# Computing Essentials 2017

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

Making IT work for you

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# Computing Essentials

2017

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# Computing Essentials

## 2017

Making IT work for you

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# Dedication

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

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# New to Computing Essentials 2017

Every chapter's Making IT Work for You, Privacy, Ethics, and Environment features have been carefully revaluated, enhanced, and/or replaced. Additionally, 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 | Revised Figure 1-1 Parts of an Information System to include mobile devices (tablets and smartphones), Windows 10 operating system, and Office 10 |
| Chapter 2 | Added coverage of Microsoft's new Edge browser, *https* and MMS (Multimedia Messaging Service) |
| | Expanded coverage of Facebook Messenger, Google Hangouts |
| | Added coverage Instagram, Pinterest, Tumblr, and Vine |
| | Added a major new section on the Internet of Things (IoT) |
| Chapter 3 | Added coverage of video editors and video game design software |
| | Added discussion of game apps including role playing games (RPG) |
| | Expanded Cloud Computing to include Microsoft Office 365 for Office and iPad. |
| Chapter 4 | Expanded coverage of voice recognition and real time operating systems (RTOS) |
| | Undated operating systems to include coverage of Windows 10 and Cortana |
| | Expanded coverage of Mac OS including Yosemite and related system software |
| | Expanded coverage of Chrome OS |
| Chapter 5 | Expanded coverage of laptops to include two-in-one, gaming, and ultrabooks |
| | Expanded coverage of tablets to include keyboard attachments, digital pens, and speech recognition |
| | Added a new major section on Wearable Computers |
| | Expanded and updated ports and cables |
| Chapter 6 | Added coverage of gaming mice, 3D scanners, and smart cards |
| | Expanded coverage of voice recognition systems to include digital assistants (Siri, Cortana, and Google Now) |
| | Updated resolution standards to include UHD 4K and UHD 5K |
| | Added coverage of UHDTV, 3D UHDTV, digital projectors headsets and headphones |
| | Expanded coverage of drones, robots, and virtual reality |
| Chapter 7 | Reorganized chapter to give more prominence to solid-state storage |
| | Expanded solid-storage, flash memory coverage, and NAS |
| Chapter 8 | Updated Wi-Fi standards to include 802.11ac and 802.11ax |
| | Added cellular as a wireless connection technology including discussion of cells and cell towers |
| | Expanded coverage of LTE as a fourth-generation mobile telecommunication technology |
| Chapter 9 | Added Privacy relating to drones and the Dark Web |
| | Added Ethics boxes relating to the right to be forgotten and net neutrality |
| | Added a Tip on creating strong passwords |
| | Added a new section on security tools including password managers |
| Chapters 10, 11, 12, and 13 | New end of chapter case |

# 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.

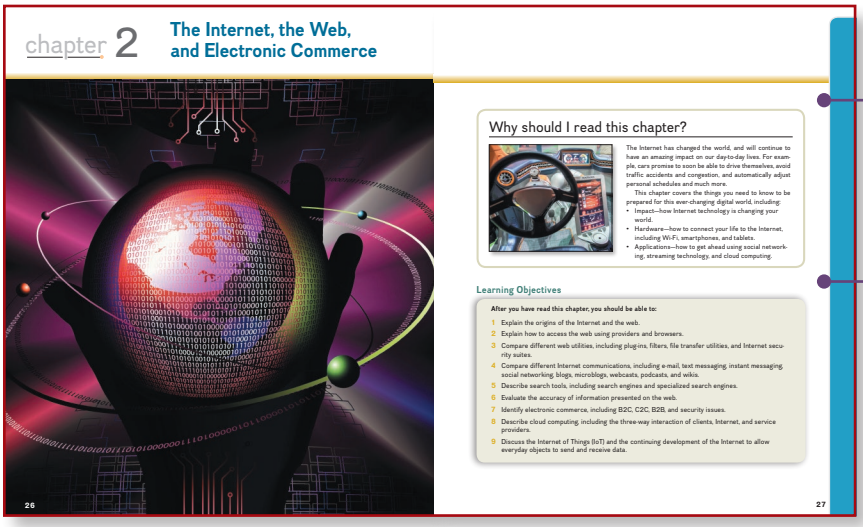
The goal of *Computing Essentials* is to provide you with the basis for understanding the concepts necessary for success. *Computing Essentials* also endeavors to instill an appreciation for the effect of information technology on people, privacy, ethics, and our environment and to give you a basis for 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 layout 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 will continue to have an amazing impact on our day-to-day lives. For example, cars promise to soon be able to drive themselves, avoid traffic accidents and congestion, and automatically adjust personal schedules and much more.

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, smartphones, 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:

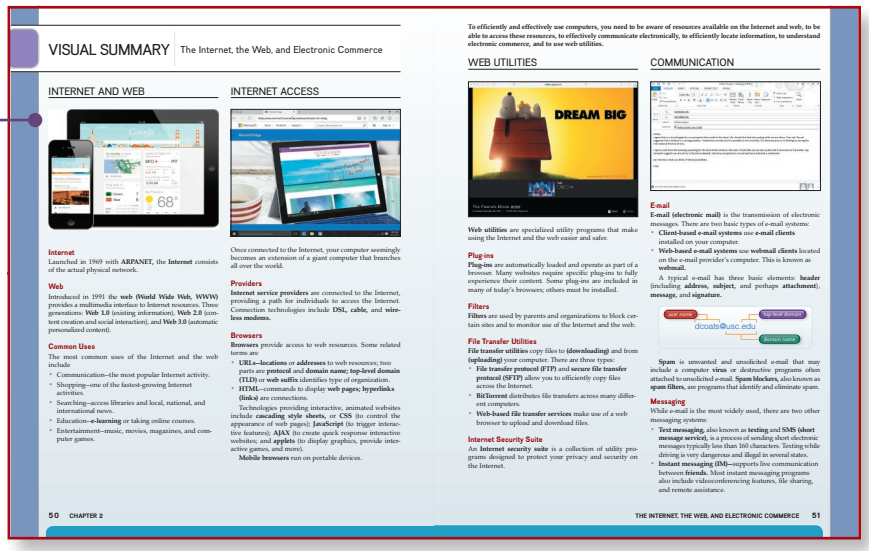
1. Explain the origins of the Internet and the web.
2. Explain how to access the web using providers and browsers.
3. Compare different web utilities, including plug-ins, filters, file transfer utilities, and Internet security suites.
4. Compare different Internet communications, including e-mail, text messaging, instant messaging, social networking, blogs, microblogs, webcasts, podcasts, and wikis.
5. Describe search tools, including search engines and specialized search engines.
6. 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.

26 27

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 ACCESS

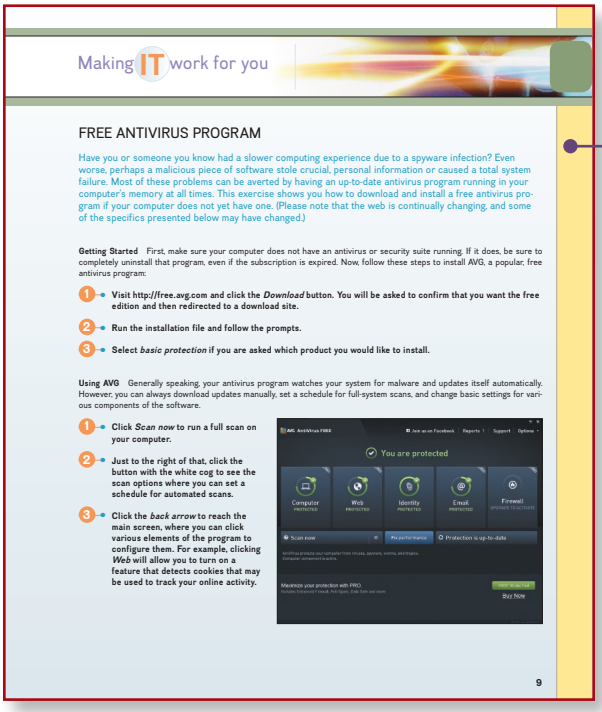
WEB UTILITIES

COMMUNICATION

50 CHAPTER 2 THE INTERNET, THE WEB, AND ELECTRONIC COMMERCE 51

# Unique Content

## MAKING IT WORK FOR YOU



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 below 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 confirm that you want the free edition and then redirected to a download site.
2. Run the installation file and follow the prompts.
3. Select *basic protection* if you are asked which product you would like to install.

**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.

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.



9

Special-interest topics are presented in the Making IT Work for You section found within nearly every chapter. These topics include Installing a Free Antivirus Program, Online Entertainment, Google Docs, Skype, and Cloud Storage.

## PRIVACY, ETHICS, AND ENVIRONMENT

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.

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.

**privacy**

Did you know that one type of specialty processor is devoted exclusively to protecting your privacy? Called cryptoprocessors, these microchips perform encoding and decoding of data faster and more securely than a CPU. These specialized chips exist in ATMs, TV set-top boxes, and smartcards.



Figure 5-10 Chip mounted onto a chip carrier

**ethics**

Because labor costs are much lower in China, many computers and peripherals are manufactured there. While this has resulted in the loss of jobs elsewhere, it has improved the standard of living for millions of Chinese. Unfortunately, their working conditions are considered to be very poor. Do you think consumers have an ethical responsibility regarding where and/or how products are manufactured?

networking card plugs into a slot on the system board to provide a connection to a local area network.

- Connecting lines called **bus lines** provide pathways that support communication among the various electronic components that are either located on the system board or attached to the system board.

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, smartphone, or wearable computer. Although these system boards vary in size, 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.

**environment**

Have you ever wondered what you should do with your old computers equipment? Consider donating them to charitable organizations that work with local schools and low-income families. Or, recycle them. Many computer retailers and local government agencies accept recycled equipment.

# 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.

DISCUSSION

Respond to each of the following questions.

1 Making IT Work for You: ONLINE ENTERTAINMENT

Review the Making IT Work for You: Online Entertainment on pages 30–31, and then respond to the following: (a) Do you currently have a subscription to Netflix, Hulu Plus, or another service that allows you to stream movies and TV shows? If so, which ones? If not, do you plan on using one in the future? Why or why not? (b) What device do you use most often to watch video content from the web? Would you consider purchasing a dedicated streaming device such as the Roku? Why or why not? (c) Could ever see yourself canceling or "cutting the cord" from your current cable or satellite service? Why or why not?



2 Privacy: SOCIAL NETWORKING

When a Facebook friend posts a picture, video, or text that includes you, who can view that post? Review the Privacy box on page 40, and respond to the following: (a) Who should be responsible for ensuring privacy on social networking sites? Defend your position. (b) Do you think that most people are aware of their privacy settings on Facebook? Have you ever checked your settings? Why or why not? (c) Investigate and then summarize the default security settings for a social networking website such as Facebook or Google+.



## 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.

3 Ethics: FILTERING AND MONITORING

Parents can use content filters and monitoring software to restrict or monitor their child's Internet behavior. Review the Ethics box on page 35, and respond to the following: (a) Is it ethical for parents to filter or monitor Internet content for their children? Does your answer depend on the age of the child? Defend your position. (b) Should parents inform their children that Internet activity is being filtered or monitored? Why or why not? (c) Do you feel that filtering or monitoring software is the best way to protect children? Defend your position.



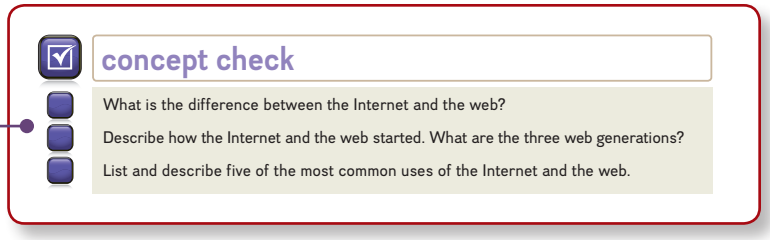
4 Environment: E-MAIL

Review the Environment box on page 37, and then respond to the following: (a) When it comes to sending letters, holiday cards, and invitations to friends and family, do you mostly use e-mail or postal mail? What are your reasons for choosing one over the other? (b) Are there any situations where you feel that using e-mail would be inappropriate? (c) Have you signed up for paperless billing from your financial institutions and utility companies? Why or why not? (d) Go through all the paper mail you have received in the last week or two. Is there anything there that you could receive via e-mail or view on the web? If so, list a few examples.

# 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

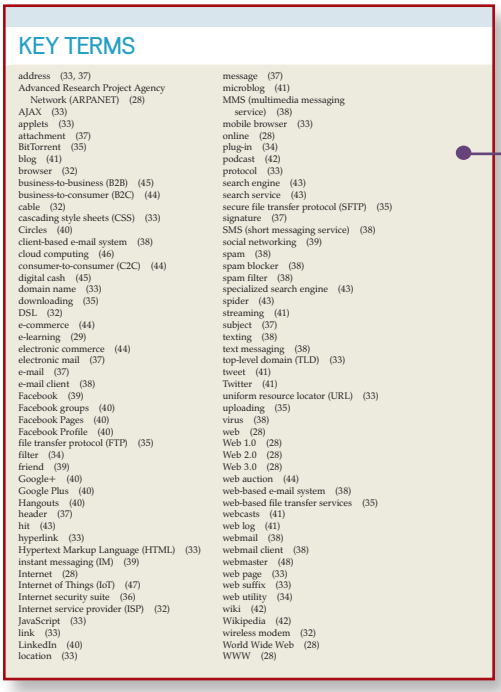
What is the difference between the Internet and the web?

Describe how the Internet and the web started. What are the three web generations?

List and describe five of the most common uses of the Internet and the web.

## KEY TERMS

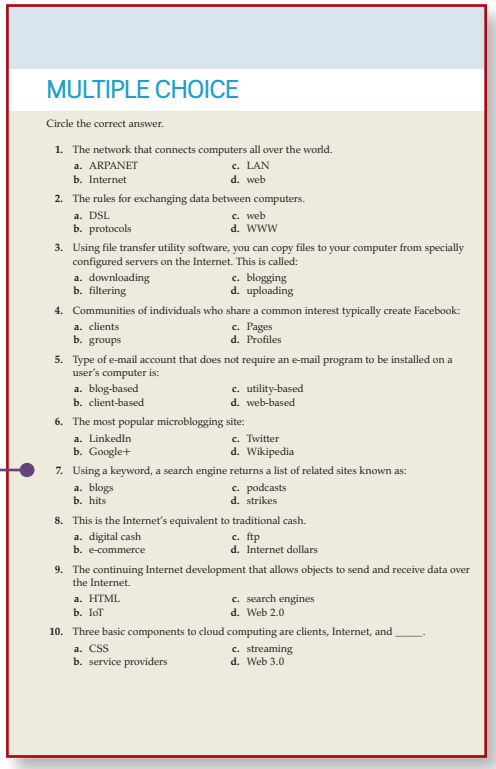
Throughout the text, the most important terms are presented in bold and are defined within the text. You will also find a list of key terms at the end of each chapter and in the glossary at the end of the book.


KEY TERMS

address (33, 37)
Advanced Research Project Agency Network (ARPANET) (28)
AJAX (33)
applets (33)
attachment (37)
BitTorrent (35)
blog (41)
browser (32)
business-to-business (B2B) (45)
business-to-consumer (B2C) (44)
cable (32)
cascading style sheets (CSS) (33)
Circles (40)
client-based e-mail system (38)
cloud computing (46)
consumer-to-consumer (C2C) (44)
digital cash (45)
domain name (33)
downloading (35)
DSL (32)
e-commerce (44)
e-learning (29)
electronic commerce (44)
electronic mail (37)
e-mail (37)
e-mail client (38)
Facebook (39)
Facebook groups (40)
Facebook Pages (40)
Facebook Profile (40)
file transfer protocol (FTP) (35)
filter (34)
friend (39)
Google+ (40)
Google Plus (40)
Hangouts (40)
header (37)
hit (43)
hyperlink (33)
Hypertext Markup Language (HTML) (33)
instant messaging (IM) (39)
Internet (28)
Internet of Things (IoT) (47)
Internet security suite (36)
Internet service provider (ISP) (32)
JavaScript (33)
link (33)
LinkedIn (40)
location (33)
message (37)
microblog (41)
MMS (multimedia messaging service) (38)
mobile browser (33)
online (28)
plug-in (34)
podcast (42)
protocol (33)
search engine (43)
search service (43)
secure file transfer protocol (SFTP) (35)
signature (37)
SMS (short messaging service) (38)
social networking (39)
spam (38)
spam blocker (38)
spam filter (38)
specialized search engine (43)
spider (43)
streaming (41)
subject (37)
texting (38)
text messaging (38)
top-level domain (TLD) (33)
tweet (41)
Twitter (41)
uniform resource locator (URL) (33)
uploading (35)
virus (38)
web (28)
Web 1.0 (28)
Web 2.0 (28)
Web 3.0 (28)
web auction (44)
web-based e-mail system (38)
web-based file transfer services (35)
webcasts (41)
web log (41)
webmail (38)
webmail client (38)
webmaster (48)
web page (33)
web suffix (33)
web utility (34)
wiki (42)
Wikipedia (42)
wireless modem (32)
World Wide Web (28)
WWW (28)

## 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.

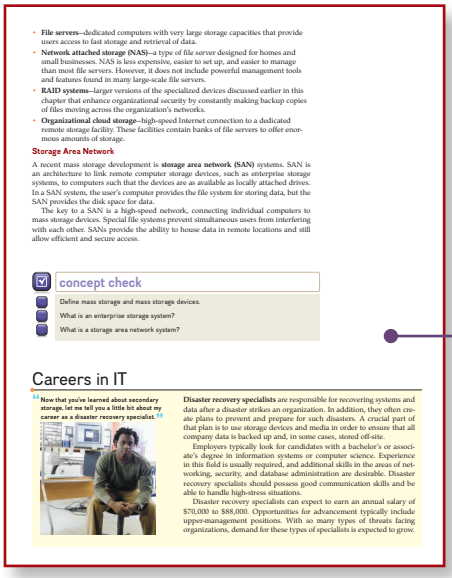

MULTIPLE CHOICE

Circle the correct answer.

1. The network that connects computers all over the world.
   a. ARPANET c. LAN
   b. Internet d. web
2. The rules for exchanging data between computers.
   a. DSL c. web
   b. protocols 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 c. blogging
   b. filtering d. uploading
4. Communities of individuals who share a common interest typically create Facebook:
   a. clients c. Pages
   b. groups 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 c. utility-based
   b. client-based d. web-based
6. The most popular microblogging site:
   a. LinkedIn c. Twitter
   b. Google+ d. Wikipedia
7. Using a keyword, a search engine returns a list of related sites known as:
   a. blogs c. podcasts
   b. hits d. strikes
8. This is the Internet's equivalent to traditional cash.
   a. digital cash c. ftp
   b. e-commerce d. Internet dollars
9. The continuing Internet development that allows objects to send and receive data over the Internet.
   a. HTML c. search engines
   b. IoT d. Web 2.0
10. Three basic components to cloud computing are clients, Internet, and ____.
    a. CSS c. streaming
    b. service providers d. Web 3.0

# The Future of Information Technology

## CAREERS IN IT



- **File servers**—dedicated computers with very large storage capacities that provide users access to fast storage and retrieval of data.
- **Network attached storage (NAS)**—a type of file server designed for homes and small businesses. NAS is less expensive, easier to set up, and easier to manage than most file servers. However, it does not include powerful management tools and features found in many large-scale file servers.
- **RAID systems**—larger versions of the specialized devices discussed earlier in this chapter that enhance organizational security by constantly making backup copies of files moving across the organization's networks.
- **Organizational cloud storage**—high-speed Internet connection to a dedicated remote storage facility. These facilities contain banks of file servers to offer enormous amounts of storage.

**Storage Area Network**

A recent mass storage development is **storage area network (SAN)** systems. SAN is an architecture to link remote computer storage devices, such as enterprise storage systems, to computers such that the devices are as available as locally attached drives. In a SAN system, the user's computer provides the file system for storing data, but the SAN provides the disk space for data.

The key to a SAN is a high-speed network, connecting individual computers to mass storage devices. Special file systems prevent simultaneous users from interfering with each other. SANs provide the ability to house data in remote locations and still allow efficient and secure access.

concept check

Define mass storage and mass storage devices.

What is an enterprise storage system?

What is a storage area network system?

Careers in IT

"Now that you've learned about secondary storage, let me tell you a little bit about my career as a disaster recovery specialist."

**Disaster recovery specialists** are responsible for recovering systems and data after a disaster strikes an organization. In addition, they often create plans to prevent and prepare for such disasters. A crucial part of that plan is to use storage devices and media in order to ensure that all company data is backed up and, in some cases, stored off-site.

Employers typically look for candidates with a bachelor's or associate's degree in information systems or computer science. Experience in this field is usually required, and additional skills in the areas of networking, security, and database administration are desirable. Disaster recovery specialists should possess good communication skills and be able to handle high-stress situations.

Disaster recovery specialists can expect to earn an annual salary of $70,000 to $88,000. Opportunities for advancement typically include upper-management positions. With so many types of threats facing organizations, demand for these types of specialists is expected to grow.

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

**Your Car's Dashboard as a Powerful, Internet-Connected Computing Device**

Do you often wish that you could shop online or make dinner plans while your car drove itself? Would you like your car to use the Internet to suggest a better route, or stream a music list tailored to your likes? A computer located within the vehicle already governs many of your car's functions. That computer is responsible for various safety and diagnostic features. Recently, cars have begun offering Internet access for driving directions, streaming audio, and cell phone connectivity. In the future, cars will drive themselves and seamlessly integrate into our digital lives. Technology has been making better cars, and will continue to evolve to improve our lives as we look to the future.

Apple and Google have created partnerships with automobile manufacturers to place iPad or Android devices into the center of a vehicle's main console. Cars can connect to Wi-Fi access points or 4G networks to reach the Internet as the modern smartphone does. These developments allow your vehicle to provide many services that normally require a smartphone but in a safer and more integrated manner.

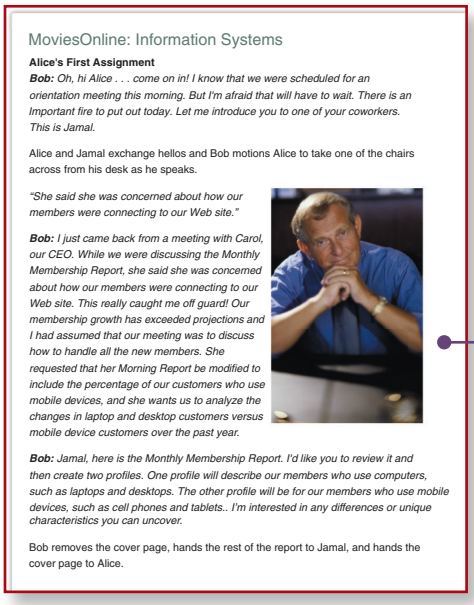
One of the immediate benefits involves quick access to information. Drivers get real-time traffic data, weather, store hours, and much more. Also available is access to all the apps that you expect to have. One example is the Pandora service, which allows you to stream free, ad-supported music from stations you create yourself. Why pay for satellite radio or listen to stations that you don't enjoy when you can access your favorite online music services right from your dashboard? Another benefit is the entertainment of your passengers or children. Some vehicles include screens that face the back seats, allowing parents to play DVDs for their children. Internet-connected vehicles allow individuals already paying for an online streaming video service to give their children access to this enormous library of cartoons and movies right in the vehicle. In fact, with a tablet-like interface, your child can choose from a preset selection of movies or educational games, depending on his or her mood.

Now, such a tool at your fingertips has the risk of becoming a distraction while you're driving. There is no question that safety features must be built in to prevent accidents from occurring. Luckily, there is already a piece of technology that prevents the driver from ever having to touch the dashboard: voice recognition.

In the same way that Apple's "Siri" has revolutionized the way individuals interact with their iPhones, similar systems are installed in the new dashboards. Drivers simply speak their commands to get the information they need and to use the vehicle's controls. Furthermore, this computer system uses existing technologies that recognize and speak English to the user. This will allow the driver to hear e-mail messages, social network updates, and today's news and weather while driving to work.

Some companies have already taken steps in implementing this technology. Ford uses voice recognition in some of its vehicles with a feature called Sync with MyFord Touch. Audi has added 3G connectivity in its new A7 model. However, the real breakthroughs will come when you can drive in safety while being as productive as when you are on your laptop. Advances in dictation software will one day allow users to easily dictate e-mail responses. Changes in sensors and automated driving will allow users to devote less attention to driving and more to getting things done. Google and Mercedes are currently testing self-driving cars, and they may be available in the next ten years. When it does, do you see yourself paying for this upgrade in your next car? Would you be comfortable allowing a car to drive itself while you worked on your laptop or tablet?

49



MoviesOnline: Information Systems

**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 changes in laptop and desktop customers versus mobile device customers over the past year.*

***Bob:*** *Jamal, here is the Monthly Membership Report. I'd like you to review it and then create two profiles. One profile will describe our members who use computers, such as laptops and desktops. The other profile will be for our members who use mobile devices, such as cell phones and tablets.. I'm interested in any differences or unique characteristics you can uncover.*

Bob removes the cover page, hands the rest of the report to Jamal, and hands the cover page to Alice.

Found in Connect for Computing Essentials 2017, 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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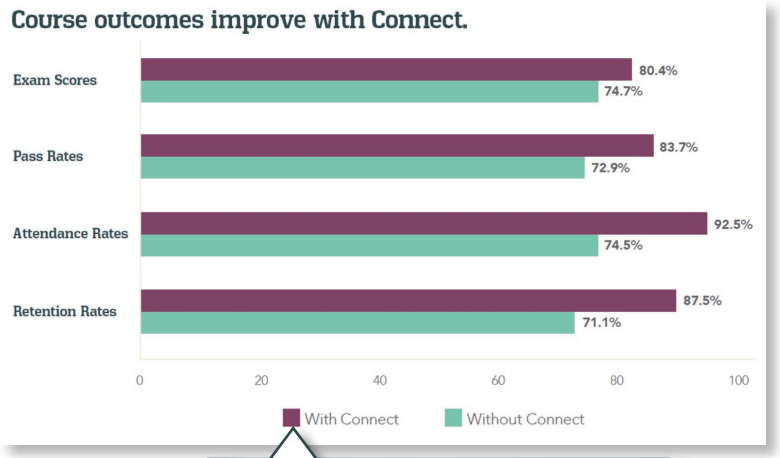


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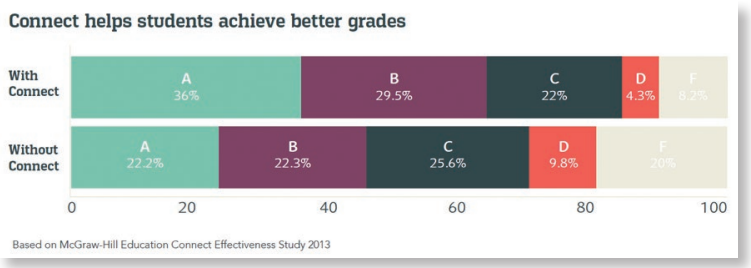
# Analytics

## Connect Insight®




Connect Insight is Connect's new one-of-a-kind visual analytics dashboard—now available for both instructors and students—that provides at-a-glance information regarding student performance, which is immediately actionable. By presenting assignment, assessment, and topical performance results together with a time metric that is easily visible for aggregate or individual results, Connect Insight gives the user the ability to take a just-in-time approach to teaching and learning, which was never before available. Connect Insight presents data that empowers students and helps instructors improve class performance in a way that is efficient and effective.

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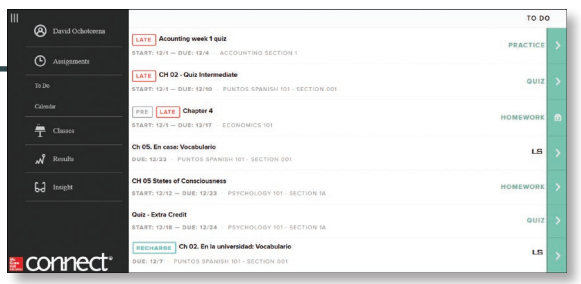
Connect's new, intuitive mobile interface gives students and instructors flexible and convenient, anytime–anywhere access to all components of the Connect platform.



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*Findings based on a 2015 focus group survey at Pellissippi State Community College administered by McGraw-Hill Education

# 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, matching, 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.

# SIMNET ONLINE TRAINING AND ASSESSMENT FOR OFFICE APPLICATIONS

SIMnet™ Online provides a way for you to test students' software skills in a simulated environment. SIMnet provides flexibility for you in your applications course by offering:

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For more information on skills assessment software, please contact your local sales representative, or visit us at www.simnetkeepitsimple.com.

# Acknowledgments

A special thank-you goes to the professors who took time out of their busy schedules to provide us with the feedback necessary to develop the 2017 edition of this text. The following professors offered valuable suggestions on revising the text:

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**Paulette Comet**
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**Joshua Cuneo**
*Georgia Gwinnett College*

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# About the Authors

Tim and Linda O'Leary 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. Now, they are joined by their son Dan O'Leary as a coauthor. Dan has recently completed his PhD in Electrical Engineering with significant experience in teaching and consulting in information technology.

The O'Leary's form a unique team blending experience and youth. 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. 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.

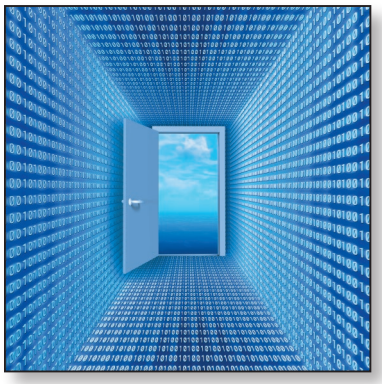
Tim, Linda, and Dan have talked to and taught numerous students, all of them with a desire to learn something about computers and applications that make their lives easier, more interesting, and more productive.

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).

chapter 1

# Information Technology, the Internet, and You

# Why should I read this chapter?



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.
- Connectivity and cloud computing—how the Internet, 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 Alan and I work in information technology. On the following pages, we'll be discussing some of the most exciting new developments in computer technology including smartphones, tablet computers, and cloud computing. Let me begin in this chapter by giving you an overview of the book and showing you some of its special features."**

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.

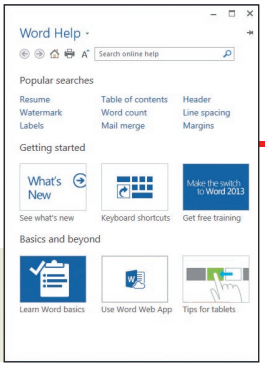
To effectively and efficiently use computers, you need to know the parts of an information system: people, procedures, software, hardware, data, and the Internet. You also need to understand the wireless revolution, the mobile Internet, and the web and to recognize the role of information technology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

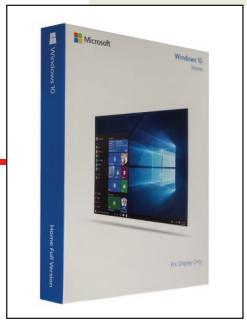
- **People:** It is easy to overlook people as one of the parts of an information system. Yet this is what personal computers are all about—making **people, end users** like you, more productive.
- **Procedures:** The rules or guidelines for people to follow when using software, hardware, and data are **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.

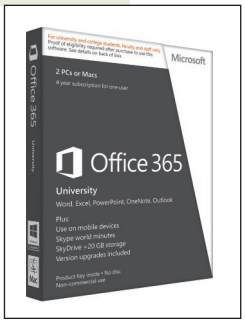
**People**
are end users who use computers to make themselves more productive.



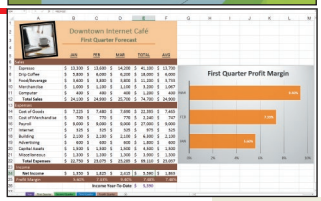

**Procedures**
specify rules or guidelines for computer operations.

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

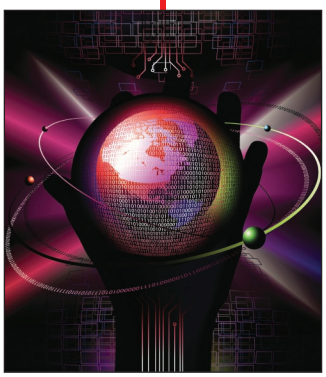


**Hardware**
includes keyboard, mouse, display, system unit, tablets, smartphones, and other devices.



**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

## concept check

What are the parts of an information system?

What is a program?

What is the difference between data and information?

## environment

Did you know that over 10 million tons of material was diverted from landfills last year alone as a result of recycling efforts? 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

- **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. |
| Online Entertainment | Use your computer to watch your favorite television programs, movies, and other video content. See page 30. |
| Google Docs | Create, collaborate, and access documents from almost anywhere with a free online office suite. See page 78. |
| Skype | Visit face to face with friends and family located almost anywhere at little or no cost. See page 157. |
| Cloud Storage | Send large files using a free tool and the cloud. See page 182. |

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

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.

**Are you getting the most out of your computer? 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 laptop's battery keeps its charge for less time than it used to? Here are some ways to make your battery last longer. See page 128.
2. **Language translation.** Have you had trouble communicating with someone who does not speak English? If so, Google Translate may be just what you need. See page 148.
3. **Lost files.** Have you ever accidentally deleted or lost important files from your flash drive? Here are a few suggestions that might help. See page 178.
4. **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 233.
5. **Wireless networks.** Do you use your laptop to connect to wireless networks at school, coffee shops, airports, or hotels? If so, it is important to use caution to protect your computer and your privacy. A few suggestions are on page 208.

**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.

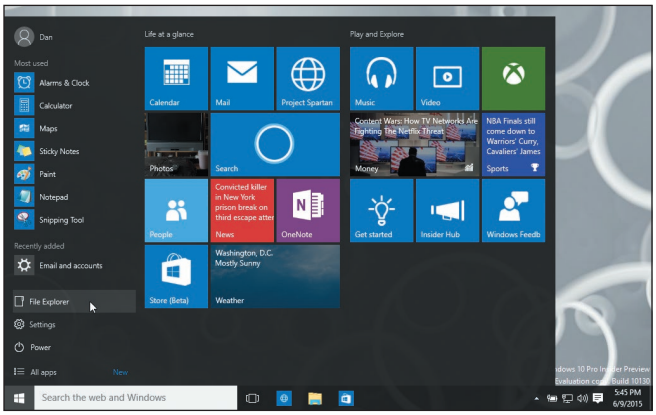



Figure 1-5 **Windows 10**

Figure 1-6 **Mac OS X**

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 Mac OS. (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 tablet computers. There are over half a million apps. The most popular mobile apps are for social networking, playing games, and downloading music and videos.

| Type | Description |
|---|---|
| Browsers | Connect to websites and display web pages |
| Word processors | Prepare written documents |
| Spreadsheets | Analyze and summarize numerical data |
| Database management systems | Organize and manage data and information |
| Presentation graphics | 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 below 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 confirm that you want the free edition and then redirected to a download site.**
2. **Run the installation file and follow the prompts.**
3. **Select *basic protection* if you are asked which product you would like to install.**

**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.

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.**