

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

# Computing Essentials 2021



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Making **IT** work for you

INTRODUCTORY 2021

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- Dedication

We dedicate this edition to Nicole and Katie—our inspiration.

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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 Environment features have been carefully reevaluated, 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 1: Expanded discussion of smartphones and cell phones
- Chapter 2: Added coverage of Web 4.0
  - Expanded coverage of Twitter
  - Expanded coverage of mobile browsers
  - Expanded coverage of web utilities and filters
  - Expanded discussion of social networks, including LinkedIn and Facebook
  - Expanded coverage of podcasts
  - Added coverage of fake news and deepfakes
- Chapter 3: Added coverage of features, including Find and Replace
  - Enhanced layout of figures
  - Reorganized topics to increase emphasis of video editors
  - Expanded coverage of mobile apps
- Chapter 4: Added coverage of voice assist tools
  - Added coverage of macOS Mojave and Dark Mode
  - Added comparison of search programs for Android, iOS, Windows, and macOS
  - Added comparison of storage management programs for Android, iOS, Windows, and macOS
  - Added comparison of backup programs for Android, iOS, Windows, and macOS
- Chapter 5: Reorganized sequence of topics to better compare different types of system units
  - Enhanced figures comparing different types of system units
  - Increased coverage of coprocessors and GPU (graphics processing units)
- Chapter 6: Updated and expanded coverage of stylus, handwriting recognition software, and touch screens
  - Updated features of monitors including specifics regarding dot (pixel) pitch
  - Added coverage of flexible screens
  - Added features of printers including connectivity
  - Expanded coverage of 3D printers
- Chapter 7: Added coverage of network and hybrid drives

Expanded coverage of SSDs (solid-state drives)

Added coverage of Ultra HD Blu-ray (UHD BD)

Chapter 8: Updated salary range for network administrators in Careers in IT

Chapter 9: Expanded coverage of privacy concerns specifically related to smartphone use

Added coverage of big data and digital footprints

Expanded coverage of deep web and dark web

Added comparison of viewing and deleting browser histories using Android Chrome and iOS Safari

Expanded coverage of spyware for smartphones including Pegasus

Added coverage of two-factor authentication and two-step authentication

Chapter 11: Added coverage of NoSQL

**T**he 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 it will continue to have an amazing impact on our everyday lives. For example, because of the Internet, you can do things like watching your favorite TV shows, shopping for groceries, and even managing your bank. This chapter covers the things you need to know to be prepared for the ever-changing digital world, including:

- How to use the Internet to do things you need to do.
- How to protect your information on the Internet, including Web 2.0, social networking, and mobile devices.
- How to use the Internet to do things you need to do, such as shopping, banking, and social networking.

**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 browsers and search engines.
- 3 Compare different Internet services, including Web 2.0, social networking, and mobile devices.
- 4 Identify different types of Internet services, including Web 2.0, social networking, and mobile devices.
- 5 Describe how to use the Internet to do things you need to do, such as shopping, banking, and social networking.
- 6 Explain the importance of protecting your information on the Internet, including Web 2.0, social networking, and mobile devices.
- 7 Describe the Internet of Things (IoT) and the challenges facing it.

Each chapter begins with a Why Should I Read This? 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

#### The Internet, the Web, and Electronic Commerce

#### INTERNET and WEB




**Internet**  
The Internet is a global system of interconnected computer networks that use the standard Internet Protocol (IP) suite to communicate. It consists of billions of interconnected devices, from desktop computers and servers to mobile phones and smart TVs.

**Web**  
The World Wide Web (WWW) is a system of interlinked hypertext documents, images, and other resources, such as audio, video, and 3D objects, that are accessible via the Internet. It is the most popular application of the Internet.

**Common Uses**  
The most common uses of the Internet and the Web include:

- Communication: Email, instant messaging, and social networking.
- Shopping: Online retail, digital marketing, and e-commerce.
- Entertainment: Streaming services, digital music, and video on demand.
- Education: Online learning, digital textbooks, and virtual classrooms.
- Business: E-commerce, digital marketing, and customer service.

#### INTERNET ACCESS




**Access**  
The Internet is accessible from almost anywhere in the world. It can be accessed via a variety of devices, including desktop computers, laptops, smartphones, and tablets.

**Problems**  
There are several problems associated with Internet access, including:


- Digital Divide: The gap between those who have access to the Internet and those who do not.
- Security: The risk of identity theft, fraud, and other cyber threats.
- Privacy: The collection and use of personal data by companies and governments.
- Censorship: The restriction of access to certain websites and information.

**WEB UTILITIES**



**Web Utilities**  
Web utilities are tools that help you manage your online presence and improve your website. Examples include search engines, social media management tools, and analytics tools.

**Communication**



**Social Networking**  
Social networking sites allow you to connect with friends and family, share photos and videos, and join groups. Examples include Facebook, Twitter, and LinkedIn.

**Web 2.0**  
Web 2.0 refers to the second generation of the Internet, which is characterized by user-generated content and social networking. Examples include YouTube, Wikipedia, and MySpace.

**Internet Security**  
Internet security is the practice of protecting your information and assets from cyber threats. It includes using antivirus software, firewalls, and secure connections.

Activity	Objective	Group	Process
Plan	Develop a plan for the project.	Individual	Self-Directed Learning
Proceed	Execute the plan and monitor progress.	Group	Teamwork/Cooperation
Assess/Reflect	Evaluate the results and learn from the experience.	Individual	Self-Reflection



## MAKING IT WORK FOR YOU

Making IT work for you

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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.

**1 What will you store?**


The types of files that you store can have a big impact on choosing 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 of OneDrive, Google Drive, 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 Carbonite and iDrive. They have apps that back up your device's 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.


**2 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 use.



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

© iStockphoto.com/Mark Proulx



The best place for all your photos, files, and more.

Cloud storage service Google Drive is designed to store and display digital photos, files, and more. © iStockphoto.com/Mark Proulx

Apple's iCloud works with the Works office suite.

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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.

Nearly every chapter has an Environment box located in the margin adjacent to the coverage of related technologies. Topics include plagiarism of online materials, editing images to promote a particular message, and the use of monitoring software.

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 proper disposal of older CRT monitors, empty inkjet cartridges, and old computers.

## PRIVACY, ETHICS, AND ENVIRONMENT

environment

Communication

As previously mentioned, communication is the most popular Internet activity, and its impact cannot be overestimated. At a personal level, friends and family can stay in contact with one another even when separated by thousands of miles. At a business level, electronic communication has become a standard way to stay in touch with suppliers, employees, and customers. Some popular types of Internet communication are social networking, blogs, microblogs, podcasts, wikis, e-mail, and messaging.

**Social Networking**

Social networking is one of the fastest-growing and most significant Web 2.0 applications. Social networking sites focus on connecting people and organizations that share a common interest or activity. These sites typically provide a wide array of tools that facilitate meeting, communicating, and sharing. There are hundreds of social networking sites, but they share some common features:

- Profiles are created by individuals to share information about them. These profiles often include photos, personal details, and contact information. (See Figure 2-10.)
- Pages are created by companies to promote their business. These pages often include hours of operation, upcoming sales, and information about their products.
- Groups are communities of individuals who share a common interest and come together online to share information and discuss specific topics. Groups are typically organized around topics, events, or ideas. They are popular among clubs and organizations to coordinate activities or share information.
- Friends are a list of other members on a social media site that you want to communicate with.
- News feeds is the first page you see after logging into a social networking site. It typically consists of a collection of recent posts from friends, trending topics on the site, people's responses to your posts, and advertisements.
- Share settings on your social media account determine who can see your posts. The most common options include sharing with everyone, just your friends, or just a subset of your friends.

privacy

Did you know that one type of specially processed is devoted exclusively to protecting your privacy? Called cryoprocessors, these microchips perform encoding and decoding of data faster and more securely than a CPU. These specialized chips exist in ATMs, TV record boxes, and credit card machines.

ethics

Many of the electronic devices purchased in the United States are manufactured in other countries. Some of these manufacturers pay extremely low wages, have unsafe or unsafe public work conditions, and pollute local environments. Do you think that consumers have an ethical responsibility regarding where and/or how products are manufactured?



**Figure 2-10** Facebook profile  
Image © iStockphoto.com/Mark Proulx

# 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 characteristics.
4. Discuss optical discs, including CDs, DVDs, Blu-ray, and hybrid.
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 172–173. 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 137 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.

## 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.

## ENVIRONMENT

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

### 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 technology trends 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, on-line 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, how and how often? 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 and public Wi-Fi connections that record all of your personal communications in Chapter 6 and protection of personal privacy while using social networking sites such as Facebook in Chapter 8. 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 2, 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 Environment

Almost everyone agrees that protecting our environment today is more important than ever before. Numerous Environment boxes appear in the margins of the upcoming chapters. These boxes present a variety of environmental topics, including digital media benefits in Chapter 2, operating systems reducing energy consumption in Chapter 4, and recycling old inkjet cartridges 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 Environment box, read it, and describe its contents. (c) Did you find the coverage thought-provoking? Why or why not?

**Design Elements:** Concept Check Icons: D21825/Getty Images; Making IT Work for You: cfrs129/Shutterstock

## 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

address (27)	mobile browser (21)
Advanced Research Project Agency Network (ARPANET) (28)	news feed (24)
attachment (36)	pager (27)
bitcoin (41)	podcast (33)
BitTorrent (31)	PPtP (21)
blog (35)	profile (24)
browser (30)	protocol (21)
business-to-business (B2B) (41)	search engine (29)
business-to-consumer (B2C) (40)	search service (39)
cable (35)	secure file transfer protocol (SFTP) (33)
casting style sheet (CSS) (21)	share settings (24)
client-based e-mail system (36)	signature (36)
cloud computing (42)	SMS (short messaging service) (26)
consumer-to-consumer (C2C) (40)	social networking (34)
deep fake (29)	spam (28)
desktop browser (31)	spam blocker (28)
digital cash (41)	spam filter (38)
domain name (21)	spider (29)
downloading (32)	subject (27)
DSL (24)	teaching (24)
e-commerce (40)	teasing (24)
e-learning (27)	text messaging (34)
electronic commerce (40)	top-level domain (TLD) (21)
electronic mail (27)	tweet (25)
e-mail (27)	Twitter (25)
e-mail client (36)	uniform resource locator (URL) (31)
Facebook (35)	uploading (32)
fake news (29)	virus (28)
file transfer protocol (FTP) (33)	web (28)
filter (32)	Web 1.0 (24)
friend (24)	Web 2.0 (24)
groups (34)	Web 2.0 (24)
header (37)	Web 4.0 (26)
hyperlink (21)	web nation (40)
Hypertext Markup Language (HTML) (21)	web-based e-mail system (26)
Instagram (35)	web-based file transfer services (31)
instant messaging (34) (34)	websites (26)
Internet (26)	webmail client (24)
Internet of Things (IoT) (42)	websites (44)
Internet security suite (33)	web page (31)
Internet service provider (ISP) (26)	web suite (31)
JavaScript (31)	web utility (34)
link (21)	wiki (35)
LinkedIn (28)	Wikipedia (24)
location (27)	wireless modem (28)
message (38)	WorldWideWeb (28)
microblog (29)	WWW (26)
MMS (multimedia messaging service) (24)	

## 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.

## MULTIPLE CHOICE

Circle the correct answer.

1. The network that connects computers all over the world.
  - a. ARBANET
  - b. Internet
  - c. LAN
  - d. web
2. The rules for exchanging data between computers.
  - a. DSL
  - b. protocols
  - c. web
  - d. WWW
3. Using file transfer utility software, you can copy files to your computer from specially configured servers on the Internet. This is called:
  - a. downloading
  - b. filtering
  - c. blogging
  - d. uploading
4. Communities of individuals who share a common interest typically create Facebook:
  - a. clients
  - b. groups
  - c. pages
  - d. profiles
5. Type of e-mail account that does not require an e-mail program to be installed on a user's computer is:
  - a. blog-based
  - b. client-based
  - c. utility-based
  - d. web-based
6. A very popular microblogging site:
  - a. LinkedIn
  - b. Facebook
  - c. Twitter
  - d. Wikipedia
7. Using a keyword, a search engine returns a list of related sites known as:
  - a. blogs
  - b. hits
  - c. podcasts
  - d. strikes
8. This is the Internet's equivalent to traditional cash.
  - a. digital cash
  - b. e-commerce
  - c. fiat
  - d. Internet dollars
9. The continuing Internet development that allows objects to send and receive data over the Internet.
  - a. HTML
  - b. IoT
  - c. search engines
  - d. Web 2.0
10. Three basic components to cloud computing are clients, Internet, and \_\_\_\_\_.
  - a. CSS
  - b. service providers
  - c. streaming
  - d. Web 3.0

## 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.

## CAREERS IN IT

Devices like tablets, cell phones, and wearable devices have led many to predict that mobile applications are just the beginning of the wireless revolution, and that we will see dramatically different ways to communicate and use computer technology.

The Internet of Things (IoT) is the continuing development of the Internet that allows everyday objects embedded in devices to send and receive data over the Internet. It promises to connect all types of devices, from computers to cell phones, to not only to any number of other devices.

Whether communication, cloud computing, or IoT are during 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. The rest of these mobile devices, see Figure 1-27.

**concept check**

- Define data link for common types of files.
- Define connectivity and networks.
- What is cloud computing? What are variations? IoT?

**Careers in IT**

As mentioned previously, each of the following chapters highlights a specific career in information technology. Each provides specific job descriptions, salary ranges, educational requirements, and more. For additional career information, see Figure 1-28.

Career	Description
Webmaster	Creates and maintains website content and resources. See page 58.
Software engineer	Designs, codes, tests, and creates application software. See page 75.
Computer system specialist	Provides technical support to customers and other users. See page 87.
Computer technician	Repairs individual computer components and systems. See page 111.
Network technician	Prepares networks to handle central servers, and other centrally connected devices. See page 131.
Network administrator	Creates and maintains computer networks. See page 143.

Figure 1-28 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 process of using and understanding information technology involves a help you learn problem and an ongoing search for information. Knowledge is acquired and information technology is used to solve and analyze the problem. This is the focus of the chapter. The chapter discusses how to use information technology effectively.

**The Information Age**

The information age is a period in which the most important technology for the 21st century is information technology. The focus is on the Internet, mobile devices, and cloud computing. This section is presented in Chapter 2, The Internet, the Web, and Electronic Commerce.

**Personal Information**

The chapter discusses how to use and understand information technology. It covers the importance of staying informed and the role of information technology in the workplace. It also discusses the importance of staying informed and the role of information technology in the workplace.

**Personal Information**

The chapter discusses how to use and understand information technology. It covers the importance of staying informed and the role of information technology in the workplace. It also discusses the importance of staying informed and the role of information technology in the workplace.

### 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 are 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, 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 Williams

Found in Connect for Computing Essentials 2021, 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.



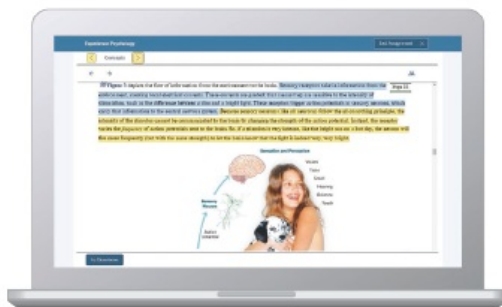
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# Support Materials in Connect

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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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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 25 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).



Courtesy of Timothy O’Leary.



Making **IT** work for you

INTRODUCTORY 2021

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.”



mapodile/E+/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.

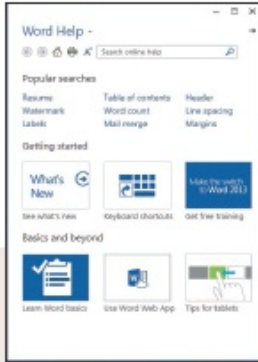
## Information Systems

---

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



**Procedures**  
specify rules or guidelines  
for computer operations.

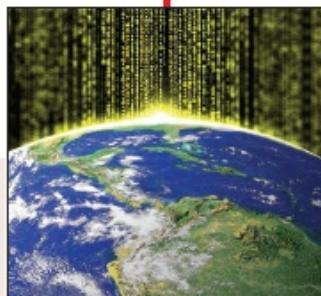
**Software**  
provides step-by-step instructions  
for computer hardware.



**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:** filadendron/E+/Getty Images; **Procedures:** Microsoft Corporation; **software:** (Windows 10) Aaron Roeth/McGraw-Hill Education; (Office 365) Nor Gal/Shutterstock; **Hardware:** (Smartphone) junior\_cinematic/Shutterstock; (Tablet) Colin Hui/Shutterstock; (Laptop) 4X-image/iStock/Getty Images; (Desktop) Scanrail1/Shutterstock; **Data:** Microsoft Corporation; (Rescue puppy or Dog) Zoom Pet Photography/Image Source/Getty Images; (Employee portrait) Sam Edwards/age fotostock; (Coffee) Stockbyte/Getty Images; (Parrot) Maciej Czekajewski/Shutterstock; **Internet:** franckreporter/Getty Images

- **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.



### concept check

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

### environment

Recycling last year reduced our landfills by over 10 million tons. This success is largely due to voluntary participation of people across the country who have made “reduce, reuse, and recycle” a personal commitment. This includes recycling old computers, cell phones, printers, and displays. Your participation in recycling means fewer one-use products, cleaner water, and cleaner air. But recycling may someday pay off financially

too. Many now see waste as a resource, and one that we shouldn't squander by filling up the garbage can instead of the recycling bin. Imagine a future where the garbage collector drops off a check for your contributions to going green.

## 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, Environment, Ethics, and Careers in IT.



**Figure 1-2** People and computers

goodluz/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 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.
- **Environment.** Today it is more important than ever that we be aware of our impact on the environment. In this chapter and the following ones, you will find Environment boxes in the margin that present important relevant environmental information.
- **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.

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 72.
Gaming	Delve into the world of video games and find the best video game hardware for you. See page 110.
Cloud Storage	Move your files online to synch files between devices or free up space on your digital devices. See page 172.
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 192.

**Figure 1-3** Making IT Work for You applications

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 120.
- 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 67.
- 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 226.
- 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 170.
- 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 221.

**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

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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.

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.



**Figure 1-5 Windows 10**

Microsoft Corporation



**Figure 1-6 macOS**

Apple

## 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](#).

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**

**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.

## Making IT work for you

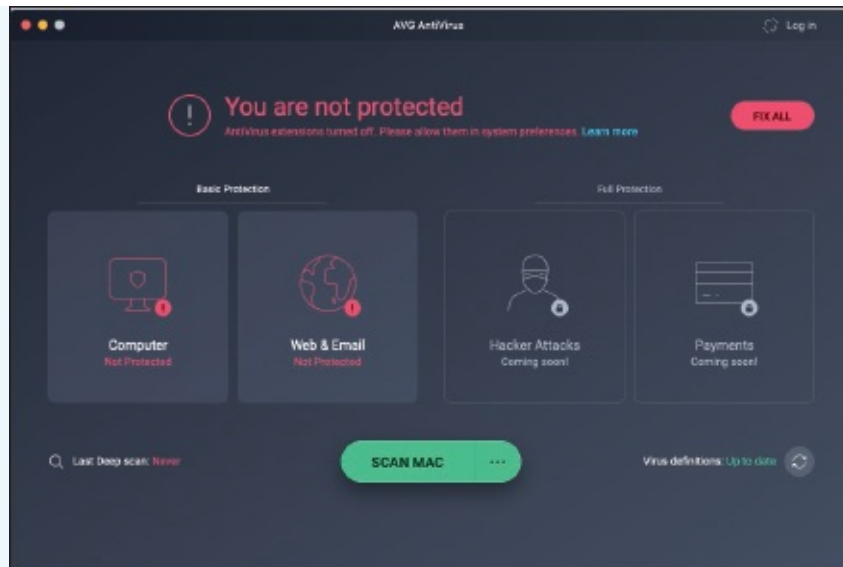
### FREE ANTIVIRUS PROGRAM

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:

- 1 • 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.
- 2 • Run the installation file and follow the prompts.
- 3 • 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.



AVG Technologies

- 1 • Click *Scan now* to run a full scan on your computer.
- 2 • 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.
- 3 • 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.



## concept check

- Describe the two major kinds of software.
- Describe two types of system software programs.
- Define and compare general-purpose applications, specialized applications, and mobile apps.

## Hardware

Computers are electronic devices that can follow instructions to accept input, process that input, and produce information. This book focuses principally on personal computers. However, it is almost certain that you will come in contact, at least indirectly, with other types of computers.

### Types of Computers

There are four types of computers: supercomputers, mainframe computers, midrange computers, and personal computers.