. The Features column could include the availability of items such as customizable color schemes, e-commerce, drag and drop, website logs and analytics, and mobile editing. Which website builder would you choose if you were creating a website? Why?

### 2 Social Media

Gaming via social media has seen explosive growth in recent years, especially among adult males. Exponential gaming growth has spawned companion businesses that facilitate and manage the gaming experience. Some mobile and desktop apps provide gamers a portal for tracking all their online gaming results in a central location that can be shared with friends and others with similar game interests. These apps integrate with the major Internet messaging services, have personalized news feeds, and incorporate a "suggestion" engine for new game discoveries. Many gaming blogs offer game tricks, work-arounds, and hidden features. Beginning gamers can engage their minds during downtime and expand their circle of online friends.

**Research This:** Visit at least two online social networks for gamers. How many games are shown? Which topics are featured in community discussions and live chats? Are rewards available? If so, what are they? Which online leagues and tournaments are offered? What are some of the latest news articles about specific games and the gaming industry? Have you participated in gaming online social networks? If so, which ones?



Google Inc.

## Internet Research

### 3 Search Skills

#### Narrowing Your Search Results

One strategy for narrowing search results is to specify what you are or are not looking for as part of your search text. Precede words with a plus sign (+) if you want to ensure that they appear in your search results, and precede a word with a minus sign (-) if you want to exclude that word from search results. For example, typing the phrase, windows +microsoft, will search for information about the operating system; typing the phrase, windows -microsoft, also will find information about windows that are made of glass.

Include the keyword, and, between words or phrases in search text if you want search results to include both words or phrases, or the keyword, or, if search results containing either word or phrase are acceptable. Group terms with parentheses to clarify search text. For example, type the phrase, iPhone and "Steve Jobs" (including the quotation marks), to search for articles about the inventor of the iPhone. Type the phrase, (iPhone or iPad) and "Steve Jobs" (including the parentheses and quotation marks), to search for information about iPhone or iPad devices that also mentions Steve Jobs.



**Research This:** Create search text using the techniques described above or in previous Search Skills exercises, and type it in a search engine to answer these questions. (1) What is an open source FTP application that has versions for both Windows and Mac? (2) Other than TurboTax, what are two examples of online tax preparation software? (3) Find reviews comparing Internet Explorer, Edge, Chrome, and Firefox browsers. (4) What are the more popular calendar management and task management apps on Google Play?

### 4 Security

Virus hoaxes are widespread and sometimes cause panic among Internet users. Secure IT 4-4 in this chapter gives advice on recognizing and avoiding virus hoaxes. Snopes.com provides further insight on the sources and variations of a wide variety of rumors, deceptions, and folklore.

**Research This:** Visit snopes.com and type the search text phrase, virus hoaxes & realities, in the Search box at the top of the page. Review the list of the more recent real (indicated by a green dot) and false (indicated by a red dot) rumors circulating on the Internet. Which are the three newest actual warnings, and which are the three latest virus hoaxes? What harm is predicted to occur if a user downloads each of these real or false viruses or views a website laden with malware? What is the origin of the website's name, Snopes?

### 5 Cloud Services

#### Photo Editing (SaaS)

Online photo editing apps provide browser-based capabilities to modify digital images, and often contain many similar features as their desktop counterparts.

They are an example of SaaS (software as a service), a service of cloud computing that provides access to software solutions accessed through a browser. In addition to drawing shapes, touching up colors, and adding filters to images, online photo editing apps allow users to access, store, and share their photos on the cloud. Online photo editing apps often include the ability to share photos with friends easily by sending a link, or posting the photo to online social networks.

**Research This:** (1) Use a search engine to research various online photo editing apps. Compare the features of two of them as you explore their capabilities. Summarize your findings in a table, regarding image formats you can import or save, sharing capabilities, special editing features, and ways to organize photos online. Which features take advantage of the fact that the app is cloud based? (2) If you have access to computers running two different operating systems, such as Windows and Mac, try running the photo editing app in a browser on both computers. What similarities and differences do you notice between the two versions?

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## Critical Thinking

The Critical Thinking exercises challenge your assessment and decision-making skills by presenting real-world situations associated with chapter concepts. The Collaboration exercise should be completed with a team.

**Instructions:** Evaluate the situations below, using personal experiences and one or more resources available to you (such as articles on the web or in print, blogs, podcasts, videos, television, user guides, other individuals, electronics or computer stores, etc.). Perform the tasks requested in each exercise and share your deliverables in the format requested by your instructor (brief report, presentation, discussion, blog post, video, or other means).

### 1. File, Disk, and System Management Tools

You are the director of information technology at a company that frequently hires student interns. The interns tend to have limited experience with using file, disk, and system management tools. As part of your job, you lead workshops that teach the interns the many tasks and functions they can perform using these tools.

**Do This:** Choose three categories of tools, such as disk cleanup, PC maintenance, and file compression. Determine whether your computer's operating system includes these tools. Use the web to research popular tools for each category, whether they can be purchased separately or if they are available only as part of an operating system, and the costs for each tool. Choose one program from each category, and read user reviews and articles by industry experts. Describe situations where you would use each type of tool. Share any experiences you have with using the tools.

### 2. Web and Mobile App Comparison

You recently purchased a new smartphone and want to research mobile apps that also have accompanying web apps.

**Do This:** Choose three categories of apps, and find an example for each that has both a free web and mobile version. Read user reviews of each app, and search for articles by industry experts. Research any known safety risks for the apps. If you determine the app is safe, have access to the appropriate device, and would like to test the mobile app, you can download it

to a smartphone or other mobile device. Try accessing the web app on a computer. Using your experience or research, note the differences in functionality between the web and mobile app. Is one or the other easier to use? Why or why not?

### 3. Case Study

**Amateur Sports League** You are the new manager for a nonprofit amateur soccer league. The league needs productivity software in order to keep track of participant and budget information and to prepare flyers. You prepare information about productivity software options to present to the board of directors.

**Do This:** Use the web to research popular word processing, spreadsheet, and accounting software. Choose three programs from each category. List common features of each, find pricing information, and note any feedback or ratings by users. Which programs would you recommend? Why? Describe the steps involved in developing a project, creating a flyer for the league as an example. Identify possible uses the league may have for the spreadsheet and accounting software. Compile your findings.



Source: © Cengage Learning

## Collaboration

### 4. Educational Program and App Effectiveness

The principal of the local elementary school has recommended that educational apps should play a major role in the learning process, believing that these apps enable students to learn at their own pace. Some enable teachers to track an individual student's progress and understanding.

**Do This:** Form a three-member team and research the use of educational apps. Each member of your team should choose a different type of app, such as flash cards, testing, or CBT. List the advantages and disadvantages of using that type of app. If possible, download or access a free version of an educational app from each category and spend some time using it. Read user reviews of popular apps, and search for articles by industry experts. Would you recommend using an app for educational purposes? Why or why not? Meet with your team, and discuss and compile your findings.