Cengage

The Shelly Cashman Series®

Discovering Computers

Digital Technology, Data, and Devices

Campbell

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Discovering Computers

Digital Technology, Data, and Devices

17th Edition

Jennifer T. Campbell

Cengage

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Preface

About the Author

Jennifer T. Campbell has written and co-authored several other leading technology texts, including Technology for Success, Discovering Computers, Discovering the Internet, Web Design: Introductory, Microsoft Expression Web Introductory Concepts and Techniques, Computer Literacy Basics: Microsoft Office 2007 Companion, and Microsoft Office Quick Reference Pocket Guide. For over 25 years Ms. Campbell has served integral roles in computer educational publishing as an editor, author, and marketing manager. She holds a B.A. in English from The College of William and Mary.

Introduction/Preface for the Instructor

This text was revised using careful analysis from surveyed digital literacy and computer concepts instructors. The conceptual approach to text development included focus on the most relevant and up-to-date introductory technology topics along with emphasizing the responsibility that goes along with being a digital citizen. Discovering Computers presents the key content that students need for success using an inviting approach that encourages critical thinking, problem solving, and hands-on application. Its in-depth and relevant content, use of diagrams to depict complex concepts, and practical activities set students up for success in the real world. Each module includes a How To, Ethics and Issues, and Secure IT topic. Woven throughout the modules are Consider This? boxes, which introduce additional topics and encourage critical thinking. No prerequisites are required for this introductory-level text, and no prior knowledge of technology and computer concepts is assumed

The Target market for this title is introductory computing learners, along with entry-level learners for any discipline interested in understanding computer technology basics and digital literacy.

New to This Edition

- All new Module 1, which introduces the concepts of Digital Literacy and how to be a Digital Citizen, including contextual history.
- The Ethics & Issues, Secure IT, and How To content is woven into the chapter narrative, presenting module topics with these critical lenses.
- Databases, System and Application Development, and Web Development now are full individual modules.

Organization of the Text

COVERAGE INTRODUCES TODAY'S WEB AND CLOUD APPS, VIRTUAL AND AUGMENTED REALITY, AND CROWDSOURCING. Students become familiar with the latest computer advancements as this edition's timely coverage and online support address emerging issues and reflect the most recent applications and tools available.

CONVERGENCE, DEVICE, AND PLATFORM AGNOSTIC. The content and exercises do not assume students are using a specific device or platform, and the idea of convergence among device capabilities is addressed.

TIMELY, FOCUSED MODULES HIGHLIGHT TOPICS MOST IMPORTANT FOR STUDENT SUCCESS. All content is structured using a proven approach to enhance the reader's learning experience and highlight key information students need to know at home, at school, and at work.

END-OF-MODULE ASSIGNMENTS PROVIDE CRITICAL HANDS-ON PRACTICE. The author has carefully designed all assignments to help students develop the skills that are most important for their success in your course and in their future coursework and employment.

CRITICAL THINKING SKILLS. Consider This boxes and questions posed throughout the book challenge students to critically evaluate and determine solutions for contemporary technology dilemmas.

Ancillary Package

Test Banks: Questions written by the author are tightly aligned with each module's learning objectives.

Instructor Manual: The module outline corresponds directly with the content in each module, and additional discussion questions and activities are aligned to headings in the book.

PowerPoints: The icebreaker activity relates to the module topic, and the module objectives and content slides align with the book. Activities and the self-assessment align with module learning objectives and supplement the content in the book.

Solution and Answer Guide: The answers provided are written by the author and correspond to the end of module activities.

Transition Guide: The guide is written by the author and provides information on what has changed in this edition so that instructors know what to expect.

Acknowledgments

I wish to thank my editor, Lyn Markowicz, for her expertise in crafting this book. I also thank the team at Cengage: Grant Davis, Amy Savino, Zenya Molnar, and Ciara Horne for their support.

Cengage would like to thank Kacie Rea, M.S.Ed. for her contributions to the Technology Timeline.

Being a Digital Citizen:
At Home, School, and Work

1

Objectives

After completing this module, you will be able to:

1 Define digital literacy
2 Explain society's reliance on technology
3 Describe how to protect your personal information
4 Explain the role of technology in the professional world
5 Use technology to find a career
6 Define convergence
7 Describe the legal and ethical responsibilities of a digital citizen
8 Identify the uses of assistive technologies

How Technology Impacts You

Digital literacy, also known as **computer literacy**, means having a current knowledge and understanding of computers, mobile devices, the web, and related technologies. A **digital citizen** is a person familiar with how to use technology to become an educated and productive member of the digital world. Aspects of being a digital citizen include the ethical, legal, and productive use of technology.

Even if you consider yourself a technology user and are familiar with many of the important basic concepts that are the backbone of digital literacy, a basic review is helpful. A **computer** is an electronic device, operating under the control of instructions stored in its own memory, that can accept data, process the data to produce information, and store the information for future use. **Memory** consists of electronic components that store instructions waiting to be executed by the processor, data needed by those instructions, and the results of processing the data into information. The **Internet** is a global collection of millions of computers linked together to share information. A **network** is a collection of two or more computers connected together to share resources. **Wi-Fi** (short for wireless fidelity) is a wireless data network technology that provides high-speed data connections that do not require a physical connection; it is used for mobile devices. A **server** is a powerful, high-capacity computer you access using the Internet or other network; it stores files and "serves" them, that is, makes the files available to, users; usually grouped at a location called a data center. An **online social network** (Figure 1-1) is an online community where users can share their interests, ideas, stories, photos, music, and videos with other registered users via a social networking website, such as Facebook, Google Plus, Twitter, Instagram, or Snapchat. Digital literacy is an evolving area that includes many other important topics, such as big data. **Big Data** is a term that refers to the large and complex data sources that defy easy management with traditional data processing methods.

The following are examples of how you, a digital citizen, might use your digital literacy to interact with technology, including embedded computers and the Internet, in your daily life.

Figure 1-1   Knowledge of online social networks is a key component of digital literacy.

iStock.com/Scyther5

A Day in the Life of a Digital Citizen

The sound of the alarm you asked your smart speaker to set last night wakes you up. You can smell the coffee brewing from the coffeemaker you programmed to go off five minutes before your alarm. Once you leave for work, your thermostat will adjust the temperature by five degrees and then readjust to a more comfortable temperature by the time you arrive home.

On your way to and from work, you check the public transportation app on your phone (Figure 1-2) to locate and get directions to the nearest subway station. Once there, you scan your phone to pay your fare and access the terminal. A screen in the station displays an alert when the train is incoming. As the subway speeds toward the next station, it relies on sensors to determine any oncoming traffic and report delays, changes in routes, and the next available stop.

Figure 1-2   You can use apps to find out information about public transit options.
Rawpixel.com/Shutterstock.com
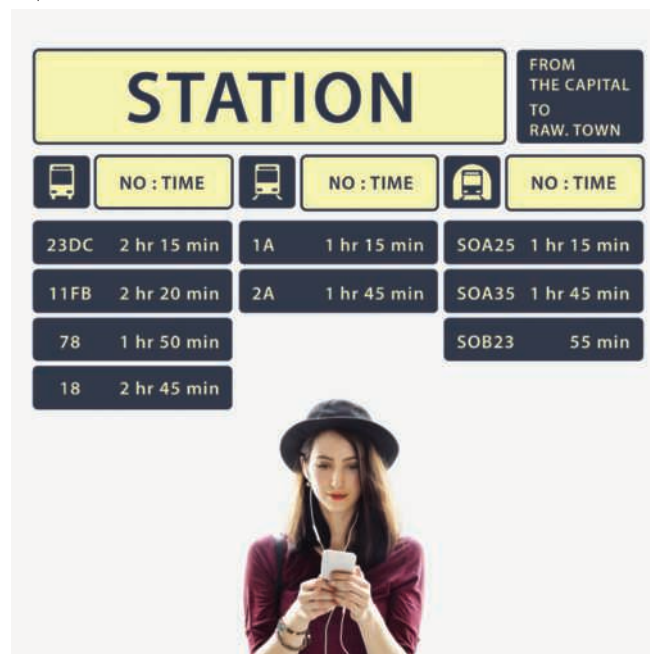
After work, you decide to take your car and go shopping. You program your vehicle's GPS to direct you to the nearest mall. As you drive, your car senses the space between you and the car ahead and slows your speed to keep a safe distance. Outside the mall, you use a parking app to locate a parking spot near the front door and use your car's cameras to safely navigate into the spot.

Before heading into the store, you decide to check your balance on your debit card. Your banking app tells you how much money is in your checking account. You tap to transfer $40 to your smartphone's payment app, then you head to the store.

You walk into a clothing store, searching for a new sweater. You talk to a sales associate, who uses a tablet to look up your personal profile, including past purchases, based on your phone number. The sales associate tells you what size you wear and what colors you have bought in the past few years. Together, you find a sweater that fits and that is not similar to anything in your wardrobe. Before using the store's self-checkout, you check your store loyalty app on your smartphone to see what coupons are available.

Later, back at home, you sign in to your school's network to access your assignments. You use videoconferencing to discuss a group project with your classmates and complete a research paper using credible online sources, giving proper citations to the facts and quotes you find. You turn in your paper using the school's plagiarism checker and then shut down your laptop for the night. You make sure your alarm is set on your phone for tomorrow, and then you call it a night.

❓ Consider This

What is digital distraction?

Digital distraction is the practice of using and relying on technology so much that you do not pay enough attention to normal, everyday activities. Digital distraction might be characterized by using your smartphone while having dinner with others instead of interacting with them, or checking your social media during class. Digital distraction can lead to negative effects, such as lower grades, strained relationships, or danger of an injury or accident because of your lack of awareness of your surroundings. Have you ever been with or witnessed someone being digitally distracted? What occurred? What dangers might you encounter? How can you avoid this happening?

How Technology Impacts Society

If you think you cannot make it through a day without using technology, you are probably right. Even if you set aside your smartphone, you could still end up interacting with a database while making a purchase at your grocery store, watching a video during a class lecture, or using an ATM to get cash. The fact is you are likely to live a digital lifestyle, using a variety of technologies for work and play.

Over the last quarter century or so, technology has revolutionized our lives. Because of advances in technology, you can more quickly and effectively than ever before access, search for, and share information. You can manage your finances, calendars, and tasks. You can play games and watch videos on your phone or computer for entertainment and relaxation. Being digitally literate is essential for acquiring a job, using and contributing to global communications, and participating effectively in the international community.

Society as a whole has changed significantly, as well. Our devices connect us to a variety of other users and to other devices because of the evolution of technology. This can be both positive and negative and can create a division between those who have access to technology and those who do not.

The History of Computers

People have relied on tools and machines to count and manipulate numbers for thousands of years. These tools and technologies have evolved from the abacus in ancient times, to the first computing machines in the nineteenth century, to today's powerful handheld devices, such as smartphones and tablets.

The first generation of computers used **vacuum tubes** (Figure 1-3), which are cylindrical glass tubes that controlled the flow of electrons. The ENIAC (Electronic Numerical Integrator and Computer) and UNIVAC (Universal Automatic Computer) are examples of these expensive machines. Their use and availability were limited due to their large size, the amount of power they consumed, the heat they generated, and how quickly they wore out.

Figure 1-3 Electronic digital computer with vacuum tubes.
Emkaplin/Shutterstock.com

The next generation of computers replaced vacuum tubes with **transistors**, which were smaller, cheaper, and more reliable. These computers contained many components still in use today, including tape and disk storage, memory, operating systems, and stored programs.

In the 1960s, computer engineers developed **integrated circuits**, which packed the equivalent of thousands of vacuum tubes or transistors into a silicon chip about the size of your thumb. In 1971, Ted Hoff and a team of engineers at Intel and IBM introduced the microprocessor. A **microprocessor** is the "brains" of a computer, a chip that contains a central processing unit. Microprocessors were even faster, smaller, and less expensive than integrated circuits. Today, microprocessors often are called **processors** for short.

In the 1970s and 1980s, computers meant for personal use started to gain popularity. In 1978, Steve Jobs and Steve Wozniak of Apple Computer Corporation introduced the Apple II (Figure 1-4), a preassembled computer with color graphics and popular spreadsheet software called VisiCalc.

Figure 1-4 Apple II computer.
Anton_Ivanov/Shutterstock.com

IBM followed Apple's lead in 1981, introducing its **personal computer** (**PC**) intended for individual use instead of commercial or industrial. Other manufacturers also started making similar machines, and the market grew. Since 1981, the number of PCs in use has grown to the billions; however, many people today use tablets and smartphones in addition to or instead of PCs.

Today's computers have evolved into connected devices that can share data using the Internet or wireless networks. They are smaller, faster, and have far greater capabilities than previous computers. In fact, your smartphone probably has more computing power than the computer that guided the Apollo mission to the moon in 1969!

The Internet of Things

The **Internet of Things** (**IoT**) is an environment in which processors are embedded in every product imaginable (things), and these things, in turn, communicate with one another via the Internet or wireless networks. Alarm clocks, coffeemakers, thermostats, streetlights, navigation systems, and much more are enhanced by the growth of IoT. IoT-enabled devices often are referred to as smart devices (Figure 1-5) because of their capability of communicating, locating, and predicting. Smart devices often have associated apps to control and interact with them.

Figure 1-5 Smart devices use IoT to control home functions, such as a thermostat.

Andrey_Popov/Shutterstock.com
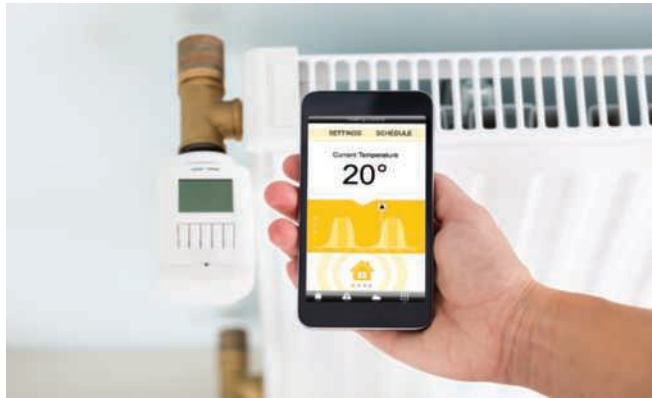
The basic premise of IoT is that objects can be tagged, tracked, and monitored through a local network or across the Internet. Communication technologies, such as Bluetooth, RFID tags, near-field communications (NFC), and sensors, have become readily available, more powerful, and less expensive. Sensors and tags can transmit data to a server on the Internet over a wireless network at frequent intervals for analysis and storage.

Developments in big data have made it possible to efficiently access, store, and process the mountain of data reported by sensors. Mobile service providers offer connectivity to a variety of devices so that transmitting and receiving data can take place quickly.

Embedded computers are a part of IoT. An **embedded computer** is a computer that functions as one component in a larger product and has a specific purpose. Embedded computers usually are small and have limited hardware on their own but enhance the capabilities of everyday devices. Embedded computers perform a specific function based on the requirements of the product in which they reside. For example, an embedded computer in a printer monitors the ink levels, detects paper jams, and determines if the printer is out of paper.

Embedded computers seem to be everywhere. This technology enables computers and devices to connect with one another over the Internet using IoT. You encounter examples of embedded computers multiple times a day, perhaps without being aware of it.

Today's vehicles have many embedded computers. These enable you to use a camera to guide you when backing up, warn you if a vehicle or object is in your blind spot, or alert you to unsafe road conditions. Recently, all new cars were required to include backup cameras and electronic stability control, which can assist with steering the car in case of skidding. All this technology is intended to make driving safer (Figure 1-6).

Figure 1-6 Some of the embedded computers designed to improve safety, security, and performance in today's vehicles.

Nir Levy/Shutterstock.com; Santiago Cornejo/Shutterstock.com; iStock.com/Narvikk; iStock.com/Kenneth-Cheung; iStock.com/Marcin Laska; iStock.com/pagadesign; Source: OnStar, LLC

Smartphone apps, such as the OnStar RemoteLink app shown here, remotely start the engine, unlock doors, stream music through the vehicle's sound system, display driving directions, and more.

Adaptive cruise control systems detect if vehicles in front of you are too close and, if necessary, adjust the vehicle's throttle, may apply brakes, and/or sound an alarm.

Cars equipped with wireless communications capabilities, called telematics, include features such as navigation systems, remote diagnosis and alerts, and Internet access.

Tire pressure monitoring systems send warning signals if tire pressure is insufficient.

Advanced airbag systems have crash-severity sensors that determine the appropriate level to inflate the airbag, reducing the chance of airbag injury in low-speed accidents.

Electronic stability control automatically applies brakes, and may reduce engine power, when you lose control of steering or traction.

Drive-by-wire systems sense pressure on the gas pedal and communicate electronically to the engine how much and how fast to accelerate.

Critics of in-vehicle technology claim that it can provide drivers with a false sense of security. If you rely on a sensor while backing up, parking, or changing lanes, you may miss other obstructions that can cause a crash. Reliance on electronic stability control may cause you to drive faster than conditions allow or to pay less attention to the distance between your vehicle and others.

ATMs and Kiosks   **Automated teller machines** (**ATMs**) are one of the more familiar uses of IoT. You can use your ATM card to withdraw cash, deposit checks, and interact with your bank accounts. Recent innovations are improving card security, such as **chip-and-pin technology** that stores data on an embedded chip instead of a magnetic stripe.

ATMs are a type of kiosk. A **kiosk** is a freestanding booth usually placed in a public area that can contain a display device used to show information to the public or event attendees. Kiosks enable self-service transactions in hotels and airports, for example, to permit users to check in for a flight or room. Health care providers also use kiosks for patients to check in and enter information, such as their insurance card number.

IoT at Home   IoT enables you to manage devices remotely in your home, such as starting the washing machine at a certain time, preparing a grocery shopping list (Figure 1-7), viewing potential intruders via a webcam, or adjusting the room temperature. Personal IoT uses include wearable fitness trackers that record and send data to your smartphone or computer about your physical activity, the number of steps you take in a day, and your heart rate.

IoT continues to advance its capabilities and can help you maintain a secure, energy-efficient, connected, voice-activated, remotely accessible home.

IoT in Business   All businesses and areas of business can take advantage of IoT. Manufacturing can use sensors to monitor processes and increase quality of finished goods. Robotic arms can help ensure precision during the manufacturing process (Figure 1-8). Retail can use sensors to track inventory or send coupons to customers' phones while they shop. Shipping companies can track mileage and location of their trucks and monitor driving times to ensure the safety of their drivers.

Figure 1-8   Manufacturers can use a tablet to control a robotic arm.
Zapp2Photo/Shutterstock.com

A health care provider can use IoT to:

- Connect to a patient's wearable blood pressure or glucose monitor
- Send prescription updates and changes to a pharmacy, and alert the patient of the prescription
- Track and store data provided by wearable monitors to determine necessary follow-up care
- Send the patient reminders about upcoming appointments or tests

The uses of IoT are expanding rapidly, and connected devices continue to impact and enhance business practices at all levels.

The Digital Divide

All this technology has many uses for both personal and business needs; however, it is not available to everyone. The **digital divide** is the gap between those who have access to technology and its resources and information, especially on the Internet, and those who do not. Socio-economic and demographic factors, such as age, income, location, and education, contribute to the digital divide, which can impact individuals, households, businesses, or geographic areas.

Figure 1-7   IoT devices can help you with daily tasks, such as grocery shopping.

Refrigerator detects milk is low → Refrigerator sends a text to your phone that you need milk → Refrigerator adds 'buy milk' to your scheduling app → Phone determines the closest grocery store with the lowest milk price → Phone sends store address to your vehicle's navigation system
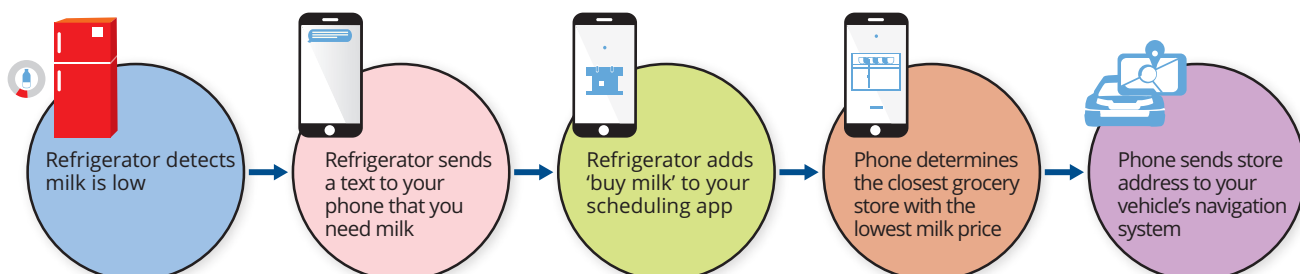
Imagine the educational opportunities when you have access to high-speed, unfiltered Internet content; your own laptop, tablet, or smart device; and software to create, track, and process data and information. Then compare these opportunities with the opportunities available to students who live in countries where the government restricts access to Internet content, and economics prevent them from owning their own devices and the software or apps used on them. These inequalities affect learning, knowledge, and opportunities and can have a lasting impact on the future of those affected.

Corporations, nonprofits, educational institutions, and governments are working on solutions to narrow the digital divide so that all learners can become digitally literate.

❓ Consider This

Does the Internet of Things discriminate?
Advantages of the IoT include comfort, safety, and efficiency. Individuals who can access IoT-enabled devices can find accurate data quickly, use GPS to have a shorter commute, collect and communicate health data using wearable devices, and reduce costs when grocery shopping by knowing what items are needed and when they expire. Individuals in areas in which these technologies are not available, or those who cannot afford them, are at a disadvantage. It is likely that the divide between the more and less fortunate will increase. What can you do to prevent IoT discrimination? What should you expect companies and governments to do?

Secure IT: Protect Your Privacy

Privacy is defined as the state or condition of being free from public attention to the degree that you determine. That is, privacy is freedom from attention, observation, or interference, based on your decision. Privacy is the right to be left alone to the level that you choose.

Prior to the current age of technology, many individuals generally were able to choose the level of privacy that they desired. Those who wanted to have very open and public lives in which anyone and everyone knew everything about them were able to freely provide that information to others. Those who wanted to live a very quiet or even anonymous life could limit what information was disseminated.

Today, however, that is virtually impossible. Data is collected on almost all actions and transactions that individuals perform. This includes data collected through web surfing, purchases (online and in stores), user surveys and questionnaires, and a wide array of other sources. It also is collected on benign activities, such as the choice of movies streamed through the Internet, the location signals emitted by a smartphone, and even the path of walking as recorded by a surveillance camera. This data is then aggregated by data brokers. **Data brokers** hold thousands of pieces of information on hundreds of millions of consumers worldwide. These brokers then sell the data to interested third parties, such as marketers or governments. While data brokers are legitimate and operate within the law, be aware that data collection also can be used to gather your personal information for misuse (Figure 1-9).

Attackers target your personal information because with your information, they can steal your hard-earned money or ruin your ability to receive a loan. In many ways, the theft and manipulation of your personal information for financial fraud is one of the most harmful types of attacks.

Figure 1-9 Ways your data can be accessed, collected, and sold.

Access		Collect		Sell	
Access	• Social media posts and comments • Web browsing or shopping history • Credit card statement or application • Official records, such as census data or driver's license	Collect	• Full name • Current and previous addresses • Phone numbers • Email addresses • Age • Gender identity • Property owned • Social Security number • Income • Education • Occupation	Sell	• Marketers and advertisers • Fraud detection or security • Investment/loan officers • Individual businesses • Government agencies

Table 1-1   How Personal Information Is Stolen

Technique	Explanation
Dumpster diving	Personal information from discarded credit card statements, charge receipts, and bank statements can be retrieved after being discarded in the trash.
Phishing	In phishing, attackers attempt to deceive you into revealing personal or financial information when you respond to an email message or visit a website.
Change of address form	Using a standard change-of-address form, the attackers divert all mail to a post office box so that the victim never sees the charges made.
Pretexting	An attacker who pretends to be from a legitimate research firm asks for personal information.
Stealing	Stolen wallets and purses contain personal information that can be used in identity theft.
Data mining	Attackers attempt to guess your passwords or password security questions by soliciting a response to a query on an online social media site that prompts you to enter information such as a pet's name, home state, and more.

Identity theft involves using someone's personal information, such as their name, Social Security number, or credit card number, to commit financial fraud (Table 1-1). Using this information to obtain a credit card, set up a cellular telephone account, or even rent an apartment, thieves can make excessive charges in the victim's name. The victim is charged for the purchases and suffers a damaged credit history that can lead to being denied loans for school, cars, and homes.

To Protect Your Privacy

Many technologies exist to help you protect your data from unauthorized access, including protecting your devices, apps, and individual files with passwords or encryption. You can and should use several ways to prevent your information from falling into the hands of attackers. It is especially important to protect your personal and financial data. Consider the following safeguards to protect your privacy:

- Shred financial documents and paperwork that contains personal information before discarding it.
- Do not carry a Social Security number in a wallet or write it on a check.
- Do not provide personal information either over the phone or through an email message.
- Keep personal information in a secure location in a home or apartment.

- Be cautious about what information is posted on social networking sites and who can view your information. Show "limited friends," such as casual acquaintances and business associates, a reduced version of a profile.
- Keep only the last three months of the most recent financial statements and then shred older documents instead of tossing them in the trash or a recycling bin. For paper documents that must be retained, use a scanner to create a PDF of the document and then add a strong password to the PDF file that must be entered before it can be read.
- Give cautious consideration before giving permission to a website or app request to collect data.
- Use common sense. Websites that request more personal information than would normally be expected, such as a username and password to another account, should be avoided.
- Be alert to signs that may indicate unusual activity in an account, such as a bill that did not arrive at the normal time or a large increase in unsolicited credit cards or account statements.
- Follow up on calls regarding purchases you did not make.
- Carefully review financial and billing statements each month as soon as they arrive.

? Consider This

How can you create a strong password?
Do not use your personal information, such as your name, or the name of your pet or family members, your birth date, schools attended, and other information that may be found online. Although requirements vary, in general, use at least eight characters, and mix upper- and lowercase letters, numbers, punctuation marks, and allowed symbols (note that systems sometimes prohibit the use of certain symbols, such as @). Change your password frequently. Do not use the same password for all websites or apps. Avoid common sequences or patterns, such as 12345678, and avoid spelling words backwards or using common abbreviations. Lastly, manage your passwords using an app. Have you ever had an account accessed by someone using your password? Why do you think this did/could occur?

How Technology Impacts the Professional World

Nearly every job requires you to interact with technology to complete projects, exchange information with coworkers, and meet customers' needs. Whether you are looking for a job in a technology field or other area, you can use technology to prepare for and search for a job.

Technological advances, such as the personal computer (PC), enabled workers to do their jobs more efficiently while at their desks. Today's workers can use smartphones, the Internet, the cloud, and more to work remotely, whether they are **telecommuting** (working from home), or traveling halfway around the world.

An **intelligent workplace** uses technology to enable workers to connect to the company's network, communicate with one another, use productivity software and apps, meet via web conferencing, and more. Some companies provide employees with computers and devices that come with the necessary software and apps, network connectivity, and security. Other workplaces have a **BYOD** (**bring your own device**) policy, enabling employees to use their personal devices to conduct business. Companies use online collaborative productivity software to allow employees to share documents, such as reports or spreadsheets, and to make edits or comments.

Technology in K-12 Education

Schools use social networking tools to promote school events, work cooperatively on group projects, and teach concepts such as anti-bullying. Online productivity software enables students to work collaboratively on projects and send the finished assignment to the teacher using email, reducing the need for paper printouts. **Interactive white boards** enable teachers to project from a computer or device to a screen that they can use to enter, add, or manipulate data or content (Figure 1-10). These factors and more create an **intelligent classroom**, in which technology is used to facilitate learning and communication.

Figure 1-10 Interactive white boards allow teachers to use a mouse or touch to manipulate, edit, or add data to a screen.

iStock.com/Gorodenkoff

Technology in Higher Education

A college or university might use a **learning management system** (**LMS**) to set up web-based training sites where students can check their progress in a course, take practice tests, and exchange messages with the instructor or other students. Students also can view instructor lectures online and take classes or earn a degree online. Ebooks let students read and access content from their tablet or device and access digital assets like videos associated with the content.

Technology in Health Care

Physicians use computers to monitor patients' vital signs and research symptoms and diagnoses. The **mobile health** (**mHealth**) trend refers to health care professionals using smartphones or tablets to access health records stored on the cloud, and patients using digital devices to monitor their conditions and treatments, thereby reducing the need for visits to the doctor's office. For example, mHealth apps can track prescription information, text reminders to take medication, or refill the prescription. Medical monitoring devices, such as electronic bracelets, collect vital signs and send the data to a specialist. Patients can ingest smart pills that contain sensors to monitor medication or that contain tiny cameras to enable a physician to view the patient's internal organs without invasive procedures. Health care also uses 3-D printers to manufacture skin for burn patients, as well as prosthetic devices and casts. **Telemedicine** (Figure 1-11) is the use of telecommunications technology, including secure web-based videoconferencing, to diagnose and treat patients remotely, which provides rural or remote patients access to doctors in other areas, or when an in-person medical visit is not possible.

Technology in the Transportation Industry

Transportation workers use handheld computers to scan codes on packages or containers of products before loading them on a vehicle, train, ship, or plane. You then can track the progress of your package as it makes its way to you. Computers find an efficient route for the packages and track their progress (Figure 1-12). Drivers use GPS to navigate quickly and safely, avoiding traffic and hazardous conditions. Soon, self-driving trucks will use robotics for mechanical control. Automated vehicles increase independent transportation options for people with disabilities.

Technology in Manufacturing

Manufacturers use **computer-aided manufacturing** (**CAM**) to streamline production and ship products more quickly. With CAM, robots perform work that is too dangerous, detailed, or monotonous for people. In particular, they play a major role in automotive manufacturing. For example, robots typically paint the bodies of cars because painting is complex, difficult, and hazardous. Pairing robotic systems with human workers also improves quality, cost efficiency, and competition. Computers and mobile devices make it possible to order parts and materials from the warehouse to assemble custom products. A company's computers monitor assembly lines and equipment using **machine-to-machine** (**M2M**) communications to communicate among machines, equipment, and devices to perform tasks.

Figure 1-11 Telemedicine appointments can be useful when in-person medical visits are not possible.
iStock.com/Geber86

Figure 1-12 The transportation industry uses code scanning to track packages.
Pro_Vector/Shutterstock.com

? **Consider This**

How can you set up a home office for telecommuting?
When employees telecommute, they save money on transportation (gas, bus or train fares, and parking). Recent events have forced many individuals to work from home for extended periods. To set up a home office, choose a location that is free from noise and distractions. If you are sharing a room with others who also are telecommuting, consider turning your desk to face the wall and using noise-cancelling headphones. If you participate in videoconferences, make sure your background is professional, or use a filtered background provided by your conferencing app. Invest in a comfortable chair and a desk that has adequate space for your work. Your company may be able to reimburse you for such costs in order to ensure your efficiency. Make sure to put limits in place as you would if you were working in your office — take breaks, and set a specific time when you "leave the office" for the day. Resist the temptation to extend your hours beyond what works for you and your family. Do you telecommute for school or work? What is your workspace like? How might you improve it?

How To: Use Technology in Your Job Search

You can use both social media and job search websites to learn about technology careers and to promote yourself to potential employers. By creating a profile on a career networking site or creating a personal website or blog that showcases your talents, hiring managers can learn more about you beyond what you can convey in a traditional, one-page paper resume. To further demonstrate your skills and abilities, you can consider pursuing a technology certification.

Create a Professional Online Presence

Your professional online presence often is the first thing a recruiter or interviewer will see. They may use your online resume or social networking profiles to determine whether to even contact you for an interview. It also can be a determining factor in getting you hired, so make sure you present yourself as a professional person who would be an asset to any organization or company. Consider the following tips when creating an online presence:

- Do not use humorous or informal names for your account profiles, blog, or domain name.
- Include a photo that shows your best self.
- Upload a PDF of your resume.
- Include links to videos, publications, or digital content you have created.
- Proofread your resume, blog, website, or profile carefully to avoid spelling and grammar mistakes.
- Enable privacy settings on your personal social media accounts, and never post anything online that you would not want a potential employer to see.

Online social networks for professionals can help you keep up with former coworkers, instructors, potential employers, and others with whom you have a professional connection. You can use these networks to search for jobs, learn about a company before interviewing, join groups of people with similar interests or experiences, share information about your career, and communicate with contacts.

Figure 1-13   LinkedIn is a career-based online social networking site.
Source: LinkedIn
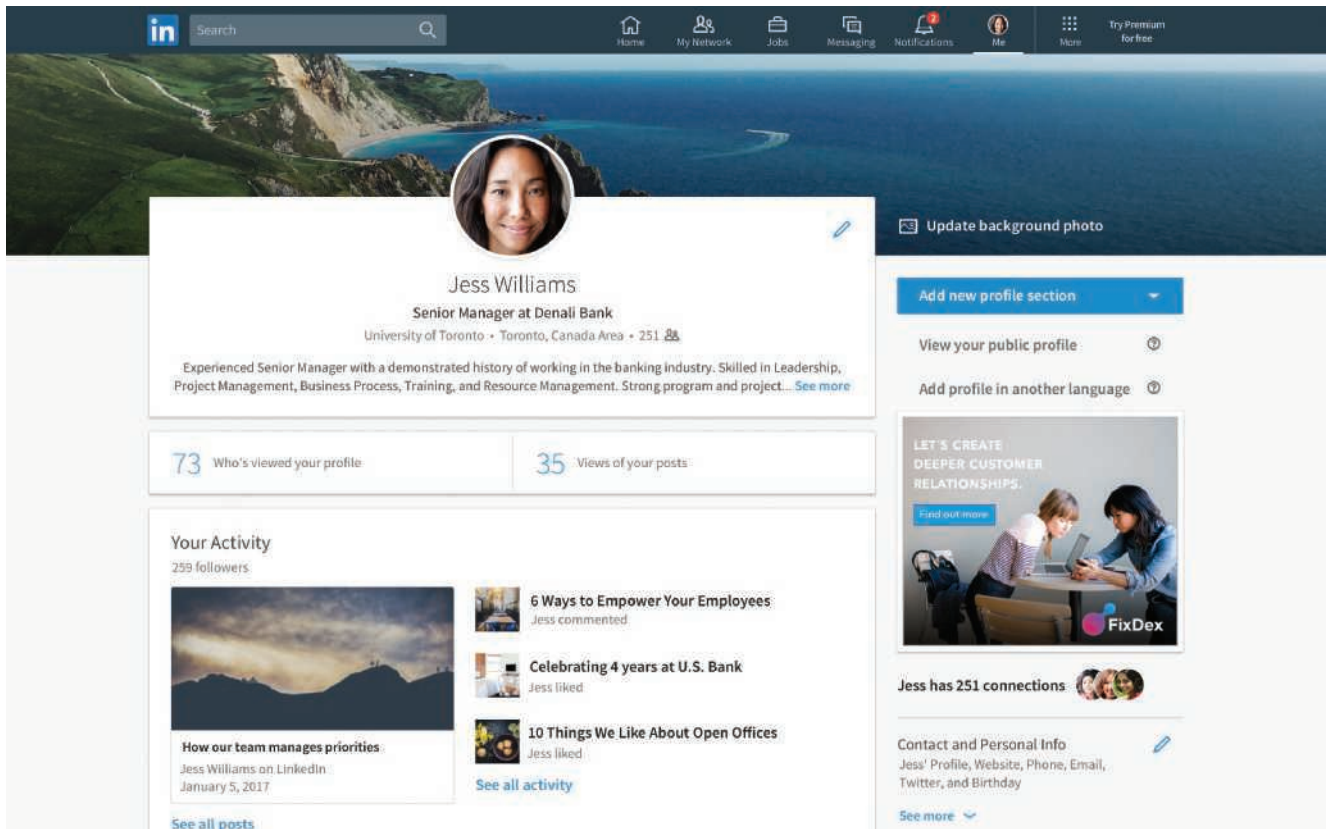
LinkedIn (Figure 1-13) is a social networking site designed to provide business and employment-oriented services. LinkedIn and other professional networking websites also offer online training courses to keep your skills up to date.

Achieve Technology Certifications

Some technology careers require you to have certain certifications. A **certification** in an industry or program demonstrates your knowledge in a specific area to employers and potential employers. Online materials and print books exist to help you prepare for a certification exam. Most certifications do not require coursework assignments, but instead require you to pass an exam that demonstrates your proficiency in the area. Tests typically are taken at an authorized testing center. Some tests are multiple choice, while others are skills-based. You likely will have to pay a fee to take the exam. Some areas that offer certifications include:

- Application software
- Data analytics, database, and web design
- Hardware
- Networking
- Operating systems
- Programming
- Cybersecurity

Obtaining a certification requires you to spend time and money. Certifications demonstrate your commitment to your chosen area and can help you land a job.

? **Consider This**

How can you use LinkedIn and other professional online social networking tools to help you in your career?
Whether you are looking for a first job or are employed in a career in your field, there are many reasons to use LinkedIn and other sites. Add current and former classmates and coworkers to your network. Do not hesitate to reach out to contacts that might be helpful to you, such as a fellow alumna of your school, or someone in your same position at another company, even if you do not know them personally. Follow companies and join industry groups to stay aware of job opportunities and developments in your field. Keep your profile updated, use a professional photo, and share links to relevant articles or your own achievements. Recommend your colleagues, and ask for recommendations that endorse your skills and provide references for your work or abilities. Have you set up a LinkedIn account? How might you find contacts that will be useful for you? What would you do if you received a request to connect with someone you do not know?

How Convergence Impacts Technology

As you learned, a computer is an electronic device, operating under the control of instructions stored in its own memory. Computers can accept data (input), process the data according to specified rules, produce information (output), and store the information for future use. Electronic components in computers process data using **instructions**, which are the steps that tell the computer how to perform a particular task. A set of coded instructions that tell a computer or device what tasks to perform is referred to as **software**, a **program**, or an **app**. Using software, you can complete a variety of activities, such as search for information, type a paper, balance a budget, create a presentation, or play a game.

Although you might think of a computer as a laptop or desktop, some consider computers to be any devices that perform all or some of those functions. **Convergence** is the increasing integration of technological capabilities on a growing number of previously unrelated devices. For example, you can access some of the same email, social network, and gaming apps and accounts on your laptop, tablet, and smartphone (Figure 1-14). The exact capabilities of each device vary, but the convergence trend means that the overlap in capability is increasing.

The following computers and devices have many overlapping capabilities, but differ in size, initial purpose, and how data is input and output.

Computer Devices

A **laptop** is a thin, lightweight mobile computer with a screen in its lid and a keyboard in its base (Figure 1-15). **Notebook** is another term for laptop. Designed to fit on your lap and for easy transport, most laptops weigh up to 7 pounds (varying by manufacturer and specifications). A laptop that is less than one inch thick and weighs about three pounds or less sometimes is referred to as an ultra-thin laptop. Most laptops can operate on batteries or a power supply or both.

Figure 1-15   Laptops are portable computers that you can use for school or work.
iStock.com/PeopleImages

Figure 1-14   Size comparison of a laptop, tablet, and smartphone.
iStock.com/UnitedPhotoStudio1

A **desktop**, or **desktop computer**, is a personal computer designed to be in a stationary location, where all its components fit on or under a desk or table. On many desktops, the screen is housed in a display device (or simply display) that is separate from a tower, which is a case that contains the processing circuitry. Another type of desktop called an **all-in-one** does not contain a tower and instead uses the same case to house the display and the processing circuitry.

With PCs, desktops, and laptops, keyboards, hand-held devices such as a mouse, and touch screens are the main input methods. Output is displayed visually on the screen, printed as a hard copy, or can be heard as audio.

Mobile Devices

A **mobile device** is a portable or handheld computing device, such as a smartphone or tablet, small enough to hold in your hand. Most mobile devices are Internet capable, meaning that they can connect to the Internet wirelessly. You often can exchange information between the Internet and a mobile device or between a computer or network and a mobile device.

Usually smaller than a laptop but larger than a phone, a **tablet** is a thin, lightweight mobile device that has a touch screen. Tablets often are associated with ebook readers. An **ebook reader**, or **e-reader**, is a mobile device that is used primarily for reading digital media, such as books or magazines.

A **smartphone** is an Internet-capable phone that usually also includes a calendar, an address book, and games, in addition to apps. Smartphones typically communicate wirelessly with other devices or computers. With most smartphone models, you also can listen to music, take photos, and record videos. Users often purchase a set of **earbuds** (Figure 1-16), which are

Figure 1-16   Earbuds enable you to listen to your devices without disturbing others.
iStock.com/PeopleImages

small speakers that rest inside each ear canal, in order to listen to phone calls or media without disturbing those around them.

Mobile devices use a variety of input methods, including touch screen, an on-screen keyboard, and voice. Some mobile devices come with a physical keyboard or use a stylus or pen. Output is displayed on a screen.

Media and Gaming Devices

While many users still purchase separate media and gaming devices, many of the capabilities of these devices, in particular, overlap with computers and mobile devices. You might use your smartphone or tablet to take, edit, and share pictures. You can use your laptop or mobile device to download, stream, and play videos or music.

A **digital camera** is a camera that creates a digital image of an object, person, or scene. With many digital cameras, you also can communicate wirelessly with other devices; many also include apps similar to those on a smartphone. Digital cameras typically allow you to review, and sometimes modify, images while they are in the camera. You also can transfer images from a digital camera to a computer or device, so that you can review, modify, share, organize, or print the images. Some also can record videos.

A **digital media player** is an application that lets you play audio and video files; most tablets and smartphones include media players. **Digital media** includes music, photos, videos, and virtual reality. Thus, portable media players enable you to listen to music, view photos, and watch videos, movies, and television shows. You can download digital media to your device, or you can play the media while it streams. **Streaming** is a way of receiving audio and video content on your device as it is being downloaded from the web.

A **wearable device**, or **wearable**, is a small, mobile computing consumer device designed to be worn. These devices often communicate with a mobile device or computer. Two popular wearable devices are activity trackers and smartwatches. An **activity tracker** is a device that monitors heart rate, measures pulse, counts steps, and tracks sleep patterns. In addition to keeping time, a **smartwatch** can communicate with a smartphone to make and answer phone calls, read and send messages, access the web, play music, work with apps, such as activity trackers and GPS, and more.

A **game console** is a hardware device that allows you to play video games, either single-player or multiplayer. A **handheld game device** is small enough to fit in one hand, making it more portable than a game console. The difference between the two is that game consoles typically require you to connect the console to a television or other screen to view the game, while handheld gaming devices include a small screen. Both types of devices are Internet capable and allow you to listen to music and watch TV or movies or view photos.

Are digital cameras, portable media players, ebook readers, and handheld game devices becoming obsolete as more and more smartphones and tablets include their functionality?

Smartphones and tablets enable you to take and store photos; store, organize, and play or view your digital media; read ebooks; and play games. Due to convergence, consumers may need fewer devices for the functionality that they require. Still, consumers may purchase separate stand-alone devices, such as a separate digital camera and portable media player, for a variety of reasons. The stand-alone device (i.e., a digital camera) may have more features and functionality than the combined device offers, such as a smartphone. You might want to be able to use both devices at the same time; for example, you might send text messages on the phone while reading a book on an ebook reader. Or, you might want protection if your combined device breaks. For example, you still can listen to music on a portable media player if your smartphone becomes nonfunctional. How many devices do you possess? What programs or activities do you do that can be done with other devices? Do you own any devices that are for specific purposes? If so, why?

What Does It Mean to Be a Digital Citizen?

You can be digitally literate without necessarily being a responsible digital citizen. For example, digitally literate people know how to copy and paste information from one source into another. Digital citizens, however, know when it is appropriate to copy and paste information, how to properly credit the source, and the ramifications of violating copyright restrictions. Other aspects of digital citizenship include adhering to the relevant laws, abiding by commonly accepted etiquette guidelines, staying aware of your rights and the rights of others, keeping your information secure, and taking care not to adopt unhealthy technology habits.

Digital ethics is a challenging and ever-changing landscape. Being a responsible digital citizen involves being aware of your legal and ethical obligations as you use technology to avoid breaking the law or causing harm to others or yourself. Using available technologies in a way that respects the laws and others' privacy, protects your identity, and safeguards your behavioral and physical health is at the core of being a digital citizen (Figure 1-17).

Netiquette is a term that describes the rules of Internet etiquette. Netiquette includes the code of acceptable behaviors users should follow while on the Internet; that is, it is the conduct expected of individuals while online. Netiquette includes rules for all aspects of the Internet, including the web, social media, Internet messaging, chat rooms, online discussions, and methods to transfer or store files.

Legal and Ethical Responsibilities of a Digital Citizen

Digital ethics is the set of legal and moral guidelines that govern the use of technology, including computers, mobile devices, information systems, databases, and more. A digital citizen is anyone who uses or interacts with technology at work or in daily life for productivity or entertainment. All digital citizens are responsible for educating themselves about their obligations, as well as their own rights.

Figure 1-17   Determining how to use technology involves several gray areas.

Is it legal? → Are there laws that expressly prohibit using technology for this purpose?

Is it ethical? → Does society generally approve or disapprove of this action? What about your professional or academic code of ethics?

Is it moral? → Does this feel right to you based on your own personal code of morals?
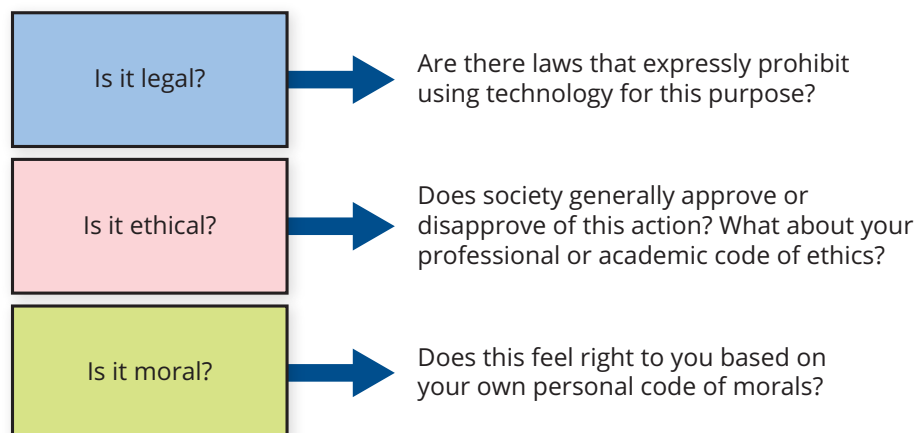
Figure 1-18   Technology raises many ethical and legal questions.

> ✓ Is it ever acceptable to use a fake name online?
> ✓ Can I throw my old smartphone in the trash?
> ✓ Who is responsible for validating information before sharing it online?
> ✓ Can I use a company-issued device for personal communications?
> ✓ Why is digital inclusion an important ethical issue?
> ✓ What should I do to protect my privacy when using IoT-enabled devices? Is it ever acceptable to copy and paste webpage content?
> ✓ Should I do a regular digital detox?
> ✓ Can I use a wiki for research?
> ✓ How can I make sure my website is accessible?

Like many ethical questions, digital ethical questions do not always have easy answers and can involve complex issues related to privacy and protecting the identity, rights, and behavioral health of individuals (Figure 1-18).

Many laws are being debated, revised, and passed to deal with how technology complicates problems like harassment, abuse of or attacks on free speech, invasions of privacy, copyright infringement, and bullying. Online activity allows for some level of anonymity, making it challenging to identify the perpetrators. Because it is so easy to distribute material widely on the Internet, finding effective solutions to these problems is difficult. States' laws, which vary widely, are being adapted to address these problems.

Cyberbullying is a form of bullying that involves digital devices and platforms, such as social media sites, online forums, messaging apps, and email. Missouri is one state that has attempted to define and enact punishment for cyberbullying, which a Missouri statute defines as bullying "through the transmission of a communication including, but not limited to, a message, text, sound, or image by means of an electronic device." The law states that schools are required to report any instances of cyberbullying and that perpetrators can be convicted of a felony.

Other states, such as Massachusetts, are enacting "hands-free" laws to prevent distracted drivers from causing accidents. **Distracted driving** means driving a vehicle while focusing on other activities, typically involving an electronic device, such as a cell phone. The law prohibits texting and all other activities while driving. Whether or not your state laws prohibit distracted driving, you can protect yourself and others on the road by taking precautions (Figure 1-19).

How Companies and Schools Can Protect Themselves

Schools, businesses, and organizations have an obligation to protect themselves, their employees, their customers, and their information. One method organizations use to lay out their expectations and rules for digital citizenship is by enacting acceptable use policies. An **acceptable use policy** (**AUP**) is a document that lists guidelines and repercussions of use of the Internet and other digital company resources, including network storage and email servers (Figure 1-20).

An AUP is distributed in part to reduce an organization's liability and to clarify what is and is not a fireable offense. For example, if employees use their company's email server to send harassing email or use the company's network resources to hack into another website, and those employees have signed an AUP forbidding such behavior, then the company would clearly have the right to terminate the employees. AUPs typically cover not only illegal or unethical behavior but also actions that waste company resources or time. Companies also use AUPs to protect company data, such as customer

Figure 1-19   Tips for avoiding distracted driving.

What should I do with my device while driving?	What if I remember that I need to text or call someone?	What else can I do?
• Turn it off or silence it. • Set up an automated response that tells people when you are driving. • Set up your GPS or maps app before you start driving.	• Pull over and park in a safe location before reaching for your device. • Ask your passengers to call or text for you.	• Keep kids safe with car seats or seat belts, as appropriate for their age and size. • Secure your pets. • Do not eat or drink, and definitely do not read texts or emails.

Figure 1-20   Acceptable use policies outline rules for using technology.
Source: U.S. Department of Justice
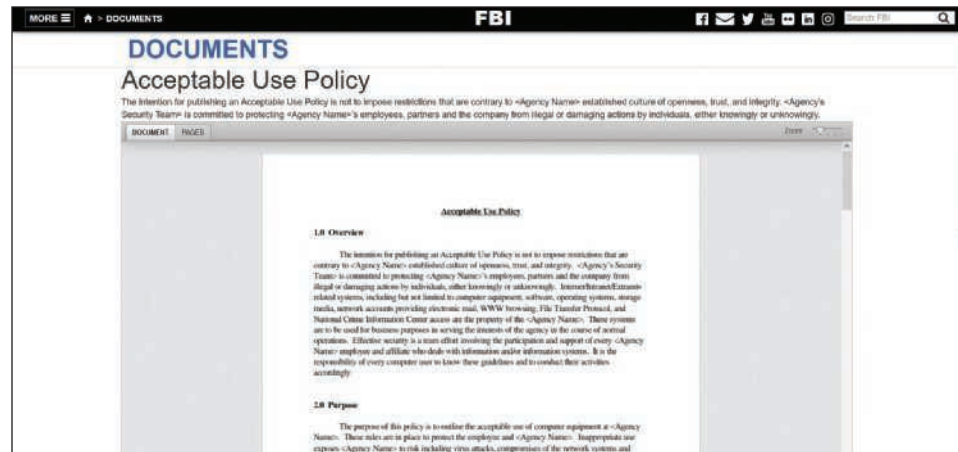
contact information, from being misused. For example, an AUP would forbid an employee from sharing contact information acquired at work for personal or nonbusiness use.

Within an AUP, the details of acceptable behavior often are listed in a code of conduct. Included in a code of conduct are rules against causing harm to others, misuse or unauthorized access of another person's files or data, protection of intellectual property, stealing, software piracy, and social considerations.

Schools typically also have sections in an AUP on how to address behavior such as plagiarism and cyberbullying.

The Internet makes it easier to **plagiarize**, which is copying or using someone else's work and claiming it as your own. Professional writers, such as journalists, are expected to follow strict ethical guidelines when copying or citing content from other sources. As a student, you need to hold yourself to similar standards. If you are not sure exactly what constitutes plagiarism, your school probably has a webpage explaining specific rules of plagiarism. You might even have been asked to sign a document indicating that you understand those rules when you first enrolled. Beware of websites that entice students to cheat intentionally by providing papers for purchase. Most schools will expel a student for such a serious infraction. To help discourage theft of other peoples' work, teachers often require students to submit papers using a service, such as turnitin, that automatically checks for plagiarized passages; turnitin also can help students check for uncited passages and more before submitting. This website, and others like it, also give resources to students to educate them about what plagiarism is and how to avoid it (Figure 1-21).

Figure 1-21   Schools use technology to predict and prevent plagiarism.
Source: Turnitin, LLC.
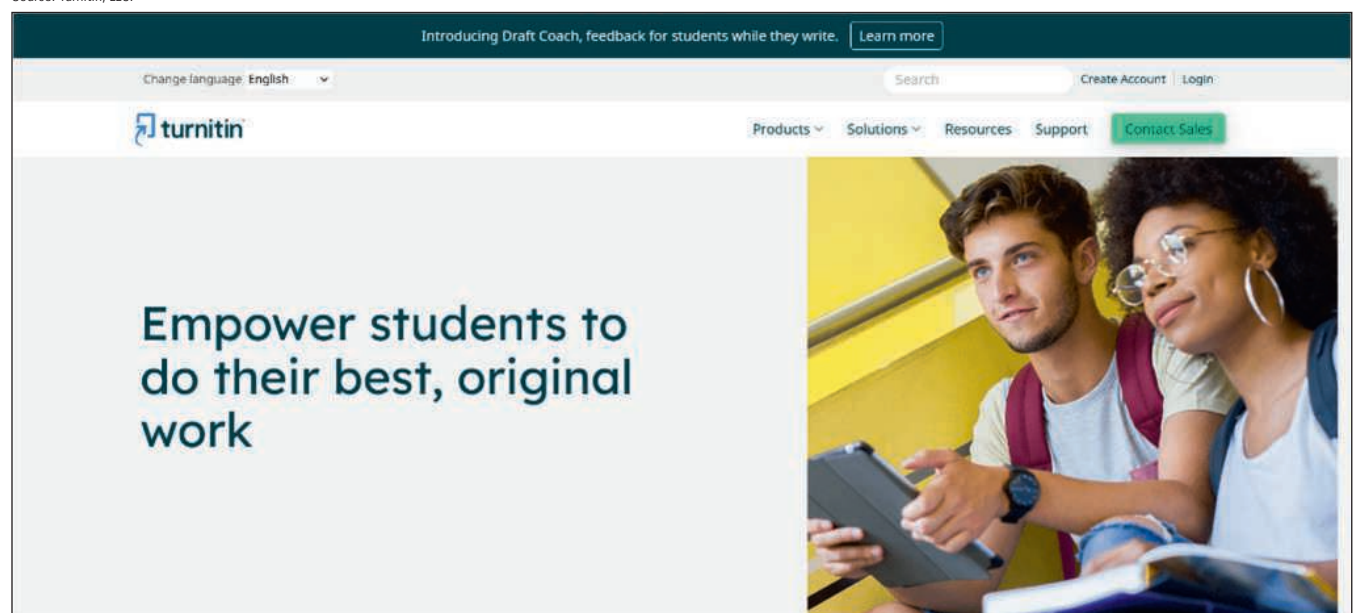
Cyberbullying, which is known to be extremely harmful to its victims, is an issue that schools, students, families, and communities are struggling to deal with. Examples of cyberbullying include sending, posting, or sharing negative and harmful content about another person or group. It is difficult for schools to address and monitor cyberbullying, as much of it takes place off school grounds, outside of regular school hours, and on devices and platforms that do not belong to the school. Yet it often affects the victim at school. Schools are adopting policies that include consequences for any form of student-to-student bullying that contributes to a hostile environment for a student or group.

Green Computing

People use and often waste resources, such as electricity and paper, while using technology. The practice of **green computing** involves reducing electricity consumed and environmental waste generated when using computers, mobile devices, and related technologies.

Personal computers, displays, printers, and other devices should comply with guidelines of the **ENERGY STAR program** (Figure 1-22). The U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) developed the ENERGY STAR program to help reduce the amount of electricity used by computers and related devices. This program encourages manufacturers to create energy-efficient devices. For example, many devices switch to sleep or power-save mode after a specified amount of inactive time.

Electronic waste and trash have a negative effect on the environment where they are discarded. You can avoid electronic waste by not replacing devices every time a new version is released and by recycling devices and products, such as ink and toner cartridges, when they no longer provide value.

Your personal green computing efforts should include:

- Purchasing and using products with an ENERGY STAR label
- Shutting down your computers and devices overnight or when not in use
- Donating computer equipment
- Using paperless communication
- Recycling paper, toner and ink cartridges, computers, mobile devices, and printers
- Telecommuting and using videoconferencing for meetings

Organizations can implement a variety of measures to reduce electrical waste, such as:

- Consolidating servers
- Purchasing high-efficiency equipment
- Using sleep modes and other power management features for computers and devices
- Buying computers and devices with lower power consumption processors and power supplies
- Recycling or disposing of out-of-date or discarded technology properly
- Using outside air, when possible, to cool the data center or computer facility
- Allowing employees to telecommute to save gas and reduce emissions from vehicles

Green computing practices are usually easy to implement and can make a huge impact on the environment.

Figure 1-22   Look for the ENERGY STAR logo when purchasing appliances or devices.
US Environmental Protection Agency/Energy star program

❓ Consider This

What should you do with your devices when you no longer need them?
Computers, monitors, and other devices and equipment contain toxic materials and potentially dangerous elements, including lead or mercury. You should never store obsolete technology for this reason. Disposing of devices in a landfill can release materials into the environment and cause air, land, or water pollution. Recycling and refurbishing are safer alternatives. Many manufacturers will accept unusable devices and then repurpose them into new devices that can be donated or create new products from the waste. Before you dispose of, sell, donate, or otherwise get rid of any device, be sure to erase and remove any data or information stored on it. Have you ever donated or recycled a device? Have you ever or would you consider purchasing a device that had been donated or recycled? Why or why not?

Ethics & Issues: Who Is Responsible for Providing Assistive Technologies?

The ever-increasing presence of computers in everyone's lives has generated an awareness of the need to address computing requirements for those with limitations, such as intellectual disabilities, mobility issues, and hearing and visual disabilities. **Accessibility** is the practice of removing barriers that may prevent individuals with disabilities from interacting with data, a website, or an app. Many technologies provide adaptive measures to address individuals' needs.

Assistive Technologies

Visually impaired people can change screen settings, such as increasing the size or changing the color of the text to make the words easier to read. Changing the color of text also can address the needs of users with certain types of color blindness. Instead of using a monitor, users with visual challenges can work with voice input and output. That is, the computer speaks out loud the information that appears on a screen or it interprets and converts the user's speech to text form. A Braille printer prints information on paper in Braille (Figure 1-23).

A **screen reader** is technology that uses audio output to describe the contents of the screen. Screen readers can read aloud webpages and documents or provide narration of the computer or device's actions. **Alternative text** (**alt text**) is descriptive text added to an object, such as a picture or drawing (Figure 1-24). A screen reader will read the alt text aloud so that the user understands the image and its purpose. Webpages and documents should include alt text for all images. Alt text can be as simple as the name of a famous individual shown in a photograph, or more complex, such as interpreting the results of a chart or graph. Productivity applications, such as Microsoft Office,

Figure 1-23 Individuals with visual challenges can use a Braille printer.
iStock.com/Inside-Studio

and webpage creation apps prompt users to add alt text and sometimes provide suggested alt text content.

Hearing impaired people can instruct programs or apps to display words or other visual clues instead of sounds, such as for a notification from an app. **Captioning software** displays scrolling text for dialogue in a video. Cameras can interpret sign language gestures into text.

Mobility issues can impact a user's ability to interact with hardware, such as a keyboard or a mouse. Users with limited hand mobility can use an on-screen keyboard, a keyboard with larger keys, or a hand-mounted pointer to control the pointer or insertion point. Alternatives to mouse buttons include a hand pad, a foot pedal, a receptor that detects facial motions, or a pneumatic instrument controlled by puffs of air. Users with conditions that cause hands to move involuntarily can purchase input devices,

Figure 1-24 Screen readers use alt text to describe an image.
Miki Studio/Shutterstock.com

Alt text

Colorful hot air balloons flying over champagne vineyards at sunset, Montagne de Reims, France

such as a keyboard or mouse, that are less sensitive to accidental interaction due to unintentional movements.

Users with intellectual disabilities might struggle with reading words on a screen, handwriting, or retaining information. Technologies that help these users learn or perform tasks include:

- Speech recognition programs so that the user can input data or information verbally
- Graphic organizers to enable a user to create an outline or structure of information
- Audio books to read information aloud to the user instead of reading on a printed page or on the screen

The basic premise of assisted technology is to improve accessibility for all users and provide the same opportunities to learn, work, and play, no matter what limitations a user has.

Legal Requirements

The **Americans with Disabilities Act** (**ADA**) is a law that requires any company with 15 or more employees to make reasonable attempts to accommodate the needs of physically challenged workers. The **Individuals with Disabilities Education Act** (**IDEA**) is a law that requires that public schools purchase or acquire funding for adaptive technologies. These laws were put in place to ensure that people with disabilities can access resources, information, and services using the appropriate technology.

Regardless of legal requirements, companies and schools should be aware of discriminatory practices that may preclude capable individuals from working or learning productively. A fair environment means providing solutions both proactively and when made aware of them.

? **Consider This**

How can you advocate for yourself when you are in need of assistive technology?
Technological advances in assistive technology have opened up career and educational opportunities for many. If you are in a situation where your needs are not met or you could use more assistance, you need to know your rights and how to address them. First, you can research the legal requirements your company or school is obligated to follow. These requirements should specify who pays for any equipment or apps that will help you. Bring these requirements, along with any research you have on your specific technology needs, to your supervisor or a school administrator. Bring a supportive person if you feel more comfortable. Ask to participate in the choice of technology purchase so as to meet your specific needs. Your school or employer may not be aware of your needs or how to meet them without your participation. If these methods do not work, contact a rights' advocacy group that can work on your behalf to ensure that you have the opportunities to fulfill your potential as a student or employee. Are you or is anyone you know in need of assistive technologies? What does your school provide? What other resources are available in your area?

Study Guide

Instructions: The Study Guide exercise reinforces material you should know after reading this module. 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/ebook.

1. Define the term, digital literacy. What does it mean to be a digital citizen?

2. Define the terms, computer, Internet, and online social network.

3. ___ refers to large and complex data sources that defy easy handling with traditional data processing methods.

4. What are the negative effects of digital distraction?

5. Explain the role of vacuum tubes, transistors, and integrated circuits in computer development.

6. How did the microprocessor contribute to the development of the PC?

7. Define the Internet of Things.

8. Explain the role of embedded computers in IoT. List examples.

9. ___ technology stores data on a credit card's embedded chip instead of a magnetic stripe.

10. Define kiosk. Describe its uses.

11. How does IoT affect home and business users?

12. Describe the digital divide, and how it is harmful.

13. Explain how privacy has been impacted by technology.

14. What privacy risks are involved with using technology?

15. What is a data broker, and how do they access, collect, and sell your data?

16. Describe the effects of identity theft on the victim. How does identity theft occur, and what can you do to prevent it?

17. A(n) ___ attack attempts to deceive you into revealing personal or financial information when you respond to an email message or visit a website.

18. List guidelines for creating a strong password.

19. Define telecommuting and intelligent workplace. Explain how these and other technologies impact the professional world.

20. How has technology impacted K-12 education? How do instructors use an interactive white board?

21. What is the purpose of a learning management system? How else has technology impacted higher education?

22. Describe the mHealth trend. How does telemedicine help patients?

23. Explain how technology has impacted the transportation industry.

24. Define M2M communication. What other ways has technology impacted the manufacturing industry?

25. List guidelines for creating a professional online presence. Why is this important?

26. Describe how achieving a technology certification might help you in your job search or career.

27. Define the term, software. Software also is called a(n) ___ or ___.

28. Explain the role of instructions as they are used in software.

29. Define convergence, and give examples.

30. A(n) ___ is anyone who interacts with a computer or mobile device or utilizes the information it generates.

31. Differentiate among the following computing devices: laptop, desktop, and all-in-one. A laptop also is known as a(n) ___ computer.

32. What are the typical input and output methods for computer devices?

33. List types of mobile devices, and describe the purpose of each.

34. Explain whether or not a mobile device is a computer.

35. How does convergence affect media and gaming devices?

36. What questions might you ask when determining whether something is ethical, legal, or moral?

37. Define netiquette. What behaviors does it provide rules for?

38. Give examples of states' attempts to regulate digital ethical behavior.

39. A(n) ___ is a document that lists guidelines and repercussions of use of the Internet and other digital company resources, including network storage and email servers.

40. What is cyberbullying? Give examples.

41. List ways you can practice green computing. How can you dispose of devices responsibly?

42. Define accessibility.

43. Give examples of assistive technologies. Describe the purpose of alt text.

44. Explain the legal ramifications of the ADA and IDEA.

Key Terms

You should be able to define the Key Terms listed below.

acceptable use policy (AUP) (1-16)
accessibility (1-19)
activity tracker (1-14)
all-in-one (1-14)
alternative text (alt text) (1-19)
Americans with Disabilities Act (ADA) (1-20)
app (1-13)
automated teller machines (ATMs) (1-6)
Big Data (1-2)
BYOD (bring your own device) (1-9)
captioning software (1-19)
certification (1-12)
chip-and-pin technology (1-6)
computer (1-2)
computer-aided manufacturing (CAM) (1-10)
computer literacy (1-2)

convergence (1-13)
cyberbullying (1-16)
data brokers (1-7)
desktop (1-14)
desktop computer (1-14)
digital camera (1-14)
digital citizen (1-2)
digital distraction (1-3)
digital divide (1-6)
digital literacy (1-2)
digital media (1-14)
digital media player (1-14)
distracted driving (1-16)
earbuds (1-14)
ebook reader (1-14)
embedded computer (1-5)
ENERGY STAR program (1-18)
e-reader (1-14)
game console (1-14)
green computing (1-18)
handheld game device (1-14)
identity theft (1-8)

Individuals with Disabilities Education Act (IDEA) (1-20)
instructions (1-13)
integrated circuits (1-4)
intelligent classroom (1-9)
intelligent workplace (1-9)
interactive white boards (1-9)
Internet (1-2)
Internet of Things (IoT) (1-4)
kiosk (1-6)
laptop (1-13)
learning management system (LMS) (1-10)
LinkedIn (1-12)
machine-to-machine (M2M) (1-10)
memory (1-2)
microprocessor (1-4)
mobile device (1-14)
mobile health (mHealth) (1-10)
netiquette (1-15)

network (1-2)
notebook (1-13)
online social network (1-2)
personal computer (PC) (1-4)
phishing (1-8)
plagiarize (1-17)
privacy (1-7)
processor (1-4)
program (1-13)
screen reader (1-19)
server (1-2)
smartphone (1-14)
smartwatch (1-14)
software (1-13)
streaming (1-14)
tablet (1-14)
telecommuting (1-9)
telemedicine (1-10)
transistors (1-4)
vacuum tubes (1-4)
wearable (1-14)
wearable device (1-14)
Wi-Fi (1-2)

Extend Your Knowledge

Instructions: The Extend Your Knowledge exercise expands on subjects covered in the module and encourages you to find the latest developments on these topics. Use a search engine or another search tool to locate news articles, blog entries, videos, expert discussions, or other current sources on the listed topics. List your sources, and write 3-4 sentences describing what you have learned to submit in the format required by your instructor.

- Big Data
- Internet of Things
- Laws governing digital ethics
- Assistive technologies

What did you learn that helped you better understand the concepts in this module? Did anything surprise you? How will what you learned impact you?

Checkpoint

The Checkpoint exercises test your knowledge of the module concepts.

True/False   Mark T for True and F for False. If False, rewrite the statement so that it is True.

_____ **1.** A computer is an electronic device, operating under the control of instructions stored in its own memory, that can accept data, process the data to produce information, and store the information for future use.

_____ **2.** The basic premise of IoT is that objects can be tagged, tracked, and monitored through a local network or across the Internet.

_____ **3.** With phishing, an attacker who presents to be from a legitimate research firm asks for personal information.

_____ **4.** A company's computers monitor assembly lines and equipment using modem-to-modem (M2M) communications to communicate between machines, equipment, and devices to perform tasks.

_____ **5.** Use humorous or informal names for your account profiles, blog, or domain name to show potential employers that you have a sense of humor.

_____ **6.** Electronic components in computers process data using apps, which are the steps that tell the computer how to perform a particular task.

_____ **7.** A user is anyone who interacts with a computer or mobile device or utilizes the information it generates.

_____ **8.** Designed to fit on your lap and for easy transport, most desktops weigh less than 7 pounds.

_____ **9.** Handheld gaming devices typically require you to connect to a television or other screen to view the game.

_____ **10.** Netiquette includes the code of acceptable behaviors users should follow while on the Internet.

_____ **11.** The Internet makes it easier to pirate, or copy or use someone else's work and claim it as your own.

_____ **12.** Captioning software displays scrolling text for dialogue in a video.

Matching   Match the terms with their definitions.

_____ **1.** all-in-one

_____ **2.** convergence

_____ **3.** processor

_____ **4.** Internet of Things

_____ **5.** kiosk

_____ **6.** BYOD

_____ **7.** app

_____ **8.** LMS

_____ **9.** tablet

_____ **10.** AUP

a. term that describes the trend of computers and devices with technologies that overlap

b. a freestanding booth usually placed in a public area that can contain a display device used to show information to the public or event attendees

c. series of related instructions, organized for a common purpose, that tells the computer what tasks to perform and how to perform them

d. web-based training site where students can check their progress in a course, take practice tests, and exchange messages with the instructor or other students

e. a document that lists guidelines and repercussions of use of the Internet and other digital company resources, including network storage, and email servers

f. an environment where processors are embedded in every product imaginable, and the products communicate with one another via the Internet or wireless networks

g. thin, lightweight mobile computer that has a touch screen

h. type of desktop computer that does not contain a tower and instead uses the same case to house the display and the processing circuitry

i. a policy enabling employees to use their personal devices to conduct business

j. a chip that contains a central processing unit

Problem Solving

Instructions: The Problem Solving exercises extend your knowledge of module concepts by seeking solutions to practical problems with technology that you may encounter at home, school, or work. The Collaboration exercise should be completed with a team. 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.). Is this a real issue you've encountered? Do you think you would be able to solve the situation if you encounter it? 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. **Bad Directions**   Your friend is driving you, and you are using your smartphone for directions. While approaching your destination, you realize that your smartphone app instructed you to turn the wrong way. How could this have happened?

2. **Digital Distraction**   While eating lunch with a friend, you notice your friend is looking at their phone a lot. What kinds of rules can you two agree on so that you can enjoy each other's company without getting distracted? How have you solved this issue with your friends in the past? How might you approach it differently in the future?

3. **Smart Thermostat**   You programmed your apartment's thermostat to turn down the heat during the day while you and your roommates are not home. Because everybody gets home around 5:00 p.m., you used your app to instruct the thermostat to increase the heat by five degrees starting at 4:30 p.m. You walk in the apartment, and it is still colder. How can you make sure the app is connecting to your thermostat?

4. **Unauthorized Charges**   You get a notification from your credit card company that you made several expensive charges that you do not recognize. How might this have happened? What are your next steps? What steps can you take to protect yourself?

5. **Gaming with Friends**   You have a weekly date with several friends to play a multiplayer video game together. An hour before your date, you decide to warm up with a few single-player games. Your game is not showing up on your television screen. What might be wrong with your game console, and how can you fix it?

Professional

6. **Discarding Old Computer Equipment**   Your company has given you a new laptop. Because of the negative environmental impact of discarding the old computer in the trash, your supervisor asked you to suggest options for its disposal. How will you respond? Is it important to you to follow environmentally friendly practices? Why or why not?

7. **Acceptable Use Policy**   During a quick break at work, you attempt to sign in to an online social network on your work desktop. You get a message from your supervisor asking you to see them regarding a violation of the company's AUP. What did you do wrong? How can you explain your actions to your boss? Does the company have a right to limit your activities? How might you apply what you have learned to your current job?

8. **Colleague Needs Help**   You notice your new colleague has had difficulty taking notes during a presentation that had many important visuals. Later, they confide that they have some visual challenges. At their old job they had access to assistive technologies. What are their rights? What are the company's responsibilities? Where can you find information that they can share with their supervisor?

9. **Professional Online Presence**   You have had several first interviews lately, but no job offers. You decide to look at your online presence to see if it contains any red flags. Your social media settings are public, and you do not have a separate account on a professional network. What can you do to make your online presence help you in your job hunt?

10. **Synchronization Error**   You added appointments to the calendar on your computer, but they are not showing up on your smartphone. Your calendar has synchronized with your smartphone in the past. What are your next steps?

Collaboration

11. **Technology in Health Care**   Your primary care physician is opening their own practice. They would like to use technology in the new office that not only will improve the patient experience but also make the job easier. In addition, many appointments use secure web conferencing software to treat patients remotely. Form a team of three people. One team member should research ways that technology can help improve patient check-in and billing. Another team member should research technology your physician can use while working with patients remotely, and the third team member should research technology that can be used in the office to improve the patient experience. What concerns do you and your classmates have about telemedicine security?

How To: Your Turn

Instructions: This exercise presents general guidelines for fundamental skills when using a computer or mobile device and then requires that you determine how to apply these general guidelines to a specific program or situation. 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 Sign Up for a LinkedIn Account

A LinkedIn account provides access to contacts, networking opportunities, industry groups, and a wealth of information. Establishing a LinkedIn account gives you a place for your professional online presence. You can add a link to your account on your resume or in an email message expressing interest in a job. Even if you already have an account, follow the steps below to ensure your online presence will help you in your career or job search. The following steps guide you through the process of signing up for a LinkedIn account.

a. Start a browser and navigate to www.linkedin.com.

b. Sign in if you have an account or follow the on-screen instructions to sign up for a free = account.

c. Allow LinkedIn to provide a list of suggested contacts using your contacts list in your email account, social network, current school, and current or past employers. Send connection requests to those with whom you feel comfortable. Try to find a current classmate doing the same assignment, and send them a direct message.

d. Upload a professional head shot if you have one, or ask a friend to take a picture of you with a blank background.

e. Add your contact, school, and work information.

Exercises

1. Read and reply to any direct messages you have received, or send one to a classmate asking for a reply. What can you see yourself using this feature for with potential employers, contacts of contacts, or current colleagues?

2. Perform a search for jobs that interest you. Apply several filters to narrow down your choices by salary, location, qualifications, and more. Are you interested in any of the positions you find in your search?

3. Choose one article online pertaining to your preferred industry that you can share with your new contacts, and add a sentence or two with your opinions about the article.

4. Read through your news feed. Like or respond to at least one post by a contact. What made you react to that post? How can you get others to interact with your posts?

5. Follow at least two companies in your industry. What types of posts do they make? Choose one that interests you to include in your response to your instructor.

6. Join a network of your choice. Possible choices include alumni from your school, persons with similar interests, or anything that you think might be helpful in your career. Which network did you select, and why?

7. Ask a colleague or classmate to view your LinkedIn account and your overall online presence. What suggestions do they have? How will you implement them?

Internet Research

Instructions: These exercises broaden your understanding of module concepts by requiring that you search for information on the web. 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). Additionally, reflect on the process you used to complete this activity. How did you go about choosing the tool that you did and why? Would you do anything differently next time?

1 Social Media: Online Social Networks

Online social networks are a central communications tool and the primary source of news and information for many people. Historians place the birth of online social networking with the BBS (Bulletin Board System), where users communicated with a central computer and sent messages to other BBS members and also downloaded files and games. The next phase of online social networks evolved when CompuServe, AOL (America Online), and Prodigy were among the services linking people with similar interests. Today's online social networks share many of the same basic principles by allowing members to communicate common interests, play games, and share photos, videos, and music. Some of these online social networks are for personal use, while others are for entrepreneurs, business owners, and professionals to share job-related topics.

Research This: Compare the features of the top personal online social networks, and create a table listing the number of active members in the United States and worldwide, the number of years the sites have existed, the more popular features, and the amount of content, such as photos, news stories, and links, that is shared each month. What types of advertisements are featured at each of these sites? Which sites are marketed toward younger and older users? Then, research the online social networks used for business. How does their content differ from that found on the personal online social networks? How many companies use these sites as a recruiting tool? How many native languages are supported? How are professionals using these websites to find potential clients and business partners?

2 Security: Passwords

A Consider This in this module offers advice about creating secure passwords. Despite suggestions and constant reminders from security experts to develop and then periodically change passwords, users continue to create weak passwords. These common passwords are broken easily and, therefore, never should be used. For many years, the most common passwords have been the word, password, and the number sequences, 123456 and 12345678.

Research This: Use a search engine to locate at least two different companies' lists of the ten most common passwords in the past two years. Which passwords appear on both lists? Find a password-strength checking website and type three passwords to determine how easy or difficult they are to crack. Why do you think consumers continue to use these passwords despite repeated warnings to avoid them? Do you have accounts using one or more of these passwords? What advice is given for developing strong passwords? What other security measures should you take? How do the companies gather data to determine common passwords? What changes should you make to your passwords?

3 Search Skills: Solving the Digital Divide

The issue of the digital divide is not going to go away any time soon. Its impact is felt locally, nationally, and globally. Within your own school or city, you likely can identify areas that contribute to inequities. The question of how to address the digital divide brings up many ethical concerns. Whose responsibility is it to address? What is the role of the tech industry? How can schools assist? Many organizations are working on this issue and attempting to make digital access available to all.

Research This: Select one scope of the digital divide to explore (local, state, national, or worldwide). List the top areas of inequity that need to be addressed (for example, Internet access, censorship, outdated devices, etc.). Determine the key areas that are stopping these from being addressed. Find at least one organization that is working to address the gap, and describe the efforts they are making. List ways you can work to narrow the gap between students without reliable access to educational software, the Internet, and the hardware on which to run both. Discuss the ethical ramifications of not addressing the digital divide. How can it benefit everyone to have equal access? How are you personally impacted by the digital divide?

Critical Thinking

Instructions: These exercises challenge your assessment and decision-making skills by presenting real-world situations associated with module concepts. The Collaboration exercise should be completed with a team. 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. **The Digital Divide**

   You work in the educational software industry. Your boss asks you to give a brief lecture to other employees about the digital divide. You research the following questions: What are the advantages and disadvantages to being on either side of the digital divide? What factors create or contribute to the digital divide? Who is affected? What organizations exist that are trying to overcome the digital divide? How are they attempting to do this?

   Do This: Create a one-page document in which you define and give examples of the impact of the digital divide, and list ways your company can work to narrow the gap among students without reliable access to educational software, the Internet, and the hardware on which to run both. Discuss the ethical ramifications of not addressing the digital divide — what is your role as a company? What is your role as an individual? What more can be done to address the digital divide? How might you partner with organizations looking to overcome this obstacle?

2. **Energy Efficiency**

   Increases in energy prices lead many individuals to look at purchasing energy-efficient computers and devices. Energy-efficient models often look and perform similarly to equivalent computers or devices that use more energy.

   Do This: Find two computers or devices of identical configuration, where the only difference is energy consumption. How much energy does the energy-efficient model save? Are energy-efficient computers and devices more or less expensive? Will the difference in cost (if any) affect your purchasing decision? How else might you be able to change your settings on your existing computer or device to save energy? Use the web to locate articles that recommend energy-efficient products and that provide tips about additional ways to save energy. How can you apply what you learned to other situations?

3. **Case Study**

   Cooperative-Owned Farm Stand   You are the new manager for a farm stand that is a cooperative effort, jointly owned by several local farmers. The previous manager tracked all the data on paper. You realize that using technology will increase your efficiency and enable you to communicate better with the owners, employees, and customers. At the next business meeting, you will share ideas about how you will use technology.

   Do This: To prepare for the meeting, you compile the following: differences between input and output, a list of the types of data you can use as input, and a list of the types of information you can produce as output. You include the types of computers, mobile devices, and other technologies you will use to enter data and produce the information. Incorporate your own experiences and user reviews of the devices.

Collaboration

4. **BYOD Policies**

   Research the trend of BYOD in workplaces. Compare the advantages to any potential disadvantages. What advantages and disadvantages exist for companies? What advantages and disadvantages exist for employees? What rights and responsibilities do companies have regarding the data, usage, and costs for employees' devices?

   Do This: Form a three-member team and choose a field in which you all are interested. Divide responsibilities to answer the specific privacy needs of the chosen industry, locate published policies that affect users and employers, and legal restrictions for both the employer and employee. Locate blog posts or other opinion content that supports and discredits BYOD policies. Each team member should develop a list of questions and facts based on their research. After the research, create a hypothetical BYOD policy for your industry. Be specific about what devices are allowed and what restrictions exist on both sides. Be sure to summarize your investigations, describe the hypothetical business or organization, and outline and support your recommendations.

The Internet: Connecting and Communicating Online

2

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Objectives

After completing this module, you will be able to:

1 Discuss the evolution of the Internet
2 Describe how to use the web
3 Identify techniques for connecting to the Internet
4 Explain various online activities and services
5 Identify considerations for staying safe online
6 Discuss ways to use social networks
7 Describe how to conduct and evaluate online searches
8 Identify considerations for using online content

The Internet Evolution

You probably use the web dozens or hundreds of times a day to find a place for lunch, keep track of scores, shop for a new phone, post a comment on a blog or message board, and search for photos you need to complete a project at school or at work. The **web**, originally known as the **world wide web**, is a service consisting of websites located on computers around the world, connected through the Internet. As a vast library of content, the web is where you go for entertainment, bargains, news, and information of all kinds.

Since its introduction, the web has changed the way you access information, conduct business transactions, and communicate. The **Internet** is a global collection of millions of computers linked together to share information. The linked computers form a worldwide collection of networks that connects millions of businesses, government agencies, educational institutions, and individuals (Figure 2-1). Each of the networks on the Internet provides resources that add to the abundance of goods, services, and information accessible via the Internet. The more you understand about the web and how to access its content, the more you can get out of it.

History of the Internet and the Web

To be digitally literate about the role of the Internet and the web today, you should understand its origins. The Internet has its roots in a networking project started by the Pentagon's Advanced Research Projects Agency (ARPA), an agency of the U.S. Department of Defense. ARPA's goal was to build a network that (1) allowed scientists at different physical locations to share information and work together on military and scientific projects and (2) could function even if part of the network were disabled or destroyed by a disaster, such as a nuclear attack. That network, called **ARPANET**, became functional in September 1969, linking scientific and academic researchers across the United States.

The original ARPANET consisted of four main computers, one each located at the University of California at Los Angeles, the University of California at Santa Barbara, the Stanford Research Institute, and the University of Utah. Each of these computers served as a host on the network. A **host** is any computer or device that provides services and connections to other computers or devices on a network. By 1984, ARPANET had more than 1,000 individual computers linked as hosts. Today, millions of hosts connect to this network, which now is known as the Internet (Figure 2-2).
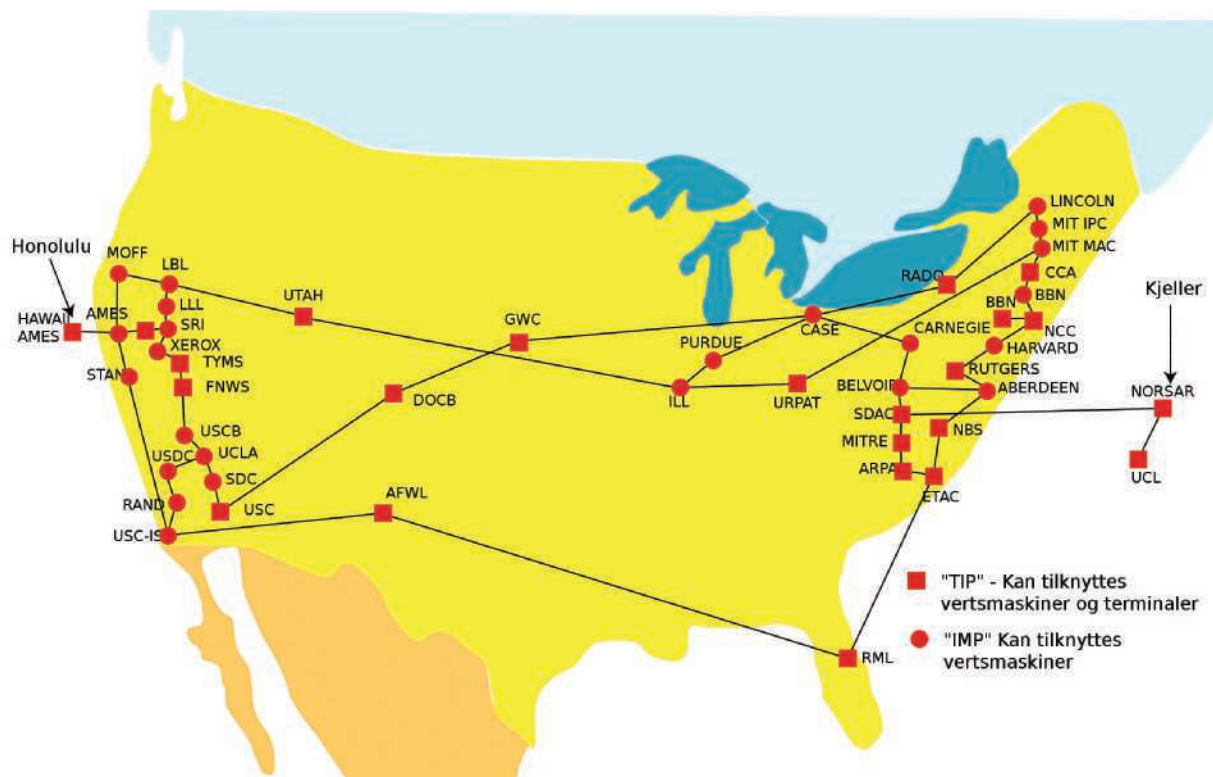
Figure 2-1 People around the world use the Internet in daily activities, such as viewing media, communicating with others, and accessing information.
iStock.com/Metamorworks

Figure 2-2 ARPANET network map from 1974.
Yngvar

The Internet consists of many local, regional, national, and international networks. Both public and private organizations own networks on the Internet. These networks, along with phone companies, cable and satellite companies, and the government, all contribute toward the internal structure of the Internet and enable you to access web services.

While the Internet was developed in the late 1960s, the web emerged in the early 1990s as an easier way to access online information using a browser. Since then, it has grown phenomenally to become one of the more widely used services on the Internet. Each decade, the landscape and impact of the web has grown and changed dramatically. Think about how differently you might go about your day fifty years ago? What about twenty, ten, or even five years ago? What can you do now that you could not do then?

Net Neutrality   With all the growth, many issues have arisen. A commonly disputed idea today is the idea of net neutrality. **Net neutrality** is the concept that one website has the same value or priority as other websites, resulting in equal, unrestricted access to each site. When net neutrality is enforced, an **Internet service provider** (**ISP**), which is a company that sells Internet access, must provide the same level of service to all websites, regardless of their content or purpose. Net neutrality supports the concept that the Internet should be neutral, and all traffic should be treated equally.

Networks transmit data over a communications channel, which can be wired or over the air (wireless). Each type of communications channel can support a certain amount of data being transferred at a given time. **Bandwidth** is a common term used to describe the capacity of a communications channel. When a communications medium or connection supports transferring a large amount of data at one time, it is said to be a high-bandwidth connection. High-bandwidth connections (also called broadband connections) support capacity for transferring content such as videos, music, and other large files; it also can support online gaming. Low-bandwidth connections (also called narrowband connections) support only slower transfer speeds, as they have less capacity. These connections are suitable for performing functions such as sending and receiving email messages, transferring small files, and viewing basic websites. **Email** (short for electronic mail) is the transmission of messages and files via a computer network.

Supporters of net neutrality like the fact that access to websites and other Internet services cannot be restricted based on factors such as content or bandwidth requirements. Those who oppose net neutrality argue that the ability for users to access certain types of high-bandwidth content, such as music and movies, might result in slower Internet speeds for others who are also connecting to

the Internet using the same ISPs. Without net neutrality, ISPs could charge more money for those wanting access to content requiring more resources (such as streaming music and movies) and charge less money for those who require access to less resource-intensive services.

? Consider This

Who owns the Internet?

Have you ever wondered who is in charge of the web? Who maintains the webpages? Who makes sure all the parts of the complex system work together? No single person, company, institution, or government agency owns the Internet.

Although the Internet is a global resource, the **U.S. Federal Communication Commission** (**FCC**) is responsible for releasing rules surrounding Internet access. Some individuals feel the government should not control Internet access and its content, but one primary goal of the FCC is to guarantee accessibility to all Internet users.

The **Internet Engineering Task Force** (**IETF**) sets standards that allow devices, services, and applications to work together across the Internet. For example, the IETF sets rules for routing data, securing websites, and developing guidelines for responsible Internet use.

Another leading organization is the **World Wide Web Consortium** (**W3C**), which consists of hundreds of organizations and experts that work together to write web standards. The W3C publishes standards on topics ranging from building webpages, to technologies for enabling web access from any device, to user-friendly browser and webpage design. Net neutrality is an issue that the W3C argues should be the standard for all ISPs and web services. The W3C also supports accessibility for all users, the web as a dynamic communications tool, and enhanced web security measures.

What rules and guidelines do you wish existed for the Internet and the web? How do the standards set by these organizations affect your user experience?

Using the World Wide Web

You may hear them used interchangeably, but the Internet and the web are not the same. The Internet is a global system of networks that provides billions of users around the world to access a variety of services by connecting networks and devices. The web, along with email, file transfer services, and messaging, is one of those services. The web provides information to users via webpages and websites.

Web Basics

When you use a mobile phone or other device to access the web, you are accessing a collection of webpages located on computers around the world, connected through the Internet. A **webpage** (Figure 2-3) is a specially formatted document that can contain text, graphics, sound, video, and links to other webpages. The content of most webpages is designed to make them visually appealing and the content easy to find. **Hyperlinks**, often shortened to **links**, are words or graphics you can click to display a webpage or other resources on the Internet, such as a file. Links make it possible to jump to other pages or other locations on the same page in order to find information quickly.

Webpages are either static or dynamic. When you visit a **static webpage**, you see the same content each time. With a **dynamic webpage**, by contrast, the content of the webpage is regenerated each time you display it. Dynamic webpages may contain customized content, such as the current date and time of day, desired stock quotes, weather for a region, or ticket availability for flights. The time

Figure 2-3 Webpage.
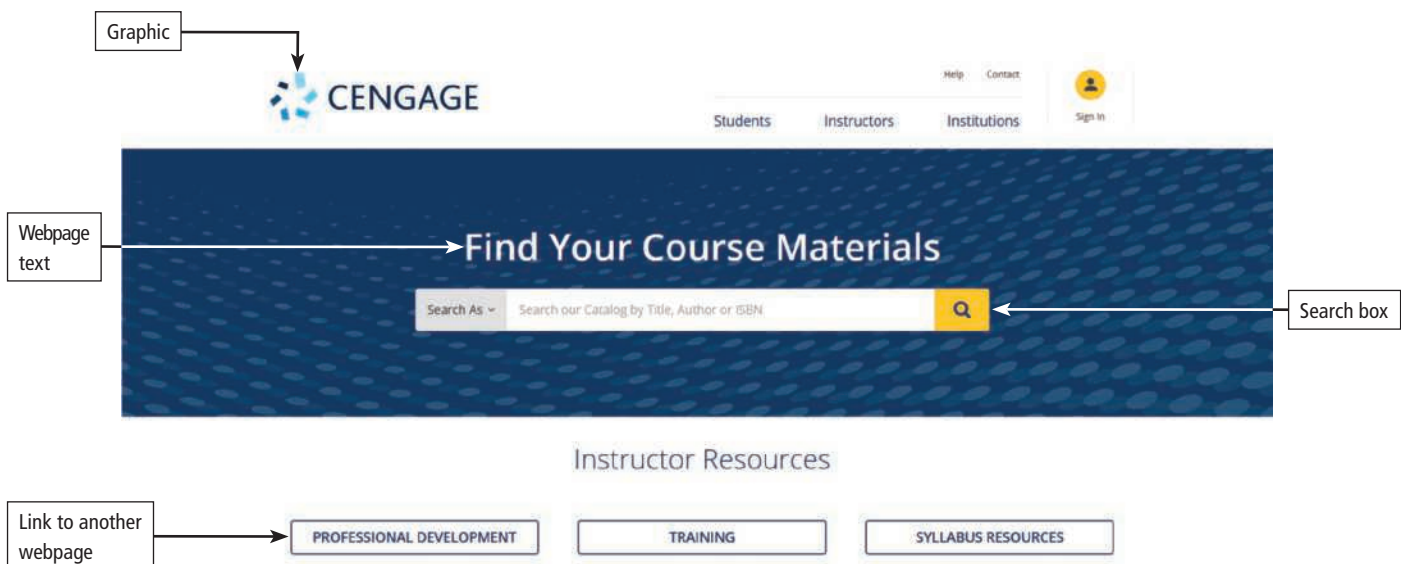
required to download a webpage varies depending on the speed of the Internet connection and the amount of graphics and other media involved.

A collection of related webpages (often shortened to "pages") and associated items, such as documents and photos, stored on a web server makes up a **website**. A **web server** is a computer that delivers requested webpages to your computer or mobile device. The same web server can store multiple websites. In general, websites focus on a specific topic, business, or purpose. A company, institution, group, or person creates and maintains a website.

Webpages may include all or some of these five major areas: header or banner, navigation bar or menu, body, sidebar, and footer. Each area can include text, graphics, links, and media, such as audio and video.

Web Design Basics   Because users view websites on a variety of computers and devices, many website developers use an approach called **responsive web design** (**RWD**) that adapts the layout of the website to fit the screen on which it is being displayed. **HTML** (**Hypertext Markup Language**) is a set of code that developers use to specify the headings, paragraphs, images, links, and other content elements that a webpage contains (Figure 2-4). HTML is one of the core technologies for developing webpages, along with CSS. HTML specifies a webpage's layout. **CSS** (**cascading style sheets**) is used to specify the content's design and appearance.

Figure 2-4   HTML code.
iStock.com/Photovibes

Accessing Web Content

To access content on the web, you use a **browser**, which is an app such as Google Chrome, Apple Safari, Mozilla Firefox, or Microsoft Edge (Table 2-1), designed to display webpages. You use the tools in a browser to navigate the web, or move from one webpage to another. The webpage that appears when you start a browser is called the home page or the start page. The main page in a website is also called its home page.

As you navigate websites, your browser keeps a copy of each page you view in a holding area called the **cache**, so that the next time you go to a webpage, it

Table 2-1   Popular Browsers

	Apple Safari	Preinstalled on Apple computers and devices, Safari has been the default browser for macOS since 2003 and is relatively new to Windows. The browser has built-in sharing with online social networks, fast performance, parental controls, and ease of use.
	Google Chrome	Google's Chrome was first released in 2008. This free browser is available for Windows, macOS, and Linux, and it must be downloaded and installed. Chrome has independent tabbed browsing; if one tab experiences a problem, the other tabs continue to function.
	Microsoft Edge	Edge is a Microsoft browser included in the Windows operating system. It is the default browser for Windows on most devices and is not compatible with prior versions of Windows. Features include integration with Cortana and OneDrive, along with annotation and reading.
	Mozilla Firefox	Developed by the Mozilla Corporation for Windows, macOS, and Linux, Firefox is known for its extensive array of plug-ins (discussed later in the module). This free browser was first released in 2004 and must be downloaded and installed. It has enhanced privacy and security features, a spelling checker, tabbed browsing, and a password manager.

(top to bottom) Apple; Google; Microsoft; Mozilla Firefox

loads more quickly. Websites often use **cookies**, which are small text files generated by a web server to store information, such as items you view or purchase on an e-commerce site. The browser also keeps track of pages you have viewed in sequence by tracking **breadcrumbs** — the path you followed to display a webpage. The **navigation bar** in a browser includes buttons, such as Back and Forward, that you can use to revisit webpages along the breadcrumb path.

To keep track of billions of webpages, the Internet assigns each one a **web address** or **uniform resource locator** (**URL**), an address that identifies the location of the page on the Internet (Figure 2-5), including its host web server. When the URL for a webpage starts with http://, the browser uses the **Hypertext Transfer Protocol** (**HTTP**), the most common way to transfer information around the web, to retrieve the page; when the URL for a webpage starts with http://, the browser uses this protocol for transferring the information. If you can interpret a URL, you can learn about the sponsor, origin, and location of the webpage and catch a glimpse of how the web works. In the server address *www.cengage.com*, the *www* indicates that the server is a web server, *cengage* is the name the Cengage company chose for this website, and *.com* means that a commercial entity runs the web server.

Figure 2-5 The IPv4 and IPv6 addresses, along with the domain name, for Google's website.

IPv4 address ————→ 74.125.22.139

IPv6 address ————→ 2001:4860:4860::8844

Domain name ————→ google.com

Top-level domain

Many browsers and websites do not require that you enter the http:// or the host name www in the web address. For example, you could enter nps.gov instead of http://www.nps.gov. As you begin typing a web address or if you enter an incorrect web address, browsers often display a list of similar addresses or related websites from which you can select. If, however, the host name is not www, you will need to type the host name as part of the web address.

Internet Protocols Computers and devices communicating with one another on a network must do so while following a **protocol**, which is a common set of rules for exchanging information.

The Internet relies on an addressing system much like the postal service to send data to a computer or device at a specific destination. The server address in a URL corresponds to an Internet Protocol (IP) address, which identifies every computer on the Internet. An **IP address** is a unique number that consists of four sets of numbers from 0 to 255 separated by periods, or dots, as in 69.32.132.255. The Internet uses two IP addressing schemes: IPv4 and IPv6 (Figure 2-5). Due to the growth of the Internet, the original IPv4 addresses began dwindling in availability. The IPv6 scheme increased the available number of IP addresses exponentially.

TCP/IP (**Transmission Control Protocol/Internet Protocol**) is a set of protocols that is used by all computers and devices on the Internet. TCP defines how data is routed through a network, and IP specifies that all computers and devices connected to a network have a unique IP address.

Domain Names and URLs Although computers can use IP addresses easily, they are difficult for people to remember, so domain names were created. A **domain name** is the portion of a URL that identifies one or more IP addresses, such as cengage.com. URLs use the domain name in the server address part of the URL to identify a particular website.

Each file stored on a web server has a unique pathname (Figure 2-6), just like files stored on a computer. The pathname in a URL includes the names of the folders containing the file, the file name, and its extension. A common file name extension for webpages is .html, sometimes shortened to .htm. For example, the pathname might be student/index.html, which specifies a file named index.html stored in a folder named student.

Figure 2-6 Parts of a URL.

Protocol | Server address | Pathname

http://www.cengage.com/student/index.html
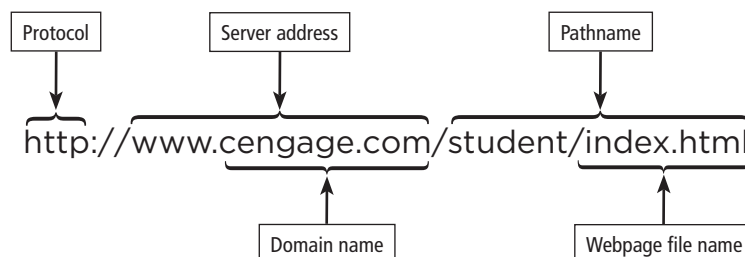
Domain name | Webpage file name

Figure 2-7   URL and pathway display in the address bar.

Not all URLs include a pathname. If you do not specify a pathname or file name in a URL, most web browsers open the website's main page, which sometimes is called index.html. A browser displays the URL for the current webpage in its **address bar** (Figure 2-7), the part of a browser window that displays the location of the current webpage. You can also use the address bar to type the URL of the webpage you want to display.

In a web address, the three-letter extension after the period indicates a **top-level domain** (**TLD**), such as the "com" in "cengage.com". The TLD identifies the type of organization associated with the domain. As you visit websites, you might notice some that have TLDs other than .com, such as .edu for educational institutions and .gov for U.S. government agencies. The TLD provides a clue about the content of the website.

An organization called Public Technical Identifiers (PTI) approves and controls TLDs, such as those in Table 2-2, which lists popular TLDs in the United States. For websites outside the United States, the suffix of the domain name often includes a two-letter country code TLD, such as .au for Australia and .uk for the United Kingdom.

How Data Travels the Internet
Computers and devices connected to the Internet work together to transfer data around the world using servers and clients and various wired and wireless transmission media. On the Internet, your computer or device is a client that can access data and services on a variety of servers.

The inner structure of the Internet works much like a transportation system. Just as interstate highways connect major cities and carry the bulk of the automotive traffic across the country, several main transmission media carry the heaviest amount of **traffic**, or communications activity, on the Internet. These major carriers of network traffic are known collectively as the **Internet backbone**.

In the United States, the transmission media that make up the Internet backbone exchange data at several different major cities across the country. That is, they transfer data from one network to another until it reaches the final destination.

The **domain name system** (**DNS**) is the method that the Internet uses to store domain names and their corresponding IP addresses. When you enter a domain name (i.e., google.com) in a browser, a DNS server translates the domain name to its associated IP address so that the request can be routed to the correct computer. A **DNS server** is a server on the Internet that usually is associated with an ISP.

Table 2-2   Popular TLDs

TLD	Intended Purpose
.biz	Businesses
.com	Commercial organizations, businesses, and companies
.edu	Educational institutions
.gov	Government agencies
.mil	Military organizations
.museum	Museums and individual museum professionals
.name	Individuals
.net	Network providers or commercial companies
.org	Nonprofit organizations
.pro	Licensed professionals
.technology	Technology information
.travel	Entities whose primary area of activity is in the travel industry

❓ Consider This

How do you select and customize a browser?

A browser typically is included with the operating system of a computer or mobile device. You can access additional browsers by visiting their websites and downloading the files to install or by selecting a browser app from your device's app store. Use a search engine to locate the browser you want to install, then visit its website to download the most recent version. A **search engine** is software designed to locate relevant webpages by creating a simple query based on your search criteria and storing the collected data in a search database. Most browsers are available for download at no cost. Keep your browser up to date to prevent security gaps. You can set your browser to perform updates automatically. Do research and make a decision based on your computer or device's available memory and operating system, as well as the tasks you want the browser to perform.

You can customize settings to improve your browsing experience by adding favorites (also called bookmarks). A **favorite** is a preferred website that you can access with a click or by selecting an icon from a folder. Browsers include built-in security features, such as filters and secure connections, which protect you from malicious or unsecure websites by blocking access or asking for verification. These features also can block websites you do not want to be displayed and can instruct the browser to save passwords. Privacy features help prevent thieves from accessing information about your browsing history, such as websites you have visited, data about your browsing session, and content you have seen on specific webpages.

Which browser or browsers have you used? Have you ever chosen to use a browser that did not come with your computer or device? If so, why did you make this choice? When browsers were first invented, their only function was to browse the web. Can you recommend a more descriptive name for today's browsers?

How To: Connect to the Internet

You can connect your computers and mobile devices to the Internet through wired or wireless network technology and then access its services free or for a fee. With wired connections, a computer or device physically attaches via a cable or wire to a communications device, such as a modem, that transmits data and other items over transmission media to the Internet. Wireless connections use a wireless modem or other communications device to transmit data and other items wirelessly. Wireless communications can use technologies that include cellular radio, satellite, or Wi-Fi to connect to the Internet. Many devices automatically connect to the Internet through a mobile service provider, such as Verizon.

ISPs use hardware such as cables, satellites, and fiber-optic lines for these connections. Most of today's Internet connections are broadband connections, which are capable of transmitting large amounts of data across the network. Broadband connections usually are "always-on" connections, which means that the computers and devices on the network are always connected to the Internet.

Before you can connect to the Internet, you need to select an ISP. Methods to connect to the Internet include cellular networks, Wi-Fi hot spots, and mobile hot spots. A **hot spot** is a wireless network device that provides Internet connections to mobile computers and devices. A **mobile hot spot** enables you to connect a phone, computer, or other device to the Internet through the cellular network (Figure 2-8).

Selecting an Internet Service Provider

ISPs often charge a fixed amount for an Internet connection, offering customers a variety of plans based on desired speeds, bandwidth, and services. In addition to Internet access, ISPs may include additional services, such as email and online storage.

Figure 2-8   Verizon mobile hot spot.
Source: Verizon Media

Before selecting an ISP, take a look at your personal needs, and ask yourself the following:

- **What types of activities will I be doing?** This affects your bandwidth needs. Data sizes typically are stated in terms of megabytes and gigabytes. A **megabyte** (**MB**) is equal to approximately one million characters, and a **gigabyte** (**GB**) is equal to approximately one billion characters. Bandwidth affects the rate at which you can access or upload data. Low bandwidth is not good for streaming media or accessing online software suites.

- **How many devices do I need to connect?** Your needs may change depending on your activities on a given day, long-term decisions such as adding a roommate to your plan, and seasonally, such as if you are a student who does not take classes during the summer. Consider a provider that offers reasonable service to meet your highest needs, can handle multiple devices at once, and possibly enables you to scale back your access during times in which will not need as much access.

- **Do I need access if I travel?** Make sure that the ISP not only offers service in the area in which you live but also can provide reliable access to areas to which you travel frequently.
- **What is my budget?** All the above questions impact the budget of your plan. Look for deals or packages that offer the best value.

Choosing a Network Type

The use of mobile phones to access the Internet has become so popular that providers of mobile phone services continuously have to expand network capacity and support the latest cellular standards to keep up with demand. You also can set up your own hot spot when you need to.

Cellular Networks   Various types of cellular networks, including 4G and 5G, are available. 4G (fourth generation) cellular networks can provide Internet services in most locations where cellular service is offered. 5G networks provide higher-speed data transmission, making them more appealing to those requiring access to high-bandwidth content. As cellular standards evolve, home users use cellular providers for their Internet service, as opposed to relying on wired connections offered by cable and DSL providers. Figure 2-9 illustrates how a cellular network might work.

Many homes and businesses use Wi-Fi networks to provide network and Internet connectivity to computers and devices. When a device that supports Wi-Fi is within range of one or more wireless networks, you can view the list of networks and choose the one to which you want to connect.

Using Wi-Fi Hot Spots   Although most hot spots enable unrestricted or open access, some require that users agree to terms of service, obtain a password (for example, from the hotel's front desk), or perform some other action in order to connect to the Internet. Wireless networks that are available in public places, such as hotels, restaurants, and coffee shops, are known as **Wi-Fi hot spots**.

If you need to connect to the Internet where no wireless networks or Wi-Fi hot spots are available, you can consider using a mobile hot spot. Many smartphones contain mobile hot spot functionality, although cellular service providers may charge an extra fee to use it, and any data transmitted or received through the hot spot will be added to your overall data usage. In addition, separate hot spot devices, about the size of a deck of cards, can provide Internet connectivity to computers and devices using the cellular network. The mobile hot spot creates a wireless network to which nearby computers and devices can connect. The mobile hot spot will display the name of the wireless network you should enter or select to

**Figure 2-9**   How a cellular network might work.

iStock.com/alexey_boldin
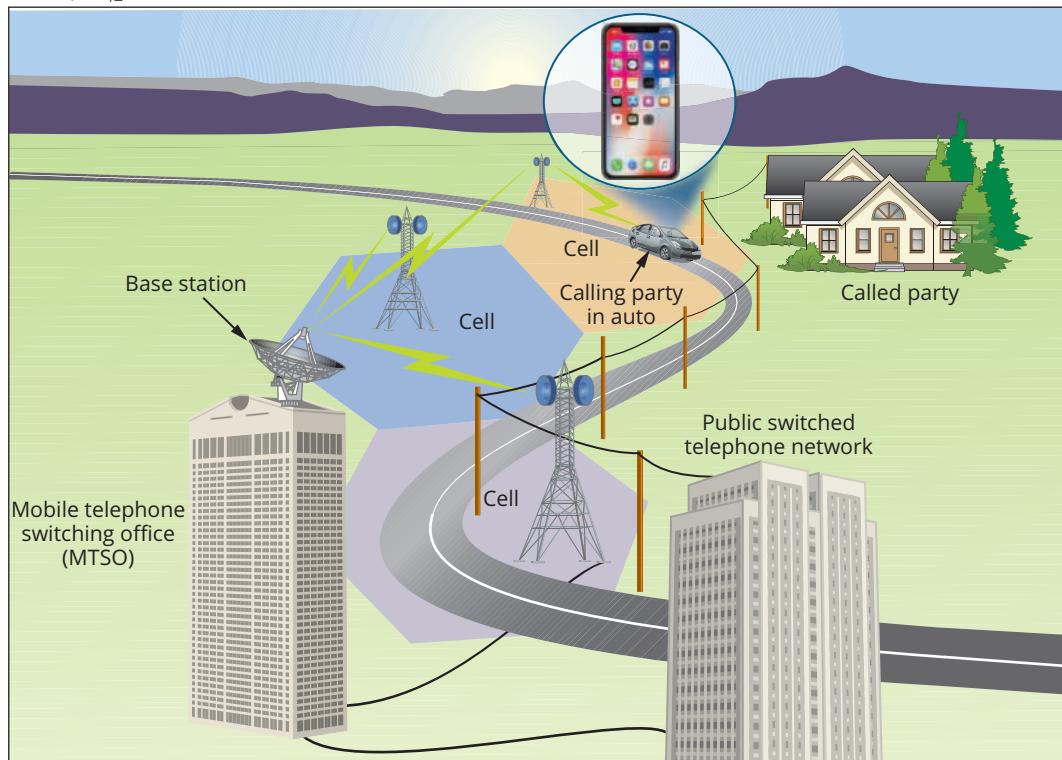
connect (Figure 2-10). You may be required to enter a network key, which is a password required to log into a wireless network. If you are using a mobile hot spot in a busy location, you can also monitor the number of devices that are connecting. If you notice connections that you did not initiate, you should consider changing the wireless network key. Internet connections using a mobile hot spot typically are not as fast as Wi-Fi networks.

Figure 2-10   Available wireless networks.
Campbell
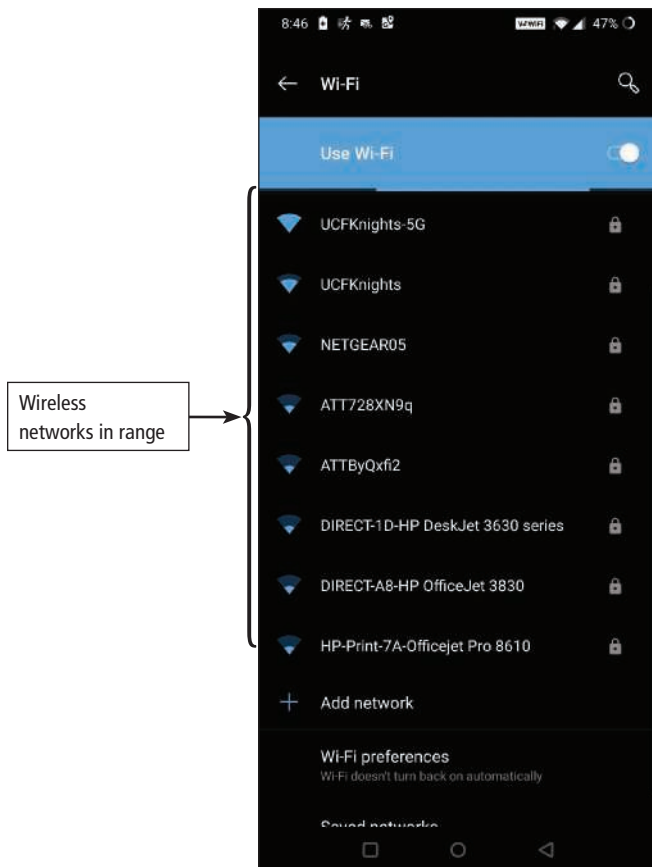
Tethering transforms a smartphone or Internet-capable tablet into a portable communications device that shares its Internet access with other computers and devices wirelessly. Users may pay additional fees for mobile hot spot and tethering services.

Connecting to a Wireless Network

Employees and students typically connect their computers and mobile devices to the Internet wirelessly through a business or school network, which, in turn, usually connects to a high-speed Internet service. When away from the office, home, or school, mobile users often access the Internet using Wi-Fi, mobile hot spots, or tethering services. A **wireless access point** (**WAP**) allows a Wi-Fi compliant device to connect to a network (Figure 2-11). Hotels and airports often provide wireless Internet connections as a free service. The exact steps for connecting to a wireless network will depend on your device, connection type, and the network.

Figure 2-11   Netgear wireless access point.
Source: Netgear

When connecting to a wireless network, keep the following in mind:

- Before you can connect to the Internet, you must identify the network using its **service set identifier** (**SSID**), which is the unique address of the wireless network.
- Select the name of the network to which you want to connect.
- After you have selected the network to which you want to connect, tap or click the appropriate button or link to connect to the network.
- If you are connecting to a secure network that requires a wireless network key or authentication with a username and password, you will be prompted to enter the required information. Once the correct information has been supplied, you should automatically be connected to the wireless network.
- Some wireless networks in public places require you to start a browser and agree to terms of service before connecting you to the Internet.
- Because of the risks associated with constant Internet connectivity, you should turn off computers and devices on your network when you are not using them for extended periods of time.

? Consider This

How do you know if a Wi-Fi network is safe?
Often network owners select easy-to-identify names, such as a business name (i.e., Downtown Diner), owner's name (i.e., Jasper's Phone), or address (i.e., 45 Speen Street). If you are connecting to a network in a restaurant or hotel, for example, verify the name of the wireless network with an employee to make sure you are connecting to the correct network. Verifying the network name will help prevent you from inadvertently connecting to a fraudulent network. Have you ever connected to public Wi-Fi? How did you ensure your data and device were secure?

Explore Websites, Web Apps, and E-Commerce

What do you want to do on the web today? Chances are good that a certain type of website provides many options to find what you are seeking. Besides displaying information and other content, websites can be interactive. You can contribute ideas, comments, images, and videos to an online conversation.

Website Categories

You can visit various categories of websites and webpages to accomplish online tasks (Figure 2-12). In addition, you can use websites to play games; access news, weather, and sports information; download or read books; participate in online training; attend classes; and more.

Informational and Research Websites   An informational and research website contains factual information. Examples include libraries, encyclopedias, dictionaries, directories, guides (Figure 2-13), and other types of reference. You can find guides on numerous topics, such as health and medicine, research paper documentation styles, and grammar rules. Many of the other types of websites identified in this section also are used to research information.

Figure 2-12   Types of websites.

banking and finance

entertainment

portals

blogs

government or organization

retail and auctions

bookmarking

health and fitness

science

business

information and research

search sites

carrers and employment

travel and tourism

mapping

content aggregation

media sharing

website creation and management

e-commerce

news, weather, sports, and other mass media
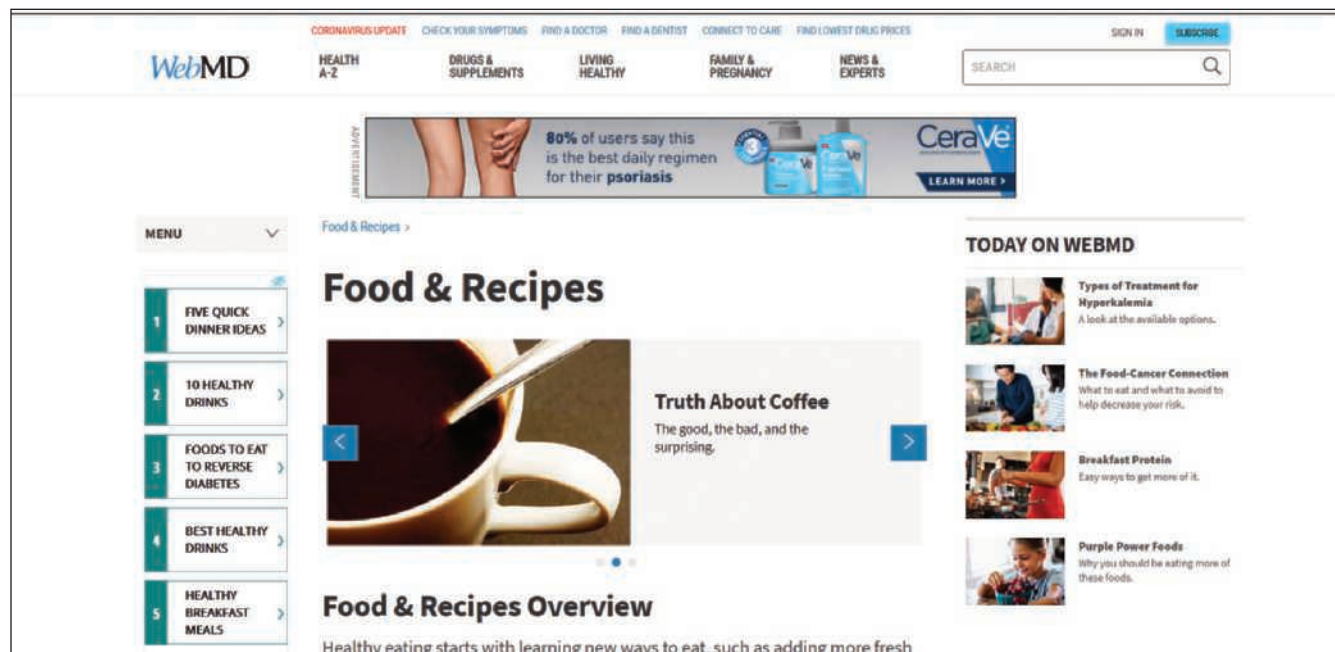
web apps and software as a service (SaaS)

educational

online social networks

wikis and collaboration

Figure 2-13   You can research your symptoms and find health information on a medical website, such as WebMD.
Source: WebMD, LLC

Bookmarking   A **bookmarking site** is a website that enables members to organize, tag, and share links to media and other online content (Figure 2-14). A **tag** is descriptive text used to categorize media and invite comments. You can assign tags to webpages, photos, videos, blog posts, email messages, social media messages, and other digital content so that it is easier locate at a later time. (**Social media** refers to the many ways individuals and businesses share information and interact using the Internet.)

News, Weather, Sports, and Other Mass Media   News, weather, sports, and other mass media websites contain stories and articles relating to current events, life, money, politics, weather, technology trends (Figure 2-15), and sports. You often can customize these websites so that you can receive local news or news about specific topics. Some provide a means to send you alerts, such as weather updates or sporting event scores, via text or email messages.

Figure 2-14   Pinterest is an example of a bookmarking site.
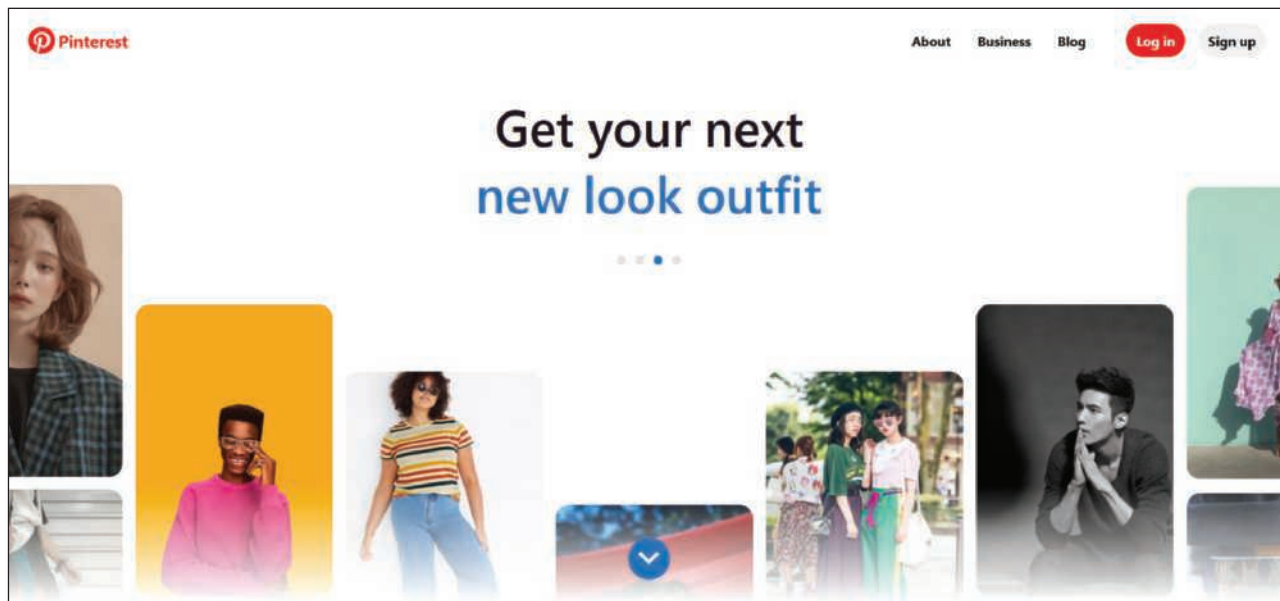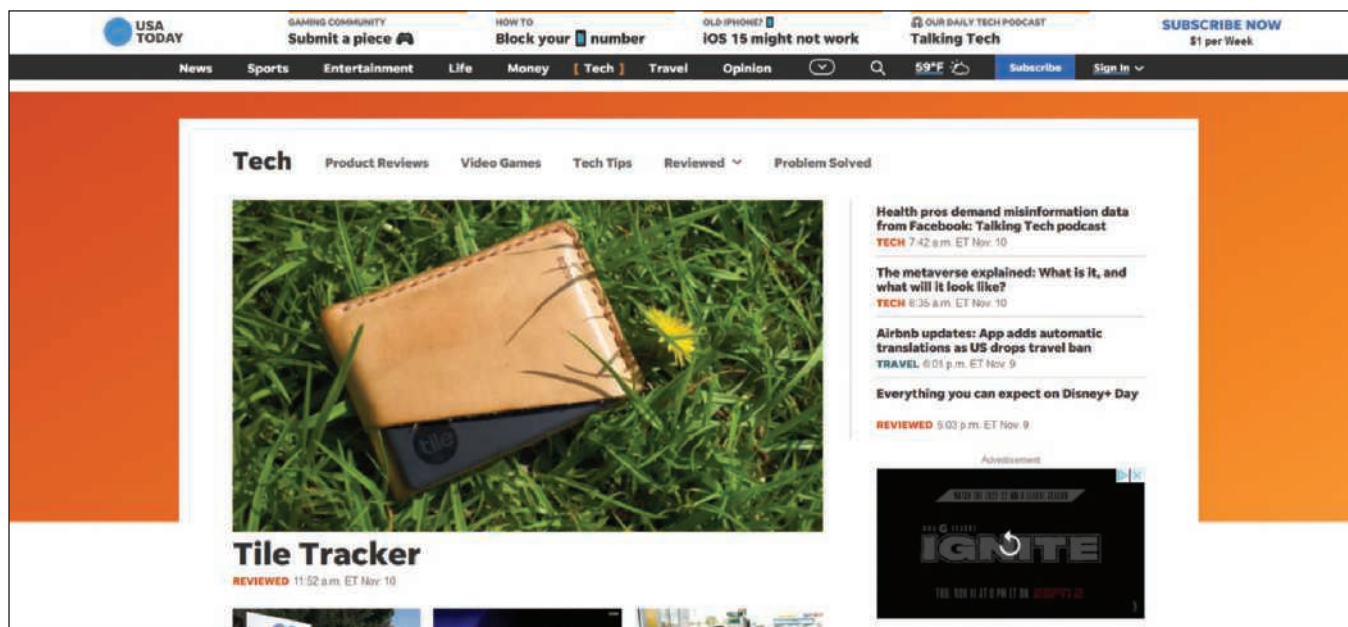Source: Pinterest

Figure 2-15   USA Today is an example of a news site that provides news about many topics, including technology.
Source: USA Today

News on the web enhances newspapers and reaches different populations. Although some exist solely online, many magazines and newspapers sponsor websites that provide summaries of printed articles, as well as articles not included in the printed versions. Newspapers, magazines, and television and radio stations often have corresponding news, weather, or sports websites and apps that include video and updated, extended coverage beyond the information available in a printed newspaper or daily television newscast.

Educational   An educational website offers formal and informal teaching and learning. The web contains thousands of tutorials where you can learn how to build a website or cook a meal. For a more structured learning experience, companies provide online training to employees, and colleges offer online classes and degrees. Instructors often use the web to enhance classroom teaching by publishing course materials, grades, and other pertinent class information.

Business, Governmental, and Organizational   A business website contains content that increases brand awareness, provides company background or other information, and/or promotes or sells products or services. Government agencies' websites providing citizens with information, such as census data (Figure 2-16), or assistance, such as filing taxes. Many other types of organizations use the web for a variety of reasons. For example, nonprofit organizations raise funds for a cause, and advocacy groups present their views or opinions.

Blogs   A **blog** (originated from the term, web log) is an informal website consisting of time-stamped articles, or posts, in a diary or journal format, usually listed in reverse chronological order. The term **blogosphere** refers to the worldwide collection of blogs. A blog that contains video sometimes is called a video blog, or vlog. A **microblog** (also a type of social media site) allows users to publish short messages, usually less than 10,000 characters, for others to read. The collection of a user's Tweets, or posts on Twitter, for example, forms a microblog.

Similar to an editorial section in a newspaper, blogs reflect the interests, opinions, and personalities of the author, called the **blogger**. Some blogs allow readers to add comments on blog posts, which then are published on the blog for all visitors to see. Businesses create blogs to communicate with employees, customers, and vendors. Teachers create blogs to collaborate with other teachers and students. Other bloggers create blogs to share aspects of their personal lives with family, friends, and others.

A blog is more efficient than older publishing forms because a writer can communicate directly and immediately with an audience, without traditional gatekeepers who select and edit content. The audience for a public blog needs only its web address to access it. For a private blog, they need permission from the blogger to read entries. Visitors can read and comment on blog entries, but they cannot edit them.

A popular blog creation site is WordPress, a free, easy-to-use site that lets you create a blog containing text and media, or a complete website. A blogging network is a blogging site that uses the tools of social networking. For example, Tumblr

Figure 2-16   The U.S. Census Bureau website provides population data.
Source: U.S. Department of Commerce
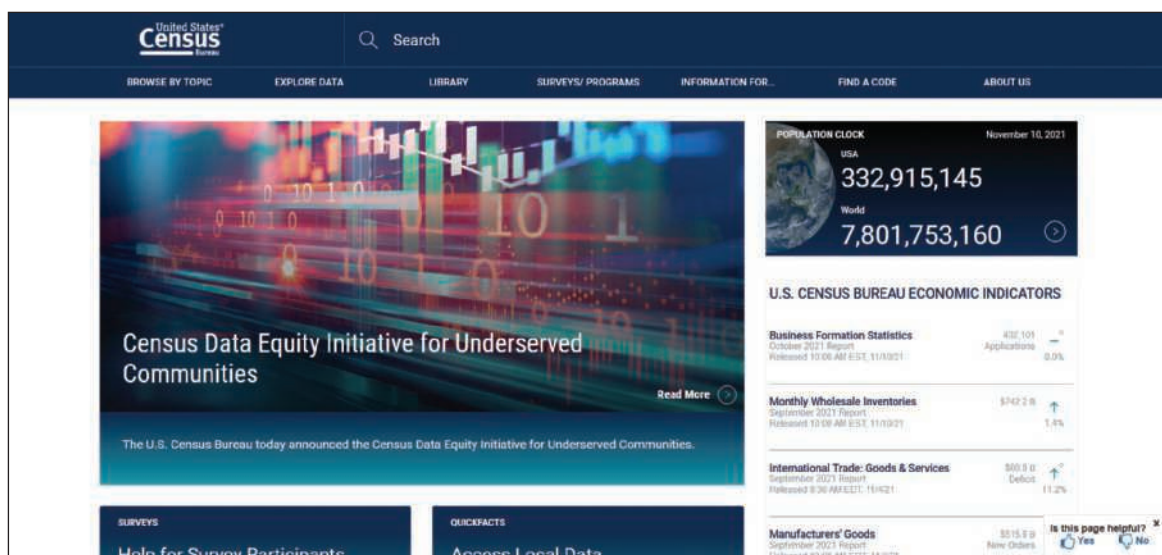
lets users post not only text but also photos, quotations, links, audios, and videos. Bloggers can tag their entries and chat with other bloggers. Bloggers can share one another's posts on Tumblr or on other social networks.

Wikis and Collaboration   As the web becomes more interactive, an increasing amount of content is supplied by users. You can contribute comments and opinions to informational sites such as news sites, blogs, and wikis. A **wiki** (from the Hawaiian word for "quick") is a collaborative website where you and your colleagues can modify and publish content on a webpage. A wiki enables users to organize, edit, and share information. Some wikis are public, accessible to everyone (Figure 2-17). Others are private so that content is accessible only to certain individuals or groups. Many companies, for example, set up wikis for employees to collaborate on projects or access information, procedures, and documents.

Contributors to a wiki typically must register before they can edit content or add comments. Wikis usually hold edits on a webpage until an editor or content manager can review them for accuracy. Unregistered users typically can review the content but cannot edit it or add comments.

Other types of collaboration websites enable users to share and edit any type of project — including documents, photos, videos, designs, prototypes, calendars, and more, often at the same time. On these websites, comments or edits are seen by other connected users. Most of these websites also enable users to communicate via text chat, and some provide a whiteboard capability for sharing drawings or sketches. **Chatting** refers to holding real-time typed conversations by two or more people who are online at the same time.

Health and Fitness   Many websites provide up-to-date medical, fitness, nutrition, or exercise information for public access. Some offer users the capability of listening to health-related seminars and discussions. Consumers, however, should verify the online medical information they read with a personal physician. Health service organizations store your personal health history, including prescriptions, lab test results, doctor visits, allergies, and immunizations. Doctors use the web to assist with researching and diagnosing health conditions.

Science   Science websites contain information about space exploration, astronomy, physics, earth sciences, microgravity, robotics, and other branches of science. Scientists use online social networks to collaborate on the web. Nonprofit science organizations use the web to seek public donations to support research.

Figure 2-17   Wikipedia is an example of a user-contributed wiki.
Source: Wikimedia Foundation, Inc.

Entertainment   An entertainment website offers music, videos, shows, performances, events, sports, games, and more in an interactive and engaging environment. On entertainment websites, you can view or discuss activities ranging from sports to videos. For example, you can cast a vote on a topic for a television show.

Many entertainment websites support streaming media, which allows users to access and use a file while it is transmitting. You can listen to streaming audio or watch streaming video, such as a live performance or broadcast, as it downloads to your computer, mobile device, or an Internet-connected television.

Banking and Finance   Online banking and online trading enable users to access their financial records from anywhere in the world, provided they have an Internet connection. Using online banking, users can access accounts, pay bills, transfer funds, calculate mortgage payments, and manage other financial activities from their computer or mobile device (Figure 2-18). With online trading, users can invest in stocks, options, bonds, treasuries, certificates of deposit, money market accounts, annuities, mutual funds, and so on, without using a broker.

Travel and Tourism   Travel and tourism websites enable users to research travel options and make travel arrangements. On these websites, you typically can read travel reviews, search for and compare flights and prices, order airline tickets, book a room, or reserve a rental car.

Mapping   Several mapping websites and web apps exist that enable you to display up-to-date maps by searching for an address, postal code, phone number, or point of interest (such as an airport, lodging, or historical site). The maps can be displayed in a variety of views, including terrain, aerial, maps, streets, buildings, traffic, and weather. These websites also provide directions when a user enters a starting and destination point. Many work with GPS to determine where a user is located, eliminating the need for a user to enter the starting point and enabling the website to recommend nearby points of interest.

Retail and Auctions   You can purchase just about any product or service on the web. To purchase online, you visit the business's **electronic storefront**, which contains product descriptions, images, and a shopping cart. A **shopping cart** allows the customer to collect items to purchase. When ready to complete the sale, the customer enters personal data and the method of payment, which should be through a secure Internet connection.

Figure 2-18   You can manage your bank account, make transfers, and more with a banking website, such as Bank of America.
Source: Bank of America
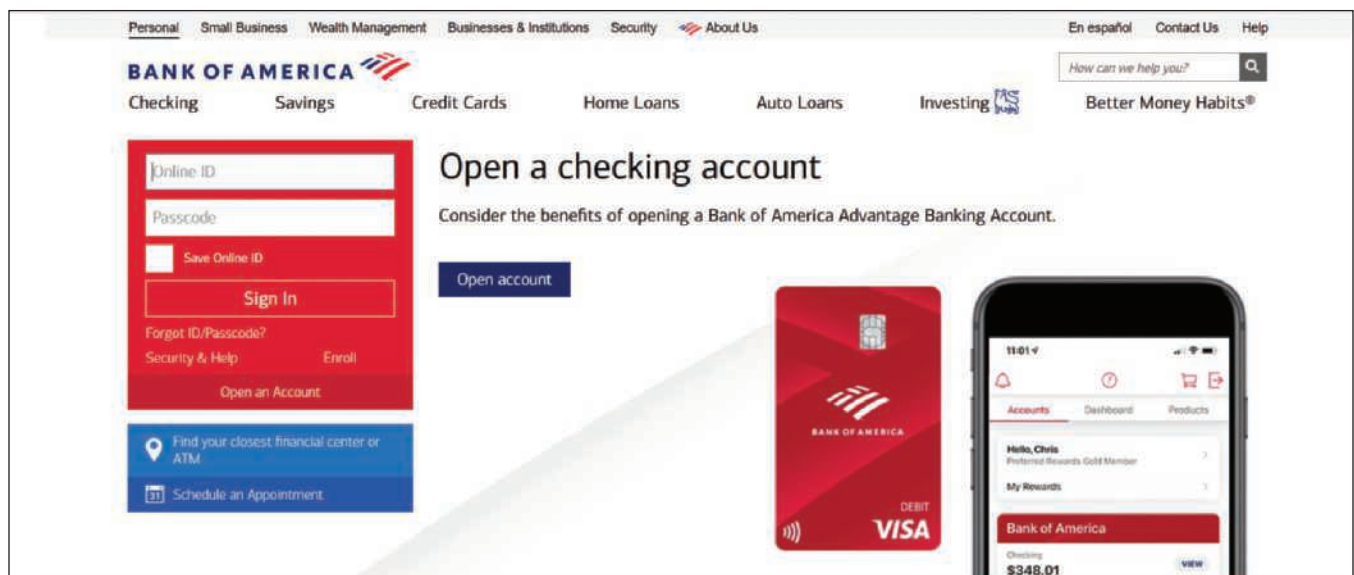
With an **online auction**, users bid on an item being sold by someone else (Figure 2-19). The highest bidder at the end of the bidding period purchases the item. eBay is one of the more popular online auction websites.

Careers and Employment You can search the web for career information and job openings. Job search websites list thousands of openings in hundreds of fields, companies, and locations. This information may include required training and education, salary data, working conditions, job descriptions, and more. In addition, many organizations advertise careers on their websites.

Portals A **portal** is a website that combines pages from many sources and provides access to those pages. Most web portals are customized to meet your needs and interests. For example, your bank might create a web portal that includes snapshots of your accounts and access to financial information. Portals exist that offer a selection of services, including the following: search engine; news, sports, and weather; web publishing; yellow pages; stock quotes; maps; shopping; and email and other communications services.

Content Aggregation A **content aggregator** site, sometimes called a **curation website**, such as News360 or Flipboard, gathers, organizes, and then distributes web content (Figure 2-20). As a subscriber, you choose the type of content you want and receive updates when new content is available.

Figure 2-19 Online auction sites enable you to bid on and pay for items sold by users.
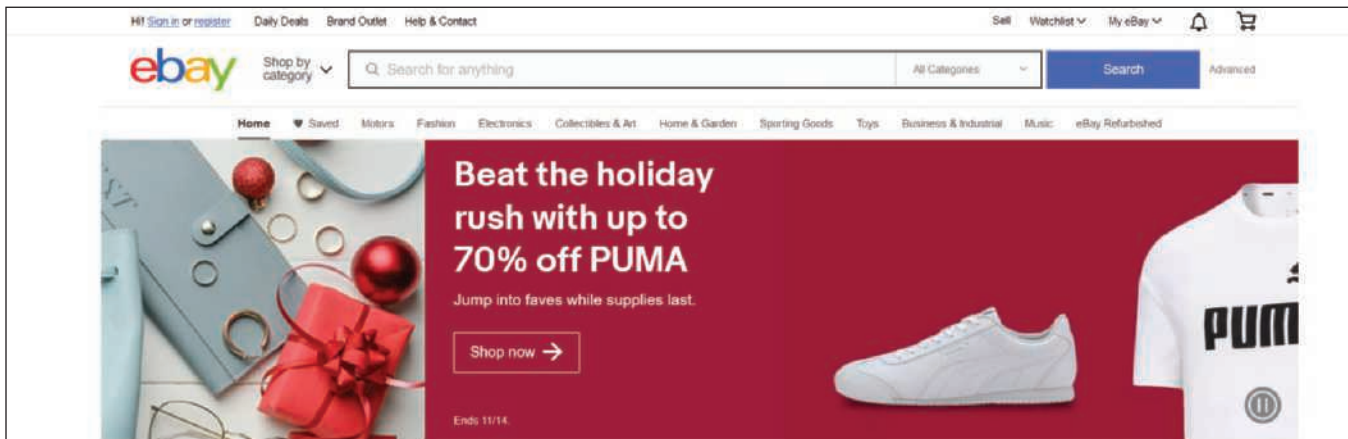Source: eBay

Figure 2-20 Flipboard is an example of a content aggregator.
Source: Flipboard