Workplace Software and Skills

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OpenStax

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Preface

About OpenStax

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About OpenStax Resources

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All OpenStax textbooks undergo a rigorous review process. However, like any professional-grade textbook, errors sometimes occur. In addition, the wide range of topics, data, and technology in business software change frequently, and portions of the textbook may become out of date. Since our books are web-based, we can make updates periodically when deemed pedagogically necessary. If you have a correction to suggest, submit it through the link on your book page on OpenStax.org. Subject matter experts review all errata suggestions. OpenStax is committed to remaining transparent about all updates, so you will also find a list of past and pending errata changes on your book page on OpenStax.org.

Format

You can access this textbook for free in web view or PDF through OpenStax.org, and for a low cost in print. The web view is the recommended format because it is the most accessible—including being WCAG 2.0 AA compliant—and most current. Print versions are available for individual purchase, or they may be ordered through your campus bookstore.

About *Workplace Software & Skills*

Workplace Software and Skills covers applications from the Microsoft 365 (formerly Microsoft Office) suite and Google Workspace. Coverage of both suites aligns with contemporary business use and prepares students for workforce needs, especially introductory students who have had limited exposure to these software programs.

By teaching their basic and advanced features, users of all levels can learn the skills necessary for success in their jobs.

Applications covered in depth from Microsoft 365 include Word, PowerPoint, Excel, and Access, as well as overviews of integrations with Outlook, Calendar, and Teams. Applications covered in depth from Google Workspace include Docs, Sheets, and Slides, as well as overviews of integrations with Gmail, Calendar, and Meet. The text also provides overviews of additional collaboration and conference applications, as well as in-depth coverage of content management software such as WordPress.

With this selection of applications, *Workplace Software and Skills* provides a holistic exposure to common tools of business practice and prepares students for additional focused training that may be required for specialized fields. In addition to technical skill development, the text covers conceptual topics related to ethics and security; and technology advancements, such as the Internet of Things and generative artificial intelligence. These topics are discussed as they relate to business and everyday life, reflecting their importance to contextualizing business computer application use within the modern business world. They emphasize responsible use and considerations for collaboration across a virtual network.

Across each chapter, conceptual and technical skill is anchored in real-world examples and applications. This ensures that students are prepared for entry into the workforce with a portfolio of completed examples relevant to positions requiring these skills.

Pedagogical Foundation

Learning Objectives

Every module begins with a set of clear and concise learning objectives, which are designed to be both measurable and closely aligned with current teaching practice. These objectives can help the instructor decide what content to include or assign and guide student expectations of learning. After completing the module and end-of-module exercises, students should be able to demonstrate mastery of the learning objectives.

Key Features

- **Cross-chapter Scenario:** Presents students with a mock business simulation that continues from Chapter 1 through Chapter 15. The scenario focuses on a multi-division business and provides a variety of work-related tasks, such as preparing a memo or creating a slideshow for an entry-level employee, as well as longer projects, such as a marketing report that a mid-level employee might need to create. Additional scenarios showcase green technology, non-profit organizations, and entrepreneurship. Students will be exposed to everyday business needs as related to the chapter topic. Integrated projects and capstones will also pull from this simulated business scenario.
- **Real-World Application:** Discusses the practical applications of software and related technology in our everyday lives, whether in or out of the workplace.
- **Mac Tips:** Calls out brief notes where commands or tools for macOS and Windows differ.
- **Spotlight on Ethics:** Highlights an ethics issue related to the concept, skill, or activity being taught in the text. These features may discuss a real-world case, dig deeper into an ethical concept being discussed, or present an ethical dilemma for the student to think through.
- **Link to Learning:** Includes a few sentences of introduction to a website with an interactive activity, animation, or video that helps improve student understanding.
- **Final Project**: The last chapter includes a complex final project assignment. Students are given a dataset and asked to create a detailed business report that uses product integrations, tools, and skills learned across all fifteen chapters.

Section Summaries

Section summaries distill the information in each section for both students and instructors down to key, concise points addressed in the section.

Key Terms

Key terms are bold and are followed by a definition in context. Definitions of key terms are also listed in the Glossary, which appears at the end of the chapter.

Assessments

A variety of assessments allow instructors to confirm core conceptual understanding, elicit brief explanations that demonstrate student understanding, and offer more in-depth assignments that enable learners to dive more deeply into a concept, tool, or topic.

- **Review Questions** test for conceptual apprehension of key concepts and tools.
- **Practice Exercises** ask students to apply the program content they have learned so that they can both learn by repetition and extend the practice through critical thinking exercises.
- **Written Questions** require students to explain concepts in words, as well as asking students to explain when a concept should be applied in the workplace, and respond to non-technical concepts, such as ethics.
- **Case Exercises** ask students to come up with creative solutions to a new problem; these exercises may draw from real-world examples or fictional scenarios.

Answers to Questions in the Book

The end-of-chapter Review Questions, Written Questions, Practice Exercises, and Case Exercises are intended for homework assignments or classroom discussion; thus, student-facing answers or solutions are not provided. Sample answers are provided in the Instructor Solution Manual, for instructors to share with students at their discretion, as is standard for such resources.

About the Authors

Senior Contributing Authors

Figure 1 Senior Contributing Authors (left to right): Tammie Bolling, Angela Mitchell, Tanya Scott, Nyrobi Wheeler.

Tammie Bolling, Pellissippi State Community College

Dr. Tammie Bolling holds the rank of tenured Professor at Pellissippi State Community College. She has obtained master's degrees in business administration, healthcare management, and psychology, as well as postgraduate certificates in varying information technology areas and a doctorate in Leadership. In addition to teaching, she manages the Industry Recognized Credential and Major Field Test testing program for the Business and Computer Technology department. Dr. Bolling's other areas of interest include the development of cultural competence and the internationalization of curricula in a wide range of disciplines, and is an avid mobile technology researcher. Dr. Bolling was named a Fulbright Scholar to Ireland in 2022-2023 in Computing, which was one of the highlights of her professional life.

Angela Mitchell, Wilmington College

Dr. Angela Mitchell is department chair and professor of business and economics at Wilmington College. She primarily teaches finance and statistics courses, and serves in various leadership roles at the institution. Her primary research interests are focused on nonprofit management and efficiencies and student intercultural

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Dr. Tanya Scott is the director of program innovation at Achieving the Dream, a national nonprofit organization that partners with community colleges to help achieve student success. Dr. Scott's experience spans teaching, program development, and leadership in middle school, high school, community college, and university settings in Canada and the United States. She holds a master's degree in Education and a doctorate in Business Administration-I/O Psychology. An active practitioner, she has extensive undergraduate and graduate teaching experience in teacher and curriculum development, instructional strategies, and integrating technology in the classroom, as well as business, change management, strategy, and leadership. She is also a fervent advocate for open educational resources and open pedagogy.

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Additional Resources

Student and Instructor Resources

We've compiled additional resources for both students and instructors, including an instructor's manual, test bank, and lecture presentation slides. Instructor resources require a verified instructor account, which you can apply for when you log in or create your account on OpenStax.org. Take advantage of these resources to supplement your OpenStax book.

Instructor's answer guide. Each component of the instructor's manual is designed to provide maximum guidance for delivering the content in an interesting and dynamic manner.

Test bank. With nearly 2,000 true/false, multiple-choice, fill-in-the-blank, and short answer questions in our test bank, instructors can customize tests to support a variety of course objectives. The test bank is available in Word format. Authored by Amit Shah, Frostburg State University.

PowerPoint lecture slides. The PowerPoint slides provide learning objectives, images and descriptions, and feature focuses as a starting place for instructors to build their lectures.

Data files. Some chapters are accompanied by downloadable data files (typically in .xlsx, .docx, or .csv format) that provide students with the data needed to perform certain assessments, exercises, or in-text examples. Providing the data files to students reduces the amount of unnecessary typing and allows the student to jump right into manipulating the data.

Academic Integrity

Academic integrity builds trust, understanding, equity, and genuine learning. While students may encounter significant challenges in their courses and their lives, doing their own work and maintaining a high degree of authenticity will result in meaningful outcomes that will extend far beyond their college career. Faculty, administrators, resource providers, and students should work together to maintain a fair and positive experience.

We realize that students benefit when academic integrity ground rules are established early in the course. To that end, OpenStax has created an interactive to aid with academic integrity discussions in your course.

Figure 2 Visit our academic integrity slider (https://www.openstax.org/r/academic-integrity-slider). Click and drag icons along the continuum to align these practices with your institution and course policies. You may then include the graphic on your syllabus, present it in your first course meeting, or create a handout for students. (attribution: Copyright Rice University, OpenStax, under CC BY 4.0 license)

At OpenStax we are also developing resources supporting authentic learning experiences and assessment. Please visit this book's page for updates. For an in-depth review of academic integrity strategies, we highly recommend visiting the International Center of Academic Integrity (ICAI) website at https://academicintegrity.org/ (https://academicintegrity.org/).

Community Hubs

OpenStax partners with the Institute for the Study of Knowledge Management in Education (ISKME) to offer Community Hubs on OER Commons—a platform for instructors to share community-created resources that support OpenStax books, free of charge. Through our Community Hubs, instructors can upload their own materials or download resources to use in their own courses, including additional ancillaries, teaching material, multimedia, and relevant course content. We encourage instructors to join the hubs for the subjects most relevant to your teaching and research as an opportunity both to enrich your courses and to engage with other faculty. To reach the Community Hubs, visit www.oercommons.org/hubs/openstax.

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As allies in making high-quality learning materials accessible, our technology partners offer optional low-cost tools that are integrated with OpenStax books. To access the technology options for your text, visit your book page on OpenStax.org.

Figure 1.1 Today's workspaces represent decades of advances in technology. Portable personal computers, cellular communications, tablets, and advances in artificial intelligence have changed the way people do their jobs. (credit: modification of "Home office, Computer, Desk" by Pexels/Pixabay, CC0)

Chapter Outline

1.1 Computing from Inception to Today
1.2 Computer Hardware and Networks
1.3 The Internet, Cloud Computing, and the Internet of Things
1.4 Safety, Security, Privacy, and the Ethical Use of Technology

✎ Chapter Scenario

WorldCorp welcomes you to your new position within the company, a multinational corporation where the jobs are plentiful, and the future is bright. To be successful at WorldCorp, you will need to know a little bit about the computing past and a lot about the computing present. You'll also need to have a sense of the computing future, especially as it pertains to business. That's what this chapter is about. You will also need to know how to perform basic functions at WorldCorp using two major computer programs you've probably heard of—Microsoft 365, or more commonly known as Office, and Google Workspace. The next chapter in this textbook, Essentials of Software Applications for Business, covers the basics of these programs.

WorldCorp activities presented in other chapters will lay out specific computing tasks, such as formatting documents, creating spreadsheets, designing online slide presentations, posting on social media, and conducting virtual meetings. Even though the online environment changes rapidly, these are fundamental computing skills that workers need regardless of their level of employment. As you move forward in the text, you will learn more about WorldCorp, its structure, products, customers, and strategies.

1.1 | Computing from Inception to Today

Learning Objectives

By the end of this section, you will be able to:
- Explain the evolution of computing in the workplace
- Explain the rise of computing for personal use
- Discuss the use of technology in today's workplace
- Describe key technologies in mobile devices, digital imaging, and gaming
- Discuss recent advances in technology and related career opportunities

Today's workplace looks very different from the workplace of even a decade ago. Much has changed in the field of computer science and computing in general, reshaping the use of technology at both individual and professional levels. From the early uses of massive, room-size computers to perform large, complex calculations to today's much smaller, more advanced computers—even one so small it can fit in the palm of your hand like the Raspberry Pi 4 shown in Figure 1.2—computing has secured a solid foothold in our everyday lives.

Figure 1.2 The Raspberry Pi 4 contains the basic components and power of a computer. It can power a robot, smart products, and basic PCs. At 3.4 inches by 2.2 inches and only .6 inches high, it fits in the palm of your hand. (credit: "Raspberry pi" by kritsadaj/ Pixabay, CC0)

Workers today need to know how to use computers to perform basic (and advanced) tasks that employers need. Those tasks could be preparing documents, creating spreadsheets for financial calculations, designing slide presentations for meetings, constructing databases, and even navigating social media and virtual meeting spaces that help companies communicate internally and externally. This text explores the basic software applications that perform these tasks, mostly through Microsoft Office and Google Workspace.

But, first, this chapter looks at the evolution of computing to provide some context and appreciation for the field itself and to show its importance not just for today's workplace, but also to give you a sense of where computing is heading.

Computing in the Workplace

The rise of computers for work came out of a need to manage a massive quantity of numbers. The early computers essentially were developed to be "data crunchers." Their origins date back to the 1800s in France. Joseph Marie Jacquard, a textile merchant, developed a machine to automatically weave designs in fabric using a punch card system, as you can see in Figure 1.3. This punch card system laid the foundation for more advances in number calculations, including those developed by Herman Hollerith for the 1880 U.S. census.

Hollerith went on to improve the initial punch card system and eventually founded IBM, one of the first major computing companies.
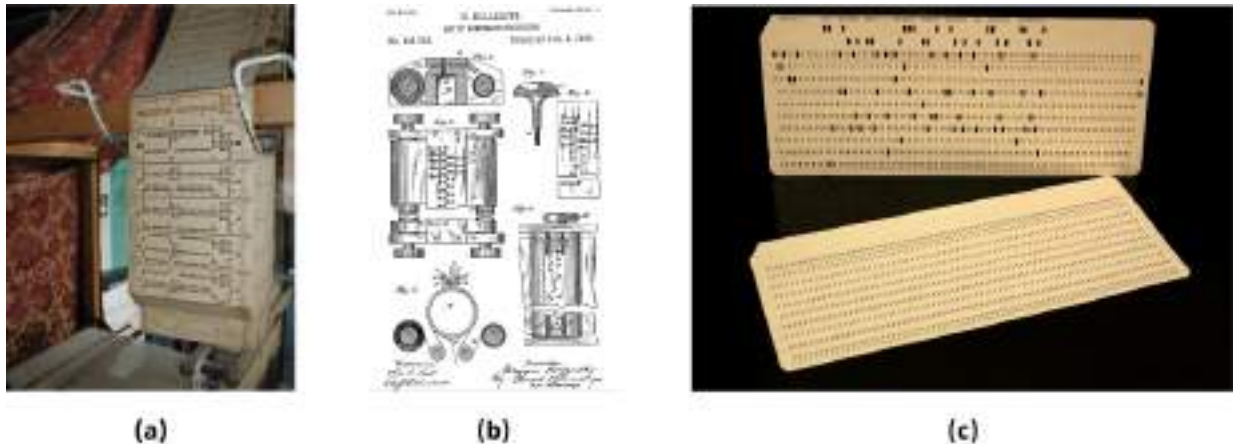
Figure 1.3 (a) Jacquard's loom, which performed calculations using a punch card system, was an early development in computing, as was (b) Herman Hollerith's punch-card tabulating machine, for which he was awarded a patent in 1889. (c) Each hole in a punch card equals a piece of data (called a "bit" today) that the machines read. (credit a: modification of work "Jacquard.loom.cards" by George H. Williams/Wikimedia Commons, Public Domain; credit b: modification of work "Holerith395782Figures1-6" by Herman Hollerith/Wikimedia Commons, Public Domain; credit c: modification of work "2punchCards" by José Antonio González Nieto/Wikimedia Commons, CC BY 3.0)

The first computer (in the modern sense of the term) was the Z1, designed and built in the late 1930s by Konrad Zuse of Germany. This machine was motor-driven, programmable, and weighed over 2,000 pounds, about 400 times the average laptop today. The Z1 contained many of the internal components still used in today's computers, paving the way for other inventors to evolve the technology.

Bill Hewlett and David Packard, two Stanford University engineering students, began working out of a garage in California, initially developing equipment for engineers and major companies. They founded their company, Hewlett Packard (HP), in 1939, but it wasn't until a few decades later that it would become a titan in the computer manufacturing industry.

Meanwhile, the 1940s and 1950s saw major advances in computing technology. Most notable was the 1943 invention of the ENIAC (Electronic Numerical Integrator and Calculator). This massive unit, built by two professors at the University of Pennsylvania, is considered the forerunner of today's digital computers because it was the first machine to run calculations electronically. Other innovations included solving equations simultaneously and the invention of the transistor, which allowed for much smaller computers to be built.

The development of computer language is another major milestone in computing history. By using words rather than symbols, computer coding became easier to learn and write, especially for those in the business world who did not have mathematics or engineering degrees. It is thanks, in large part, to mathematician and U.S. Navy Admiral Grace Hopper (Figure 1.4). Hopper's PhD in mathematics from Yale, along with her naval career working on technology to aid the war effort during World War II, positioned her to make some remarkable contributions, and in a male-dominated field.

Figure 1.4 Grace Hopper, shown here in 1960 with a UNIVAC computer, earned her PhD in mathematics and went on to an illustrious career in computer science. (credit: "Grace Hopper and UNIVAC" by Public.Resource.Org/Flickr, CC BY 2.0)

SPOTLIGHT ON ETHICS

Grace Hopper: A Pioneer in Computer Science

Historically, science, technology, engineering, and mathematics (known as the STEM fields) were seldom viewed as appropriate fields for females, and the same was true for careers in the military. Although women today make up half of the U.S. workforce, less than 30 percent of employees in STEM fields are women. As a reflection of this gender bias, in 1950, fewer than 5 percent of doctoral degrees awarded in chemistry, math, and physics were granted to females, and even today, that number has only risen to just under 20 percent.

Grace Hopper was a pioneer in the computer science field and in the military as a woman working in STEM. She was also a member of the first group of women to be granted a PhD in mathematics from Yale University. Hopper's work in computer science had a profound impact on the future of computer programming, especially through her creation of an English-language-based programming language, which eventually became COBOL (still in use today).

There are many organizations centered on narrowing the gender gap in STEM fields. One of these is the American Association of University Women (AAUW). Founded in 1881, it has been tirelessly focused on investing in education, especially in STEM fields, and on promoting these fields to females through tech camps and other initiatives.

Computers entered the workplace in the 1950s. Their use at that time was for scientific and engineering applications, mostly as calculating machines to facilitate data analysis. In 1964, the Programma 101, an Italian desktop-sized programmable calculator, was the first commercially viable workplace computer to hit the market. It was heavy and expensive—its $3,200 price tag in 1964 dollars was the equivalent of nearly $30,000 today. As a result, only large corporations and research institutions had the space and resources to use the computers that were commercially available. This remained the status quo into the 1970s, when the development of the **microcomputer** changed the face of the industry. The first personal computer, the Kenbak-1, came on the market in 1971. *Microcomputer* is the technical name for the personal computers that operated with a single processing unit and were much smaller than the machines used in corporations or industrial institutions. Intel's 1970 invention of the **microchip** (a group of small circuits that work together to make a computer operational) was quickly followed by the floppy disk (which allowed for data to be stored and moved easily), developed by IBM engineers, and **ethernet** connection capability, developed by Xerox. Ethernet connects computers and devices such as printers through hard cables. With advances in technology, the market for computers expanded rapidly in the 1970s. That's when Paul Allen and Bill Gates founded Microsoft

to focus on developing software and an operating system for the new computers. It is also when Steve Jobs and Steve Wozniak founded Apple, creating the Apple I computer with a single circuit board.

Xerox's revolutionary Alto computer, shown in Figure 1.5, introduced in 1973, included a screen resembling those we use today, plus a mouse and keyboard. The screen included, for the first time, elements such as folders, buttons, and icons controllable through the mouse. The Alto not only had the ability to act as a calculator but also could print documents and send electronic mail, anticipating the email we know today.

Figure 1.5 Xerox's Alto computer has a similar look to today's computers, even including the mouse. (credit: "Xerox Alto Computer) by Joho345/Wikimedia Commons, Public Domain)

Early personal computers like the Programma and the Alto set the stage for the rapid expansion of computing in the workplace. By 1980, there were several microcomputers on the market that made computing more accessible to small businesses and even individuals. Computing capabilities had expanded to include color graphics, spreadsheets, and word processing programs. The market competition between Microsoft, HP, IBM, Apple, and others shaped the industry and our society. In fact, in 1983, *Time* magazine's cover recognized the computer as "Machine of the Year," replacing its traditional "Man of the Year." These early computers have evolved into today's laptops, cell phones, tablets, and wearables.

These innovations in computing technology have had a profound impact on the workplace. Figure 1.6 shows just how different today's "workplace" has become. From the automation of manual processes, to the ways we store and analyze information, to how and where we communicate with colleagues and customers—all have changed dramatically. Resulting improvements include improved efficiency and productivity, reduction of errors, improved database management and analytics, advanced communication capabilities, telecommuting, enhanced graphics and marketing, the need for new organizational structures and departments (such as information technology, or IT, departments), and the development of technology privacy policies and legal regulations. Computing machines, along with the emergence and subsequent explosion of the internet, have forever transformed both our work and our personal lives.

Figure 1.6 Computing technology has transformed the modern workspace. People no longer have to be "in the office." (credit: "left": modification of work by Cory Zanker; credit "center": modification of work by "@Saigon"/Flickr; credit "right": modification of work by Daniel Lobo)

Computing for Personal Use

By the 1970s, new workplace technology filtered into homes in the form of entertainment devices. With technological improvements and more accessible prices, the value of a computer in the home—to help manage everything from household finances to children's homework assignments—was becoming evident. The advertisement for the Apple II computer shown in Figure 1.7 shows what this early technology looked like.

Figure 1.7 This December 1977 advertisement for the Apple II computer touts its uses around the home, such as organizing finances, storing recipes, and gaming. (credit: modification of "Apple II advertisement Dec 1977 page 2" by Apple Computer Inc./Wikimedia Commons, Public Domain)

In the early 1980s, personal computers were made available to the average consumer through retailers such as Sears and Radio Shack. In 1981, IBM introduced a personal computer—first known by the code name "Acorn" and subsequently renamed the IBM PC—that included the Microsoft operating system and Office software, as well as an Intel microchip. Soon to follow was Apple's Macintosh computer, launched in January 1984, running Apple's own operating system and officially establishing Apple as competitors to Microsoft and the PC. Many of these new designs were streamlined and user-friendly for the whole family. Moreover, the price point made them more attainable for the consumer, though still expensive for that time.

Initially, home computers were focused on gaming and entertainment. Figure 1.8 shows what that primitive technology looked like in the 1980s. Classic games such as chess and solitaire were translated into the computer environment, a trend that quickly caught on even with rudimentary graphics and text-based games. These games allowed the user to experience the computer's capabilities in settings far beyond the workplace and established the personal computer as a technology to support not only work, but pleasure and entertainment, too.

(a)   (b)

Figure 1.8 (a) The Apple II and (b) the Commodore PET offered video games that popularized the use of computers at home. (credit a: modification of "Living Computers – Apple" by Michael Dunn/Wikimedia Commons, CC BY 2.0; credit b: modification of "Commodore PET Exhibit at American Museum of Science and Energy Oak Ridge Tennessee" by Frank Hoffman/Wikimedia Commons, Public Domain)

With developments such as disk storage and programming capabilities, the market for personal computers continued to grow. Manufacturing costs decreased with innovations in the industry and as many producers shifted manufacturing overseas. Although computers evolved into home workstations with capabilities beyond gaming, the home computing trend was slow to catch on. Many potential home users simply did not see the value in owning a personal computer; in the late 1980s, fewer than 20 percent of households owned one. This changed in the late 1990s and early 2000s, when the home computer industry exploded with the expansion of the internet, improved interfaces that were less technically challenging for the average user, and customizable products and features such as color schemes. Increasingly, home workstations became the place to maintain family finances, store recipes, and write school research reports. Email, followed quickly by instant messaging, offered a new way to connect and communicate. Then came a way to connect to the internet without wires, using high-frequency radio signals.

Since 2000, the warp speed of innovation has brought to market lightweight laptops that can be easily carried from workplace to workplace. The computing power of the computers that first took astronauts to the moon was similar to that of a couple of today's gaming consoles. Many modern home computing devices are laptops less than one inch thick, equipped with high-speed connectivity, high-quality graphics, and touchscreen capabilities. Computing power today has increased nearly 1 trillion percent since the 1960s.

Technology Today

The rapid trajectory of innovations in computing has forever changed today's workplace, where computing power is at our fingertips. It is difficult to imagine any industry that doesn't depend on computing technology as an integral part of its business. Some of the more basic technologies that are present in businesses may include:

- direct deposit of paychecks
- key card building access
- shared company computer drives for document storage
- paperless documentation systems for recordkeeping
- high-speed printers/copiers
- automated inventory systems

Industries that are traditionally considered nontechnical have also embraced improvements that depend on computing technology—for example, farmers can control irrigation and monitor field conditions. Computing technologies have also enabled individuals to embark on entrepreneurial ventures that once only seemed like a dream and have launched some of them into marketplace leadership. From manufacturing to health care to the service sector, we can see the impact of computing and how technological innovations continue to shape the future of many industries.

For example, consider the auto industry, where advances in technology continue to pave the way for changes in how we drive, safety improvements, and new ways to purchase vehicles. Recent innovations include the introduction of self-driving vehicles (see Google's self-driving car, Waymo in Figure 1.9) and of vehicle-to-vehicle communication—cross-communication that allows cars to wirelessly share information such as speed, spatial proximity to other cars or objects, and traffic status, with the potential to reduce vehicle crashes and congestion on roadways. Technology has also created a space for nontraditional car dealers, such as Carvana, that offer an online purchase experience and home delivery. The use of technology in the auto industry can be seen at all stages of the business cycle.

Figure 1.9 Google's Waymo, a self-driving car, can navigate roads, maintain safe speeds, and see obstacles in time to apply the brakes. (credit: "Google Self-Driving Car" by R Boed/Flickr, CC BY 2.0)

Computing technology has also brought substantial changes to the health-care industry. Most medical practices and hospitals utilize electronic medical records. These records and the ability to share them across providers have increased the efficiency and accuracy of record management and have also increased the transparency of information provided to patients and their families and care providers. Performance of surgical procedures has been advanced through the use of visualization technology and robotics. Figure 1.10a shows a robotic arm used in surgery.

More recently, telehealth and virtual health-care options have grown. Figure 1.10b shows a virtual telehealth appointment. These options have reduced many barriers (including some financial barriers and transportation issues) for those seeking care for a variety of needs, including mental health issues, child illness, or support for

the elderly. This virtual option has not only added convenience, but has also improved communication between patient and provider, increased speed of care, and allowed patients to take a better informed and more active role in addressing their own health-care needs. And, of course, the use of virtual technology for health-care needs was a lifesaver during the COVID-19 pandemic, when in-person appointments were too risky.

Figure 1.10 (a) Robotic surgery and telehealth services are two health-care industry-changing technologies. (credit a: modification of "Laproscopic Surgery Robot" by GPA Photo Archive/Flickr, CC BY 2.0; credit b: modification of "People on a Video Call" by Anna Shvets/ Pexels, CC BY 2.0)

With today's available technologies, organizations and individuals alike are continuing to rethink the traditional business model. Many organizations have come to see the value of giving employees the freedom afforded by working from home, and even many industries that had resisted telecommuting learned to incorporate it as a necessary response to the COVID-19 pandemic. Some companies have found that organizational efficiencies can be realized in terms of cost savings, improved employee satisfaction, and enhanced productivity. Other businesses, such as smaller retailers, have shifted more resources to e-commerce. Banks have found innovative ways to connect with their customers using technology rather than through in-person transactions. Still others, such as restaurants, have used technology to deliver their products to consumers in new ways. In Figure 1.11, customers can order directly through the internet à la Uber Eats or even have their food delivered by robot.

Figure 1.11 (a) Uber Eats is a popular food delivery service that is becoming more widely available because of technological advances. (b) Autonomous delivery robots are becoming a more common sight on campuses. (credit a: modification of "Uber Eats bicycle" by Yuya Tamai/Flickr, CC BY 2.0; credit b: modification of "Starship food delivery robot" by bikesharedude/Flickr, Public Domain)

Technology and Food Trucks

Food trucks have been growing in popularity in the early decades of the twenty-first century. In fact, the food truck industry has grown at a faster rate than traditional restaurants. The availability of technology has helped foster this growth, especially in two areas: point-of-sale (POS) systems and social media marketing. It used to be that food trucks could accept only cash because the registers that could take credit cards did not work on the road. A POS system does even more than exchange money. A food truck can use a POS product—for example, a product called Square—to track inventory and sales, and can even use social media to post messages and to make sales.

Our interactions with computing, both at home and in the workplace, rely on interfaces and communications like those you will likely use in this course. Tools for documenting information, analyzing and exporting data, and communicating with others form the foundation of business computer applications.

Mobile Devices, Digital Imaging, and Gaming

It might be hard to imagine a world without access to information at our fingertips—or, for that matter, a world without Xbox or PlayStation. Today, many households no longer have a traditional landline phone, instead relying on mobile devices. It is estimated that less than 10 percent of homes in the United States have a traditional landline phone. Think about how advances in digital imaging technology over the past half century have forever changed the way we capture and preserve life's notable moments—our days are now routinely filled with screens and images. The rise of the computing industry has brought along changes in companion industries that have impacted most of our lives in one way or another.

In this section, you will learn about the origins of the mobile phone industry and its evolution into today's diverse handheld computing devices. The rise of the computing industry also led to a new industry, gaming. You will look at how the gaming industry not only changed the face of family entertainment but also created additional industries and shaped cultures across the world. Finally, you will explore the digital imaging industry, the impact on other fields, and recent technological developments in imaging.

Mobile Devices

The concept of a mobile phone has been around a lot longer than you might imagine—since the early 1900s, in fact. In 1908, a patent was issued for a wireless telephone in Kentucky, but the idea was considered so far-fetched that its inventors were accused of fraud. (The case was later dropped, and the invention was never produced.) Not long after, during World War I, Germany was testing radio-based wireless telephones (essentially two-way radios) on trains traveling from Berlin. By 1940, this technology had improved, and handheld receivers were widely available and used in World War II, prompting the private sector to use this emerging technology (Figure 1.12a).

Bell Laboratories, founded in the late nineteenth century by Alexander Graham Bell, was a key player in bringing mobile phones to the public. In 1946, Bell Labs developed a system to offer a mobile phone service in cars. Because of the limited number of channels available, the system quickly reached capacity, and was mostly used by taxi drivers and emergency vehicles localized in urban areas. From the 1950s to the 1980s, the technology continued to develop, built mostly around radio frequencies.

The first cellular technology using automated cellular networks, called 1G or first generation, was introduced in Tokyo in 1979. It was deployed to other countries soon after and, in 1981, reached North America, where it was known as the Advanced Mobile Phone System (AMPS). This led to the launch of the first truly mobile cell phone, Motorola's DynaTAC, in 1983 (Figure 1.12b). With a price point of just under $4,000, the unit was not designed for the everyday consumer. Motorola believed the phone's customers would include realtors and

large-company executives who could afford the purchase price as well as the $50-per-month plan to use the device. But they underestimated the appeal of the cell phone. Sales far exceeded projections, and the concept of the cell phone quickly replaced the unwieldy mobile car phones of the past.

The overwhelming demand, along with advances in digital technology, prompted the migration of the old AMPS networks to a digital format, an effort that began in 1990 and was completed in the early 2000s. The popularity of the cell phone also prompted competition between European and American networks. 2G cellular networks emerged, providing basic short message service (SMS) text messaging capabilities. The first text message was sent in 1993 in Finland. The 2G network had better security than 1G and was also much faster. These changes in network capabilities influenced the development of phone technologies.

Although smartphones are seen as a rather new technology, the first smartphone was actually introduced by IBM in 1993. The Simon Personal Communicator (Figure 1.12c) looked very different from modern smartphones. Its features included a calendar, address book, and email service. The phone even had a touchscreen. The price point, around $1,000, was high at the time, equivalent to about $2,000 in today's dollars. The device was well received in the United States, where consumers viewed it primarily as a digital personal assistant that just happened to have phone capabilities. Though popular with business executives, the Simon stayed on the market for less than a year and sold only around 50,000 units, but it did pave the way for the smartphones of today. Other notable phone introductions soon to follow were the first flip phone (the Motorola StarTAC in 1997) and the first BlackBerry device in 1999.
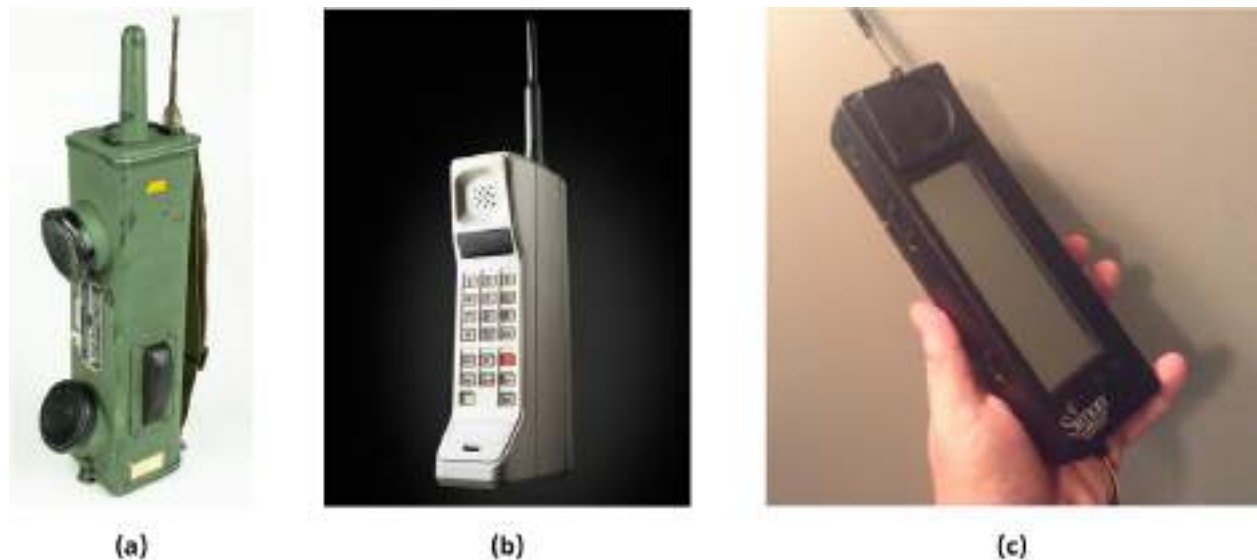
Figure 1.12 (a) This two-way wireless communication device was used during World War II to communicate critical information among troops. (b) Motorola's DynaTAC was the first mobile phone to use cellular technologies rather than radio frequencies. DynaTAC was marketed toward wealthy business professionals at a price point of nearly $4,000. (c) The first smartphone, a personal assistant device, was a precursor to today's cell phones. (credit a: modification of "Bärbar radio" by Flygvapenmuseum, CC BY; credit b: modification of "MF013: Figure 2.8" by Rosenfeld Media/Flickr, CC BY 2.0; credit c: modification of "Simon FIRST Smart Phone" by Mike Mozart/Flickr, CC BY 2.0)

As the technology rapidly advanced, 3G and then 4G networks soon followed. This allowed faster speeds as well as streaming services—4G networks were nearly 10 times faster than their 3G counterparts. With this expanded network accessibility, phones rapidly came to be seen less as a luxury and more as a need.

Apple's introduction of the iPhone in 2008 had a major impact on the market. With this introduction came the **iPhone operating system (iOS)**, exclusive to Apple. An **operating system** is one of the most important components of a computing device. It runs the interactions between the device's hardware and software components (more on these later in the chapter). The second most popular operating system to emerge during this time was the **Android operating system**, first developed in 2005 and later acquired by Google. These two operating systems, each of which has advantages and disadvantages, are engaged in an ongoing

battle for market share. At the end of 2022, the Android operating system had a majority share of the market worldwide (nearly 72 percent). Today, nearly 90 percent of Americans own a cell phone; of those, nearly 60 percent are smartphones.

LINK TO LEARNING

It seems that people are either iPhone users or Android device users, with an unwillingness to shift platforms. Although the two operating systems that run iPhones and Android devices (such as Samsung's Galaxy phones), respectively, have similar performance capabilities, they vary dramatically in terms of the user experience. The proprietary software working behind the scenes also limits the apps, or programs, that are compatible with each device. Read this article on the differences between Android and iOS (https://openstax.org/r/78AndroidiOS) to learn more. Which operating system do you prefer? Why?

The adoption of mobile phone technology has had a large economic impact in the United States and worldwide, giving rise to new products (cell phone cases, pop sockets, wireless earbuds, screen protectors) that did not exist before mobile phones hit the market. Other industries such as clothing and handbags have also been impacted: It's now commonplace for a jacket to have a specific phone pocket, and many handbags and backpacks have slots designed to accommodate most cell phones. The creation of mobile phone apps has developed into an entirely new industry that has created many jobs worldwide. And beyond these tangible effects of the cell phone boom, there have been some significant changes in how we operate in our business and professional lives. About 40 percent of all business transactions are conducted on a mobile phone device. Companies rely on mobile technology to conduct essential correspondence with their employees and their customers.

Gains in efficiency and collaboration across geographic boundaries are now easier than ever. Consumer product companies use mobile devices to advertise in new ways and to expand their market reach. We may use the technology to stay in contact with out-of-town family members, to connect to our bank or our health-care provider, and to make everyday purchases. Many children growing up today have never had a home landline phone ring or not even heard a dial tone. The dial tone is a sound that indicates that a landline is active. It can be difficult to imagine a world before cell phones, even though it was not all that long ago they first emerged on the market.

LINK TO LEARNING

Listen to this video on vintage telephone network sounds (https://openstax.org/r/78Telephone) to hear what a dial tone sounds like, as well as sounds from telephone technology through the ages.

Digital Image, Video, and Audio Capture Devices

Image, video, and audio capture are another area of technological growth that many people now use daily. Photography was invented in the mid-1800s, and it took a century and a half for digital imagery to emerge, in 1957. Using **binary digits**, Richard Kirsch was able to convert a photograph of his son into a digital image using the only programmable computer available in the United States at the time. The photograph was scanned electronically in small squares of the image, now called pixels, and reconfigured using white and black, as Figure 1.13 shows. The binary data for the image could then be stored on the computer. This development, along with the invention of the microchip, laid the foundation for future work in digital imaging.
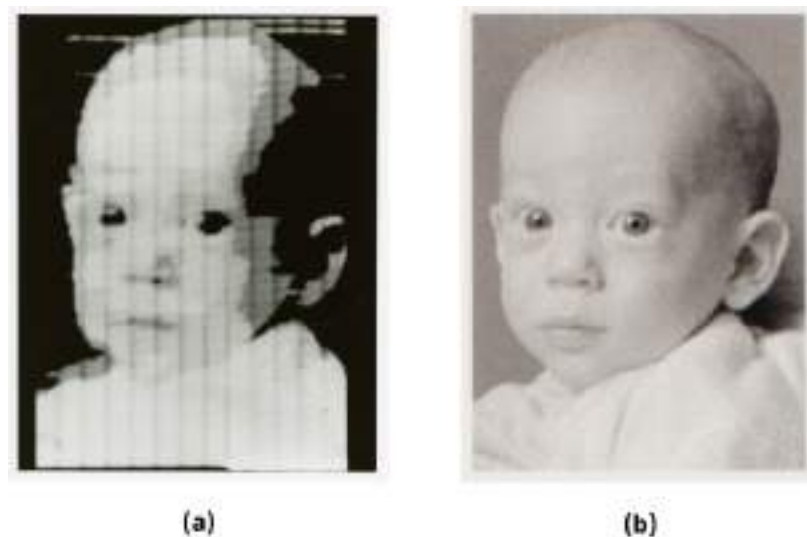
Figure 1.13 Kirsch took a photo of his son Walden and was able to capture the image digitally using binary digits. Part (a) shows the digital scan of Walden Kirsch from (b), the original photo. (credit a: modification of "NBSFirstScanImage" by Russell A. Kirsch/ Wikimedia Commons, Public Domain; credit b: modification of "Walden Kirsch" by Russell A. Kirsch/ Portland Art Museum, Public Domain)

The scientific community, government, and the military soon took notice of the advantages of using the digital approach to capturing images. Beginning in the 1960s, NASA used the technology to transmit images back from space through television receivers. Tech companies created new storage methods, such as saving images to tape. RCA built the photo-dielectric tape camera for NASA, which was able to store about 120 images on tape—a huge improvement over the long processing times needed for previous digital images.

This technology continued to grow over the decades, and soon combined with mobile phone technology. In 1997, the first image was taken using a camera phone. Cell phone manufacturers quickly launched new phone models that included cameras, and most of today's devices include a digital camera. The 2004 emergence of Flickr, a popular photo-sharing site, as well as the launch of Facebook that same year, provided new ways for people to share and connect via digital photographs.

The digital camera revolution transformed how we conduct business and stay in touch with family and friends. The use of webcams and videoconferencing technology has enabled many to conduct business across geographic boundaries and to telecommute from home to their job. This has changed the face of the traditional office environment for all industries and parts of the marketplace, such as government agencies, corporations, small businesses, and service organizations. And in many ways, digital cameras have changed our everyday lives. The use of digital cameras has revolutionized many medical procedures and how we interact with our health-care providers. Digital cameras have enabled us to see space beyond the earth and moon. Consumer products can be test marketed and brought into consumers lives' virtually. Parents have the capability to monitor their babies sleeping in cribs. Doorbell cameras have increased our sense of security in our homes. The cameras we have at our fingertips today have far surpassed the imaginations of the early inventors of this technology.

REAL-WORLD APPLICATION

Virtual Reality and Marketing

Virtual reality (VR) refers to a simulated environment that is computer-generated. Through the use of devices such as a helmet or glasses, the user sees a simulated world and is able to move about it visually. Instead of simply viewing the scene from an outsider's point of view, the user is immersed in the actual scene. Companies such as Nike, Wendy's, McDonald's, and Gucci have used VR to creatively demonstrate

new products to consumers and to allow consumers to interact with a new product concept. Even small businesses have capitalized on the technology, which enables them to bring ideas in front of consumers quickly without the expense of creating an actual prototype of the product. This concept has application across a wide range of industries, from restaurants to real estate to consumer products.

Games and Gaming Devices

Computerized games for entertainment existed long before today's gaming consoles. When computers were starting to gain a foothold in the American household, their primary use was for entertainment. The initial concept of computerized games was centered on taking existing, often traditional games, such as checkers and chess, and moving those to the computerized platform.

The first video game was developed by an American physicist. William Higinbotham developed the game Tennis for Two in 1958 using an analog computer with an oscilloscope display. This simple invention laid the groundwork for one of the most profitable industries in the world. It is estimated that over 60 percent of U.S. households today have members who regularly play video games. Technology progressed to the first gaming console, 1967's Brown Box, and then to 1972's Atari, with its popular game, Pong. In 1978, Space Invaders hit the arcade market—a game venue marketed heavily to bowling alleys and retail locations. The arcade craze became a huge commercial success for the game makers as well as the businesses that purchased the games (Figure 1.14). Motivated by getting to the top of the scoring list, players were readily putting their quarters into the machines. Over the next decade, nearly two dozen companies developed arcade games, including the well-known game Pac-Man, which was introduced to the U.S. market in 1981.

Figure 1.14 The arcade of the 1980s changed how teenagers spent their time and their money. (credit: "the Luna City Arcade" by Blake Patterson/Flickr, CC BY 2.0)

The decades that followed saw the leap from Intellivision to the Nintendo Entertainment System (NES) and Nintendo's handheld Game Boy device. At the end of the 1980s, Sega emerged as a major competitor to Nintendo. Their gaming system had better graphics and new creative energy, bringing on what would become some of the most popular games of our time, like Sonic the Hedgehog. As new game concepts emerged, controversy over violence in games and other questionable content prompted a government response and the creation of an industry rating system for games.

SPOTLIGHT ON ETHICS

Video Games and Violence

Early video games were based on traditional board games such as chess and checkers. But over time, with increases in graphic capabilities and new companies coming into the market purely as game developers,

new game concepts were developed. At times, these new game concepts contained what some considered to be inappropriate language and situations. The American Psychological Association even considers the playing of violent video games as a risk factor for aggression. The violence in video games prompted a congressional hearing on the matter in 1993. The hearing focused on three controversial games: Doom, Night Trap, and Mortal Kombat, the first video game to include realistic depictions of violence. Despite this, the game was allowed to be sold, but a new rating board emerged from the hearings called the Entertainment Software Ratings Board (ESRB). It is a voluntary, self-regulated entity run by the Entertainment Software Association, which rates games according to their level of violence and recommends appropriate age levels for users. Some stores will not sell video games without an ESRB rating.

As the trajectory of advances in games and consoles continues, today it seems that a new and improved system hits the market every year. Many people also have games downloaded on their phones. And the concept of e-sports has reached colleges and universities, both as an academic program and as an NCAA-recognized collegiate sport. The future of video games seems to be moving in the direction of artificial intelligence (AI) and virtual reality simulations, with both Apple and Google making company acquisitions in that arena.

REAL-WORLD APPLICATION

E-sports in Colleges and Universities

The term e-sports refers to a sports competition using video games. Like professional football, baseball, and other sports, e-sports events have a large following, including both spectators at the actual events and others who join to watch the action virtually. E-sports became a large player in the gaming industry around 2010 and has since exploded worldwide to such an extent that colleges and universities are taking notice. The impact on the academic environment can be seen in three key areas: academic programs such as game developing, student groups focused on gaming, and collegiate sports. Some institutions are even offering scholarships for e-sports similar to traditional athletic scholarships.

Mobile technology, digital imaging, and gaming capabilities today are inherently intertwined. Often, all three coexist on a single device. As just one example, consider how we use Google Photos on our phones to share family memories. Extending this capability, in a video game app on a mobile phone, a user can create a character using their photo and then have this virtual character interact with other players across the world. In the business world, many of us now use Zoom or other videoconferencing tools to connect with colleagues remotely. Outside of work, users of gaming consoles can chat with other players through their phones or through the console. Many games today are designed from the start to be played on multiple platforms. Microsoft is even offering mobile phone plans for customers. Each technology has changed our lives, but together their impact has been remarkable.

Advances in Technology

Technology is advancing faster than what was previously believed to be possible. In just a short period of time, we have gone from having no computers to today where nearly 90 percent of people in the United States have some access to a computing device. What's also impressive is that 90 percent of data in the world today was generated in just the last two years. Today's 5G technology is 100 times faster than 4G, and the rate of adoption of new technologies has diminished from years to mere months in some cases. As you can see in Figure 1.15, older technologies such as refrigerators and landlines took decades to reach widespread adoption with a majority of Americans buying them, while today's smartphones and tablets achieve broad adoption as

soon as they enter the market.

(a)

(b)
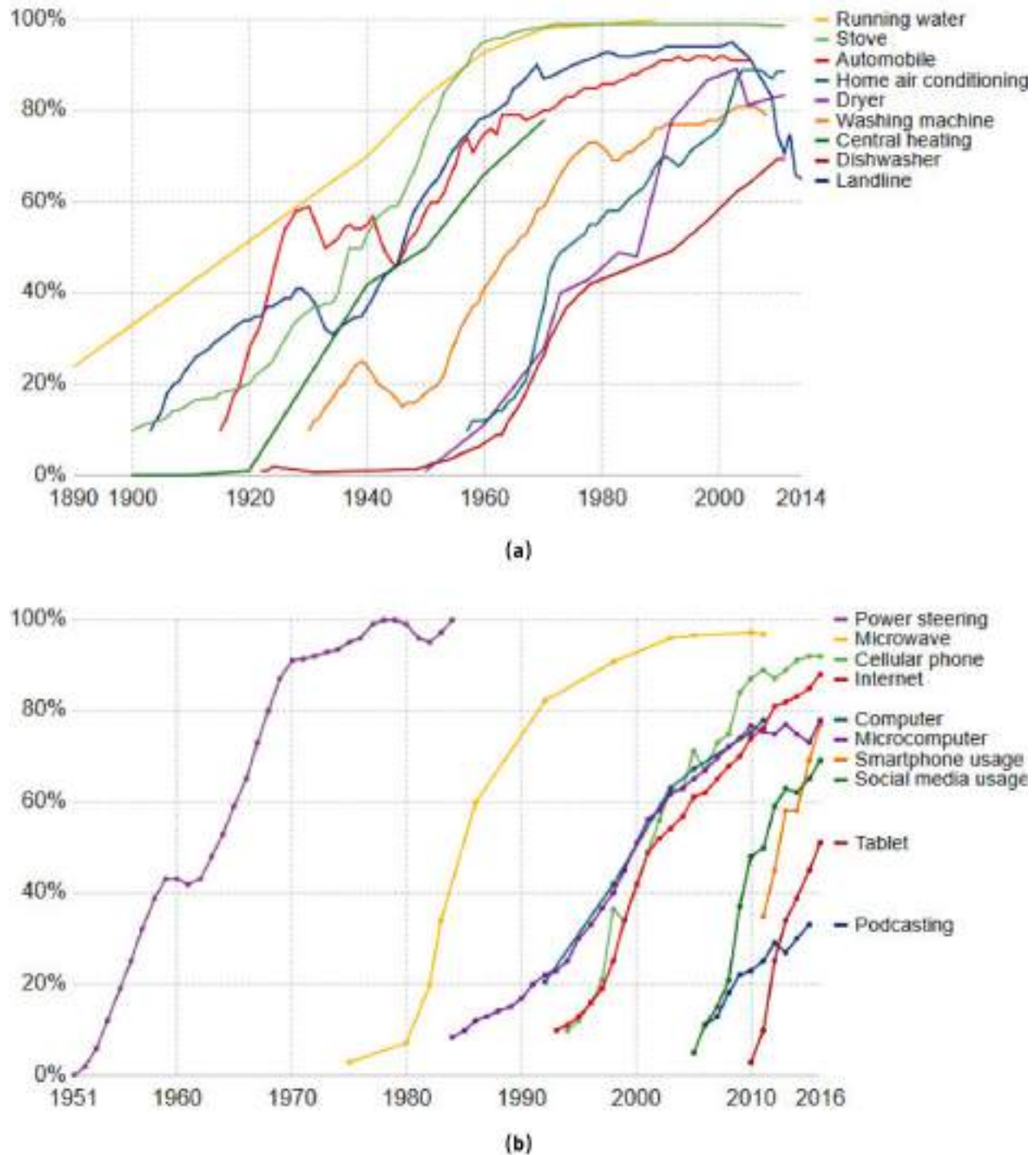
Figure 1.15 (a) Historically, the rate of adoption for new technologies has taken decades. (b) Now, new products to the market reach more than a 50 percent adoption rate in just a few years. (credit a and b: modification of work by Our World in Data, CC BY 4.0)

Computers today typically double their capabilities in less than two years. With this in mind, we can expect computing capabilities to continue to increase at a similar rate. The rate of change is increasing exponentially because companies are building on existing technologies. Researchers can take what has worked well to rapidly refine and enhance technologies for innovations and improvements. Additionally, resources from across the world—both financial resources and human capital—are being pumped into supporting these technological advances. To put the popularity of computer technology into perspective, consider how long it

takes to get fifty million users for a product. Radio took thirty-eight years after its invention to become that popular, while the hit game Angry Birds needed only about thirty-eight days to reach that milestone. Figure 1.16 shows some common products and how long each of them took to reach the same milestone.
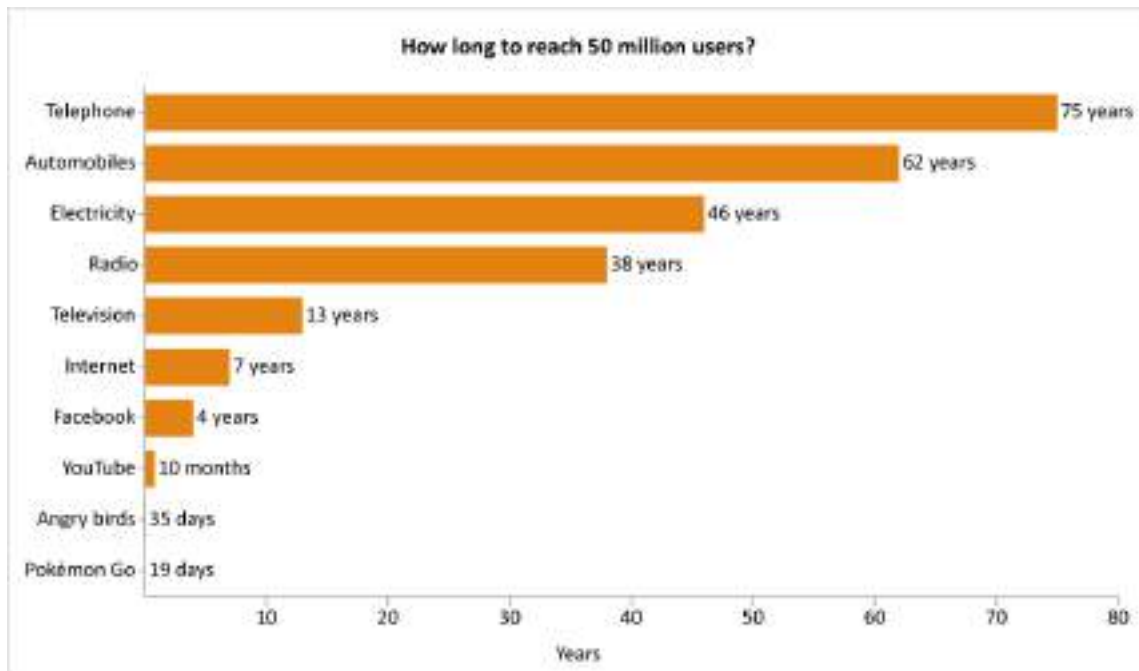
Figure 1.16 Products are being adopted at a faster rate than ever before. The advent of social media has exponentially increased the spread of some of these later innovations. (data source: Interactive Schools, https://blog.interactiveschools.com/blog/50-million-users-how-long-does-it-take-tech-to-reach-this-milestone)

AR/VR Simulations

Using digital objects in a real-life picture or scene is called **augmented reality (AR)**. For example, think about the overlays or filters you can put on photos in some social media apps. A mostly simulated, 3-D environment in which the user can move about visually and interact is called **virtual reality (VR)**. Both technologies have applications in many industries. For example, if you want to try a new style of glasses, you could use AR to see what those glasses might look like on your face. You might use a VR simulation to offer your insight on a yet-to-be-developed product concept. Other applications could be in manufacturing, real estate, medicine, and education.

One recent example of the use of VR was seen when the NBA had to cancel games because of the COVID pandemic. To keep fans engaged, the league offered VR passes that enabled ticket holders to attend past games in a VR environment and nearly be courtside for the action. The only equipment they needed was the app and a VR headset. (VR headsets are widely available for purchase, typically for under $200.) This was a unique use of the technology to keep the audience's attention during a difficult time.

Robotics and Automation

Robotics should be distinguished from **automation**, which refers to using computers or machines to do tasks that could be completed by a person. Automation can be quite technical, using computerized technology, or it can be a mechanical process using machines. For example, processing retail transactions, which was once handled by people using pen and paper, is now well automated through the use of a computer.

On the other hand, **robotics** is centered on robotic machines, which are now used in nearly every industry. These machines can automate some tasks that were previously performed by humans, but they can also be programmed to perform tasks that no human could perform. Consider some medical procedures that can now be carried out using robotic machines but that simply were not possible in the past, such as certain procedures

on the brain. The use of robots in the workplace can reduce errors, increase safety, enhance productivity, and reduce time spent on routine tasks for employees.

Robotics has been a part of the manufacturing environment for some time. But today we see increasingly unique applications of robotics in the workplace. For example, the University of California is testing a robotic pharmacist, which will perform many of the functions of a traditional pharmacist, such as choosing the correct prescription and dosage. Robots are also being used to keep areas clean and sanitized; in some cases, robots can be used to clean up spills that might otherwise be hazardous to humans. Giant Food Stores is piloting a program that uses robot assistants throughout the store to monitor for spills and potential hazards in the aisle. Drones (a kind of robot) are used in some military applications, and the use of drones is being tested for package delivery. Finally, robots can be used to find and rescue victims in disaster situations where it might be too dangerous to send in typical emergency personnel.

Nanotechnology

Another advancement in technology is **nanotechnology**, which entails changing individual molecules to produce different properties or attributes. It can be applied to a wide variety of fields, including engineering and chemistry, as well as to medicine and consumer products. The U.S. National Nanotechnology Initiative was launched in 2000 to manage research and development in the field, and the first academic program centered on nanotechnology emerged by 2004. At that time, the technology was being heavily tested with consumer products. Nanotechnology has been used to make golf balls go straighter, make car bumpers more dent resistant, and give cosmetics and lotions deep skin-penetrating properties. With nanotechnology, drug delivery to patients can be better targeted and controlled. Filters made using nanotechnology have been used to filter drinking water sources in countries such as India. In agriculture, nanotechnology has improved yields with the use of soil analysis and targeted fertilizer applications. Nanotechnology can also be used to better combat air and water pollution through increased filtration efforts. Research into nanotechnology possibilities continues to expand.

Wearables

A **wearable** is a device that uses computing technology to collect and receive data via the internet. You may already be using a wearable technology device—for example, a smartwatch. Using similar technology to a smartwatch, Motiv has developed a ring that can track fitness goals and sleep cycles. As Figure 1.17 shows, you would never know it was a smart ring from its outward appearance. Other wearables include heart rate monitors and a medical alert device. These devices can be worn, incorporated into apparel, or even embedded into the skin. The military is even considering using embedded wearables to keep track of troops. Some cutting-edge wearables are centered in the medical industry; for example, a wearable has been developed that can detect early signs of breast cancer.

Figure 1.17 The fitness tracking ring is a new take on the fitness tracker. It can track activity and sleep cycles and send the information to your smartphone. (credit: "Left hand with Oura smart ring on finger, right hand shows phone with the Oura app´s

energy and activity statistics" by Marco Verch/Flickr, CC BY 2.0)

Some professional athletes use wearables to improve performance and track incidences of concussions. Wearables for children are becoming more popular for location tracking. The possibilities are endless. It is estimated that there are nearly a billion wearable devices active globally, over 50 percent of which are smartwatches. And about a quarter of wearable users wear the device while sleeping. Revenues in the industry are nearly $10 billion in the United States. Wearables are now also being used for ticketing purposes at concerts and amusement parks.

LINK TO LEARNING

You may have a smartwatch or use a fitness tracker when working out. These are commonplace wearables in today's society. But where is the industry headed? Wearables have been identified as an area of growth in the economy. Many tech companies are focusing on innovative ways to incorporate internet-connected devices in different settings, as illustrated in this article on the wearable tech of the future (https://openstax.org/r/78WearTech) in *Time*. You may be surprised to discover just how futuristic they are becoming.

Smart Spaces

An internet-connected space—office, home, car, or building that incorporates technologies that can be controlled from the internet—is called a **smart space**. In homes, we see products centered on convenience, security, and comfort. The goal is to improve your life without interfering and creating a nuisance. For example, you can have a thermostat that enables you to control the temperature in your home from your phone, even when you are not at home. You can have a device that switches on the lights or the TV when you verbally ask it to do so, or home security lights that come on for your safety as you approach the front door. With products such as Google Home Smart, shown in Figure 1.18—a virtual assistant that is connected to the internet—all members of the family can control many devices. If you have your devices synced to one another, you can even have Google Home tell you your calendar appointments for the day or set reminders and alarms.

Figure 1.18 Devices such as Google Home Smart are creating "smart" spaces that are able to be managed from remote locations, such as the workplace. (credit: "Home Automation22" by mikemacmarketing/Wikimedia Commons, CC BY 2.0)

Similar technologies can be employed in the workplace. Smart offices/buildings can be equipped with many of the same technologies—a good strategy for managing utility costs and adding convenience for employees. Smart offices can make employees more productive by giving them more time to focus on creative and

strategic tasks as opposed to more routine and mundane responsibilities such as sending invoices or even turning on the office lights. Job satisfaction can be increased by giving employees more control over their workspaces.

A unique application of the technology is its use in schools, which is being piloted in Texas with a partnership between two private companies and Microsoft. They are equipping schools with a variety of connected devices centered on security and communication in an emergency. These devices can communicate internally during an emergency, such as a fire, and can also communicate externally with first responders and police.

There are some challenges in the smart space industry. Many concerns arise about the invasive nature of some of the connected devices, including concerns about recording personal information, governmental monitoring of the information, and the usage/security of the data collected. Another challenge is educating consumers on how to use the equipment and its capabilities. Finally, the price point is high for some of these devices because many are still rather new to the market.

AI and Machine Learning

Using computers, robots, and machines to mimic the human brain is called **artificial intelligence (AI)**. From problem solving to perception to learning, the goal is to reduce errors and minimize human biases and emotions in the process. In **machine learning**, a subset of AI, an AI device learns on its own, gathering data and using that data to continuously refine and "learn" about the system and its usage. Speech and image recognition are two examples of AI. Another example is a robot vacuum cleaner, where the AI system uses a computer and the data it collects to know where to clean in the home. Figure 1.19 shows the popular Roomba vacuum. Still another example is seen when websites show recommended products for you based on your prior searches. The device learns your likes and dislikes based on your clicks and other related data.

Figure 1.19 AI in the home can take over inconvenient or repetitive tasks such as cleaning. (credit: "iRobot Roomba 870" by Kārlis Dambrāns/Flickr, CC BY 2.0)

In a more large-scale use of AI, for quite some time airlines have made use of autopilot features, including robotics, image recognition, and GPS, to fly and navigate an aircraft. In the retail industry, the use of AI is expected to grow about 30 percent by 2028, a strong increase, to include applications centered on personalizing the customer experience as well as managing distribution and inventories. Today, AI technology has evolved to create stories in the style of famous writers or even write detailed research papers when prompted.

Workplace and Career Implications

Technology in the workplace has made processes faster and more reliable, increased collaboration, made it possible to work from anywhere, and, overall, changed the typical office culture. The adoption of new technologies in the workplace has some distinct career implications for individuals, while organizations need to figure out the best mix of humans and technology to allow the business to thrive.

The idea that technology eliminates jobs is a myth: Technology introduced into the workplace is intended to help employees do their jobs better, not to replace jobs. But this does mean that employees may need to shift from more traditional tasks to tasks that are more technology-driven. For example, an employee in the human

resources field may have spent hours sifting through résumés for contact information to schedule interviews. With technology, this process can be automated, freeing up time for the employee to focus on more meaningful tasks such as interviewing candidates and decision making. In a manufacturing environment, technology can enable employees to focus on process improvements and problem solving rather than working with repetitive tasks on a production line.

These changes affect our future educational and training needs. Some jobs that require a lower skill base have been replaced with technology. Additional training may be necessary in areas such as troubleshooting technology in the workplace. The shift for employees today is toward capitalizing on brain power, reserving human capital for the complex, multifaceted tasks that technological advances cannot tackle. Therefore, training and education in critical thinking, communication, problem solving, and teamwork skills are a necessity. These skills are of value at all levels within an organization. Jobs in the technological fields are expected to grow; however, an emphasis will be placed on the essential skills of communication, fostering cross-functional collaborations, and creative problem solving that cannot be replicated by technology.

REAL-WORLD APPLICATION

Changing Careers

Facing a career change (whether voluntary or not) can be a scary proposition, especially if you have been in your current position for some time. With changes in technology, many people will face decisions regarding their career direction, either needing to change focus within their current industry or, in some cases, pivoting to an entirely different industry. Here are some tips to consider when you are facing a career change:

- Identify areas where you can further develop your technological skills.
- Use your network to find out about job opportunities.
- Take a certification course for a particular computer program or a class on enhancing your public speaking skills.
- Reach out to your network, either social media or sites such as LinkedIn, to make people aware that you are interested in a new opportunity.

It is important to take the time to find the right opportunity and then to take small steps to get where you want to be. Think about your long-term goal. Do your research by interviewing those in the industry you want to be in or utilize a job coach/mentor to assist in your journey. Would you consider a career change? Why or why not? If so, what strategies will you use to make the transition easier?

Importance of Lifelong Learning

To protect your job security in the workplace of the future, you will want to demonstrate to your employer that you are committed to lifelong learning. With the rapid acceleration of technological change, some employers today are actively seeking employees with a lifelong learning mind-set. Lifelong learning requires continuous self-improvement and education—the motivation to be a continual student. It often occurs outside a traditional educational system and includes both informal channels and formal ones such as corporate training programs. Employee development is a core part of many human resources departments within organizations. Mandatory training or education may be required for your position, or voluntary opportunities may be offered to employees. Taking the initiative to learn and adopt new workplace technologies can be both professionally and personally fulfilling.

There are some strategies you can use to help further a lifelong learning mind-set. First, understand your personal interests and set some goals that align with them. Lifelong learning does not always have to incorporate building skills or knowledge applicable to the workplace. It might be centered on something you

enjoy in your personal life. For example, suppose you really enjoy genealogy and local history. Perhaps you decide you want to learn more about the history of your hometown. For local history, you might visit the local historical society or find internet resources about the history of your hometown. Then, you can determine how you might incorporate this desire for learning into your life. Will you do something related to your personal learning goals once a week? Will you share your new knowledge with coworkers, friends, or family? Or maybe you can find a way to utilize the new information in the workplace or the community.

There are many ways to incorporate a lifelong learning mind-set into your life. Regardless of your approach, the lifelong learning mind-set can be advantageous from both a personal and a professional standpoint.

1.2 | Computer Hardware and Networks

Learning Objectives

By the end of this section, you will be able to:
- Explain the components that make up a computer
- Describe how computers process and store data
- Discuss what networks are and how they function
- Understand how to maintain and clean computer components

You do not need to know how to build a computer from scratch to effectively use a mobile device or other computing technology. However, a basic understanding of how computers operate can help you troubleshoot problems, and with some knowledge of computer terminology, you will be a more informed consumer when you are making technology purchases. Although there are technological and programming differences between computers, tablets, gaming consoles, and mobile devices, all are built around the same basic technology. This technology has evolved through innovations in the field to offer users enhanced features, reduced costs, and increased operating speeds.

This section will cover some basic aspects of computing. These concepts will give you a broader understanding of the technology you are using beyond simply operating the computer or tablet for personal or work tasks.

What Is a Computer?

Although today's computers look and behave differently from early efforts, they include the same core features. A **computer** is simply a programmable machine that can execute predefined lists of instructions and respond to new instructions. A very large computers called a **mainframe** is capable of great processing speed and data storage. Mainframe computers today typically function as servers. Servers are powerful computers that act as a central hub of the technology needs for the organization. Servers support data storage, sharing of computer programs, and hosting websites. Another name for a computer program (language) or set of programs with the end goal of converting data into processes and actions is **software**. Software, such as Microsoft Word, allows the user to interface with the computer. Accessories such as a keyboard, mouse, printer, and monitor are called **hardware**. These input and output devices allow us to communicate with the computer and to extract information from it.

There are many different types of computer systems, including workstations, microcomputers, and supercomputers. A **workstation** is a powerful single-user computer that is similar to a personal computer but more powerful. They are typically used to manage business operations such as invoicing customers, managing online sales, or ordering inventory for the company. A **minicomputer** is similar in power to mainframe computers but, as the name implies, is much smaller in size and can be used in midsize organizations that need more power than what a typical personal computer might provide. A **supercomputer** is extremely powerful and has the fastest processor available. These computers can be used to process highly complex scientific data at fast speeds.

Computers are hard to get away from—they're in all kinds of everyday devices. Appliances, cars, watches, and

even the heating and cooling systems in our homes incorporate computer technology that enables us to send and receive information from these devices. Today's smartphones are essentially minicomputers.

How Computers Work

Most computers consist of a few basic elements. The **motherboard** is the hardware that runs communications for the computer system (Figure 1.20a). It sits within the system unit, which is the container that houses most of the computer's electronic components. The **central processing unit (CPU)** contains a single chip called a **microprocessor** (the "brains" of a computer system). A microprocessor (Figure 1.20b) consists of a control and what is known as an arithmetic-logic unit, which performs math and logical operations within the computer system.

Figure 1.20 Two essential components of a computer's inner workings are (a) the motherboard and (b) the CPU's microprocessor. (credit a: modification of "Green Motherboard" by Pixabay/Pexels, CC0; credit b: modification of "Intel Core 2 Duo E6750" by Nao Iizuka/Flickr, CC BY 2.0)

Personal Computers and Devices

Numerous types of computers and devices are available for business or personal use today. A **personal computer (PC)** is a microcomputer that is suitable for individual use, including a desktop computer, laptop, tablet, smartphone, and wearable device such as a smartwatch. Desktop computers are personal workstations that you set up at a fixed location, such as a desk. They are typically equipped with a tower (where components such as the motherboard are housed), a monitor, and other peripheral accessories, such as a keyboard, mouse, and printer. Laptops are portable and lightweight—small enough to fit into most briefcases. The computer and monitor are combined, and peripheral accessories are optional. Tablets, such as the Kindle, are smaller than laptops and have less functionality but are still very powerful, with many features that support everyday personal use. They are even more portable than laptops, and their touch screens, which don't require a mouse, are their distinguishing feature.

Operating Systems

As stated earlier, a computer's operating system is software that is essential to all functionality and use of the computer. It controls the computer's activities, from memory to processes, and ensures that hardware and software components can "speak" to each other. It provides the interface necessary for humans to communicate with the computer and all its components. Here is where the big players enter the computing scene: Microsoft Windows, Apple macOS, and Google's Android OS, to name a few. You will typically interact with Windows and Apple macOS on a laptop or tablet. The programs that we discuss in this text, such as Google Sheets and Microsoft Word, use their respective operating system. The Android and iOS operating systems are used for mobile devices. You are likely to see these operating systems in use daily, both in the workplace and in your personal life.

Information Processing, Storage, and Memory

Businesses take great care in procuring computers that can handle the work that needs to get done. Before

selecting computers, they'll investigate some basic functions that have to do with how fast the devices process information and how well they store data. The **information processing cycle** is the sequence of events involved in processing information—input, processing, storage, and output:

- Input consists of entering the data and information into the computer system.
- Processing involves a series of operations performed by the computer to organize, interpret, or otherwise make use of the information input into the computer.
- Output entails viewing this processed information in a way that makes sense to the user, either through the monitor or as a printout.
- Finally, storage is the process of saving information into the computer for future use.

There are two types of storage, primary storage and secondary storage. Primary storage refers to temporary files that are available only when the computer is on. Primary storage is also known as short-term memory, or **random access memory (RAM)**. This type of memory is not meant to save information for future use but allows the computer to operate and process information quickly as it is being used. Secondary storage is considered permanent storage on a computer system or removable device, such as the old floppy disks. You may also be familiar with another type of memory—**cache**. The computer's cache holds data that can be retrieved quickly, often including downloads from websites or other information that can be used to load websites faster. The cache operates in the background to help the computer operate more quickly.

A **hard disk** is considered secondary storage where users can save files and retrieve data and programs. There are two types of hard disks, internal and external. An **internal disk drive** is housed within the computer unit, and users update and produce copies of all files they need. Figure 1.21 shows a few types of **external disk drive**. These are portable, allowing the user to save information outside of the computer unit for use elsewhere.

Before an operating system loads and is ready to use, the computer needs hardwired instructions, called **read-only memory (ROM)**. Businesses should be sure to procure computers with sufficient RAM and to make sure that data storage solutions are in place to handle their needs. The amount of RAM impacts the speed at which programs run. Computers with less RAM are slower and can hinder work productivity in the workplace. Often businesses will begin with less RAM and eventually upgrade to higher levels as their business and needs expand.

(a)   (b)   (c)

Figure 1.21 Different types of storage devices used over the years include (a) floppy disks, which are no longer used, (b) CD-ROM disks, and (c) flash drives. (credit a: modification of "Floppy Disk Data" by OpenClipart-Vectors/Pixabay, CC0; credit b: modification of "Dvd Cd-Rom Compact Disk" by OpenClipart-Vectors/Pixabay, CC0; credit c: modification of "Usb Disk Disc" by Clker-Free-Vector-Images/Pixabay, CC0)

Networks

Talk about networks is common in the workplace. You will hear that the network "has gone down" or "is running slow." What does this mean? What is a network, anyway? A **network** is a connection of two or more computer systems, as well as devices, by either a cable or a wireless connection. Networks may be simple or

complex, self-contained within a small area like your home or dispersed over a large geographic area.

These different types of networks are called personal area networks (PANs), local area networks (LANs), and wide area networks (WANs). Personal area networks typically connect personal computers and devices within a small area. Local area networks (LANs) are primarily used by colleges and universities as a way of linking computers and sharing printers and other resources. Wide area networks (WANs) allow access to regional service providers and span distances greater than 100 miles. The internet is a wide area network.

Network Hardware

In order to function properly, networks depend on a **router**. These devices perform two functions: they direct the data traffic, so to speak, from one network to another, and they allow multiple computers to use the same internet connection. Routers can vary in shape and size and also by performance. Switches coordinate direct flow of data between components. Gateways are devices that allow one local area network to be linked to other LANs or larger networks. The purpose of a **hub** is to send a received message to all connected devices rather than just the intended ones.

Network Servers

A **client** is a device that requests and uses resources available from other devices on the same network. For example, if you use a computer at your local library or a computer located on your campus, you are using a client device. In the workplace, the computers that employees have at their workstations are often connected through the network and are clients to that network. A **server** connects devices and allows for resource sharing across the network. Servers may have different functions. Examples are application servers, communication servers, database servers, file servers, print servers, and web servers.

Network adapter cards connect computers and devices to a network, enabling the sharing of hardware, software, and data across the network. The network adapter card connects the system unit to the network via a network cable. These cards used to be purchased separately in the early days of personal computers, but most computers today come with integrated cards embedded in their motherboard. The devices sending and receiving data are identified by **transmission control protocol/internet protocol (TCP/IP)**, which organizes the information into small packets for transmission through the network and across the internet. One of the most widely used internet protocols, used for web traffic, is **hypertext transfer protocol (HTTP)**. **HTTPS** is a more secure protocol than HTTP, for users and website owners alike, because users' information is protected with a "pass" safety inspector embedded within the protocol. Before exchanging confidential information, such as credit card information, online, users should always verify if the website begins with https. And even with this safer and more secure connection, you should always be cautious when sharing information.

Secure File Transfer Protocol (SFTP) is a secure version of file transfer protocol; it provides a secure connection for transferring files. User datagram protocol (UDP) is a communication protocol that works across the internet for time-sensitive transmissions such as video playback. Its main goal is to speed up communication by establishing connection before data is transferred. Another security protocol that uses encryption to help ensure privacy of information and communications across the internet is **secure sockets layer (SSL)**. Cybersecurity is a major concern of computer users, both personally and professionally. As encryption technology has progressed, there have been several iterations of SSL protocols. Today, the encryption is referred to as TLS (transport layer security), but the intent is the same—providing protection of data that is shared via the internet.

SPOTLIGHT ON ETHICS

Secure Information Transfers

One of the most common types of cybercrimes is identity theft, which occurs when a hacker steals an

individual's identity for economic gain. The increase of hacker**s**, individuals who gain unauthorized access to computer systems in an attempt to steal someone's information, has become a major issue and has led to the development of such software programs as Norton Antivirus and LifeLock to protect consumers' identities.

Another major safety concern when using computers is the existence of malware and viruses—software that can damage or slow down a computer system by opening an insecure portal into your computer. Malware can also damage files and allow hackers access to files and information stored on your computer. Depending on how these programs are written, they may only damage the computer that initiated the virus/malware, or the malware may flow throughout networks by attaching itself to other files that are exchanged across the network.

Users should be very careful when opening files sent to them in email or when clicking links to unfamiliar websites. Phishing scams are very common. These are attempts by hackers to gain access to your personal information, such as the credentials you may use to access financial and other sensitive accounts. Phishing most often occurs through email that appears to come from a reputable source, or via social media. It is always best to avoid logging into accounts through links sent in email, clicking on links that are not secure or recognizable, or opening files unless you know who the sender is and what is being sent.

1.3 | The Internet, Cloud Computing, and the Internet of Things

Learning Objectives

By the end of this section, you will be able to:

- Explain how the internet has evolved and how it functions in today's world
- Describe how to conduct an effective internet search
- Conduct business research on the internet
- Explain the use of cloud computing for business
- Define the Internet of Things

The internet has dramatically transformed how we access and manage information, both at home and in the business world. For many people, it's almost impossible to go about your day without needing access to the internet. It's in your home—from smart doorbells to TVs, thermostats, and personal assistants. It's on your wrist, in your car, and, of course, on your phone. It's big business and it is integral to just about every business out there.

Established businesses have taken advantage of the ability to reach new customers by selling their products online, while would-be entrepreneurs use the internet to open online storefronts. The internet also enables us to conduct both personal and professional transactions more efficiently—from accessing important health-care documents to filing our tax returns, transferring money between bank accounts, and making payments to individuals online. Many of us practically run our lives through our phones.

LINK TO LEARNING

Read this article on the invention of the internet (https://openstax.org/r/78InternetInv) to learn more. When was the internet first developed and for what purpose? How did it evolve into the internet we use today?

The Internet: From Inception to Today

The internet as we know it today originated in the 1960s with the idea of using a traditional telephone

switching circuit to wirelessly connect computers in a network. The telephone system would allow these computers to communicate with one another, exchange data, and run shared programs. Researchers and engineers from both the public and the private sector came together to form the Advanced Research Projects Agency (ARPA) to investigate ways the U.S. military could improve communications, with the goal of protecting the country from unexpected enemy attacks.

In 1969, a new digital **packet switching** technology was introduced to enable two computers to communicate with each other, replacing the telephone circuit technology. Packet switching happens when computers break down data or information into smaller groups (packets) and transmit several of those packets over the network. When the packets reach the destination computer, they are put back together in their original form. The communication occurred through the traditional phone line system but was transformed into digital data during transmission. The packet technology did not require a dedicated telephone line to network the computers together. This was the origin of the ARPA Network, or ARPANET, and is the same technology used today for the internet. The networked computers were also able to send simple messages to one another, setting the stage for email as we know it today. Figure 1.22 shows an early iteration of the ARPA network.
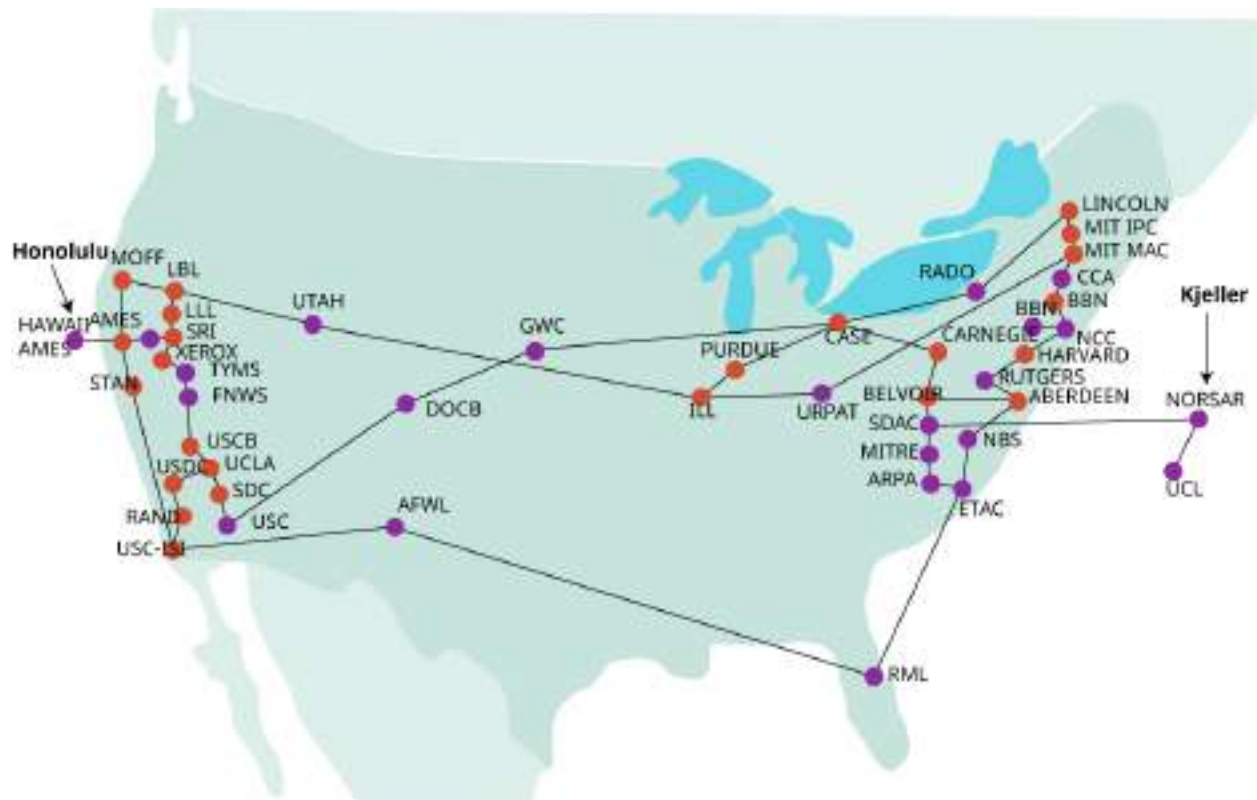
Figure 1.22 In the 1970s, ARPA's network consisted of a series of nodes (connectors) and lines that stretched across the continental United States. (credit: modification of "Arpanet 1974" by Yngvar/Wikimedia Commons, Public Domain)

In less than five years, the network expanded to include thirty different organizations and institutions across the world, and by 1975, ARPA determined that it needed to establish standards for consistency. These rules helped ensure that the interconnected network, or internet, was secure and efficient. The transmission control protocol/internet protocol (TCP/IP) was established to standardize the computer language used between the computers in the network. With these rules, a unique **internet protocol address (IP address)** allowed users to determine the geographic location of any computer on the network. The IP address was also used to direct the transmitted information to the appropriate destination. Because the IP address is a series of numbers and decimal points that can be hard to remember, the **domain name system (DNS)** was developed in 1983 to convert IP addresses into simple names. The DNS thus became the phone book for the internet, enabling users to send a message using their name, the symbol @, and the location of the computer as identified by its

domain name. With the DNS, the foundation of the World Wide Web (WWW) was put into place. The term *internet* simply refers to the interconnected computers, a network that now extends across the world. The WWW is the content that has been collected over the internet and is available online. By 1981, the network had grown to over 200 hosts. The first domain name was registered in 1985 to a computer manufacturer.

By the mid-1980s, scientists and researchers across the world were working on computer networking technology. With the success of the ARPANET, the ARPA group was charged with working on other, more cutting-edge projects. The ARPANET-connected organizations were predominantly government entities or educational research centers; the system was not available for commercial or personal use. Consequently, the project was moved to the U.S. Department of Defense, where the network continued to expand through various branches, including NASA and the National Science Foundation (NSF). In 1985, the NSF created the structure for a supercomputing center to connect colleges and universities, research centers, and regional networks. By the end of the 1980s, this network had grown to over 30,000 hosts. As a result, ARPANET was decommissioned in 1990.

In 1989, the first dial-up **internet service provider (ISP)** was established, allowing commercial access to the internet. The term *dial-up internet* emerged to describe how users would use existing telephone technology to "dial up" internet access through a specific provider. Because the internet was established primarily for military use, access to the technology was highly restricted, limited to specific uses such as research. By 1992, Congress had allowed the NSF to grant some access to the network for uses beyond education and research. Then, in 1995, all restrictions on noncommercial uses of the internet were lifted.

In these early days, a good deal of computer knowledge was needed in order to use the network, so the internet was not yet part of mainstream life. But that was about to change. In 1990, hypertext transfer protocol (HTTP), hypertext markup language (HTML), and the uniform resource locator (URL) were developed to give the average person access to the web of information. This really was the birth of the World Wide Web. HTML provides the structure on which web pages are based; it is a series of commands that describe attributes such as the font size and background colors of the displayed page. The uniform resource locator (URL) is an address—similar to a postal address—that directs the user to a unique location or page on the World Wide Web. These two developments, along with the milestones shown in Figure 1.23 made the web less technically complex and easier for the average person to navigate.

People soon began to see the ease with which web pages could be created. In 1993, the first user-friendly **web browser**, Mosaic, came on the scene. A web browser provides the interface that you can use to search for the information stored on the WWW. Marc Andreessen, a student at the University of Illinois, developed it. One key feature of Mosaic was the ability to include images as well as text on a web page. Other features included buttons to select for navigating the page, the ability to include video clips, and hyperlinks. A **hyperlink** is a link that can take the user from one web page to another just by clicking the highlighted link. Initially available as a free download, Mosaic quickly caught on and evolved as more users came on board. Prior to Mosaic, fewer than 200 web pages were available, but in just a few short years by the late 1990s, that number grew to more than 100,000. After graduating, Andreessen formed Netscape Communications and would eventually launch Netscape Navigator, which would grow to over 10 million users globally in just two years. Microsoft was quick to respond with its browser, Internet Explorer, which was bundled with the Windows operating system.

Key Layers of the Internet

early milestones		milestones
1971 - email@ Ray Tomlinson	**Content**	1987 - HyperCard Bill Atkinson
1990 - Archie Emtage & Deutsch	**Search Engine**	1998 - Google Brin & Page
1986 - DOS Houdini Neil Larson	**Browsers**	1993 - Mosaic Marc Andreessen
Vannevar Bush, Ted Nelson, Douglas Engelbart	**World Wide Web**	1990 - http:// Tim Berners-Lee
1969 - ARPANET J.C.R. Licklider	**Internet**	1975 - TCP/IP Cerf & Kahn
1956 - SAGE George Valley	**Networks**	1973 - Ethernet Robert Metcalfe
1941- Z3 Konrad Zuse	**Computers**	1976 - Apple Jobs & Wozniak

Figure 1.23 Major milestones in the creation of the internet came in layers.

By 1998, some big tech names established themselves as internet-based businesses—Hotmail, Amazon, Google, eBay, and Yahoo!, to name a few. The rise of the internet led to what became known as the dot-com bubble, a period when investors poured money into many internet-based ventures that promised high returns. Of course, many of these ventures failed, and their investors lost a good deal of capital. But, despite this, new ideas continued to emerge, and the internet continued to grow. Here are a few internet ventures that came out of the dot-com bubble and are still around today:

- Wikipedia—2001
- Facebook—2004
- YouTube—2005
- Twitter (now X)—2006
- Hulu—2007

SPOTLIGHT ON ETHICS

Inequities in Internet Access

Having access to the internet is almost essential to fully participate in society today. In some instances,

without the internet, even routine tasks can seem impossible. For example, some companies can be contacted only via the internet, so you may need internet access to even apply for a job. Because of the global nature of the internet, it might be assumed that everyone has access in some way. But even in the United States, there are large disparities in access to reliable internet connections. In today's electronic world, this is furthering the gap between economic, racial, and ethnic groups; age groups; and socioeconomic groups. It is estimated that on average, nearly 15 percent of households in the United States with school-age children lack access to the internet. But in rural or low-income areas, this percentage could be much higher.

Governments are introducing initiatives to make the internet more accessible to all, often through partnerships with technology firms. For example, in a partnership with Google, the city of Austin, Texas, has been able to provide free internet services for nearly 2,000 lower-income residents. As early as 2006, India established internet access in its rural communities through the use of kiosks. These are just a couple of examples of the efforts worldwide to make the internet more accessible for all.

Using the Internet

Using the internet today is much simpler than it was even as recently as five years ago. It simply entails going to the web browser of our choice and clicking the mouse to launch it. Common browsers in use today include Google Chrome, Apple Safari, Microsoft Edge, and Firefox. The browser, once opened, will take you to where you want to go online. You can go directly to a web page by typing its URL in the navigation bar at the top of the browser. However, many browsers have a default search engine that will automatically launch when you open the browser and will allow you to search the internet for content you want to locate or research. Chrome, for example, will automatically navigate to the Google search engine when you open the Chrome program. Most browsers include a bookmark feature, and it may be helpful to bookmark/favorite pages that you visit frequently or want to remember for quick access later. With Chrome, you will see a star on the right-hand side of the URL to select to bookmark/favorite the page. Figure 1.24 shows these buttons.

Figure 1.24 To use a browser, type the website URL address into the navigation bar. Here, we've typed www.google.com to get to Google's famous search page. You can also bookmark/favorite websites that you frequent for quick access by selecting the star button. (Google Search is a trademark of Google LLC.)

Conducting Effective Searches

Conducting searches on the internet is straightforward, but there are some techniques that will make your searches more effective. Because of the vast amount of information available on the internet, incorporating some simple changes to your search strategies can make a huge difference. You might, for example, want to narrow the number of results that you get from a search to those that are most relevant. When you begin to type in a search term, most engines will display a list of suggested searches. This list of suggestions will give you similar, related searches using the terms that you have begun to type into the search bar. This is often helpful as you try to narrow your search to obtain the desired results, as Figure 1.25 shows.
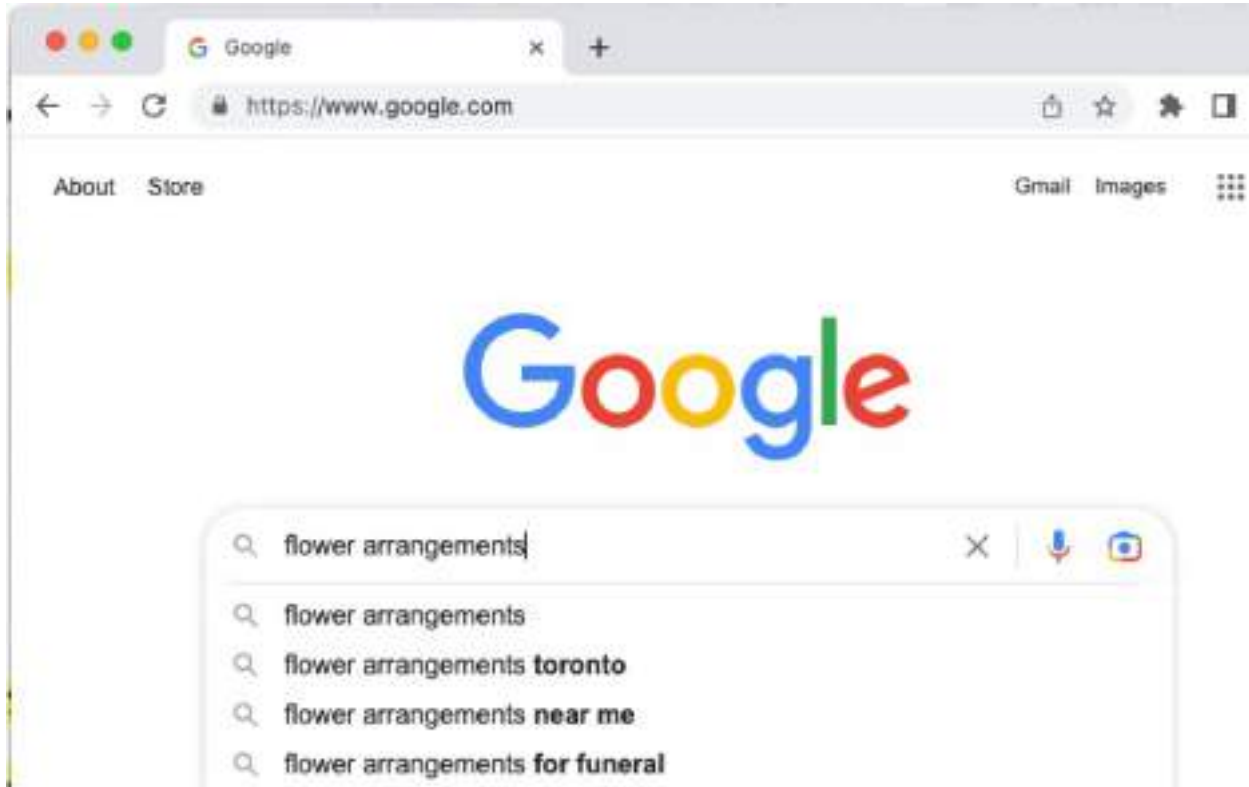
Figure 1.25 When you begin typing into a search engine, not just Google's, most will offer suggested searches based on what you typed, as you can see in the list under the "flower arrangements" entry. (Google Search is a trademark of Google LLC.)

As you conduct your search, it is often helpful to keep a list of search terms that you have successfully used. It is easy to forget that you have already used a particular phrase or word, so a simple list will make it easier to avoid replicating something you have already searched.

For example, suppose your boss at WorldCorp has asked you to search for a local nonprofit organization centered on children to support this year during the holidays. You might choose to search using the word or phrase *children, kids, not for profit, nonprofit,* or *children in need,* as just a few examples.

Search engines also offer the capability to search with an image or with voice instead of text. Once you have entered a search term or phrase, you have some additional options. For example, you can restrict the search to a certain date range or a certain location, or you can change the search to focus only on shopping related to your search term. See Figure 1.26. Keep in mind that once you reach a website, you will often find a search bar within the website itself. This will enable you to search within that specific website instead of conducting a search of the entire internet. A little trick for searching on a page is to use the control (Ctrl) key and the F key at the same time (Ctrl+F). When you press these two keys at the same time, a search window will appear that allows you to search on that specific web page.
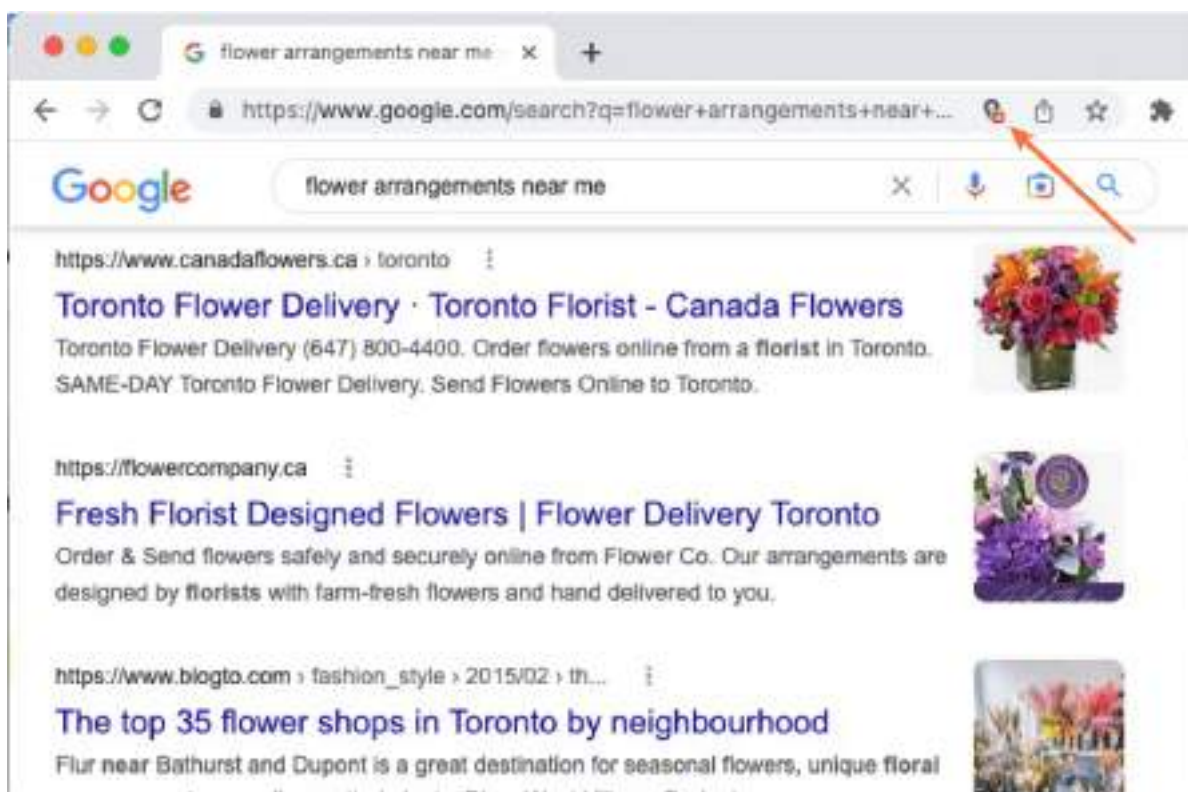
Figure 1.26 Using the advanced search features, you can restrict your search to a location or date range. You can also search using voice or search with an image. (Google Search is a trademark of Google LLC.)

To conduct an internet search, it is best to use specific and unique terms whenever possible. For example, when searching for contact information for a nonprofit organization in your hometown, rather than simply using the term "food bank," you should use the actual name of the food bank you are searching. Or, if you are unsure of the name of the organization, you might limit the search by combining "food bank" with the name of your town or city. You can add a phrase as well. Being more specific in your searches will lead to more refined results.

In defining your search, avoid using common words such as "a" and "the," as well as punctuation marks. Also note that most search engines are not case sensitive, so proper capitalization is unimportant. Finally, to get the most results, it may be helpful to focus on the base or root word. For example, instead of searching on "running gear for women," you might get more results by using "run gear women," leaving the search open to words such as "runner" in addition to "running."

Your internet searches can be further refined by adding "+" or "–" in front of a word to either add to the search term or exclude something from the term. If, for example, you are searching for theaters but do not want movie theaters, you can type "theater–movie" to get search results that do *not* include movie theaters. This same approach can be used with "+" to add more terms to your searches. (Note: Some search engines may use NOT or AND instead of the mathematical sign.)

To search for an exact phrase or string of words, enclose the phrase in quotation marks. For example, if you are looking for information about historic theaters, you can search by typing "historic theaters" and then perhaps add a location (city or state) at the end, also in quotation marks, so your search would be "historic

theaters" "Atlanta."

Use the tilde (~) to search for synonyms for the word you type. For example, searching "~coat" might return search results including jackets and sweatshirts. The asterisk (*) can be used to search partial words. This can be very helpful if you want to search for a specific person or location but are not sure of the correct spelling or the complete term. If you are researching nonprofit organizations and want to capture information that might just say "nonprofits" instead of the complete phrase, you can search using "nonprofit*." Finally, the "|" or OR operator can search on two terms at the same time, giving you results for either of the two terms. Searching "black shoes for sale" | "brown shoes for sale" will return results that satisfy both search phrases. These operators can be combined in various ways to make your searches much more directed. Be careful not to be too restrictive, however, as you might filter out some relevant results. Table 1.1 summarizes the key internet search operators.

Operator	Description
+ , AND	Include a word in the search
–, NOT	Exclude a word from the search
" "	Search for the exact words contained between the quotation marks
*	Search partial words
~	Search for synonyms
|, OR	Search two words at the same time

Table 1.1 Internet Search Operators Using these operators can make your search more effective.

Conducting Business Research

Conducting business research via the internet enables you to access information quickly at little or no cost. The internet gives you access to a large body of data from a variety of sources across the world. There are both free and fee-based services available on the internet to gather data. In addition, you can access many academic, peer-reviewed research using specialized databases. The first step is to narrow your search by determining what information you need and making a list of the data needed. As you work through your search, be sure to record relevant search terms, the website URL, and other pertinent information for you to access later if needed. A good strategy might be to keep a notepad by the computer or keep an electronic record in Microsoft Word or Google Docs.

Some common sources of information for business research can be readily accessed:

- Google Scholar is a search engine for peer-reviewed academic research. Here, you will find journal articles (often full-text .pdf files) for nearly all disciplines. This source can be handy if you are looking for targeted information based on a specific academic discipline.
- Microsoft has a similar search engine called Microsoft Academic.
- Science.gov is a website that provides access to data from nearly twenty U.S. federal agencies.
- Census.gov is an excellent source of demographic information.
- If you are searching for financial information for companies, Yahoo! Finance or Google Finance is a great place to start.
- More detailed information about specific industries and sectors is available at CSImarket.com.

When conducting research on the internet, there always will be some question of the credibility of the information you find. Because virtually anyone can create a website or post information on the internet, you should read with a critical eye. There is a wealth of quality information available, but it is just as easy to stumble upon unreliable data. Wikipedia is a commonly searched source for information. Wikipedia is an online encyclopedia built organically by users (it isn't owned by a person or organization). It was founded in 2001 as a nonprofit organization with the goal of giving free access to information for everyone. Wikipedia is the fifth most visited site on the internet. Users submit content to pages and check one another for accuracy. They are given guidelines to follow for fact checking and editorial changes. In most cases, however, using Wikipedia as the primary source for research is frowned upon because of the lack of authentic reliability checks for the information.

With any research, it is good practice to use **triangulation**: To verify the credibility of a piece of research, you should find at least three sources that are in agreement. By using multiple sources, you are minimizing the risk of uncertainty of the information found. It is also good practice to follow additional guidelines when evaluating the credibility of information found on the internet. By looking a little deeper into the research, you may uncover some hidden biases or questionable conclusions that were not readily apparent.

- Who is the author and what is their affiliation?
- Who paid for the research?
- What is the date of the information?
- Has the website been updated recently, and do the hyperlinks work?
- Are any clear biases or opinions expressed?
- Is there a way to contact the author or request more information?

By taking the time to dive a little deeper into the information retrieved, you can better ensure the data is credible and suitable for your needs.

Globalization

The internet has broken down many geographic barriers. Business transactions can easily happen from points across the globe, products can be ordered and efficiently shipped to destinations thousands of miles away, and individuals can readily access information related to current events in other countries. The global nature of the internet has opened up the world, but there is little consistency between countries in their management of this technology. There are distinct differences from country to country in the laws and regulations governing internet use. For example, Facebook and Google are banned in some countries, such as Iran and North Korea, because these sites are seen as contradictory to local traditions and customs. In China, the government plays a major role in monitoring what citizens can access and view on the internet. There are nearly 100 regulations specifically centered on the internet and its use in China.

Internet regulations across the world generally fall into one of four categories:

- Encouragement of self-regulation and voluntary use of filters for illegal material
- Punitive actions for making material available online that is unsuitable for children
- Required blocking of government-selected materials
- Prohibition on public access to the internet

Many countries have enacted some type of legislation, policy, or governmental oversight with the goal of managing internet content. This governmental involvement began as early as 1996 and continues to be amended today. As you enter the workplace, you should be aware of the specific legislation that might impact the industry that you are working in. This could include protecting user information through specific privacy controls to managing content on a social media site for appropriateness. You do not have to be a legal expert, but having a general awareness of governmental involvement in the information shared over the internet is important.

Communication, Collaboration, and Social Media

Through the internet and the software programs available today, we can stay connected to colleagues and family across great distances. Email, the Google Workspace of programs, Microsoft 365, and social media sites have all had a significant impact on business and personal productivity. Email first became a reality with the ARPANET. Today, we have many options when it comes to our email service. Gmail from Google and Outlook by Microsoft led the email market. These programs are directly integrated into their other products to aid in communication and collaboration between users. The enhanced capabilities of email programs today allow easy sharing of photos, documents, video, and large files. Just the ability to connect to colleagues who are outside of your general geographic area on a regular basis greatly improves productivity and connectivity.

We also now have several options for videoconferencing. Many people use these tools outside the workplace to spend time with out-of-town family and friends. The traditional telephone conference call where several people sit around a conference table while another colleague calls in on a speaker phone is a rare sight in today's office. Now, we can gather around a virtual table and use a videoconferencing program to conduct an important business meeting (Figure 1.27). We can use the same program to have a virtual meal with a family member who lives miles away. Some of the leading videoconferencing tools today include Zoom, Microsoft Teams, Skype, WebEx, and Google Meet. All have basically the same functionality, with features such as recording the meeting and providing a transcript of the discussion. These features have been valuable as part of a widespread shift to remote working conditions for many companies. The shift to greater use of remote working environments occurs for various reasons, ranging from global issues such as a public health emergency to more localized reasons like increasing employee satisfaction by assisting in work/life balance.

Figure 1.27 Videoconferencing tools such as Zoom make telecommuting easier than ever before. *Forbes* credited Zoom's quick rise in use to its ease in navigation. (credit: modification of "VFRÖ - Zoom Meeting 3/2020" by Radiofabrik/Flickr, CC BY 2.0)

Another tool people use to connect and collaborate with others is **social media**. Social media is digital technology that allows users (individuals and organizations) to share information about themselves such as posts, photos, or videos. More than 40 percent of the global population use social media. Social media sites had their origin in connecting friends and families. However, as the number of users increased, businesses started to see the value in connecting with their customers via these social media sites. Many businesses have a distinct presence on social media as active users, not simply advertising through the site. Today, about 70 percent of businesses have a social media presence. The line between personal and business has blurred significantly. Very few people use social media solely for connecting and sharing with friends and family. Most will interact with businesses such as retail outlets and even banks on their social media sites. Many people follow a specific brand or company that they like. Personal and business social media sites are intertwined and connected across sites.

This phenomenon has shifted how businesses manage relationships with their customers. Many banks, for

example, have a social media site where they share financial tips and banking products/promotions available to their customers. Consumer products companies can use the sites to get feedback on product attributes or advertising strategies. Small businesses can use social media sites to offer promotions to bring more foot traffic into the store—whether online or brick-and-mortar.

The leading social media sites vary by age to some extent, with older generations leaning more toward Facebook and LinkedIn while younger people tend to gravitate to platforms such as TikTok, Instagram, Snapchat, and X (Twitter). Other popular social media sites include Pinterest and Reddit.

Privacy is a concern when dealing with any interaction on the internet, but especially with social media sites, where individuals often share personal information and pictures that could open them up to cyberattacks. You should regularly check and update the privacy settings on the social media sites you use. You might consider changing your password routinely to prevent hackers from accessing your information. Never share personal information through the site or through messages within the site. You should be wary of friend/follower requests from people who are unknown to you or your other connections. Avoid being controversial or posting overly personal content. Employers now are checking applicants' social media profiles and, in some cases, monitoring employees' activity.

Finally, as a user, it is easy to get pulled into clicking on advertisements that either show up in the margins or in the social media feed. Clicking leaves a virtual footprint of your activity that both legitimate advertisers and spammers can use to target advertisements and compel you to visit their sites. Often, you can limit your exposure through the site privacy settings, but the risk of exposure of personal information probably cannot be totally mitigated unless you avoid using social media sites altogether.

Personally identifiable information (PII) may include items that directly reveal your identity, such as your address or Social Security number. But other identifiable information can also be gathered, such as race, gender, or religion. You should be cautious when sharing information on the internet via social media and other websites. Useful precautions include regularly changing your passwords, not using the same passwords for multiple sites, providing limited personal information on social media sites or putting privacy settings at a high level, and, finally, being cautious about clicking links or advertisements from unknown sources.

Libraries and Media

The internet has changed the way that libraries operate and store/share information. Many libraries still house extensive collections of books, reference materials, magazines, and the like. In fact, you may be surprised to learn that reading print books still outpaces reading electronic books. Some college students have reaped the benefits of e-books by purchasing their textbooks in (often cheaper) electronic formats. Unlike a traditional print copy of the same material, these textbooks are interactive, enabling the publisher to include updated information and links to relevant extra materials that cannot be included in the print edition. With the availability of the internet and today's technology, students can also rent electronic textbooks, which can save a good deal of money over time. Currently, electronic textbooks hold about 30 percent of the total market.

Many libraries now have online services that allow users to place a hold on materials. When the item becomes available, the patron is notified via text or email. Libraries are also moving some of their resources to a digital format. For example, some of the historical archives housed in libraries have been cataloged digitally to provide broader access. Libraries will still have a good supply of DVDs or books on CD for patrons to check out, but many resources can now be accessed electronically by using your library card.

Many states have library systems that allow patrons in one city to utilize materials owned by another library in a different city. With apps such as OneDrive and Hoopla, users can gain access to thousands of digital materials, including books and media. These apps are typically compatible with the leading e-reader apps, such as Kindle, Kobo, and Libby. Also, libraries have become a central access point and technology hub for those lacking these resources at home, as Figure 1.28 shows. Nearly 96 percent of all rural public libraries offer free access to the internet for their cardholders. In all these ways, the digital revolution has altered the way

libraries think about the services they provide.

Figure 1.28 Many libraries today have computer workstations where users can access the internet and conduct research. (credit: modification of "Vancouver Public Central Library" by GoToVan/Flickr, CC BY 2.0)

Libraries can be a source of research that might otherwise be unavailable to you. For example, the popular genealogy site Ancestry.com has agreements with libraries to provide some of its exclusive material free of charge to users of the site's library edition. Libraries also provide free access to other databases that are centered on business research, including LexisNexis, BizMiner, Business Source Complete, and IbisWorld. These databases provide a wealth of information that is not readily obtained with a simple internet search.

Web Applications

A web application is a software program that is not installed directly onto the user's computer. Instead, the program and data associated with it are stored on the internet, and the application is accessed through a browser or app rather than through an installed program on the computer. In the past, users had to purchase a license key to install programs directly onto their computer. This takes up memory and storage space on the computer and presents limitations on updates to the program. The user would generally have to purchase the program on a regular basis to get the most updated version or purchase an upgrade. Web-based applications give users access to the most up-to-date version of the software while sometimes freeing up essential storage on the networks and allowing seamless collaboration between users in real time. Companies pay monthly or annual subscription fees for these programs, often based on the number of user licenses they want to purchase. Throughout this text, you will become familiar with the Google Workspace of products and Microsoft 365, so that you can develop basic computing skills for the work world.

E-commerce

Electronic commerce, or **e-commerce**, refers to conducting business transactions online—buying and selling goods or services in an online environment rather than in a traditional brick-and-mortar storefront. The first e-commerce transaction was in 1994, but it is helpful to think of e-commerce as a modern-day version of the catalog sales (Sears, JCPenney, Montgomery Ward) of times past, except that the ordering is done over a computer rather than over a telephone or by filling out a form and mailing it through the post office.

E-commerce transactions can occur between all customers in the marketing mix. In a business-to-business transaction, one business might purchase office supplies from another business. In a business-to-customer transaction, an individual purchases a product from a retailer online and has it delivered to their home. Consumer-to-consumer purchases can also be made through e-commerce—for example, when an individual purchases a product directly from another individual through a resale website.

E-commerce does not necessarily involve shipping the purchased items; for instance, you may purchase and download an electronic product, such as an e-book or music. E-commerce simply means that the purchase transaction occurs online rather than in person. Today, virtually all products or services can be purchased online. Some entrepreneurs have started exclusively online businesses with virtual storefronts and no physical

inventory. Today, e-commerce makes up about 15 percent of all retail sales across the world, with over twenty million e-commerce sites worldwide, representing nearly $4 trillion in sales. E-commerce jobs are expected to reach nearly 500,000 by the end of the 2020s; it is predicted that by 2040, 95 percent of purchases will be through e-commerce.

<div style="background:#c0442e;color:black;padding:4px">

REAL-WORLD APPLICATION

</div>

A New Kind of Entrepreneurship

Crowdfunding is a concept wherein many people contribute to fund a particular product launch or cause. Kickstarter is one such online platform where entrepreneurs can post their business idea and ask for contributions to make it happen. Some products have raised millions of dollars to fund their ideas. Pebbletime Smartwatch and the Coolertime Cooler garnered $20 million, $13.3 million respectively from Kickstarter donations.

The Cloud and Cloud Computing

Technological advances have made working remotely, or telecommuting, a possibility for many employees. In fact, one recent survey estimated that nearly 90 percent of U.S. employees would like to work remotely. Today, there are almost five million workers in the United States (nearly 40 percent of the U.S. workforce) who telecommute. Since 2015, the number of businesses that have allowed telecommuting has increased over 40 percent. Even for those who do not telecommute full time, access to the internet and such technologies as cloud computing in the workplace enable many employees to work from home at least once per month, with nearly 50 percent doing so once a week.

With **cloud computing** many of the resources that were traditionally stored on individual computers, including software programs, data management and storage systems, and networking tools, are moved to internet servers. This technological advance was prompted by the need to store large amounts of information and data and to enable collaboration by individuals across the world. The resources and their associated data are stored in a data center that is managed by a cloud service provider (CSP). The benefits of cloud computing are that it can handle larger amounts of data than any physical storage device can, and it also allows users to access their data from any computer, no matter the location, and from any device, as Figure 1.29 illustrates.

Figure 1.29 Cloud computing enables you to store much more data than can be kept on any physical computing device. (credit: "Cloud-Computing" by Learntek/Flickr, Public Domain)

The **cloud** is the term used to describe servers that are located at different locations and that are accessed via the internet. These servers are housed in data centers to provide storage and computer processing operations. The term *cloud* was first used in 1996 by a researcher at Compaq, and the first cloud computing service was Amazon Web Services (AWS), which launched in 2002 as a public cloud system. The cloud offers some distinct cost advantages to businesses. Companies can save money by not having to constantly upgrade individual users' storage capacity, and they can lower their IT costs because the subscription fee for use of the cloud service includes many troubleshooting and technical assistance functions. When we use the cloud for storage, we no longer need to store and maintain CDs with backups of the system or flash drives to transport documents from one computer to another. Cloud computing increases the speed of computing and gives all users real-time access to information stored in the cloud. Use of the cloud allows greater security for information storage as well as speedy distribution of new software and software upgrades. Finally, the cloud offers flexibility that enables businesses to operate more efficiently.

The security of information stored in the cloud can be of concern, but due diligence by individual users and the company can mitigate these risks. Here are some basic steps for ensuring the security of information:

1. Select a CSP that encrypts its data. Computers use the process of **encryption** to rewrite readable information into a code that can be deciphered only by using the key to the code, similar to solving a word puzzle that uses a secret code (see Figure 1.30). Encryption is an important step in ensuring the security of the information transmitted and stored in the cloud.
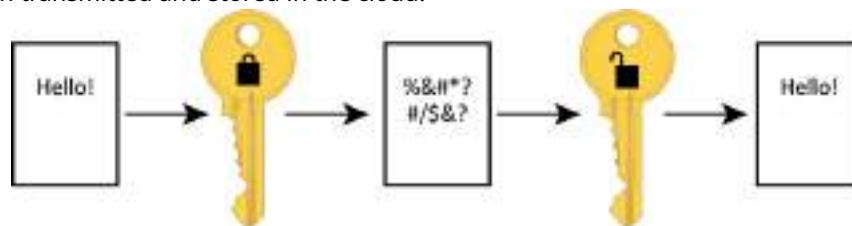
Figure 1.30 Each key has the code to the secret (encrypted) information, allowing messages to be sent safely.

2. Back up information regularly. Most CSPs will include this with the services they provide.
3. Use strong passwords and change the passwords regularly. Some businesses will set up a system that requires a password change at set time intervals.

4. Use two-factor authentication. This means that to access the system, you will need two pieces of identification, typically your username and password as well as one additional means of identification, such as an email to verify your identity, a code sent to your cell phone, or an answer to a personal question.

5. Make sure your system is protected by antivirus/antimalware software. These programs prevent unauthorized attempts to gain access to the system.

6. Avoid using public Wi-Fi access points to conduct critical business or personal transactions. Using public Wi-Fi exposes users to the potential for personal information to be compromised.

Cloud Computing in Business

Some companies set up a cloud-based **intranet**—a private network for internal company use. Unlike the internet, it is not available to the public and typically requires authorized users to enter a username and password. Many companies also require employees to make use of a virtual private network (VPN) to gain access to the company's intranet when they are off-site.

LINK TO LEARNING

The use of virtual private networks enables businesses to control who gains access to their computer network. Using cloud services can offer some of the same security advantages for business. Read this article on VPN and cloud computing (https://openstax.org/r/78VPNCloud) to learn how the two are related and some differences between the two.

Many businesses today use cloud computing to manage their information technology needs. Through the cloud, businesses can more efficiently analyze, manage, and store data. They are able to deliver software to their employees on demand and make updates to programs more rapidly. Finally, cloud computing enables seamless collaboration between business units that may be located miles apart.

Three types of clouds are involved in cloud computing:

1. The public cloud is managed by a CSP. All of their services are delivered via the internet, and they charge for their service. The resources are owned and maintained by the CSP. Microsoft Azure and IBM Cloud Services are examples of public cloud service providers.

2. A private cloud is used within a single business or organization. Its resources, which are owned by the business and maintained within the organization, are stored on a private network, or the company can pay a third party to host the private cloud. With a private cloud, there are often restrictions on who can use it and what permissions are given to the users. Businesses that use sensitive information, such as financial institutions or health-care providers, prefer private clouds because they offer more security than a public cloud system.

3. The final type of cloud system is a hybrid cloud—a blend of public and private. Some resources are utilized through a public cloud and others are secured through a private cloud.

Cloud Computing for Personal Use

You are probably using the cloud already in your professional or personal life, even if you are unaware that you are doing so. For example, cloud computing is used behind the scenes for Google and Microsoft programs, so if you are using Gmail or Outlook, you are using the cloud. Likewise, if you use Google Photos to store family memories, you are using the cloud. And if your family members play video games, stream movies, or listen to music on the internet, they are more than likely using the cloud. The cloud is working behind the scenes with much of the work we do both personally and professionally. This is a natural outgrowth of advances in internet capabilities and computing power to enable us to manage information more efficiently, conveniently, and cost-effectively.

Internet of Things (IoT): Integration and Collaboration

The **Internet of Things (IoT)** refers to the extension of internet connectivity beyond computers, to enable the transfer of information between machines and other objects, people, and animals by connecting them to the internet in some way. With the IoT, the physical connects to the virtual. Today, many consumers seek out products that connect to the internet, and some simple adjustments enable many nontechnical, inanimate objects, from light bulbs to dishwashers, to be part of the IoT.

As businesses see the value of the additional data that is gathered through IoT, many companies are marketing these technologies to consumers to make their lives easier and to save money. Having a reminder to put the laundry in the dryer or having the house thermostat adjust automatically based on outside temperature is more than a novelty—these features can save time and money, allowing consumers to feel more secure, better equipped to handle life's demands, and able to focus more on their pleasures in life. Businesses, too, can realize distinct improvements using real-time data and analytics, performance tracking, inventory/cost controls, and the automation of simple tasks. These capabilities can also allow businesses to adapt to challenging times.

REAL-WORLD APPLICATION

Pivoting during the Pandemic

COVID-19 drastically affected in-person business and services, many of whose owners found themselves struggling just to keep their businesses afloat. Some businesses chose to start offering their products or services online while some began or greatly enhanced their delivery operations. Others decided to close their business in the short term. Some businesses, such as Spotify and Netflix, put more resources into creating original content (podcasts, movies, series shows) rather than relying primarily on the sale of ads as a major revenue stream. Small restaurants offered delivery services and meal subscription services to keep their business thriving even during the pandemic. And larger corporations found that remote work allowed their employees to stay healthy while still meeting the needs of the business.

1.4 | Safety, Security, Privacy, and the Ethical Use of Technology

Learning Objectives

By the end of this section, you will be able to:
- Describe the importance of practicing responsible computer safety and security
- Identify common computer security issues
- List measures to prevent computer security breaches
- Describe the importance of privacy in a digital world

At WorldCorp, you've realized how the evolution of computing has led to your present-day status as a new employee. You're getting the hang of how computers are put together, how they have changed the business landscape, and how you need to understand their basic components to thrive in your industry. Another part of that understanding is learning how to safely navigate the computer world, both in the company's internal systems and in external systems on the internet and the World Wide Web.

The Importance of Computer Safety and Security

The protection of computer systems and information that prevents unauthorized use is referred to as **computer security**. Computer ethics are guidelines for the morally acceptable use of computers in society. Any criminal offense that involves a computer and a network is referred to as **cybercrime**. One of the most common types of cybercrimes is identity theft, which occurs when an unauthorized user steals an individual's

personal information, such as a Social Security number or credit card information for economic gain. An increase in the number of **hackers**—individuals who gain unauthorized access to computer systems in an attempt to steal someone's information—has prompted the development of software programs designed to protect consumers' identities, such as LifeLock.

There are strategies you can employ that will keep your computer, and the information you have saved on it, safe and secure from theft and hacking. These include:

- using security suites that can protect user privacy and security while on the internet
- using a **firewall**, which is a barrier between a network that is secured and one that is not secured, to provide additional security
- setting up password-protected network access
- avoiding logging in to accounts on an open network (one that is not password protected)
- using encryption to make it impossible for unauthorized individuals to gain access

Data and Identity Theft

In addition to hackers who target individual users, corporate espionage (also known as industrial, economic, or corporate spying) is conducted for commercial or financial gain by targeting businesses, government agencies, energy companies, and even schools. Corporate espionage can take the form of unethical or illegal acquisition of intellectual property (such as customer data, pricing, or research and development information) or trade secrets through theft, bribery, or blackmail. Examples of corporate espionage include:

- trespassing on a competitor's property and/or gaining unauthorized access to files
- wiretapping—the secret interception of electronic communications
- domain hacking, which occurs when another entity steals the original party's domain name
- phishing to lure competitors' employees to open emails, thereby exposing information

Attempts to get users to interact with an email or website that appears to be legitimate but is actually fake is called **phishing**. Phishing lures users to provide their personal information and login credentials through these hoax sites and emails. This is usually through the use of **spoofing**. Spoofing is communication (usually an email) that on the surface looks to be legitimate from a trusted source. These emails have become much more sophisticated and are designed to look more and more like real correspondence from a company or even a government agency such as the IRS. Something that has grown increasingly common is **ransomware**, malicious software that encrypts computer data, rendering it useless and inaccessible, and forcing the owner to pay a ransom to regain access. Software that is designed with the purpose of damaging a user's computer system once it has access to that system is called **malware**.

Password Management and Biometrics

For all of these threats to online security, there are protective steps you can take. A set of principles and best practices for storing and managing passwords in a manner that is likely to prevent unauthorized access is called **password management**. You may password protect your computer, as well as various accounts you may access through your computer and the internet. Having a strong password will ensure that hackers cannot figure out your password easily. Many organizations today use multifactor authentication to provide an additional layer of security. For example, when accessing your bank account on your phone or your laptop, you may be asked to enter a specific code that is sent via email or text. This now provides two layers of security—first, entering the correct password, then correctly entering the code that was sent to you. Multifactor authentication can also be used by businesses when accessing the company software or computer network.

REAL-WORLD APPLICATION

Please Pass the Password

Some tips for creating a strong password include:

- Avoid using a real name (either your own or the company's) as your password.
- Use a combination of letters and numbers with at least eight characters.
- Do not use a complete word such as "password."
- Do not reuse passwords.
- Use a combination of uppercase and lowercase letters.
- Incorporate special symbols instead of letters or numbers (such as an exclamation point or dollar sign instead of a numeral).

In addition to passwords, you can also use biometrics to protect your computer and information. Unique physical markers of an individual that can be used to restrict access to only those who match these physical characteristics, such as retinal scans and fingerprints, are called **biometrics**. Biometrics are much harder to hack as they cannot be guessed or stolen.

Internet and Web Privacy

The internet is pervasive and omnipresent. It is part of all you do in business and in your everyday life. How people conduct themselves online, what they share, and what they visit—all this information is captured and saved in various places, from internet providers' servers to browser companies such as Google to different social media sites. This information is captured and saved even if deleted from your computer or account. It is important to consider how to represent yourself and what to share to maintain your privacy.

Cookies

After you have searched for a product on the internet, do you notice that you suddenly start receiving advertisements for that product, or that a store website now displays that product on its front page? For that, you can thank cookies. Small data files that are deposited on user hard disks from websites you visit are called **cookies**. They keep track of your browsing and search history, collecting information about your potential interests to tailor advertisements and product placement on websites. These cookies can be either blocked or accepted, depending on a company's privacy policy. The potential risk of cookies is that they can store information about the user, user preferences, and user browsing habits. That said, they can also save time by storing users' login information and browsing preferences, allowing internet pages to load faster than if you had loaded them the first time. Regardless of convenience, it is a good idea to clear cookies from time to time and to restrict cookies on certain sites depending on your own preferences.

Browsing History

Your browsing history includes all websites you may have visited, as well as any actions you may have taken on those websites. It is typically saved locally on your computer within the browser application, as well as with the company that provides the browser. Your internet or data provider may also keep track of your browsing history. While this information is handy to have for future reference, consider clearing your browsing history from your personal computer on a regular basis. Be aware that your employer may also collect this information; while using a work computer, you should avoid visiting websites that do not support your work function. Both Google analytics and your company can theoretically store browsing data for a long time, even after you delete it.

Temporary Files

As the name implies, temporary files are created by a program to allow it to complete a task or tasks. These

files are handy to have in case of a sudden shutdown, as they may help to recover a file that might otherwise be lost. Many temporary files are automatically deleted once the task is complete or the file is saved permanently. But others may stick around; these files are saved in your temp folder. On a Windows computer, you can access your temp folder by typing %temp% in the Windows search bar at the bottom left of your screen.

MAC TIP

On a Mac, open the Finder and select Go ≫ Go to Folder. In the search bar, type ~/Library/Caches/ and then click Go to run the command. A window will open with a list of all the generated temp files saved on your Mac. You can easily select and delete these files.

Posting on Social Media

According to Pew Research, "seven-in-ten Americans use social media to connect with one another, engage with news content, share information and entertain themselves." Some of the most popular platforms today are TikTok, Facebook, YouTube, Instagram, and WhatsApp. Figure 1.31 shows the sites adults in the United States use most. The United States and China have the most social media users of all countries worldwide. Social media has exploded in popularity and is used widely for both personal and business purposes. Businesses and individuals must be mindful of what they post on social media. Even the most private accounts can have data breaches, allowing others to save and/or share private content. It is important to consider what you post, as well as any potential unintended consequences that might arise from social media use. You must also be aware of spoof accounts that present as a reputable person, when in fact they are attempting to con or mislead an individual. Similarly, AI and bots may interact with users, posing as real people when in fact they are nothing more than a computer algorithm.
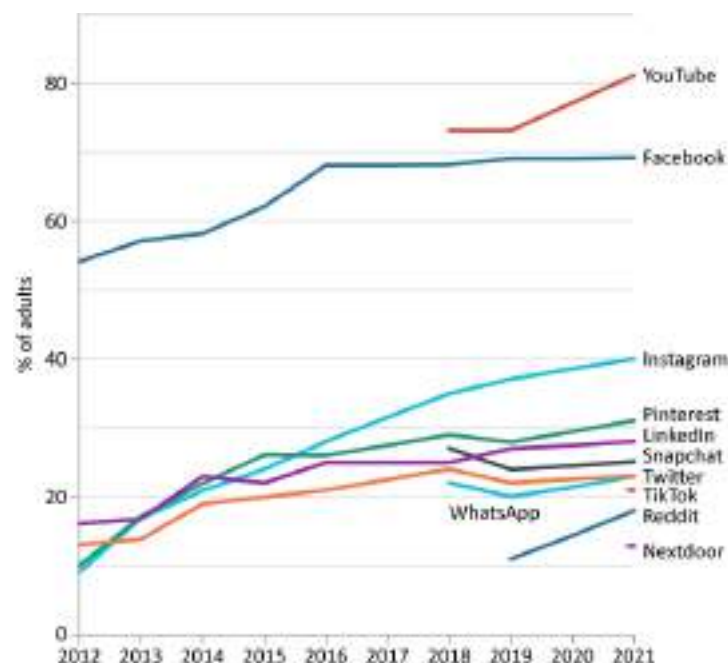
Figure 1.31 YouTube, Facebook, and Instagram were the top three social media sites among U.S. adults in 2021 for both personal and professional use. (data source: PEW Research Center, https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/)

Ultimately, you should be sure to present a positive self-image on the internet, particularly on networking social media platforms such as LinkedIn. When considering how you want to represent yourself online, answer these questions: (1) Is this information accurate? (2) Will this post be potentially detrimental to my schooling

and/or career? (3) Is the information hurtful or detrimental to someone else?

Ensuring Privacy

Privacy involves practices related to the collection and use of data about an individual. Many companies will have privacy policies when you sign up as a customer or purveyor of their content. It is important to read these policies to ensure you are not inadvertently providing permission to use your data and information in a way that you do not actually approve of. In addition, many companies will disclose they sell your information to other companies seeking similar customers. It is important to decline these permissions to avoid circulation of your contact information.

Minimal Data Collection from Customers

Collecting data from customers allows organizations to determine their needs and identify niche markets. Companies must ensure they are collecting the most minimal amount of data necessary from their customers to achieve these goals. Collecting too much data places both the company and the customer at risk. The company is responsible for ensuring that information is used responsibly and within the parameters of its privacy agreement; any data breach puts the company at risk of liability. Similarly, customers have the right to know how their information is used by the company and may request compensation if it is used inappropriately. Therefore, companies must ensure that they collect only the most minimal amount of data required to meet their business needs.

Data Security

Data security involves protecting digital information (data) from being accessed or used by parties who should not have access, or for purposes it should not be used for. Just as individuals must ensure they protect their information from hackers and malicious intent, companies are responsible for ensuring they use the most up-to-date data security measures to protect both customer information and proprietary company information and data.

Companies must ensure both internal and external security. Internally, a company should establish policies and protocols to ensure employees are abiding by data security measures. A company should also limit employee access to certain information. Keeping technologies up to date, with the most current security software, is also important. Depending on the size of the company, it may be worthwhile to establish a cybersecurity branch that employs qualified professionals dedicated to data security.

There are a number of strategies a company can use to keep data secure. Encrypting the data will render information unreadable to unauthorized users. Without the access key, encrypted information presents as nothing more than a meaningless string of characters. Companies, like individuals, can also take steps to delete files, software, and data that is no longer of use. And they can take it a step further by practicing **data erasure**, wherein the information is not only deleted but overwritten as well. In another approach, **data masking**, personally identifiable information is removed from the data, allowing the company to make decisions about its customers without associating the data with an individual's personal information. By taking these steps, companies ensure they can recover from a data breach quickly, reinforcing their **data resiliency**.

Chapter Review

Key Terms

Android operating system   Google software operating system used to run non-iPhone mobile phones such as Samsung's Galaxy

artificial intelligence (AI)   use of computers, robots, and machines to behave "intelligently," engaging in autonomous decision making and behaviors

augmented reality (AR)   use of digital objects or elements in a real-life picture or scene

automation   use of computers or machines to do tasks that could be completed by a person

binary digits   sequences of the numbers 0 and 1 used in computer programming

biometrics   authentication that uses a person's physical characteristics as a form of digital security

cache   type of storage in a computer that operates in the background, holding data that can be quickly retrieved

central processing unit (CPU)   unit that contains the microprocessor, or "brains" of a computer system

client   device that requests and uses resources from other devices on the network

cloud   servers housed in data centers to facilitate remote storage and computer operations

cloud computing   delivering computer resources such as programs and data storage through the internet rather than storing resources directly on a computer

computer   programmable machine that can execute predetermined lists of instructions and respond to new instructions

computer security   protection of computer systems and information that prevents unauthorized use

cookies   small data files that are deposited on user hard disks and internet sites visited

cybercrime   criminal offense that involves a computer and a network

data erasure   process by which information is not only deleted but overwritten as well

data masking   process by which personally identifiable information is removed from data, allowing a company to make decisions without violating customer privacy

data resiliency   ability to recover quickly from a data breach

domain name system (DNS)   phone book for the internet, enabling a user to send a message using their name, the symbol @, and the location of the computer as identified by its domain name

e-commerce   conducting business transactions online

encryption   process of taking information transmitted through the internet and converting it into an unrecognizable code to prevent unauthorized access

ethernet   protocols used to connect computers in a local area network or LAN

external disk drive   hard disk for information storage such as USBs, CDs, DVDs, and flash memory cards

firewall   barrier between a network that is secured and one that is not secured

hackers   individuals who gain unauthorized access to a computer system to steal someone's information

hard disk   secondary storage areas where users can save files and retrieve data and programs

hardware   computer accessories such as keyboard, mouse, printer, and computer monitor

HTTPS   communication protocol that is more secure than HTTP

hub   device that sends and receives messages to and from all network connections

hyperlink   link on a page or document that, when clicked, navigates the user to that location; a connection between two web pages or documents

hypertext transfer protocol (HTTP)   rules that allow users to access information on the internet and protect confidential data such as credit card numbers

information processing cycle   sequence of events involved in processing information

internal disk drive   storage space within the computer that updates and produces copies of files

Internet of Things (IoT)   extension of internet connectivity beyond computers, enabling the transfer of information between machines and other objects, people, and animals by connecting them to the internet in some way

internet protocol address (IP address)   unique combination of characters used to identify the location of a host computer

internet service provider (ISP)   company that provides individuals or organizations with access to the internet

intranet   private network for internal company use; can be combined with cloud technology

iPhone operating system (iOS)   Apple's software operating system, used to run iPhones, iPads, and other mobile devices

machine learning   use of software applications to make computations and decisions that can inform predictions without human intervention

mainframe   computer that is capable of great processing speed and data storage for large organizations

malware   software designed to damage the victim's computer system once it gains access to it

microchip   small microprocessor unit used for programming and computer memory storage

microcomputer   personal computer that was much smaller than earlier computers and operated with microprocessors

microprocessor   consists of a control and an arithmetic-logic unit, which performs math and logical operations within a computer system

minicomputer   computer that is similar in power to a mainframe computer, but much smaller in size; used in mid-size organizations

motherboard   controls communications for an entire computer system

nanotechnology   technology that focuses on changing individual molecules to produce different properties or attributes

network   connection of two or more computer systems or devices, either by a cable or through a wireless connection

operating system   connection between a device's hardware and its software

packet switching   technology that enabled the development of the internet; computer files are broken up into segments, which are transmitted over the network and reordered into a single file at their destination

password management   set of principles and best practices for storing and managing passwords to prevent unauthorized access to the computer

personal computer (PC)   microcomputer suitable for individual use

phishing   attempts to get users to interact with an email or website that appears to be legitimate but is fake

random access memory (RAM)   computer's primary, short-term memory

ransomware   malicious software that encrypts computer data, rendering it useless and inaccessible, forcing the owner to exchange something of value to regain access

read-only memory (ROM)   memory not meant for storage but to process information as the computer is being used

robotics   use of robotic machines to perform tasks that no human could perform

router   device that directs data traffic and allows for multiple devices to run on a network

secure sockets layer (SSL)   security protocol that uses encryption to help ensure privacy of information and communications across the internet

server   connects devices and allows for resource sharing across networks

short message service (SMS)   technology for sending text messages through mobile phones

smart space   physical space that incorporates technologies that can be controlled through the internet

social media   digital technology that allows users (individuals and organizations) to share information about themselves such as posts, photos, and videos

software   computer program or set of programs with the end goal of converting data into processes or actions

spoofing   correspondence such as email that appears legitimate but instead is used to obtain your personal information

supercomputer   extremely powerful computer that has the fastest processors available

transmission control protocol/internet protocol (TCP/IP)   communication standard that allows data to be

sent and received over a network, most notably the internet

triangulation   research technique whereby information is verified and validated through multiple sources

virtual reality (VR)   simulated environment in which users can interact as if they were physically present

wearable   device that uses computing technology to collect and receive data via the internet

web browser   a program used to find content stored on the WWW

workstation   powerful single-user computer, similar to a personal computer but with more powerful microprocessors

Summary

1.1 Computing from Inception to Today

- Early computers were used predominantly by engineers and scientists to handle large amounts of data. Key companies in the evolution of computing include IBM, Hewlett Packard, Xerox, Apple, and Microsoft.
- With the invention of the microprocessor, computers became available to the average consumer.
- Computing technology has increased efficiencies, decreased errors, opened new opportunities, and enhanced business–customer relationships.
- Key technologies in computing include mobile devices, digital imaging, and machine learning.
- Advances in technology are applicable to nearly every industry. The rapid pace of technological change has distinct career implications.

1.2 Computer Hardware and Networks

- Hardware components that make up a computer are the motherboard, CPU, microprocessor, and memory, as well as the keyboard, mouse, and other peripheral devices.
- Computers process and store data through the information processing cycle.
- Networks are connections of two or more computer systems, such as LANs and WANs. Routers, switches, and firewalls are basic components of networks.

1.3 The Internet, Cloud Computing, and the Internet of Things

- The internet was initially rooted in government and military applications.
- Advances in technology such as HTML, URL, and DNS made the internet more accessible to the average user.
- Programs such as Zoom, Google Docs, and X (Twitter) foster new types of interactions between businesses and their customers.
- Through sites such as eBay and Amazon, e-commerce has become an efficient way to purchase products and services, not just from companies but also from individuals.
- Cloud computing refers to storing IT resources on a virtual server rather than on the actual computers where the resources are used.
- The use of cloud computing in the workplace has increased productivity and saved money for many businesses.
- Cloud computing enables individuals to access a wide variety of resources such as media files, documents, and photos without the need for computers with massive storage capacities.
- The Internet of Things (IoT) connects the physical to the virtual; with simple changes to product designs, many products can be connected to the internet.

1.4 Safety, Security, Privacy, and the Ethical Use of Technology

- Computer safety and security are paramount considerations for a company's effective operations.
- Privacy in the digital world has become a major focus of corporate efforts to maintain the trust of employees, the public, and stakeholders.
- Common security issues include data and identity theft, cybercrime, phishing, and hacking.
- Measures that prevent computer security breaches include encryption, firewalls, password management, data erasure, and data masking.

Review Questions

1. What nineteenth-century invention laid the foundation for future developments in computing?
   a. Jacquard's loom
   b. Apple's Macintosh computer
   c. Programma 101
   d. TRS-80

2. What is the main operating system for iPhone mobile devices?
   a. Android
   b. Google
   c. iOS
   d. SMS

3. What are direct deposit, high-speed printers/copiers, and automated inventory systems all examples of?
   a. outdated technology
   b. future developments in technology
   c. early-stage developments in technology
   d. advances in technology

4. What is VR?
   a. a mostly live, real environment with some digital elements embedded
   b. a computerized game for trying out a new product
   c. a robot that can perform mundane tasks
   d. a mostly simulated environment that allows the user to interact in the space

5. The autopilot features on an airplane are an example of _____.
   a. VR
   b. AI
   c. AR
   d. machine learning

6. _____ is referred to as "the brains of the computer system."
   a. Printer
   b. Mainframe
   c. Microprocessor
   d. Router

7. _____ allows the computer to operate and process information quickly.
   a. ROM
   b. RAM
   c. HTTP
   d. WAN

8. What is a network adapter card that organizes information into small packets for movement in the network or over the internet?
   a. TCP (transmission control protocol)
   b. HTTP (hypertext transfer protocol)
   c. UDP (user datagram protocol)
   d. STP (standard transfer protocol)

9. Microsoft 365 is an example of _____.
   a. HTTP
   b. LAN
   c. a Web application
   d. an e-commerce site

10. _____ is the language used behind the scenes for website formatting.

    a.   HTTP

    b.   HTML

    c.   URL

    d.   IP address

11. What is Wikipedia?

    a.   an internet service provider

    b.   a web browser on mobile phones

    c.   a domain name

    d.   a free source of information

12. _____ is the protocol used to connect computers together in a LAN.

    a.   HTML

    b.   Ethernet

    c.   IP address

    d.   Web application

13. Which operator is used to search partial words on the internet?

    a.   *

    b. |

    c.   +

    d.   –

14. _____ refers to a private network meant for internal company use.

    a.   Cloud

    b.   Cloud computing

    c.   Internet

    d.   Intranet

15. Cloud computing was first introduced in what year?

    a.   1982

    b.   2002

    c.   1996

    d.   2016

16. _____ is a set of principles and best practices designed to prevent unauthorized access to a system.

    a.   Two-factor authentication

    b.   Biometrics

    c.   Data masking

    d.   Password management

17. Corporate espionage refers to _____.

    a.   trespassing on a competitor's property

    b.   wiretapping a competitor's office

    c.   domain hacking

    d.   all of the above

18. Cookies are defined as _____.

    a.   the practice of protecting digital information from unauthorized access, corruption, or theft

    b.   small data files from websites that are deposited on a user's hard disk

    c.   a list of web pages a user visits, stored on a computer's browser

    d.   ads that entice users to click on them

19. _____ encrypts information on your computer, making it inaccessible until you give the hacker something valuable.
    a.   Phishing
    b.   Data masking
    c.   Spoofing
    d.   Ransomware

Practice Exercises

20. Conduct research to show how mobile, imaging, and gaming devices have contributed to the U.S. economy and the global economy.

21. Using some of the internet search strategies discussed earlier in the chapter, choose an industry and research some leading technologies in that industry.

22. Think about the concept of lifelong learning. Using the strategies outlined in the chapter, discuss how lifelong learning can be incorporated into your life.

23. A computer's memory capacity and speed have an impact on its price. Perform a Google search to compare the prices of at least three laptops and three desktop computers with various speeds and memory capacities. Which is more expensive, and why? What factor has the greatest impact on the price of the computers?

24. Go to United States Census Bureau Data (https://openstax.org/r/78CensusData). Select the Explore Data section. Find your county and identify a variable of interest to you, such as education or poverty. List some key findings you discovered about your county from the data on the site.

25. You want to find out about music festivals happening this summer close to your home. First, follow your typical procedure for conducting an internet search. Then, conduct another internet search for the same information, this time using some of the techniques discussed in the chapter. What differences do you notice in the results?

26. Conduct an internet search for a topic that interests you. Then, navigate to a website devoted to that topic. Using the strategies discussed in this chapter, evaluate the credibility of the information contained on the site.

27. View your social media account (or someone else's, if you don't have one). From the perspective of an outsider, what do you see? Is everything that is viewable acceptable? Would you want your employer to view this social media account?

28. Discuss how you would protect your personal computer, including access restriction and prevention of data loss.

Written Questions

29. Discuss how today's technology has improved the workplace.

30. How was computing in the workplace instrumental in the development of computing for personal use?

31. How are mobile devices, imaging, and gaming interconnected?

32. Discuss the key differences between AR and VR.

33. What are some advantages to using VR in business?

34. What are some advantages of using smart spaces in business today?

35. What is the information processing cycle and why is it important?

36. Why is it important to understand the basic components of a computer?

37. Which network would you likely have in your home? At your place of business?

38. What capabilities must a device have to be called a computer?

39. If you were setting up a computer network in your small business, what security measures would you take to guard against cybercrime and security breaches?

40. Explain some criteria you should use in evaluating the credibility of sources for business research.

41. Outline some tips for conducting effective online searches.

42. Discuss some of the key advances with the internet that have increased business productivity.

43. Discuss some advantages and disadvantages of using cloud computing for business and for personal use.

44. Discuss some of the advantages of using the Internet of Things in business and for personal use.

45. Describe some ways that companies can protect their systems from cybercrime.

46. Define ransomware, malware, and phishing.

47. What are cookies? How are cookies used in business?

Case Exercises

48. Suppose you want to set up a computer network for a small business you are launching. The business will provide bookkeeping services for other businesses. You will maintain an office for yourself and one other employee. Your employees will also sometimes work remotely, either at their homes or at the clients' locations. Do some research on the process of setting up a computer network for a small business. What types of equipment might you need? What types of security precautions should you take to protect your clients' financial information?

49. You are working with a local entrepreneur who wants to open an organic food store in your town and is asking you for help in finding relevant demographic information to help determine appropriate pricing for some of their products.

    A. What internet sources might be appropriate for this research?
    B. Where would you begin your search?
    C. How would you determine the key competitors for the business?

Figure 2.1 Software applications are what allow us to interact with our computer's hardware. It is essential to learn how to use programs like calendars, word processors, and email clients to communicate with others and create documents in the workplace. (credit: "wocintech (microsoft) - 241" by WOCinTech Chat/Flickr, CC BY 2.0)

Chapter Outline

Chapter Scenario

WorldCorp is a multinational conglomerate that produces and works in consumer goods, health care, and technology. Its functional service areas include research and development, strategy, operations, production and distribution, human resources, information technology and equipment, marketing and sales, finance and accounting, and customer service.

The corporation has a strong commitment to social responsibility and environmental protection. Employees are encouraged to participate in company-wide and individual charity initiatives, with paid time off to participate in each once a month.

With employees located across the globe, WorldCorp understands a successful workplace is supported by a commitment to equity, diversity, and inclusion (EDI). It has a strong ethics policy that is enforced throughout the company hierarchy, with senior leaders and management expected to serve as models in all actions and interactions.

You have just been hired as a management trainee at the company and will be exposed to all functional areas. In this chapter, you have just been hired and are tasked with learning the basics of the software programs WorldCorp uses to run its operations, most notably Microsoft 365—or more commonly known as its longtime former name, Microsoft Office—and Google Workspace.

2.1 | Software Basics

Learning Objectives

By the end of this section, you will be able to:
- Explain what software is and what it does
- Describe each of the main software types used in business
- Understand how to install and maintain software

You learned about the history of computers and basic hardware in the [Technology in Everyday Life and Business](#) chapter. While hardware is the backbone of a computer, and knowledge of it and what can go wrong with it helps you to keep vital devices working properly, software is the lifeblood that gets work done personally and in the business world.

This chapter examines the basics of software programs. It also covers the terminology and functions common to most programs. Refer to this chapter as you work through the rest of the material in the textbook, especially when you encounter more advanced concepts.

One final note: Before beginning this chapter, be sure you know how to use your mouse to click and hover. Clicking (sometimes called pressing or selecting) the left side of the mouse tells it you want to activate a command directly on the screen. It is the most direct use of the mouse. Clicking the right side (called "right-clicking") of the mouse will reveal a little screen with a menu of options. Don't worry about those yet. And, finally, hovering over portions of the screen such as icons will give you a short descriptor of that tool or menu. When you hover, you do not click the mouse at all but rather direct it over the tool icon.

> **MAC TIP**
>
> You will need to hold the Control (Ctrl) key when clicking the mouse to reveal the menu of options, and then hold Command when clicking the mouse to activate a command directly on screen.

What Is Software?

When using a computer, we often hear the terms *programs*, *software*, and *applications*. Sometimes these terms are used interchangeably. However, there are some distinctions. Programs are the instructions that tell the computer how to operate and run specific tasks. Whereas software consists of the step-by-step instructions that tell a computer how to operate with its hardware. Software is essentially a collection of interlinked programs. More specifically, the instructions enable the program to perform specific actions such as printing, saving, or formatting text. These step-by-step instructions are written in computer language or code. Different types of programs include the Microsoft Office suite, educational software, and antivirus software.

There are two major categories of software: system-related software and application software. System software is related to the functioning of the computer. Examples include the computer's operating system and the software needed to run items such as printers, the keyboard, and antivirus software. Applications are programs that are task-oriented, including those we will cover in this text such as word processing programs and presentation software. Internet browsers are also considered application programs. They are used to search for content on the internet.

There are several facets of programs that are consistent regardless of the type of program. The programs use computer programming to add the functionality for the software or application. For example, there is a specific computer programming language (or code) that is used to simply print a document. This language is the foundation for making the program work. The basic elements of programs are shown in [Figure 2.2](#). They

are:

- The **graphical user interface (GUI)** is the portion of a program that allows the user to interact with it. Commands in Office are organized in groupings called tabs, while in Google Workspace, these groupings are called menus.
- A **menu bar**, or ribbon, typically at the top of the screen, contains an array of general commands that the user can choose, such as changing the font, printing the file, or adding elements such as pictures or shapes. In Office, this is referred to as the ribbon.
- A **toolbar**, typically located below the menu bar, contains icons or graphical representations for commonly used commands such as Copy or Save that are more specific than those contained in the menu bar.
- A **dialog box** provides information or requests inputs. These boxes typically appear after a user action, such as clicking a button or selecting a menu option. For example, see Figure 2.2, which shows more options for changing the font color or size.
- The **status bar** is located at the bottom of the program window. Its main function is to show the status of the program, such as the number of pages.
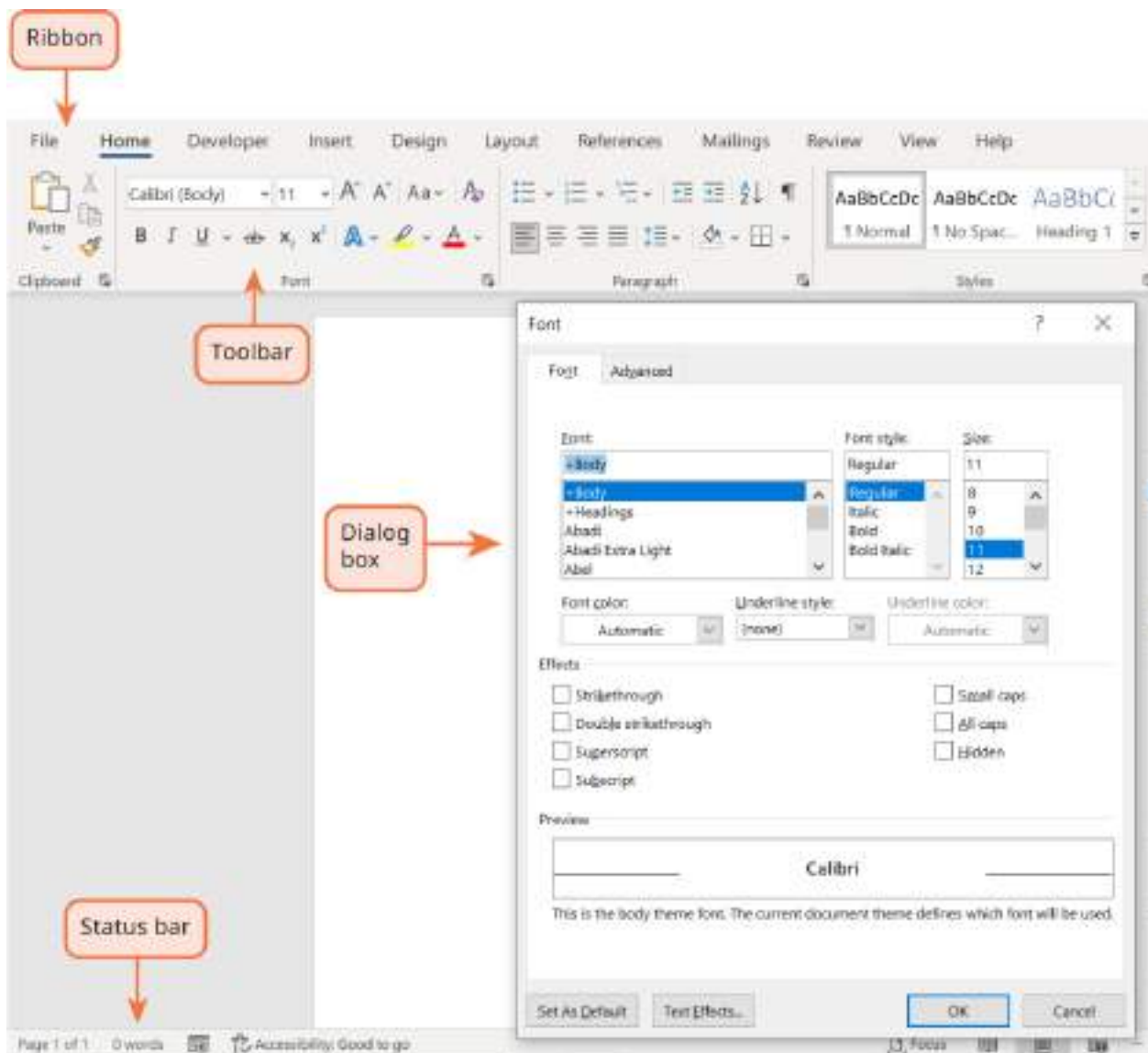

Figure 2.2 The common format for software includes a series of menus or toolbars at the top of the screen that are specific to the functionality of the program. (Used with permission from Microsoft)

Common Applications in Business

Task-oriented applications include word processing, spreadsheet, presentation, and database management programs. Figure 2.3 shows the icons for the popular applications in Google Workspace.

Specialized applications include programs used only for certain disciplines or occupations, such as QuickBooks, which is used for accounting. Mobile applications such as E-reader applications are programs designed primarily for smartphones and tablets.

A **word processing application** creates text-based documents such as memos, letters, and reports. Just about every organization uses word processing software, especially businesses, colleges, and universities. Microsoft Word is the most widely used word processing application, along with Google Docs and Open Office Writer.

A **spreadsheet application** organizes, analyzes, and uses numeric data. These applications are common in just about every profession today for compiling data in a table and creating visual displays (graphs and charts) of the information. Sales data from WorldCorp can be analyzed using the tools in a spreadsheet application. The most widely used spreadsheet applications are Microsoft Excel and Google Sheets.

A **presentation application** combines graphics and text to create attractive slideshows. These applications are used by students in colleges and universities as well as in the business world. The most common presentation applications are Microsoft PowerPoint and Google Slides. Employees at WorldCorp can use presentation applications to prepare sales summaries to present to key executives at the company.

A **database application** is designed to organize and store large amounts of data. The information in a database program often includes both text and numeric information. Microsoft Access is a database application that can be used to compile and filter a large dataset. WorldCorp can use Access to store customer data in one file that includes information such as the customer address, historical purchase information, key contacts, and other related information.

Figure 2.3 Google Workspace includes applications for emailing, managing files, and creating spreadsheets. These are the common icons you will see most as you start to learn this suite. (Google Workspace is a trademark of Google LLC.)

Specialized applications include programs that are used only in certain disciplines or occupations, such as a design application used in the engineering profession. Another example would be tax software programs that accounting professionals use to prepare taxes for their clients. Desktop publishing enables users to mix text and graphics to create page designs and layouts for brochures, newsletters, and textbooks. Popular types of desktop publishing software include Adobe InDesign and Microsoft Publisher.

Finally, businesses might also use social media applications. Social media applications are used to create virtual networks or communities through which users connect and share information, messages, and/or content such as images and videos. These applications are accessed either through the internet or by downloading the application to your device. These applications are geared to connecting with others in a variety of different scenarios. For example, LinkedIn is a professional networking application that can help you connect with others in your career field. Social media applications will be covered in detail in Content Management Systems and Social Media in Business.

One of the first social media platforms was Myspace, which was used to connect individuals with family and friends, as well as for networking. Then came Facebook (which became more popular than Myspace),

Instagram, LinkedIn, TikTok, and Twitter (now X). At WorldCorp, you would most likely use LinkedIn, which is a site tailored to the business world. Companies and workers share news, their résumés, and network through it. Social media also allows virtual collaboration, which plays a role in work life, as individuals can use Zoom or Microsoft Teams for business meetings, a feature that became crucial during the COVID pandemic. Many organizations also use social media for marketing purposes.

In addition to interacting with others, social media users can watch movies and play games on many different types of devices, including tablets, computers, and even cell phones through social media sites. The chapter Content Management Systems and Social Media in Business covers this topic in more depth.

Installing and Maintaining Software

Installing software is an automated process for the most part. Although there are some differences based on both the software and the operating systems (Windows or macOS), software installation follows a basic process. Acquisition of the software often begins with visiting the software website and purchasing the software download. Not all software requires a purchase. Some programs are freely available. Also, not all programs are directly downloaded onto your computer. With today's cloud-based technologies, some software exists in the cloud and instead you are downloading an app on your device to get access to the software.

Once you have identified the software you would like to install, generally you will find a link (or button) on the website that says Download. By clicking on the download, you agree to allow the software components to be added to your computer's hard drive. Also, although not as common today, software programs can be installed via a CD-ROM. If you have a CD-ROM to install the software, often the installation process will begin once the CD is inserted in the CD drive. You will be prompted with similar dialog windows whether installing from a download or a CD-ROM.

Keep in mind that you need to do your research and use caution when choosing software from the internet to download. There are fake sites that exist for downloading software that could harm your computer. Additionally, sometimes there are options to download other software or additional features to install. These are generally not necessary and could again be potentially harmful to your computer. Take the time to make sure you are downloading software from trusted sites.

The installation begins with downloading a folder that contains the necessary files to install the software program on your computer. Two key files in the folder are the README file and the actual install file, which will have a .exe extension (the execute file). It is a good idea to read the README file. This file is a text file that contains the steps needed to install the program. It will also contain the system requirements information to determine if your computer is suitable for the program. The programs differ based on the computer space needed to store the software files and the version of the operating system needed for the software to function. The download prompter screens will often indicate the amount of space required for the installation.

Installation starts when you click on the .exe file. You will be prompted with a series of approvals at the beginning of the installation. These approvals could include the consent to make changes (add files) to your computer, closing all other open programs, and usage of the software. Some software programs will have options to customize the installation based on the elements you want installed or where you want to place the installation files. You may be prompted with a dialog box asking you the type of installation, which could include options such as basic installation or customized. Often, the software developers will recommend the basic installation for most applications. Unless you have a reason not to complete the installation as recommended, there is usually no reason to choose a customized installation.

MAC TIP

.exe files are only for Windows computers and cannot be installed on macOS operating systems. The Mac operating system uses .dmg files.

Maintenance of software is simple. Developers of the programs will regularly check the programs for issues. At times, there may be a need to update the software. You might already be familiar with the concept with your cell phone. These updates improve security and functionality of the programs when issues arise. Installation of the updates can be set to be automatic, or you can manually and regularly check for updates of the software programs. Many programs will notify users when the program is opened if an update is available. Updating the software is a necessary part of keeping the program functional.

Troubleshooting issues in a program is another key component of being a software user. Most software has a Help function or menu available to assist the user with questions about the program. The items in the Help function are generally centered on issues of using the program itself. Items could include how to perform a certain task such as printing or other related items. If your issue is not solved with this type of assistance, most programs have a way to connect with the software company for more assistance through registering the software. This could be in the form of sending an email, contacting customer service by phone, or through a chat function in the program. Most problems with the functionality of a program can be resolved through one of these methods.

2.2 | Files and Folders

Learning Objectives

By the end of this section, you will be able to:
- Describe the purpose and use of files and folders
- Identify different file formats and their common uses
- Apply best practices in file and folder organization, including saving
- Understand the differences between Google Drive, SharePoint, and OneDrive

Being organized is a key skill in the business world. Disorganized workspaces, whether real or virtual, can lead to a host of negative outcomes: lost productivity, wasted money and resources, and a poor worker reputation. A study by professional staffing company Express Employment Professionals revealed that approximately six hours per week can be lost to poor organizational skills, and that employees earning $50,000 a year can cost their employers upward of $10,000 annually in lost time. You don't want to be one of those employees. So, here, we will learn how to organize your computer software files. This is a basic, key skill.

Right now, as a student, you need a way to organize the items from your classes such as the syllabus, homework papers, and class notes. Some students choose to use a physical binder to organize all the material needed for a class. You may have one binder to hold the information for all your courses, or multiple binders, one for each course. Just as you would organize class material in a binder, a computer needs a way to organize the information stored in the hard drive. Through computer coding and programming, the computer uses a system of files and folders to organize the information and run its programs correctly.

Most people will never use many of the files and folders stored on the hard drive. For example, you probably will not access the information in the Windows folder or the Program Files folder. Those files that are needed for operating the computer are generally not necessary for the average computer user to access. You will use files and folders for specific software programs for information you have created. Understanding how to navigate the files and folders on the computer is crucial.

Using and Organizing Folders and Files

A **file** is a collection of data, such as a document or a program. Files are stored within a folder, which can contain subfolders as well as individual files. Files contain information, unlike folders, which are used to organize the files. For example, you might organize the photos on your phone into folders labeled by year or by type of photo (family, friends, events). In addition to those folders of photos, your phone contains other folders, each named based on its contents.

In this course, you will work frequently with four types of files:

- Document files are used in word processing applications to save documents such as school assignments, communications, and lists. Microsoft Word and Google Docs are two of the programs businesses use most. WorldCorp would use document files for company memos to employees or to write up contracts with new vendors.
- Spreadsheet files are produced by spreadsheet applications, such as Microsoft Excel and Google Sheets. This type of file is often used to analyze data and for numerical recordkeeping and calculations. Spreadsheet files could be particularly useful for WorldCorp when summarizing sales data for the last quarter or to create charts to show sales trends in different regions.
- Database files are created by database management applications. Many companies have high-level, specialized databases that store information about customers or specific products they sell. In this course, you will learn about Microsoft Access.
- Presentation files consist of pages that may be used as slides or handouts. Google Slides and Microsoft PowerPoint are popular presentation applications.

What Is a Folder?

A **folder** is a defined area of a computer or drive that stores subfolders and files ([Figure 2.4](#)). Organizing files into folders and subfolders makes it easier to locate a specific file and to keep files organized for the long term. Folders and subfolders are a hierarchical way of organizing your files.

Figure 2.4 A computer stores files in the same way you might store files in a filing cabinet (although maybe a little neater). (credit: "document file, folders, carton, paper" by PPD/Pixnio, CC0)

Using and Organizing Files

As you create and use files, you will develop a system of organization that works for your needs. In some cases, the entity that you work for will have a system that is used for all employees. The goal is to gather files in such a way that facilitates finding and using those files. You could organize files by type (all Word documents in one folder), by date, or even by project. Your system will depend on how you interact with your computer and how you plan to use the files you create or download. There is no one standard way to organize files, but here are a few tips to get you started:

- Decide on an organizational system that works for you.
- Use descriptive folder names and be consistent with naming.
- Make use of subfolders within the main folder.
- When files are created, place them in the appropriate folder.
- Regularly delete or archive files or folders that you no longer need.

Opening a File

To open an existing file, locate the file wherever it is saved. It may be saved on your computer hard drive, in the cloud, or on an external drive such as a flash drive. The easiest method for locating an existing file is by using the File Explorer folder (see Figure 2.5).

MAC TIP

Folders can be found in the Finder or the Documents tab.

To access File Explorer, either double-click the manila folder icon on the desktop or access File Explorer through the Windows menu. You can also search for a specific file name using the search bar at the bottom of the screen or the search bar at the upper-right side of File Explorer. As you can see, there are several ways to find the file you are looking for.
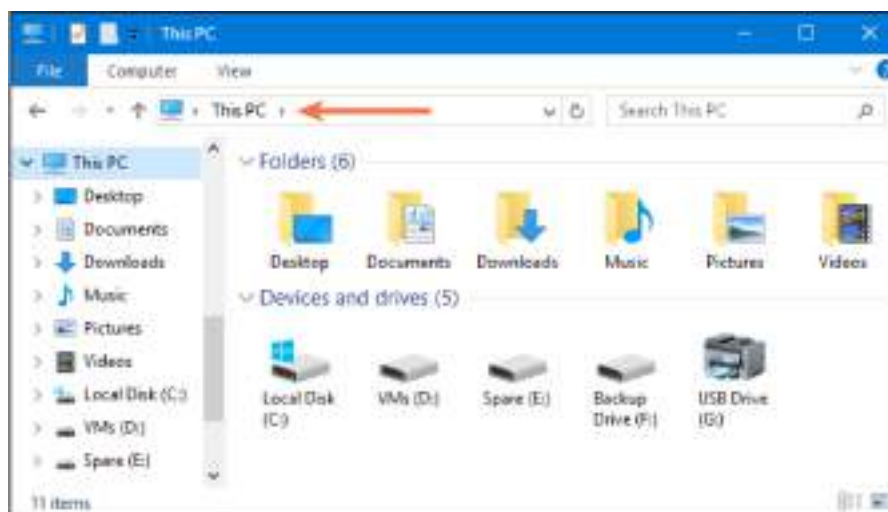
Figure 2.5 File Explorer shows the folders on your hard drive and the devices that are connected to your computer. The Search This PC search bar finds specific files on your local hard drive. (Used with permission from Microsoft)

Once you have located your file, you can either right-click or double-click on the file to open it.

Creating a File

To create a file, you will likely begin in the application program itself. For example, to create a new presentation file, open PowerPoint or Slides. Or you can create a new file directly from the desktop: Simply right-click on the desktop screen itself, select New, and choose the file type you want, as Figure 2.6 shows.

MAC TIP

For Mac users, the procedure to create a file is the same, except you would use Finder.

The new file will be created when the application program opens. Once a new file opens, you can add text, images, and other items to your file as needed.

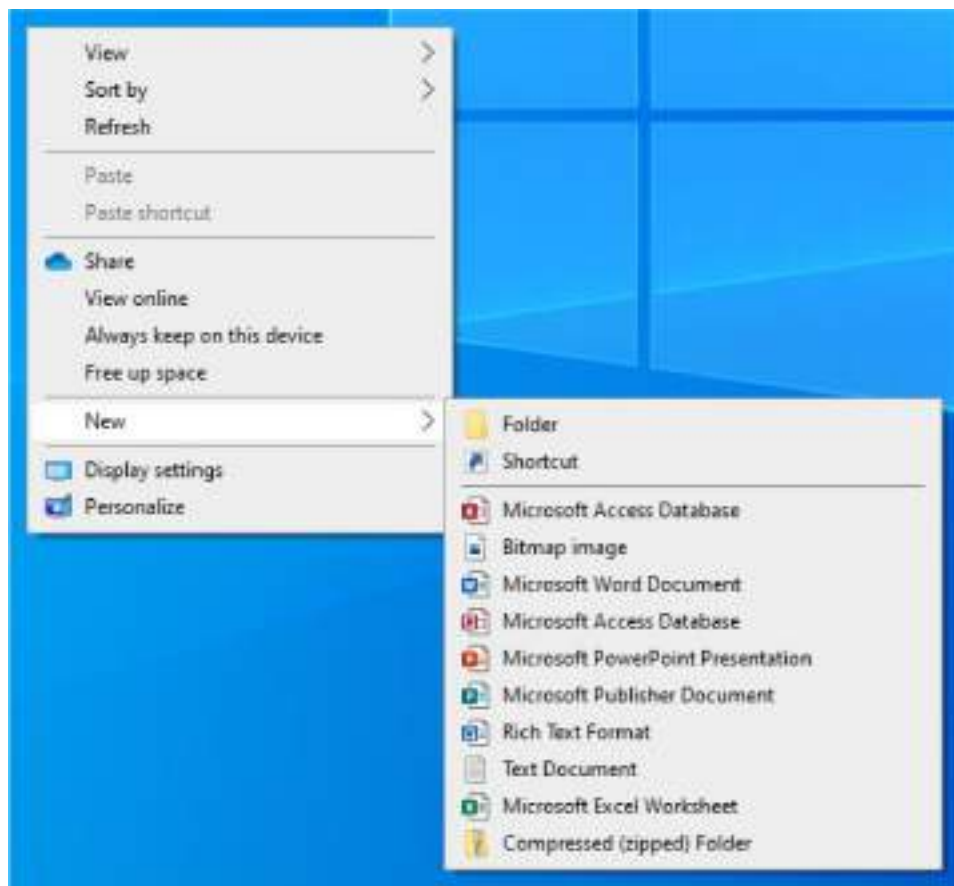**Figure 2.6** The various application programs are listed for you to select when creating a new file. (Used with permission from Microsoft)

Saving a File

Saving files might seem like a mundane task, but it is one of the most basic skills to master in computer work. In general, there are three broad categories of saving files: **Save**, **Save As**, and **AutoSave**. Save and Save As both give you the option to choose the file type and the name of the file. You would use Save if you are saving a file for the first time and also, as you go along if you are saving the file to your computer, rather than to the cloud. You can use Save As to save an existing file under a different name. This can be useful if you are keeping track of different versions or revisions of the same file. You would also use Save As to save the file in a different location on your computer. Finally, AutoSave does just what it implies—saves continuously as you make changes to the file. This is a nice feature in both Microsoft and Google applications, making it easier to retain changes in a file without having to constantly remember to save the file you are working with.

Moving and Deleting a File

From time to time, you will need to move and delete files as part of good computer housekeeping practices. To delete a file, right-click on the file you want to delete and choose Delete. Once deletion is confirmed, select OK. You can select multiple files by using either the Shift or Ctrl keys. Use Shift to select files that are listed together. You would click the first file and then hold Shift and click the last file in the list you want to move or delete. To select files that are not listed together, use the Ctrl key. Click on the first file, and then, to select additional files, hold the Ctrl key and then click on each file name.

MAC TIP

You can delete the file, which will move it to the trash bin, or you can simply drag the file to the trash bin. To

completely delete the file, you must empty the trash bin.

To move a file, you can use one of two methods. You can click and drag the file to the new location. This is particularly useful if you have saved a file on the desktop and now want to move that file to a designated folder. Alternatively, you can Cut the file from its current location (see the Home tab) and then Paste the file to the new folder or location. This can be tricky if you do not immediately paste the file in another spot. Use caution when totally deleting files.

Recovering a File

After you have deleted a file, you may still be able to recover it. This is not always possible, but in some cases, you can recover files that have been deleted or, at least, locate a previous version that may be saved on your computer. First, check the Recycle Bin. Generally, you will find it on the desktop. Open the Recycle Bin by double-clicking on the Recycle Bin icon on the computer desktop. When you see the file that you deleted and now want to retrieve, select it by double-clicking on the file name. Then, choose Restore from the dialog box. You can also right-click on the file name and choose Restore from there. Another strategy is to simply search for the file on your computer in File Explorer. In the search bar, type in the name of the file (even a partial name will work). You may be able to locate the file or a version of the file through the search tool.

MAC TIP

A file that is in the Trash can be restored. If the file has been removed from the Trash, and you use Time Machine, Apple's backup program, you can recover an earlier version of the file even after it has been removed from the Trash.

Windows systems have another option for retrieving deleted files, which involves restoring files from the file history. This is in the Systems and Security area of your computer's Control Panel. The easiest way to access this tool is to type File History in the search bar by the Start menu (see Figure 2.7). If you have File History enabled on your computer, you can choose Restore your files with File History to search for the file you have deleted.
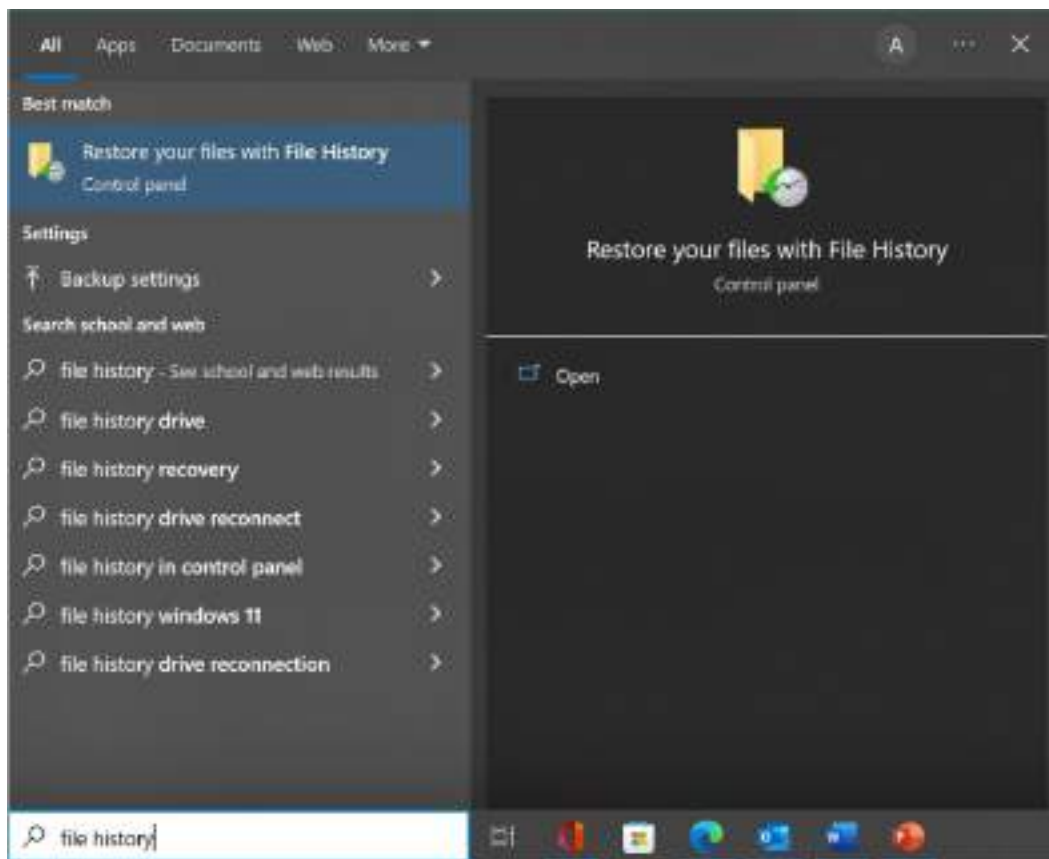
Figure 2.7 File History can also be accessed through your computer's Control Panel. (Used with permission from Microsoft)

As a final option, there are apps that you can download to help you search and recover deleted files. Several apps that serve this purpose are free and can be helpful when searching for a deleted file.

Compressing and Extracting Files

Sometimes you'll be working with a file that is too big to send as an email attachment. In that case, you can shrink the file down. It's analogous to letting the air out of a raft so you can store it in a tight spot and then reinflating it later for use. The process of reducing the size of one or more files by removing unnecessary data is called **file compression**. Compression also allows larger files to be sent faster and more efficiently. Large files usually contain lots of dense graphics or video clips or photos. With compression, no content in the file is lost; the file is simply compressed in size by the computer to make it more manageable. These compressed files are often referred to as *zipped* files. But be aware that in some instances, email recipients may not be set up to receive zipped files. This is a setting that is managed by their information technology (IT) administrator. In this case, you may have to send the uncompressed file or share the file with the recipient in another way.

How to Compress and Extract Files

Locate the file or files that need to be zipped. Press and hold or right-click the file to select it, click Send To, and then select the compressed folder. Locate the zipped file that needs to have files extracted from it. You can extract a single file, open it, and then drag it from the extracted folder to a new location. Or, to extract all contents of the zipped folder, you can press and hold or right-click the folder and select Extract All.

> **MAC TIP**
>
> To compress a file on a Mac, select the file you want to compress and then hold Control and click on the mouse and choose Compress.

File Types

Information in computers is stored in a system of files. Each file will have a unique file name followed by an extension, using the file name.extension format. The **file format** depends on the usage of the file, the program in which the file was created, and/or the size of the file. The computer will store the data in a particular file format, which is the way the data is encoded, depending on the type of data and the application the computer will use to read it. There are many different file formats. You may be familiar with some of them, such as .doc or .txt. The .txt file format is a general format for a text file that can be recognized by almost any word processing application. The text contained in a .txt file does not contain any formatting such as underlines, special spacing, and other related items.

There are many other file types within the computer filing system that you will probably never see. These file types are necessary instructions created to make the computer function. Those operating file types are beyond the scope of this text and are not essential for you to understand how to use a computer and the software programs on your computer effectively.

Table 2.1 lists some common software program file extensions that you may already be familiar with. You can choose the file type in the Save dialog box so that you do not have to type the file extension as part of the file name. Generally, the application you are using will have the file extension already chosen in the Save dialog box as a default. In general, an "x" is added to the end of a file extension for newer versions of the application. For example, when documents are created in Word in versions 2007 or newer, the file will have the .docx extension rather than .doc only.

Application	File Extensions
Microsoft Word	.doc, .docx
Google Docs	.gdoc, .gdocx
Microsoft Excel	.xls, .xlsm, .xlsx
Google Sheets	.gsheet
Microsoft PowerPoint	.ppt, .pptx
Google Slides	.gslides

Table 2.1 Types Computer application files are saved with the file name and an extension that identifies the type of file it is.

Rich Text Format (RTF)

Microsoft developed **Rich Text Format (RTF)**, or .rtf, files in 1987 to enable other Microsoft applications to read Word output more easily. Today, the .rtf format can be used to make your .docx file more compatible so that other software can use the information in the file more readily. For example, information from a Word document that is saved as an .rtf file type can be fed into a database program. Text in .rtf appears fairly "plain"—that is, with minimal formatting. .rtf files have stayed more or less the same as when they were first released, but Word .docx files are frequently updated. To put it another way, an .rtf is less sophisticated than a .docx file and may not support all the features of a newer .docx. To save a file as an .rtf, go to the File tab, click on Export, hover over Rich Text Format, and then click Save As.

> **MAC TIP**
>
> To open .rtf files on a Mac:
>
> 1. In the TextEdit app on your Mac, choose TextEdit > Settings, and then click Open and Save.
> 2. Select Display RTF files as RTF code instead of formatted text.
> 3. Open the .rtf file.

Portable Document Format (PDF)

In the business setting, you will see many documents in **Portable Document Format (PDF)**, or .pdf. Unlike .docx format, the .pdf format is designed as a publishing platform, so .pdf documents are not easily editable. This is an advantage because it means that everyone who opens the .pdf document will see the same format, alignment of objects, font style and size, images, tables, graphs, and so on. The appearance of the document will not change across any computer, phone, tablet, or other device. The Word file format, by contrast, is designed to be fully editable, so if you use Word 2019 or Word 365 (part of Microsoft 365), for example, to open a .docx created in Word 2013 or Word 2016, you may see unintended and unwelcome changes, such as a shifted object.

Countless companies and other institutions typically release their annual reports and other public documents in .pdf format. WorldCorp publishes its annual report using the .pdf format. Local townships, public schools, and community agencies also are likely to distribute their newsletters and other information as .pdf documents. Further, many job seekers produce a .pdf version of their résumé, as Figure 2.8 shows, to prevent style or alignment changes when the prospective employer opens the file.
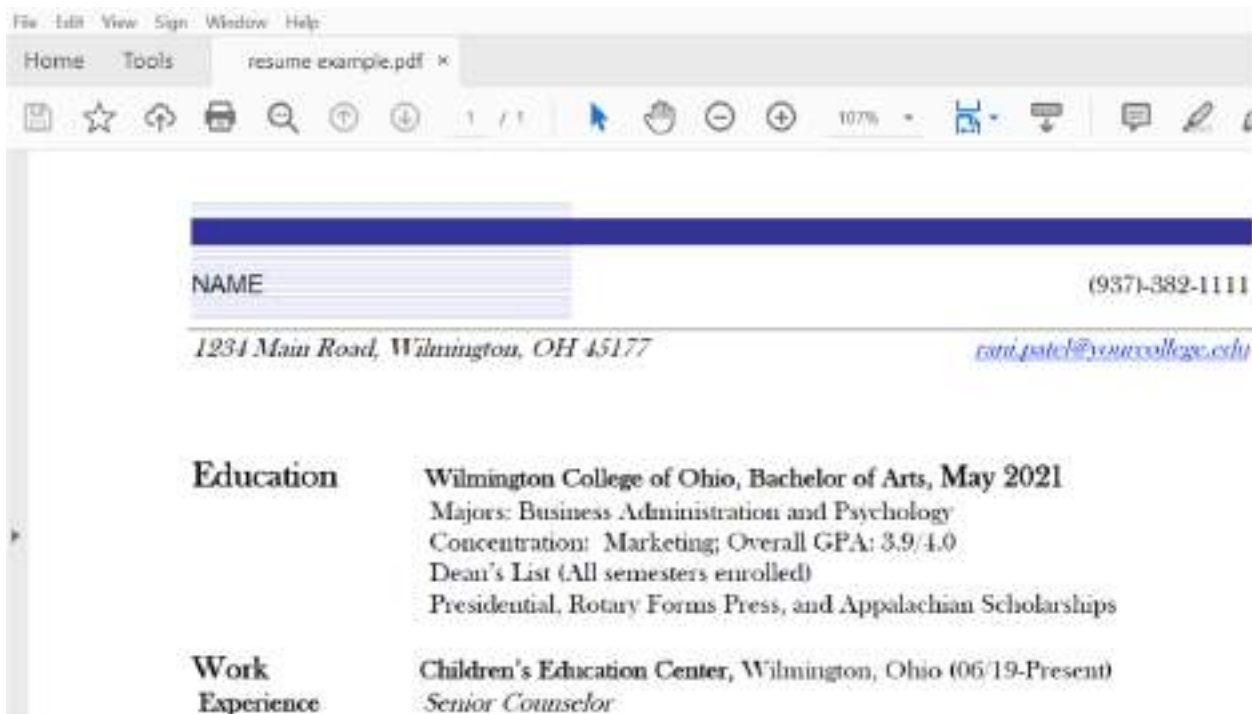
Figure 2.8 Saving as a .pdf file can preserve formatting and spacing in documents such as résumés and newsletters when they are shared with others and opened in other programs. (Used with permission from Microsoft)

Web Page/Hypertext Markup Language (HTML)

Many professionals have their own web page, featuring their professional experience, skills, contact information, and samples of work or testimonials. The content of such a website can be created in Word. For

more than a decade, Word has doubled as a What You See Is What You Get (WYSIWYG) HTML editor—a web page design application that lets users make their own web pages without needing to know hypertext markup language (HTML). HTML is one of the major programming languages that web designers use to make websites. Essentially, Word lets you write the content of your web page as if you were writing any document in Word; you can add images, objects, and graphs, then Save As an .html file. However, there are better ways to create content for websites rather than using Word. We will discuss more about this later in the book.

Today, many people use packaged services such as WordPress or Squarespace to create their own websites. You may still find some people who prefer to use Word to create their website or at least to design the initial content and layout of the site. Also, note that just creating a website doesn't make it available on the web. The website will need to be published, a domain name purchased (e.g., www.yourwebsite.com), and it hosted through a paid service such as GoDaddy.

Graphics

Graphics file formats are for pictures and moving images. In general, graphics can mean any program that allows a computer to display these types of images. But for our purposes here, it means a file format. Without going into detail that is beyond the scope of this text, these graphics file formats organize their information in different ways. You just need to be able to recognize what they are in the workplace.

- JPEG, which stands for Joint Photographic Experts Group, is the most common of the formats. Its benefit is that the files can be quickly uploaded to any platform, even if the images are large. However, if the files are compressed and decompressed multiple times when sending, the images can lose quality.
- PNG files (.png) are higher quality than JPEGs. PNG stands for portable network graphics. This file type is best for images with sophisticated backgrounds, making them denser and therefore needing more storage space on the hard drive, and more time to load on your computer.
- GIF (.gif) stands for graphics interchange format. It is a file format that works well for graphics with few colors.
- PDF stands for portable document format. It is a common file format that works best for online documents that you don't want altered. They print well, too. A PDF (.pdf) file format is not only used for text, but for images such as photos, as well as audio and video. Adobe Photoshop, InDesign, Word, and Docs are some of the applications that allow you to create PDFs.
- SVG (Scalable Vector Graphics) file formats support digital illustrations made up of geometric shapes. SVG (.svg) file formats retain the highest quality even when resized, but they are not applicable to social media platforms.
- MP4 (Moving Picture Experts Group) is a multimedia format that stores internet videos. MP4 (.mp4) files can contain audio and subtitles. They take up a manageable amount of computer storage space and you can easily upload them on a social media channel or a website.

Best Practices in Using and Organizing Folders and Files

Remember that Word allows users to save documents in different file formats and in multiple versions within a single format, designated by changing the file name—for example, from "version1" to "version2." Word also lets you choose between different file formats depending on how you want to use the file. You may also want to publish your document on the web, using a file format that allows it to be read correctly by web browsers.

REAL-WORLD APPLICATION

Tips for Organizing and Maintaining Files

Imagine you have been asked by your professor to resubmit a homework assignment that you originally turned in at the beginning of the semester. The professor cannot find your submitted assignment, so you currently have received zero credit in the gradebook. Having a well-organized system for keeping track of

your school notes and assignments will help you quickly find this assignment.

This scenario can also be applied to the workplace. Suppose you need to quickly locate a document for a customer or a coworker. A good organizational system makes this task much easier. Here are some tips for effective file management:

- After creating and naming a file, place it in the appropriate folder based on your organization system. If you want quick access to a file, you can store it on the desktop. But if you store too many files on the desktop, it can be hard to locate a specific file. It is generally preferable to store files within folders and to reserve the desktop for icons to access particular apps. Ultimately, this is a matter of personal preference.
- Group files by category. For example, your categories might be Business Plans, Résumé Services, Memos, Letters, and Meeting Notes.
- Create subfolders for all files and give them descriptive names. For example, you might want to label a subfolder Business Plan – Client 2 – June 2023.
- Use effective file name conventions for folders. Specific, informative file names like Resumes – 2022 and Employee Files – A–M will save you the time of having to search within a folder with a more generic name.

It is important to keep your files current. In many cases, you may have files that you no longer use or that have been updated. In that case, delete the previous versions of the file. Unless you need to refer to a previous version of a document or think you might need the information in the future, generally there is no need to keep older files that you no longer use. You can save multiple versions of a file and rename them in such a way that they identify the version of the original file referencing the version or even the date of the version of the file.

To make this process effective, be consistent in naming versions of files. Always use the same approach. For example, you could have the file name with the version number and the date (nameV2Mar212023). What is more important is having a consistent approach that is used by everyone who uses the files.

If you are hesitant to delete the files entirely, consider backing them up to an external drive such as a flash drive or a cloud-based storage option. This will free up space on your computer's hard drive, while still reassuring you that your files are secure. As a best practice, regularly back up all your files/folders on your computer, not just the items you are no longer using.

Create a *folder* organization system that works for your needs. For example, you might want to create folders by software program, by date, or by client. Establishing an organization system for your folders will save you time when searching for specific files. Consider writing out the system on paper first to get an idea of what it will look like. Just the process of writing out how your folders will be organized may give you additional ideas on how to structure your system. For example, if you have a few larger folders organized by client, you may want to have several subfolders within each of them that house specific files for that client by software program or usage.

Suppose WorldCorp asks you to keep track of correspondence with four of its clients. You can create four main folders (Clients 1–4) and then, within each of those folders, subfolders labeled Invoices, Email Correspondence, and Work Tasks. It is often easier to have the folders and the files within those folders sorted alphabetically so that you can easily find information.

It is better to use full names and words rather than abbreviations in your folder names. This makes using the search function more effective in locating the folders you need. This is especially important if files are shared and may need to be accessed in your absence. Most computers have the capability to mark or flag certain folders or files for quick access so that you can readily find them. Generally, this capability is found in the File

Explorer feature in your computer, which looks like a manila folder and is located on your desktop. You could also place those files or folders that you use daily on the desktop for quick access to them when you need them. Finally, organize your files as you create them rather than saving that task for later. When you create a new file in a software program, determine the folder where the file will be placed, and save the information there.

Google Drive, SharePoint, and OneDrive

Both Microsoft and Google have applications to help you manage, organize, and share your computer files. Drive is the online, cloud-based file storage system in Google. Drive is free and allows you to store, organize, manage, and create files online through the Google platform. Drive also has the capabilities to sync with multiple devices and has convenient sharing tools to share files and images with others. You will get your Drive when you create a Google account. There are limits to the storage capacity on Drive, but you can pay for more storage if needed.

Microsoft's versions of Drive are OneDrive and SharePoint. Like Drive, both are cloud-based systems. However, each serves a different purpose. OneDrive is most similar to Drive in its intended use. It is a storage system for files in the cloud, which enables you to access files on a variety of platforms and to share documents with others. You can also store and manage documents through SharePoint, but it has many more capabilities, designed for business and team communication. SharePoint helps build a shared library of resources to be used company-wide, such as links to employee documents or forms common to the organization. You can also use it to distribute comments or announcements company-wide and to create content and web pages to share. Within a company, you may have both OneDrive and SharePoint. For personal use, when you create a Microsoft account, you will be given a OneDrive account. SharePoint is more of an enterprise system for company teams.

2.3 | Communication and Calendar Applications

Learning Objectives

By the end of this section, you will be able to:
- Identify common communication applications for email and messaging
- Apply best practices to crafting an email
- Describe features and uses of calendar applications

Effective communication is a key component of any organization. Today's technologies enable us to communicate nearly seamlessly across thousands of miles, so that organizations can operate more efficiently and respond quickly to their customers' changing needs.

Communication technologies fall into three broad categories: **email**, **instant chat/messaging**, and **videoconferencing** programs. Some companies might also conduct communication by placing calls over the internet. Email is electronic mail. It is like writing a letter and delivering it via the internet rather than through the postal service. Instant chat/messaging is designed for brief, typed messages that are delivered in real time as if you were chatting with someone face-to-face. Finally, videoconferencing programs use video to mimic a face-to-face meeting where you can see and hear the other participants, but in a virtual environment (rather than in the same physical location).

There are advantages and disadvantages to each type of communication technology. Email is not ideal for conveying emotion clearly. Instant chat/messaging, though quick, as its name implies, may not preserve the entire conversation for later reference. (This may depend on the messaging service used.) Many email and instant messaging applications include a video chatting/meeting option as well.

With video communication programs, engagement from participants could be limited, especially if participants keep their video cameras turned off or if there are a large number of participants. It may be difficult to

interject to speak in such a setting. But video communication software has made it possible to hold departmental meetings where all members do not have to be gathered in the same location. This technology has transformed communication on a large scale as well, especially on the world stage, as Figure 2.9 shows.

Figure 2.9 Technical Cooperation Members of the COP26 Climate Change Conference hold a virtual meeting in 2021 in Glasgow, Scotland, enabling stakeholders from 200 countries to come together whether in person or over the internet. (credit: "IAEA Staff Behind the Scenes at COP26" by IAEA Imagebank/Flickr, CC BY 2.0)

Communication in the Digitized Office

Effective communication is essential for enhancing organizational performance. Communication is needed from upper management to effectively convey the strategic goals of the organization. Communication among colleagues is needed to ensure that work tasks are being completed in a timely manner. And, finally, external communication of an organization to key stakeholders such as customers or vendors is necessary to increase the customer base or garner additional funding if needed. External communication is essential when marketing your company. WorldCorp can use external communication via a variety of ways (such as a website and emails to potential customers) to raise awareness about a new product line they are offering. With technology today, business can be conducted without the individuals being in the same physical space. It is likely that you will encounter a digitized office environment in your career.

Challenges of Digitized Collaboration

Some challenges of collaboration via technology include:

- Building trust
- Scheduling
- Addressing communication issues
- Overcoming cultural differences

Regular video calls with teams can be an effective way to build trust in an organization. In a digitized business environment, scheduling will need to account for time zone differences and this can be facilitated with the technologies today. Figure 2.10 shows one map of the world time zones that most video conferencing programs will automatically account for when scheduling meetings in multiple countries and continents.

Figure 2.10 An understanding of time zones is important in running video meetings in multinational corporations. (credit: "Standard World Time Zones map (as of August 2015)" by UnaitxuGV/Wikimedia Commons, Public Domain)

Communications issues such as language barriers can be addressed using translation capabilities within some applications. This can allow businesses to recognize cultural differences that may exist within their organization or customer base. Organizations that operate remotely should consider offering training to help overcome some of these cultural differences so that they do not become barriers to effective teamwork. The training could include cultural awareness training or even language classes to assist employees working across borders.

Essentials of Business Communication

Communication in the workplace is an essential part of the day-to-day functions for any employee. Keep in mind that communication conducted using company equipment (even if private) can be recorded and is the property of the company that can be accessed at any time. So keep this in mind when you are communicating while at work. This includes chats, instant messages, emails, video calls, and computer files.

Although the exact content of the communication will vary, there are some best practices to follow to make the communication more effective. First, one of the most important aspects of communicating is to know your audience. The way you communicate with your coworker could be completely different than how you would communicate with a senior level manager in the company. The communication style, needs, and method can vary widely based on the audience. Next, you need to understand your communication objectives: Is the intent to inform or persuade? What are you hoping to achieve with the communication? Knowing the answer to these questions can help you format the content of your communication and clearly articulate the message.

Determining the audience and the purpose of the communication leads to creating the content of the communication. First, consider the level of formality needed in the message. Communicating lunch plans with your coworkers is a different level of formality than communicating quarterly sales results with a manager. You might also consider the timing of communication in your thought process. Sending critical information via email at 5:15 p.m. on a Friday afternoon may not be the best timing for the message to go out. Some applications might give you the ability to schedule delivery of emails at a more appropriate time. Timing is especially important when communicating across time zones. Be sure to spell-check your content and read it out loud for professionalism when appropriate. This is also applicable to all attachments to the communications that you might send.

Communication Applications

WorldCorp uses email, instant messaging, and video applications because it has several employees who work remotely. Technologies of this kind are called **communication applications**, or software that facilitates communication between individuals or groups.

Email has become its primary means to communicate. Instant messaging also plays a role in the company as a fast way to communicate with coworkers who might not be located in the same office space as you are. Finally, video communication applications work well when not everyone can be in the same place to meet face-to-face. Within each communication type, there are several applications available, and many are integrated into one program. Most of the software for the communication type will have similar functionality. For example, many email applications offer similar tools and capabilities for communicating.

Email

Email is a digital means to send messages, ranging from a short memo to a longer narrative, which can be sent to a single recipient or to thousands (or more). You've most likely used or at least heard of popular email programs such as Outlook, Gmail, Apple Mail, and Yahoo! mail. Emails can also include attachments, such as Word or Excel documents.

Regardless of which email program you use, all emails have certain common elements. The main components of an email include: To, Cc, Bcc, subject, body of the email, and attachments, as shown in Figure 2.11. The To field is where you enter the address of the primary intended recipient(s). You can include multiple recipients for the email; their email addresses will be separated either by a "," or a ";" depending on which program you are using. All **carbon copy (Cc)** recipients will get the identical email and all recipients will know all that have received the email, but they are merely "copied" on the message to be informed of it. There is no action required by Cc'd recipients. A **blind carbon copy (Bcc)** means that the recipients in the To and Cc fields will not know the Bcc individual has received the email. This function serves to inform someone else confidentially and usually means there is a crucial need for it. It's not a function to use lightly or liberally.
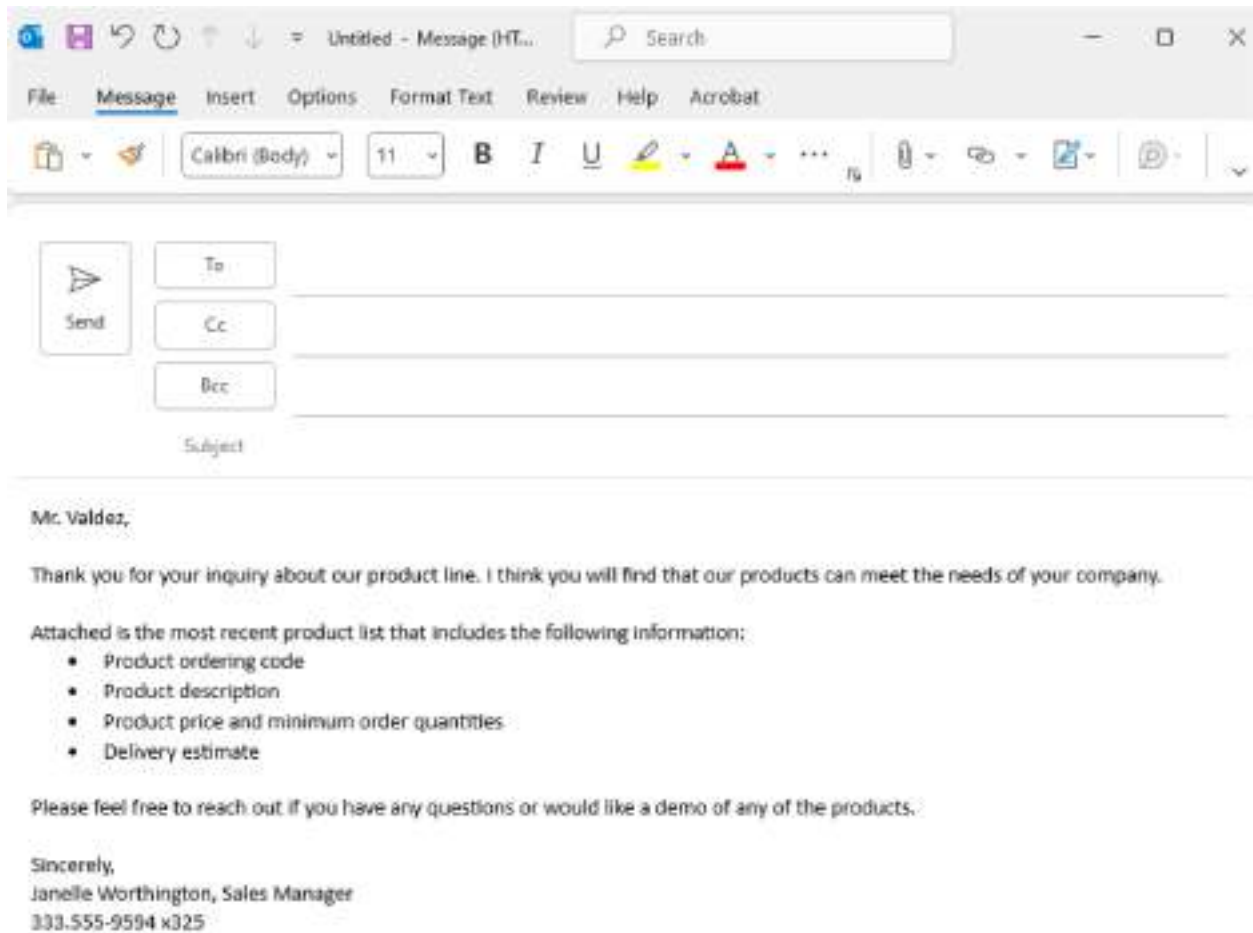
Figure 2.11 When composing a professional email, format the email in a similar manner to a business letter. (Used with permission from Microsoft)

The subject line of the email is a brief description of the content or purpose of the email. The body of the email is composed in the large space. Composing an email in an email application is similar to using word processing software such as Google Docs.

The final component of most emails is attachments. Not all emails have to include attachments, but you may want to include an attachment such as a document to review or an image you want to share. To attach a file to an email, you will usually find a tool or icon that looks like a paper clip. Attachments are just as they sound—additional information that is saved in a computer file outside of the actual email, such as spreadsheets, pictures, and PDFs. These digital files can then be saved by the recipient on their computer for future use.

When responding to an email you have received, you have several options. You can choose Reply, Reply All, or Forward, as Figure 2.12 shows. Reply will allow you to compose a response, which will go to the sender of the email only. When you choose Reply All, everyone who received the original email from the sender will also get your reply. Use caution when choosing Reply All. Make sure you are comfortable with all on the email distribution list reading your response.
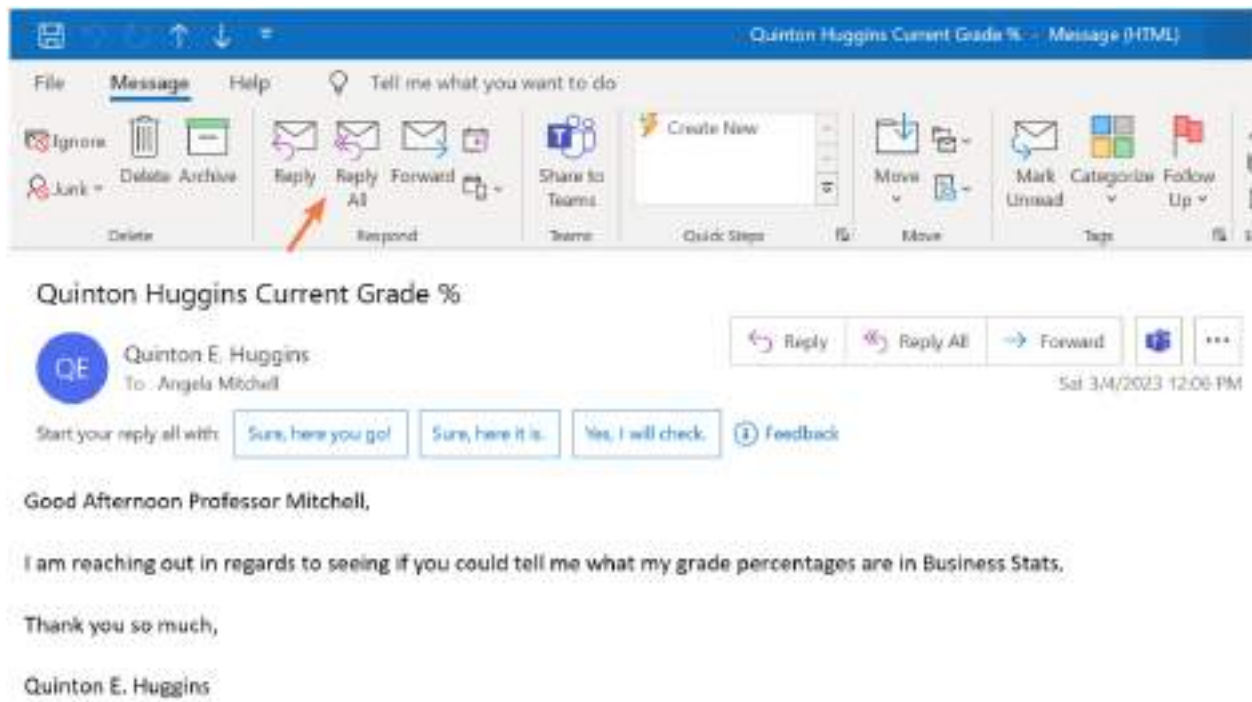
Figure 2.12 When responding to an email, be careful to choose the appropriate option. As an example, you may not want to choose Reply All when responding to an email that was sent to all employees. (Used with permission from Microsoft)

For example, the human resources (HR) director at WorldCorp has just sent a company-wide email about the upcoming holiday schedule. If you had a question about the schedule and chose Reply All, everyone in the company would get your email with the question. You really intended only to ask the question of the HR director, so you should have used Reply.

Finally, Forward allows you to forward the original email to someone else. You might choose this option if you want to get some input on a topic before responding. Sales personnel at WorldCorp might use the Forward option to send accounts payable receipts for products they have purchased.

Generally, email is not the best communication channel for long discussions that require input from multiple people, because you will get multiple replies that clog your email inbox (more on that later). In general, a business email should take a formal tone. Like a business letter, it should be clear and concise. Emails should include a descriptive subject line that conveys the topic of the message. In fact, some email programs have a security feature that will flag any message without a subject line and will ask you to write one before clicking Send.

Professional business emails should start with a greeting or salutation—something like Dear Mr. Jones, Mr. Jones, or simply Jim, depending on the level of formality you desire.

The body of the email should be brief and concise. Anything longer than a few paragraphs should be put into an attachment file instead. Pay attention to spelling and grammar as you are constructing the email. Finally, end with a closing and your signature. The closing may be a sentence such as "Thank you for your time" or "I look forward to hearing your thoughts." Some email programs have a built-in feature that allows you to include a preformatted signature on all emails, perhaps including your name, company, position, and contact information.

Common Email Applications

There are many email applications on the market. Your company will have chosen one, but that doesn't mean you can't have your own email addresses to use at home. Just be sure to keep those email accounts separate. It is not a good idea to use company email for personal matters because you have no privacy and it is the

company's property first and foremost. Because this text covers Microsoft and Google products, you will learn these email applications, Outlook and Gmail, respectively.

Microsoft Outlook

Outlook is part of the Microsoft suite of applications. It contains many of the same features that you might find in Word or Excel. You can format the email text as you are composing the email. Figure 2.13 shows you the email composition screen in the application. You will notice there are common features in Outlook that you will find in most email applications. You have options to reply to the message, include attachments, and add signatures to your emails. Another handy feature in Outlook is setting a priority for your email. This allows you to give an email that needs immediate attention a high priority label. It can alert the recipient that the email is a "High Priority" email and needs to be addressed quickly.

Other features that you will see in Outlook and many other email applications are identifying emails as spam or junk. You can mark an email as junk and emails from that sender will no longer appear in your inbox. They will instead be immediately sent to the spam or junk folders. When you no longer need an email, you can choose to delete it. When you delete an email, it goes to the Trash folder. You can still access it in the Trash folder for some time based on the settings of Outlook to delete the content of the Trash folder. Finally, you have the ability to add folders to help keep your emails organized. Just as you would for folders on your computer, you can use an organization system that works for your needs. For example, a sales agent at WorldCorp might set up an email folder for each of its customers.
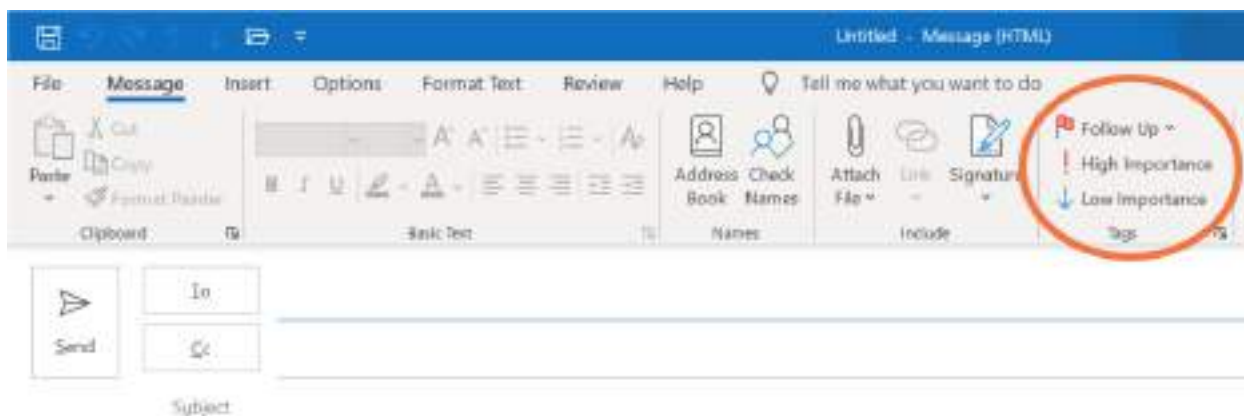

Figure 2.13 If you set the priority to High, recipients can quickly see emails that need immediate attention. (Used with permission from Microsoft)

Gmail

Gmail (see Figure 2.14) is part of the Google suite of applications. You may have experience already using Gmail as many schools will assign Gmail email addresses to their students for use while they are enrolled. In Gmail, you have some ability to format text, but not to the extent that you have with Outlook. The basic setup of the email composition is similar. The functionality of Gmail is similar to that of most email programs. You can add attachments, organize emails into folders, and identify emails as junk or spam.

Figure 2.14 Gmail places the Send button at the bottom of the email composition screen. (Gmail is a trademark of Google LLC.)

LINK TO LEARNING

Email was invented in 1971 by Ray Tomlinson, a computer engineer who worked for Bolt Beranek and Newman in Massachusetts. Tomlinson developed a system that could send messages between computers using the @ symbol. The first organization to use email was the Department of Defense. Read this article on the history of email (https://openstax.org/r/78HistoryEmail) to learn more about how email has evolved since 1971.

- How has email changed the way organizations function?
- How has email changed the way individuals stay connected?

Instant Chat/Messaging (IM) Applications

Instant chat/messaging applications offer users a quick way to send messages in real time, meaning the back and forth is directly on the screen rather than in an email you have to open first to read. Often, these applications are more text based and do not offer some of the same formatting features that you might find in email programs. Many do offer the ability to send files through the instant messaging application. However, the size of the file may be limited. Usually, communicating through instant messaging is less formal than communication in email. Also, you would not expect to format a message in instant messaging applications like a business email. You might also find that users will abbreviate words more when using instant messaging applications. This is like texting via your cell phone.

Some companies offer internal programs for instant messaging. Others use commercially available tools to facilitate communication in the workplace. For example, if you had a quick question to your manager about the format needed for a presentation you are preparing, using an instant messaging application might be a good tool. You could send the message to your manager in a short, concise question and the manager would receive the message directly. Think about instant messaging like having a face-to-face conversation with your manager, but just electronically—an online chat. Instant chat/messaging applications give users the ability to send to multiple people or to create a "chat room." Most programs also have an indication if a user is online.

This will allow you to know whether your message will be viewed when you send it.

Using instant chat/messaging in the workplace can facilitate real-time communication between employees who are not in the same physical location. This can foster team building and foster trust among the employees. It can also reduce the number of emails an employee receives on a daily basis. Instant messaging can be a secure form of communication that can be archived by the information technology department. However, overuse of instant messaging can provide a distraction in the workplace. With instant messaging, we often do not place the same attention to proofreading and making sure we are conveying the message we intend. You might inadvertently send a message in error or with incorrect information. Because of the immediate nature of instant messages, take care to make sure the message is correct before sending.

Also, instant chat/messaging is not appropriate for critical discussions such as hiring decisions, strategic company decisions, or contract discussions. Instant messaging should be viewed as a means to facilitate quick conversations, not as a replacement for company meetings and other such discussions. Instant messaging, although similar in ways to a face-to-face conversation, cannot take the place of those human interactions. Emotions and body language are not conveyed through messages. Here are the major instant message programs.

Microsoft Teams

Microsoft Teams is a useful tool in business for instant messaging. It is included in the Microsoft suite of programs. Teams also offers video chat capability as well as file sharing. Many organizations today use Teams to conduct team meetings. Teams provides much more than just a chat function. You can take calls, schedule meetings through the calendar function, and much more in the Teams environment. Figure 2.15 shows what the Teams interface looks like with the chat function selected.
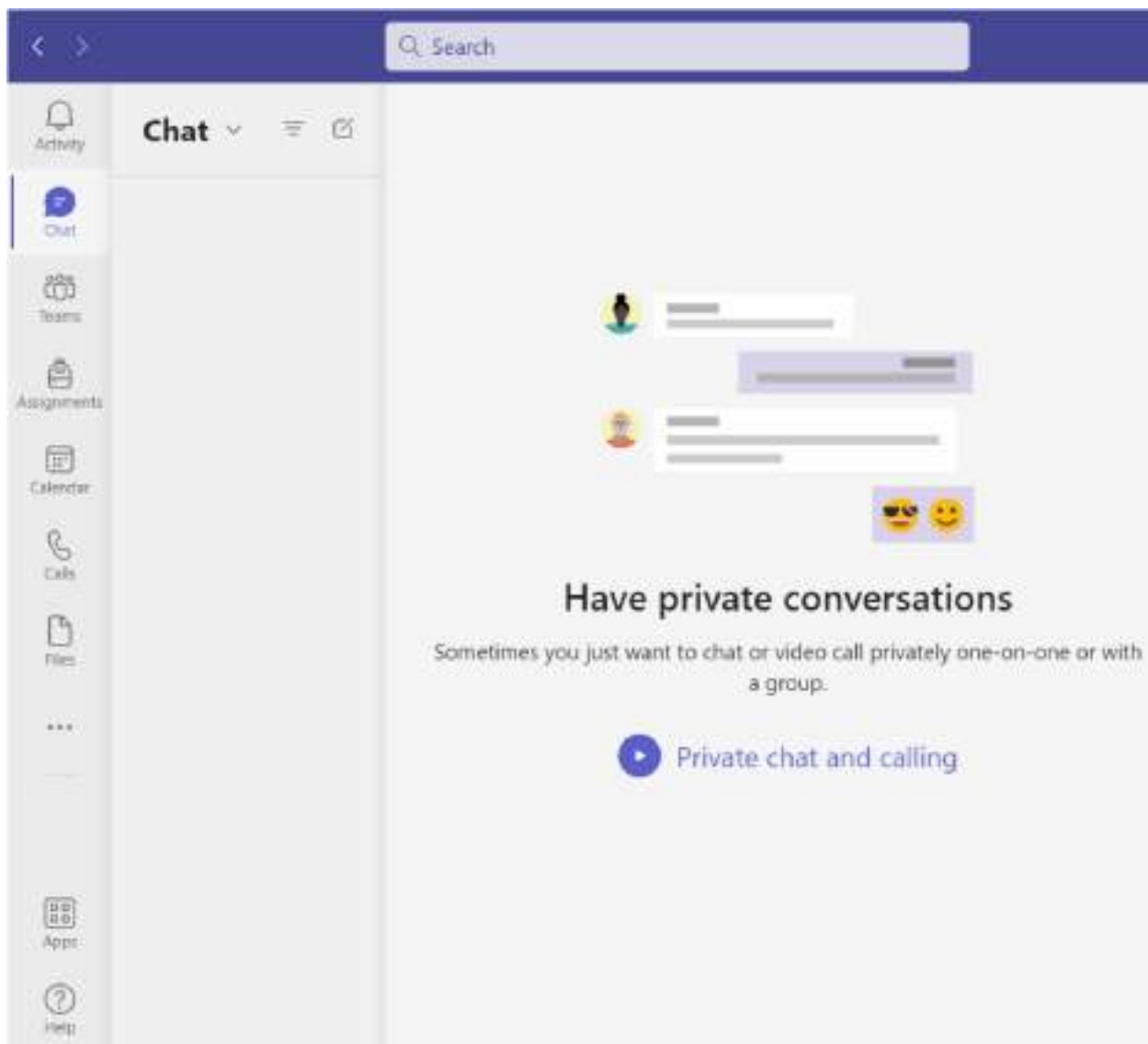
Figure 2.15 The Teams window will display your picture in the upper-right corner with a green check mark to show you are available. (Used with permission from Microsoft)

Slack

Another instant messaging platform, Slack, is a free program with some extra features available for a fee. For example, with the free version, users are limited to view and access only the most recent 10,000 instant messages. This will work for many uses but may be limiting if you try to use the free version for workplace communications, where you may need to recall a conversation that goes back further. Slack is similar in many ways to Teams (see Figure 2.16). It was designed specifically for use in the workplace. Slack allows users to add emojis to messages and to create workspaces for team collaboration. Files can be shared via Slack as they are in Teams. Private and public messages can be exchanged through Slack. Slack integrates well with other programs such as the Google suite of products, including Google Calendar.
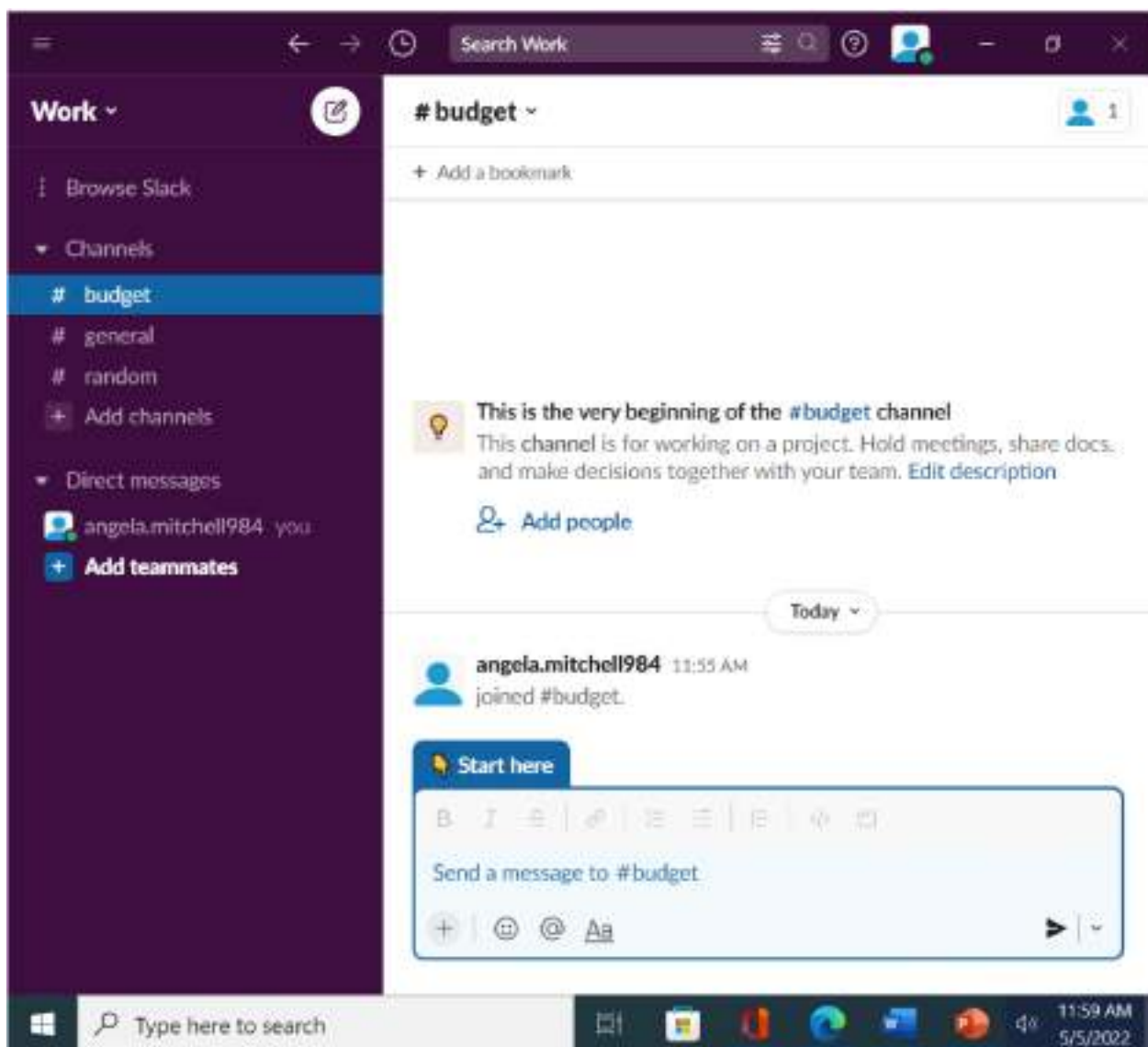
Figure 2.16 Notice that Slack uses the term "channels" to refer to different chats. (Copyright 2023 Slack Technologies, LLC.)

Calendar Applications

There are several applications that can help you keep organized. One such category of applications is calendars. Suites such as Microsoft and Google include calendar applications. One key feature of calendar applications is the ability to have both your personal and business schedules in one place that can be accessed from virtually anywhere. You can integrate the apps with your phone so that you no longer have to carry a separate day planner or schedule book with you. With the sophistication of the calendar apps today, you can enter appointment information into one place and it can be updated across many different programs and even shared to other people.

Calendar Features and Functions

With the availability of various technologies today, many people have moved their calendar to an online format, rather than a more traditional paper planner. Many prefer the convenience of storing their work and personal appointments in a single place. These calendar apps allow users to bring together multiple calendars as well as scheduling meetings and blocking out time when you might be unavailable. Many calendar applications will permit users to determine which items are visible to others or to share your calendar with coworkers and family. You can also use calendar software to allow your customers to set up meetings with you

during your available time. If you want to keep your personal appointments hidden from your coworkers, you can easily set this up in the program. The settings in the application also allow users to permit others to add appointments to their calendars.

Calendar applications can also be useful for managing work tasks for project management and setting reminders for key activities. Calendar items can be color coded and/or flagged based on their importance of due date. Calendars are used frequently in organizations to make scheduling easier when including multiple people for a meeting. Using a calendar application can also increase productivity because you can manage your time more efficiently. Many of the calendar apps also integrate well with cell phones so that you can receive notifications of upcoming appointments if you are not at your computer. You may also find when scheduling family or personal appointments such as dentist appointments, those appointments can be directly added to your calendar by the doctor's office. While some may still prefer the traditional paper planner for keeping their schedule, the convenience of calendar applications has prompted many businesses to adopt them for use in their organization.

SPOTLIGHT ON ETHICS

Adjusting Privacy Settings in Your Electronic Calendar

While electronic calendars are incredibly useful and convenient, we must also recognize that these calendars may be viewed by others, especially if we are using our employer's software. Google Calendar and Outlook/Calendar can be viewed by others easily, requiring us to use privacy options such as adjusting viewing permissions for different individuals. You may want to prevent some people from viewing your calendar entirely, provide only limited information (such as availability) to others, and allow full access to your calendar to some. You can also control what information you can make available on a calendar appointment. For instance, you can make an appointment private and not viewable by anyone; this slot will show up as private with no further details. This is helpful for keeping private appointments or sensitive appointments.

Calendar Integration and Syncing

Syncing calendars stored in other applications is an essential component of getting the best use of a calendar application. You could have a calendar on your phone for personal appointments and reminders, a calendar for your work tasks on your work computer, and then perhaps another calendar to keep track of your extended family birthdays. Through calendar integration, these calendars can be synced into one place. This often involves simple changes to the settings in the software to link all the calendars together. In fact, when you first install a calendar application on your device, you might be prompted to integrate existing calendars during the setup process.

Common Calendar Applications

Figure 2.17 shows the calendar feature in Microsoft Outlook. The calendar function and email are integrated in the program. You cannot delete the calendar application, but you can choose not to use it. There are no preset events in the calendar application. You can set the program to give you notifications of meetings and tasks when you are in the email program. The Outlook Calendar also has a meeting scheduler to assist with scheduling meetings and can even be used to determine if specific meeting spaces are available in the organization. Outlook Calendar has a useful feature to set up recurring meetings that happen at some frequency. For example, if your company has a set meeting each week for sales force updates, you can set this up in Outlook once and it will be added to all attendees' calendars for the time frame you desire.
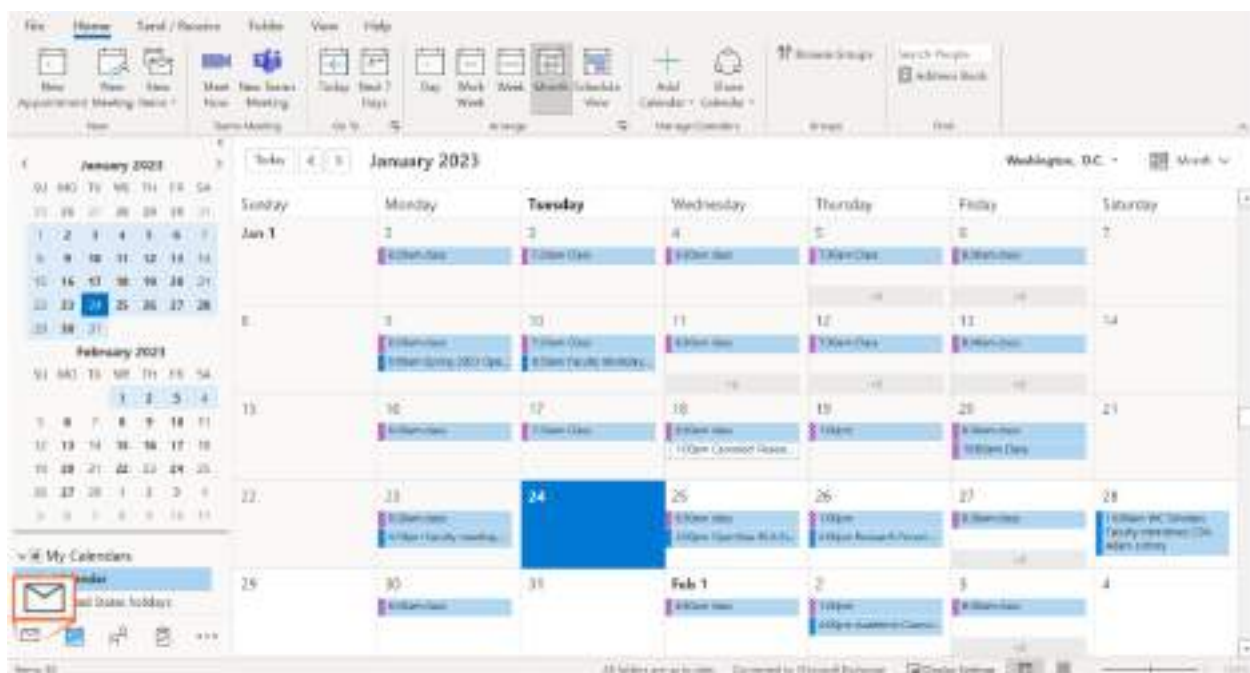
Figure 2.17 To switch back to Outlook Mail, just choose the envelope in the lower-left corner of the screen. (Used with permission from Microsoft)

If you already have a Google account, you have access to Google Calendar. Google Calendar is easy to use and integrates well with a wide variety of platforms. With Google Calendar, you create multiple calendars to manage different events. You can then manage the settings for each of the calendars independently. All the created calendars are integrated into an overall calendar interface. You can use color coding to differentiate the different calendars when viewing in the main calendar view, as Figure 2.18 shows. You access Google Calendar by logging in to your Google account.
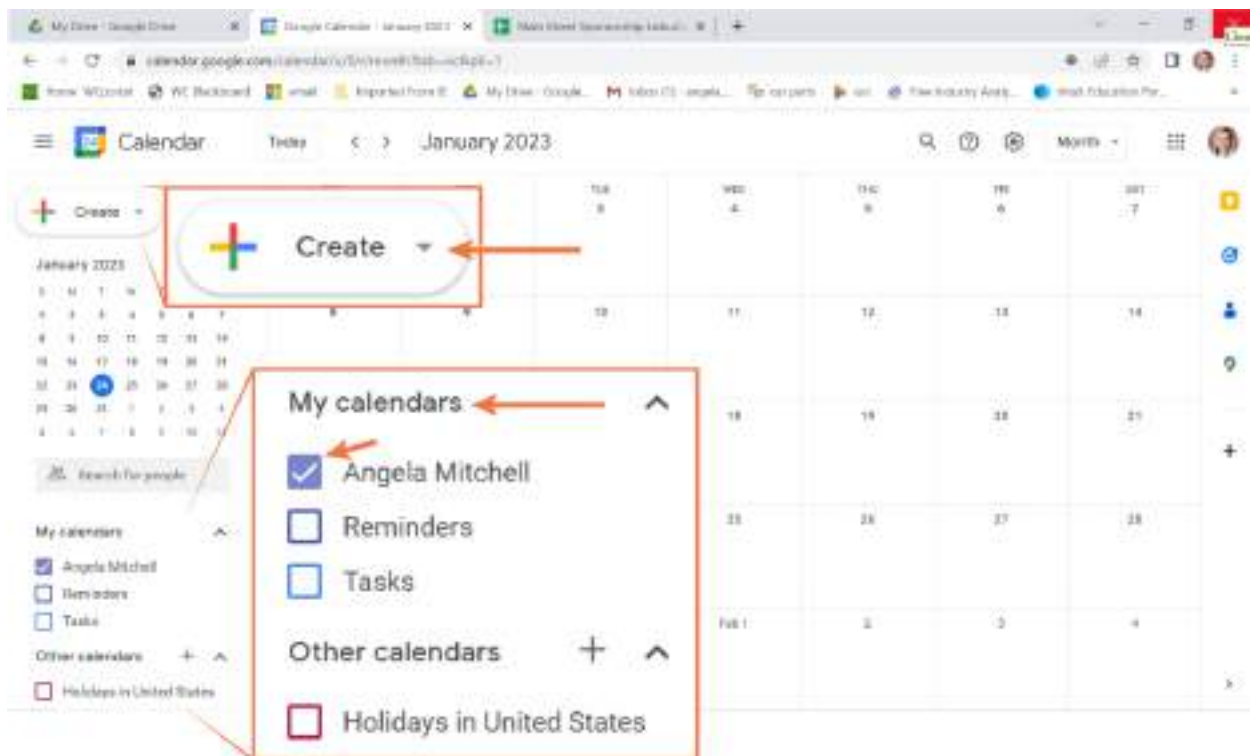

Figure 2.18 To create a new calendar appointment, choose Create. All calendars displayed in the main calendar view are listed in the lower left of the screen. (Google Calendar is a trademark of Google LLC.)

2.4 | Essentials of Microsoft 365

Learning Objectives

By the end of this section, you will be able to:
- Know how to access Microsoft applications
- Describe the key functions within Microsoft's standard menus
- Create, save, and open a document

Both personal and business productivity have increased as the result of technological advances. Computer technology has facilitated communication, information sharing, and data analytics. Although there have been several software programs developed over the years in these areas, two main leaders have emerged: Microsoft and Google are most common in organizations today and are suitable for a variety of purposes. Google and Microsoft have dominated the market for productivity software programs because they have adapted to the changing needs of businesses. Their success continues because of their forward-thinking and response to market needs.

Overview of Microsoft 365

Microsoft launched Microsoft Office in 1990. This suite of applications included three main programs: Word, Excel, and PowerPoint. These programs are bundled as a package to give the user the full range of productivity tools to meet a wide variety of needs. Office applications offer the flexibility to appeal to various preferences with the many ways to perform tasks within the software.

Office applications are compatible across a wide variety of platforms, including mobile devices and Apple/Mac operating systems. The applications also integrate well with other software. You may be aware of older versions of Office, such as Office 2016 or 2019, but the latest product, Microsoft 365, moves beyond these static versions, instead offering a subscription that updates automatically. With the introduction of Microsoft 365, the programs use a cloud-based technology that can be accessed anywhere. Microsoft 365 also enhanced the collaborative features of the programs.

Accessing and Maintaining Microsoft Products

When you register for a Microsoft 365 account, you are given access to OneDrive, which is its product that provides online storage in the cloud. This offers many advantages. When you save a file to your OneDrive, you will be able to access it from any computer as long as you have an internet connection. There are different versions of Microsoft 365 available for purchase, but most software today uses this subscription-based model for a fee. The software programs are installed on your devices as "apps," but can also be accessed through the web-based versions with some limitations to functionality. Updates to the programs are provided regularly by Microsoft and should be performed when prompted. Sometimes the information technology department (IT) will take care of these software maintenance issues with your company or school equipment. There are student editions of most versions of Microsoft 365 that can be purchased at a reduced cost or even for free. The student editions might also have some limitations to the functionality of the programs.

Applications

The Microsoft 365 suite includes software for many of the most common computer needs in today's workplace, as well as for personal use, including word processing, spreadsheets, presentations, database management, an email and calendar interface, and a collaboration tool. Table 2.2 provides an overview of the applications within the suite. Other chapters in this text will cover these programs in detail. What comes next in this chapter is a breakdown of commands that are common to all the Microsoft 365 applications, so you can get a basic understanding of how to navigate.

Application	Type	Description
Word	Word processing	Create documents such as reports, memos, agendas, résumés, flyers, and mailings.
Excel	Spreadsheet	Create data-based sheets and workbooks for gathering data, performing functions, and analysis.
PowerPoint	Presentations	Create slide presentations for use in workplace meetings or client showcases.
Access	Database	Create and maintain databases of information.
Outlook	Email	Manage email communications and calendars.
Teams	Collaboration tool	Set up workspaces for collaboration, such as a team might use on a specific project.

Table 2.2 Microsoft 365 Applications

Overview: Ribbons, Tabs, and Commands Menu

Since its initial release, Microsoft's suite of office products has been a driver of change, introducing new features in each subsequent version. Since the 2007 version, the apps have used the **ribbon**—an interactive bar of commands at the top of the application—as their user interface. With the ribbon, all the functions are clearly organized and user-friendly.

The ribbon is organized into **tabs**, each of which houses a collection of thematically grouped commands. The default tabs are File, Home, Insert, Design, Layout, References, Mailings, Review, View, and Help. As you hover your mouse over the ribbon, you will notice many small icons (pictures) that have a command over them. A **command** directs the program to complete a process, such as Save. When you select the Save icon, the command will start.

As you can see in Figure 2.19, the commands in the ribbon are organized into a **command group** of similar or related buttons, which appear together on the ribbon tabs.
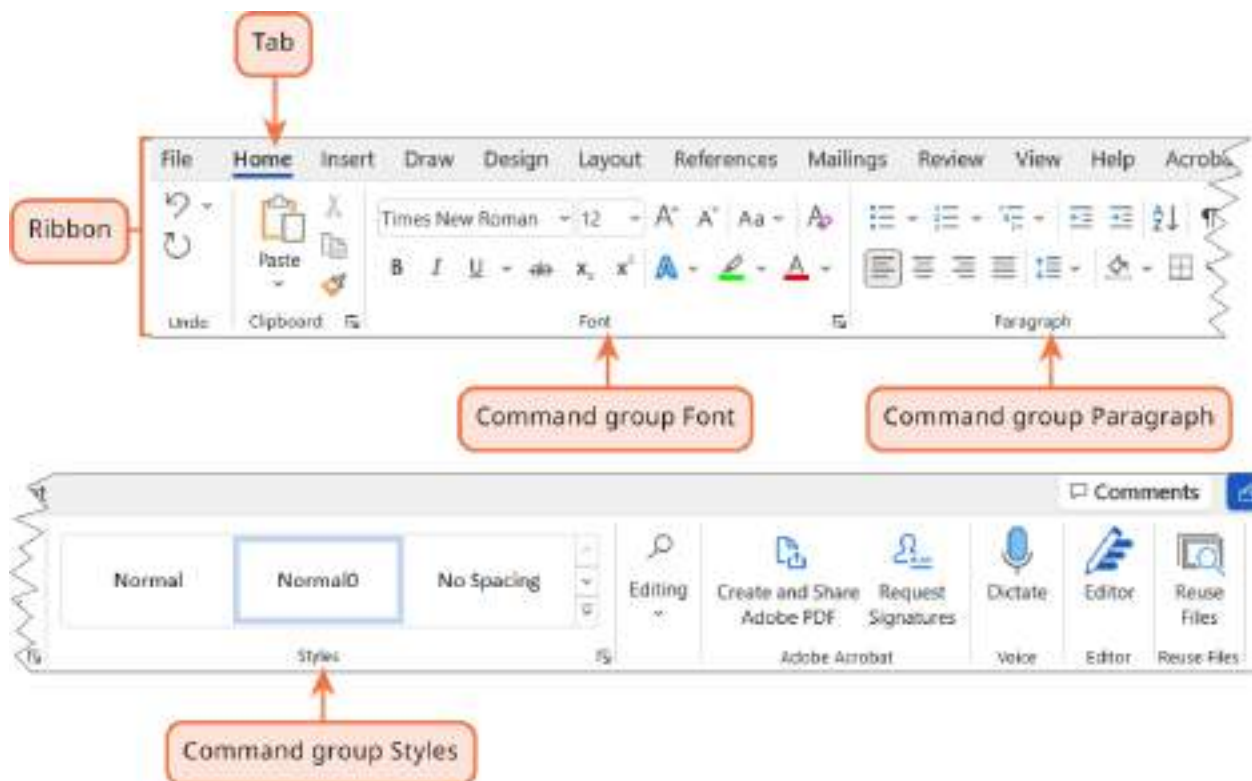
Figure 2.19 The Home tab contains the command groups Font, Paragraph, and Styles, which are used for formatting text. (Used with permission from Microsoft)

Each tab generates a different ribbon with the appropriate commands and command groups. This section introduces the most used tabs. You will learn more details about them and practice using them in each specific application as the book goes on. Figure 2.20 shows the tabs available in Word and Excel, and Figure 2.21 shows the tabs available in PowerPoint and Access.
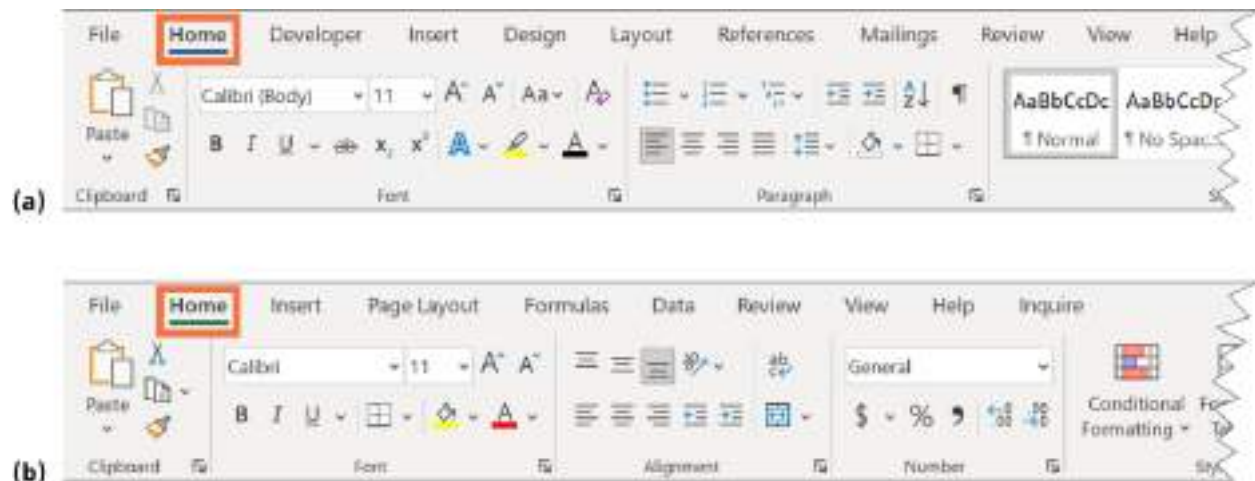

Figure 2.20 The main menu bars for (a) Word and (b) Excel share common tabs (File, Home, Insert, Help, for instance), but also contain tabs that are in character with their main functions (such as References in Word and Formulas in Excel). (Used with permission from Microsoft)
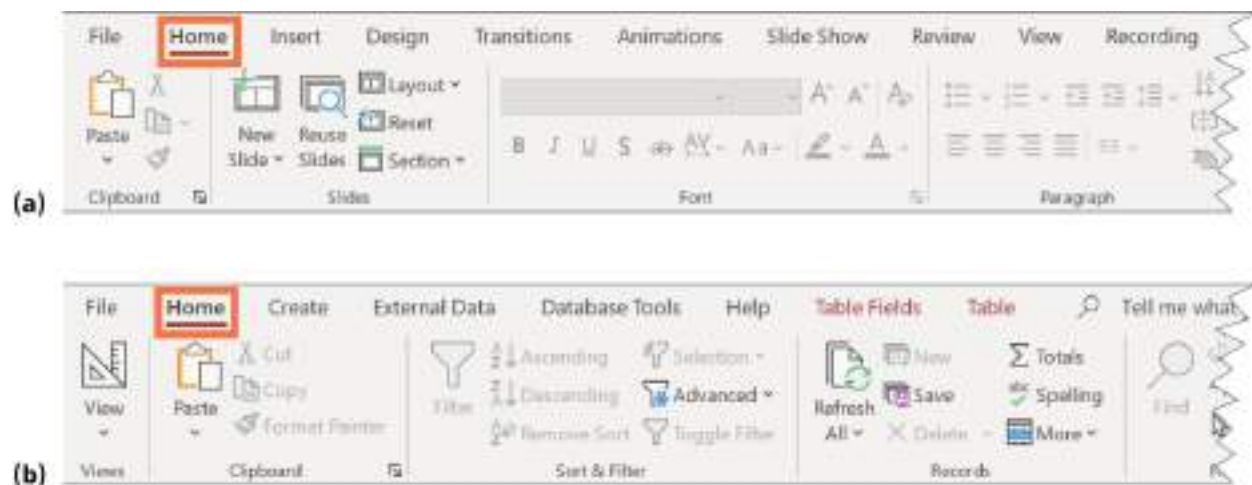
Figure 2.21 The main menu bars for (a) PowerPoint and (b) Access also share common tabs with one another and with Word and Excel (File, Home, Insert, Help, for instance). They also contain tabs that are in character with their main functions (such as Animations in PowerPoint and Database Tools in Access). (Used with permission from Microsoft)

File Tab

If you open a Microsoft product without opening any specific file, you will see the welcome screen, which provides a **Backstage view**. The Backstage view is located in an application for managing most tasks related to the documents. In Backstage view, you can open, close, rename, print, and control the settings for the application. There will be many commonalities within the Office programs for the tabs. When you have opened a file in an application such as Word or Excel, the Backstage view gives you information about that file you are working with. As you can see in Figure 2.22, the file properties are shown on the right pane of the Backstage view, which displays critical metrics about your document, such as its size, number of pages, number of words, file name, last saved time, and when it was printed. Backstage view also includes important commands such as file protection, inspecting the document, and managing the document, which will be discussed later in this chapter.
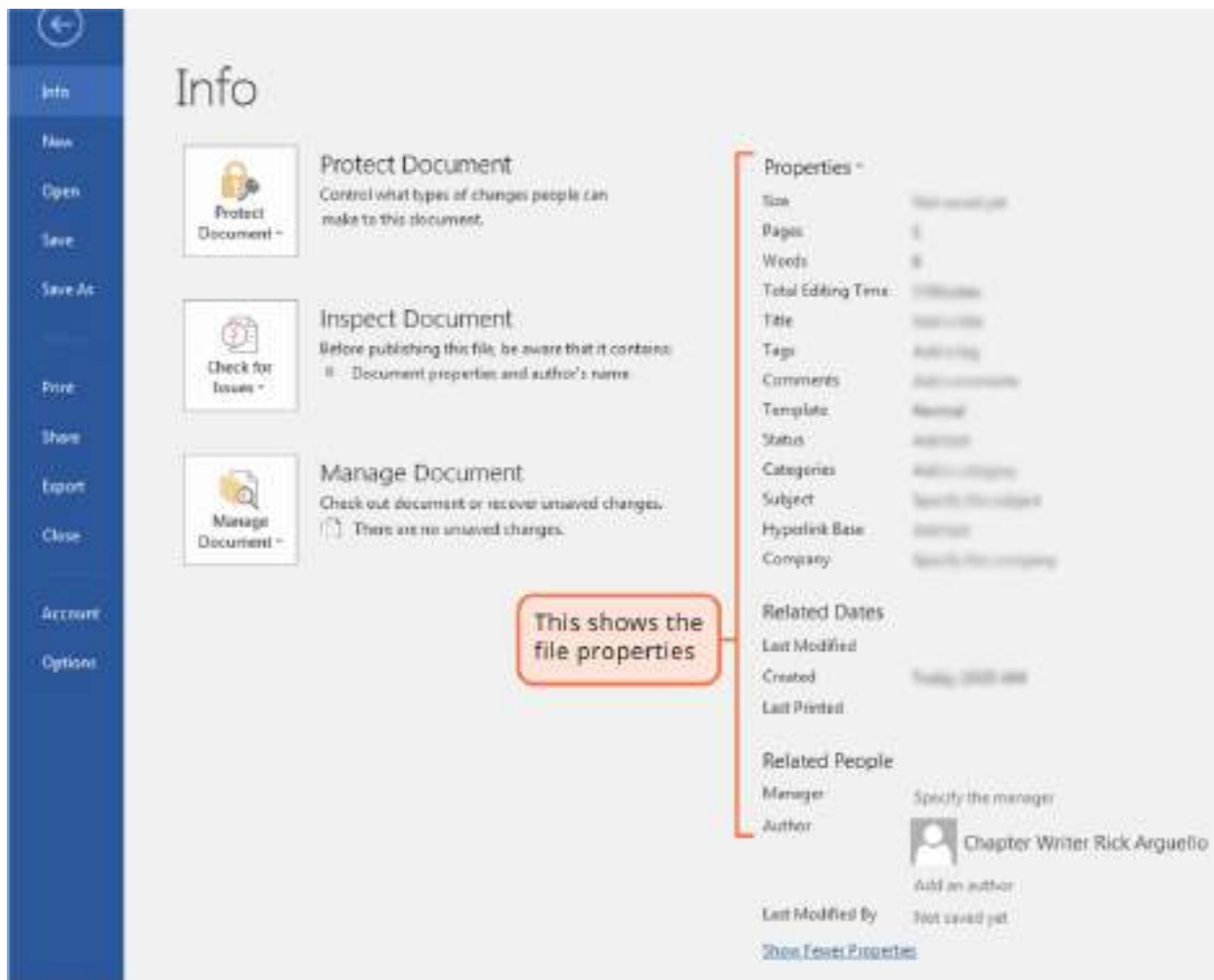
Figure 2.22 Backstage view shows file properties, which are the statistics and technical details of your file. (Used with permission from Microsoft)

MAC TIP

The Backstage view is not included in the Mac Version of Office, but you can get the properties of a file by going to the File tab and choosing Properties.

Creating a New File

As you open an Office application, you will be introduced to the welcome screen, which shows your recent files on the left and your options on the right. See Figure 2.23. Because you are in Word, you can choose Blank document to start a new document, or you can select a **template** from the default template list. A template is a document with many fields already filled and formatted, ready for the user to work on.