Chapter 2

Communications, Networks, the Internet, and the World Wide Web
Chapter Objectives

- Define communications
- Identify the basic components of a communications system
- Describe how and why network computers are used in schools and school districts
- Explain how the Internet works
Chapter Objectives

- Describe the World Wide Web portion of the Internet
- Explain how Web documents are linked to one another
- Explain the use of Web browser software
- Explain how to use a Web search tool to find information
Chapter Objectives

- Identify several types of multimedia products available on the Web
- Explain how Internet services such as e-mail, newsgroups, chat rooms, and instant messaging work
- Describe the educational implications of the Internet and the World Wide Web
- Describe different ways to connect to the Internet and the World Wide Web
- Describe the pros and cons of Web 2.0 tools for teachers and students
What Is Communications?

- A process in which two or more computers or devices transfer data, instructions, and information
- Sometimes called telecommunications
What Is Communications?

- Electronic mail (e-mail)
- Voice mail
- Facsimile (fax)
- Telecommuting
- Online services
- Videoconferencing
- Internet
- World Wide Web
Communications Networks

- Basic communications system
  - Two computers, one to send and one to receive data
  - Communications devices that send and receive data
  - A communications channel over which data is sent
Communications Networks

- Communications channel
  - Transmissions media
    - Twisted-pair cable
Communications Networks

- Digital vs. analog signals
  - Dial-up Modem
    - External modem
    - Internal modem
  - Network interface cards
Communications Networks

- **Local Area Networks (LAN)**
  - Covers limited geographical area
  - Server manages resources

- **Wide Area Networks (WAN)**
  - Covers large geographical area
  - Can consist of several LANs
Communications Networks

- **Home Networks**
  - Connects multiple computers in your home or home office
  - Share Internet access
  - Share peripherals
  - Can be wired or wireless
Networking the Classroom, School, and District

- School network server
- Example classroom
  - Three Macintosh computers
  - Printer
- Example school network
  - Classrooms
  - Administration
  - Computer lab
Networking the Classroom, School, and District

Chapter 2: Communications, Networks, the Internet, and the World Wide Web
Networking the Classroom, School, and District

- Example school district
  - Central office
  - Various schools
Networking the Classroom, School, and District

- Wireless schools and classrooms
  - Keep in touch with family and friends from anywhere
    - Smart phones
    - Handheld or netbook computers
    - Notebook computers
  - Wireless technology brings the computer lab to students
Networking the Classroom, School, and District

- High-Speed or Broadband Access
  - Government works to provide high speed Internet access to classrooms
  - Broadband technology transmits signals at much faster speeds
The Benefits of Computer Networks in Education

- Sharing of computer hardware, software, and data resources
- Unlimited educational resources
- Communicate with other educators and students
What Is the Internet?

- Worldwide group of connected networks that allow public access to information and services
- No single organization owns or controls
- Estimated over one billion users
- Variety of users
What Is the Internet?
History of the Internet

- Started as a network of four computers at the University of California at Los Angeles in 1969
- Advanced Research Projects Agency (ARPA) – ARPANET
- More than 350 million host computers today
- Backbone first provided by National Science Foundation (NSF) – NSFnet
History of the Internet

- Backbone now provided by variety of corporations
- Various organizations help define standards
- Internet2 (I2)
  - Extremely high-speed network
  - Develop and test latest Internet technologies
  - Members include more than 200 universities in the United States, along with 115 companies
How the Internet Works

- Data is divided into packets
- Routers send packets across the Internet
- At the destination, the packets are reassembled into the original message
- Transmission control protocol/Internet protocol (TCP/IP) is the communications protocol used by the Internet
How the Internet Works

Chapter 2: Communications, Networks, the Internet, and the World Wide Web

Step 1: Data is divided into small pieces, called packets.

Step 2: Packets travel over the Internet via routers.

Step 3: At the destination, the packets are reassembled into the original message.
How the Internet Works

- Internet Access Providers
  - Have permanent connections to the Internet
  - Provide temporary connections to individuals and companies for a fee
  - Regional and national ISPs
  - Online service providers offer members only areas
How the Internet Works

- Connecting to the Internet
  - Business or school network connected to the Internet
  - Dial-up access
  - Cable TV (CATV)
  - Digital subscriber line (DSL)
  - Public Internet access point
How the Internet Works

- The Internet Backbone
  - Acts as a highway
  - National ISPs use dedicated lines to connect directly to the Internet
  - Regional ISPs connect through leased lines to national ISPs
How the Internet Works

Chapter 2: Communications, Networks, the Internet, and the World Wide Web

Step 1: You initiate an action to request data from the Internet. For example, you request to display a Web page on your computer screen.

Step 2: A cable modem transfers the computer's digital signals to the cable television line in your house.

Step 3: Your request (digital signals) travels through cable television lines to a central cable system, which is shared by up to 500 homes in a neighborhood.

Step 4: The central cable system sends your request over high-speed fiber-optic lines to the cable operator, who often also is the ISP.

Step 5: The ISP routes your request through the Internet backbone to the destination server (in this example, the server that contains the requested Web site).

Step 6: The server retrieves the requested Web page and sends it back through the Internet backbone to your computer.
How the Internet Works

- Internet Addresses
  - Numeric addresses
  - Domain name
    - Domain type abbreviations
    - Country code abbreviations
# How the Internet Works

This table lists domain labels commonly used today:

<table>
<thead>
<tr>
<th>Domain Label</th>
<th>Type of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>com</td>
<td>Commercial organizations, businesses, and companies</td>
</tr>
<tr>
<td>edu</td>
<td>Educational institutions</td>
</tr>
<tr>
<td>gov</td>
<td>Government institutions</td>
</tr>
<tr>
<td>mil</td>
<td>Military organizations</td>
</tr>
<tr>
<td>net</td>
<td>Network providers</td>
</tr>
<tr>
<td>org</td>
<td>Nonprofit organizations</td>
</tr>
<tr>
<td>k12</td>
<td>K-12 schools</td>
</tr>
</tbody>
</table>

This table lists some country code abbreviations:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Country</th>
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<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>au</td>
<td>Australia</td>
<td>jp</td>
<td>Japan</td>
</tr>
<tr>
<td>ax</td>
<td>Antarctica</td>
<td>nl</td>
<td>Netherlands</td>
</tr>
<tr>
<td>ca</td>
<td>Canada</td>
<td>se</td>
<td>Sweden</td>
</tr>
<tr>
<td>de</td>
<td>Germany</td>
<td>th</td>
<td>Thailand</td>
</tr>
<tr>
<td>dk</td>
<td>Denmark</td>
<td>uk</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>fr</td>
<td>France</td>
<td>us</td>
<td>United States</td>
</tr>
</tbody>
</table>
The World Wide Web

- Started in the early 1990s
- Hyperlinks
- Uniform Resource Locator (URL)
- Hypertext transfer protocol
The World Wide Web

- How a Web Page Works
  - Hypertext
  - Hyperlinks
    - Target
    - Relative
    - Absolute
The World Wide Web

- Web Browser Software
  - Interprets HTML and displays Web pages and enables you to link to other Web pages and Web sites
The World Wide Web

- Web Browser Software
  - Interprets HTML and displays Web pages and enables you to link to other Web pages and Web sites
  - Also interprets:
    - XHTML
    - XML
    - CSS
## The World Wide Web

<table>
<thead>
<tr>
<th>Category</th>
<th>Web Site Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portal</td>
<td>A portal is a Web site that offers a variety of Internet services from a single, convenient location. Most portals offer free services including search engine and/or subject directory, news, sports and weather, and many other services. Many portals have online communities, which are Web sites that join specific groups of people with similar interests or relationships.</td>
</tr>
<tr>
<td>News</td>
<td>A news Web site contains newsworthy material including stories and articles relating to current events, life, money, sports, and the weather.</td>
</tr>
<tr>
<td>Informational</td>
<td>An informational Web site contains factual information. Many United States government agencies have informational Web sites providing information such as census data, tax codes, and the congressional budget.</td>
</tr>
<tr>
<td>Business</td>
<td>A business Web site contains content that promotes or sells products or services and most businesses have a business/marketing Web site. Many of these companies also allow you to purchase their products or services online.</td>
</tr>
<tr>
<td>Education</td>
<td>An educational Web site offers exciting and challenging avenues for formal and informal teaching and learning. Many of the Web sites included as links at this textbook’s companion Web site are educational Web sites.</td>
</tr>
<tr>
<td>Entertainment</td>
<td>An entertainment Web site offers an interactive and engaging environment. Popular entertainment Web sites offer music, videos, sports, games, ongoing Web episodes, sweepstakes, chats, and more. Sophisticated entertainment Web sites often partner with other technologies. For example, you can cast your vote about a topic on a television show.</td>
</tr>
<tr>
<td>Advocacy</td>
<td>An advocacy Web site contains content that describes a cause, opinion, or idea. These Web sites usually present views of a particular group or association.</td>
</tr>
<tr>
<td>Blog</td>
<td>A blog, short for Weblog, is an informal Web site consisting of time-stamped articles, or posts, in a diary or journal format, usually listed in reverse chronological order. A blog that contains video clips is called a video blog, or vlog.</td>
</tr>
<tr>
<td>Wiki</td>
<td>A wiki is a collaborative Web site that allows users to create, add to, modify, or delete the Web site content via their Web browser. Most wikis are open to modification by the general public.</td>
</tr>
<tr>
<td>Online Social Network</td>
<td>An online social network, also called a social networking Web site, is a Web site that encourages members in its online community to share their interests, ideas, stories, photos, music, and videos with other registered users. Most include chat rooms, newsgroups, and other communications services. Popular social networking Web sites include Facebook, Friendster, MySpace, Twitter, and Google’s YouTube.</td>
</tr>
<tr>
<td>Content Aggregator</td>
<td>A content aggregator is a business that gathers and organizes Web content and then distributes, or feeds, the content to subscribers for free or a fee. Examples of distributed content include news, music, video, and pictures.</td>
</tr>
<tr>
<td>Personal</td>
<td>A personal Web site that might be a single Web page or a collection of Web pages maintained by a private individual or a family not usually associated with any organization.</td>
</tr>
</tbody>
</table>
The World Wide Web

- Searching for Information on the Web
  - Directory maintained by a search engine company
  - Helps find information on the Web
  - Search engine
  - Subject directory
The World Wide Web

- Multimedia on the Web
  - Web pages incorporate graphics, animation, audio, video, and virtual reality
- Plug-ins

<table>
<thead>
<tr>
<th>Plug-In Application</th>
<th>Description</th>
<th>Web Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrobat Reader</td>
<td>View, navigate, and print Portable Document Format (PDF) files — documents formatted to look just as they look in print</td>
<td>adobe.com</td>
</tr>
<tr>
<td>Flash Player</td>
<td>View dazzling graphics and animation, hear outstanding sound and music, display Web pages across an entire screen</td>
<td>adobe.com</td>
</tr>
<tr>
<td>Java</td>
<td>Enable Web browser to run programs written in Java, which add interactivity to Web pages</td>
<td>java.com</td>
</tr>
<tr>
<td>QuickTime</td>
<td>View animation, music, audio, video, and VR panoramas and objects directly on a Web page</td>
<td>apple.com</td>
</tr>
<tr>
<td>RealPlayer</td>
<td>Listen to live and on-demand near-CD-quality audio and newscast-quality video, stream audio and video content for faster viewing; play MP3 files, create music CDs</td>
<td>real.com</td>
</tr>
<tr>
<td>Shockwave Player</td>
<td>Experience dynamic interactive multimedia, 3-D graphics, and streaming audio</td>
<td>adobe.com</td>
</tr>
<tr>
<td>Silverlight</td>
<td>Experience high-definition video, high-resolution interactive multimedia, and streaming audio and video</td>
<td>microsoft.com</td>
</tr>
<tr>
<td>Windows Media Player</td>
<td>Listen to live and on-demand audio, play or edit WMA and MP3 files, burn CDs, and watch DVD movies</td>
<td>microsoft.com</td>
</tr>
</tbody>
</table>
The World Wide Web

- Multimedia on the Web
  - Graphics
    - Used to enhance text-based Internet
    - Graphics formats

### Graphics Formats

<table>
<thead>
<tr>
<th>Abbreviation/ File Extension</th>
<th>Name</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMP/.bmp</td>
<td>Bitmap</td>
<td>Desktop background, scanned images</td>
</tr>
<tr>
<td>GIF/.gif</td>
<td>Graphics Interchange Format</td>
<td>Simple diagrams, shapes, images with a few colors</td>
</tr>
<tr>
<td>JPEG/.jpg</td>
<td>Joint Photographic Experts Group</td>
<td>Digital camera photos</td>
</tr>
<tr>
<td>PNG/.png</td>
<td>Portable Network Graphics</td>
<td>Web graphics</td>
</tr>
<tr>
<td>TIFF/.tif</td>
<td>Tagged Image File Format</td>
<td>Photos used by printing industry</td>
</tr>
</tbody>
</table>
The World Wide Web

- Multimedia on the Web
  - Graphics
    - Used to enhance text-based Internet
    - Graphics formats
    - Thumbnails
The World Wide Web

- Multimedia on the Web
  - Animation
    - Marquees
    - Animated GIFs
Multimedia on the Web

Audio
- MP3, WAV, WMA, RealAudio, and QuickTime
- Players
- Streaming audio
- Podcasting
- RSS
The World Wide Web

- Multimedia on the Web
  - Video
    - Streaming video
The World Wide Web

- Multimedia on the Web
  - Virtual Reality
    - Simulation of real or imagined environment that appears as a three-dimensional (3-D) space
  - VR worlds
Other Internet Services

- E-mail
  - Primary communication method for both personal and business use
  - E-mail programs
    - Mailbox
    - Mail server
  - E-mail address
    - User name
Other Internet Services

- FTP (file transfer protocol)
  - FTP sites and servers
  - Allows file downloads and uploads
  - Anonymous FTP
  - FTP programs
Other Internet Services

- Newsgroups and Message Boards
  - Online area in which users conduct written discussions about a particular subject
  - Usenet
  - News server
  - Article
  - Posting
  - Threaded discussion
  - Message board
Chapter 2: Communications, Networks, the Internet, and the World Wide Web
Other Internet Services

- Mailing Lists
  - Group of e-mail names and addresses given a single name
  - Subscribing and unsubscribing
  - LISTSERVs
Other Internet Services

- Instant Messaging
  - See when one or more people are online
  - Exchange messages and files
  - Join a private chat room
- Text messaging
- Short Message Service (SMS)
Other Internet Services

- Chat Rooms
  - Real-time conversation
  - Chat rooms
  - Chat clients
Other Internet Services

- Voice Over IP (VoIP)
  - Also called Internet telephony
  - Uses the Internet to connect calling parties
  - Low cost
  - magicJack
Netiquette

- Internet etiquette
  - The code of acceptable behaviors users should follow while on the Internet

Netiquette

Golden Rule: Treat others as you would like them to treat you.

1. In e-mail, newsgroups, and chat rooms:
   - Keep messages brief, using proper grammar and spelling.
   - Be careful when using sarcasm and humor, as it might be misinterpreted.
   - Be polite. Avoid offensive language.
   - Avoid sending or posting flames, which are abusive or insulting messages. Do not participate in flame wars, which are exchanges of flame.
   - Avoid sending spam, which is the Internet's version of junk mail. Spam is an unsolicited e-mail message or newsgroup posting sent to many recipients or newsgroups at once.
   - Do not use all capital letters, which is the equivalent of SHOUTING!
   - Use emoticons to express emotion. Popular emotions include:
     - :) Smile
     - :\ Undecided
     - :( Frown
     - :o Surprised
     - :| Indifference
     - :D Laughing
   - Use abbreviations and acronyms for phrases such as:
     - BTW by the way
     - FYI for your information
     - FWIW for what it's worth
     - IMHO in my humble opinion
     - TTFN ta ta for now
     - TTYL thank you very much
   - Clearly identify a spoiler, which is a message that reveals a solution to a game or ending to a movie or program.

2. Read the FAQ (frequently asked questions) document if one exists. Many newsgroups and Web pages have an FAQ.

3. Use your username for your personal use only.

4. Do not assume material is accurate or up to date. Be forgiving of others’ mistakes.

5. Never read someone’s private e-mail.

Chapter 2: Communications, Networks, the Internet, and the World Wide Web
Internet Security

- Firewall
- Filtering software
- Acceptable Use Policy (AUP)
The Impact of the Internet and the World Wide Web on Education

- The Web is the Gutenberg printing press of modern times
- Collaboration with other teachers and students
  - ePALS
- New instructional strategies
The Future of the Internet and the World Wide Web

- The Web will continue to evolve as the primary communications channel for people around the world.
- By 2012, more than two billion wireless communication devices will be in use worldwide, and many of these products will have the ability to access the Web wirelessly.
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