COMPLETE

VISUALIZING TECHNOLOGY

Sixth Edition

Debra Geoghan

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Debra Geoghan

Bucks County Community College

Pearson

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What's New in This Edition?

Visualizing Technology Sixth Edition

Visualizing Technology is a highly visual, engaging computer concepts textbook. Filled with all the important topics you need to cover, but unlike other textbooks, you won't find pages full of long paragraphs. Instead, you'll find a text written the way students are hardwired to think: it has smaller sections of text that use images creatively for easier understanding, and chapters are organized as articles with catchy headlines. The sixth edition continues to provide a hands-on approach to learning computer concepts in which students learn a little and then apply what they are learning in a project, simulation, or watch a Viz Clip video to dive deeper. Each chapter has two *How-To* projects focused on *Digital Literacy* and *Essential Job Skills* so that students are gaining the skills needed for professional and personal success. They learn about the important topics of ethics, green computing, and careers in every chapter. And, as technology continually evolves, so does the content. In this new edition, all of the content has been reviewed and updated to cover the latest technology, including Windows 10, macOS Sierra, and more coverage of troubleshooting and security.

The optimal way to experience *Visualizing Technology* is with MyITLab. All of the instruction, practice, review, and assessment resources are in one place, allowing you to arrange your course from an instructional perspective that gives students a consistent, measurable learning experience from chapter to chapter.

Highlights of What's New in This Edition

- New *Digital Competency* Badge offered through MyITLab
- New Pearson etext 2.0 provides an interactive and accessible learning experience
- Updated all content for currency
- Added a variety of Infographics to illustrate complex topics visually
- Updated Viz Clip videos as needed
- Added coverage of Windows 10, macOS Sierra
- Included more coverage of Troubleshooting and Security

INSTRUCTION

Prepare visual and kinesthetic learners with a variety of instructional resources

- **Pearson etext 2.0** provides an environment in which students can interact with the learning resources directly.
- **Viz Intro Videos** provide overview of chapter objectives.
- **Viz Clip Videos** dig deeper into key topics in a YouTube-like style.
- **PowerPoint Presentation** – to use for in-class, online lecture, or student review lecture.
- **Audio PowerPoint Presentations** deliver audio versions of PPTs—lecture option for online students.
- **TechBytes Weekly** provides ready-to-use current news articles, including discussion questions and course activities.

PRACTICE

Engage students with hands-on activities and simulations that demonstrate understanding

- **How-To Projects** provide two active-learning projects per chapter—a *Digital Literacy* Project and an *Essential Job Skill* Project. Each project focuses on skills students need for personal and professional success. Topics include basic website creation, mobile application creation, video creation, and using social media for brand marketing.
- **How-To Videos** *show* students how to complete the projects.
- **IT Simulations** provide 12 hands-on scenarios that students work through in an active learning environment to demonstrate understanding.
- **Windows 10 high-fidelity training simulations** allow students to explore Windows in a safe, guided environment that provides feedback and Learning Aids (Watch and Practice) if they need help.

REVIEW

Self-check and review resources keep learning on track

- **Viz Check Quiz Parts 1 & 2** provide a self-check of 3–4 objectives so that students can see how well they are learning the content. (Feeds grade to MIL gradebook.)
- **Viz Intro Videos** can also be used for review, as they provide an overview of what is covered in the chapter.
- **Other in-book, end-of-chapter projects and resources:** Mindmap Visual Review; Objective Recaps; Key Terms; Summary; Review Exercises—Multiple Choice, True or False, and Fill-in-the-Blank.

ASSESSMENT

Measure performance with ready-to-use resources

- **End-of-Chapter Quiz** is a comprehensive chapter quiz that covers all chapter objectives.
- **Application Projects** (MyITLab Grader project) are written to Windows 10 and Office 2016 and allow students to demonstrate productivity, competency, and critical thinking.
- **Testbank exam** contains customizable prebuilt, autograded, objective-based questions covering chapter objectives.
- **Other in-book, end-of-chapter projects and resources:** Running Project; Critical Thinking; Do-It-Yourself; Ethical Dilemma; On The Web; Collaboration.

CHANGES BY CHAPTER

Chapter 1 What Is a Computer?

- Added coverage of Chromebooks

Chapter 2 Application Software

- Updated all software versions
- Added more coverage of Windows 10 Settings tools

Chapter 3 File Management

- Added Cortana and Siri

Chapter 4 Hardware

- Removed reference to obsolete connectors and ports
- Added Thunderbolt2

Chapter 5 System Software

- Added new objective - Troubleshooting and Maintenance

Chapter 6 Digital Devices and Multimedia

- Expanded discussion of digital assistants, added Amazon's Echo

Chapter 7 The Internet

- Updated to most recent browser versions
- Increased discussion of browser security

Chapter 8 Communicating and Sharing: The Social Web

- Changed Objective 7 to cover online tools used in business
- Added SharePoint, Slack, and other tools

Chapter 9 Networks and Communication

- Added more information about antivirus software and malware
- Added more information about wireless security

Chapter 10 Security and Privacy

- Updated images

Chapter 11 Databases

- Updated images

Chapter 12 Program Development

- Added more coverage of Artificial Intelligence (AI)

Appendix A Microsoft® Office 2016 Applications Projects

Appendix B Using Mind Maps

Visual Walkthrough

VISUALIZING TECHNOLOGY HALLMARKS

- **Addresses visual and kinesthetic learners**—images help students to learn and retain content while hands-on projects allow students to practice and apply what they learned.
- **Easy to read**—it has the same amount of text as other concepts books but broken down into smaller chunks of text to aid in comprehension and retention.
- **Clear, easy-to-follow organization**—each chapter is broken into a series of articles that correspond to chapter objectives.
- **Highly visual**—students will want to read!

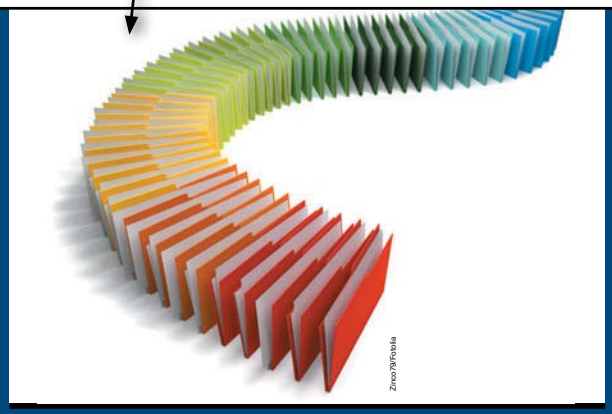
Learning Objectives clearly outlined in chapter opener and restated at the beginning of each article

Learning Outcomes are clearly defined at the beginning of each chapter.

Chapter Intro Video introduces the main concepts of the chapter

Explanation of the **Running Project** for that chapter

Catchy headlines begin each article



A Place for Everything

Objective 1

Create Folders to Organize Files

One of the most important things that you need to do when working with computers is called **file management**: opening, closing, saving, naming, deleting, and organizing digital files. In this article, we discuss organizing your digital files, creating new folders, and navigating through the folder structure of your computer.

SIMULATION File Management

The Windows Optimize Drives utility optimizes and defragments hard drives automatically on a weekly basis, and optimizes SSD drives monthly. You can also run it manually if you need to. Microsoft recommends that you defragment a drive that's more than 10 percent fragmented. Figure 5.21 shows the Optimize Drives utility. Like the Disk Check utility, the Optimize Drives utility can be accessed from the Tools tab of the disk's Properties dialog box.

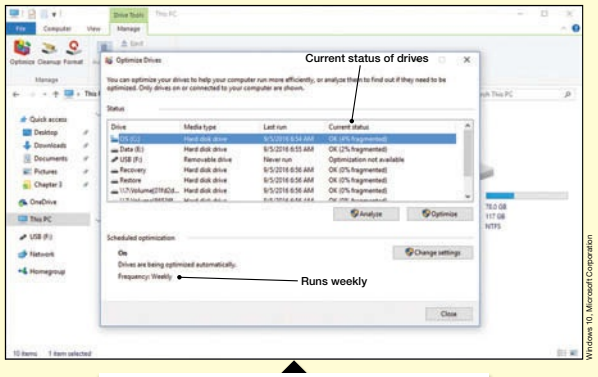


FIGURE 5.21 The Windows Optimize Drives utility is scheduled to run automatically.

FIND OUT MORE

Is defragmenting a hard disk really necessary? Some people say no. Use the Internet to research the controversy. Do you agree with the contention? Why or why not? What webpages did you find supporting this argument? What credentials does the author have that make you trust the information you found? Make sure you're using recent information.

IT Simulations—take students through a hands-on activity covering a key topic in the chapter

Find Out More—prompts for additional research on a given topic

Images are used to represent concepts that help students learn and retain ideas

Green Computing provides eco-friendly tips for using technology

Moore's Law

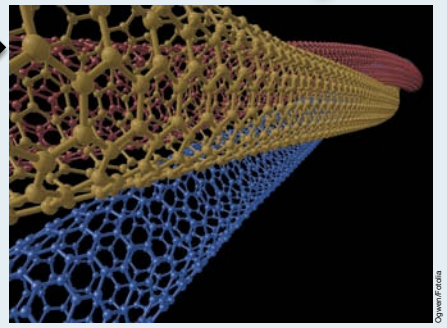
In 1965, Intel cofounder Gordon Moore observed that the number of transistors that could be placed on an integrated circuit had doubled roughly every two years. This observation, known as **Moore's Law**, predicted this exponential growth would continue. The law was never intended to be a true measure, but rather an illustration, of the pace of technology advancement. The increase in the capabilities of integrated circuits directly affects the processing speed and storage capacity of modern electronic devices. As a result of new technologies, such as building 3D silicon processors or using carbon nanotubes in place of silicon (Figure 1.7), this pace held true for roughly 50 years, but by 2016 most experts agreed this pace is no longer viable. The increase in the capabilities of integrated circuits directly affects the processing speed and storage capacity of modern electronic devices.

Moore stated in a 1996 article, "More than anything, once something like this gets established, it becomes more or less a self-fulfilling prophecy. The Semiconductor Industry Association puts out a technology road map, which continues this [generational improvement] every three years. Everyone in the industry recognizes that if you don't stay on essentially that curve they will fall behind. So it sort of drives itself." Thus, Moore's Law became a technology plan that guides the industry. Over the past several decades, the end of Moore's Law has been predicted. Each time, new technological advances have kept it going, but as new ideas and technologies have emerged, sticking to Moore's Law has become increasingly less practical or important. Moore himself admits that exponential growth can't continue forever.

In less than a century, computers have gone from being massive, unreliable, and costly machines to being an integral part of almost everything we do. As technology has improved, the size and costs have dropped as the speed, power, and reliability have grown. Today, the chip inside your cell phone has more processing power than the first microprocessor developed in 1971. Technology that was science fiction just a few decades ago is now commonplace.

From *Engines of Innovation: U.S. Industrial Research at the End of an Era*, Richard S. Rosenbloom and William J. Spencer (Eds.), published by Harvard Business School Press, © 1996.

FIGURE 1.7 Carbon nanotubes may someday replace silicon in integrated circuits.



Ogwen/Fotolia

GREEN COMPUTING

Smart Homes

The efficient and eco-friendly use of computers and other electronics is called **green computing**. Smart homes and smart appliances help save energy and, as a result, are good for both the environment and your pocketbook.

Smart homes use home automation to control lighting, heating and cooling, security, entertainment, and appliances. Such a system can be programmed to turn various components on and off at set times to maximize energy efficiency. So, the heat can turn up, and the house can be warm right before you get home from work, while not wasting the energy to keep it warm all day while you're away. If you're away on vacation or have to work late, you can remotely activate a smart home by phone or over the Internet. Some utility companies offer lower rates during off-peak hours, so programming your dishwasher and other appliances to run during those times can save you money and help energy utility companies manage the power grid, potentially reducing the need for new power plants.

Can't make your home a smart home overnight? No worries! You can take some small steps without investing in an entire smart home system. Try installing a programmable thermostat, putting lights on timers or motion sensors, and running appliances during off-peak hours.

Smart appliances can monitor signals from the power company transmitted over the **smart grid**—a network for delivering electricity to consumers that includes communication technology to manage electricity distribution efficiently. When the electric grid system is stressed, smart appliances can react by reducing power consumption. Although these advances are called smart home technology, the same technologies can also be found in commercial buildings.

Adrian Sherratt/Alamy

Running Project

Use the Internet to look up current microprocessors. What companies produce them? Visit **computer.howstuffworks.com/microprocessor.htm** and read the article. How many transistors were found on the first home computer processor? What was the name of the processor, and when was it introduced?

5 Things You Need to Know

- First-generation computers used vacuum tubes.
- Second-generation computers used transistors.
- Third-generation computers used integrated circuits (chips).
- Fourth-generation computers use microprocessors.
- Moore's Law states that the number of transistors that can be placed on an integrated circuit doubles roughly every two years—although today it is closer to every 18 months.

Key Terms

central processing unit (CPU)
ENIAC (Electronic Numerical Integrator and Computer)
green computing
integrated circuit
microprocessor
Moore's Law
smart appliance
smart grid
smart home
transistor
vacuum tube

14 CHAPTER 1

Objective 2 15

Subtopics have same color background as main topics—makes it easy to follow each piece

Ethics boxes provide thought-provoking questions about the use of technology

Social Review Sites

Social review sites such as TripAdvisor let users review hotels, movies, games, books, and other products and services. Yelp allows users to review local businesses and places with physical addresses such as parks. Figure 8.23 shows a Yelp map of Times Square restaurants on the iPad app. The reviews are from regular people, not expert food critics, and can help you decide where to eat. You can use the Yelp app on a mobile device to get information when you are right in the area.

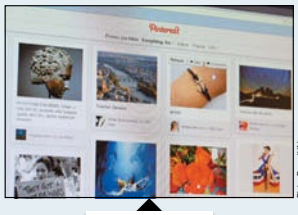
From Yelp Inc. Copyright © by Yelp Inc.

FIGURE 8.23 Searching for a Place to Eat in Times Square Using the Yelp App on an iPad

Social Bookmarking and News Sites

Social bookmarking sites allow you to save and share your bookmarks or favorites online. Pinterest allows you to create virtual cork boards around topics of interest and pin webpages to them (Figure 8.24). You can share your boards with others, and you can follow other people to see what they have pinned. StumbleUpon discovers websites based on your interests. When you sign up, you indicate topics that interest you. Then, as you visit websites, you can click the *StumbleUpon* button to be taken to a similar site. You can click *I like this* to improve the selection of pages you stumble onto. Delicious allows you to not only save and share your bookmarks online but also search the bookmarks of others. It's a great way to quickly find out what other people find interesting and important right now. The links are organized into topics, or tags, to make it easier for you to find links. You can click the *Follow* button if you have a Delicious account, but you don't need an account to browse Delicious.

Social news sites are different from traditional mass media news sites in that at least some of the content is submitted by users. Social news is interactive in a way that traditional media isn't. It's like having millions of friends sharing their finds with you. Content that's submitted more frequently or gets the most votes is promoted to the front page.



Blaize Pascall/Alamy

FIGURE 8.24 Pinterest

Three of the most popular social news sites are reddit, Digg, and Slashdot. Digg doesn't publish content but allows the community to submit content they discover on the web and puts it in one place for everyone to see and to discuss. reddit (Figure 8.25) allows community members to submit content and to vote that content up or down, as well as discuss it. reddit is organized into categories called subreddits. Celebrities often participate in AMA—ask me anything—interviews on reddit. Slashdot, which focuses primarily on technology topics, produces some content but also accepts submissions from its readers. Whatever your interests, there's probably a social news site for you.

Ian Dagnall Computing/Alamy

FIGURE 8.25 reddit

ETHICS

Some people create multiple accounts on social bookmarking and news sites so they can promote their own content. For example, a blogger might create several accounts on Digg and use each one to Digg a blog post, artificially raising its popularity on Digg and driving more traffic to it. This violates the Digg terms of use. But what if the blogger had all his friends and family members create accounts and Digg his post? Is it ethical? Does it violate the terms of use? Is it fair to other bloggers?

Running Project

Go to the Wikipedia article "Reliability of Wikipedia" at **wikipedia.org/wiki/Reliability_of_Wikipedia**. How does Wikipedia ensure that the content is correct? What procedures are in place to remove or correct mistakes? How does Wikipedia compare to other online sources of information?

3 Things You Need to Know	Key Terms
• Social media relies on the wisdom of the crowd rather than that of an expert. • Anybody can edit a wiki. • Social bookmarking and news sites help users find content that others recommend.	crowdsourcing social bookmarking site social news site social review site wiki

Running Project—Specific instructions are provided for compiling information for the Running Project

Things You Need to Know—Key takeaway points are provided for each article

Key Terms—Students are reminded of the key terms they should understand after reading each article

Digital Literacy Skill

Capture a Screenshot of Your Desktop

HOW TO VIDEO

A useful skill is creating screen shots of your desktop. For example, it's helpful for providing directions on how to do something or for keeping a record of an error message that appears on your screen. Windows includes a program called the Snipping Tool that you can use to capture a screenshot. Macs include the Grab tool.

The Windows Snipping Tool can capture four types of snips: Free-form, Rectangular, Window, or Full-screen. The Mac Grab tool can capture three types of grabs: Selection, Window, or Screen.

You can save your screenshots, email them, paste them into documents, and annotate and highlight them. If necessary, download the student data files from **pearsonhighered.com/viztech**. From your student data files, open the *vt_ch01_howto1_answersheet* file and save the file as **lastname_firstname_ch01_howto1_answersheet**.

Students get prepared for professional and personal success with these **Digital Literacy** and **Essential Job Skills** How-To projects.

Facebook Pages

Unlike a Facebook profile, which is linked to a person, a Facebook Page is used to promote an organization, a product, or a service. A Facebook Page can have more than one administrator, so you can share the responsibilities among several people or departments. The Facebook Page for this textbook can be found at **facebook.com/visualizingtechnology**. A Page is public, so it can be viewed by anyone, even those who are not logged in to Facebook.

To create a Facebook Page, you need a personal Facebook account. Facebook's Terms of Service permit you to have only one personal Facebook account, but you can create multiple Facebook Pages. So, for example, a college representative might create a page for each department, club, or office. Once you are logged in to your personal account, the option *Create Page* can be found in the menu options. You can choose from several page categories (Figure 8.29). A page for a business or an organization will have

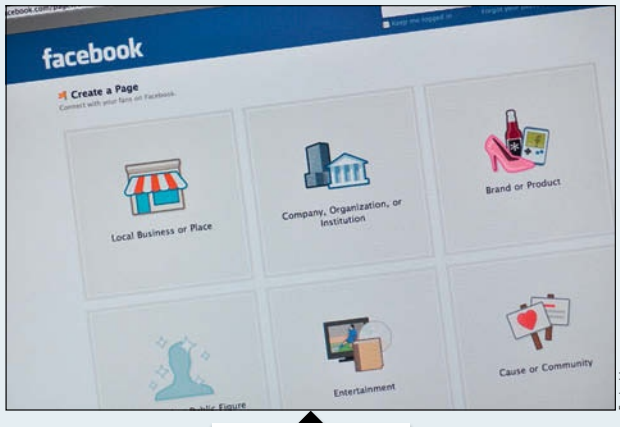


FIGURE 8.29 Create a Page Categories

Career Spotlight—Each chapter provides an interesting career option based on chapter content

CAREER SPOTLIGHT

SOFTWARE TRAINERS Software trainers—sometimes called corporate trainers—are in demand as companies deploy more software programs. This high-paying career may involve some travel and requires good computer skills, organization, and communication skills. Software trainers usually have at least a bachelor's degree and on-the-job training. Some companies offer train-the-trainer courses that can lead to certification. You might work for a training company, in the training department of a large company, or as a consultant to many companies.

Spotmatikphoto/Fotolia

Running Project

Research a game or program that you would like to run on your computer. What are the system requirements for the program? Does your computer meet the minimum requirements? In what ways does it exceed them?

Viz Check—In MyITLab, take a quick quiz covering Objectives 1–3.

3 Things You Need to Know

- File Explorer can help you determine the drives and storage space available on your computer.
- You can find out your system specifications by using the System control panel or the About This Mac window.
- System requirements are the minimum requirements needed to run software and include hardware and software specifications.

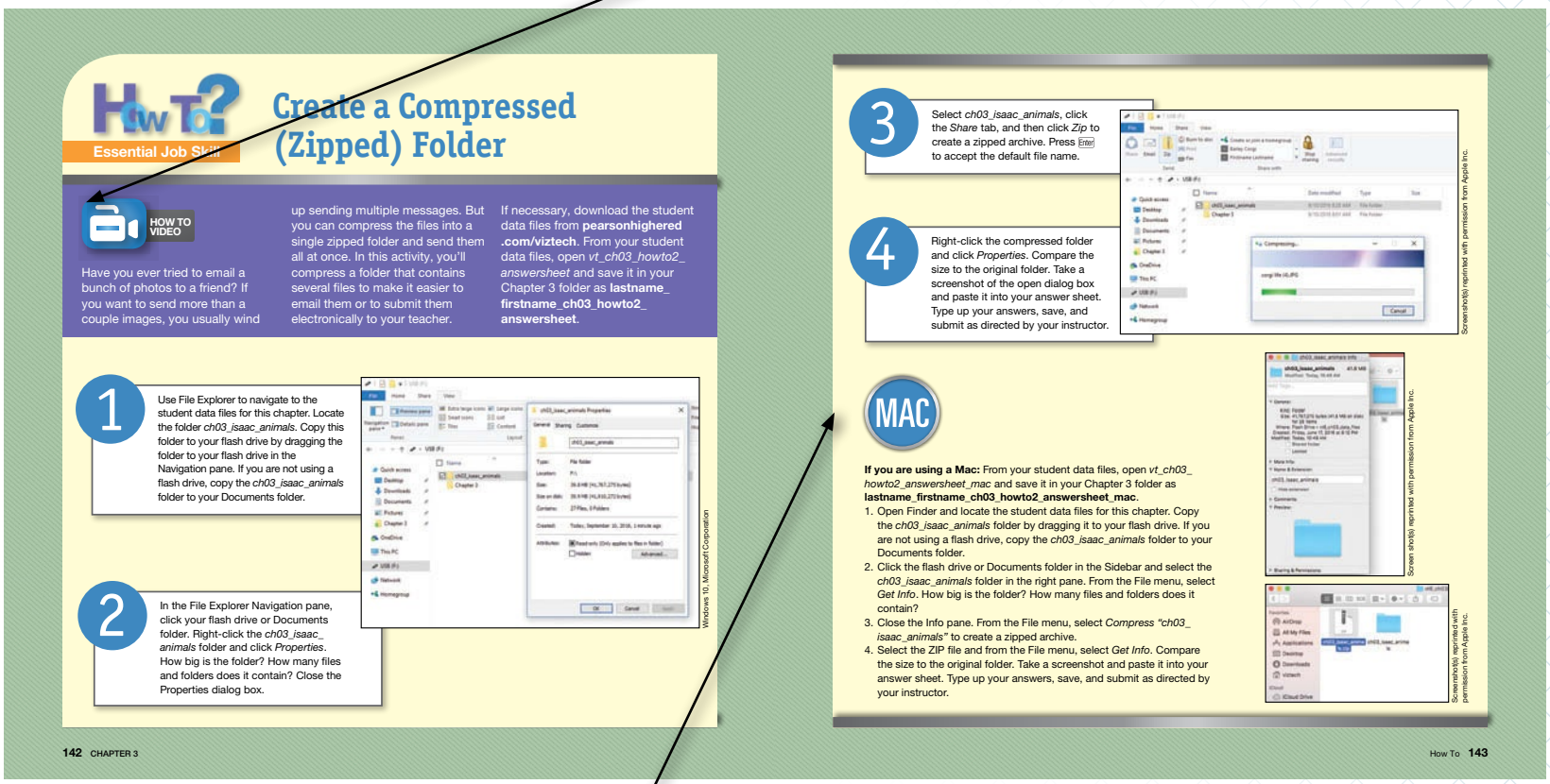
KEY TERM

system requirements

Viz Check quizzes—Each chapter includes two short online quizzes covering 3–5 objectives

How-To Projects—Each chapter provides two step-by-step projects, complete with visual instructions, to complete interesting and useful items

How-To Videos—Each How-To Project has a corresponding video walk-through of the project



How To?

Essential Job Skill

Create a Compressed (Zipped) Folder

HOW TO VIDEO

Have you ever tried to email a bunch of photos to a friend? If you want to send more than a couple images, you usually wind up sending multiple messages. But you can compress the files into a single zipped folder and send them all at once. In this activity, you'll compress a folder that contains several files to make it easier to email them or to submit them electronically to your teacher.

If necessary, download the student data files from **pearsonhighered.com/viztech**. From your student data files, open *vt_ch03_howto2_answersheet* and save it in your Chapter 3 folder as **lastname_firstname_ch03_howto2_answersheet**.

1. Use File Explorer to navigate to the student data files for this chapter. Locate the folder *ch03_isaac_animals*. Copy this folder to your flash drive by dragging the folder to your flash drive in the Navigation pane. If you are not using a flash drive, copy the *ch03_isaac_animals* folder to your Documents folder.

2. In the File Explorer Navigation pane, click your flash drive or Documents folder. Right-click the *ch03_isaac_animals* folder and click *Properties*. How big is the folder? How many files and folders does it contain? Close the Properties dialog box.

Windows 10, Microsoft Corporation

3. Select *ch03_isaac_animals*, click the *Share* tab, and then click *Zip* to create a zipped archive. Press Enter to accept the default file name.

4. Right-click the compressed folder and click *Properties*. Compare the size to the original folder. Take a screenshot of the open dialog box and paste it into your answer sheet. Type up your answers, save, and submit as directed by your instructor.

Screenshot(s) reprinted with permission from Apple Inc.

MAC

If you are using a Mac: From your student data files, open *vt_ch03_howto2_answersheet_mac* and save it in your Chapter 3 folder as **lastname_firstname_ch03_howto2_answersheet_mac**.

1. Open Finder and locate the student data files for this chapter. Copy the *ch03_isaac_animals* folder by dragging it to your flash drive. If you are not using a flash drive, copy the *ch03_isaac_animals* folder to your Documents folder.
2. Click the flash drive or Documents folder in the Sidebar and select the *ch03_isaac_animals* folder in the right pane. From the File menu, select *Get Info*. How big is the folder? How many files and folders does it contain?
3. Close the Info pane. From the File menu, select *Compress "ch03_isaac_animals"* to create a zipped archive.
4. Select the ZIP file and from the File menu, select *Get Info*. Compare the size to the original folder. Take a screenshot and paste it into your answer sheet. Type up your answers, save, and submit as directed by your instructor.

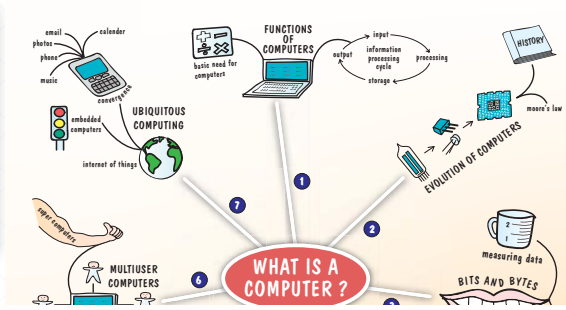
Screenshot(s) reprinted with permission from Apple Inc.

142 CHAPTER 3

How To 143

Mac coverage—Where appropriate, instructions and solutions are included so Mac users can complete the exercises

The **End-of-Chapter content** ranges from traditional review exercises to application and hands-on projects that have students working independently, collaboratively, and online



Learn It Online

- Visit **pearsonhighered.com/viztech** for student data files
- Find simulations, VizClips, Viz Check Quizzes, and additional study materials in **MyITLab**
- Be sure to check out the **Tech Bytes** weekly news feed for current topics to review and discuss

Objectives Recap

1. Explain the Functions of a Computer
2. Describe the Evolution of Computer Hardware
3. Describe How Computers Represent Data Using Binary Codes
4. List the Various Types and Characteristics of Personal Computers
5. Give Examples of Other Personal Computing Devices
6. List the Various Types and Characteristics of Multiuser Computers
7. Explain Ubiquitous Computing and Convergence

Key Terms

Moore's Law **14**
multiuser computer **32**
netbook **22**
notebook **22**
operating system (OS) **23**
personal computer (PC) **20**
punch card **5**
server **33**
SIM card (Subscriber Identity Module) **29**
smart appliance **15**
smart grid **15**
smart home **15**
smartphone **29**
stylus **22**
subnotebook **22**
supercomputer **34**
tablet **22**
transistor **11**
Turing machine **5**
Turing test **5**
ubiquitous computing (ubicomp) **38**
Unicode **17**
universal design **25**
unmanned aircraft system (UAS) **41**
vacuum tube **11**
video game system **30**
volunteer computing **36**
wearable **29**
workstation **21**

Summary

1. **Explain the Functions of a Computer**
   A computer is a device that converts raw data into information using the information processing cycle. The four steps of the IPC are input, processing, storage, and output. Computers can be programmed to perform different tasks.
2. **Describe the Evolution of Computer Hardware**
   The earliest computers used vacuum tubes, which are inefficient, large, and prone to failure. Second-generation computers used transistors, which are small electric switches. Third-generation computers used integrated circuits, which are silicon chips that contain multiple tiny transistors. Fourth-generation computers use microprocessors, which are complex integrated circuits that contain the central processing unit (CPU) of a computer.
   Moore's Law states that the number of transistors that can be placed on an integrated circuit has doubled roughly every two years. The increase in the capabilities of integrated circuits directly affects the processing speed and storage capacity of modern electronic devices.
3. **Describe How Computers Represent Data Using Binary Codes**
   A single bit (or switch) has two possible states—on or off—and can be used for situations with two possibilities such as yes/no or true/false. Digital data is represented by 8-bit binary code on most modern computers. The 8-bit ASCII system originally had binary codes for 256 characters. Unicode is an extended ASCII set that has codes for more than 100,000 characters.

Summary continues on the next page

Summary *continued*

4. **List the Various Types and Characteristics of Personal Computers**
   Personal computers include desktop computers, which offer the most speed, power, and upgradability for the lowest cost; workstations, which are high-end desktop computers; and all-in-ones, which are compact desktop computers with the computer case integrated into the monitor. Portable personal computers include notebooks and tablets.
5. **Give Examples of Other Personal Computing Devices**
   Other computing devices include smartphones, wearables, GPS, video game systems, and simulators.
6. **List the Various Types and Characteristics of Multiuser Computers**
   Multiuser computers allow multiple simultaneous users to connect to the system. They include servers, midrange servers, mainframe computers, and enterprise servers. Supercomputers perform complex mathematical calculations. They perform a limited number of tasks as quickly as possible. Distributed computing uses the processing of multiple computers to perform complex tasks.
7. **Explain Ubiquitous Computing and Convergence**
   Ubiquitous computing means the technology recedes into the background so you no longer notice it as you interact with it. The Internet of Things is the connection of the physical world to the Internet. Convergence is the integration of multiple technologies, such as cell phones, cameras, and MP3 players, on a single device.

Multiple Choice

Answer the multiple-choice questions to check your understanding of key terms and concepts from this chapter.

1. The _____ is a measure of intelligent behavior.
   a. Analytical Engine
   b. Artificial intelligence
   c. Bernoulli numbers p
   d. Turing test
2. First-generation compu
   a. integrated circuits
   b. microprocessors
   c. transistors
   d. vacuum tubes
3. A _____ is a complex central processing unit
   a. microprocessor
   b. silicon
   c. transistor
   d. vacuum tube
4. What is the binary cod language characters ar
   a. ASCII
   b. Base 2
   c. International Standa
   d. Unicode
9. _____ is a field of study in which information technology is applied to the field of biology.
   a. Bioinformatics
   b. Distributed computing
   c. Ergonomics
   d. Ubicomp
10. A(n) _____ is an example of convergence.
    a. smart grid
    b. smartphone
    c. traffic light
    d. ubicomp

True or False

Answer the following questions with *T* for true or *F* for false for more practice with key terms and concepts from this chapter.

_____ 1. Computers convert data into information using the information processing cycle.
_____ 2. Third-generation computers used vacuum tubes.
_____ 3. Today's computers use transistors and integrated circuits.
_____ 5. Unicode contains codes for most of the languages in use today.
_____ 6. Bioinformatics allows you to design a workspace for your comfort and health.
_____ 7. All-in-one is another name for a tablet computer.
_____ 8. Users connect to servers via clients.
_____ 9. Volunteer computing projects harness the idle processing power of hundreds or thousands of

Application Project

Office 2016 Application Projects

Word 2016: Intern Report

Project Description: In the following Microsoft Word project, you will create a letter telling your new boss about the things you have learned in this class. In the project you will enter and edit text, format text, insert graphics, check spelling and grammar, and create document footers. *If necessary, download the student data files from* ***pearsonhighered.com/viztech****.*

Step	Instructions
1	Start Word. From your student data files, open the file named *vt_ch01_word*. Save the document as lastname_firstname_ch01_word
2	On the last line of the document, type Anna Sanchez, Intern to complete the letter.
3	Select the first four lines of the document containing the name and street address, and then apply the No Spacing style.
4	Format the entire document as Times New Roman, 12 pt.
5	In the first body paragraph, format *Jones Consulting* as italic.
6	Place the insertion point before *Anna* on the last line of the document.

Running Project ...

... The Finish Line

Use your answers from the previous sections of the chapter project to discuss the evolution of computers in the past few centuries. Write a report responding to the questions raised throughout the chapter project. Save your file as **lastname_firstname_ch01_project**, and submit it to your instructor as directed.

Do It Yourself 1

Consider the features available on the personal computing device that you use the most. From your student data files, open the file *vt_ch01_DIY1_answersheet* and save the file as **lastname_firstname_ch01_DIY1_answersheet**.

What device did you choose? Is it a desktop, notebook, tablet, or some other type of system? Where is it located? How long have you had it? Did you research the computer before you made your purchase? What made you purchase it?

What do you use the computer for the most? What are five features you use most frequently? Why? What are three you use the least? Why? How could this device be improved to make your life more convenient? Describe one way life would be easier and one way your life would be more difficult without this device. Save your answers and submit your work as directed by your instructor.

Do It Yourself 2

Use an online mind mapper or presentation tool such as Mindomo, MindMeister, or Prezi, to create a mind map to compare desktop, notebook, and mobile devices. A mind map is a visual outline. More information about using mind maps can be found in Appendix B. From your student data files, open the file *vt_ch01_DIY2_answersheet* and save the file as **lastname_firstname_ch01_DIY2_answersheet**.

Your map should have three main branches: desktop, notebook, and mobile devices. Each branch should have at least three leaves: characteristics, advantages, and disadvantages.

When you are finished with your map, take a screenshot of this window and paste it into your answer sheet, or, if available, export your mind map as a PNG or JPG file.

Critical Thinking

Convergence has led to smaller devices that cost less and do more. From your student data files, open the file *vt_ch01_CT_answersheet* and save the file as **lastname_firstname_ch01_CT_answersheet**.

Research three of the newest smartphones or tablets on the market—one from each mobile platform: iOS, Android, and Windows. Complete the following table, comparing the features of each device. Use this research to decide which device would best meet your personal needs. Which device should you buy and why? What other accessories will you need to purchase? Do you need to purchase a service plan to take advantage of all the device's features? Save your file and submit both your table and essay as directed by your instructor.

	Device 1: iOS	Device 2: Android	Device 3: Windows
Website or store			
Brand			
Model			
Price			
Phone			
Calendar			
Camera/video			
GPS			
Games			
Video player			
MP3 player			
Internet			
Downloadable apps			
Additional features			
Additional purchases required			

Ethical Dilemma

The term *digital divide* refers to the gap in technology access and literacy. There have been many types of programs designed to close this gap. One current trend is to put a tablet in the hands of every student. From your student data files, open the file *vt_ch01_ethics_answersheet* and save the file as **lastname_firstname_ch01_ethics_answersheet**.

Use the Internet to find a school program that supplies all students with tablets or notebooks. What are the goals of the program? How was it funded? Has it been successful? How has its success or failure been measured? Do you think programs like this one can really solve the digital divide? Why or why not? Type up your answers; be sure to cite your sources. Save the file and submit your work as directed by your instructor.

On the Web

There are many important people and events that led to our modern computers. In this exercise, you will create a timeline that illustrates the ones you feel are most significant. From your student data files, open the file *vt_ch01_web_answersheet* and save the file as **lastname_firstname_ch01_web_answersheet**.

Visit **computerhope.com/history** and under *Timeline* click the link to open the time period that includes the year you were born. Create a timeline showing five to seven important milestones in the development of computers that occurred in this decade. Use a free online timeline generator, such as Dipity or Timeglider, or an online presentation tool, such as Prezi or PowerPoint, to create your timeline. Share the URL and present your findings to the class. Prepare a summary of your timeline and include the URL where it can be viewed. Save the file, and submit your work as directed by your instructor.

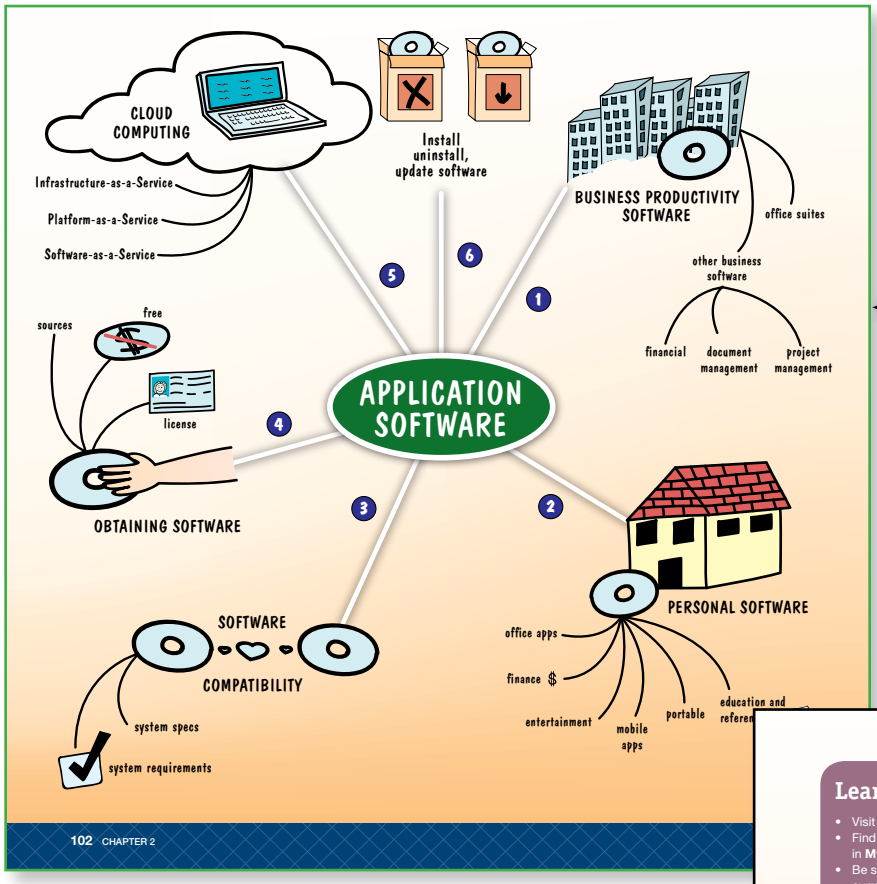
Collaboration

With a group of three to five students, research a famous computer pioneer. Write and perform a news interview of this person. If possible, video record the interview. Present your newscast to the class.

Instructors: Divide the class into groups of three to four students, and assign each group a famous computing pioneer from the list **computerhope.com/people**.

The Project: As a team, prepare a dialog depicting a news reporter interviewing this person. Use at least three references. Use Google Drive or Microsoft Office to prepare the presentation and provide documentation that all team members have contributed to the project.

Outcome: Perform the interview in a newscast format using the dialog you have written. The interview should be 3 to 5 minutes long. If possible, record the interview, and share the newscast with the rest of the class. Save this video as **teamname_ch01_video**. Turn in a final text version of your presentation named **teamname_ch01_interview**. Be sure to include the name of your presentation and a list of all team members. Submit your presentation to your instructor as directed.



Mind maps are visual outlines of the chapter content, organized by objectives. They help students organize and remember the information they learned

Learn It Online

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- Find simulations, VizClips, and additional study materials in **MyITLab**
- Be sure to check out the **Tech Bytes** weekly news feed for current topics to review and discuss

Objectives Recap

1. Identify Types and Uses of Business Productivity Software
2. Identify Types and Uses of Personal Software
3. Assess a Computer System for Software Compatibility
4. Compare Various Ways of Obtaining Software
5. Discuss the Importance of Cloud Computing
6. Install, Uninstall, and Update Software

Key Terms

app **84**
application software **53**
bug **99**
cell **57**
cloud **86**
cloud computing **86**
cloud service provider (CSP) **87**
database **59**
desktop application **84**
document management system (DMS) **61**
donationware **83**
EULA (end-user license agreement) **83**
field **59**
form **59**
freemium **83**
freeware **83**
Gantt chart **62**
hotfix **99**
Infrastructure-as-a-Service (IaaS) **87**
office application suite **55**
open source **65**
patch **99**
personal information manager (PIM) **60**
Platform-as-a-Service (PaaS) **87**
platform-neutral **85**
portable apps **71**
project management software **62**
query **59**
record **59**
report **59**
retail software **83**
service pack **99**
shareware **83**
Software-as-a-Service (SaaS) **88**
spreadsheet **57**
subscription **83**
system requirements **80**
table **59**
web apps **85**
word processor **55**

Summary

1. Identify Types and Uses of Business Productivity Software

The most common business software is an office application suite—which may include a word processor, spreadsheet, presentation program, database, and personal information manager. Other business applications include financial software, document management, and project management software.

2. Identify Types and Uses of Personal Software

Personal software includes office applications, especially word processors, spreadsheets, and presentation programs. Other personal applications include entertainment and multimedia software such as media managers, video and photo editing software, and video games. Financial and tax preparation software as well as educational and reference software are also popular. You can run portable apps from a flash drive and take them with you.

3. Assess a Computer System for Software Compatibility

Before purchasing and installing software, you should research the system requirements needed to run the program and compare them to your system specifications using File Explorer and the System Control Panel or System Settings window. On a Mac, use the About This Mac window.

4. Compare Various Ways of Obtaining Software

You can obtain software from brick-and-mortar and online stores, publisher websites, and download websites. Download mobile apps only from trusted markets. It's important to read the EULA to understand the software license restrictions.

5. Discuss the Importance of Cloud Computing

Cloud computing moves hardware and software into the cloud, or Internet. Cloud computing allows you to access applications and data from any web-connected computer. Some benefits include lower cost, easier maintenance, security, and collaboration.

6. Install, Uninstall, and Update Software

Managing the programs on your computer includes installing, uninstalling, and updating the software. You can install programs through an app store, by using media, or by downloading from a website. Updating software fixes bugs, adds features, or improves compatibility. You should uninstall software using the program's uninstaller.

About the Author

Pearson Education, Inc.

Debra is a professor of computer and information science at Bucks County Community College, teaching computer classes ranging from basic computer literacy to cybercrime, computer forensics, and networking. She has certifications from Microsoft, CompTIA, Apple, and others. Deb has taught at the college level since 1996 and also spent 11 years in the high school classroom. She holds a B.S. in Secondary Science Education from Temple University and an M.A. in Computer Science Education from Arcadia University.

Throughout her teaching career Deb has worked with educators to integrate technology across the curriculum. At BCCC she serves on many technology committees, presents technology workshops for BCCC faculty, and serves as the computer science coordinator. Deb is an avid user of technology, which has earned her the nickname “gadget lady.”

Dedication

This project would not have been possible without the help and support of many people. I cannot express how grateful I am to all of you. Thank you.

My team at Pearson—Jenifer, Cheryl, Anne, Laura, and everyone else: you have been amazing, helping to bring my vision to reality and teaching me so much along the way.

My colleagues and students at Bucks County Community College: for your suggestions and encouragement throughout this process. You inspire me every day.

And most importantly—my family. My husband and sons for your patience, help, and love—even when it meant taking a photo "right this minute," or reading a chapter when you wanted to be doing something else, or missing me while I was away. And the rest of my family and friends who agreed to let me use their photos throughout the book. I couldn't have done this without your love and support.

And finally my dad—who taught me to love technology and not be afraid to try new things. I miss you and love you, daddy.

Reviewers of All Editions

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VISUALIZING TECHNOLOGY

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What Is a Computer?

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In This Chapter

VIZ INTRO

If you've gone grocery shopping, put gas in your car, watched a weather report on TV, or used a microwave oven today, then you've interacted with a computer. Most of us use computers every day, often without even realizing it. Computers have become so commonplace that we don't even consider them computers. In this chapter, we discuss what a computer is and look at the development of computers in the past few centuries. After reading this chapter, you will recognize the different types of computing devices and their impact on everyday life.

Objectives

1. Explain the Functions of a Computer
2. Describe the Evolution of Computer Hardware
3. Describe How Computers Represent Data Using Binary Code
4. List the Various Types and Characteristics of Personal Computers
5. Give Examples of Other Personal Computing Devices
6. List the Various Types and Characteristics of Multiuser Computers
7. Explain Ubiquitous Computing and Convergence

Running Project

In this project, you'll explore computers used in everyday life. Look for instructions as you complete each article. For most articles, there is a series of questions for you to research. At the conclusion of the chapter, you'll submit your responses to the questions raised.

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What Does a Computer Do?

Objective 1

Explain the Functions of a Computer

A **computer** is a programmable machine that converts raw **data** into useful **information**. Raw data includes numbers, words, pictures, or sounds that represent facts about people, events, things, or ideas. A toaster can never be anything more than a toaster—it has one function—but a computer can be a calculator, a media center, a communications center, a classroom, and much more. The ability to change its programming distinguishes a computer from any other machine.

Necessity Is the Mother of Invention

The original computers were people, not machines, and the mathematical tables they computed tended to be full of errors. The technical and scientific advancements of the Industrial Revolution at the end of the 19th century led to a growing need for this type of hand-calculated information and to the development of the first mechanical computers. Computers automated the tedious work of computing such things as tide charts and navigation tables.

In the early 19th century, mathematician Charles Babbage designed a machine called an **Analytical Engine**. This mechanical computer could be programmed using **punch cards**—stiff pieces of paper that convey information by the presence or absence of holes. Punch cards were developed by Joseph Marie Jacquard as part of the Jacquard loom to manufacture textiles with complex patterns (Figure 1.1). The Analytical Engine would have been the first mechanical computer, but the technology didn't exist at the time to build it. In his 1864 book *Passages from the Life of a Philosopher*, Babbage wrote, "The whole of the development and operations of analysis are now capable of being executed by machinery. As soon as an Analytical Engine exists, it will necessarily guide the future course of science." In 2011, a group of researchers at London's Science Museum began a project to build Babbage's computer. The project will take at least 10 years and cost millions of dollars.

Mathematician Ada Lovelace, a contemporary of Babbage, wrote a program for the Analytical Engine to calculate a series of Bernoulli numbers—a sequence of rational numbers used in number theory. Because of her efforts, many consider her the first computer programmer. Lovelace never tested the program because there were no machines capable of running it; however, when run on a computer today, her program yields the correct mathematical results. In 1979, the Ada computer language was named in her honor.

In 1936, mathematician Alan Turing wrote a paper titled *On Computable Numbers*, in which he introduced the concept of machines that could perform mathematical computations—later called **Turing machines**. In 1950, he developed the **Turing test**, which tests a machine's ability to display intelligent behavior. It took 64 years for the first computers to pass the Turing test, but it happened in 2014. Many consider Alan Turing to be the father of computer science and **artificial intelligence**—the branch of science concerned with making computers behave like humans. Alan Turing was the subject of the 2014 movie *The Imitation Game*.

Mark Scheuern/Alamy Stock Photo

FIGURE 1.1 Punch cards create textile patterns in a Jacquard loom.

Agsandrew/Fotolia

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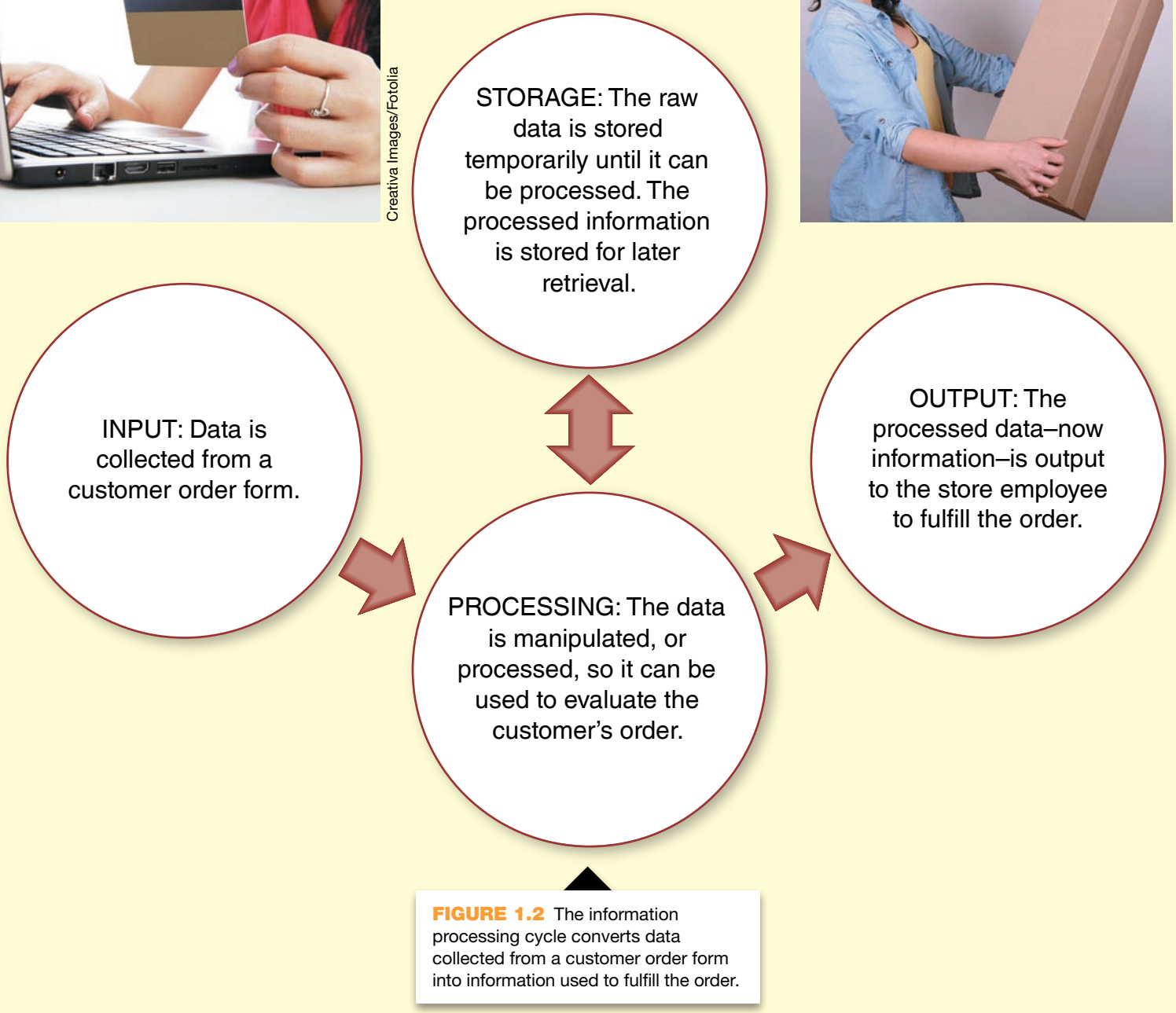


FIGURE 1.2 The information processing cycle converts data collected from a customer order form into information used to fulfill the order.

THE INFORMATION PROCESSING CYCLE

Computers convert data into information by using the **information processing cycle (IPC)**. The four steps of the IPC are input, processing, storage, and output. Raw data entered into the system during the input stage is processed, or manipulated, to create useful information. The information is stored for later retrieval and then returned to the user in the output stage. Figure 1.2 shows a general analogy of how this works. In this example, a customer is ordering an item online. The data collected from the customer is the input. The input is temporarily stored in the system until it can be processed. During processing, the data is used to evaluate the customer order. The output is sent to the employee to pick, pack, and ship the order.

It was nearly a century after Babbage designed his Analytical Engine before the first working mechanical computers were built. From that point, it took only about 40 years to go from those first-generation machines to the current fourth-generation systems.

Running Project

Many developments of the Industrial Revolution, such as the Jacquard loom, helped pave the way for modern computers. Use the Internet to find out how the following people also contributed: George Boole, Vannevar Bush, Nikola Tesla, and Gottfried Wilhelm Leibniz.

4 Things You Need to Know

- Computers are programmable machines.
- The four steps of the information processing cycle are input, processing, storage, and output.
- The IPC converts raw data into useful information.
- Artificial intelligence is the science of making computers behave like humans.

Key Terms

Analytical Engine

artificial intelligence

computer

data

information

information processing cycle (IPC)

punch card

Turing machine

Turing test

Digital Literacy Skill

Capture a Screenshot of Your Desktop

HOW TO VIDEO

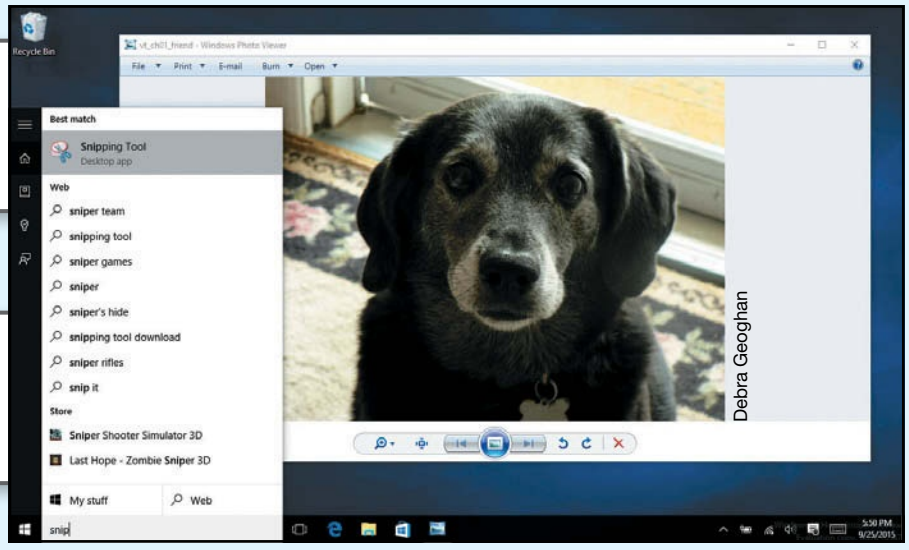
A useful skill is creating screen shots of your desktop. For example, it's helpful for providing directions on how to do something or for keeping a record of an error message that appears on your screen. Windows includes a program called the Snipping Tool that you can use to capture a screenshot. Macs include the Grab tool.

The Windows Snipping Tool can capture four types of snips: Free-form, Rectangular, Window, or Full-screen. The Mac Grab tool can capture three types of grabs: Selection, Window, or Screen.

You can save your screenshots, email them, paste them into documents, and annotate and highlight them. If necessary, download the student data files from **pearsonhighered.com/viztech**. From your student data files, open the *vt_ch01_howto1_answersheet* file and save the file as **lastname_firstname_ch01_howto1_answersheet**.

1. From your student data files, right-click the file *vt_ch01_friend*, point to *Open with*, and then click *Photos*.

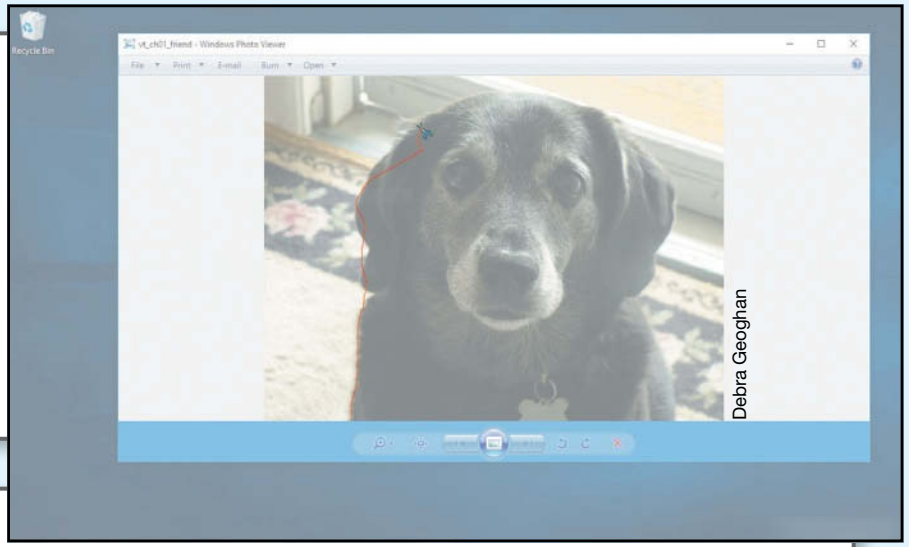
2. In the Windows search box on the taskbar, type **snip** and then, in the Search results, click *Snipping Tool*.



Windows 10, Microsoft Corporation

3

In the Snipping Tool window, click the drop-down arrow next to *New* and click *Free-form Snip*. Drag the mouse to draw a line around the dog's head with the Snipping Tool scissors. Click the *Copy* icon on the toolbar. Switch to your answer sheet and paste the snip under **Free-form Snip**. You can resize the image to fit your answer sheet.



Windows 10, Microsoft Corporation

4

Return to your image. In the Snipping Tool window, click *New*. Click the drop-down arrow next to *New* and click *Rectangular Snip.* Drag the box around the dog's head and release the mouse button. Click the *Copy* icon on the toolbar. Paste the rectangular snip into your document under **Rectangular Snip**.

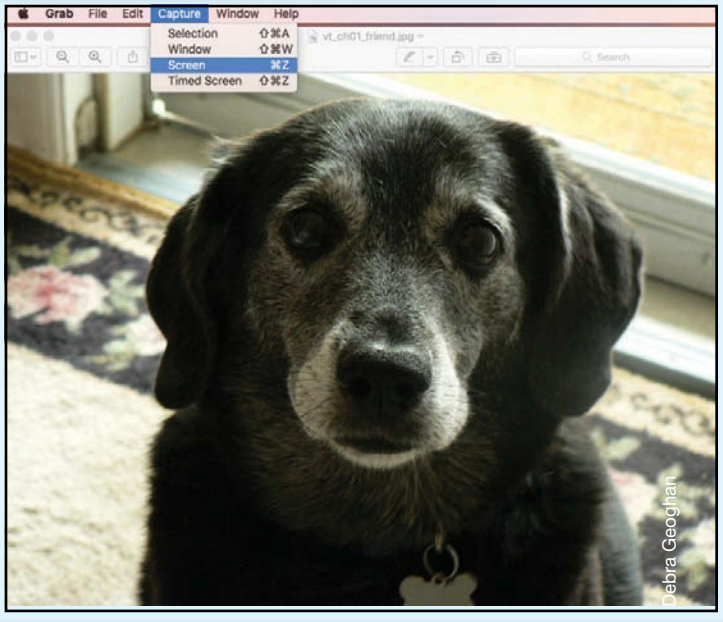
5

Use the same procedure to capture a Window Snip and a Full-screen Snip of the dog and paste both in your document. In a paragraph, describe the difference between the snips you took. Save the file and submit it as directed by your instructor.

MAC

If you are using a Mac:

1. From your student data files, double-click the file *vt_ch01_friend* to open it in Preview.
2. From Launchpad, click the *Other* folder, and then open Grab.
3. From the Grab *Capture* menu, click *Selection*. Drag the box around the dog's head and release the mouse button. Use the *Edit* menu to copy the capture and then paste it into your answer sheet. Use the same procedure to capture a Window and Screen grab and paste both in your document. In a paragraph, describe the difference between the grabs you took. Save the file and submit it as directed by your instructor.



Screen shot(s) reprinted with permission from Apple Inc.