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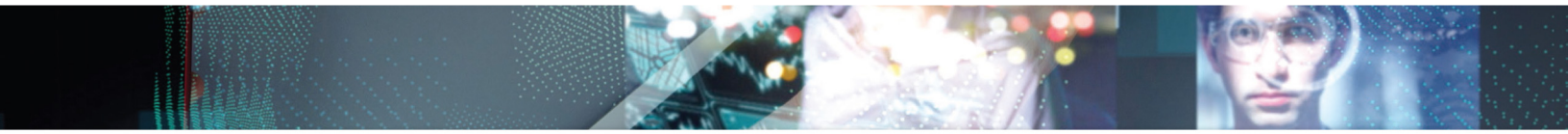

Computing Essentials 2023

Making IT Work for You

Timothy J. O'Leary | Daniel A. O'Leary | Linda I. O'Leary

Mc Graw Hill

Computing Essentials

Making IT work for you

INTRODUCTORY 2023

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INTRODUCTORY 2023

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COMPUTING ESSENTIALS

This book is printed on acid-free paper.

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Dedication

To Jackie, a friend and quiet companion of over 20 years.
You will be missed.

Brief Contents

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501-1333

Contents

New to *Computing Essentials* 2023

To increase student motivation and engagement, a focus on smartphones has been added by increasing content and providing marginal tips offering practical advice for efficient smartphone use. While the coverage of other topics has not been reduced, this change offers a gateway to demonstrate the relevance of all types of computers to their lives. Additionally, every chapter's Making IT Work for You, Privacy, Ethics, and Community features have been carefully revaluated, enhanced, and/or replaced. Also, every chapter's Look to the Future has been revised to show that the expected breakthroughs of tomorrow are rooted in today's advances. More specific new coverage includes the following:

Chapter 2:	Added coverage of Web 5.0 Expanded coverage of Web 4.0 Reorganized coverage of Web 1.0 to 3.0 to emphasize relationships between web generations Expanded coverage of netiquette Expanded coverage of social networks, including TikTok and Instagram Expanded coverage of podcasts Added coverage of cryptocurrencies and blockchain
Chapter 3:	Added coverage of features, including grammar checkers Expanded coverage of app stores Expanded coverage of mobile apps Reorganized topics to emphasize growing significance of mobile platforms Expanded coverage of specialized apps to emphasize mobile apps Added coverage of shopping sites and fake reviews Added gaming coverage to include free-to-play
Chapter 4:	Expanded coverage of virtual assistants Added coverage of operating system accessibility features Added coverage of Windows 11 Added coverage of macOS 12 Monterey
Chapter 5:	Added coverage of mobile microprocessors Added coverage of Thunderbolt 3 Expanded coverage of USB Added coverage of UTF-8 and UTF-16
Chapter 6:	Added coverage of assistive devices for people with disabilities Expanded coverage of virtual keyboards Expanded coverage of voice recognition systems
Chapter 7:	Expanded coverage of SSDs (solid-state drives) Expanded coverage of USB flash drives Expanded coverage of cloud drives
Chapter 8:	Expanded coverage of satellite communications Expanded coverage of 5G networks
Chapter 9:	Added coverage of social media and role of advertising Added coverage of limitation of privacy mode browsing Expanded coverage of ransomeware Expanded coverage of data backups Added coverage of data leaks Expanded coverage of two-factor authentication

Preface

The 20th century brought us the dawn of the digital information age and unprecedented changes in information technology. In fact, the rate of change is clearly increasing. As we begin the 21st century, computer literacy is undoubtedly becoming a prerequisite in whatever career you choose.

The goal of *Computing Essentials* is to provide you with the basis for understanding the concepts necessary for success. *Computing Essentials* also endeavors to instill an appreciation for the effect of information technology on people, privacy, ethics, and our environment and to give you a basis for building the necessary skill set to succeed in the 21st century.

Times are changing, technology is changing, and this text is changing too. As students of today, you are different from those of yesterday. You put much effort toward the things that interest you and the things that are relevant to you. Your efforts directed at learning application programs and exploring the web seem, at times, limitless. On the other hand, it is sometimes difficult to engage in other equally important topics such as personal privacy and technological advances.

At the beginning of each chapter, we carefully lay out why and how the chapter's content is relevant to your life today and critical to your future. Within each chapter, we present practical tips related to key concepts through the demonstration of interesting applications that are relevant to your lives. Topics presented focus first on outputs rather than processes. Then, we discuss the concepts and processes.

Motivation and relevance are the keys. This text has several features specifically designed to engage and demonstrate the relevance of technology in your lives. These elements are combined with a thorough coverage of the concepts and sound pedagogical devices.

VISUAL CHAPTER OPENERS


chapter 2 The Internet, the Web, and Electronic Commerce

Why should I read this chapter?

The Internet has changed the world, and our world has changed how we use the Internet. Originally, the Internet was only available to academics and scientists in universities and federal buildings. Today the Internet connects everything, from cell phones to refrigerators.

This chapter covers the things you need to know to be prepared for this ever-changing digital world, including:

- Impact—how Internet technology is changing your world.
- Hardware—how to connect your life to the Internet, including Wi-Fi, cell phones, and tablets.
- Applications—how to get ahead using social networking, streaming technology, and cloud computing.

Learning Objectives

After you have read this chapter, you should be able to:

1. Explain the origins of the Internet and the web.
2. Explain how to access the web using providers and browsers.
3. Compare different web utilities, including filters, file transfer utilities, and Internet security suites.
4. Compare different Internet communications, including social networking, blogs, microblogs, podcasts, wikis, text messaging, instant messaging, and e-mail.
5. Describe search tools, including search engines.
6. Describe how to evaluate the accuracy of information presented on the web.
7. Identify electronic commerce, including B2C, C2C, B2B, and security issues.
8. Describe cloud computing, including the three-way interaction of clients, Internet, and service providers.
9. Discuss the Internet of Things (IoT) and the continuing development of the Internet to allow everyday objects to send and receive data.

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Each chapter begins with a Why Should I Read This Chapter? feature that presents a visually engaging and concise presentation of the chapter's relevance to the reader's current and future life in the digital world. Then a list of chapter learning objectives is presented providing a brief introduction to what will be covered in the chapter.

VISUAL SUMMARIES

Visual summaries appear at the end of every chapter and summarize major concepts covered throughout the chapter. Like the chapter openers, these summaries use graphics to reinforce key concepts in an engaging and meaningful way.


VISUAL SUMMARY Input and Output

KEYBOARDS

POINTING DEVICES

Input is any data or instructions that are used by a computer. **Input devices** translate words, numbers, sounds, images, and gestures that people understand into a form that the system unit can process. These include keyboards and pointing, scanning, image capturing, and audio-input devices.

Keyboards convert numbers, letters, and special characters that people understand into electrical signals. These signals are sent to, and processed by, the system unit.

Keyboards

There are three basic categories of keyboards: virtual, laptop, and traditional.

- **Virtual keyboard,** primarily used with cell phones and tablets. Does not have a physical keyboard. Keys displayed on screen and selected by touching a key's image.
- **Laptop keyboards,** used on laptop computers. Smaller than traditional keyboard with fewer keys. Includes all the keys found on virtual keyboard plus extra keys, such as function and navigation keys.
- **Traditional keyboards,** used on desktop and larger computers. Standard keyboard has 101 keys. **Toggle keys** turn features on and off. **Combination keys** perform actions when combinations of keys are held down.

Pointing devices provide an intuitive interface with the system unit by accepting physical movements or gestures and converting them into machine-readable input.

Touch Screens

Touch screens allow users to select actions by touching the screen with a finger or pen/like device. A **stylus** is a pen/like device that uses pressure to draw images on a screen. **Handwriting recognition software** translates handwritten notes into a form that the system unit can process. **Multitouch screens** accept multiple-finger commands.

Mouse

A **mouse** controls a pointer that is displayed on the monitor. The **mouse pointer** usually appears in the shape of an arrow. Some mice have a **wheel button** that rotates to scroll through information on the monitor. A **cordless** or **wireless mouse** uses radio waves or infrared light waves. A **touch pad** operates by touching or tapping a surface. It is widely used instead of a mouse with laptops and some types of mobile devices.

Game Controllers

Game controllers provide input to computer games. Widely used controllers include gaming mice, **joysticks, gamepads,** and **motion-sensing devices.**

156 CHAPTER 6

To efficiently and effectively use computers, you need to be aware of the most commonly used input and output devices. These devices are translators for information into and out of the system unit. Input devices translate words, sounds, and actions into symbols the system unit can process. Output devices translate symbols from the system unit into words, images, and sounds that people can understand.

SCANNING DEVICES

IMAGE CAPTURING DEVICES

Scanning devices move across text and images to convert them into a form that the system unit can process.

Optical Scanners

An **optical scanner (scanner)** converts documents into machine-readable form. The four basic types are **flatbed, document, portable,** and **3D.**

Card Readers

Card readers interpret encoded information located on a variety of cards. The most common is the **magnetic card reader** that reads information from a thin magnetic strip on the back of a card. **Chip cards** contain microchips to encrypt data and improve security.

Bar Code Readers

Bar code readers or **scanners** (either handheld **wand readers** or **platform scanners**) read **bar codes** on products. There are a variety of different codes, including the **UPC** and **MaxiCode.**

RFID Readers

RFID readers read **RFID (radio-frequency identification) tags.** These tags are widely used for tracking lost pets, production, and inventory and for recording prices and product descriptions.

Character and Mark Recognition Devices

Character and mark recognition devices are scanners that are able to recognize special characters and marks. These types are **magnetic-ink character recognition (MICR), optical-character recognition (OCR),** and **optical-mark recognition (OMR).**

Image capturing devices create or capture original images. These devices include digital cameras and webcams.

Digital Cameras

Digital cameras record images digitally and store them on a memory card or in the camera's memory. Most digital cameras record video too. Today, many digital cameras are embedded in other devices, such as cell phones and tablets.

Webcams

Webcams are specialized digital video cameras that capture images and send them to a computer for broadcast over the Internet. Webcams are built into many cell phones and tablets, while others are attached to the computer monitor.

AUDIO-INPUT DEVICES

Audio-input devices convert sounds into a form that can be processed by the system unit. By far the most widely used audio-input device is the microphone.

Voice Recognition Systems

Voice recognition systems use a microphone, a sound card, and special software. Siri, Cortana, and Google Assistant are digital assistants that use voice recognition. Specialized portable voice recorders are widely used by doctors, lawyers, and others to record dictation. Some systems are able to translate dictation from one language to another, such as from English to Japanese.

INPUT AND OUTPUT 157

Unique Content

MAKING IT WORK FOR YOU

Making IT work for you

CLOUD STORAGE

Do you find that you take a lot of photos and videos on your phone, and your storage space is running low? Are you working on a group project and finding it difficult to keep everyone updated with the most recent version of documents and files? Are you looking for a safe, secure location to store backups and important files? If so, cloud storage may be the solution you are looking for. Here are some things to consider when choosing a cloud storage option.

- **What will you store?**

The types of files that you store can have a big impact on determining the best cloud storage service for you. The following suggests the best file service for you based on the types of files you typically store.

- If you primarily store photos, then consider the cloud services of Flickr and Adobe Creative Cloud. They feature online tools to edit, share, and search photos.
- If you primarily store music, then consider the cloud services of Google Play Music and iTunes Match. They feature online tools to listen to music and create customizable playlists.
- If you primarily store documents, then consider the cloud services Adobe Document Cloud and Microsoft's One Drive. They feature online tools to view and edit documents.
- If you primarily need storage to back up your system programs, consider the cloud services of Backblaze and iDrive. They have apps that back up your devices' data, making backups seamless and easy.

Also, what you store will impact how much storage you need. If you are only looking to store documents and text files, you will not need much storage space; however, videos and photo albums can take up a lot more storage. Different services offer different pricing plans and have special offers depending on what types of files you store—the best cloud storage plan for you will tailor itself to your storage needs.

- **What tools will you use?**

If your storage needs are mostly sharing and working on documents, your best cloud storage choice may be determined by the software you

Cloud storage service Flickr is designed to store and display digital photos.
OlegDoroshin/Shutterstock

Apple's iCloud works with the iWorks office suite.
NotPhotos3/Alamy Stock Photo

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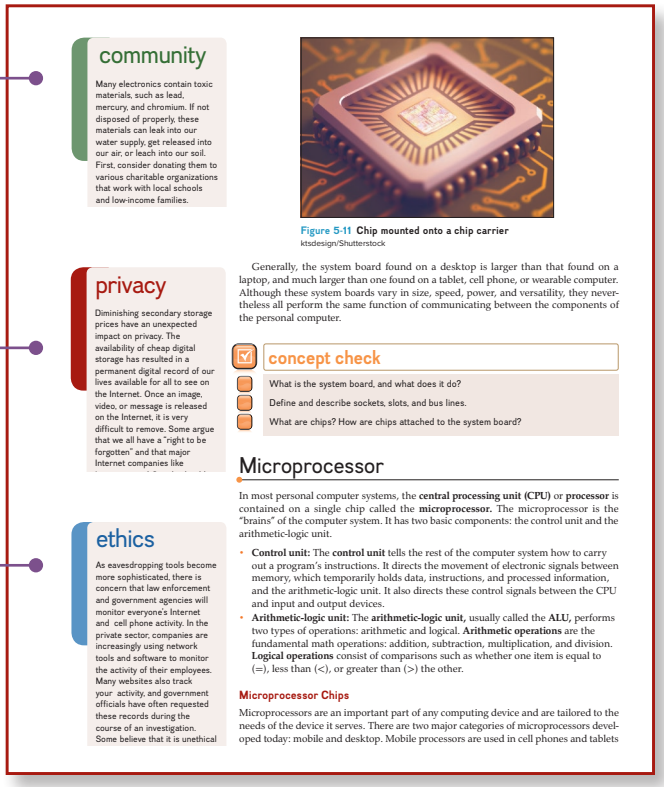
Special-interest topics are presented in the Making IT Work for You section found within nearly every chapter. These topics include Online Entertainment, Gaming, Virtual Assistants, and the Mobile Office.

PRIVACY, ETHICS, AND COMMUNITY

Nearly every chapter has a Community box located in the margin adjacent to the coverage of related technologies. Topics include how accessibility tools make technology available to everyone or how our actions on social media impact our communities.

Nearly every chapter has a Privacy box located in the margin adjacent to the coverage of related technologies. Topics include protecting personal information when using a free Wi-Fi network or when disposing of an outdated computer.

Nearly every chapter has an Ethics box located in the margin adjacent to the coverage of related technologies. Topics include altering images to promote a particular message and how the technology we use affects labor practices around the world.



community

Many electronics contain toxic materials, such as lead, mercury, and chromium. If not disposed of properly, these materials can leak into our water supply, get released into our air, or leach into our soil. First, consider donating them to various charitable organizations that work with local schools and low-income families.

privacy

Diminishing secondary storage prices have an unexpected impact on privacy. The availability of cheap digital storage has resulted in a permanent digital record of our lives available for all to see on the Internet. Once an image, video, or message is released on the Internet, it is very difficult to remove. Some argue that we all have a "right to be forgotten" and that major Internet companies like

ethics

As eavesdropping tools become more sophisticated, there is concern that law enforcement and government agencies will monitor everyone's Internet and cell phone activity. In the private sector, companies are increasingly using network tools and software to monitor the activity of their employees. Many websites also track your activity, and government officials have often requested these records during the course of an investigation. Some believe that it is unethical

Figure 5-11 **Chip mounted onto a chip carrier**
ktsdesign/Shutterstock

Generally, the system board found on a desktop is larger than that found on a laptop, and much larger than one found on a tablet, cell phone, or wearable computer. Although these system boards vary in size, speed, power, and versatility, they nevertheless all perform the same function of communicating between the components of the personal computer.

concept check

- What is the system board, and what does it do?
- Define and describe sockets, slots, and bus lines.
- What are chips? How are chips attached to the system board?

Microprocessor

In most personal computer systems, the **central processing unit (CPU)** or **processor** is contained on a single chip called the **microprocessor.** The microprocessor is the "brains" of the computer system. It has two basic components: the control unit and the arithmetic-logic unit.

- **Control unit:** The **control unit** tells the rest of the computer system how to carry out a program's instructions. It directs the movement of electronic signals between memory, which temporarily holds data, instructions, and processed information, and the arithmetic-logic unit. It also directs these control signals between the CPU and input and output devices.
- **Arithmetic-logic unit:** The **arithmetic-logic unit,** usually called the **ALU,** performs two types of operations: arithmetic and logical. **Arithmetic operations** are the fundamental math operations: addition, subtraction, multiplication, and division. **Logical operations** consist of comparisons such as whether one item is equal to (=), less than (<), or greater than (>) the other.

Microprocessor Chips

Microprocessors are an important part of any computing device and are tailored to the needs of the device it serves. There are two major categories of microprocessors developed today: mobile and desktop. Mobile processors are used in cell phones and tablets

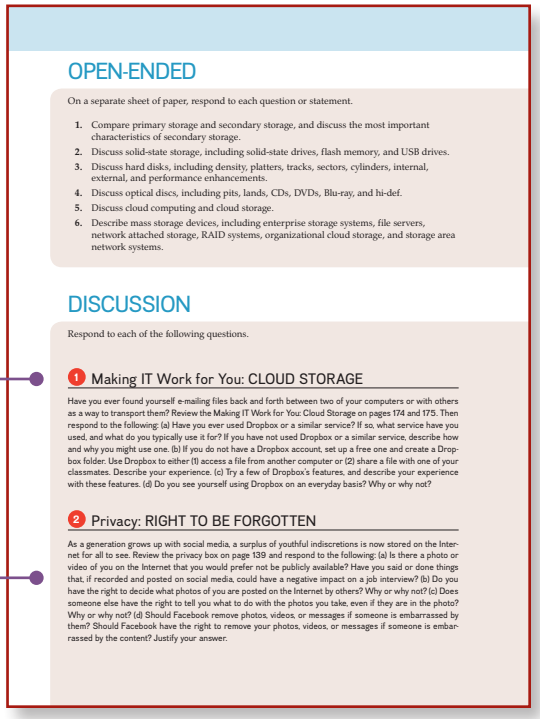
Unique End-of-Chapter Discussion Materials

MAKING IT WORK FOR YOU

Making IT Work for You discussion questions are carefully integrated with the chapter's Making IT Work for You topics. The questions facilitate in-class discussion or written assignments focusing on applying specific technologies into a student's day-to-day life. They are designed to expand a student's awareness of technology applications.

PRIVACY

Privacy discussion questions are carefully integrated with the chapter's marginal Privacy box. The questions facilitate in-class discussion or written assignments focusing on critical privacy issues. They are designed to develop a student's ability to think critically and communicate effectively.



OPEN-ENDED

On a separate sheet of paper, respond to each question or statement.

1. Compare primary storage and secondary storage, and discuss the most important characteristics of secondary storage.
2. Discuss solid-state storage, including solid-state drives, flash memory, and USB drives.
3. Discuss hard disks, including density, platters, tracks, sectors, cylinders, internal, external, and performance enhancements.
4. Discuss optical discs, including pits, lands, CDs, DVDs, Blu-ray, and hi-def.
5. Discuss cloud computing and cloud storage.
6. Describe mass storage devices, including enterprise storage systems, file servers, network attached storage, RAID systems, organizational cloud storage, and storage area network systems.

DISCUSSION

Respond to each of the following questions.

1 Making IT Work for You: CLOUD STORAGE

Have you ever found yourself e-mailing files back and forth between two of your computers or with others as a way to transport them? Review the Making IT Work for You: Cloud Storage on pages 174 and 175. Then respond to the following: (a) Have you ever used Dropbox or a similar service? If so, what service have you used, and what do you typically use it for? If you have not used Dropbox or a similar service, describe how and why you might use one. (b) If you do not have a Dropbox account, set up a free one and create a Dropbox folder. Use Dropbox to either (1) access a file from another computer or (2) share a file with one of your classmates. Describe your experience. (c) Try a few of Dropbox's features, and describe your experience with these features. (d) Do you see yourself using Dropbox on an everyday basis? Why or why not?

2 Privacy: RIGHT TO BE FORGOTTEN

As a generation grows up with social media, a surplus of youthful indiscretions is now stored on the Internet for all to see. Review the privacy box on page 139 and respond to the following: (a) Is there a photo or video of you on the Internet that you would prefer not be publicly available? Have you said or done things that, if recorded and posted on social media, could have a negative impact on a job interview? (b) Do you have the right to decide what photos of you are posted on the Internet by others? Why or why not? (c) Does someone else have the right to tell you what to do with the photos you take, even if they are in the photo? Why or why not? (d) Should Facebook remove photos, videos, or messages if someone is embarrassed by them? Should Facebook have the right to remove your photos, videos, or messages if someone is embarrassed by the content? Justify your answer.

DISCUSSION

Respond to each of the following questions.

1 Making IT Work for You

Making it a habit of keeping current with technology applications can be a key to your success. Numerous full-page spreads identified as *Making IT Work for You* are presented in the following chapters. These sections address some of today's most interesting and useful applications. They include online entertainment in Chapter 2, online office suites in Chapter 3, and cloud storage in Chapter 7. Select one that you find the most interesting and then respond to the following: (a) Why did you select this application? (b) Have you used this application? If so, when and how? If not, do you plan to in the near future? (c) Go to the chapter containing your selected application, and locate the application's Making IT Work for You coverage. Review and briefly describe its contents. (d) Did you find the coverage useful? Why or why not?

2 Privacy

Privacy is one of the most critical issues facing society today. Numerous Privacy boxes appear in the margins of the upcoming chapters presenting a variety of privacy issues. These issues include apps that constantly track your movements without your knowledge or consent in Chapter 3; public Wi-Fi connections that record all of your personal communications in Chapter 8; and protection of personal privacy while using social media in Chapter 9. Select one that you find the most interesting, and then respond to the following: (a) Why did you select this issue? (b) Do you have knowledge of or experience with the issue? If so, describe your knowledge or experience. If not, do you consider the issue to be important for protecting your privacy? (c) Go to the chapter containing your selected issue, locate the Privacy box, read it, and describe its contents. (d) Did you find the coverage thought-provoking? Why or why not?

3 Ethics

Computer ethics are guidelines for the morally acceptable use of computers in our society. Numerous Ethics boxes appear in the margins of the upcoming chapters presenting a variety of ethical issues. These issues include image editing in Chapter 3, unauthorized use of webcams in Chapter 6, and unauthorized monitoring or eavesdropping of Internet activity in Chapter 8. Select one issue that you find the most interesting and then respond to the following: (a) Why did you select this issue? (b) Do you have knowledge of or experience with the issue? If so, describe your knowledge or experience. If not, do you consider the issue critical for individuals or organizations? (c) Go to the chapter containing your selected issue, locate the Ethics box, read it, and describe its contents. (d) Did you find the coverage thought-provoking? Why or why not?

4 Community

Almost everyone belongs to several communities—some in person and some digital. Numerous Community boxes appear in the margins of the upcoming chapters. These boxes present a variety of community topics, including etiquette on the Internet in Chapter 2, Accessibility for people with disabilities in Chapter 4, and the role of communities in bringing Internet access to the developing world in Chapter 8. Select one that you find the most interesting and then respond to the following: (a) Why did you select this topic? (b) Go to the chapter containing your selected topic, locate the Community box, read it, and describe its contents. (c) Did you find the coverage thought-provoking? Why or why not?

Design Elements: Concept Check icons: Dizzle52/Getty Images; Making IT Work for You: cifotart/Shutterstock

CHAPTER 1 23

ETHICS

Ethics discussion questions are carefully integrated with the chapter's marginal Ethics boxes. The questions facilitate in-class discussion or written assignments focusing on ethical issues relating to technology. They are designed to develop a student's ability to think critically and communicate effectively.

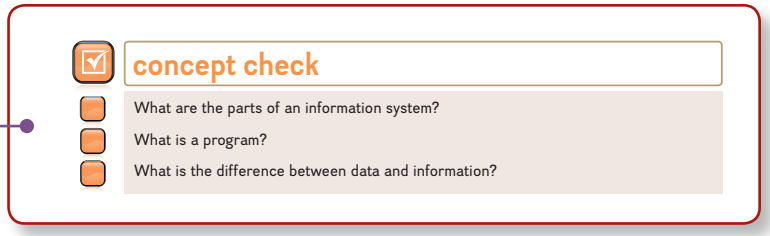
COMMUNITY

Community discussion questions are carefully integrated with the chapter's marginal Community boxes. The questions facilitate in-class discussion or written assignments focusing on the impact of technology on communities. They are designed to develop a student's ability to think critically and communicate effectively.

Reinforcing Key Concepts

CONCEPT CHECKS

Located at points throughout each chapter, the Concept Check cues you to note which topics have been covered and to self-test your understanding of the material presented.

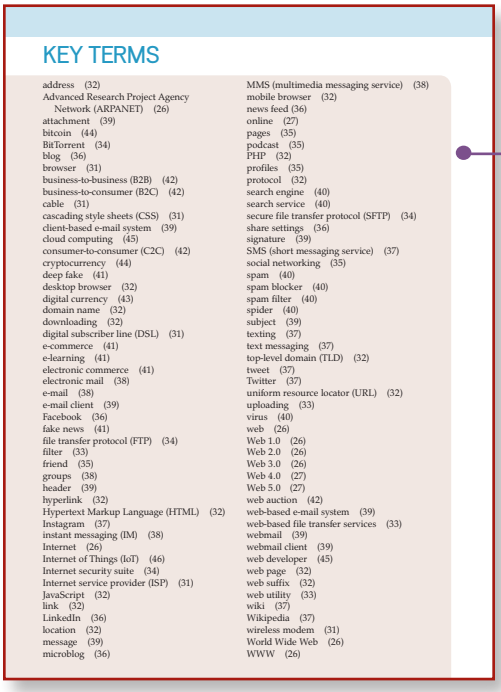

concept check

What are the parts of an information system?

What is a program?

What is the difference between data and information?

KEY TERMS


KEY TERMS

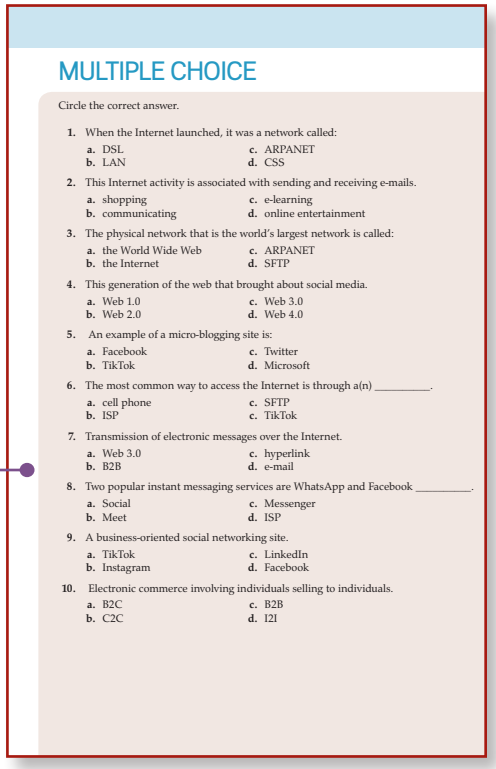
address (32)
Advanced Research Project Agency Network (ARPANET) (26)
attachment (39)
bitcoin (44)
BitTorrent (34)
blog (36)
browser (31)
business-to-business (B2B) (42)
business-to-consumer (B2C) (42)
cable (31)
cascading style sheets (CSS) (31)
client-based e-mail system (39)
cloud computing (45)
consumer-to-consumer (C2C) (42)
cryptocurrency (44)
deep fake (41)
desktop browser (32)
digital currency (43)
domain name (32)
downloading (32)
digital subscriber line (DSL) (31)
e-commerce (41)
e-learning (41)
electronic commerce (41)
electronic mail (38)
e-mail (38)
e-mail client (39)
Facebook (36)
fake news (41)
file transfer protocol (FTP) (34)
filter (33)
friend (35)
groups (38)
header (39)
hyperlink (32)
Hypertext Markup Language (HTML) (32)
Instagram (37)
instant messaging (IM) (38)
Internet (26)
Internet of Things (IoT) (46)
Internet security suite (34)
Internet service provider (ISP) (31)
JavaScript (32)
link (32)
LinkedIn (36)
location (32)
message (39)
microblog (36)
MMS (multimedia messaging service) (38)
mobile browser (32)
news feed (36)
online (27)
pages (35)
podcast (35)
PHP (32)
profiles (35)
protocol (32)
search engine (40)
search service (40)
secure file transfer protocol (SFTP) (34)
share settings (36)
signature (39)
SMS (short messaging service) (37)
social networking (35)
spam (40)
spam blocker (40)
spam filter (40)
spider (40)
subject (39)
texting (37)
text messaging (37)
top-level domain (TLD) (32)
tweet (37)
Twitter (37)
uniform resource locator (URL) (32)
uploading (33)
virus (40)
web (26)
Web 1.0 (26)
Web 2.0 (26)
Web 3.0 (26)
Web 4.0 (27)
Web 5.0 (27)
web auction (42)
web-based e-mail system (39)
web-based file transfer services (33)
webmail (39)
webmail client (39)
web developer (45)
web page (32)
web suffix (32)
web utility (33)
wiki (37)
Wikipedia (37)
wireless modem (31)
World Wide Web (26)
WWW (26)

KEY TERMS

Throughout the text, the most important terms are presented in bold and are defined within the text. You will also find a list of key terms at the end of each chapter and in the glossary at the end of the book.

CHAPTER REVIEW

Following the Visual Summary, the chapter review includes material designed to review and reinforce chapter content. It includes a key terms list that reiterates the terms presented in the chapter, multiple-choice questions to help test your understanding of information presented in the chapter, matching exercises to test your recall of terminology presented in the chapter, and open-ended questions or statements to help review your understanding of the key concepts presented in the chapter.

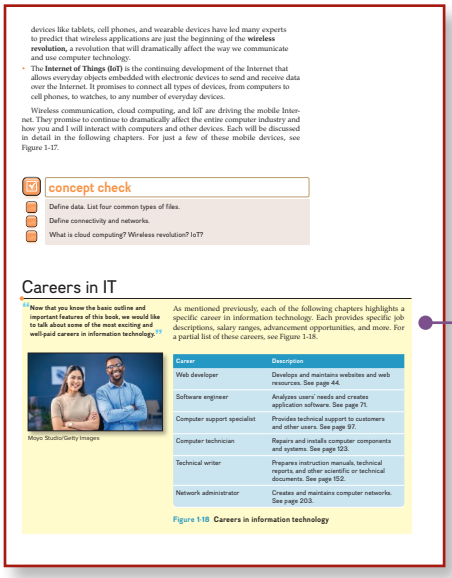

MULTIPLE CHOICE

Circle the correct answer.

1. When the Internet launched, it was a network called:
   a. DSL c. ARPANET
   b. LAN d. CSS
2. This Internet activity is associated with sending and receiving e-mails.
   a. shopping c. e-learning
   b. communicating d. online entertainment
3. The physical network that is the world's largest network is called:
   a. the World Wide Web c. ARPANET
   b. the Internet d. SFTP
4. This generation of the web that brought about social media.
   a. Web 1.0 c. Web 3.0
   b. Web 2.0 d. Web 4.0
5. An example of a micro-blogging site is:
   a. Facebook c. Twitter
   b. TikTok d. Microsoft
6. The most common way to access the Internet is through a(n) _____.
   a. cell phone c. SFTP
   b. ISP c. TikTok
7. Transmission of electronic messages over the Internet.
   a. Web 3.0 c. hyperlink
   b. B2B d. e-mail
8. Two popular instant messaging services are WhatsApp and Facebook _____.
   a. Social c. Messenger
   b. Meet d. ISP
9. A business-oriented social networking site.
   a. TikTok c. LinkedIn
   b. Instagram d. Facebook
10. Electronic commerce involving individuals selling to individuals.
    a. B2C c. B2B
    b. C2C d. I2I

The Future of Information Technology

CAREERS IN IT



devices like tablets, cell phones, and wearable devices have led many experts to predict that wireless applications are just the beginning of the **wireless revolution**, a revolution that will dramatically affect the way we communicate and use computer technology.

- The **Internet of Things (IoT)** is the continuing development of the Internet that allows everyday objects embedded with electronic devices to send and receive data over the Internet. It promises to connect all types of devices, from computers to cell phones, to watches, to any number of everyday devices.

Wireless communication, cloud computing, and IoT are driving the mobile Internet. They promise to continue to dramatically affect the entire computer industry and how you and I will interact with computers and other devices. Each will be discussed in detail in the following chapters. For just a few of these mobile devices, see Figure 1-17.

concept check

- Define data. List four common types of files.
- Define connectivity and networks.
- What is cloud computing? Wireless revolution? IoT?

Careers in IT

"Now that you know the basic outline and important features of this book, we would like to talk about some of the most exciting and well-paid careers in information technology."

As mentioned previously, each of the following chapters highlights a specific career in information technology. Each provides specific job descriptions, salary ranges, advancement opportunities, and more. For a partial list of these careers, see Figure 1-18.

Mayo Studio/Getty Images

Career	Description
Web developer	Develops and maintains websites and web resources. See page 44.
Software engineer	Analyzes users' needs and creates application software. See page 71.
Computer support specialist	Provides technical support to customers and other users. See page 97.
Computer technician	Repairs and installs computer components and systems. See page 123.
Technical writer	Prepares instruction manuals, technical reports, and other scientific or technical documents. See page 152.
Network administrator	Creates and maintains computer networks. See page 203.

Figure 1-18 Careers in information technology

Some of the fastest-growing career opportunities are in information technology. Each chapter highlights one of the most promising careers in IT by presenting job titles, responsibilities, educational requirements, and salary ranges. Among the careers covered are webmaster, software engineer, and database administrator. You will learn how the material you are studying relates directly to a potential career path.

A LOOK TO THE FUTURE

Each chapter concludes with a brief discussion of a recent technological advancement related to the chapter material, reinforcing the importance of staying informed.

A LOOK TO THE FUTURE

Using and Understanding Information Technology

The purpose of this book is to help you use and understand information technology. We want to help you become proficient and to provide you with a foundation of knowledge so that you can understand how technology is being used today and anticipate how technology will be used in the future. This will enable you to benefit from six important information technology developments.

The Internet and the Web

The Internet and the web are considered to be the two most important technologies for the 21st century. Understanding how to efficiently and effectively use the Internet to browse, communicate, and locate information is an essential skill. These issues are presented in Chapter 2, The Internet, the Web, and Electronic Commerce.

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Powerful Software

The software that is now available can do an extraordinary number of tasks and help you in an endless number of ways. You can create professional-looking documents, analyze massive amounts of data, create dynamic multimedia web pages, and much more. Today's employers are expecting the people they hire to be able to effectively and efficiently use a variety of different types of software. General-purpose, specialized, and mobile applications are presented in Chapter 3. System software is presented in Chapter 4.

Powerful Hardware

Personal computers are now much more powerful than they used to be. Cell phones, tablets, and communication technologies such as wireless networks are dramatically changing the ways to connect to other computers, networks, and the Internet. However, despite the rapid change of specific equipment, their essential features remain unchanged. To become an efficient and effective end user, you should focus on these features. Chapters 5 through 8 explain what you need to know about hardware. For those considering the purchase of a computer, an appendix—The Computer Buyer's Guide—is provided at the end of this book. This guide provides a very concise comparison of desktops, laptops, tablets, and cell phones.

Privacy, Security, and Ethics

What about people? Experts agree that we as a society must be careful about the potential of technology to negatively affect our lives. Specifically, we need to be aware of how technology can affect our personal privacy and our environment. Also, we need to understand the role and the importance of organizational and personal ethics. These critical issues are integrated in every chapter of this book as well as extensively covered in Chapter 9.

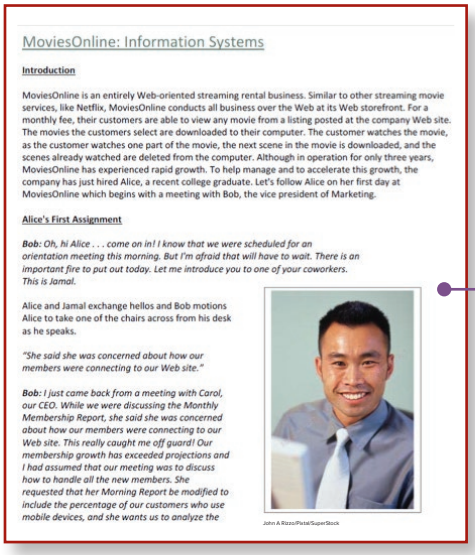
Organizations

Almost all organizations rely on the quality and flexibility of their information systems to stay competitive. As a member or employee of an organization, you will undoubtedly be involved in these information systems. In order to use, develop, modify, and maintain these systems, you need to understand the basic concepts of information systems and know how to safely, efficiently, and effectively use computers. These concepts are covered throughout this book.

Changing Times

Are the times changing any faster now than they ever have? Almost everyone thinks so. Whatever the answer, it is clear we live in a fast-paced age. The Evolution of the Computer Age section presented at the end of this book tracks the major developments since computers were first introduced.

After reading this book, you will be in a very favorable position compared with many other people in industry today. You will learn not only the basics of hardware, software, connectivity, the Internet, and the web, but also the most current technology. You will be able to use these tools to your advantage.



MoviesOnline: Information Systems

Introduction

MoviesOnline is an entirely Web-oriented streaming rental business. Similar to other streaming movie services, like Netflix, MoviesOnline conducts all business over the Web at its Web storefront. For a monthly fee, their customers are able to view any movie from a listing posted at the company Web site. The movies the customers select are downloaded to their computer. The customer watches the movie, as the customer watches one part of the movie, the next scene in the movie is downloaded, and the scenes already watched are deleted from the computer. Although in operation for only three years, MoviesOnline has experienced rapid growth. To help manage and to accelerate this growth, the company has just hired Alice, a recent college graduate. Let's follow Alice on her first day at MoviesOnline which begins with a meeting with Bob, the vice president of Marketing.

Alice's First Assignment

***Bob:** Oh, hi Alice . . . come on in! I know that we were scheduled for an orientation meeting this morning. But I'm afraid that will have to wait. There is an important fire to put out today. Let me introduce you to one of your coworkers. This is Jamal.*

Alice and Jamal exchange hellos and Bob motions Alice to take one of the chairs across from his desk as he speaks.

"She said she was concerned about how our members were connecting to our Web site."

***Bob:** I just came back from a meeting with Carol, our CEO. While we were discussing the Monthly Membership Report, she said she was concerned about how our members were connecting to our Web site. This really caught me off guard! Our membership growth has exceeded projections and I had assumed that our meeting was to discuss how to handle all the new members. She requested that her Morning Report be modified to include the percentage of our customers who use mobile devices, and she wants us to analyze the*

John A Rizzo/Pixtal/SuperStock

Found in Connect for *Computing Essentials* 2023, Using IT at MoviesOnline—A Case Study of a fictitious organization provides an up-close look at what you might expect to find on the job in the real world. You will follow Alice, a recent college graduate hired as a marketing analyst, as she navigates her way through accounting, marketing, production, human resources, and research, gathering and processing data to help manage and accelerate the growth of the three-year-old company.

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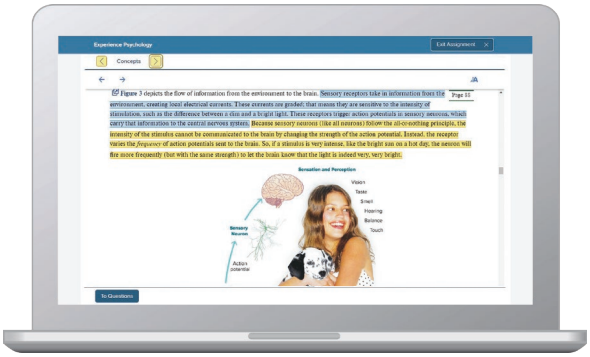

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Support Materials in Connect

The Instructor's Manual offers lecture outlines with teaching notes and figure references. It provides definitions of key terms and solutions to the end-of-chapter material, including multiple-choice and open-ended questions.

The PowerPoint slides are designed to provide instructors with a comprehensive resource for lecture use. The slides include a review of key terms and topics, as well as artwork taken from the text to further explain concepts covered in each chapter.

The testbank contains over 2,200 questions categorized by level of learning (definition, concept, and application). This is the same learning scheme that is introduced in the text to provide a valuable testing and reinforcement tool. Text page references have been provided for all questions, including a level-of-difficulty rating.

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Acknowledgments

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Tarrant County College

About the Authors

Courtesy of Timothy O'Leary.

The O'Learys live in the American Southwest and spend much of their time engaging instructors and students in conversation about learning. In fact, they have been talking about learning for over 30 years. Something in those early conversations convinced them to write a book, to bring their interest in the learning process to the printed page.

The O'Learys form a unique team blending youth and experience. Dan has taught at the University of California at Santa Cruz, developed energy-related labs at NASA, and worked as a database administrator and as a consultant in information systems; he is currently a professor at the City College of San Francisco. Tim has taught courses at Stark Technical College in Canton, Ohio, and at Rochester Institute of Technology in upstate New York, and is currently a professor emeritus at Arizona State University. Linda offered her expertise at ASU for several years as an academic advisor. She also presented and developed materials for major corporations such as Motorola, Intel, Honeywell, and AT&T, as well as various community colleges in the Phoenix area.

Tim, Linda, and Dan have talked to and taught numerous students, all of them with a desire to learn something about computers and applications that make their lives easier, more interesting, and more productive.

Each new edition of an O'Leary text, supplement, or learning aid has benefited from these students and their instructors who daily stand in front of them (or over their shoulders).

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Computing Essentials

Making IT work for you

INTRODUCTORY 2023

chapter 1

Information Technology, the Internet, and You

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Why should I read this chapter?

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The future of computers and digital technology promises exciting challenges and opportunities. Powerful software and hardware systems are changing the way people and organizations interact in their daily life and on the Internet.

This chapter introduces you to the skills and concepts you need to be prepared for this ever-changing digital world, including:

- Information systems—how the critical parts of technology interact.
- Efficiency and effectiveness—how to maximize the use of technology.
- Privacy, ethics, and environment—how to integrate technology with people.
- Software, hardware, and data—understand the technology used in information systems.
- Connectivity and cloud computing—how the Internet, the web, and the wireless revolution are changing how we communicate and interact.

Learning Objectives

After you have read this chapter, you should be able to:

1. Explain the parts of an information system: people, procedures, software, hardware, data, and the Internet.
2. Distinguish between system software and application software.
3. Differentiate between the three kinds of system software programs.
4. Define and compare general-purpose, specialized, and mobile applications.
5. Identify the four types of computers and the five types of personal computers.
6. Describe the different types of computer hardware, including the system unit, input, output, storage, and communication devices.
7. Define data and describe document, worksheet, database, and presentation files.
8. Explain computer connectivity, the wireless revolution, the Internet, cloud computing, and IoT.

Introduction

"Welcome to *Computing Essentials.* I'm Katie, and this is Alan, we work in information technology. On the following pages, we'll be discussing some of the most exciting new developments in computer technology, including smartphones, tablets, and cloud computing. Let me begin this chapter by giving you an overview of the book and showing you some of its special features."

Moyo Studio/Getty Images

The purpose of this book is to help you become a highly efficient and effective computer user. This includes how to use (1) apps and application software; (2) all types of computer hardware, including mobile devices like smartphones, tablets, and laptops; and (3) the Internet. Becoming a highly efficient and effective computer user also requires a full understanding of the potential impact of technology on privacy and the environment as well as the role of personal and organizational ethics.

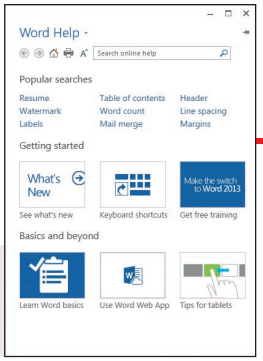
To effectively and efficiently use computers, you need to know the parts of an information system: people, procedures, software, hardware, data, and the Internet. You also need to understand the wireless revolution, the mobile Internet, and the web and to recognize the role of information technology in your personal and professional life.

Information Systems

When you think of a personal computer, perhaps you think of just the equipment itself. That is, you think of the screen or the keyboard. Yet there is more to it than that. The way to think about a personal computer is as part of an information system. An **information system** has several parts: *people, procedures, software, hardware, data,* and the *Internet.* (See Figure 1-1.)

- **People:** It is easy to overlook people as one of the parts of an information system. Yet this is what personal computers are all about—making **people, end users** like you, more productive.
- **Procedures:** The rules or guidelines for people to follow when using software, hardware, and data are **procedures.** These procedures are typically documented in manuals written by computer specialists. Software and hardware manufacturers provide manuals with their products. These manuals are provided in either printed or electronic form.
- **Software:** A **program** consists of the step-by-step instructions that tell the computer how to do its work. **Software** is another name for a program or programs. The purpose of software is to convert **data** (unprocessed facts) into **information** (processed facts). For example, a payroll program would instruct the computer to take the number of hours you worked in a week (data) and multiply it by your pay rate (data) to determine how much you are paid for the week (information).
- **Hardware:** The equipment that processes the data to create information is called **hardware.** It includes smartphones, tablets, keyboards, mice, displays, system units, and other devices. Hardware is controlled by software.
- **Data:** The raw, unprocessed facts, including text, numbers, images, and sounds, are called data. Processed data yields information. Using the previous example of a payroll program, the data (number of hours worked and pay rate) is processed (multiplied) to yield information (weekly pay).
- **Internet:** Almost all information systems provide a way to connect to other people and computers, typically using the Internet. This connectivity greatly expands the capability and usefulness of information systems.

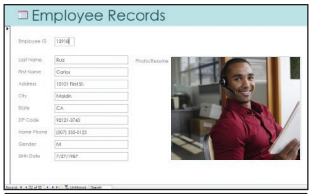
People
are end users who use computers to make themselves more productive.

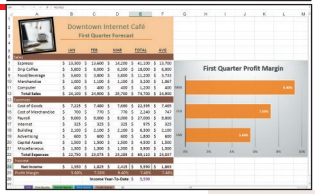


Procedures
specify rules or guidelines for computer operations.

Software
provides step-by-step instructions for computer hardware.

Hardware
includes keyboard, mouse, display, system unit, tablets, smartphones, and other devices.





Data
consists of unprocessed facts, including text, numbers, images, and sounds.

Internet
allows computers to connect to people and other computers.

Figure 1-1 Parts of an information system

People: Prostock-Studio/Getty Images; **Procedures:** Microsoft Corporation; **Software:** Microsoft Corporation; NoDerog/Getty Images; **Hardware:** (Smartphone): Urbanscape/Shutterstock; (Tablet): Prime Stock Photo/Alamy StockPhoto; (Laptop): mama_mia/Shutterstock; (Desktop) Rawf8/Alamy Stock Photo; **Data:** Microsoft Corporation; (Rescue puppy or dog): Zoom Pet Photography/ImageSource/Getty Images; (Employee portrait): Sam Edwards/age fotostock; (Coffee): Stockbyte/Getty Images; (Parrot): Maciej Czekajewski/Shutterstock; **Internet:** franckreporter/Getty Images

concept check

- What are the parts of an information system?
- What is a program?
- What is the difference between data and information?

People

People are surely the most important part of any information system. Our lives are touched every day by computers and information systems. Many times the contact is direct and obvious, such as when we create documents using a word processing program or when we connect to the Internet. (See Figure 1-2.) Other times, the contact is not as obvious.

Throughout this book you will find a variety of features designed to help you become an efficient and effective end user. These features include Making IT Work for You, Tips, Privacy, Community, Ethics, and Careers in IT.

Figure 1-2 People and computers
fizkes/Shutterstock

- **Making IT Work for You.** Throughout this book you will find Making IT Work for You features that present numerous interesting and practical IT applications. For just a few of the Making IT Work for You topics, see Figure 1-3.
- **Tips.** We all can benefit from a few tips or suggestions. Throughout this book you will find numerous tips to make your computing safer, more efficient, and more effective. These tips range from the basics of keeping your computer system

Application	Description
Free Antivirus Program	Protect your computer by installing and using a free antivirus program. See page 9.
Cloud Office Suites	Create and collaborate with others online to make better documents and presentations. See page 74.
Gaming	Delve into the world of video games and find the best video game hardware for you. See page 113.
Cloud Storage	Move your files online to synch files between devices or free up space on your digital devices. See page 174.
The Mobile Office	Get work done on the road; whether a business trip or your daily commute, these tools will help you make the most of your time. See page 194.

Figure 1-3 Making IT Work for You applications

Community

Every major technology has affected communities—but none in the unique ways that computers have. We have changed how we interact with our communities, both in the tools we use to communicate, such as social media posts, and in the ways we communicate, in emojis and podcasts. But technology has had a deeper impact on our communities than just the way we interact. It has forever changed how we find and identify our communities. Every day, people meet, discuss, and bond with others they have never met in person. The entire world feels a little smaller, with our communities extending around the globe.

running smoothly to how to protect your privacy while surfing the web. For a partial list of the tips presented in the following chapters, see Figure 1-4.

- **Privacy.** One of the most critical issues today is how to protect the privacy of our personal information. Throughout this book you will find Privacy boxes in the margin that present information about protecting our privacy.
- **Community.** Computers are changing the way we define and interact with our communities. In this chapter and the following ones, you will find Community boxes in the margins that present ways in which technology affects how we create and engage with our communities.
- **Ethics.** Most people agree that we should behave ethically. That is, we should follow a system of moral principles that direct our everyday lives. However, for any given circumstance, people often do not agree on the ethics of the situation. Throughout this book you will find numerous Ethics boxes posing a variety of different ethical/unethical situations for your consideration.
- **Careers in IT.** One of the most important decisions of your life is to decide upon your life's work or career. Perhaps you are planning to be a writer, an artist, or an engineer. Or you might become a professional in **information technology (IT).** Each of the following chapters highlights a specific career in information technology. This feature provides job descriptions, projected employment demands, educational requirements, current salary ranges, and advancement opportunities.

Are you getting the most out of your cell phone? Here are just a few of the tips to make your computing safer, more efficient, and more effective. tips

1. **Low battery.** Do you find that your cell phone's battery keeps its charge for less time than it used to? Here are some ways to make your battery last longer. See page 122.
2. **Cell phone cameras.** Capturing life's moments in a photo is easier and faster with a cell phone. But a few simple tips can make the process easier and your photos better. See page 71.
3. **Disaster planning.** Having a cell phone lost or stolen can be devastating. Follow these suggestions to make it easier to get your phone back, or recover its data quickly. See page 228.
4. **Data usage.** Is your cell phone data plan costing you money? Are your cell phone apps using up your data plan without you knowing it? Take control of your data usage with the tips on page 172.
5. **Protecting your identity.** Identity theft is a growing problem and can be financially devastating if you are a victim. Some steps to protect your identity are on page 223.

Figure 1-4 Selected tips

concept check

- Which part of an information system is the most important?
- Describe the Making IT Work for You, Tips, and Privacy features.
- Describe the Environment, Ethics, and Careers in IT features.

Software

Software, as we mentioned, is another name for programs. Programs are the instructions that tell the computer how to process data into the form you want. In most cases, the words *software* and *programs* are interchangeable. There are two major kinds of software: *system software* and *application software.* You can think of application software as the kind you use. Think of system software as the kind the computer uses.

System Software

The user interacts primarily with application software. **System software** enables the application software to interact with the computer hardware. System software is "background" software that helps the computer manage its own internal resources.

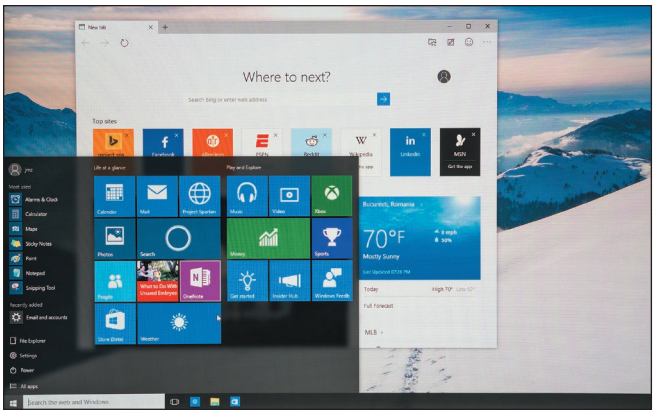


Figure 1-5 Windows 10
omihay/Shutterstock

Figure 1-6 macOS
Alexey Boldin/Shutterstock

System software is not a single program. Rather, it is a collection of programs, including the following:

- **Operating systems** are programs that coordinate computer resources, provide an interface between users and the computer, and run applications. Smartphones, tablets, and many other mobile devices use **embedded operating systems,** also known as **real-time operating systems (RTOS).** Desktop computers use **stand-alone operating systems** like Windows 10 or macOS. (See Figures 1-5 and 1-6.) Networks use **network operating systems (NOS).**
- **Utilities** perform specific tasks related to managing computer resources. One of the most essential utility programs that every computer system should have is an antivirus program. These programs protect your computer system from **viruses** or malicious programs that are all too often deposited onto your computer from the Internet. These programs can damage software and hardware, as well as compromise the security and privacy of your personal data. If your computer does not have an antivirus program installed on it, you need to get one. To see how you can install a free antivirus program on your computer, see Making IT Work for You: Free Antivirus Program on page 9.

Application Software

Application software might be described as end-user software. Three types of application software are *general-purpose, specialized,* and *apps.*

General-purpose applications are widely used in nearly all career areas. They are the kinds of programs you have to know to be considered an efficient and effective end user. Some of the best known are presented in Figure 1-7.

Specialized applications include thousands of other programs that are more narrowly focused on specific disciplines and occupations. Two of the best known are graphics and web authoring programs.

Mobile apps, also known as **mobile applications** or simply **apps,** are small programs primarily designed for mobile devices such as smartphones and for tablets. There are over 5 million apps. The most popular mobile apps are for social networking, playing games, and downloading music and videos.

Type	Description
Word processors	Prepare written documents
Spreadsheets	Analyze and summarize numerical data
Database management systems	Organize and manage data and information
Presentation software	Communicate a message or persuade other people

Figure 1-7 General-purpose applications

FREE ANTIVIRUS PROGRAM

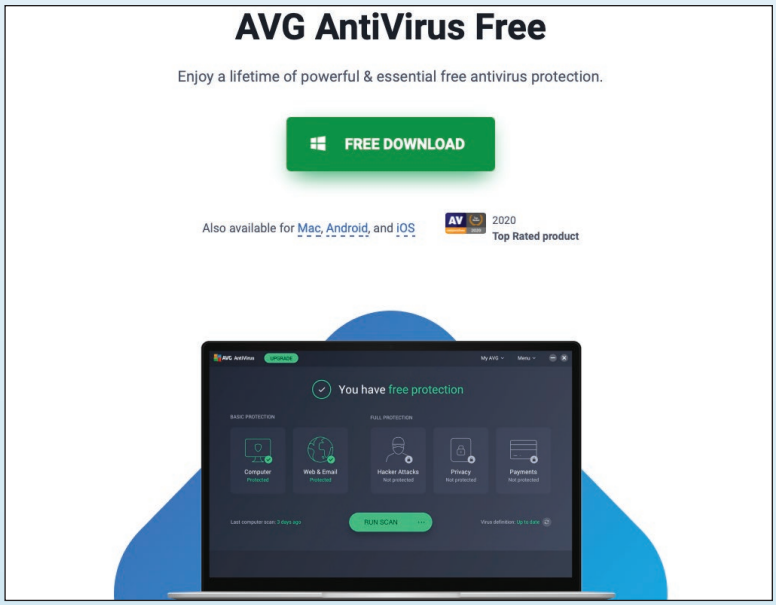
Have you or someone you know had a slower computing experience due to a spyware infection? Even worse, perhaps a malicious piece of software stole crucial, personal information or caused a total system failure. Most of these problems can be averted by having an up-to-date antivirus program running in your computer's memory at all times. This exercise shows you how to download and install a free antivirus program if your computer does not yet have one. (Please note that the web is continually changing, and some of the specifics presented here may have changed.)

Getting Started First, make sure your computer does not have an antivirus or security suite running. If it does, be sure to completely uninstall that program, even if the subscription is expired. Now, follow these steps to install AVG, a popular, free antivirus program:

- **Visit http://free.avg.com and click the *Download* button. You will be asked to click "save" to save the installation file to your computer.**
- **Run the installation file and follow the prompts.**
- **Select *Install Basic* to install the antivirus software. Once the program is installed, it will open automatically.**

Using AVG Generally speaking, your antivirus program watches your system for malware and updates itself automatically. However, you can always download updates manually, set a schedule for full-system scans, and change basic settings for various components of the software.

- **Click *Scan now* to run a full scan on your computer.**
- **Just to the right of that, click the button with the white cog to see the scan options, where you can set a schedule for automated scans.**
- **Click the *back arrow* to reach the main screen, where you can click various elements of the program to configure them. For example, clicking *Web* will allow you to turn on a feature that detects cookies that may be used to track your online activity.**



AVG Technologies