

Understanding Computers in a Changing Society

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Chapter 1: An Introduction to Computers

Learning Objectives

1. Explain why it is essential to learn about computers today and discuss several ways computers are integrated into our business and personal lives.
2. Define a computer and describe its primary operations.
3. List some important milestones in computer evolution.
4. Identify the major parts of a personal computer, including input, processing, output, storage, and communications hardware.
5. Define software and understand how it is used to instruct the computer what to do.

Learning Objectives

6. List the six basic types of computers, giving at least one example of each type of computer and stating what that computer might be used for.
7. Explain what a network, the Internet, and the World Wide Web are, as well as how computers, people, and Web pages are identified on the Internet.
8. Describe how to access a Web page and navigate through a Web site.
9. Discuss the societal impact of computers, including some benefits and risks related to their prominence in our society.

Overview

- This chapter covers:
 - What computers are, how they work, and how they are used
 - Computer terminology
 - An overview of the history of computers
 - The basic types of computers in use today
 - An overview of networks and the Internet
 - Societal impacts of computers

Computers in Your Life

- Why learn about computers?
 - Pervasive computing
 - Also known as ubiquitous computing
 - Computers have become an integral part of our lives
 - Basic computer literacy
 - Knowing about and understanding computers and their uses is an essential skill today for everyone

Computers in Your Life

- Before 1980
 - Computers were large, expensive
 - Very few people had access to them
 - Computers were mostly used for high-volume processing tasks
- Microcomputers in the early 80s
 - Inexpensive personal computers
 - Computer use increased dramatically

Computers in Your Life

- Today
 - More than 80% of US households include a computer, and most use computers at work
 - Electronic devices are converging into single units with multiple capabilities
 - Computer is no longer an isolated productivity tool
 - Check e-mail on living room television
 - View internet content on mobile phone or other mobile device
 - Computer literacy
 - Knowing about and understanding computers and their uses is an essential skill for everyone

Computers in the Home

- Computers used for a variety of tasks:
 - Looking up information and news
 - Exchanging e-mail
 - Shopping and paying bills
 - Watching TV and videos
 - Downloading music and movies
 - Organizing digital photographs
 - Playing games
 - Making vacation plans

Computers in the Home

- Wireless networking
 - Computers can be used in nearly any location
- Smart appliances
 - Traditional appliances with built-in computer or communication technology
- Smart homes
 - Household tasks are monitored and controlled by a main computer in the house

Computers in the Home



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REFERENCE AND COMMUNICATIONS



micro104/Shutterstock.com

PRODUCTIVITY



Courtesy of Microsoft Corporation

ENTERTAINMENT

Computers in Education

- Youth today can be called the *computing generation*
- Most students today have access to computers at school
 - Some schools integrate e-books into the curriculum
- Colleges and universities are even more integrated
 - Wireless hotspots allow usage of personal laptops to connect to the college network
 - Some colleges require a computer for enrollment
- Distance learning
 - Students participate from locations other than the traditional classroom setting using computers and Internet access

Computers in Education



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COMPUTER LABS AND CLASSROOMS



Jenkeico/Shutterstock.com

CAMPUS WIRELESS HOTSPOTS



Denver Makle, 7th Army JMTC

DISTANCE LEARNING

Computers on the Job

- Computers have become a universal on-the-job tool for decision-making, productivity, and communication
 - Used by all types of employees
 - Used for access control and other security measures
 - Use by service professionals is growing
 - Used extensively by the military
 - Employees in all lines of work need to continually refresh their computer skills

Computers on the Job



OFF-SITE COMMUNICATIONS

AUTHENTICATION

Computers on the Go

- Computers are encountered in nearly every aspect of daily life
 - Consumer kiosks
 - ATM transactions
 - POS systems at retail stores
 - Self-checkout systems
 - Consumer authentication systems
 - Portable computers or mobile devices
 - GPS systems

What Is a Computer and What Does It Do?

- Computer
 - A programmable, electronic device that accepts data, performs operations on that data, and stores the data or results as needed
 - Computers follow instructions, called programs, which determine the tasks the computer will perform
- Basic operations
 - Input: Entering data into the computer
 - Processing: Performing operations on the data
 - Output: Presenting the results
 - Storage: Saving data, programs, or output for future use
 - Communications: Sending or receiving data

What Is a Computer and What Does It Do?

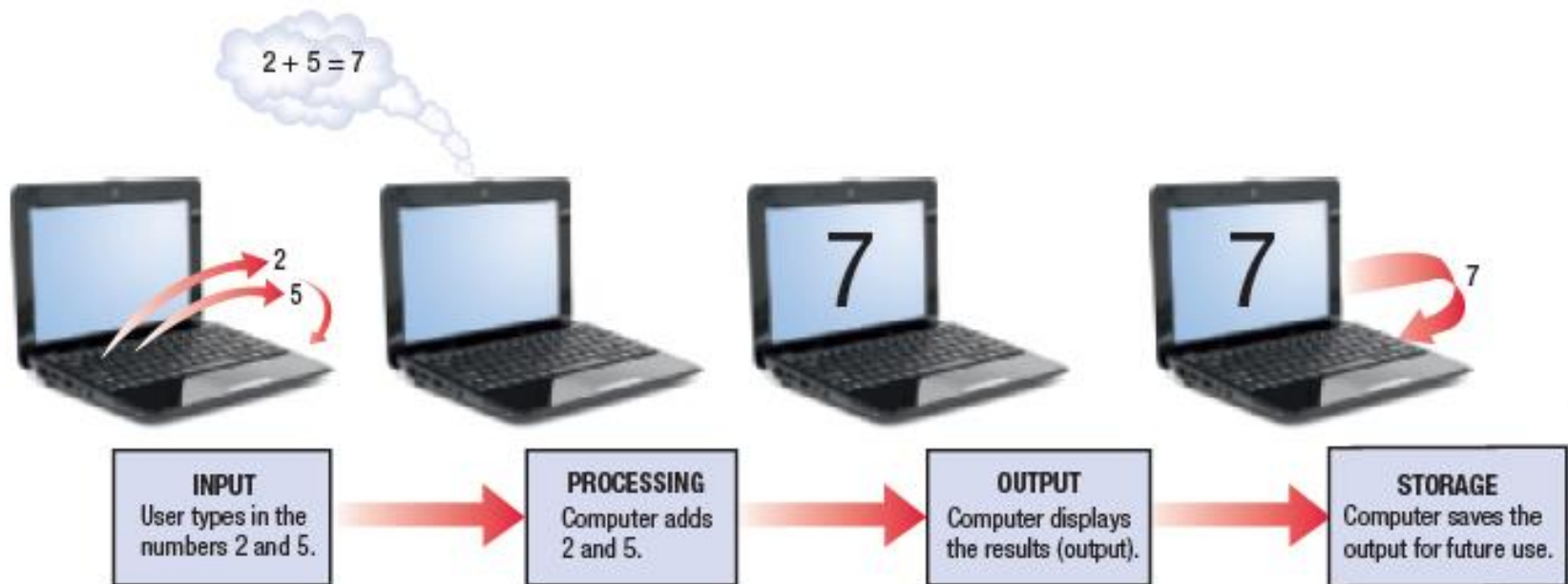


FIGURE 1-6
The information processing cycle.

Data vs. Information

- Data
 - Raw, unorganized facts
 - Can be in the form of text, graphics, audio, or video
- Information
 - Data that has been processed into a meaningful form
- Information processing
 - Converting data into information

Computers Then and Now

- The computer as we know it is a fairly recent invention
- The history of computers is often referred to in terms of generations
- Each new generation is characterized by a major technological development
- Precomputers and early computers (before 1946)
 - Abacus, slide rule, mechanical calculator
 - Punch Card Tabulating Machine and Sorter

Computers Then and Now

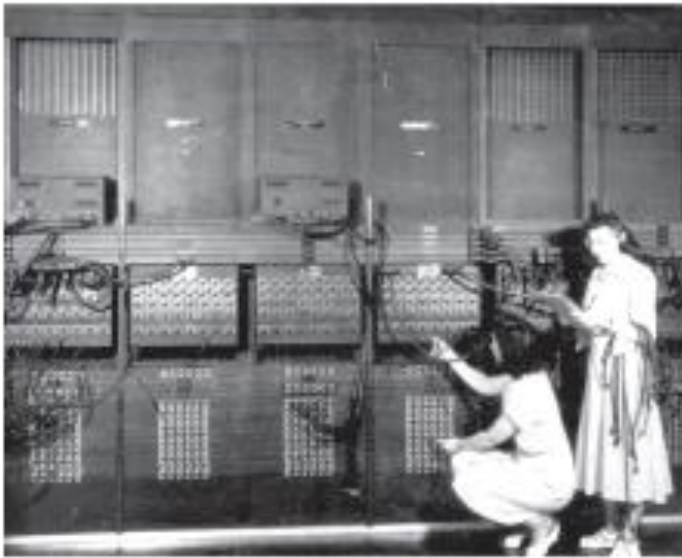


PRECOMPUTERS AND EARLY COMPUTERS
Dr. Herman Hollerith's Punch Card Tabulating Machine and Sorter is an example of an early computing device. It was used to process the 1890 U.S. Census data.

Computers Then and Now

- First-generation computers (1946-1957)
 - Enormous and powered by vacuum tubes
 - Used a great deal of electricity and generated a lot of heat
 - ENIAC and UNIVAC
- Second-generation computers (1958-1963)
 - Used transistors
 - Computers were smaller, more powerful, cheaper, more energy-efficient, and more reliable
 - Punch cards and magnetic tape were used to input and store data

Computers Then and Now



FIRST-GENERATION COMPUTERS

First-generation computers, such as ENIAC shown here, were large and bulky, used vacuum tubes, and had to be physically wired and reset to run programs.



SECOND-GENERATION COMPUTERS

Second-generation computers, such as the IBM 1401 mainframe shown here, used transistors instead of vacuum tubes so they were smaller, faster, and more reliable than first-generation computers.

Computers Then and Now

- Third-generation computers (1964-1970)
 - Used integrated circuits (ICs)
 - Keyboards and monitors introduced
- Fourth-generation computers (1971-present)
 - Use microprocessors
 - IBM PC, Apple Macintosh
 - Use keyboards, mice, monitors, and printers
 - Use magnetic disks, flash memory, and optical disks for storage
 - Computer networks, wireless technologies, Internet introduced

Computers Then and Now



THIRD-GENERATION COMPUTERS

Third-generation computers used integrated circuits which allowed the introduction of smaller computers, such as the IBM System/360 mainframe shown here.



FOURTH-GENERATION COMPUTERS

Fourth-generation computers, such as the original IBM PC shown here, are based on microprocessors. Most of today's computers fall into this category.

Computers Then and Now

- Fifth-generation (now and the future)
 - Infancy stage
 - No precise classification
 - May be based on artificial intelligence (AI)
 - Will likely use voice and touch input
 - May be based on optical computers and utilize nanotechnology

Hardware

- Hardware: The physical parts of a computer
 - Internal hardware
 - Located inside the main box (system unit) of the computer
 - External hardware
 - Located outside the system unit
 - Connect to the computer via a wired or wireless connection
 - Hardware devices are associated with all five computer operations

Hardware

- Input devices
 - Used to input data into the computer
 - Keyboards, mice, scanners, cameras, microphones, joysticks, touch pads, touch screens, fingerprint readers, etc.
- Processing devices
 - Perform calculations and control computer's operation
 - Central processing unit (CPU) and memory
- Output devices
 - Present results to the user
 - Monitors, printers, speakers, projectors, etc.

Hardware

- Storage devices
 - Used to store data on or access data from storage media
 - Hard drives, CD/DVD discs and drives, USB flash drives, etc.
- Communications devices
 - Allow users to communicate with others and to electronically access remote information
 - Modems, network adapters, etc.

Hardware



FIGURE 1-9
Typical computer hardware.

Software

- Software
 - The programs or instructions used to tell the computer hardware what to do
- System software
 - Operating system starts up the computer and controls its operation
 - Without OS, computer cannot function
 - Boots the computer and launches programs at the user's direction
 - Most use a GUI to interact with the user via windows, icons, menus, buttons, etc.
 - Windows, Mac OS, Linux, etc.

Software

WINDOWS DESKTOP
Provides the backdrop for icons, windows, and other objects.

ICONS
Represent folders, documents, or other items that can be opened.

WINDOWS
Rectangular areas containing programs, documents, or other data. The active window is the one currently being used.

DIALOG BOX
Displayed when needed to request information from the user.

MENU BAR
Opens menus that can be used to issue commands.

TOOLBAR
Contains buttons or icons that can be used to issue commands.

START BUTTON
Opens the Start menu that is used to launch programs.

PINNED PROGRAMS
Represent programs that can be opened directly from the taskbar.

TASKBAR BUTTONS
Correspond to open windows; can be used to preview thumbnails of open windows, as well as to change the active window.

SIZING BUTTONS
Resize or close a window.

HYPERLINK
Issues a command to the computer when clicked.

TASKBAR
Usually located at the bottom of the desktop.

NOTIFICATION AREA
Shows the clock and other indicators.

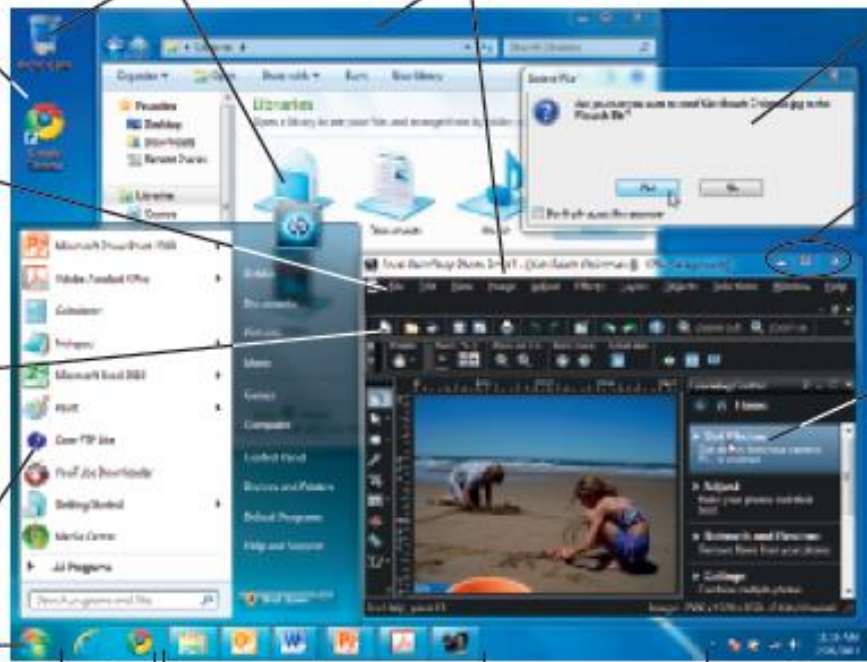


FIGURE 1-10
The Windows desktop.

Application Software

- Application software
 - Performs specific tasks or applications
 - Creating letters, budgets, etc.
 - Managing inventory and customer databases
 - Editing photographs
 - Scheduling appointments
 - Viewing Web pages
 - Sending and receiving e-mail
 - Recording/playing CDs and DVDs
 - Designing homes
 - Playing games

Application Software



WORD PROCESSING PROGRAMS

Allow users to create written documents, such as reports, letters, and memos.



MULTIMEDIA PROGRAMS

Allow users to play music or videos and transfer content to CDs and DVDs.

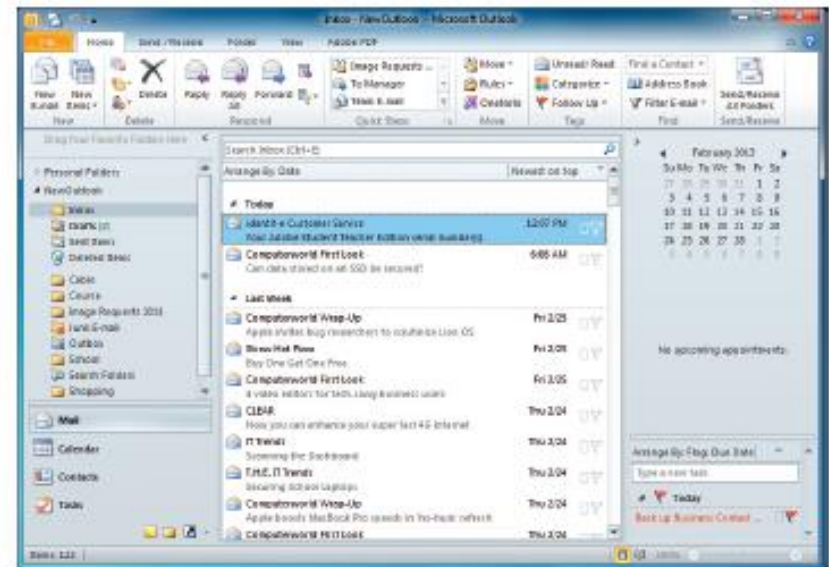
FIGURE 1-11
Examples of application software.

Application Software



WEB BROWSERS

Allow users to view Web pages and other information located on the Internet.



E-MAIL PROGRAMS

Allow users to compose, send, receive, and manage electronic messages sent over the Internet or a private network.

FIGURE 1-11
Examples of
application
software.

Computer Users and Professionals

- Computer users (end users)
 - People who use a computer to obtain information
- Computer professionals include:
 - Programmers
 - Write programs computers use
 - Systems analysts
 - Design computer systems
 - Computer operations personnel
 - Manage day-to-day computer operations
 - Security specialists
 - Secure computers and networks against hackers

Quick Quiz

1. Which of the following was not a first generation computer?
 - a. IBM PC
 - b. UNIVAC
 - c. ENIAC
2. True or False: A window displayed when the computer needs more information from the user is called a dialog box.
3. Speakers are an example of a(n) _____ device.

Answers:

1) a; 2) True; 3) output

Computers To Fit Every Need

- Six basic categories of computers:
 - Embedded computers
 - Mobile devices
 - Personal computers
 - Midrange servers
 - Mainframe computers
 - Supercomputers

Embedded Computers

- Embedded computer
 - Embedded into a product and designed to perform specific tasks or functions for that product
 - Cannot be used as general-purpose computers
 - Often embedded into:
 - Household appliances
 - Thermostats
 - Sewing machines
 - A/V equipment
 - Answering machines
 - Cars

FIGURE 1-12



A camera located under the mirror detects moving vehicles in the driver's blind spot.

A light indicates that a moving vehicle is in the driver's blind spot.

Mobile Devices

- Mobile device
 - A very small device with some type of built-in computing or Internet capability
 - Often based on a mobile phone
 - Typically have small screens and keyboards
 - Examples:
 - Smartphones
 - Handheld gaming devices
 - Portable digital media players
 - Mobile tablets

Personal Computers

- Personal computer
 - Small computer designed to be used by one person at a time
 - Also called a microcomputer
 - Available in different sizes and shapes
- Desktop computers
 - Fit on or next to a desk
 - Can use tower case, desktop case, or all-in-one
 - Can be PC-compatible or Macintosh
 - Not designed to be portable



PC-COMPATIBLE TOWER COMPUTERS



MAC ALL-IN-ONE COMPUTERS

FIGURE 1-14
Desktop computers.

Portable Computers

- Portable Computers
 - Designed to be carried around easily
 - Fully functional computers
 - Notebook (laptop) computers
 - Typically use a clamshell design
 - Tablet Computers
 - Usually use a digital pen/stylus or touch screen
 - Can be slate or convertible tablets

Portable Computers

- Netbooks
 - Smaller, lighter, and less expensive than conventional notebooks
 - Longer battery life
 - Good for students and business travelers

FIGURE 1-15
Portable computers.



NOTEBOOKS



TABLETS



NETBOOKS

Thin Client and Internet Appliances

- Thin client or network computer (NC)
 - Device designed to access a network for processing and data storage
 - Lower cost, increased security and easier maintenance
 - Limited or no local storage
 - Not able to function as a computer if network is down
- Internet appliance
 - Specialized network computer designed for Internet access and/or e-mail exchange
 - Some designed to be used in the home

Thin Client and Internet Appliances

- Can be built into another product such as a refrigerator or telephone console
- Can be a stand-alone device
- Can include Internet-enabled gaming consoles

FIGURE 1-16
Thin clients and Internet appliances.



Courtesy of NIComp uting

THIN CLIENTS



Courtesy of Sony Ele ctronics, Inc.

STAND-ALONE INTERNET DEVICES



Be one Fine me/ Shutterstock.com

INTERNET-ENABLED GAMING CONSOLES

Midrange Servers

- Midrange server
 - A medium-sized computer used to host programs and data for a small network
 - Sometimes referred to as a microcomputer
 - Users connect via a network with a computer, thin client, or dumb terminal
 - May consist of a collection of individual circuit boards called blades
 - Virtualization
 - Creating virtual rather than actual environments (often used to share a server for increased efficiency)



FIGURE 1-17
Midrange servers.

The user connects to the server using a computer, thin client, or dumb terminal.

The server is typically stored in a nearby closet or other out-of-the-way place.

Courtesy Ergotron Inc., Courtesy Dell Inc.

Mainframe Computers

- Mainframe computer
 - Powerful computer used by many large organizations to manage large amounts of centralized data
 - Standard choice for hospitals, universities, large businesses, banks, government offices
 - Located in climate-controlled data centers and connected to the rest of the company computers via a network
 - Larger, more expensive, and more powerful than midrange servers
 - Usually operate 24 hours a day
 - Also called high-end servers or enterprise-class servers

Mainframe Computers



Courtesy of IBM Corporation

FIGURE 1-18
Mainframe computers.

Supercomputers

- Supercomputer
 - Fastest, most expensive, most powerful type of computer
 - Generally run one program at a time, as fast as possible
 - Commonly built by connecting hundreds of smaller computers, supercomputing cluster
 - Used for space exploration, missile guidance, satellites, weather forecast, oil exploration, scientific research, complex Web sites, decision support systems, 3D applications, etc.

Supercomputers



Courtesy of NVIDIA

FIGURE 1-19
The Tianhe-1A
supercomputer.

Quick Quiz

1. A tablet PC is an example of a(n) _____.
 - a. Desktop computer
 - b. Portable PC
 - c. Internet appliance
2. True or False: The terms mainframe computer and supercomputer are interchangeable; both refer to the largest, most powerful computers.
3. A smartphone is an example of a(n) _____.

Answers:

1) b; 2) False; 3) mobile device

Computer Networks and the Internet

- Computer network
 - A collection of hardware and other devices that are connected together
 - Users can share hardware, software, and data
 - Users can communicate with each other
- Network servers
 - Manage resources on a network

Computer Networks and the Internet

- Computer networks exist in many sizes and types
 - Home networks
 - School and small business networks
 - Large corporate
 - Public wireless networks
 - The Internet

Computer Networks and the Internet

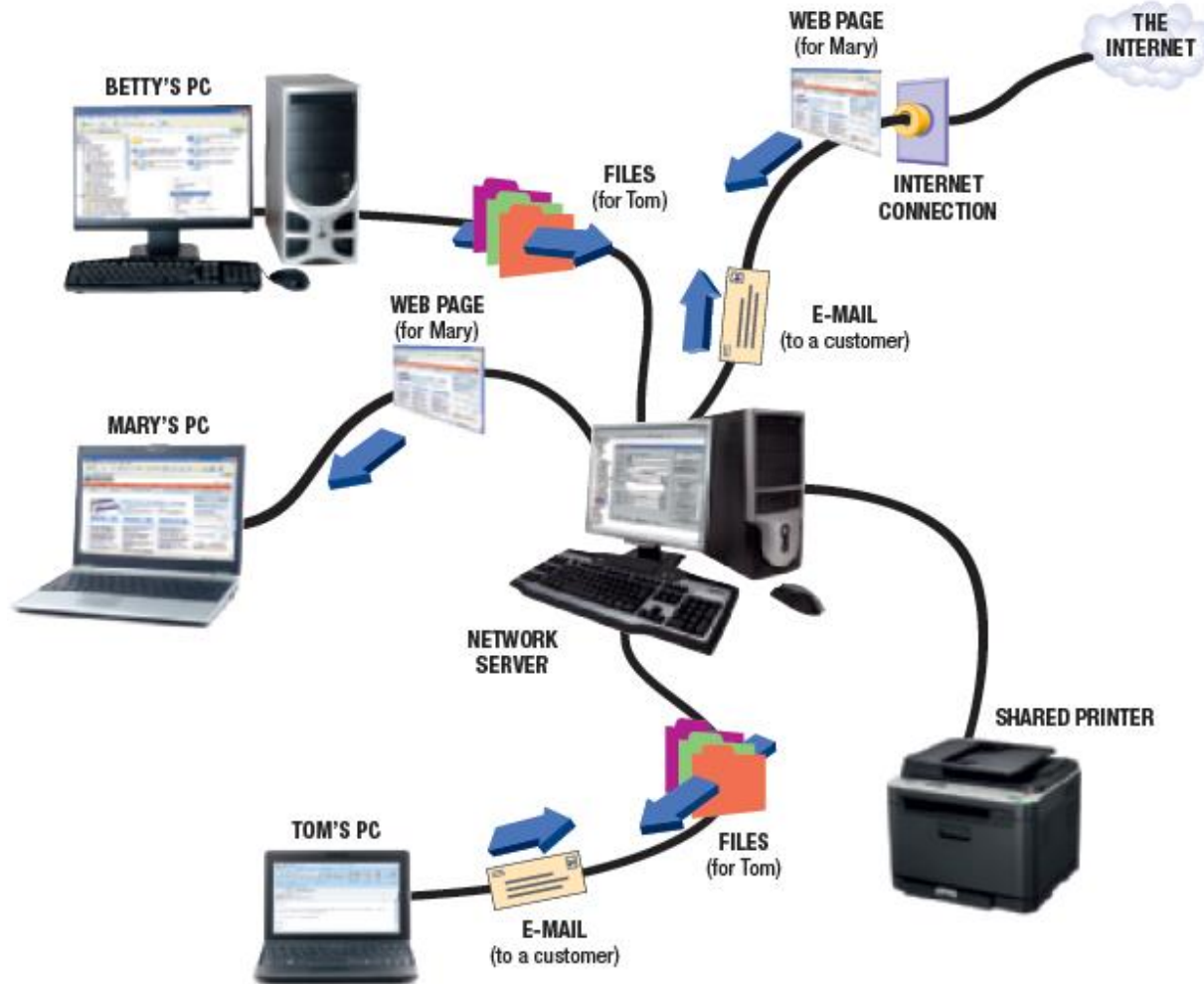


FIGURE 1-20
Example of a
computer network.

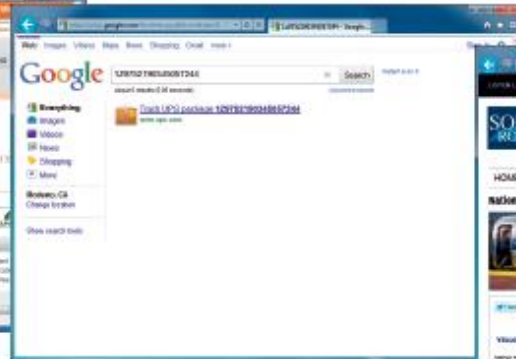
What are the Internet and the World Wide Web?

- Internet
 - The largest and most well-known computer network in the world
 - Individuals connect to the Internet using an Internet service provider (ISP)
- World Wide Web
 - One resource (a vast collection of Web pages) available through the Internet
 - Web sites contain Web pages stored on Web servers
 - Web pages viewed using a Web browser (Internet Explorer, Chrome, Safari, Firefox, Opera, etc.)
 - A wide variety of information is available through the Web

What are the Internet and the World Wide Web



ACCESSING PRODUCT INFORMATION



LOOKING UP REFERENCE INFORMATION



READING NEWS



SHOPPING



ACCESSING SOCIAL NETWORKS



WATCHING TV SHOWS AND MOVIES

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FIGURE 1-21
Some common Web activities.

Accessing a Network or the Internet

- Need a modem or network adapter to connect
- Some networks require a username and password
- Internet connections can be:
 - Direct (always-on) connections
 - Dial-up connections
- Internet addresses are used to access resources on the Internet
 - IP (Internet Protocol) address
 - Numeric address that identifies computers
(207.46.197.32)

Accessing a Network or the Internet

- IP addresses and domain names
 - Text-based address that identifies computers (microsoft.com)
- Uniform resource locators (URLs)
 - Identify Web pages (http://twitter.com/jobs/index.html)
- E-mail addresses
 - Identifies people for e-mail exchange (jsmith@cengage.com)

IP Addresses and Domain Names

- IP addresses are numeric and unique
- Domain names
 - Correspond to IP addresses
 - Top-level domains (TLDs) identifies type of organization or its location
 - Custom TLDs may soon be allowed

FIGURE 1-22
Sample top-level domains (TLDs).

ORIGINAL TLDs	INTENDED USE
<i>.com</i>	Commercial businesses
<i>.edu</i>	Educational institutions
<i>.gov</i>	Government organizations
<i>.int</i>	International treaty organizations
<i>.mil</i>	Military organizations
<i>.net</i>	Network providers and ISPs
<i>.org</i>	Noncommercial organizations

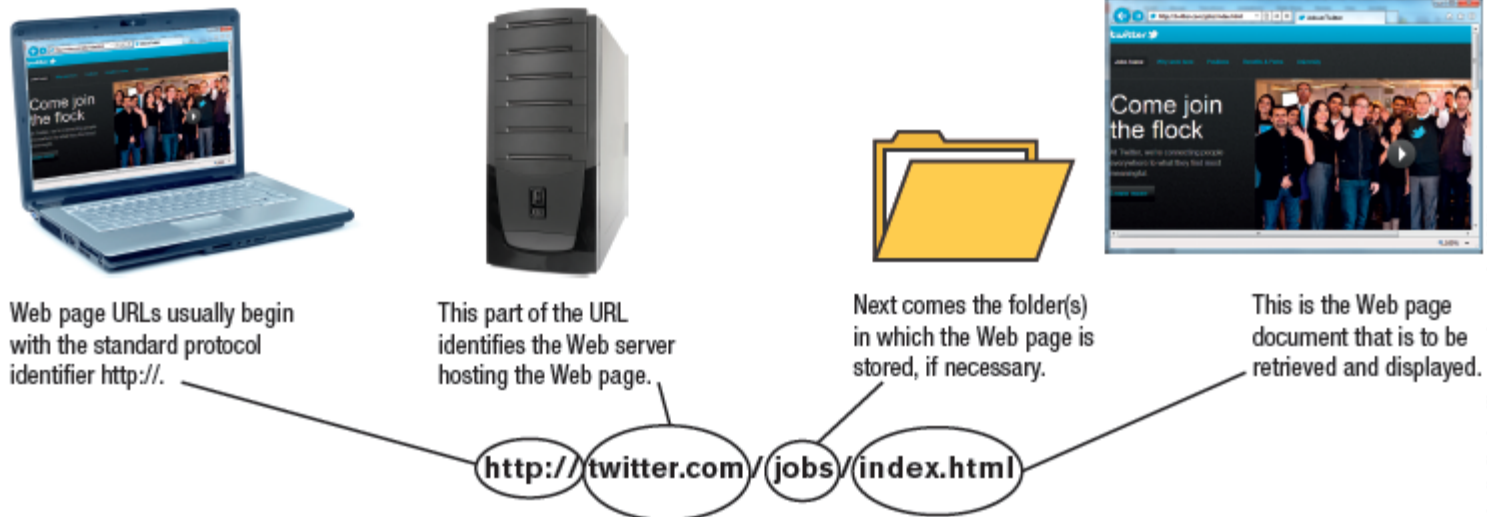
NEWER TLDs	INTENDED USE
<i>.aero</i>	Aviation industry
<i>.biz</i>	Businesses
<i>.fr</i>	French businesses
<i>.info</i>	Resource sites
<i>.jobs</i>	Employment sites
<i>.mobi</i>	Sites optimized for mobile devices
<i>.name</i>	Individuals
<i>.pro</i>	Licensed professionals
<i>.uk</i>	United Kingdom businesses

Uniform Resource Locators (URLs)

- Uniform Resource Locators (URLs)
 - Uniquely identifies a Web page
 - Protocol or standard being used
 - Identification of the Web server
 - Names of folders in which the Web page file is stored
 - Web page's filename

Uniform Resource Locators (URLs)

- Protocols:
 - Hypertext Transfer Protocol (http://) is typically used to display Web pages (https:// is used for secure Web pages)
 - File Transfer Protocol (ftp://) is often used for file exchange



E-mail Addresses

- E-mail addresses consist of:
 - Username
 - A person's identifying name for a particular domain
 - The @ symbol
 - Domain name for the computer that will be handling the person's e-mail (mail server)
- Pronouncing Internet addresses

TYPE OF ADDRESS	SAMPLE ADDRESS	PRONUNCIATION
Domain name	berkeley.edu	berkeley dot e d u
URL	microsoft.com/windows/ie/default.asp	microsoft dot com slash windows slash i e slash default dot a s p
E-mail address	president@whitehouse.gov	president at white house dot gov

Surfing the Web

- Web browser
 - Used to display Web pages
- Browser starting page or home page
 - The first page displayed when the browser is opened
- To navigate to a Web page, you can:
 - Type a URL in the Address bar
 - Click a hyperlink –graphics or text linked to other Web pages
 - Select a Favorite/Bookmark or page from the History list

Surfing the Web

FIGURE 1-25
Surfing the Web with Internet Explorer. URLs, hyperlinks, and favorites can be used to display Web pages.

TOOLBARS
Include the Back and Forward buttons, and the Favorites bar.

ADDRESS BAR
Type a URL in the Address bar and press Enter to display the corresponding Web page.

HYPERLINKS
Point to a hyperlink to see the corresponding URL on the status bar; click the hyperlink to display that page.

STATUS BAR
Includes zoom options and security indicators.

TABS
Click the rightmost tab to open a new tab.

FAVORITES BAR AND LIST
Click a page name to display that Web page.

FAVORITES BUTTON
Click to display the Favorites list.

TOOLBARS
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FAVORITES BAR AND LIST
Click a page name to display that Web page.

FAVORITES BUTTON
Click to display the Favorites list.

Courtesy Stanford University

Searching the Web

- Search site:
- Web page that helps you find Web pages containing the information you are seeking
 - Typically search using keywords
- Reference Sites
 - Look up addresses, telephone numbers, ZIP codes, maps, etc.

FIGURE 1-26

The Google search site displayed in the Chrome browser.

OTHER SEARCHES

Use these options to search for images, news, video, products for sale, and more.



KEYWORD SEARCHES

Since the Web option is selected, type keywords here and press Enter to see a list of Web pages matching your search criteria.

ADVANCED SEARCHES

Click to display a fill-in form to perform a more specific search.

E-Mail

- Electronic mail (e-mail)
 - Electronic messages exchanged between computers on a network
 - One of the most widely used Internet applications
 - Can be conventional e-mail program, Web-based, or mobile-based

Conventional

Microsoft Outlook

Microsoft Mail

Web-based

Gmail

Windows Live Mail

E-Mail

- Can contain photos, attached files, etc.
- Mobile e-mail may require a fee
- Other types of mobile communications
 - Short Message Service (SMS)
 - Multimedia Message Service (MMS)

E-Mail

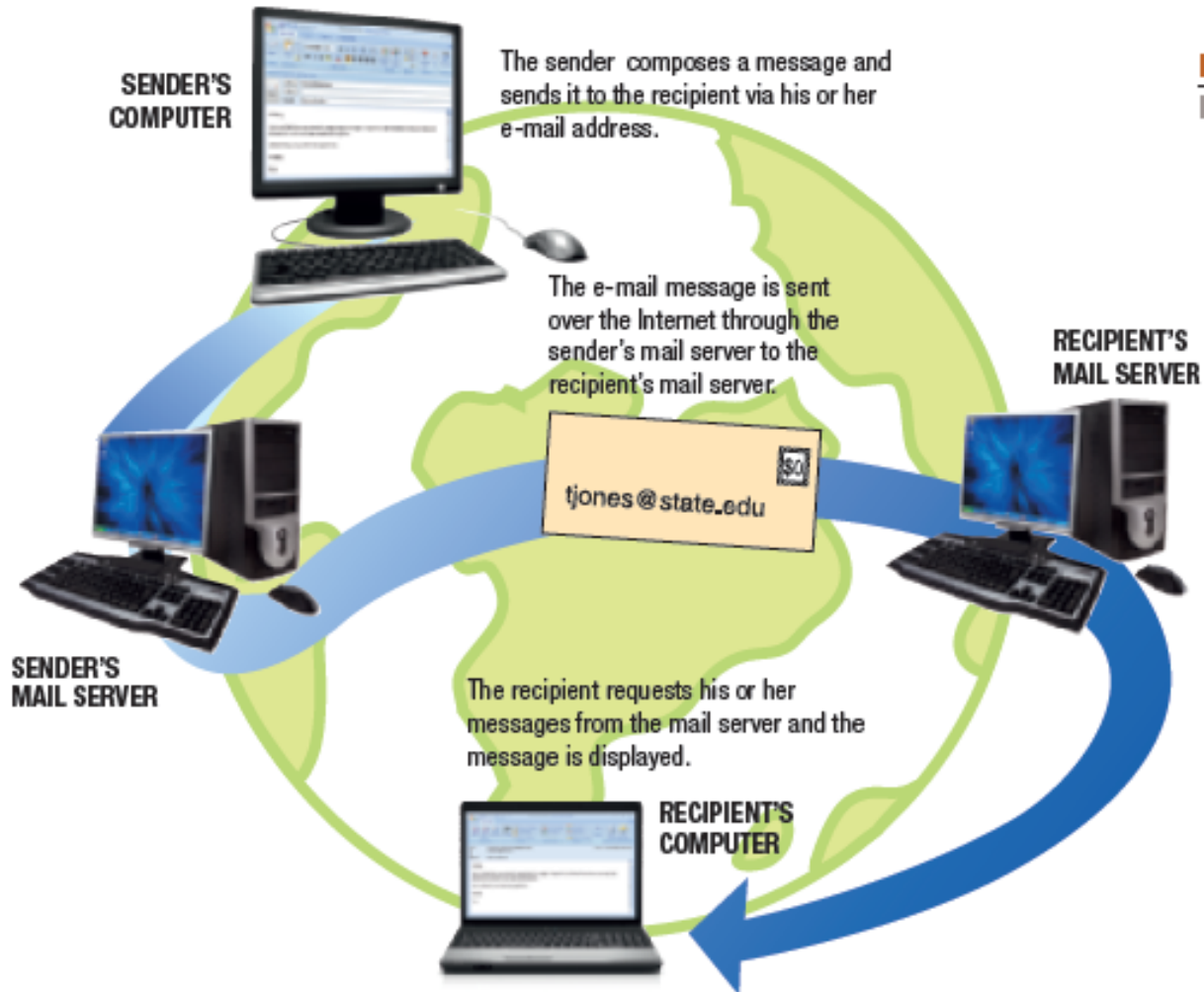


FIGURE 1-27
How e-mail works.

Computers and Society

- The vast improvements in technology over the past decade have had a distinct impact on daily life, both at home and at work
- Many benefits of a computer-oriented society
 - Ability to design products before construction leads to safer products
 - Earlier medical diagnoses and more effective treatment
 - Devices that allow physically and/or visually challenged individuals to perform job tasks
 - Documents e-mailed or faxed in moments
 - Download information, music, programs, movies, and more on demand

Computers and Society

- Computer-oriented society also has risks
 - Stress and health concerns
 - Spam
 - Computer viruses and malware
 - Identity theft and phishing
 - Privacy issues
 - How data is collected
 - How secure is the collected data

Computers and Society

- Differences in online communications
 - Less formal than traditional
 - Netiquette
 - Be polite and considerate of others
 - Refrain from offensive remarks
 - Abbreviations (acronyms) and emoticons
 - Acronyms such as BTW (by the way)
 - Illustrations of faces-- 😊

Computers and Society

RULE	EXPLANATION
Use descriptive subject lines	Use short, descriptive subject lines for e-mail messages and online posts. For example, "Question regarding MP3 downloads" is much better than a vague title, such as "Question."
Don't shout	SHOUTING REFERS TO TYPING YOUR ENTIRE E-MAIL MESSAGE OR ONLINE POST USING CAPITAL LETTERS. Use capital letters only when it is grammatically correct to do so or for emphasizing a few words.
Watch what you say	Things that you say or write online can be interpreted as being sexist, racist, ethnocentric, xenophobic, or in just general bad taste. Also check spelling and grammar—typos look unprofessional and nobody likes wading through poorly written materials.
Avoid e-mail overload	Don't send spam, which is unsolicited bulk e-mail and the Internet equivalent of junk mail. The same goes for forwarding e-mail chain letters or every joke you run across to everyone in your address book.
Be cautious	Don't give out personal information—such as your real name, telephone number, or credit card information—to people you meet online.
Think before you send	Once you send an e-mail or text message or post something online, you lose control of it. Don't send messages that include content (such as compromising photos) that you would not want shared with others.

FIGURE 1-30
Netiquette. Use these netiquette guidelines and common sense when communicating online.

Computers and Society

- The Anonymity Factor
 - Gives many individuals a sense of freedom
 - Can also be abused
- Information Integrity
 - Use common sense when evaluating online content
 - Check your source--not all information on the Internet is accurate

Quick Quiz

1. Index.html is an example of a(n) _____.
 - a. URL
 - b. IP address
 - c. Web page filename
2. True or False: All information published to Web pages is accurate.
3. In the e-mail address jsmith@abc.com, abc.com is the _____.

Answers:

1) c; 2) False; 3) domain name

Summary

- Computers in Your Life
- What is a Computer and What Does It Do?
- Computers to Fit Every Need
- Computer Networks and the Internet
- Computers and Society