Evolution of the Internet

• The **Internet** is the largest and most well-known computer network, linking millions of computers all over the world
  – The Internet has actually operated in one form or another for several decades

• **ARPANET** is the predecessor of the Internet
  – Created in 1969 and named after the Advanced Research Projects Agency (ARPA), which sponsored its development
  – Initially connected four supercomputers; eventually evolved into today’s Internet
Evolution of the Internet (cont’d)

• The World Wide Web (Web) is the collection of Web pages available through the Internet
  – Proposed by Tim Berners-Lee in 1989
  – Originally only text-based content; release of the Mosaic browser in 1993 led to graphical content
  – The Web is the most widely use part of the Internet

• Internet2 is a consortium of researchers, educators, and technology leaders from industry, government, and the international community
  – Dedicated to the development of revolutionary Internet technologies; much of the focus is on speed
The Internet Yesterday and Today

**EARLY 1990s**
Even at the beginning of the 1990s, using the Internet for most people meant learning how to work with a cryptic sequence of commands. Virtually all information was text-based.

**TODAY**
Today’s Web organizes much of the Internet’s content into easy-to-read pages that can contain text, graphics, animation, video, and interactive content that users access via hyperlinks.

**FIGURE 8-1**
Using the Internet: Back in the “old days” versus now.
The Internet Community Today: Users, ISPs, and Internet Content Providers

- **Users** – People who use the Internet
- **Internet service providers (ISPs)** provide access to the Internet, typically for a fee
- **Internet content providers** refer to persons or organizations that provide Internet content
  - Businesses, non-profit organizations, educational institutions, individuals
The Government & Hardware and Software Companies

• Government and other organizations impact the Internet
  – Some countries limit information and access
  – FCC influences communications in the United States
  – Internet Society (ISOC)
    • Addresses issues impacting the future of the internet
  – Internet Corporation for Assigned Names and Numbers (ICANN)
    • Domain and IP address management
  – World Wide Web Consortium (W3C)
    • Protocols and standards, ensures interoperability

• Hardware and software companies provide the hardware and software used in conjunction with the Internet and Web
  – Application Service Providers & Infrastructure Companies
Application service providers (ASPs) refer to companies that manage and distribute Web-based software services over the Internet.

- Cloud software, Software as a Service (SaaS), cloudware
- Often fee-based business software
- A **Web service** is a self-contained business application that operates over the Internet:
  - XML protocols and standards to support
  - Application to application communication

Infrastructure companies are enterprises that own or operating the physical structure of the Internet:

- Conventional and mobile phone companies, cable companies, and satellite Internet providers
Example of a Web Service

Clicking this button logs a Zappos.com customer in via an Amazon Web service and the customer's Amazon account.

**FIGURE 8-3**
Web services. This Web service enables Web developers to use Amazon's authentication system for users.
Myths About the Internet

• Myth 1: The Internet is free
  – Most people and businesses pay for Internet access
  – Businesses, schools, and libraries lease communications lines from phone companies
  – Mobile phone users pay hotspot or mobile phone providers for access
  – Fee-based content is growing at a rapid pace
    • Music/movie downloads
    • Donation-based sites

FIGURE 8-4
Fee-based Web content. The use of fee-based Web content, such as streaming movies via Netflix as shown here, is growing.
• Myth 2: Someone controls the Internet
  – No single group or organization controls the Internet
  – Governments can regulate Internet use within its country, but this is difficult to enforce
• Myth 3: The Internet and World Wide Web are identical
  – Internet is the physical network
  – WWW is the collection of Web pages available over the Internet
  – Other resources are available via the Internet, for example, FTP
### Home Internet Connection Options

<table>
<thead>
<tr>
<th>TYPE OF INTERNET CONNECTION</th>
<th>AVAILABILITY</th>
<th>APPROXIMATE MAXIMUM SPEED*</th>
<th>APPROXIMATE MONTHLY PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional dial-up</td>
<td>Anywhere there is telephone service</td>
<td>56 Kbps</td>
<td>Free—$30</td>
</tr>
<tr>
<td>Cable</td>
<td>Virtually anywhere cable TV service is available</td>
<td>6–200 Mbps</td>
<td>$30–110</td>
</tr>
<tr>
<td>DSL</td>
<td>Within 3 miles of a switching station that supports DSL</td>
<td>3–15 Mbps</td>
<td>$30–40</td>
</tr>
<tr>
<td>Satellite</td>
<td>Anywhere there is a clear view of the southern sky and where a satellite dish can be mounted and receive a signal; most often in rural or mountainous areas</td>
<td>5–15 Mbps</td>
<td>$40–80</td>
</tr>
<tr>
<td>Fixed wireless</td>
<td>Selected areas where service is available; most often in rural areas</td>
<td>2–12 Mbps</td>
<td>$60–250</td>
</tr>
<tr>
<td>Broadband over fiber (BoF)</td>
<td>Anywhere fiber has been installed to the building; most often in urban areas</td>
<td>5 Mbps–1 Gbps</td>
<td>$30–70</td>
</tr>
<tr>
<td>Mobile wireless (4G)</td>
<td>Virtually anywhere cellular phone service is available</td>
<td>3–100 Mbps</td>
<td>Varies greatly depending on data plan</td>
</tr>
</tbody>
</table>

* Download speed; most connections have slower upload speeds.

**FIGURE 8-7**
Typical home Internet connection options.
Cable and DSL

• **Cable Internet access** is most widely used home broadband connection
  – Delivers via a cable provider’s network
  – Fast, typically around 25 Mbps
  – Requires a cable modem

• **DSL (Digital Subscriber Line) Internet access** delivers data via standard telephone lines
  – Must be less than 3 miles from a switching station
  – Transmits over telephone lines but does not tie up the line
  – Typically around 10 Mbps
Satellite and Fixed Wireless

• **Satellite Internet access** is often the only broadband option for rural areas
  – Slower than cable and more expensive than cable or DSL
  – Requires satellite modem and transceiver dish
  – Performance might degrade or stop altogether during bad weather

• **Fixed wireless Internet access** uses radio transmission towers rather than satellites
  – Requires a modem and, sometimes, an outside-mounted transceiver
  – Uses Wi-Fi or WiMAX technology
  – Typically between 2 and 10 Mbps
Broadband over Fiber (BoF) and Mobile Wireless

• **Broadband over Fiber (BoF) Internet access** delivers data over fiber-optic cabling all the way to the building
  – Also called fiber-to-the-premises (FTTP)
  – Verzion Fios and Google Fiber
  – Very fast—up to 1 Gbps
  – Requires special networking equipment

• **Mobile wireless Internet access** delivers data via a cellular network
  – Often used with smartphones and tablets while on the go
  – Typically requires a data plan
  – Speed depends on the cellular standard and specific network
Searching the Internet

• **Search sites** are Web sites designed to help users find Web pages that contain the information they are seeking
  – Typically use a **search engine** in conjunction with a database containing information about Web pages to locate appropriate Web pages
  – Search site databases are updated on a regular basis
  – Automated programs (often called spiders or web crawlers) use the hyperlinks to crawl (jump continually) from page to page to update the search database
  – To search, type the URL of a search site or search using the Address bar of your browser to use your default site
Methods for Searching the Internet

• **Keyword search**
  – *Keywords* are typed in a search box to locate Web pages (hits) matching those keywords
  – Clicking on a Web page name displays that page
  – Most common type of Internet search

• **Directory search**
  – Categories are selected to locate Web pages in those categories

• **Search site tools vary by search site**
  – Can search for music files, image files, news articles, maps, people, videos, etc.
  – Can do calculations, track packages, define words, etc.
Searching the Internet

- Using Boolean Operators
  - Use AND, OR, and NOT to further refine a search
  - Check the search site being used to see what operators can be used on the site
- Using Multiple Search Sites
  - Different search sites can return different results
- Using Appropriate Keywords, Synonyms, Variant Word Forms, and Wildcards
  - Synonyms are different words that mean the same thing
  - Variant word forms are variations of your keywords, alternate spellings, etc.
  - Wildcards, such as *, can be used to search for keyword patterns
Evaluating Search Results

• Does the title and listed description sound appropriate for the information you are seeking?
• Is the URL from an appropriate company or organization?
• You should also evaluate:
  – The author
  – The source
    • Determine if reliable or biased
  – The currency of information
    • Many online articles are years old
• Verify online information with a second source
Citing Internet Resources

• To avoid plagiarism, proper citation procedures should be used for all Internet content used in a paper, book, or on a Web site

• Citations for online sources are similar to written sources:
  – Author
  – Date of publication
  – Article or Web page title
  – Date the article was retrieved from the Internet
  – URL used

• Note Internet Archive Wayback Machine
Examples of Web Citations

<table>
<thead>
<tr>
<th>TYPE OF RESOURCE</th>
<th>CITATION EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>Rodriguez, M. “Re: Solar Powered Cars.” Message to the author. 2 May 2016. E-mail.</td>
</tr>
</tbody>
</table>

* MLA does not require the use of a URL but it is acceptable to include the URL in your citation.

**FIGURE 8-16**

Citing Web sources.
These examples follow the Modern Language Association (MLA) format.
Beyond Browsing, Searching, and E-Mail

• Many other activities take place via the Web in addition to browsing, searching, and e-mail

• Today’s online communications programs can typically be used for a variety of activities
  – Messaging
  – Message Boards
  – VOIP
  – E-mail
  – Web Conferencing, Skype, Facetime, etc.
  – Online communication convergence is referred to as unified communications (UC)
How It Works

Social Commerce

• Use of social networks to perform financial transactions

• Free money transfers between individuals using messaging services
  – Snapchat (via Snapcash) and Facebook (via Facebook Messenger)
Forums and VoIP

• A forum (discussion group or message board) is a Web page that enables individuals to post messages on a particular topic for others to read and respond to
  – Typically organized by topics (threads)

• Voice over Internet Protocol (VoIP) refers to making telephone calls over the Internet
  – Computer to computer
  – More permanent VoIP setups replace landline phones
  – Relatively inexpensive
  – Does not work when Internet connection or power is out
Social networking site: A site that enables a community of individuals to communicate and share information
   – Facebook, Google +, etc.

Social media: The collection of social networking sites and other communications channels used to share information with a broad audience
   – Media-sharing sites (YouTube and Flickr)
   – Microblogging sites (Twitter)
   – Social curation sites (Digg, Reddit, and Pinterest)

For security and safety reasons, be careful not to reveal too much about yourself
Social Media Integration

• Integrated into other online activities
  – Can start a video call within Facebook
  – Can share a YouTube video via e-mail
  – Can often Like content on Web sites
  – Can use social media credentials to log on to Web sites

FIGURE 8-22
Social networks are integrated into many Web sites.
E-Commerce

- **E-commerce** is performing financial transactions over the Internet
  - More convenient and easier comparison shopping for individuals
  - Reduced costs and increased customer satisfaction for businesses
  - Be cautious to prevent fraud and identity theft
    - Enter sensitive data only on secure Web sites
    - Use a credit card or online payment service
  - **Online shopping**: Buying products or services over the Internet
  - **Online auctions**: Bids are placed for items and the highest bidder purchases the item
  - **Online banking**: Performing banking activities via the Web
  - **Online investing**: Buying and selling stocks or other types of investments via the Web
Inside the Industry

E-Commerce Payment Options

• Payment options vary
• Typically displayed on the checkout page
• Most common payment options are credit and debit cards
• Other options include online payment services (PayPal, Bill Me Later, etc.), Bitcoins, digital gift cards, etc.

Options for online payments include credit/debit cards, PayPal, Bitcoins, and gift cards/promo codes.
Online Entertainment

• **Online music**
  – Music played or obtained via the Web

• **Online TV, videos, and movies**
  – Live or recorded TV shows available via the Web
  – Videos watched or downloaded via the Web
  – Feature films available via the Web
  – **Video-on-demand (VOD)**
    • Selecting movies or TV television shows to be delivered on demand to your device
    – Rented movies can usually be viewed only for a limited time
Online Gaming

• **Online gaming**
  
  – Playing games via the Web
    
    • Web-based games
    
    • Online multiplayer games
  
  – Can be played via PC, smartphone, gaming consoles, portable gaming devices, etc.
  
  – Often associated with Internet addiction
    
    • The inability to stop using the Internet or to prevent extensive use of the Internet from interfering with other aspect’s of one’s life
Online News and Reference

• Online news
  – Available through Web sites belonging to news organizations, television networks, newspapers, magazines, etc.
  – Usually updated on a continual basis
  – Growing trend is to abandon print subscriptions and provide Web-only service--mainly due to cost
  – News archives are often available (may require a fee)

• Reference sites
  – Provide access to specific types of useful information
  – Maps, weather, ZIP Code lookup, etc.
RSS Feeds and Podcasts

- **RSS (Really Simple Syndication) feed**
  - News tool that delivers selected Web content to subscribers as the content is published to a Web site

- **Podcast**
  - Recorded audio or video file that can be played or downloaded via the Web
  - Prepared by individuals and businesses
  - Used to share knowledge, express opinions, share original poems, songs, or short stories
  - Typically uploaded to the Web on a regular basis
Product, Corporate, Government, and Other Information

• Vast amount of product information available online
  – Product specifications
  – Instruction manuals

• Government information is also available online
  – Tax forms
  – Government publications
  – Legislative bills

• Wide variety of information from non-profit organizations, conservation groups, political parties, etc., is also available
Internet of Things (IoT)

- Facilitated by move from IPV4 (32bit) to IPV6 (128bit)
- Everyday objects interconnected via the Internet
- Sensors in shoes and other objects, smart fitness devices, home automation systems, smart freeways and traffic lights, for example
- Devices will communicate with each other and provide feedback to users as needed
Online Education and Writing

• Online education
  – Using the Internet to facilitate learning
  – Web-based learning management systems
    • Used to deliver course content, manage assignments and grades, and more
    • Blackboard, etc.
  – Student response systems
    • Students use a special device or their smartphone to respond to surveys or review questions during lectures
Web-Based Training and Distance Learning

- **Web-based training (WBT)** includes any instruction delivered via the Web
  - Used for both education delivery and employee training
  - Usually experienced individually and at each student’s pace
  - Content can be updated as needed
  - Technological problems can be a disadvantage

- **Distance learning** occurs when students take classes from a different location from the one where the delivery of instruction takes place
  - Can be just one class or for an entire degree
Blogs, Wikis, and Other Types of Online Writing

• **Blog**: A Web page that contains short, frequently updated entries in chronological order, typically by just one individual
  – Typically created via a blogging site
  – Often published on school, business, and personal Web sites

• **Wiki**: A collaborative Web page designed to be edited and republished by a variety of individuals (e.g., Wikipedia)
  – Carefully evaluate content, as irresponsible individuals can enter erroneous information

• **E-portfolio (electronic portfolio or digital portfolio)**: A collection of an individual’s work accessible via the Web
  – Can include papers, projects, résumés, etc.
Censorship and Privacy Issues

• Internet Filtering
  • Using software or browser options to block access to particular Web pages or types of Web pages
  • Used by individuals, schools, employers, public computers, etc.
  • Can use browser settings or special filtering software
  • Algorithmic personalization

• Some countries attempt to regulate Internet content
  – To hinder spread of information from political opposition
  – To filter out material determined to be offensive
  – To protect national security

• In the United States:
  – Difficult to define “patently offensive” and “indecent”
    • Communications Decency Act
  – Difficult to find a fair balance between protection and censorship
    • Children’s Internet Protection Act (CIPA)
• **Internet filtering** can be used to block access to particular Web pages or types of Web pages
  – Via software or browser settings
  – Used by individuals, schools, employers, public computers, etc.
  – Can be used to restrict the hours the Internet can be used
Web Browsing Privacy: Cookies

- **Web Browsing Privacy**
  - Encompasses what information about individuals is available, how it is used, and by whom

- **Cookies** are small files stored on a hard drive by a Web server
  - Can be session-based or persistent cookies
    - Necessary due to stateless HTTP protocol
  - Can be used to identify return visitors and their preferences (first-party cookies)
  - Can be tracking cookies used to track Web activity (third-party cookies)
  - Can include personally identifiable information (PII) or non-personally identifiable information (Non-PII)
  - Cookie data can be viewed or deleted
  - Cookie settings can be changed and/or managed with software
Example of Blocking Third-Party Cookies

FIGURE 8-35
Blocking third-party cookies in Chrome.
Spyware and Adware

• **Spyware**: Software installed without users knowledge that transmits data secretly through the user’s Internet connection
  – Sometimes used by advertisers to gather marketing information
  – Can be used by criminals to gather personal data stored on your computer

• **Adware**: Software supported by onscreen advertising
  – Often included in free programs
  – Does not gather information
  – Is not installed without user’s consent but may be installed without the user’s direct knowledge
E-Mail Privacy

• Only encrypted e-mail can be transmitted privately
  – Unencrypted e-mail can be read by others if intercepted
  – Employers and ISPs have access to e-mails sent through those organizations
  – Businesses and ISPs typically archive e-mail messages

FIGURE 8-36
You cannot assume e-mail messages are private, unless they are encrypted.
Summary

• Evolution of the Internet
• Getting Set Up to Use the Internet
• Searching the Internet
• Beyond Browsing, Searching, and E-Mail
• Censorship and Privacy Issues