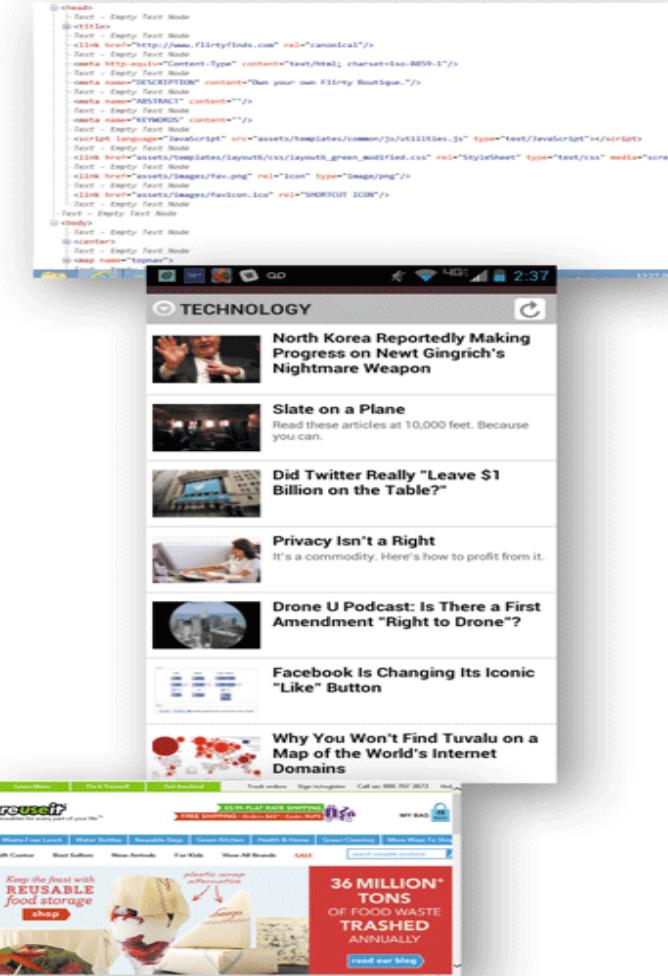


# 1 | Into the Internet (Lecture 01)



## Discovering the Internet, 5<sup>th</sup> Edition



# Objectives

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- Define the Internet
- Describe how individuals, businesses, educational institutions, and organizations use the Internet
- Discuss the developments of the Internet and the World Wide Web

# Defining the Internet

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- The **Internet** is a worldwide network of computers that allows individual and businesses around the world to share information and other resources and to conduct business transactions
- The Internet is an interconnected network of networks where each **host** (a computer directly connected to the Internet) has a number of other computers connected to it
- Users who connect to the Internet to access information and services are **online**

# Defining the Internet

---



# Defining the Internet

---

- All computers and mobile devices use a common method of communicating known as a **protocol**, or standard
- The Internet uses **Transmission Control Protocol/Internet Protocol (TCP/IP)**

# Using the Internet

The **World Wide Web**, or **Web**, consists of a worldwide collection of electronic documents (**Web pages**)

- The Internet and web significantly have influenced the way the world communicates, educates, entertains, and conducts business.
- People use the Internet to:
- Search for information and conduct business
  - Communicate and share information or media
  - Check weather, news, and sport statistics
  - Participate in online training
  - Shop and play games
  - Download books, music, or videos

# Using the Internet



# Using the Internet

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## ➤ Who Uses the Internet?

- Students
- Teachers
- Businesspeople
- Professionals
- Homemakers
- Children
- Retirees

# Using the Internet

Internet diary: time-stamped articles, or posts, in a diary or journal format, usually listed in reverse chronological order

- People also use the Internet to publish **blogs**
  - Video sharing or **video blogging**
  - **Microblogging**

Sending brief text messages to subscribers, such as by using Twitter or other services to share status updates, links to articles, photos, and more

# Using the Internet

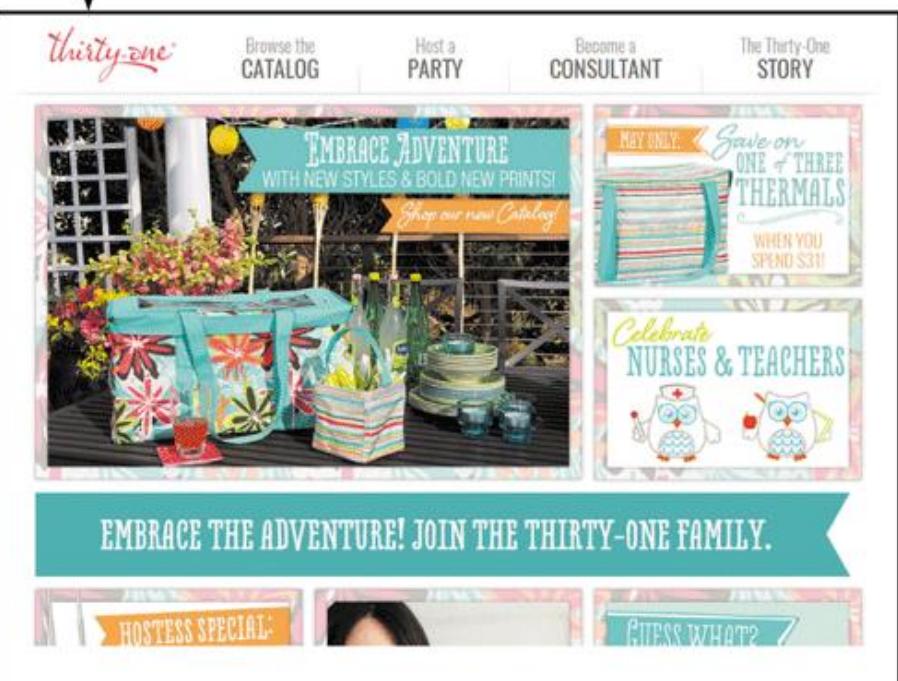
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## ➤ Internet Activities

- Browsing and searching for information
- Communicating with others through email, text or video chat, social networking, instant messaging, mailing lists, blogs and microblogs, and other media
- Downloading and uploading files
- Accessing remote computers or servers
- Conducting business activities
- Online shopping and bill payment

# Using the Internet

retail website



nonprofit website



# Using the Internet

The **World Wide Web**, or **Web**, consists of a worldwide collection of electronic documents (**Web pages**)



## ➤ Internet Activities – The **World Wide Web**

- Commonly called the **web**, it is a subset of the Internet
- **Webpages** – can include **text, pictures, sound, animation, or video**
- **Website** – collection of related webpages
  - College, university, corporate, retail, non-profit, personal

**webpage**, **Webpage**, **Web page** and **web page** **are used interchangeably**

# Using the Internet

HTML - A set of codes that are included in the text describing how the text should be displayed or printed. The format used to store most files on the Web

## ➤ Internet Activities (continued)

- **Markup language** – coding system that uses **tags** to control appearance of webpage
  - Hypertext Markup Language (**HTML**)
  - Cascading style sheets (**CSS**)
- **Web authoring software**
- **Web server** – computer on which webpages are stored

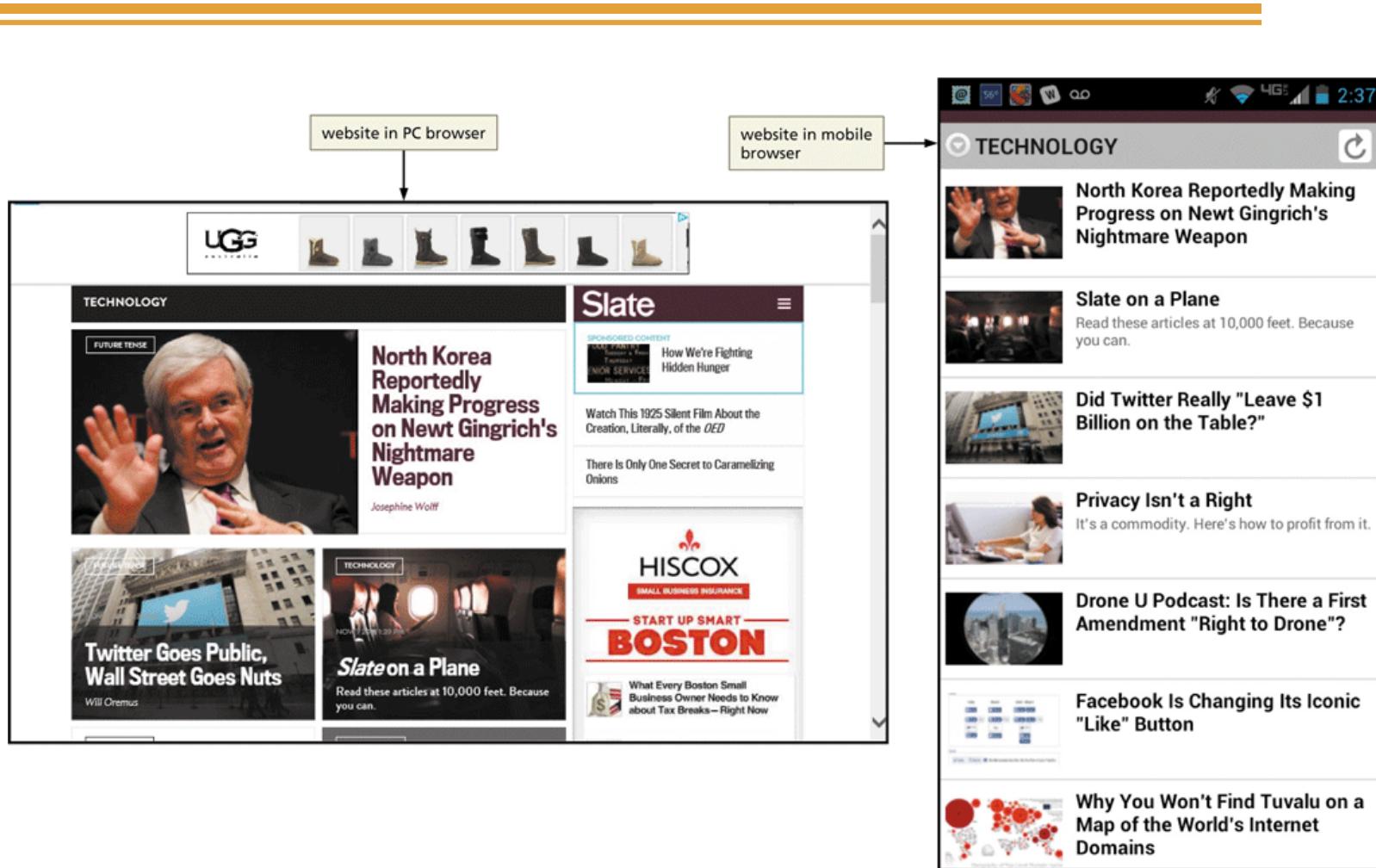
CSS includes styles that define **how to display** HTML elements. The styles are normally stored in **Style Sheets**, as **CSS files**.

# Using the Internet

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- Internet Activities (continued)
  - **Web browser** or **browser** – software used to access and view webpages
  - **Hyperlink**, or **link**, used to connect to other webpages
  - **Browsing** or **surfing the web** refers to moving from one webpage to another

# Using the Internet

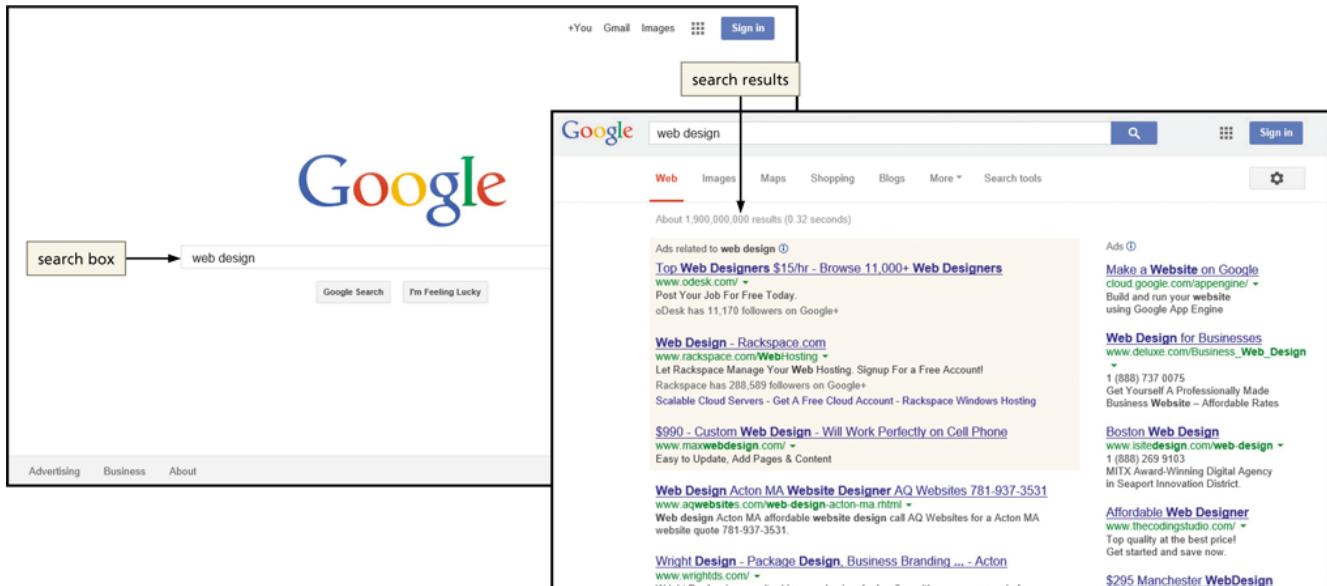


# Using the Internet

## ➤ Internet Activities (continued)

### – Search tools

- Web-based resource to help find specific information on the web



# Using the Internet

## ➤ Internet Activities (continued)

### Internet Communication Methods

Online Communication	Description	Must users be online at the same time?
Email	Users send and receive text with or without attached files	No
Instant messaging (IM) and mobile instant messaging (MIM)	Two or more users take turns exchanging brief messages	Yes
Internet Relay Chat (IRC) or chatting	Users type text into a chat window; all users can see what other users type	Yes
Massive multiplayer online games (MMOGs)	Many users play online games simultaneously, and can compete and interact with people all over the world	Yes
Newsgroups and mailing lists	Users subscribe to a newsgroup discussion or mailing list on a certain topic and receive messages about that topic	No
Social bookmarking	Users share web links to articles, videos, photographs, and webpages, and can use tags to organize their bookmarks	No
Social networking	Users share status updates, microblogs, photos and video, links, and personal commentary using a variety of online tools	No

# Using the Internet

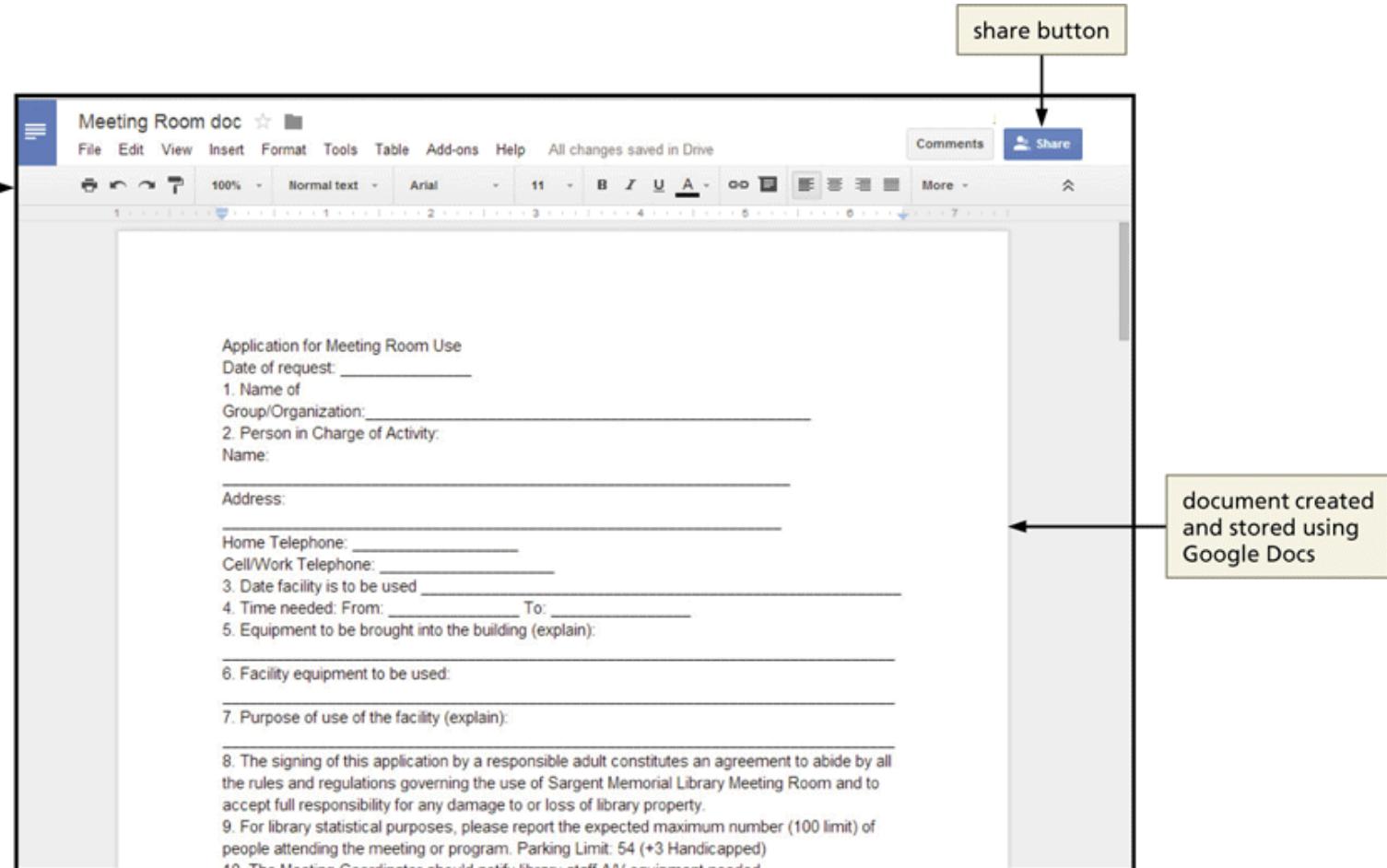
## ➤ Internet Activities (continued)

- **Downloading and uploading files** – using **FTP (File Transfer Protocol)** to send or retrieve electronic files from a **server**
- **Remote computing**
  - **Cloud computing**
  - **Virtual private network (VPN)**
  - **Web conferencing or video calling**
  - **Telnet**

Allows remote data access, storage, software access, and collaboration technologies

Provides a secure, encrypted connection between a remote user and a Local Area Network (LAN)

# Using the Internet



# Using the Internet

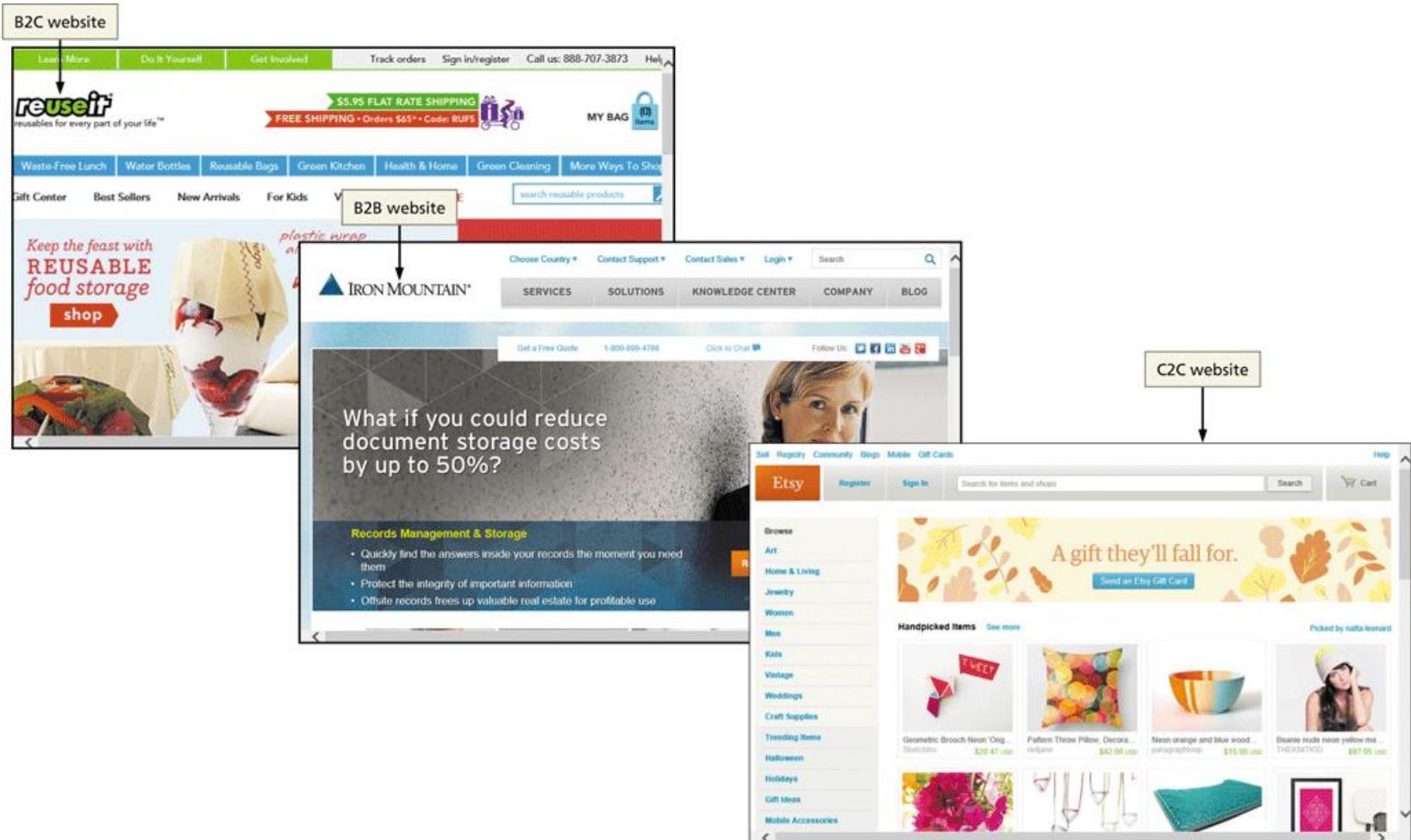
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## ➤ Internet Activities (continued)

### – Conducting business activities

- E-business:
  - **Business-to-consumer (B2C)**
  - **Business-to-business (B2B)**
  - **Business-to-employee (B2E)**
  - **Consumer-to-consumer (C2C)**
- B2B transactions account for majority of e-business dollars spent

# Using the Internet



# Impact of the Internet

## ➤ Origins in ARPANET

- Department of Defense founded **Advanced Research Projects Agency (ARPA)** to prevent computer systems from being vulnerable to a nuclear attack
- J.C.R. Licklider headed computer and information processing research efforts
- Leonard Kleinrock developed **packet switching**
- **ARPANET** – prototype network connecting ARPA and university research centers

Packet switching involves separating data from a sending computer or device into small units known as packets, sending each packet independently over cables, and then reassembling the packets on the receiving computer or device

# Impact of the Internet

Circuit switching allows a caller to dial a number to establish and maintain a private circuit across the wires

## Circuit switching versus packet switching

Aspect	Circuit Switching	Packet Switching
Call setup	Required	Not required
Cost	Minimal; cost is per call	Cost is per packet
Bandwidth	Static between two computers; can cause wasted bandwidth	Dynamic; uses different paths to transfer packets separately
Congestion	Only at setup; once connection is established, data flows freely	Can occur on every packet because each is trying to find a separate path

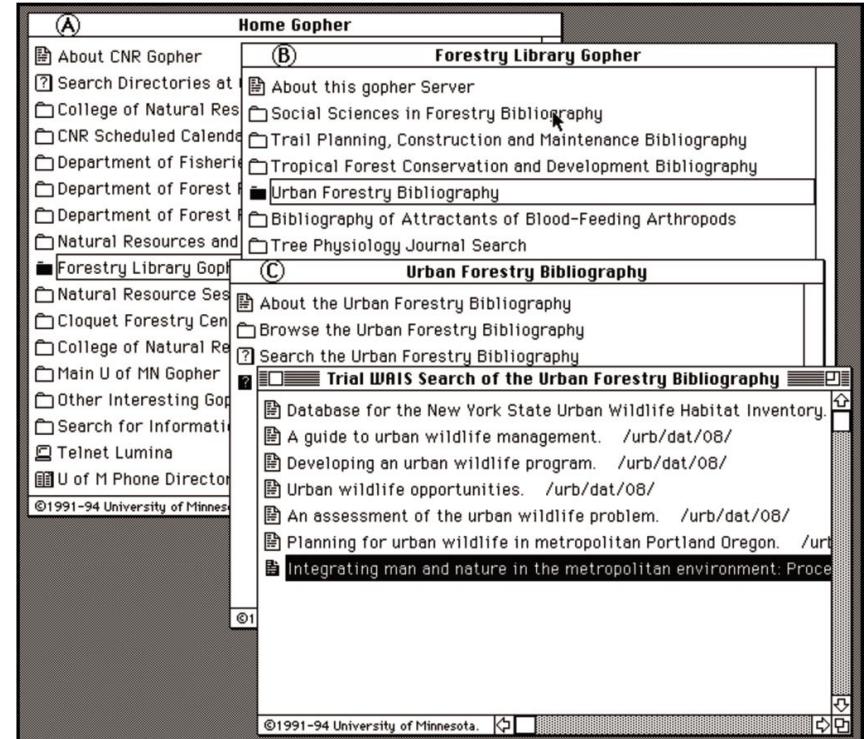
# Impact of the Internet

NSF – National Science Foundation

- Growth and Development of ARPANET
  - Thirteen research centers in ARPANET (1970)
  - Roughly doubled in size every year for next 15 years
  - Robert Kahn and Vinton Cerf developed standard or protocol for communications over a network **Transmission Control Protocol (TCP) and Internet Protocol (IP)** (1972)
- Beyond Research, to the Public
  - NSFnet replaced ARPANET (1985)
  - Congress authorized commercial activity on the NSFnet (1992)
  - NSFnet moved connections to commercial network providers (1995)

# Impact of the Internet

- The Beginnings and Rise of the Web
  - Gopher at University of Minnesota (1991)
    - Directory-based system
    - Used directory links to make navigation easier

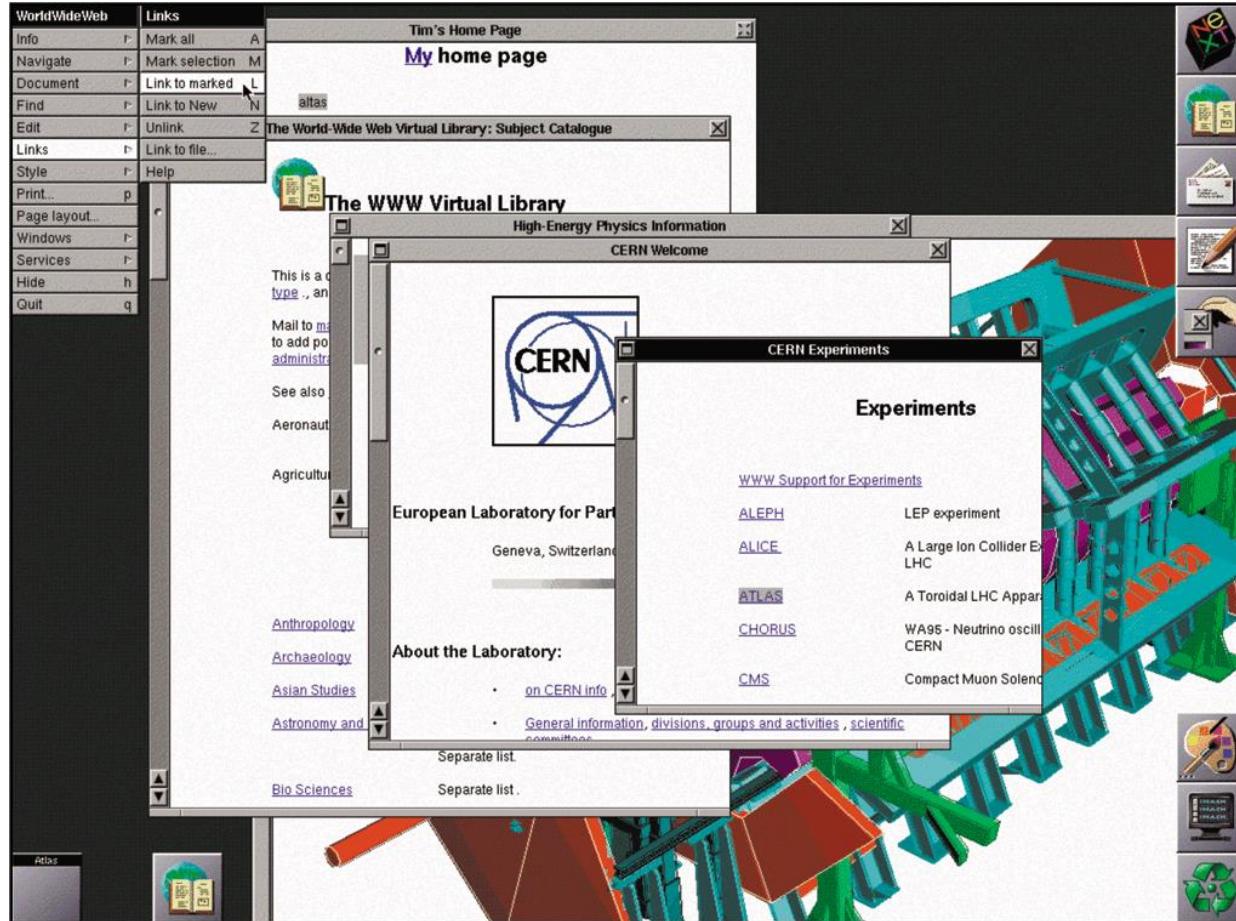


# Impact of the Internet

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- The Beginnings and Rise of the Web (continued)
  - Tim Berners-Lee (1991)
    - Hypertext Markup Language (HTML)
    - **Hypertext Transfer Protocol (HTTP)**
    - First browser; was called WorldWideWeb
  - Marc Andreessen and Eric Bina (1993)
    - Mosaic browser
  - Marc Andreessen and Jim Clark (1994)
    - Netscape Navigator browser

# Impact of the Internet



# Impact of the Internet

---

## ➤ The Beginnings and Rise of the Web (continued)

### – Research and education networks

- Microsoft Internet Explorer (1995)
- **Internet2 (I2)**

Microsoft released its browser called Internet Explorer (IE) for free

I2 is a major cooperative initiative among academia, industry, and government agencies devoted to developing and using new and emerging network technologies that facilitate research and education

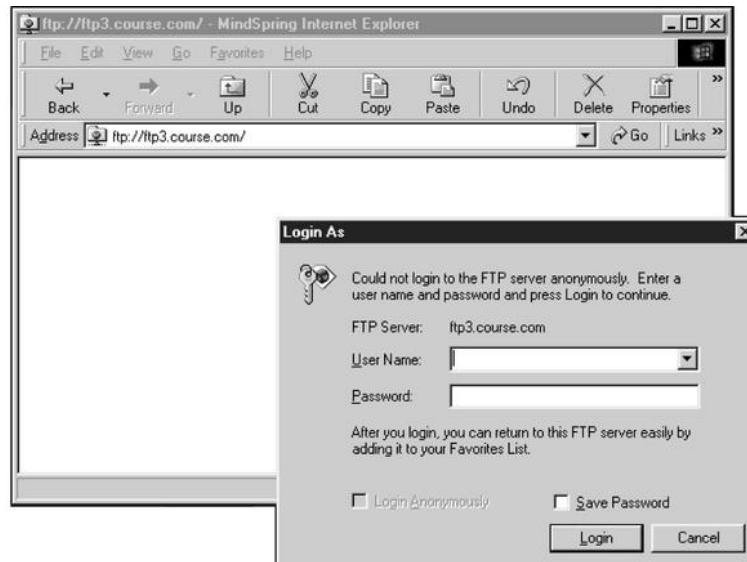
# FTP (File Transfer Protocol)

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- Can transfer binary files over the Internet without the encoding and decoding overhead
- FTP site
  - A computer that is running an FTP server application
- Anonymous FTP site
  - Does not require a login
  - Commonly used as a place to get software updates and patches

# Responsibilities of FTP Server Administrator

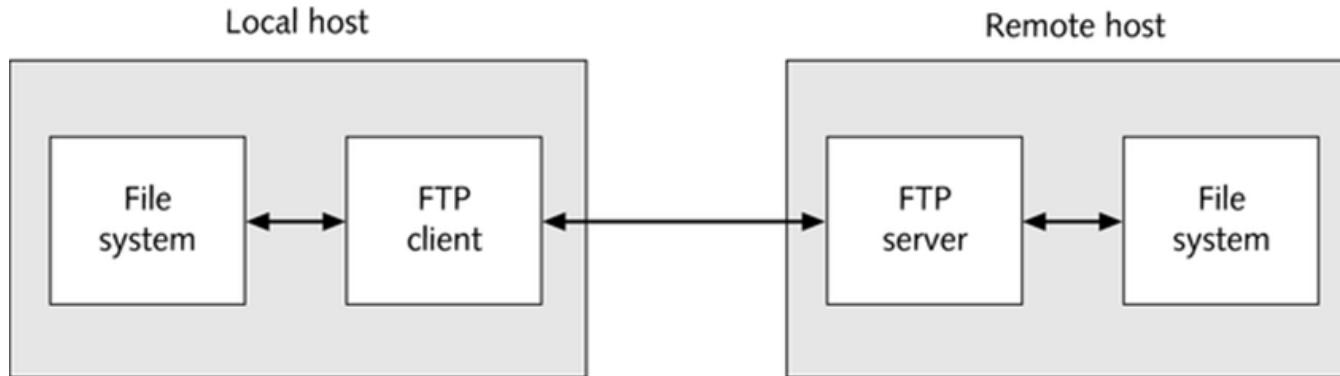
- Create and manage user IDs and passwords of those who can access the site
- Configure permissions
- Reset forgotten or compromised passwords



# How to Access FTP

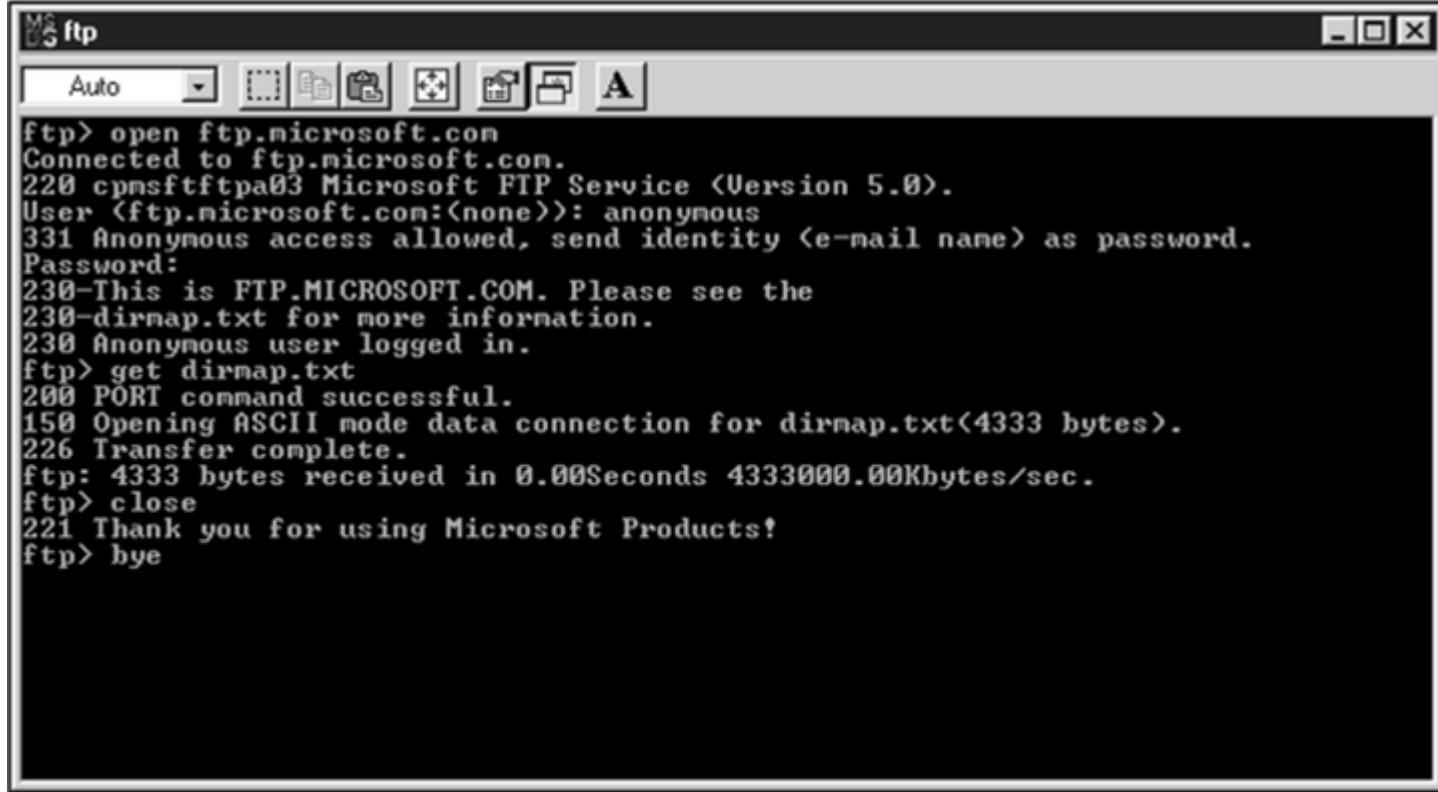
## Graphical User Interface

- Using client software:
  - Web browsers
  - Operating system command utilities
  - GUI software dedicated to FTP (e.g., FTP Pro)
- From a command prompt



FTP client and server software have access to their individual file systems — files can be transferred in either direction

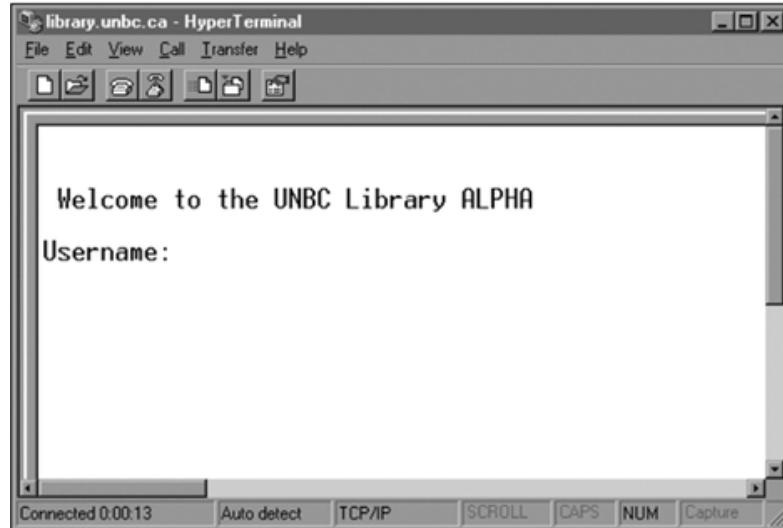
# FTP from a Command Prompt



## An FTP session using the FTP utility

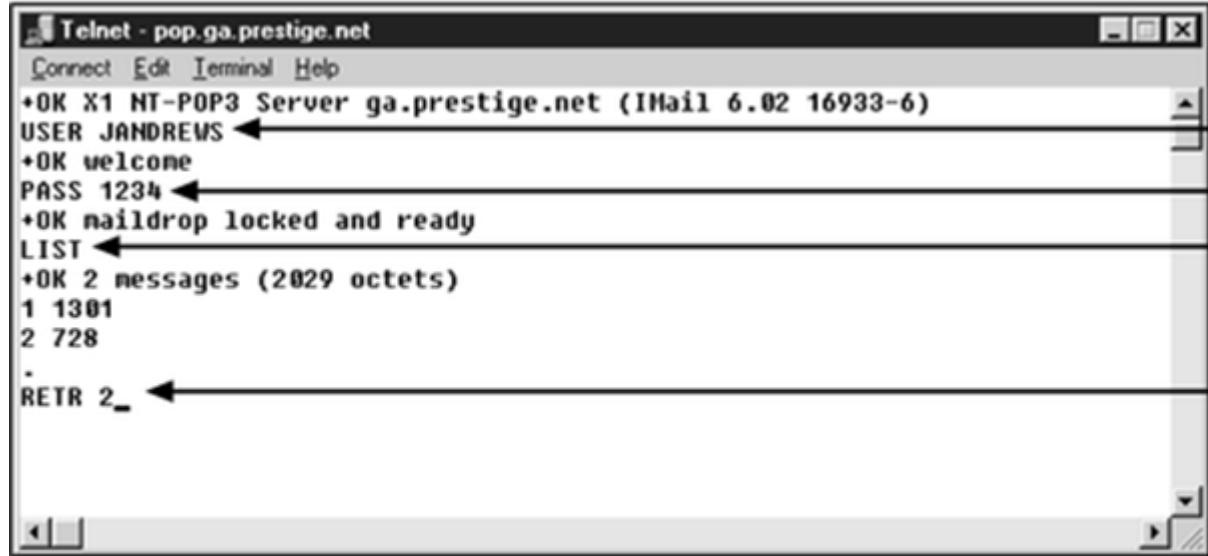
# Telnet

- A program that allows a computer to be controlled from a remote computer
- Example: library card catalogs



HyperTerminal can be used as a Telnet utility

# Telnet



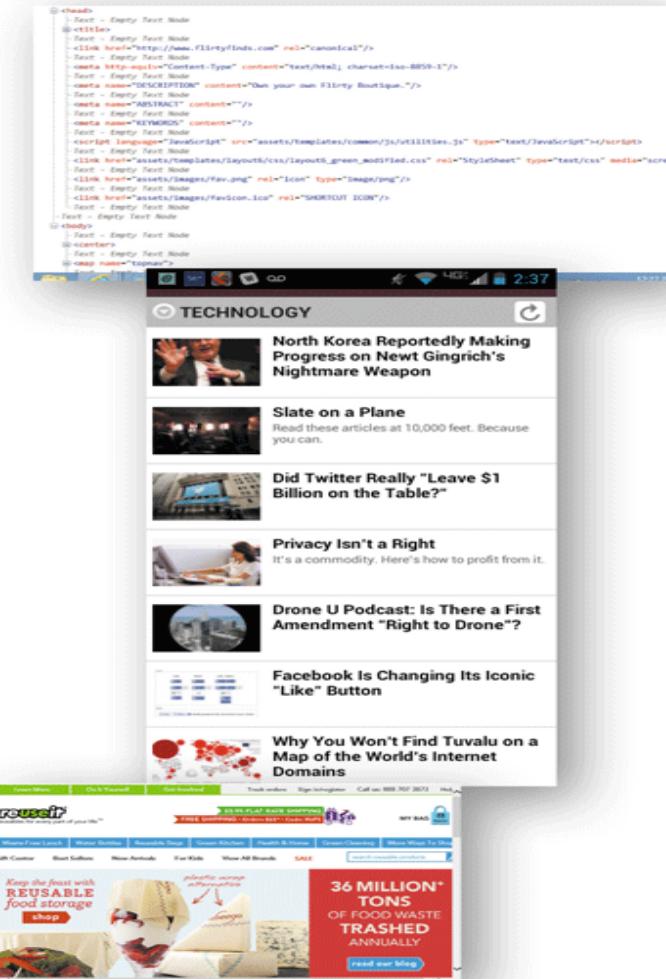
The screenshot shows a Telnet window titled "Telnet - pop.ga.prestige.net". The menu bar includes "Connect", "Edit", "Terminal", and "Help". The terminal window displays the following sequence of commands and responses:

- \*OK X1 NT-POP3 Server ga.prestige.net (IMail 6.02 16933-6)
- USER JANDREWS ← Enter user ID
- \*OK welcome
- PASS 1234 ← Enter password
- \*OK maildrop locked and ready
- LIST ← List all messages
- \*OK 2 messages (2029 octets)
- 1 1381
- 2 728
- . RETR 2 ← Retrieve second message

Using Telnet, you can read e-mail on an e-mail server using commands

# 1

# Into the Internet (Lecture 02)



## Discovering the Internet, 5<sup>th</sup> Edition



# Objectives

---

- Explain how individuals and businesses connect to the Internet
- Describe OSI model and the Internet

# Connecting to the Internet

---

## ➤ Internet Service Providers (ISPs)

- Provide Internet access to individuals and companies
- **Mobile service provider**, sometimes called a wireless data provider, offers wireless Internet access to computers and mobile devices

# Connecting to the Internet

---

## ➤ Internet Service Providers (ISPs) (continued)

- Considerations for choosing an ISP

- The speed or **bandwidth** of the connection
- The availability of wireless or mobile data service
- The type of connection and cost of service
- Availability of customer service and technical support

Bandwidth - the amount of **data** that can be transmitted in a fixed amount of time.

# Connecting to the Internet

---

## ➤ Internet Service Providers (ISPs) (continued)

- **Transfer rate** measures numbers of bits can be transmitted in one second (**bits per second or bps**)

1,000

- **Kilobits per second (Kbps)** – thousands of bits per second
- **Megabits per second (Mbps)** – millions of bits per second
- **Gigabits per second (Gbps)** – billions of bits per second

1,000,000

1,000,000,000

1 US billion = 1,000,000,000

1 UK billion = 1,000,000,000,000

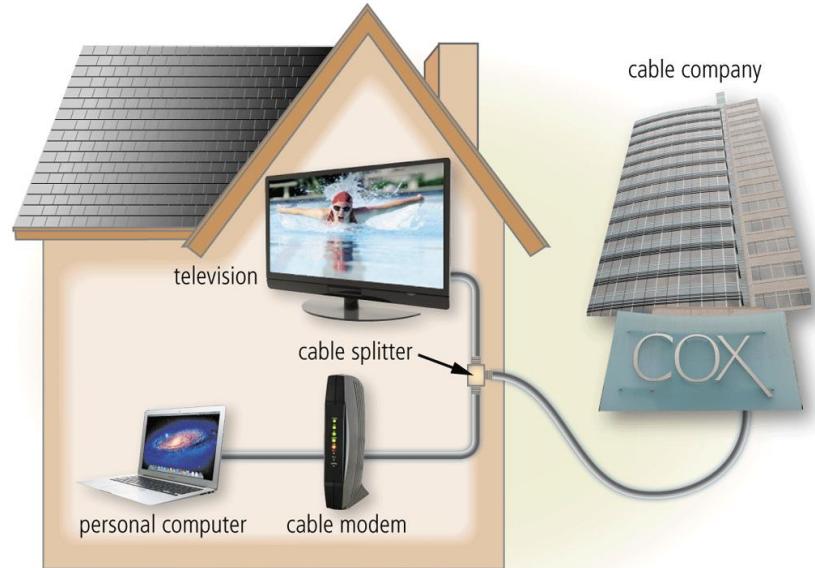
# Connecting to the Internet



## ➤ Connection Methods

### – **Cable**

- **Cable television (CATV) lines** use same coaxial cable that delivers TV transmissions
- **Cable modem** and **line splitter** required



# Connecting to the Internet

## ➤ Connection Methods (continued)

### – Digital Dedicated Lines

- A constant connection between two communications devices that uses a local phone network

- Integrated Services Digital Network (**ISDN**)
- Digital subscriber line (**DSL**)
- Asymmetrical digital subscriber line (**ADSL**)
- T-carrier line
- Fractional T-1 line
- T-3 line

T-1 (1.544Mbps)

Fractional T-1 (up to 768Kbps)

T-3 (44.736Mbps)

Types of long-distance digital phone lines that carry multiple signals over a single communications line, whereas a standard phone line carries only one signal

A set of standards for digital transmission of data over standard copper phone lines, up to 1.54Mbps

Transmits at fast speeds on existing standard copper phone wiring, up to 8.45Mbps

Type of DSL that supports faster transmissions when receiving data (8.45Mbps) than when sending data (640Kbps)

# Connecting to the Internet

---

- Connection Methods (continued)
  - **Wireless Fidelity**
    - **Wireless fidelity (Wi-Fi)** technologies to connect to networks
    - **Hotspot** – specific geographic location in which a wireless access point provides public Internet access
    - **Wireless access point** – hardware that connects wireless devices to a network



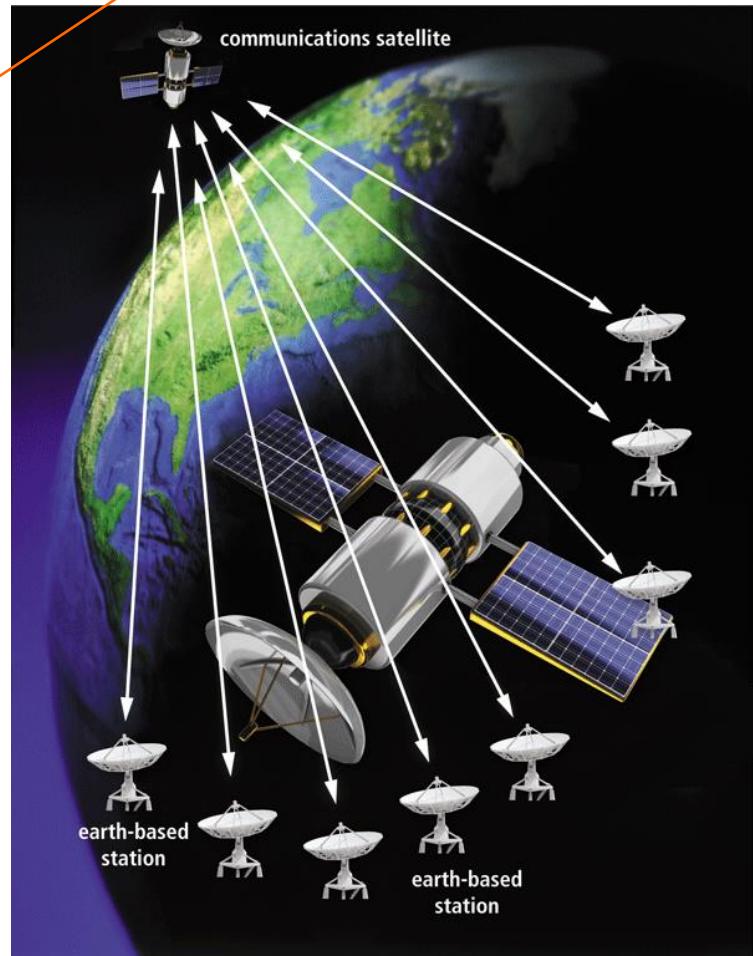
# Connecting to the Internet

One-way satellite access uses the satellite for downloading data, and uses a slow, regular phone line and modem for uploading data

## ➤ Connection Methods (continued)

- **Satellite Internet access:** One-way or two-way satellite transmissions

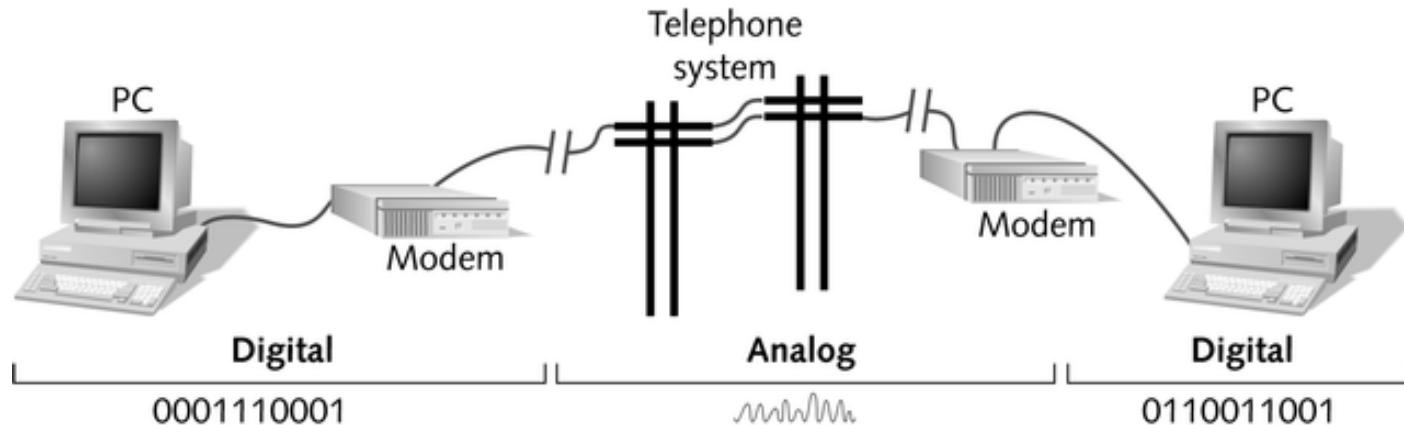
Two-way satellite access uses the faster satellite connection for both uploading and downloading data



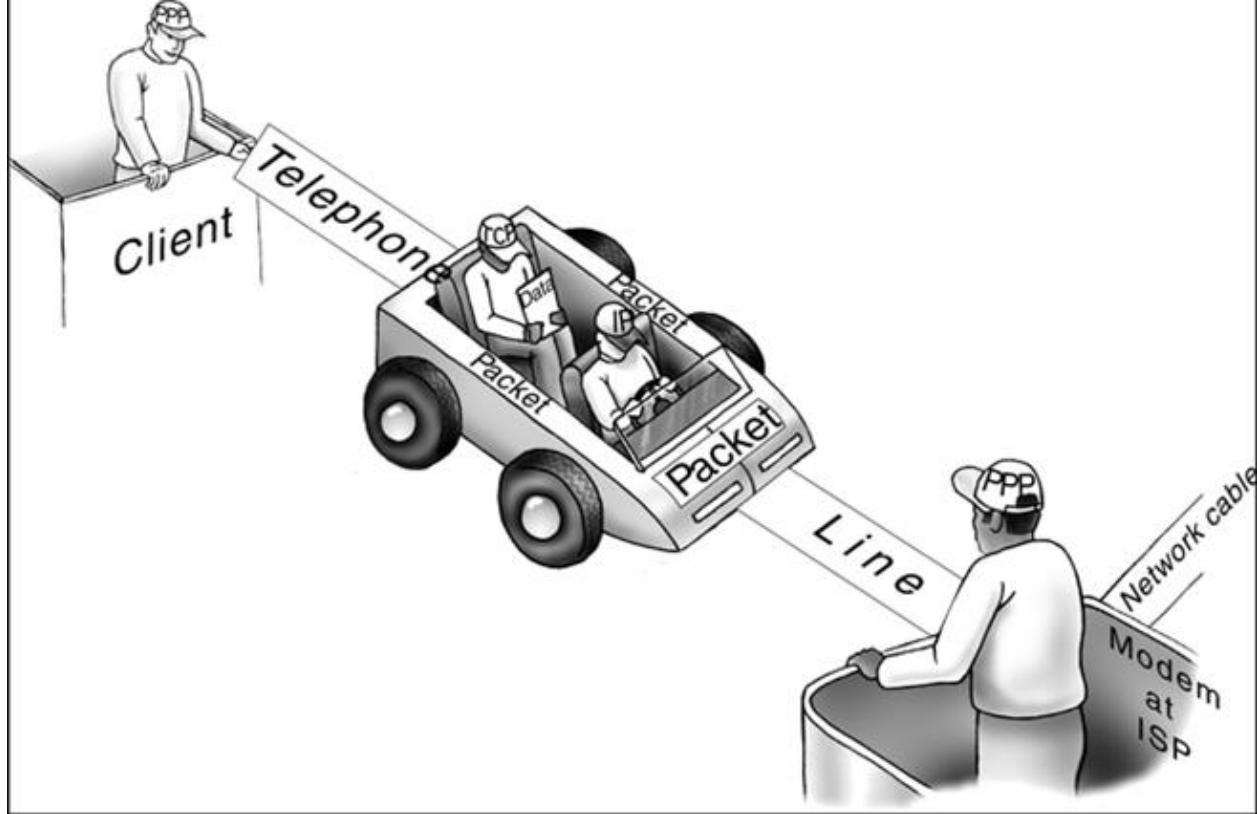
# Regular Telephone Lines

Transmission Control Protocol/Internet Protocol

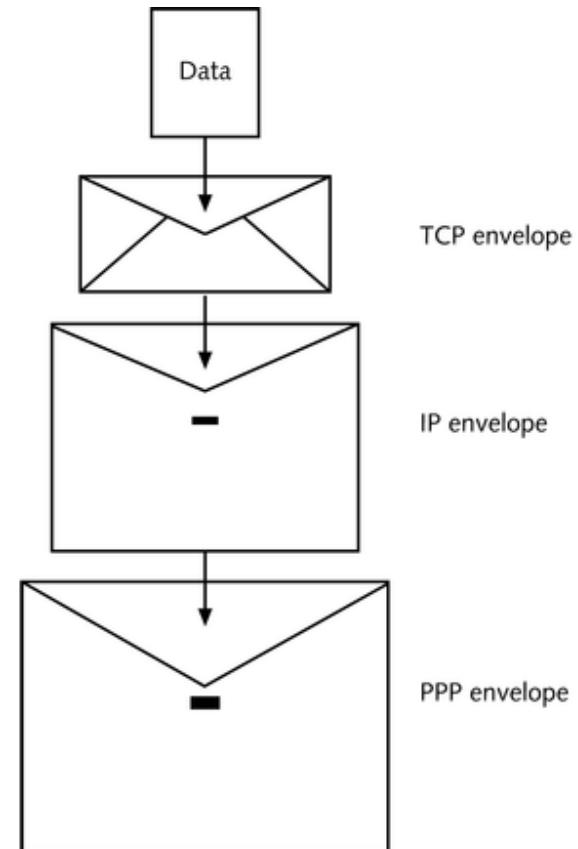
- Require an internal or external modem (i.e. for dial-up Internet access) to convert PC's digital data to analog data
- Use PPP (Point-to-Point Protocol) to transmit TCP/IP packets



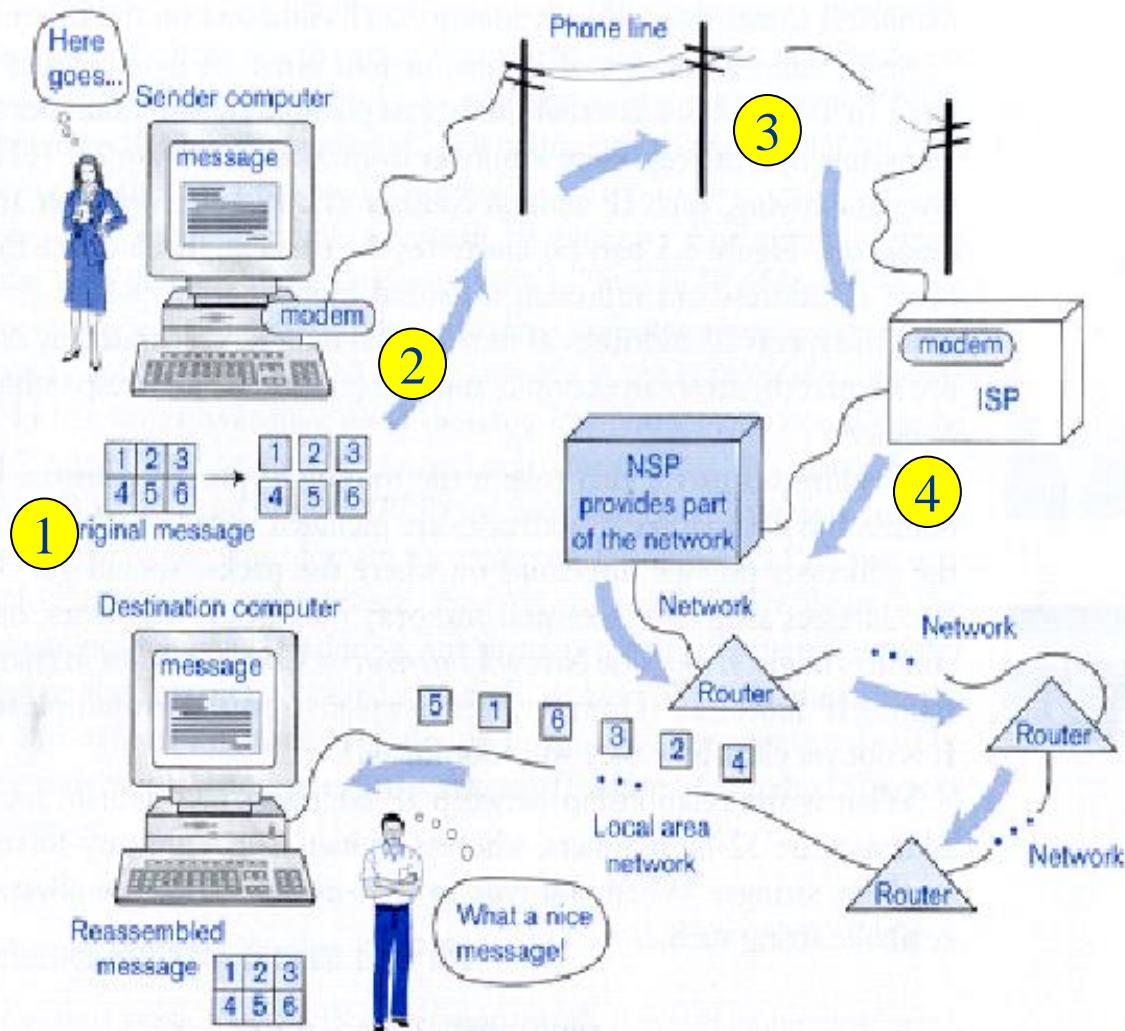
# Point-to-Point Protocol



The PPP line protocol supports TCP/IP packets as they travel over a telephone line from the client to the ISP



## Illustration of a Message Split into Packets, Routed to Destination through an ISP and an NSP, and Reassembled



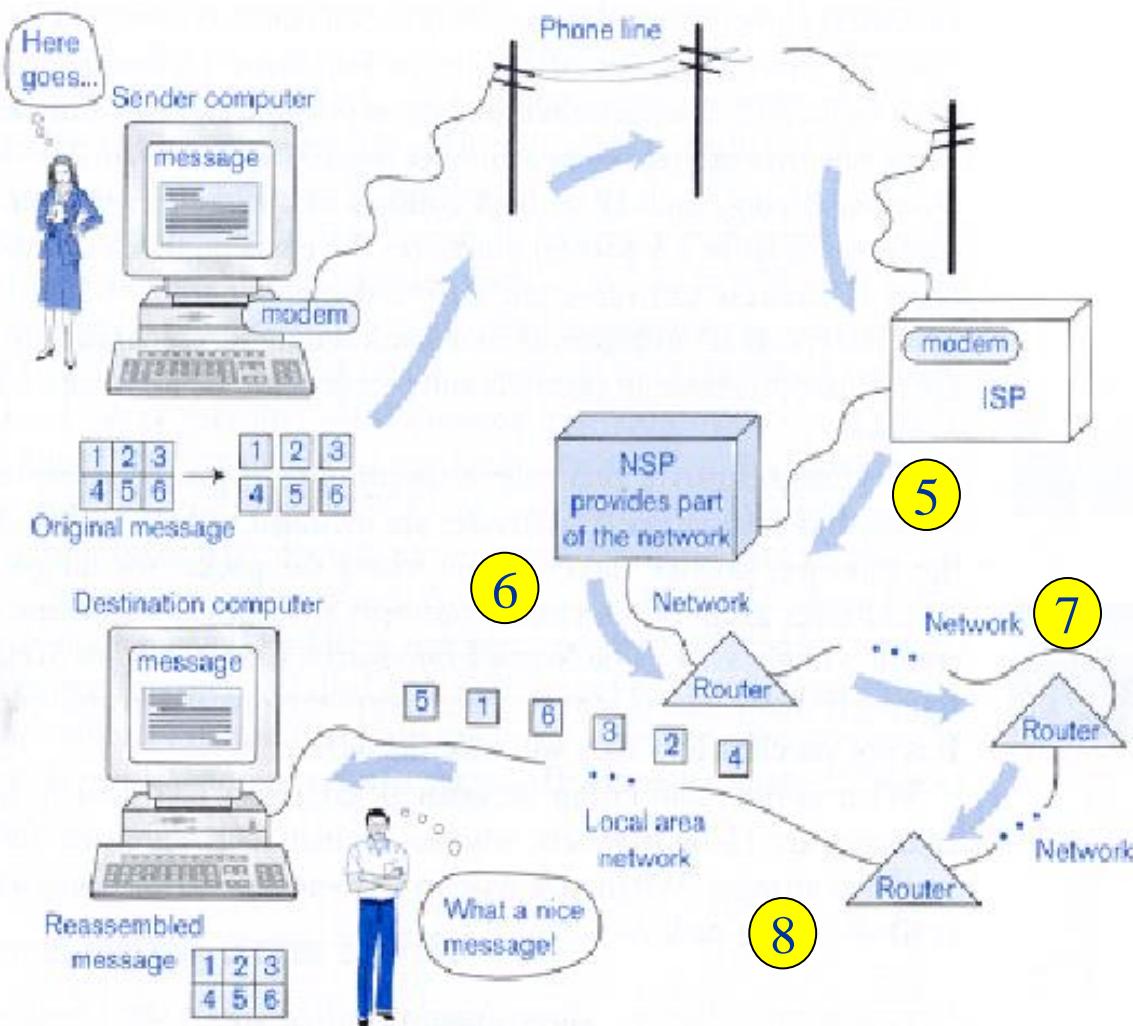
# Sending a Message

1. Message is split into IP packets.
2. Modem converts the digital IP packets into analog telephone signal.
3. Analog signal is transmitted over the telephone line.
4. A second modem at the ISP's end completes the connection and converts analog signal back to digital IP packets

# Sending a Message

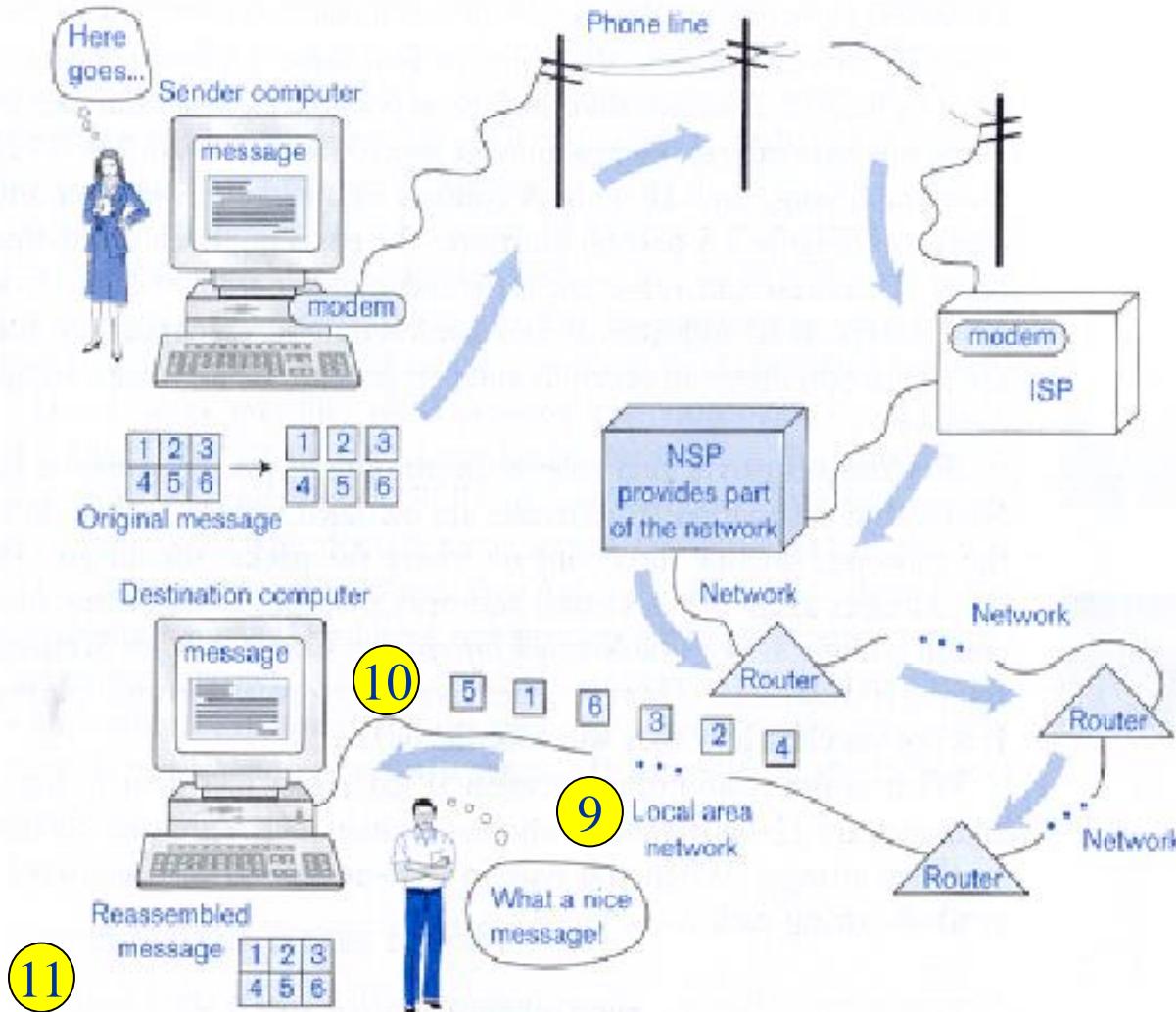
5. Packet redirected to Network service provider via high speed leased lines
6. NSP connects to the global Internet high-speed backbone.
7. The packets are transmitted over the international links and routers.
8. Packets arrive at the network that the destination computer attached to.

Illustration of a Message Split into Packets, Routed to Destination through an ISP and an NSP, and Reassembled



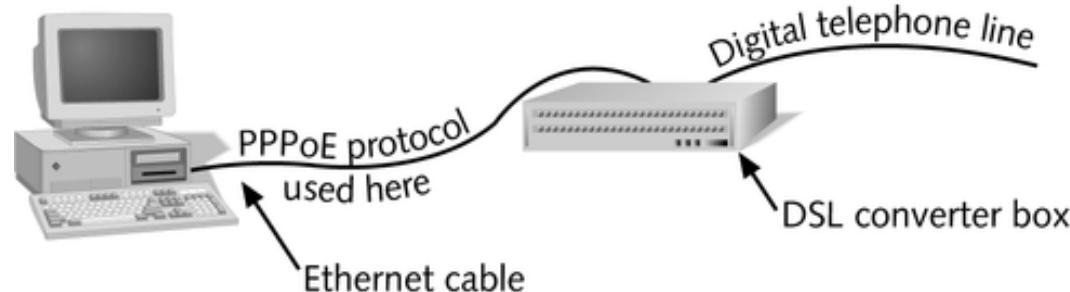
# Sending a Message

9. Packets are transmitted
10. Packets arrives the destination computer without proper order.
11. The destination computer reassemble the message



# PPPoE (Point-to-Point Protocol over Ethernet) – e.g. for DSL connection

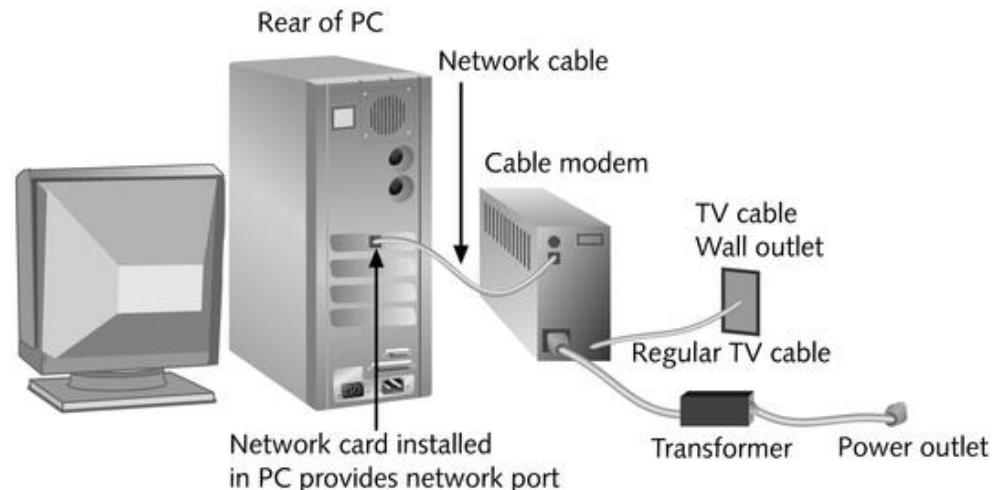
- Adapts PPP to work with the Internet
- Describes how a PC is to interact with a broadband converter box (e.g. DSL modem)
- Gives the user security and authentication
- Sets standards for networks to connect to the Internet via DSL modems and other high-speed access services



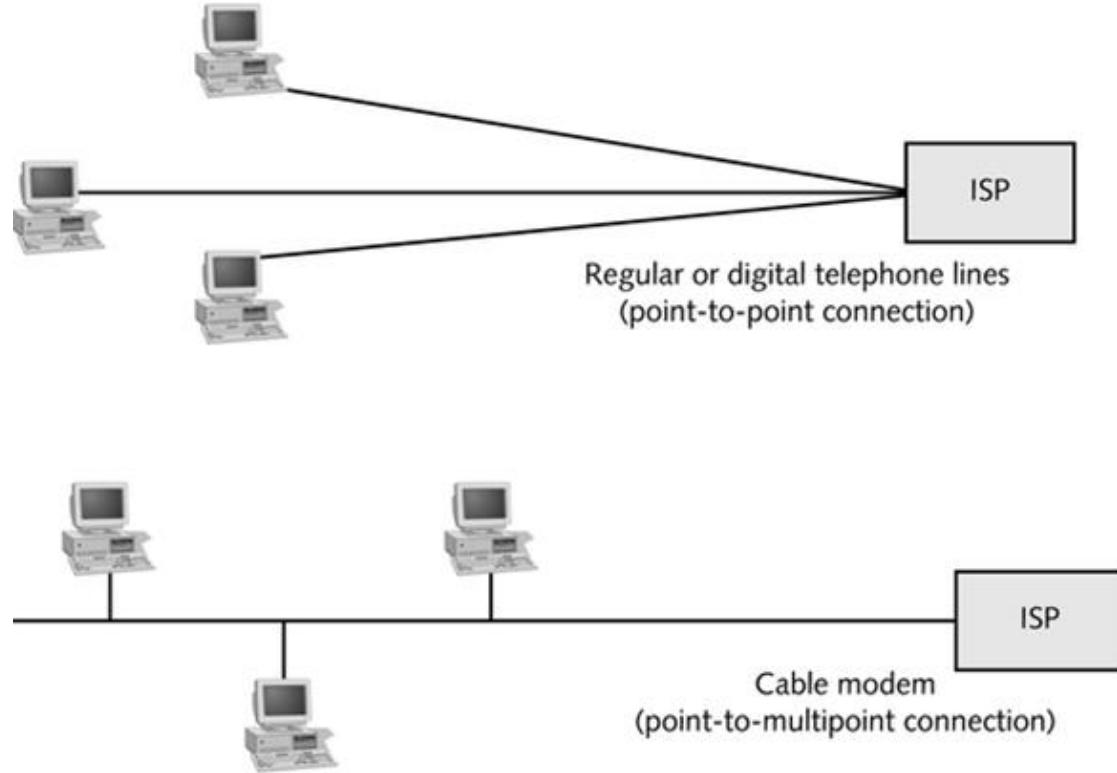
# Cable Modem

Network Interface Card

- Uses a regular TV cable cord (e.g. cable TV lines) to connect to a TV cable wall outlet
- From the modem, a network cable connects to a NIC in the user's PC
- Broadband media (carries more than one type of transmission)
- Disadvantages
  - Point-to-multipoint connection can mean degradation in service
  - Lack of security

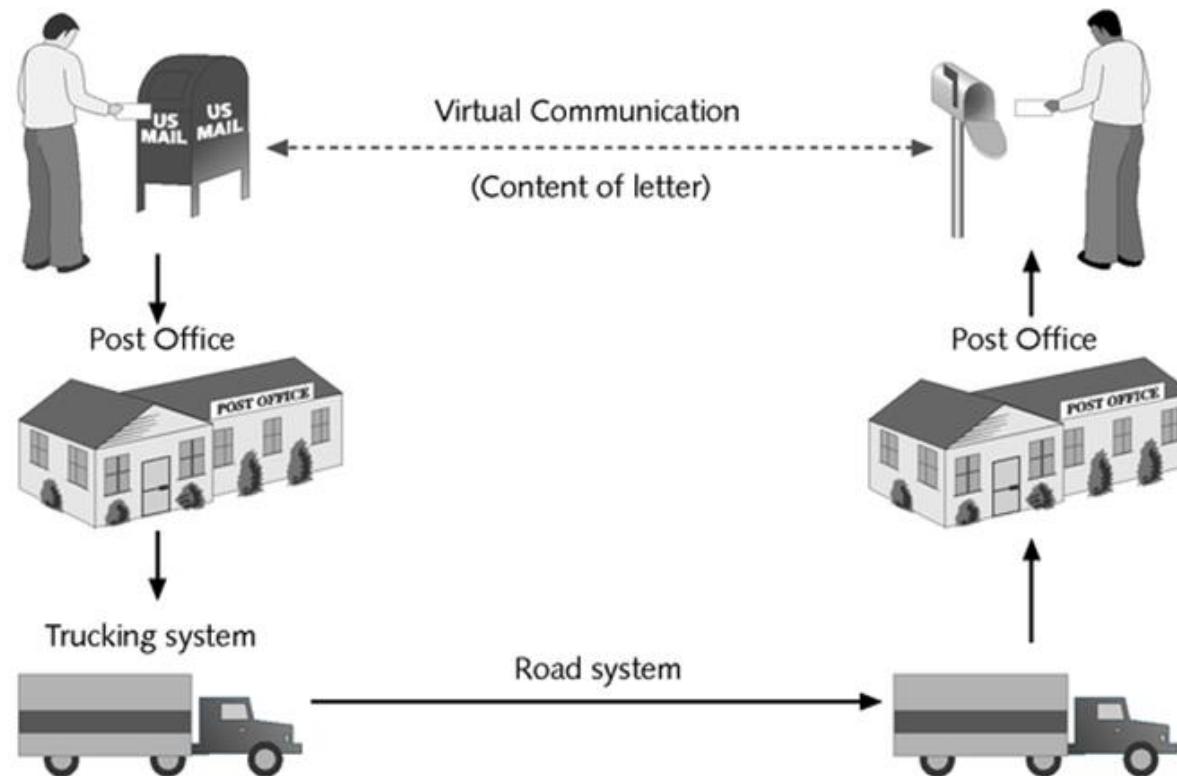


# Cable Modem



Telephone lines provide you with a private line to your ISP, but you share cable modem with others in your neighborhood

# The OSI Model and the Internet

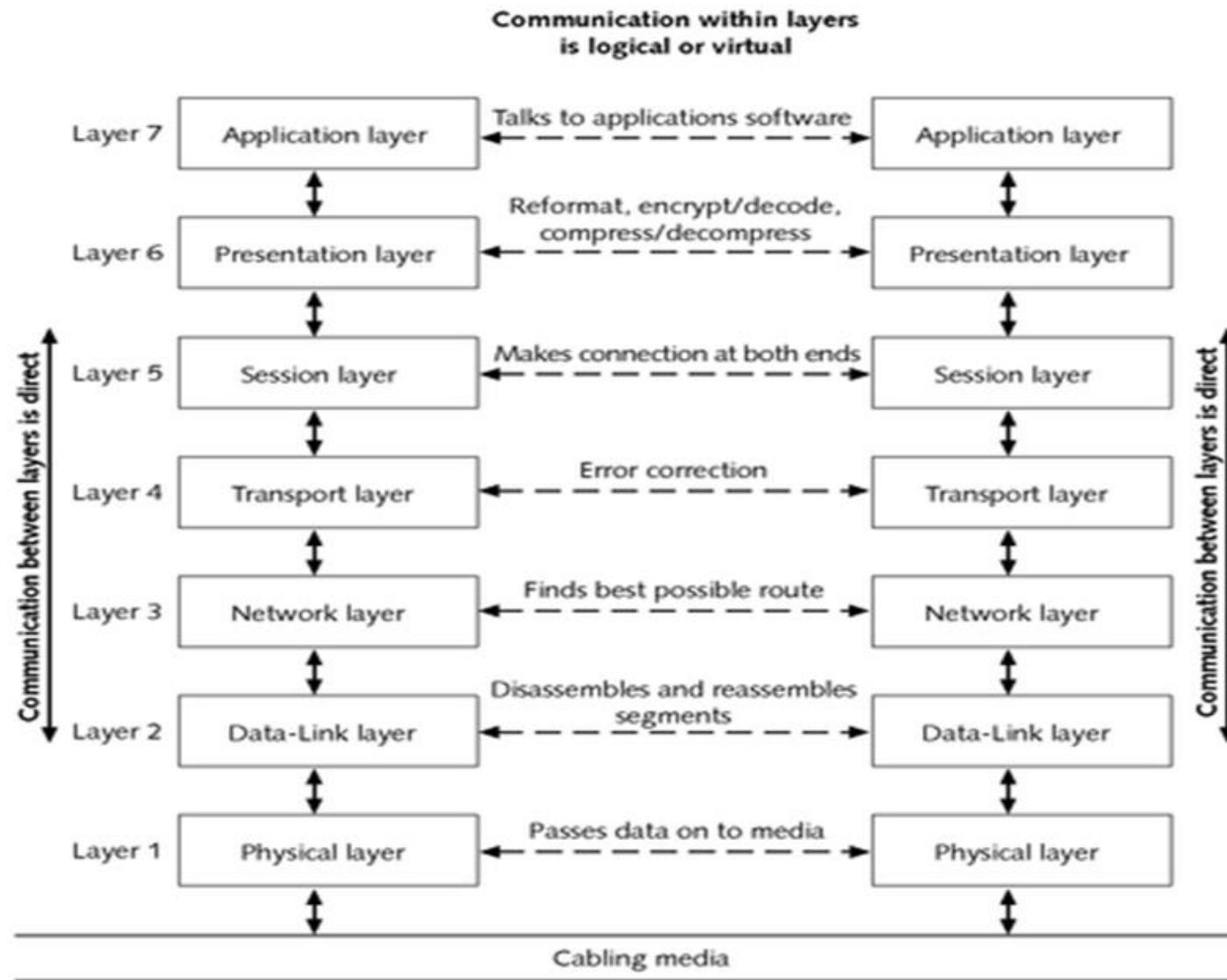


Communication is virtual between sender and receiver, but direct between adjacent system in the postal service

# Understanding the OSI Model

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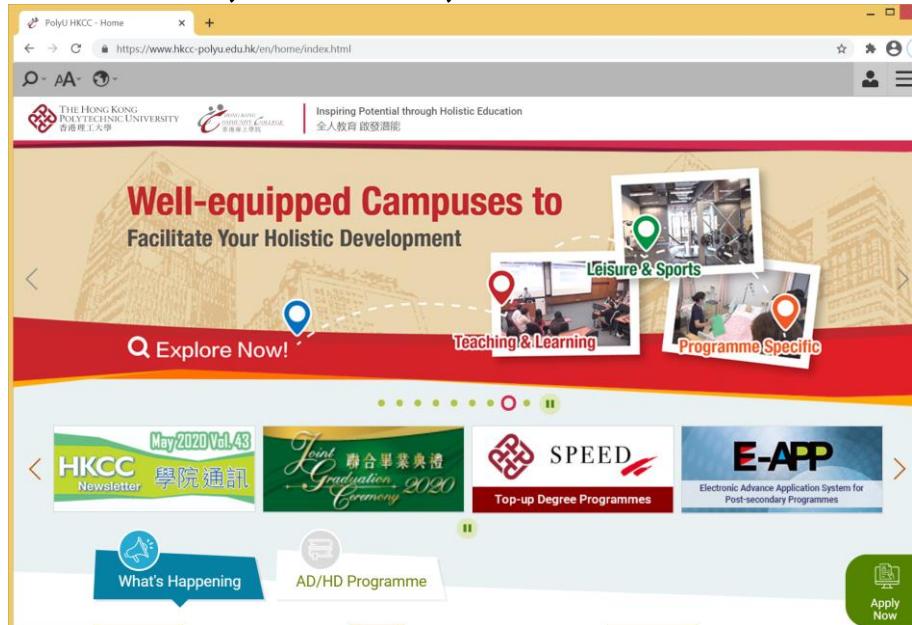
- In early 1980s, manufacturers began to standardize networking so that networks from different manufacturers could communicate
  - International Organization for Standardization (ISO)
  - Institute of Electrical and Electronics Engineers (IEEE)
- Open Systems Interconnect (OSI)
  - A networking model developed by ISO to identify and standardize all the levels of communication needed in networking



The OSI reference model identifies seven layers of network communication within software and firmware

# Application Layer

- Provides the interface for application software, such as Web browsers or Web servers, to set up communication with another application software.
  - e.g. Web Browser, E-mail, Chat Rooms



# Presentation Layer

---

- Receives requests for files from the Application layer and presents the requests to the Session layer
- Reformats, compresses, or encrypts data as necessary
  - e.g. ASCII, Unicode

American Standard Code for Information Interchange

# Session Layer

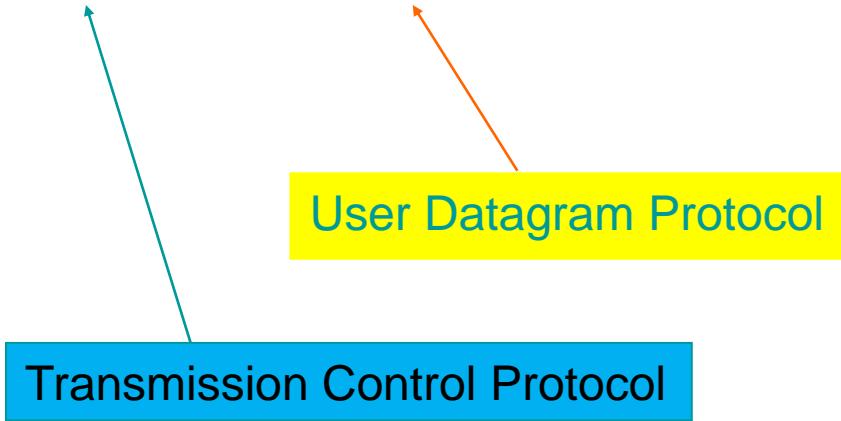
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- Establishes and maintains a session between two networked stations or hosts

# Transport Layer

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- Responsible for error checking
- Requests a resend when the data is corrupted
- Guarantees successful delivery of data
  - TCP and UDP



# Network Layer

- Divides a block of data into segments (data packets or datagrams) that are small enough to travel over a network
- Responsible for routing (finding the best possible route by which to send the data packets over a group of networks)
- Reassembles the packets once they reach their destination
  - e.g. IP, ARP, RARP, ICMP

Internet Control Message Protocol

Address Resolution Protocol

Reverse Address Resolution Protocol

# Data Link Layer

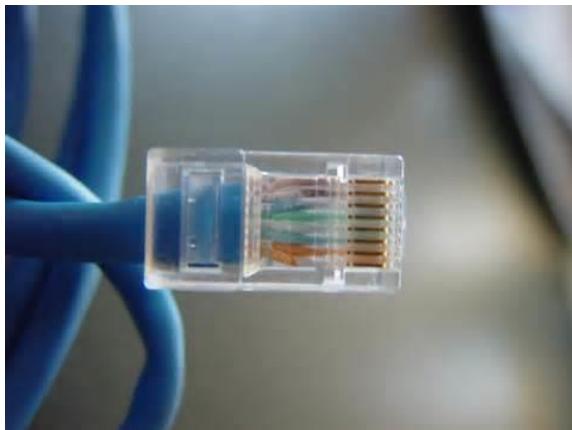
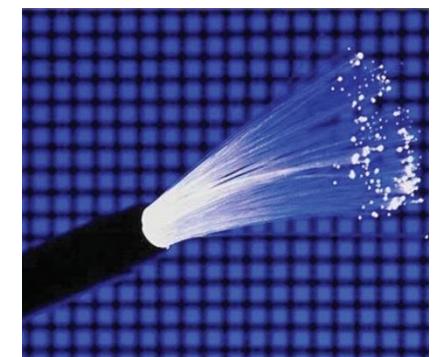
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- Responsible for receiving packets of data from Network layer and presenting them to Physical layer, and does the reverse for incoming data
- If the packets received from Network layer are too large for Physical layer, Data Link layer further disassembles packets of data into smaller packets as needed to transport over the network
- On the receiving end, Data Link layer reconstructs the packets into their original size
  - e.g. Ethernet, ATM, Token Ring

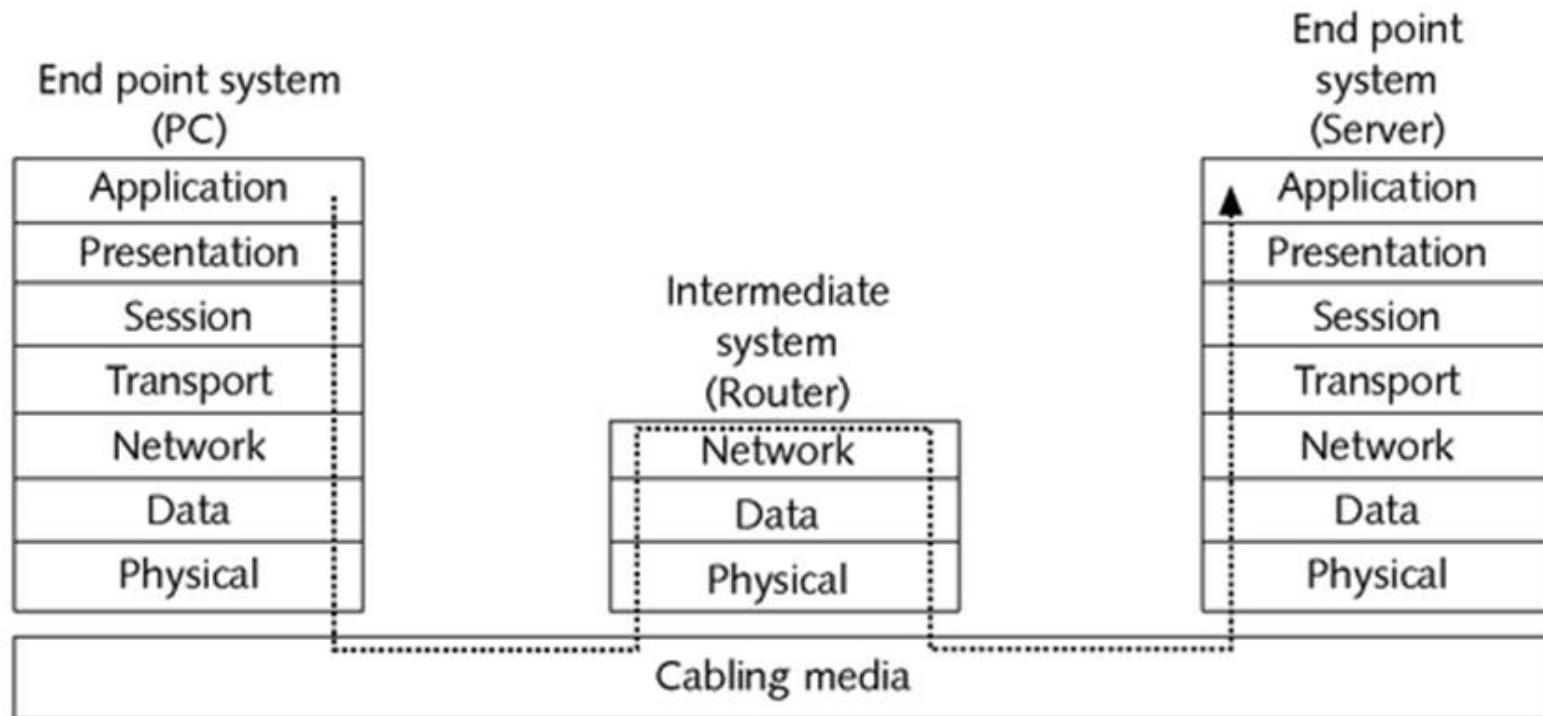
Asynchronous Transfer Mode

# Physical Layer

- Passes data packets onto the cabling media
  - e.g. Cabling: Twisted-pair, Coaxial, Fiber Optic



# Network Devices and the OSI Model



The two end-point systems traverse all seven of the OSI layers, but intermediate devices such as a router may only interact with some of the layers

# The OSI Model Applied to the Internet

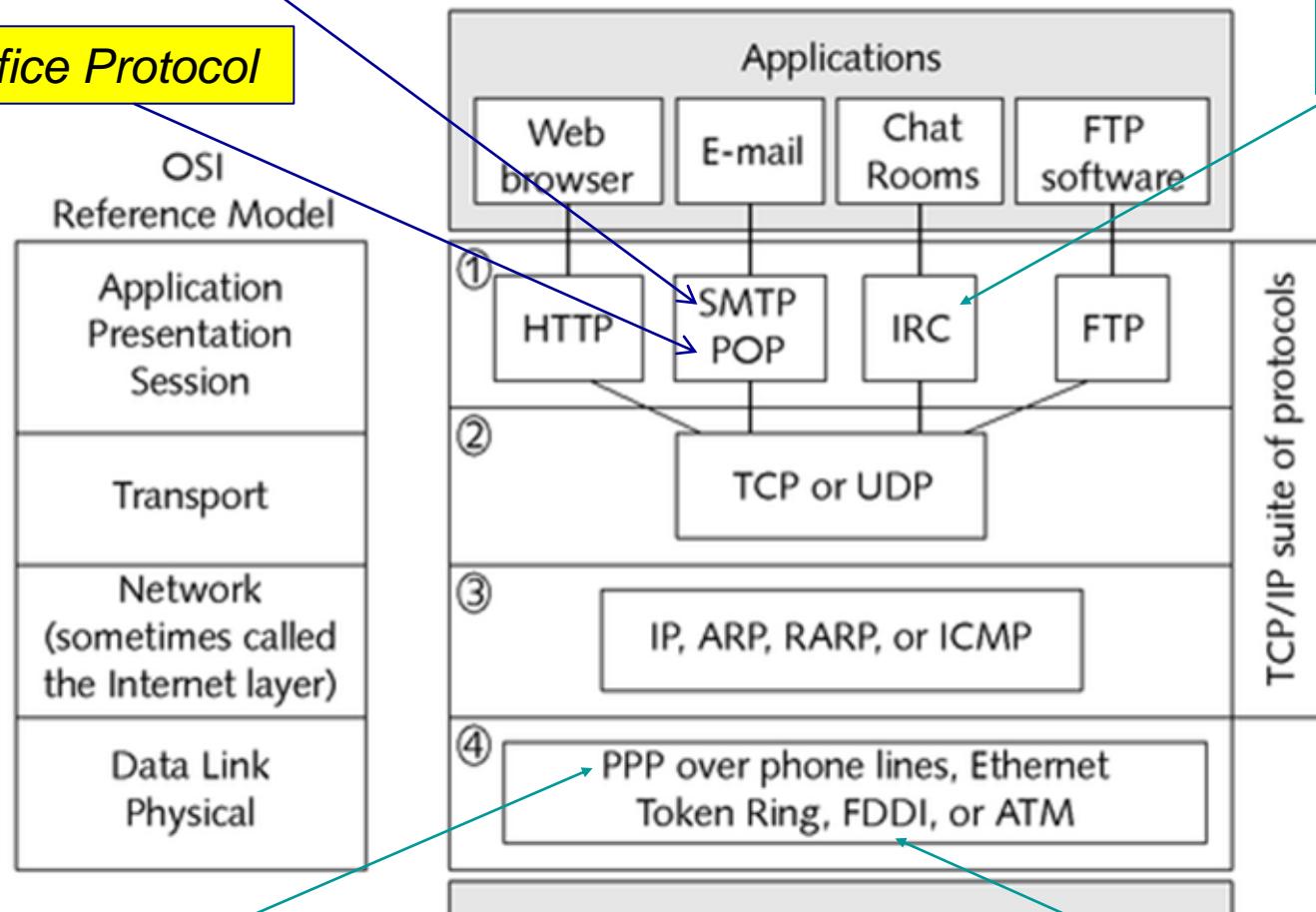
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- Four major groupings
  1. Application, Presentation, and Session layers
  2. Transport layer
  3. Network layer
  4. Data Link and Physical layer
- Top three groups = TCP/IP Suite
  - Supports communication on the Internet
  - TCP (Transmission Control Protocol) is responsible for error checking
  - IP (Internet Protocol) is responsible for routing

Simple Mail Transfer Protocol

Post Office Protocol

Internet Relay Chat



An overview of networking software showing the relationships among components

# The Application, Presentation, and Session Layers

---

- Language or protocol used by each application
  - Web browser: **HTTP**
  - E-mail: **SMTP** and **POP**
  - Chat room software: **IRC**
  - FTP software: **FTP**
- Application Program Interface (API)
  - Calls another program to perform a utility task

# The Transport Layer

---

- Includes two protocols
  - TCP (Transmission Control Protocol)
    - Establishes a connection from host to host before it begins transmitting data (connection-oriented protocol)
    - Guarantees delivery
  - UDP (User Datagram Protocol)
    - Sends data without caring about whether or not the data is received (connectionless protocol)

# The Network Layer

---

- TCP and UDP communicate with this layer which is responsible for routing
- IP (Internet Protocol)
  - The governing protocol at this layer, responsible for breaking up and reassembling data into packets and routing them to their destination

# Other Supporting Protocols at the Network Layer

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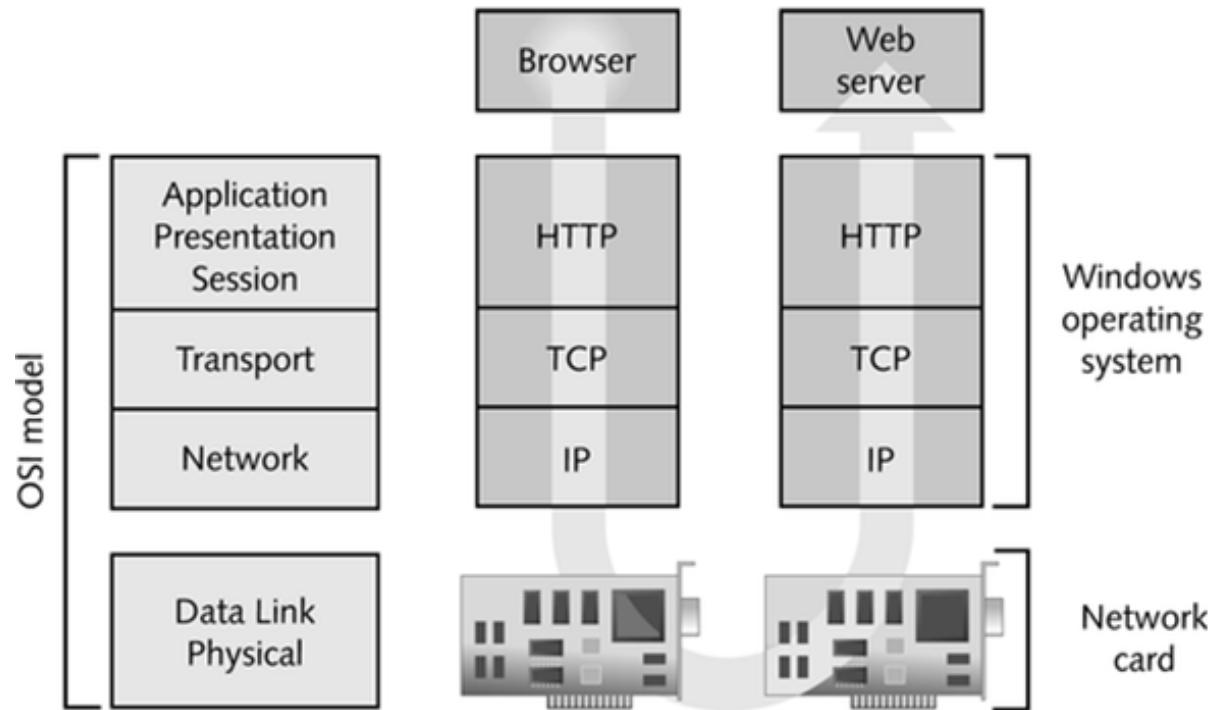
- ARP (Address Resolution Protocol)
  - Locates a host on a local network
- RARP (Reverse Address Resolution Protocol)
  - Discovers the Internet address of a host on a local network
- ICMP (Internet Control Message Protocol)
  - Communicates problems with transmission to devices that need to know about these problems

# The Data Link and Physical Layers

---

- Most often covered by the firmware (software that is permanently stored on a microchip) on a single network interface card
- Protocol used depends on the type of physical network that the data is traveling on (Point-to-Point Protocol, Ethernet, Token Ring, FDDI and ATM)

# The OSI Model Applied to a TCP/IP Network



When a browser sends a request to a web server, all layers of the OSI model are involved on both the client and the server

# 2

# Browsing the Web

## (Lecture 03)



# Discovering the Internet, 5<sup>th</sup> Edition

# Objectives

---

- Describe a website, common webpage characteristics, and web servers
- Explain the role IP addresses, domain names, and URLs play in locating webpages

# Websites, Webpages, and Web Servers

---

- Websites
  - Number of pages varies depending on site's purpose and type of content and services it provides
  - **Home page** is the primary webpage at a website
  - A **web portal**, or simply a **portal**, is a special type of website that offers access to a vast range of content and services

# Websites, Webpages, and Web Servers

The figure displays three distinct web pages from the American Red Cross website:

- Top Right:** A news page titled "News & Events". It features a large image of a person in a red vest assisting another individual. Below the image, the headline reads "American Red Cross Provides Assistance for Balkans Flooding". To the right, there's a sidebar for "Upcoming Local Events" listing events for June 16, 18, and 19.
- Middle Left:** A homepage banner for "Get CPR and First Aid Certified". It shows a close-up of hands performing CPR on a mannequin. Below the banner, there's a "Sign Up for News and Updates" section.
- Bottom Center:** A "Ways to Help" page. It includes a "Donate \$10 right now" section with a mobile phone icon, and a "Text redcross to 90999" button. On the left, there's a sidebar with various ways to help, such as "Ways to Donate", "Ways to Fundraise", and "Ways to Volunteer".

Two large red arrows point from the bottom center page up towards the top right and middle left pages, indicating the relationship between these different types of web pages.

# Websites, Webpages, and Web Servers

---

## ➤ Webpages

- Designed to attract visitors and hold their attention
- Common characteristics
  - Logo and/or name
  - Images and media
  - Links
  - Advertisements
  - Search tool
  - Connectivity links or icons
  - Copyright statement
  - Link to a privacy and security policy statement

# Websites, Webpages, and Web Servers

The screenshot shows the Barnes & Noble website homepage. Several UI elements are highlighted with callout boxes:

- logo**: Points to the Barnes & Noble logo in the top left.
- navigation**: Points to the navigation bar at the top, which includes links for Sign in, My Account, Order Status, My NOOK, Stores & Events, and Help.
- images**: Points to the book cover of "Mr. Mercedes" by Stephen King, which is the main visual element of the homepage.
- search tool**: Points to the search bar and button in the top right corner.

Other visible elements include:

- A banner for "nook for Windows 8" at the top.
- A promotional offer for "FREE Express Shipping, Save in Stores with Membership".
- A shopping bag icon indicating "0 items" and a promotion to "Spend \$25, Get FREE SHIPPING".
- A search bar with the placeholder "Search Over 30 Million Products".
- A dropdown menu for "All Products".
- A "Search" button.
- A horizontal menu bar with categories: Books, NOOK Books, nook, Textbooks, Newsstand, Teens, Kids, Toys & Games, Home & Gifts, Movies & TV, Music, Gift Cards, and Bargain Books.
- A section titled "This Week's Biggest Books" with a "Shop Now" button.
- Four promotional banners at the bottom: "Paperback Offer", "From Page to Screen", "Teens: From Page to Screen", and "40% Off Blu-rays".

# Websites, Webpages, and Web Servers

---

- Web Servers
  - Browser is a client that requests services from a web server
  - **Server** “serves up” or provides the requested resources or services
    - Web browsing is example of **client/server computing**

# Websites, Webpages, and Web Servers

## ➤ Web Servers (continued)

- Single web server can host multiple websites
- Larger websites may be stored across multiple web servers

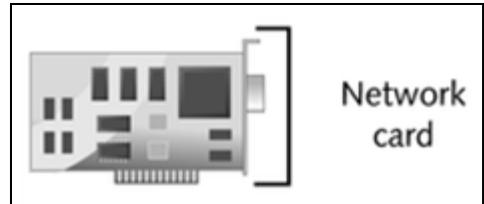


# Addressing on the Internet

---

- Methods used to identify devices and programs
  - Physical address
    - Permanently embedded in a network interface card
    - Identifies a device on a Local Area Network (LAN)
  - IP address
    - Identifies a computer, printer, or other device on the Internet
  - Domain name
    - An easy-to-remember word or phrase for an IP address

# Physical Addresses



- Also called MAC (Media Access Control) address or adapter address
- 6-byte hex hardware addresses unique to each NIC card and assigned by manufacturers
- Often printed on the adapter
- Used at the Data Link layer for computers on the same network to communicate
- Computers on different networks use IP addresses to communicate

Network Interface Controller Card, Also known as network interface card or network card

e.g. 01-2F-45-E7-69-AB or 01:2F:45:E7:69:AB

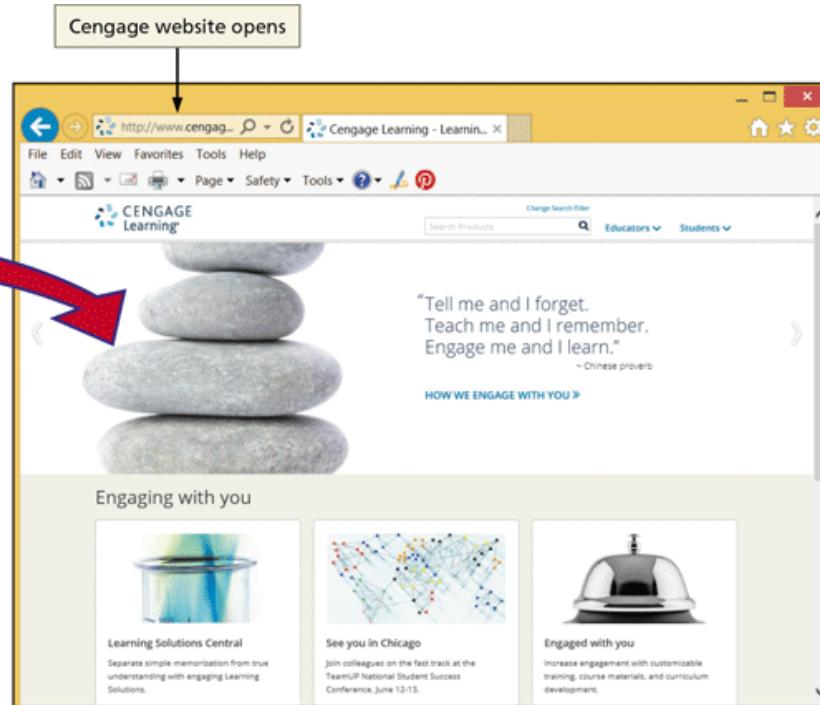
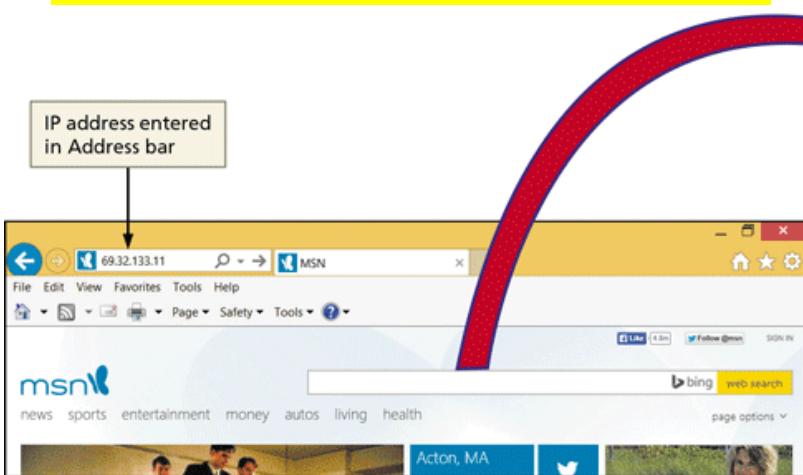
# MAC Addresses

---

- The most absolute of addresses; they do not change as long as the NIC does not change
- All hosts on the same network must communicate by their MAC addresses, which are managed by the Data Link layer protocol that controls the network

# Domain Names, IP Addresses, and URLs

Uniform Resource Locator – unique address that identifies an individual webpage or web-based resource, sometimes called a web address



# Domain Names, IP Addresses, and URLs

---

## ➤ IP Address

- A unique number that identifies each computer or device connected to the Internet
- **Static IP addresses** seldom change
- **Dynamic IP addresses** are temporary
- A group of four numbers separated by a period or dot, such as 69.32.133.11
  - IPv4
  - IPv6

IPv6 addresses are denoted by eight groups of hexadecimal quartets separated by colons in between them.

An example of a valid IPv6 address:  
2001:cdba:0000:0000:0000:3257:9652

# IP version 4 (IPv4)

---

- 32-bit addresses consisting of four 8-bit numbers separated by periods, used to uniquely identify a device on a network that uses TCP/IP protocols
- The first numbers identify the network; the last numbers identify the host
- Example: 206.96.103.114

Each of the four numbers separated by periods is called an octet (for 8 bits)  $2^8=256$

# Public, Private, and Reserved IP Addresses

---

- Public IP address
  - Available to the Internet
- Private IP address
  - Used on a private TCP/IP network that is isolated from the Internet
- Reserved IP address
  - Reserved for special use by TCP/IP

IP Address	How It Is Used
255.255.255.255	Broadcast messages
0.0.0.0	A currently unassigned IP address
127.0.0.1	Indicates your own workstation

$$256 \times 256 \times 254 = 16,646,144$$

# Classes of IP Addresses

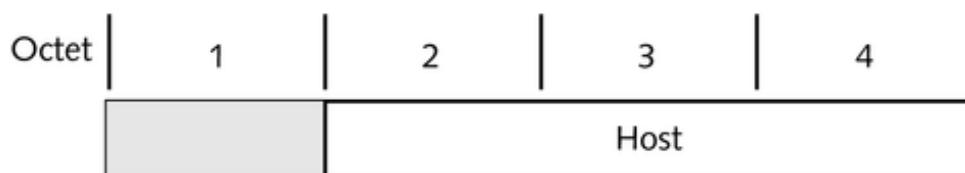
$$64 \times 256 = 16,384$$

$$256 \times 254 = 65,024$$

$$32 \times 256 \times 256 = 2,097,152$$

Classes of IP addresses

Class	Network Octets (blanks in the IP address are used for octets identifying hosts)	Total Number of Possible Networks or Licenses	Host Octets (blanks in the IP address are used for octets identifying networks)	Total Number of Possible IP Addresses in Each Network
A	0._____._____ to 126._____._____	127	_____.0.1 to _____.255.255.254	16,646,144
B	128.0._____._____ to 191.255._____._____	16,384	_____._____.0.1 to _____._____.255.254	65,024
C	192.0.0._____._____ to 223.255.255._____._____	2,097,152	_____._____._____.1 to _____._____._____.254	254



Class A address is assigned to large organizations with many hosts and heavy communication needs e.g. large educational, business and government



Class B



Class C

Class C address is assigned to small- to medium-sized organizations

# Dynamically Assigned IP Addresses

---

- Used for the current session only; when the session is terminated, the IP address is returned to the list of available addresses
- Compare with static IP addresses, which are permanently assigned to workstations

# Plans for New IP Addresses

1 US billion = 1,000,000,000

1 UK billion = 1,000,000,000,000

About to happen

## ➤ IP version 6 (IPv6)

- A new scheme of IP addresses being developed due to the impending shortage of IP addresses
- Each address segment can have 32 bits, for a total of 128 bits for the entire address
- Can automatically assign an IP address to a network device

$$32 \times 4 = 128$$

$$2^{32} = 4.3 \text{ US billion}$$

An example of a valid IPv6 address:

2001:cdba:0000:0000:0000:3257:9652

Address segment contains 32 bits

# Ports (TCP/IP Port Assignments)

Port number ranges from 0 to 65535

- Numbers used to address software or services running on a computer so that the process (service running on a host) can be found by TCP/IP
- Socket
  - Combination of IP address and port number

<http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml>

# Standard Port Numbers

Some common TCP/IP port assignments for well-known services

Port	Service	Description
7	Ping	Verify two computers can communicate
20	FTP	File transfer data
21	FTP	File transfer control information
23	Telnet	Telnet used by UNIX computers
25	SMTP	Simple Mail Transfer Protocol; client sends e-mail
35	Printer	Private printer service
53	DNS	Domain Name Service
69	TFTP	Trivial FTP

TFTP is used for automated transfer of configuration or boot files between machines in a local environment. Compared to FTP, TFTP is extremely limited, providing no authentication, and is rarely used interactively by a user.

# Standard Port Numbers

Common port no  
for Web server

Network News Transfer Protocol

Some common TCP/IP port assignments for well-known services (continued)

Port	Service	Description
79	Finger	Provides information about users and their accounts
80	HTTP	World Wide Web protocol
109	POP2	Post Office Protocol, version 2; client receives e-mail
110	POP3	Post Office Protocol, version 3; client receives e-mail
119	NNTP	News servers
143	IMAP	Internet Message Access Protocol; newer protocol for clients to receive e-mail
161	SNMP	Simple Network Management Protocol; TCP/IP protocol that monitors and helps manage network traffic
2049	NFS	Network File System; a method of sharing (called mounting) a hard drive on a network so it appears to be a local drive

# Network Masks

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- Portion of the IP address that identifies the network
- Sometimes called a subnet mask
- Not used by all networks

# Physically and Logically Dividing a Large Network

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## ➤ Segmenting

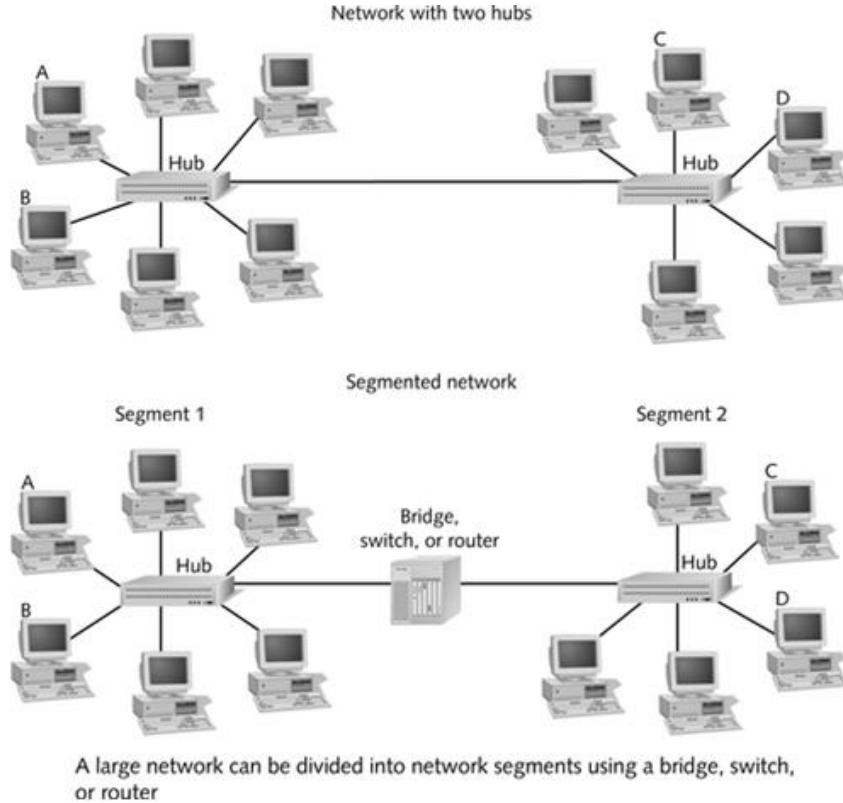
- Physically dividing the network using hardware devices (bridges, switches, routers)

## ➤ Subnetting

- Logically dividing the network using software settings

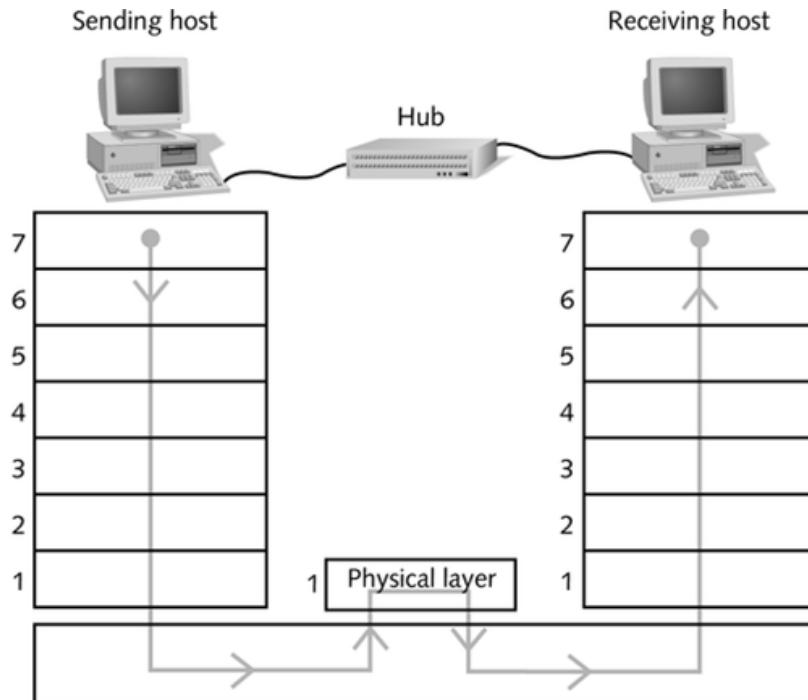
# Segmenting a Network

- Use a bridge, switch, or router



# Segmenting a Network

- Hub Operation
  - By Broadcasting

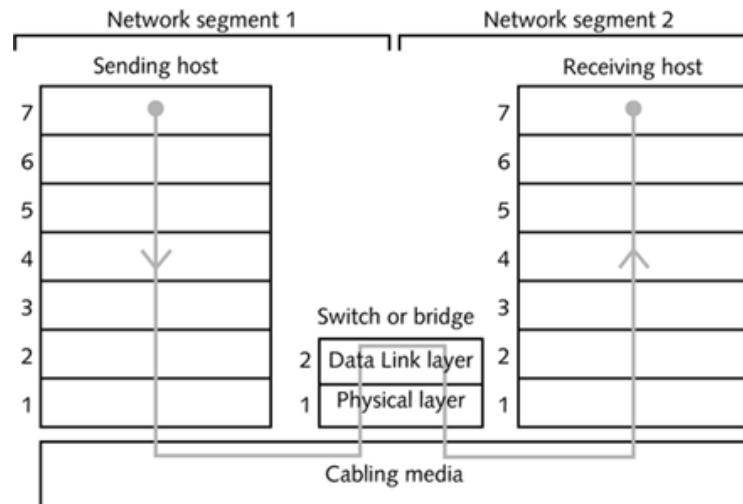


A hub operates at the Physical layer of the OSI model

# Bridges and Switches

Media Access Control address is hard-coded on network card by network card manufacturer. It is a 6-byte hexadecimal address unique to each network card and assigned by network card manufacturer. For example, 00 00 0C 08 2F 35. It is also called physical address, adapter address, hardware address or Ethernet address.

- Use MAC addresses to determine where to send packets
- Work at the Data Link layer of the OSI model



A switch or bridge works at OSI layer 2, the Data Link layer, where MAC addresses are used to send a data packet to the right network segment

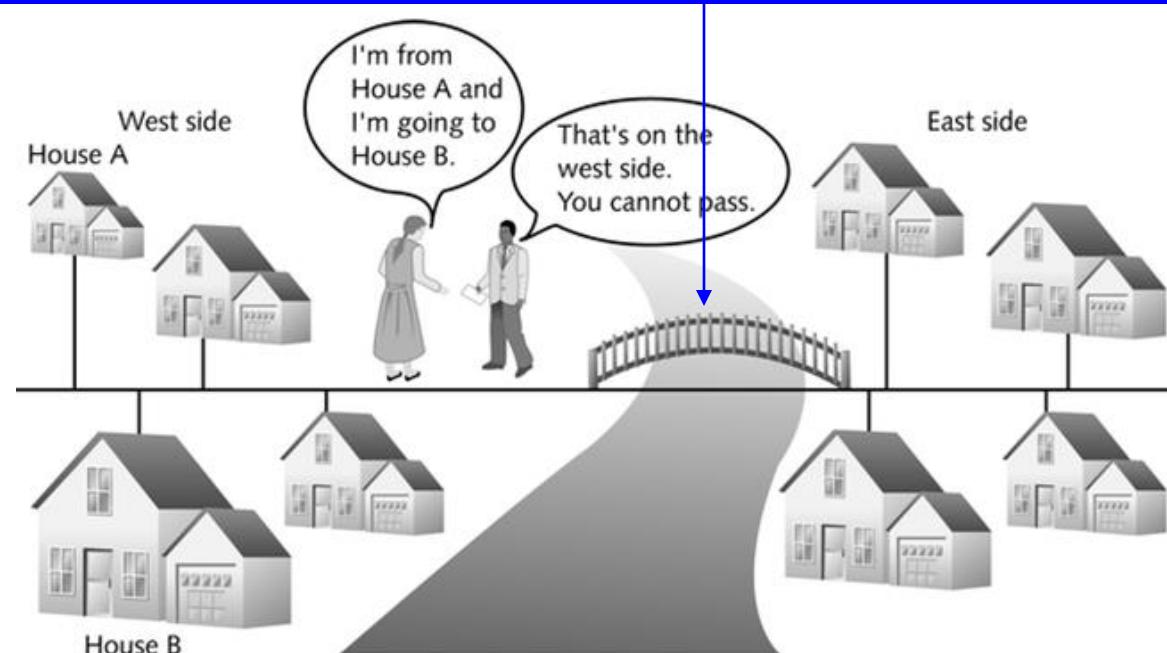
# Bridge

---

- Broadcasts messages to all networks to which it is connected except to the originating segment
- Effective at separating high-volume areas on a Local Area Network (LAN)
- Does not work well with large networks (produces unnecessary traffic)

# Bridge

The bridge looks at the destination address where the traveler wants to go. The bridge then searches for the destination address in his routing table. If he finds the destination address in the table, the table gives the side the address is on. He then allows or refuses the traveler to pass based on that knowledge. If the bridge does not find the destination address in the routing table, he allows the traveler to cross. In addition, the bridge updates his routing table by information he has just learnt. By knowing that the traveler come from the west side and knowing the source address of the traveler, he enters this source address into its routing table as one address on the west side. At first, the bridge does not know much about addresses on each side, but as many travelers come from both sides of the bridge, his table becomes more complete, and the bridge can be more efficient at his job.

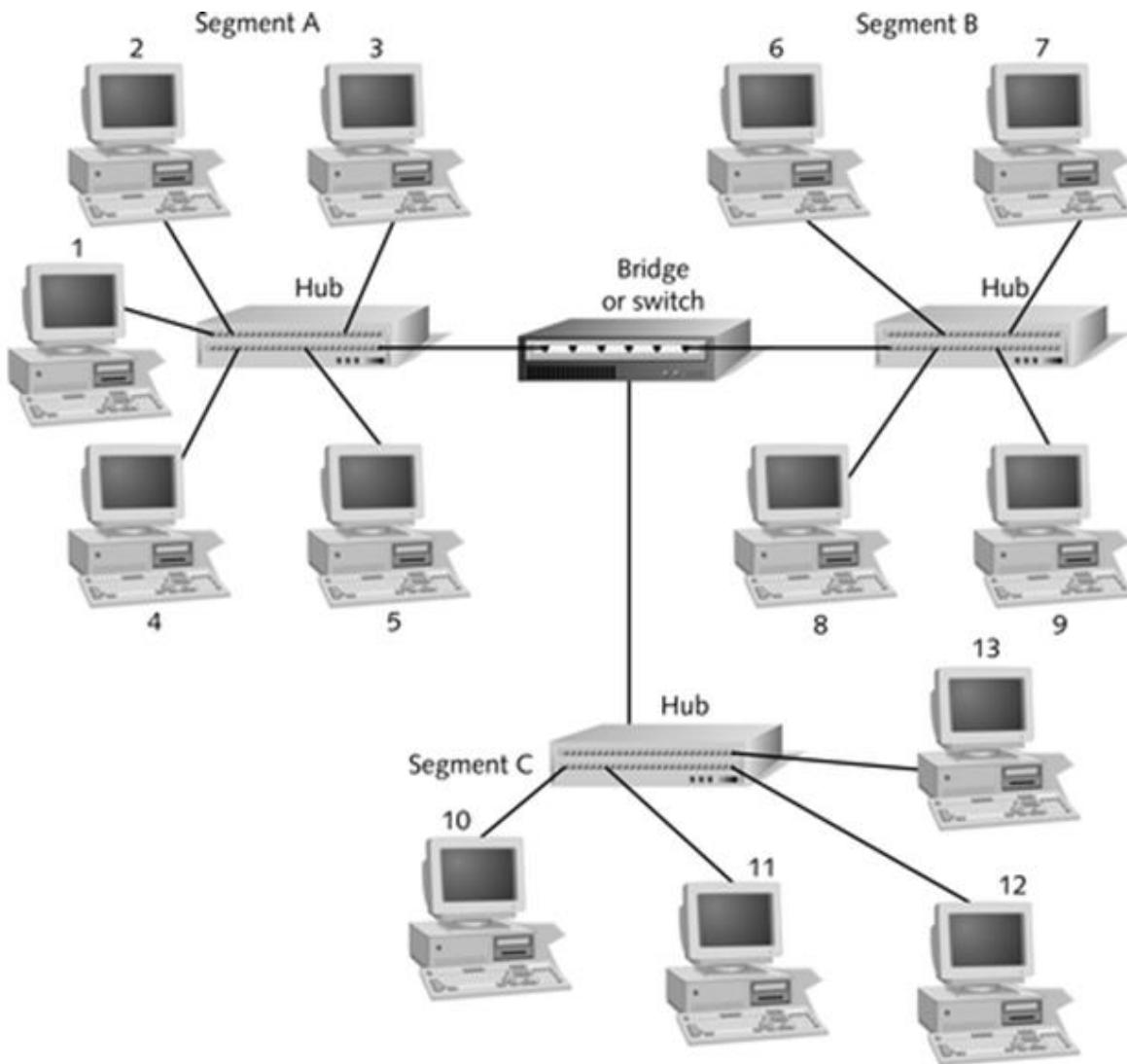


A bridge is an intelligent device operating at the Data Link layer of the OSI model

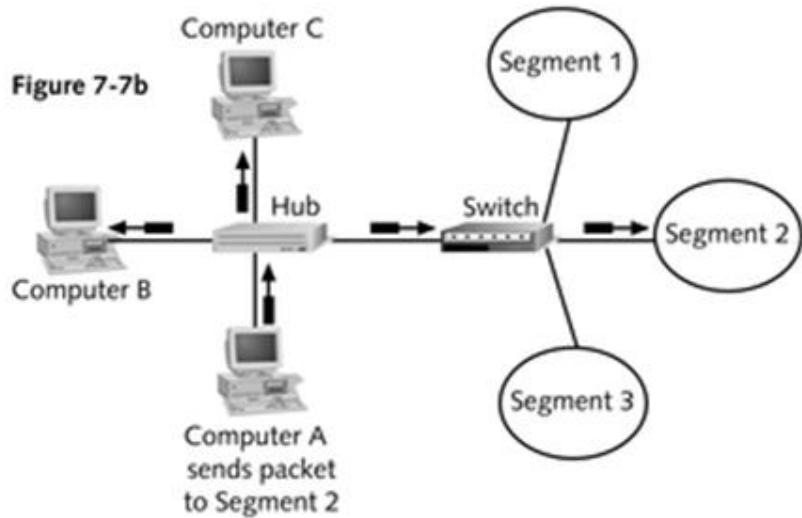
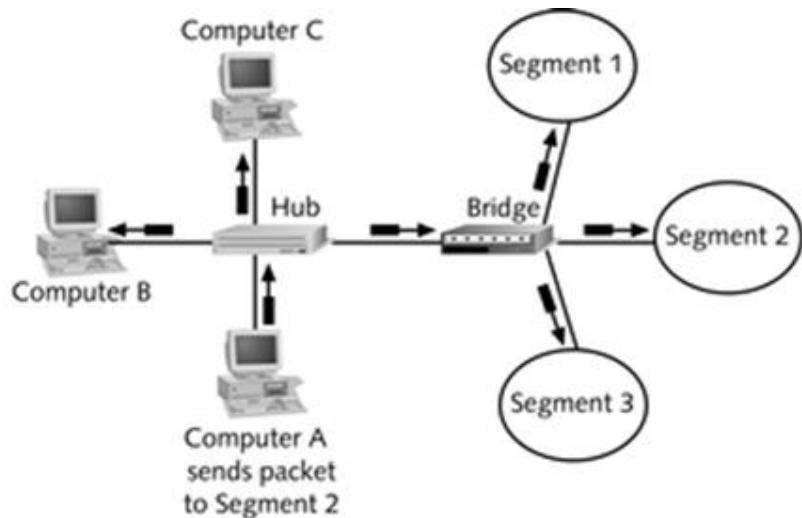
# Switch

---

- Only sends a packet to the destination network
- More efficient than a bridge
- More intelligent than a bridge; knows which LAN a packet should be sent to (using routing tables)



A bridge or switch connects two or more segments and decides to allow or prevent the packet from passing through based on its destination MAC address



A switch is more intelligent than a bridge and can determine which network segment a packet needs to be sent to

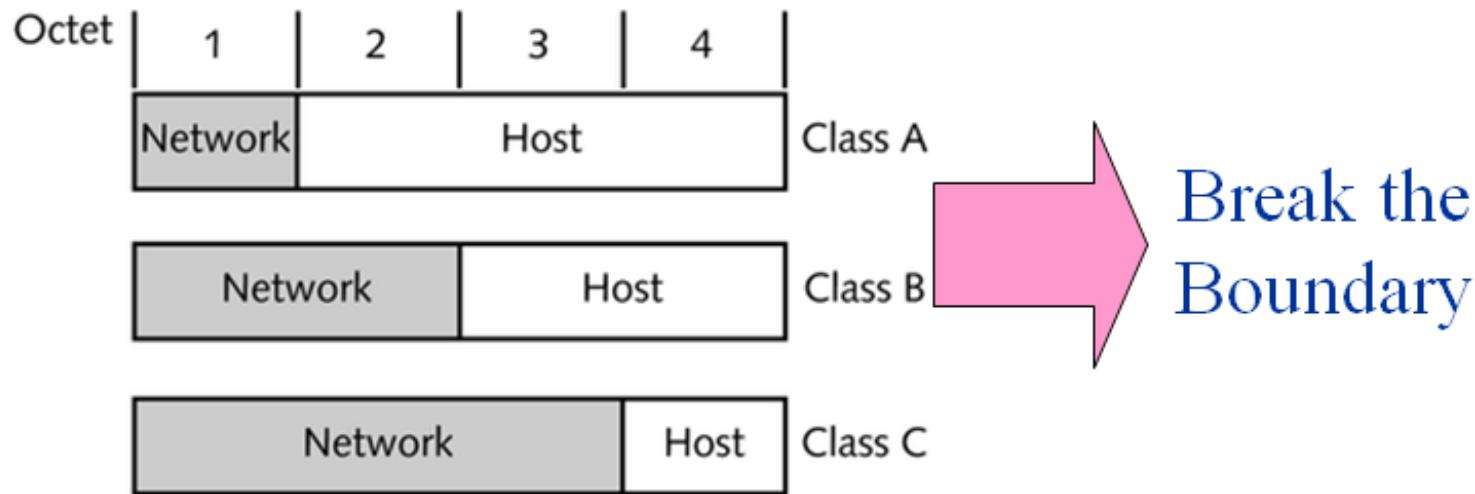
# Gateways

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- **Gateway**
  - Any device that connects two networks of differing protocols, or a device that provides a network access to other networks
- **Default gateway**
  - The main gateway or unit that sends or receives packets addressed to other networks
- **Alternate gateway**
  - An alternate router that is used if the default gateway is down

# Subnetting

- Process of logically dividing a very large network into two or more networks based on IP addresses rather than MAC addresses to reduce congestion



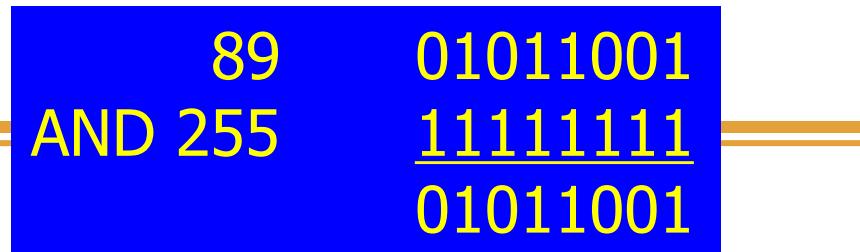
The network portion and host portion for each class of IP address

# Subnet Masks

---

- Define which portion of the host address within an IP address is being borrowed to define separate subnets within the network
- Used by a host to decide if a remote host is on its own network or another network
- If the destination host is on a remote network, the sending host sends the data to a device that sits as the gateway to other networks

# Subnet Masks



- A group of four 8-bit numbers separated by periods
- Use ones on the left to identify the subnet and zeroes on the right to identify the host for a given IP address
- A few bits at the beginning of the host portion of the IP address are borrowed from the host and used to identify the subnet
- The subnet mask tells how many of these bits are used for that purpose

## Default subnet masks for classes of IP addresses

Class of IP Address	Subnet Mask	Sample IP Address	Network ID	Host ID
Class A	11111111.00000000.00000000.00000000	89.100.13.78	89	100.13.78
Class B	11111111.11111111.00000000.00000000	190.78.13.250	190.78	13.250
Class C	11111111.11111111.11111111.00000000	201.18.20.208	201.18.20	208

# How to Select a Subnet Mask

All 1s in subnet – broadcast

All 0s in subnet – not used

- Base selection on the number of subnets needed and the number of hosts planned for each subnet

$2^6 - 2$

$2^2 - 2$

$2^2 - 2$

$2^{22} - 2$

Some examples of subnet masks

Class IP Address	Subnet Mask in Decimal	Subnet Mask in Bits	Possible Number of Subnets	Possible Number of Hosts in One Subnet
Class A	255.192.0.0	11111111.11000000.00000000.00000000	2	4,194,302
Class A	255.252.0.0	11111111.11111100.00000000.00000000	62	262,142
Class B	255.255.248.0	11111111.11111111.11111000.00000000	30	2,046
Class B	255.255.252.0	11111111.11111111.11111100.00000000	62	1,022
Class C	255.255.255.192	11111111.11111111.11111111.11000000	2	62
Class C	255.255.255.252	11111111.11111111.11111111.11111100	62	2

# Assigning and Tracking Domain Names and IP Addresses

---

- Was under the authority of the U.S. Government
- Reorganized to give more authority and responsibility to the private sector; and regulated by the Internet Corporation for Assigned Names and Numbers (ICANN)

# IP Addresses, Domain Names, and URLs

---

## ➤ Domain Names

- A text alias for one or more IP addresses
  - cengage.com is domain name for 69.32.133.79
- Domain Name System (DNS) uses name servers to resolve domain name to IP address
  - Managed by ICANN
  - TLD (.com, .biz, and so forth)
  - ccTLD (.us, .uk, and so forth)

Top-level Domain

Country-code Top-level Domain

# Top-Level Domains

Top-Level Domains

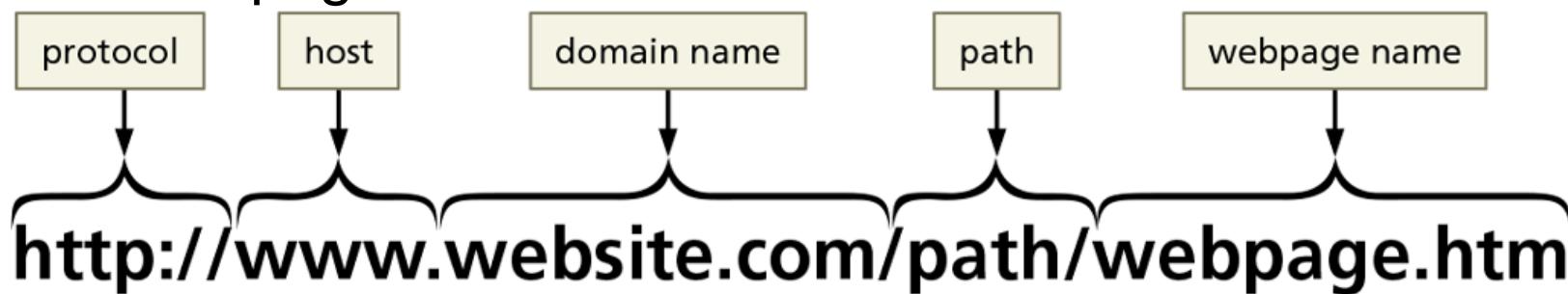
TLD Abbreviation	Type of Domain	TLD Abbreviation	Type of Domain
.com	Commercial firms	.aero	Aviation industry
.edu	Educational institutions	.biz	Businesses
.gov	Government entities	.coop	Cooperatives
.mil	U.S. military	.info	All uses
.net	Major networking centers	.museum	Museums
.org	Nonprofit organizations	.name	Individuals
.int	International organizations	.pro	Credentialed professionals
.mobi	Mobile products and services	.jobs	Human resources professionals
.travel	Travel industry	.asia	Pan-Asian and Asia Pacific community
.tel	Business and individual contact information	.cat	Catalan linguistic community

**Figure 2-5** Domains in the DNS are grouped by type of organization or sponsoring group.

# Domain Names, IP Addresses, and URLs

## ➤ Uniform Resource Locators (URLs)

- A unique web address
  - http:// protocol
  - host
  - domain name
  - path
  - webpage/resource name



# Protocols in URL

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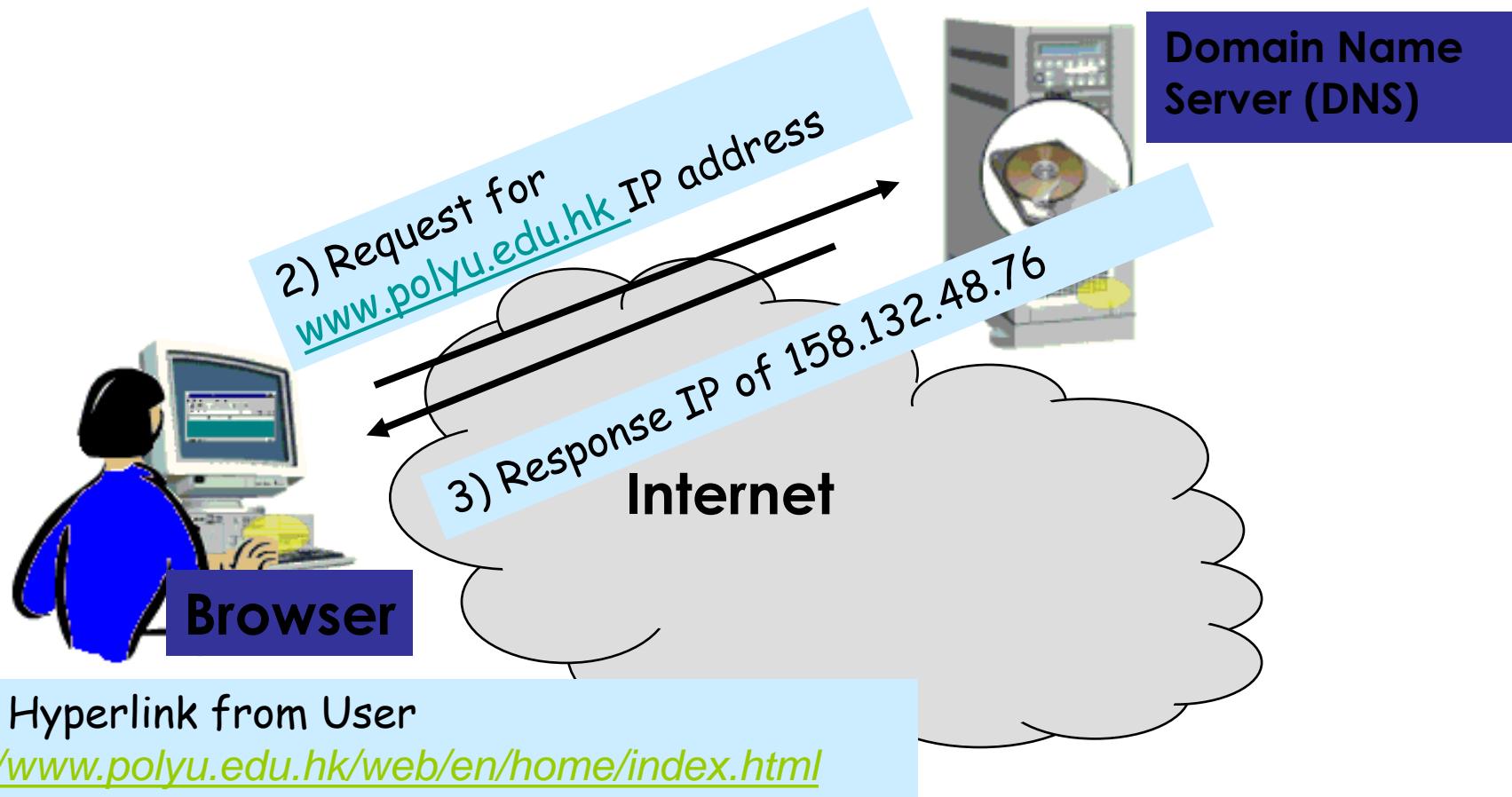
Protocol	Use	Example
ftp	File transfer	ftp://ftp.adobe.com/
http	Hypertext	http://www.hkcc-polyu.edu.hk
https	Hypertext secure	https://www.hkcc-polyu.edu.hk/en/home/index.html
mailto	Sending mail	mailto:sc.chan@cpce-polyu.edu.hk
news	Requesting news	news://netforum.netvigator.com

# Before we can get the web page, what's happening behind the computer?

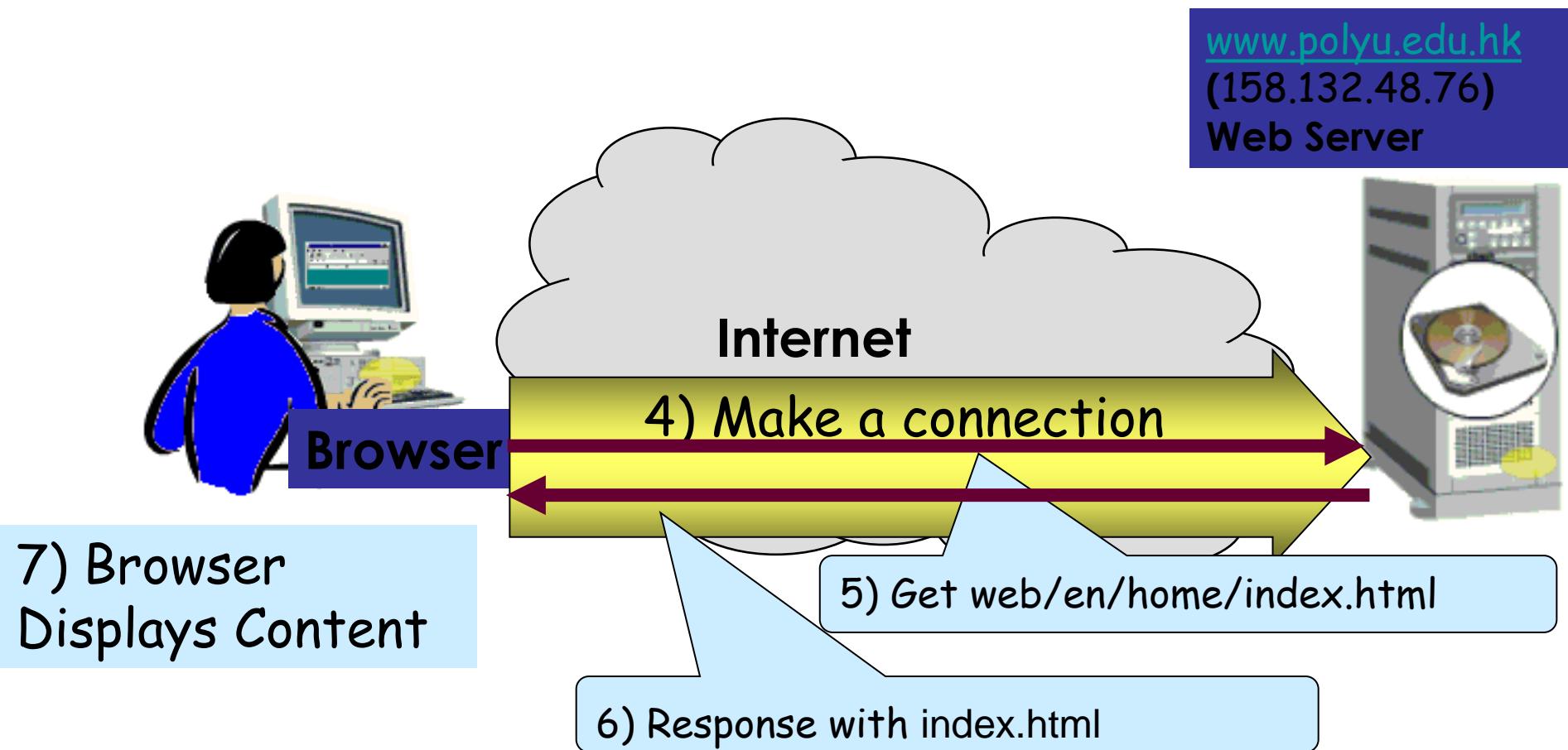
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# Internet Web Browsing Model



# Internet Web Browsing Model



# How to Create & Update Domain Names

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- Purchase a domain name from a registrar of domain names
  - e.g.
    - [www.networksolution.com](http://www.networksolution.com)
    - [www.hkirc.hk](http://www.hkirc.hk)

# 2

# Browsing the Web

## (Lecture 04)



# Discovering the Internet, 5<sup>th</sup> Edition

# Objectives

---

- Start a browser and view webpages
- Visit webpages using browser shortcuts
- Discuss the risks and safeguards related to using the web

# Browsers

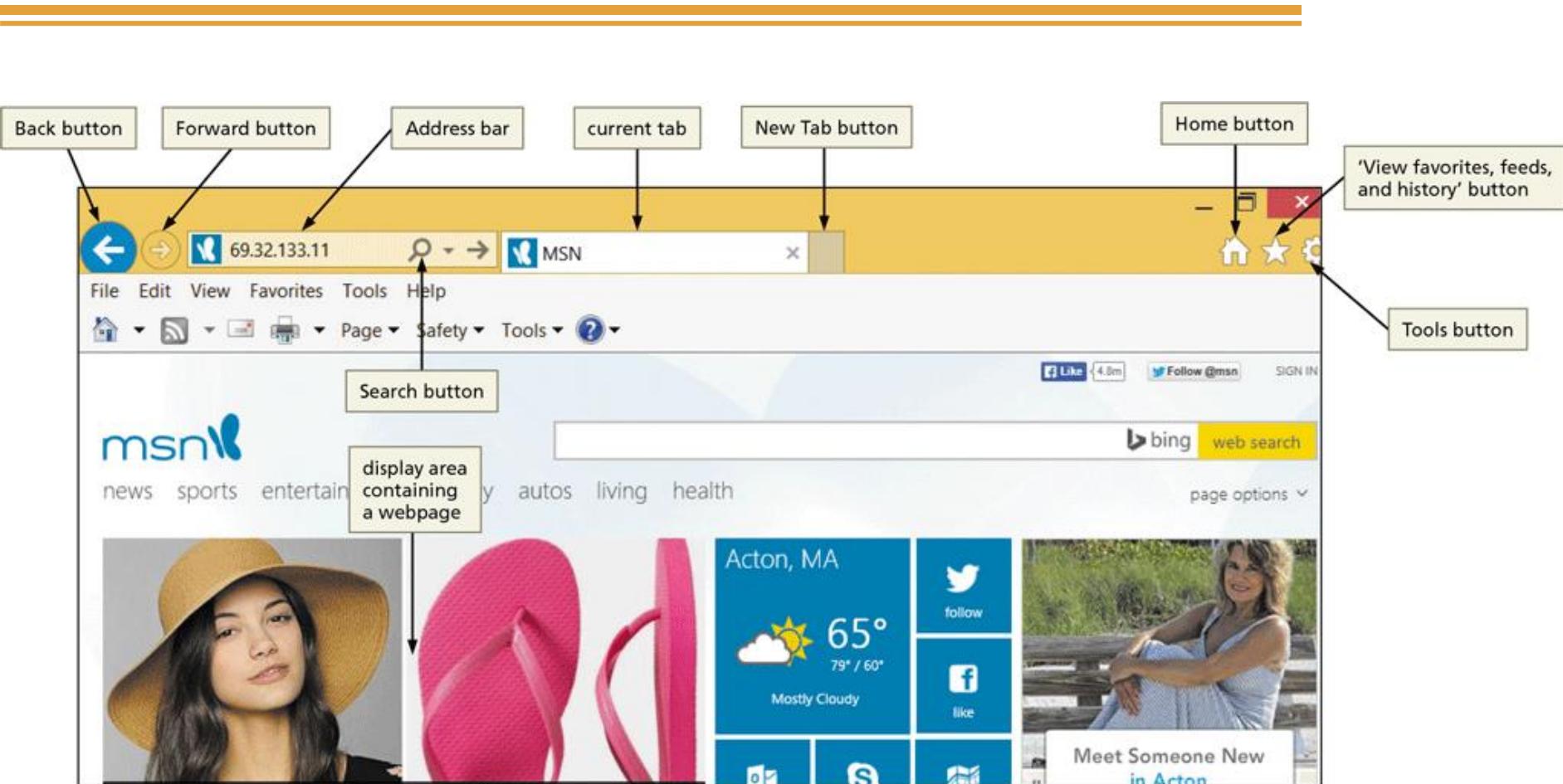
---

- Software or app used to access and view webpages
- Popular browsers for personal computers in homes and businesses
  - Google Chrome
  - Mozilla Firefox
  - Microsoft Windows Internet Explorer
  - Apple Safari
  - Opera

# Browsers

Browser	Description	Mobile Version(s)
Google Chrome	Free browser for Windows and Mac OS. Must be downloaded and installed. Includes strong security features.	Google Chrome, Google Android
Mozilla Firefox	Free browser for Windows, Mac OS, and Linux computers. Must be downloaded and installed. Includes many plug-ins, privacy and security features, and a password manager.	Firefox Mobile
Microsoft Internet Explorer	Free browser, comes installed on Microsoft Windows computers. Offers protection against phishing and malware.	Internet Explorer Mobile
Apple Safari	The default browser for Mac OS computers. Includes built-in social networking sharing tools, and is known for its fast performance.	Safari Mobile
Opera	Used on both computers and mobile devices. Must be downloaded and installed. The second oldest browser.	Opera Mini

# Browsers



# Browsers

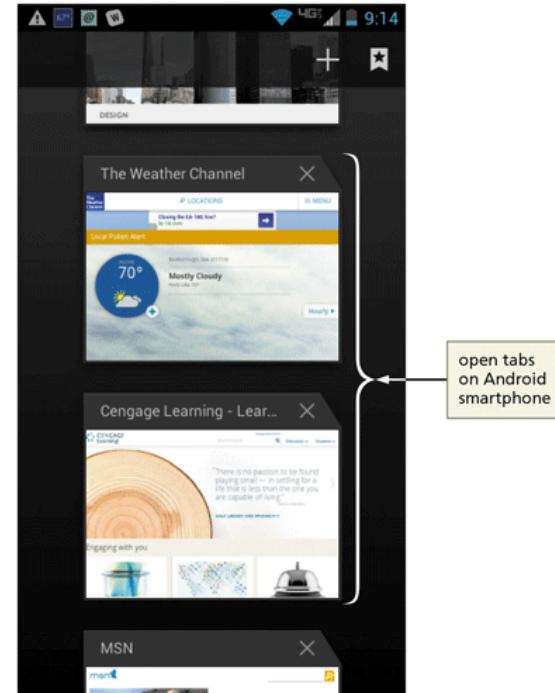
---

- Navigating Recently Viewed Webpages
  - Use the Back, Forward, Stop, Refresh, and Home Buttons
    - Back and Forward buttons – revisit recently viewed webpages
    - Stop and Refresh buttons – stops opening a page or opens an updated copy of the current page
    - Home – displays the home page(s)

# Browsers

## ➤ Using Tabbed Browsing

- Allows you to open multiple webpages in a single browser window



# Browsers

---

## ➤ Using Tabbed Browsing (continued)

- Each page can be opened in its own tab
- On mobile devices, view open tabs using a menu command
- New tab button displays a blank tab on which you can enter a URL
- Tapping or clicking a tab brings the webpage and tab from the background to the foreground
- Click the New Tab button to open a blank tab then enter URL in the Address box to open a webpage in the new tab

# Using Browser Shortcuts to Visit Webpages

---

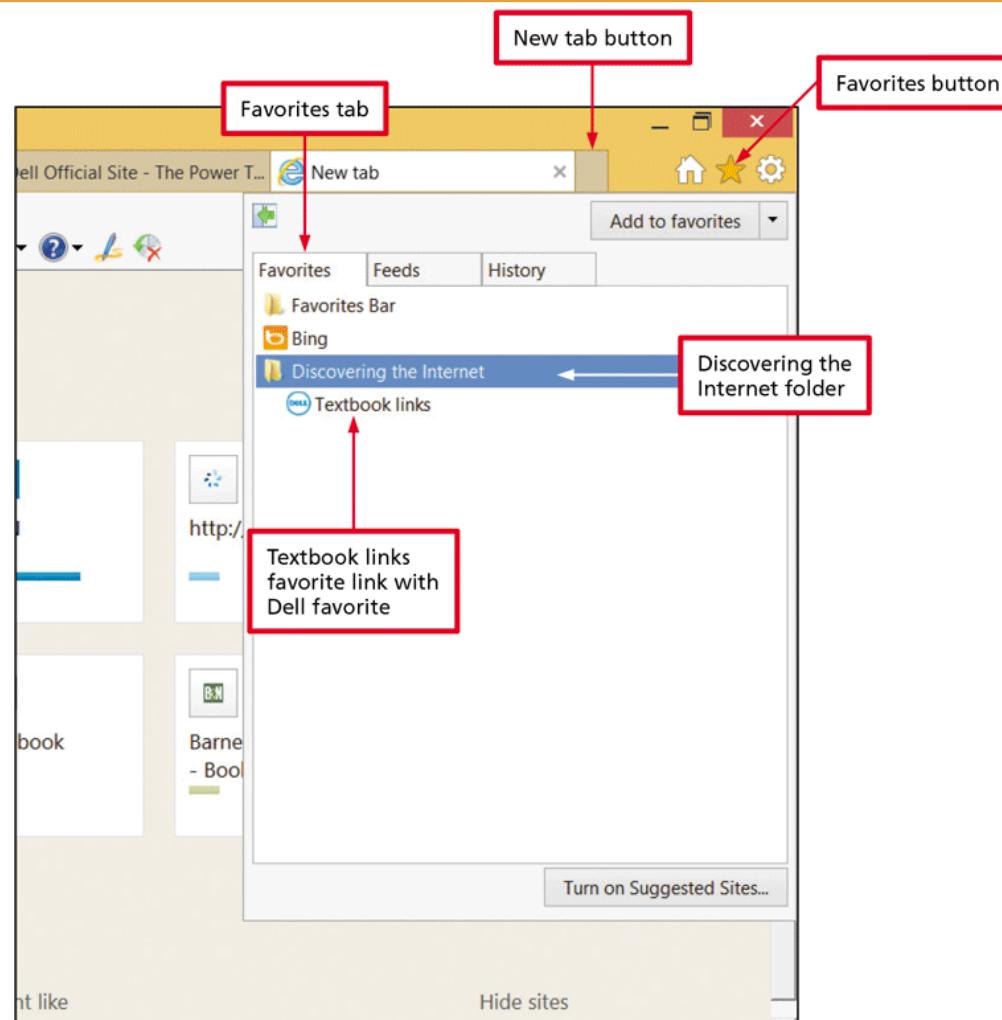
- Most browsers provide shortcuts for accessing webpage content and revisiting webpages, including:
  - Favorites
  - History
  - Accelerators
  - Web feeds
  - Address bar drop-down list
  - Suggested websites

# Using Browser Shortcuts to Visit Webpages

---

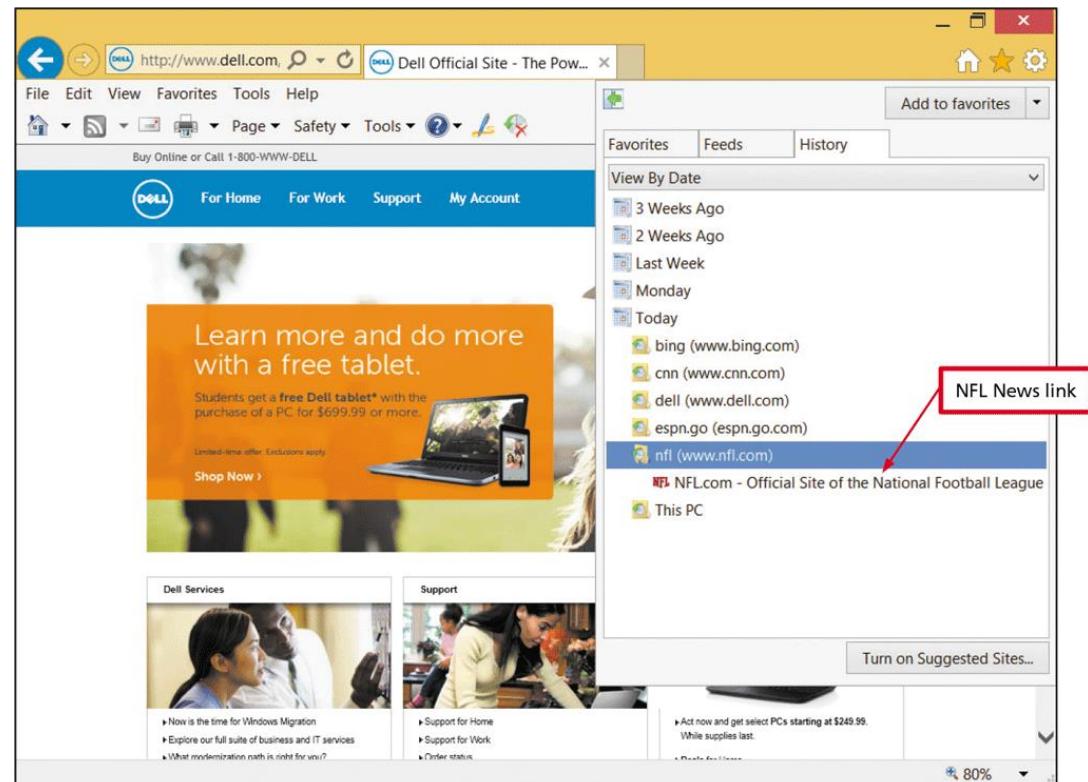
- Favorites
  - A **favorite**, or **bookmark**, is a browser shortcut to a frequently viewed webpage
  - Once created, you can tap or click the Favorites or Bookmark button to revisit the webpage

# Creating a Subfolder and Adding a Favorite or Bookmark



# Revisiting a Webpage Using the History List

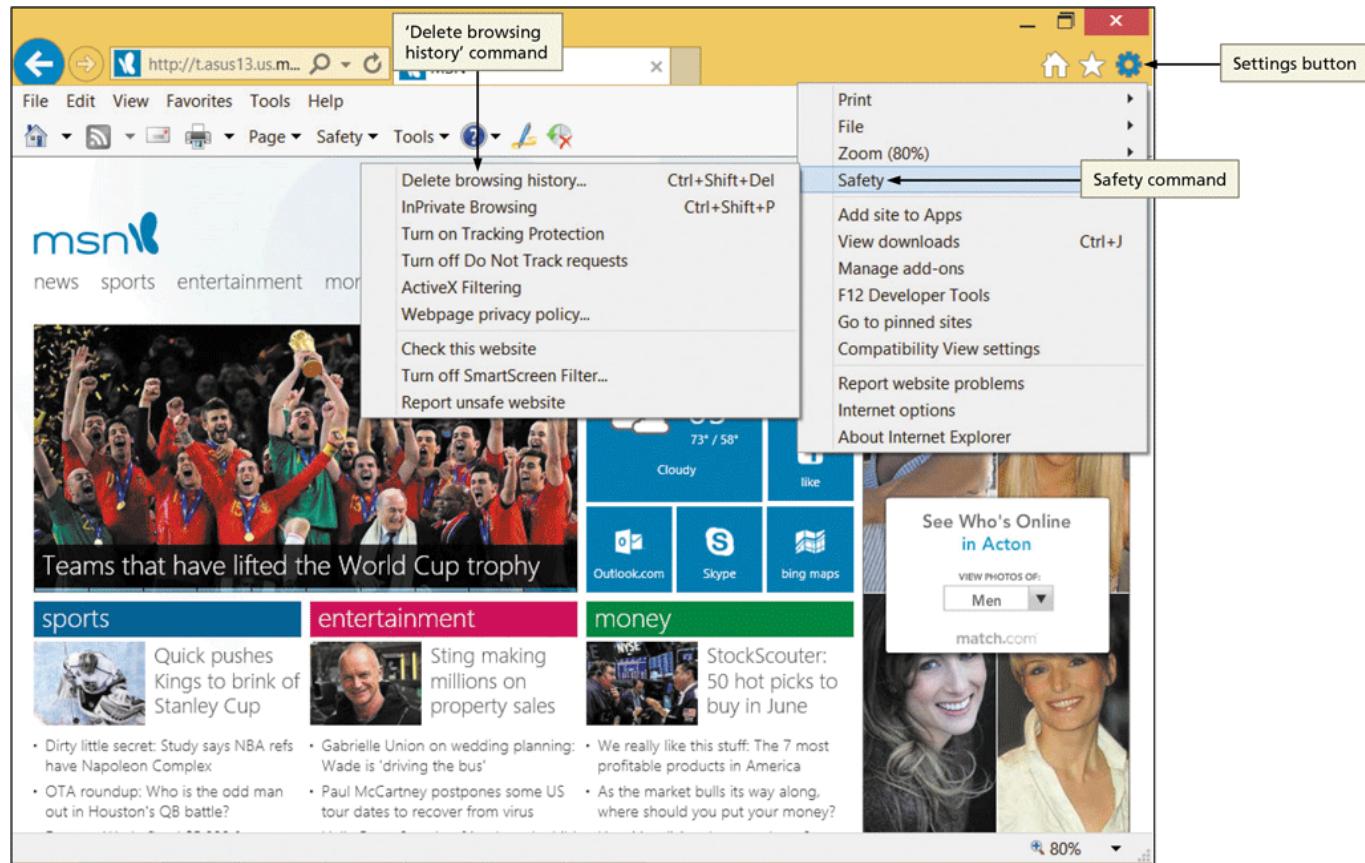
- Tap or click the Favorites button, Customize button, or other option
- Tap or click the History tab or History menu option to view the History list
- Tap or click the Today icon, if necessary, to expand the list of webpages visited today



# Using Browser Shortcuts to Visit Webpages

## ➤ Clear the Browser History

- Clear the browser history to protect your privacy



# Using Browser Shortcuts to Visit Webpages

Technologies that distribute web content to subscribers based on the websites and types of web content the user specifies

## ➤ Add-Ons

- Allow you to access web content or take some action based on selected webpage text
- Also called **accelerators** or **extensions**

## ➤ Web Feeds

- A service that provides updates to web content for subscribers
- **RSS (Really Simple Syndication)** and **Atom**

- **Feed reader** ← Can be email client or browser add-on. Nowadays, most browsers have a built-in feed reader
- **Aggregator**

- Most browsers have a built-in feed reader; can download stand-alone feed readers

# Subscribing to a Web Feed

---

- Type CNN . com / TECH in the Address bar and then press the ENTER key to open the webpage
- Tap or click the Feeds button arrow to view the available feeds on the selected website
- Click ‘CNN – Tech (RSS) or the feed of your choice
- Scroll the webpage to view the news stories available
- Tap or click the ‘Subscribe to this feed’ link to display the Subscribe to this Feed dialog box or perform similar steps if your browser works differently
- Tap or click the Subscribe button to display the confirmation webpage

# Subscribing to an RSS Feed

The screenshot shows a Microsoft Internet Explorer window displaying an RSS feed from CNN.com. The title bar reads "http://rss.cnn.com/rss/technology.xml CNN.com - Technology". The menu bar includes File, Edit, View, Favorites, Tools, and Help. Below the menu is a toolbar with icons for Home, RSS, Print, Page, Safety, Tools, and Help.

The main content area shows a yellow header for "CNN.com - Technology" with the subtext: "You are viewing a feed that contains frequently updated content. When you subscribe to a feed, it is added to the Common Feed List. Updated information from the feed is automatically downloaded to your computer and can be viewed in Internet Explorer and other programs. Learn more about feeds." A red arrow points from this text to the "Subscribe to this feed" link.

A red box highlights the "Subscribe to this feed" link. The link is located in the yellow header area, just below the main title.

The feed content lists several news items:

- At E3, all games, no Kinect for Microsoft** (Yesterday, June 9, 2014, 4:58:31 PM)  
Microsoft kept its eyes forward and revealed what is coming for the Xbox One this year and next at its 2014 Electronic Entertainment Expo briefing in Los Angeles, California. However, it is what they didn't talk about that might be more interesting.  
Email this Add to del.icio.us Digg This! Share on Facebook Stumble It!
- 'Smart' helmet may help detect concussions** (Yesterday, June 9, 2014, 2:32:27 PM)  
For years, the protocol for treating possible concussions on a football field has been this: After a player takes a hard hit to the head, a coach or trainer examines him to assess the severity of the impact and his readiness to return to the field.  
Email this Add to del.icio.us Digg This! Share on Facebook Stumble It!
- Meet Pepper, the emotional robot** (Friday, June 6, 2014, 5:11:02 PM)  
When someone is being stiff and acting emotionless, we may have to quit calling them a robot.  
Email this Add to del.icio.us Digg This! Share on Facebook Stumble It!
- Can this robot read your emotions?** (Friday, June 6, 2014, 1:17:04 PM)  
CNN's Will Ripley introduces us to Pepper, touted as the world's first robot able to read emotions.  
Email this Add to del.icio.us Digg This! Share on Facebook Stumble It!

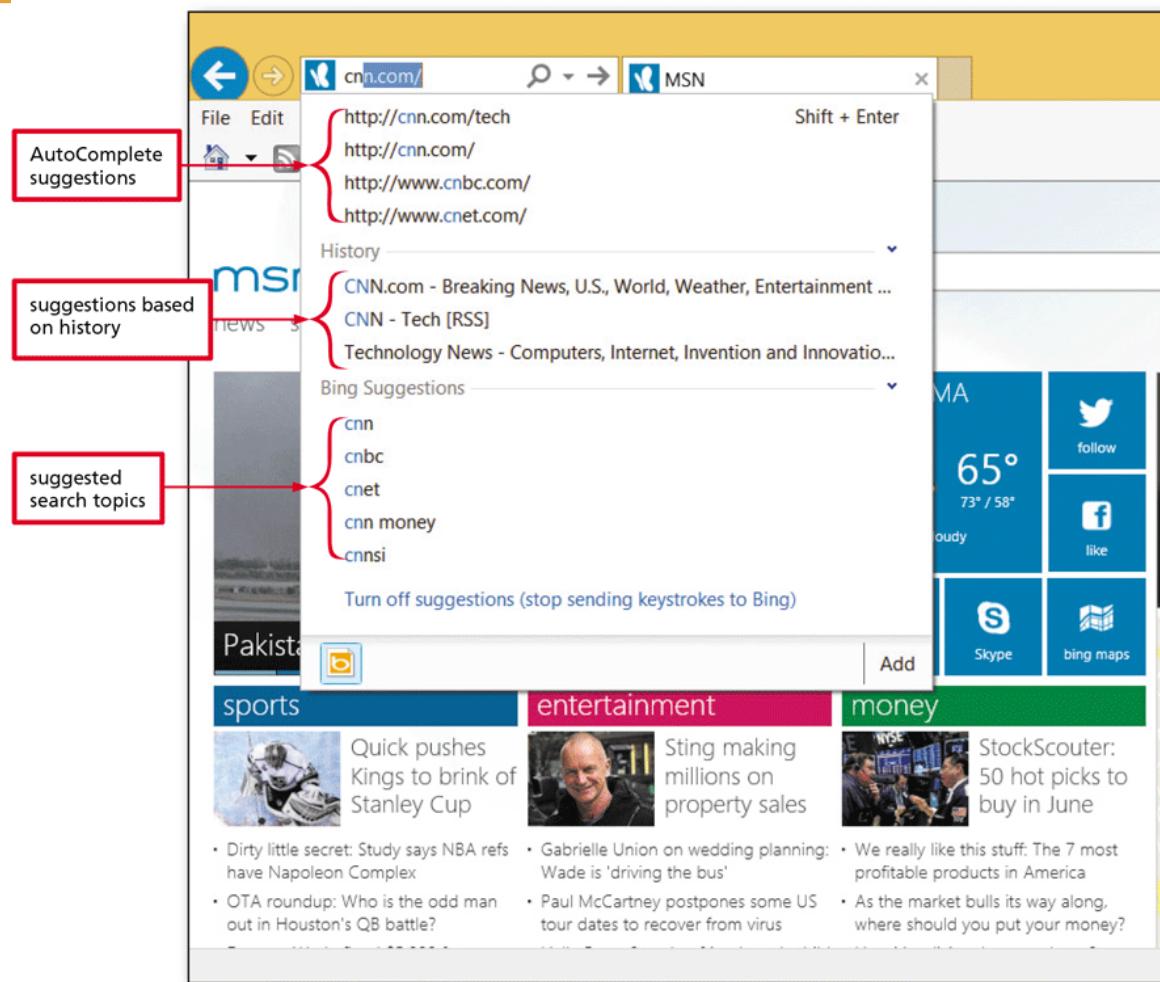
On the right side of the screen, there is a sidebar titled "Displaying 18 / 18" which includes a "Sort by:" dropdown menu with options "All" (selected) and "Date" and "Title". The bottom right corner of the browser window shows a zoom level of "80%".

# Using Browser Shortcuts to Visit Webpages

---

- Viewing and Deleting a Web Feed
  - Tap or click feed you wish to delete
  - Unsubscribe by deleting the feed from the feed reader
- Suggested Websites
  - The **AutoComplete** feature looks at the first few characters you type in the Address box and then suggests websites and search keywords based on the stored URLs
  - The Address bar dropdown list organizes suggestions by:
    - AutoComplete suggestions
    - History of webpages previously visited
    - Suggested search topics

# Using Browser Shortcuts to Visit Webpages

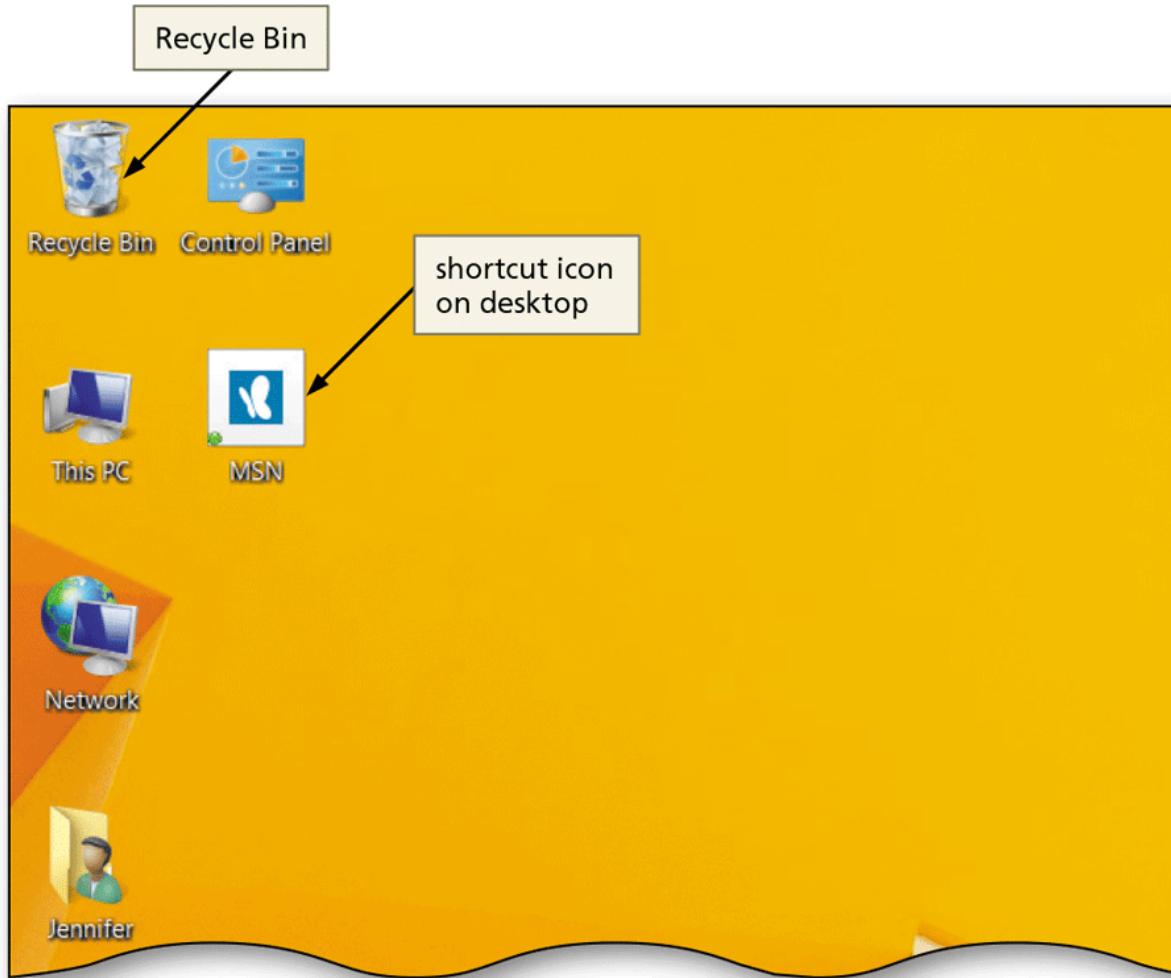


# Creating a Website Shortcut on the Desktop

---

- Navigate to [www.msn.com](http://www.msn.com) if necessary
- If necessary, minimize browser window so that you can see the desktop
- Tap or click the MSN icon in the Address bar or select the URL in the Address bar
- Drag the icon or suggested URL to the desktop to create a shortcut

# Creating a Website Shortcut on the Desktop

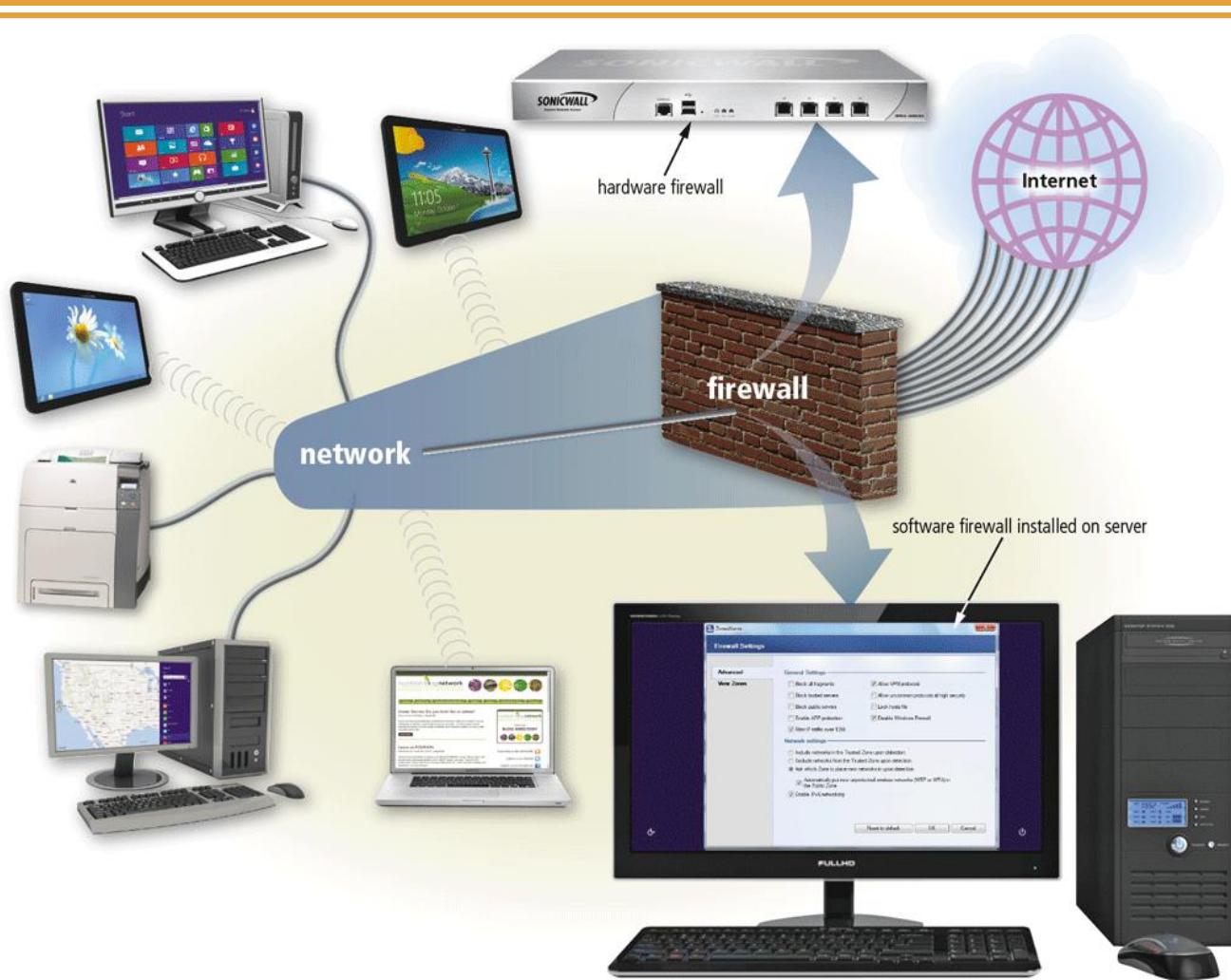


# Using the Web: Risks and Safeguards

---

- Protecting Your Computer from Hackers
  - A **hacker** is an individual who uses his or her technology skills to access a network and the computers on that network without authorization
  - A **firewall** is hardware and/or software that protects a computer or network from unauthorized access by hackers
    - Operating system might provide a firewall
    - Use password protection
    - Many routers and other network devices include firewalls

# Using the Web: Risks and Safeguards



# Using the Web: Risks and Safeguards

---

## ➤ Virus Protection

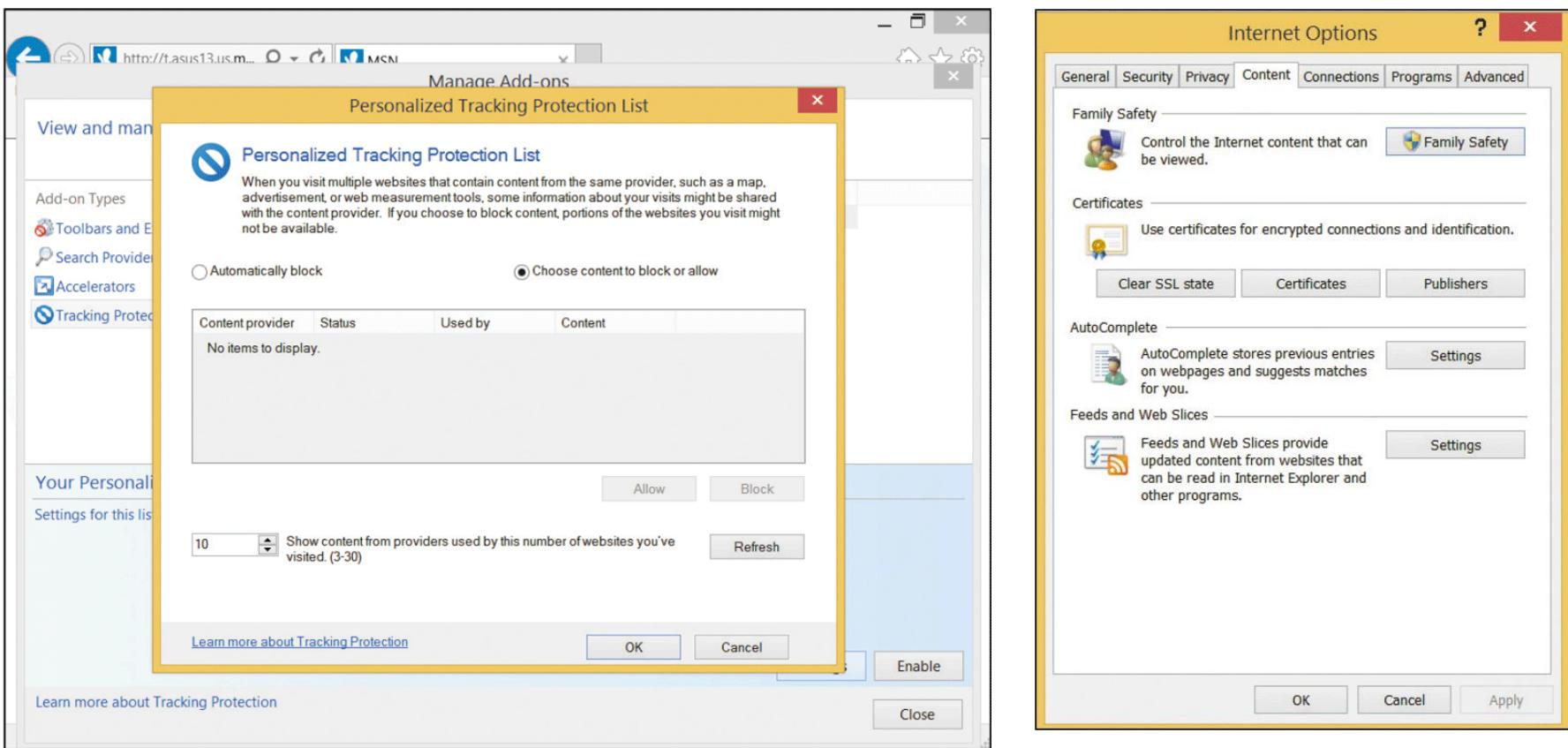
- A **virus** is a small, potentially damaging computer program or app
- Most browsers include filters and virus detection
- Can be spread to other computers through:
  - Sending/receiving e-mail message, text message, or file attachment
  - Downloading software and apps
- Install virus protection software to protect against infection and update it automatically

# Using the Web: Risks and Safeguards

---

- Shopping Safely Online
  - Use reputable online vendors
  - Pay with a credit card over a **secure connection**
  - Never send your credit card number or other personal information as an email or text message
- Filtering Web Content
  - Web is a largely unregulated and unprotected environment
    - **Tracking Protection Lists (TPLs)**
    - Use **web content filters (Internet filters)**

# Using the Web: Risks and Safeguards



# Using the Web: Risks and Safeguards

---

- Protecting against Malicious Websites
  - A **malicious website** is a website designed to look like a legitimate site, but is owned by hackers or online thieves
  - Used by thieves to:
    - Collect personal information, such as name and password
    - Distribute malicious software
  - Most browsers have built-in filters for detecting malicious websites

# Using the Web: Risks and Safeguards

---

- Keeping Your Personal Information Private
  - **Information privacy** refers to the right of individuals and companies to deny or restrict the collection and use of personal information.
  - Entities that might be collecting and using your private information:
    - Employers
    - Internet Service Providers
    - Government agencies
    - Privacy Advocates

# Using the Web: Risks and Safeguards

---

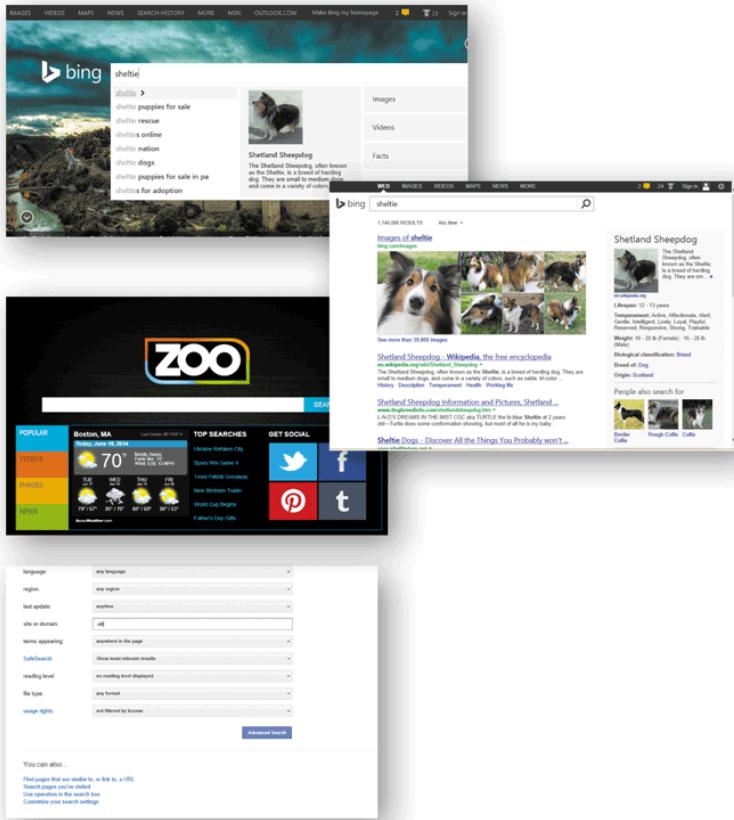
## ➤ Keeping Your Personal Information Private (continued)

- Privacy Advocates – dedicated to informing government agencies and consumers about privacy issues and maintaining information about privacy issues at their websites
- Business websites
- **Cookies** – Small text file stored on a computer or device
- **Spyware** – technology that accesses your computer system to gather information without your knowledge and approval
- **Adware** – form of spyware that gathers information then uses it to deliver targeted web advertising

# 3

# Searching the Web

## (Lecture 5)



# Discovering the Internet, 5<sup>th</sup> Edition

# Objectives

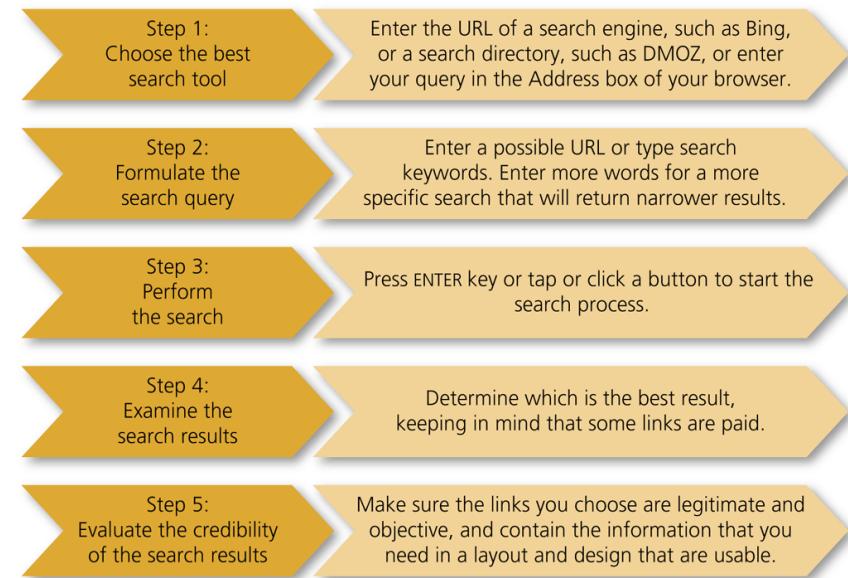
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- Describe how search engines work, and understand the search process
- Use different types of search tools and compare search results
- Apply search tool shortcuts and advanced features, including Boolean operators
- Perform searches using browser search features
- Identify and use specialized search tools

# The Search Process

---

- Choose the best search tool
- Formulate the search query
- Perform the search
- Examine the search results
- Evaluate the credibility of the search results



# The Search Process

---

- Choosing the Best Search Tool
  - Easy to use
  - Returns results quickly
  - Provides access to frequently updated large indexes and other web-based files
  - Presents most relevant search results returned
  - Clearly indicates paid or sponsored links

# The Search Process

---

## Search Engines

Content/Topic	Examples
Business	Business.com, GenieKnows, Justdial
Food/Recipes	RecipeBridge, Yummly
Job/Career	CareerBuilder, Hotjobs, Indeed, Glassdoor, Monster
Legal	Google Scholar, Lexis Nexis, WestLaw
Medical	Bing Health, Healthline, WebMD
Real Estate/Property	Realtor.com, Redfin, Trulia, Zillow
Maps	Google Maps, Mapquest, OpenStreetMap, Wikimapia
Question and Answer	Answers.com, eHow, wikiHow, WolframAlpha

# The Search Process

---

## ➤ Formulating the Search Query

- The **search query** is the question that defines the information you seek
- A query should include at least one **keyword**, the specific word that describes that information
- Choose carefully, using specific rather than general keywords
- To perform a search, enter one or more keywords into the **search text box** or Address box

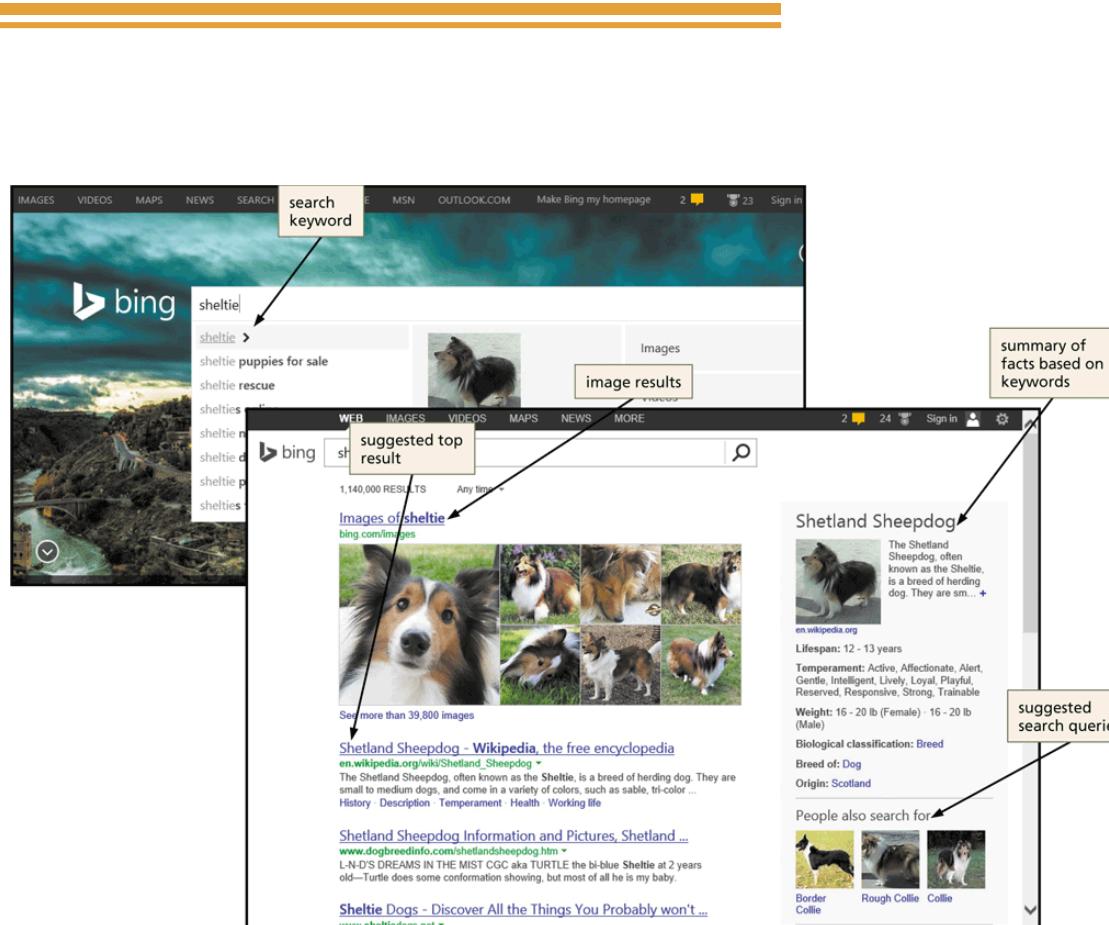
# The Search Process

---

- Formulating the Search Query (continued)
  - A search tool then uses the keywords to identify relevant webpages and return a **search results list**
  - **Search results list** contains the URL, title, and description of and links to webpages
  - Each webpage item listed in search results list is a **hit**

# The Search Process

- Formulating the Search Query (continued)
  - More keywords equal more focused results
  - Surround a phrase with quotation marks



# The Search Process

---

- Formulating the Search Query (continued)
  - Ensure proper spelling
  - A **targeted search** seeks specific information using keyword combinations
  - An **open-ended search** seeks information on a broader scale using a simple keyword
  - A search that uses complete sentences is sometimes called a natural language search
  - Small, unimportant words in a natural language search query are called **stop words**, and are ignored

# The Search Process

---

## ➤ Examining the Search Results

- Different search tools return different search results for the same keyword
- Be aware that paid or sponsored listing may appear at top of search results
- People typically look only at the first 10 or 20 hits; search again with different keywords or search tool, if necessary

# The Search Process

---

- Evaluating the Credibility of Search Results
  - Authority
    - Owner or author expertise
    - Check top-level domains
    - **Primary source** is any document, item, or other data that provides firsthand information about a topic
  - Objectivity
    - Fair
    - Unbiased
    - Not skewed toward commercial or political interests

# The Search Process

---

- Evaluating the Credibility of Search Results (continued)
  - Scope and Quality
    - Depth of coverage
    - Amount of detail provided
    - Accurate and up-to-date
    - Compares favorably with other pages on the same topic
    - Consider currency for breaking news
  - Design and Functionality
    - Well-designed and easy-to-use page
    - **Broken links** indicate poor attention to detail

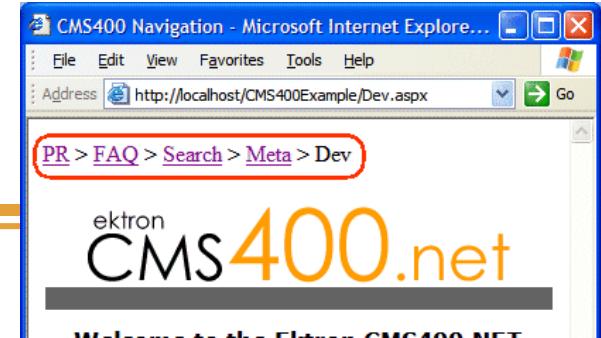
# The Search Process

---

## Evaluating the Credibility of Webpages

Area	Questions
Authority	<ul style="list-style-type: none"><li>• Is this a primary source document?</li><li>• Is the webpage's sponsoring organization or author a noted authority?</li><li>• Are the webpages up to date?</li></ul>
Objectivity	<ul style="list-style-type: none"><li>• Is the webpage objective?</li><li>• Is any bias clearly stated?</li></ul>
Scope	<ul style="list-style-type: none"><li>• What is the intended audience for this website?</li><li>• How does the information on the webpage compare with others on the same topic?</li></ul>
Design and functionality	<ul style="list-style-type: none"><li>• Does the webpage have a professional appearance?</li><li>• Do all parts of the webpage work correctly?</li></ul>

# Search Tools



## ➤ Directories

- **Directory** is a human-compiled, hierarchical list of webpages
- Yahoo! is one of the first directories
- Editors create an **index**, or list of webpages
- Organizes links in categories and subcategories
- Users increasingly **drilling down** through categories to find specific information
- A **breadcrumb trail** shows the hierarchical arrangement of categories and subcategories through which you have clicked

# Search Tools

The image displays three screenshots of the dmoz directory listing for the category "Recreation: Outdoors".

**Screenshot 1: Main Category**

The first screenshot shows the main category page for "Recreation: Outdoors" (73,205 sites). It includes a search bar, navigation links, and a sidebar with various categories like Arts, Business, Computers, etc. A large red arrow points from this main category page to the sub-category page.

**Screenshot 2: Sub-Categories**

The second screenshot shows the sub-categories for "Recreation: Outdoors". It lists categories such as Chats and Forums, Directories, Equipment, Guides and Outfitters, Maps, News and Media, Organizations, Parks, Personal Pages, Schools and Education, and Survival and Primitive Technology. A red arrow points from this page to the specific sub-category page for Geocaching.

**Screenshot 3: Specific Sub-Categories**

The third screenshot shows the specific sub-category page for "Geocaching" (99 sites). It lists sub-categories under Geocaching: Arrowhead Collecting, Birding, Boating, Canoe and Kayaking, Camping, Caving, Climbing, Cooking, Geocaching, Horseriding, Orienteering, Prospecting, Rockhounding, Scuba Diving, Surfing, Trapping, Whining, Zorbing. It also includes sections for "See also:" and "This category in other languages". A red arrow points from this specific sub-category page back to the main category page.

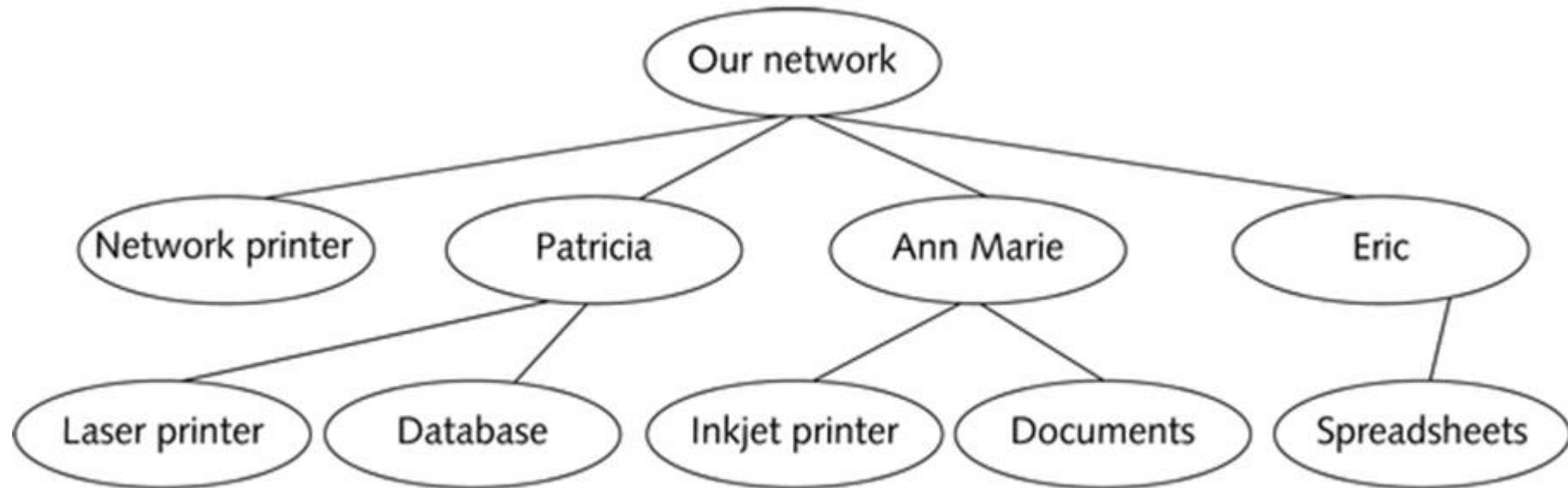
# Directory Server

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- Stores information about people, hosts, and other resources on the network in directories and provides this information to computers on the network
- Requirements
  - To be able to handle a high volume of searches
  - To provide results for queries quickly

# How Directories Work

- By following an upside-down tree structure

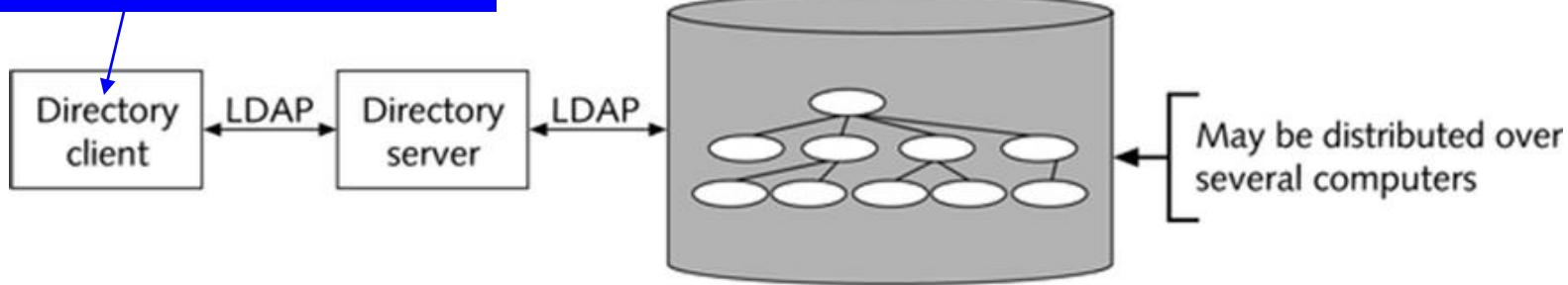


Information about resources on a network can be kept in a directory

# How Directories Work

- Directory servers sometimes use a protocol called LDAP (Lightweight Directory Access Protocol) to access directories

When an application or user needs information from a directory, user's application acts as a client to the directory server and makes request to the server.



# Using Directories

---

- Directories on the web are similar to search engines in the way they operate and provide information
- Example:

# Search Tools

## ➤ Search Engines

A spider, bot, or web crawler automatically browses the web going from link to link to add and update its searchable index

- Use software called a **spider**, **bot**, or **web crawler**
- Typical information collected by a web crawler
  - Page title
  - URL
  - **Meta tag keywords**
  - Occurrence of keywords in page
  - All of the words on the page – **full-text searching**
  - Internal links
  - Number and relevancy of other webpages that link to the page

bot: short for robot

# Search Tools

---

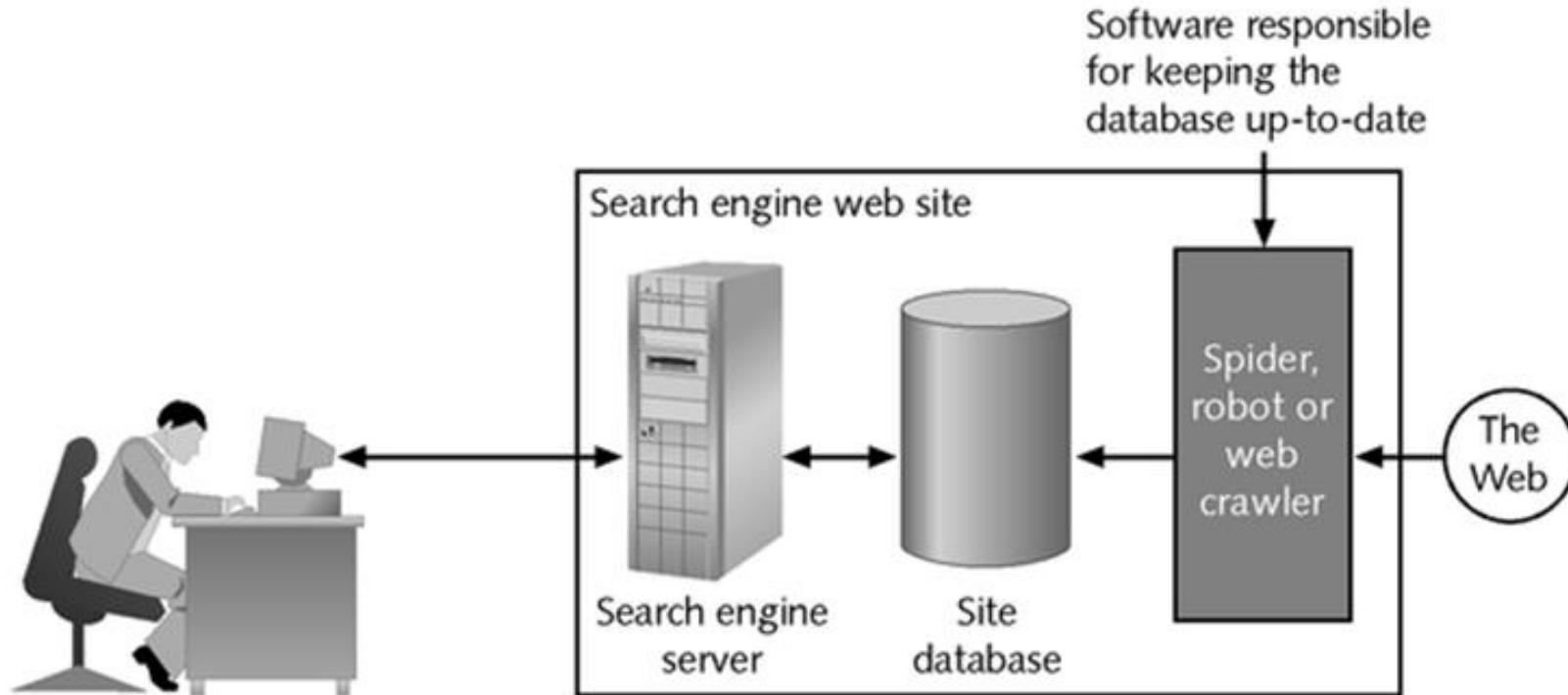
- Search Engines (continued)
  - Search engines use different algorithms to determine relevance of webpages in the search results
  - Most search engines also include paid or sponsored listings on the search results page
  - Many search tools today have become hybrids, basing results on indexes created by both web crawlers and human editors

# Search Engine Web Sites

---

- Help users find information anywhere on the web
- Keep databases containing keywords and the URLs where the keywords are located
- Ways in which databases are created and maintained
  - A person enters keywords in a subject directory
  - Web crawlers, spiders, or web robots look for new information

# Using a Search Engine Web Site



When you use a search engine web site to locate something on the Web, the search engine server searches the site's database, not the entire Web

# Three-step process of Search Engines

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## ➤ Three-step process

### 1. Crawling

- use software called web crawler, bot or spider to collect information from webpages

### 2. Indexing

- Index the data coming in from crawlers by using keywords

### 3. The search process

- Use the index created to look up the search term

# Search Tools

---

## ➤ Metasearch Engines

- A **metasearch engine** compiles the search results from multiple search engines into a single search results list
  - Some eliminate duplicates
  - Watch for paid or sponsored listings in search results list
    - Dogpile
    - Mamma.com
    - Zoo
    - Ixquick

# Search Tools

The screenshot shows the Zeebox search interface. At the top is a large "zoo" logo with a colorful swoosh underneath. Below it is a search bar with a white input field and a blue "SEARCH" button. To the left is a vertical sidebar with four colored sections: blue ("POPULAR"), orange ("VIDEOS"), yellow ("IMAGES"), and green ("NEWS"). The main content area has several sections: "Boston, MA" with a weather forecast for June 16, 2014, including a sun icon, a temperature of 70°F, and a "Mostly Sunny" condition; a "TOP SEARCHES" list with items like "Ukraine Retakes City", "Spurs Win Game 4", "Tesla Patent Giveaway", "New Birdman Trailer", "World Cup Begins", and "Father's Day Gifts"; and a "GET SOCIAL" section with icons for Twitter, Facebook, Pinterest, and Tumblr.

**POPULAR**

**VIDEOS**

**IMAGES**

**NEWS**

**Boston, MA** Last Update: 08/18/2014

Today, June 16, 2014

70 °F Mostly Sunny  
Feels like: 74°  
Wind: ESE 13 MPH

TUE Jun 17 WED Jun 18 THU Jun 19 FRI Jun 20

79° / 67° 85° / 70° 80° / 69° 80° / 63°

AccuWeather.com

**TOP SEARCHES**

- Ukraine Retakes City
- Spurs Win Game 4
- Tesla Patent Giveaway
- New Birdman Trailer
- World Cup Begins
- Father's Day Gifts

**GET SOCIAL**

# Advanced Search Techniques

## ➤ Refining Searches

- A **Boolean operator** specifies which keywords should be included or excluded from search results

### Boolean Operators

Task	Procedure
Search for all the words in any order.	Type AND between keywords. Example: Canada AND nickel AND mines
Search for at least one of the words.	Type OR between keywords. Example: ocean OR sea
Search for a phrase in the given order.	Surround the phrase with quotation marks. Example: "Catalina yachts"
Exclude a concept from the search results.	Type NOT before the excluded word. Examples: orange NOT Florida or sometimes: kayak AND NOT inflatable

# Advanced Search Techniques

---

## ➤ Refining Searches

- Boolean operators include:
  - AND
    - Keyword must be included
  - OR
    - At least one of multiple keywords must be included
  - NOT
    - Keyword must be excluded
- Major search engines offer searching shortcuts

# Advanced Search Techniques

---

- Advanced Search Forms
  - Used to structure complex search queries
  - Prompts you to specify Boolean operators and other criteria
  - Can filter results by:
    - Language
    - File type
    - Domain
  - Great way to learn more about how to use specific search engine shortcuts and Boolean operators

# Browser Searches

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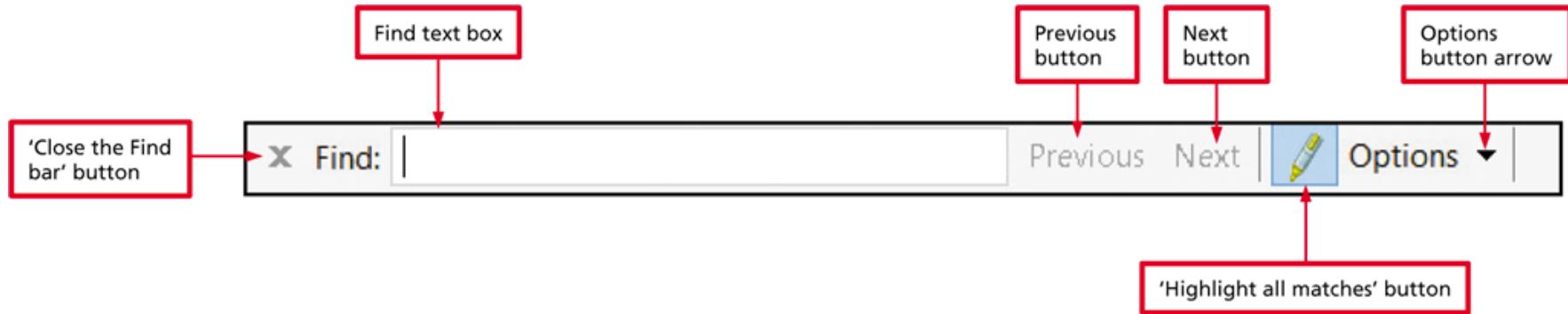
## ➤ Address Bar Searches

- Enter keywords in the Address box on the Address bar
- Press ENTER key or tap or click appropriate button to open search results page in the current tab

# Browser Searches

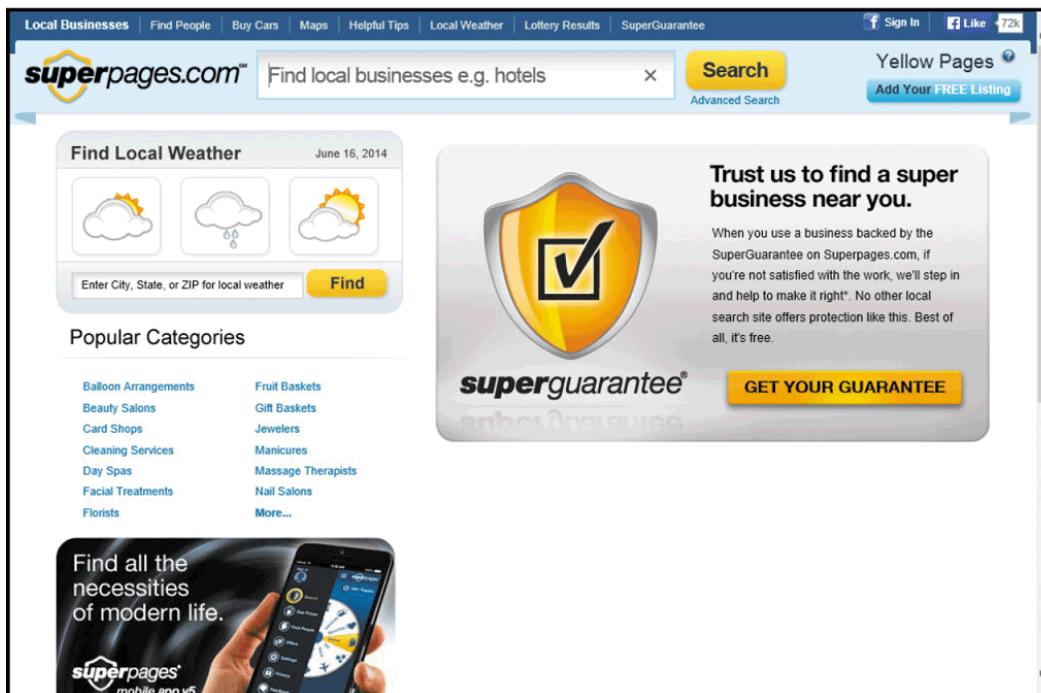
## ➤ Webpage Searches

- Find bar allows you to search the contents of a webpage
- Press CTRL+F to display the Find Bar



# Specialized Searches

- People and Business Search
  - Use **online white pages directory** or **online yellow pages directory**



# Specialized Searches

---

- People and Business Search (continued)
  - Free resources
    - Pipl
    - Wink
  - Fee-based (pay for additional information)
    - WhitePages
    - Superpages

# Specialized Searches

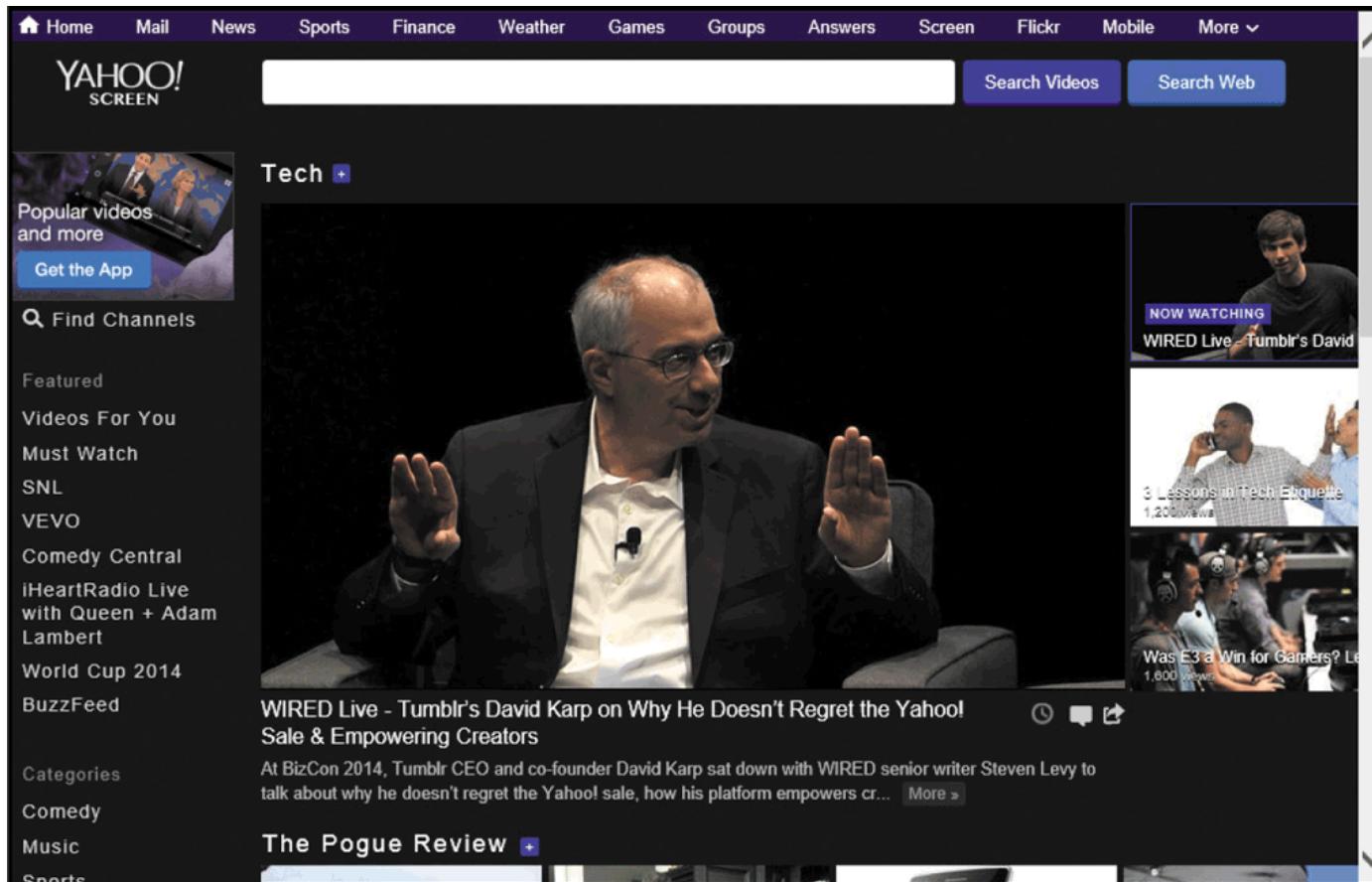
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## ➤ News and Current Event Search

- MSN
- Yahoo!
- Associated Press (AP)
- United Press International (UPI)
- Reuters

# Specialized Searches

## ➤ Video Search



# Specialized Searches

## ➤ Social Media Search

The screenshot shows the Digg homepage. At the top, there is a navigation bar with links for "HOME", "VIDEO", "READER", "iOS · Android · Twitter · Tumblr · Facebook · The Daily Digg", "Sign In", and a search icon. Below the navigation, there is a large image of a prison at night with a guard tower and a barbed-wire fence. To the right of the image, the title "FREEING MYSELF" and "The Night I Broke Back Into Prison" is displayed, along with the author's name "107 · Narratively · Crime". A brief description follows: "After serving thirteen years behind bars and struggling to rebuild his life, an ex-con finds solace in a surreptitious trip to the most unexpected place of all — his former cell." Below the main article, there are three smaller thumbnail images: one of a person jumping with a parachute, one of a soccer player sitting on the field, and one of a man and a child working on a wooden chest.

# Specialized Searches

## ➤ Shopping Search

The screenshot shows the DealTime website interface. At the top, there's a navigation bar with categories like Clothing & Accessories, Electronics, Home & Garden, Computers & Software, Sports & Outdoors, and More. A search bar is also present. On the right side of the header, there's a promotional banner for 'Millions of Deals on SALE' with a link to 'See our Top Daily Deals >'. Below the header, a large section titled 'Deals of the Day' features a deal for a 'Chroma Haiku 4-in. Paring Knife'. The deal includes a 19% discount from \$58.95 to \$47.00, free shipping, and 73 days left. The product image shows a small paring knife with a wooden handle. To the right of this main deal, there are other items listed: a Samsung UN55F7500 television for \$1,997.99 (29% off), a Chroma Haiku 4-in. Paring Knife for \$58.95 (19% off), a Bataleon Feelbetter Snowboard for \$240.90 (35% off), and a Speed Stacks 30 Set Sport Pack for \$569.99 (15% off). At the bottom of the main deal section, there's a link to 'Not it? See Thousands of Kitchen Deals On Sale'. Below this, there's a section for 'Most Popular Deals by Price' with filters for Under \$15, \$15 - \$50, and Over \$50. A scroll bar is visible on the right side of the page.

# Research Alternatives to Search Engines

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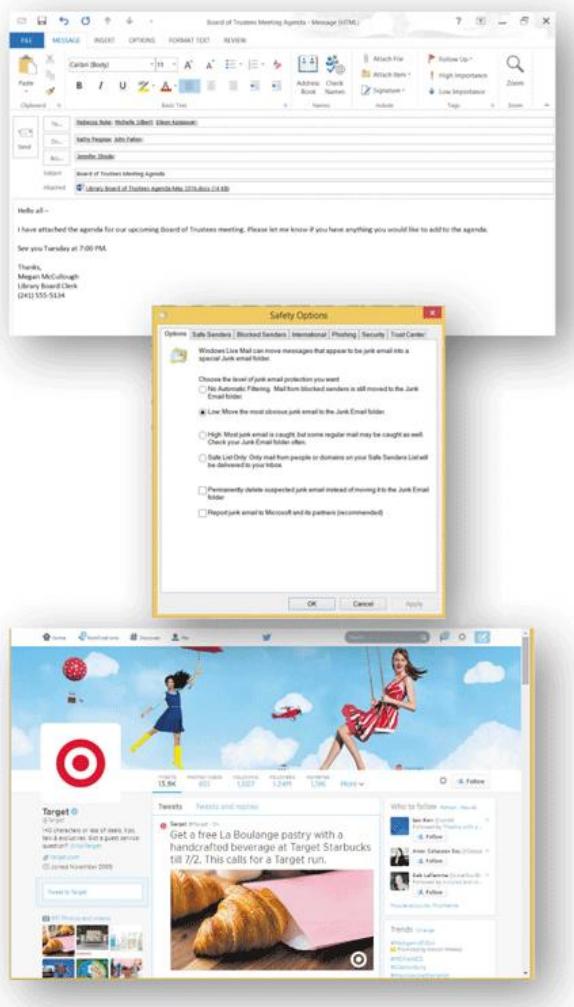
- LexisNexis
  - Abstracts and articles on business, news, government, medical, and legal topics
- ingentaconnect
  - Online articles from academic and professional publications
- Hoover's (Dun & Bradstreet)
  - Profiles on public and private businesses, along with financial statements and analyses and other information
- FindLaw
  - Legal resources portal

# Research Alternatives to Search Engines

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- Proquest
  - Provides information services to the business, scientific, engineering, financial, and legal communities over the Internet or an internal intranet
- Government resources
  - Federal Citizen Information Center
  - Internal Revenue Service
  - U.S. Census Bureau
  - U.S. Bureau of Labor Statistics
  - THOMAS
  - U.S. Small Business Administration
  - U.S. National Park Service
  - USA.gov

# 4 | Communicating Online (Lecture \$6)



## Discovering the Internet, 5<sup>th</sup> Edition

# Objectives

---

- Describe the components of email systems and email messages
- Use email to send, receive, and organize email messages and contacts, and discuss email viruses
- Describe various online social media and communication tools and discuss how they are used

# Email Systems

---

- Email is one of the most efficient and commonly used online communication tools
  - Indispensable for businesses, schools and other organizations
  - Used by people for nonbusiness communications
- Volume of daily email exceeds the number of pieces of paper mail handled by major postal systems
  - Problems include spam (unsolicited junk email)

*Spam* is the use of electronic messaging systems (including most broadcast media, digital delivery systems) to send unsolicited bulk messages indiscriminately

# Email Systems

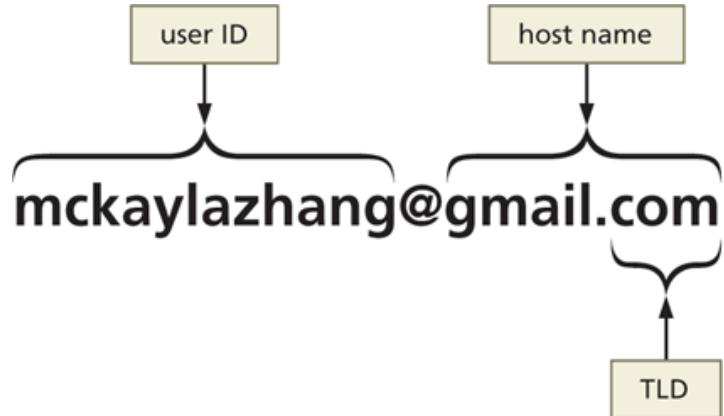
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- Email has several distinct benefits
  - Speed of delivery
  - Low cost
  - Accessibility
  - Convenience
  - Ease of management
- Components of an email system
  - Addresses, clients, servers, protocols

# Email Systems

---

- Email Addresses
  - User name or user ID
  - Host name
  - TLD (top level domain)



Components of an e-mail address

# Email Systems

---

- Email Clients, Servers, and Protocols
  - **Email Client**
    - Program used to create, send, and receive email messages
  - Typically offers tools to:
    - Create and send outgoing email messages
    - Read, save, and print messages and attachments
    - Sort, archive, and delete messages
    - Create folders to organize messages

# Email Systems

---

- Email Clients, Servers, and Protocols
  - Email protocols include:
    - **POP (Post Office Protocol)**
    - **SMTP (Simple Mail Transfer Protocol)**
    - **IMAP (Internet Message Access Protocol)**
    - **HTTP (Hypertext Transfer Protocol)**

# Email Systems

## How an Email Message May Travel from a Sender to a Receiver

### Step 1

Using an email program, you create and send a message on a computer or mobile device.

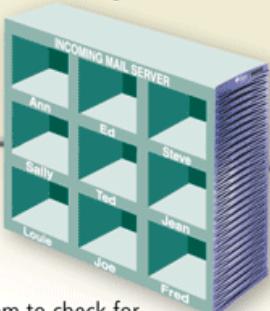


### Step 2

Your email program contacts software on the outgoing mail server.



incoming mail server



### Step 3

Software on the outgoing mail server determines the best route for the data and sends the message, which travels along Internet routers to the recipient's incoming mail server.



Internet router

Internet router

### Step 4

When the recipient uses an email program to check for email messages, the message transfers from the incoming mail server to the recipient's computer or mobile device.

# E-mail Clients and E-mail Servers: How They Interact

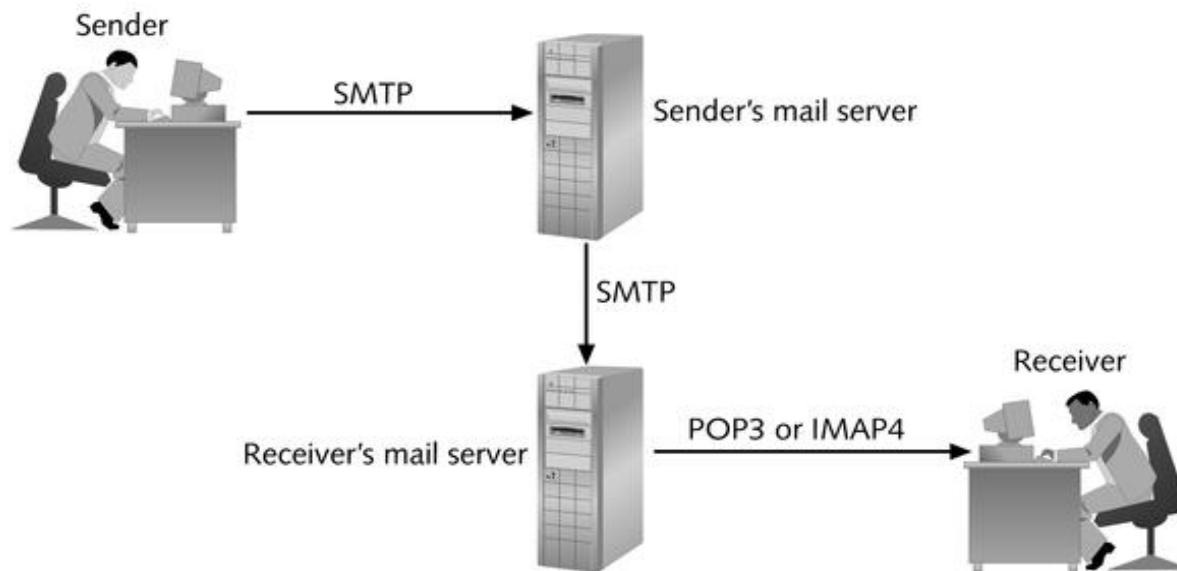
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- How a sender's email client software finds the e-mail server and ways you can control the process
- Users can have one e-mail server or two e-mail servers (one for sending and one for receiving)

# How E-mail Clients and Servers Interact

---

- Three e-mail protocols
  - SMTP (*Simple Mail Transfer Protocol*)
  - POP (*Post Office Protocol*), e.g. *POP3*
  - IMAP (*Internet Message Access Protocol*)



# SMTP

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- Used to send e-mail over the Internet
- Character-based commands are issued from the client; server replies with numeric codes
- A stateful protocol (it can recognize and interpret the nature of the material being sent)

# POP

---

- Used when a client downloads its e-mail messages from a server
- Server replies to each command with a positive (+OK) or negative (-ERR) response
- Four states
  - Connecting state: Connection is established
  - Authentication state: A session is established
  - Transaction state: Mail is delivered
  - Update state: The session is closed
- Slowly being outdated by IMAP

# POP

---

## ➤ Disadvantage

- After the client retrieve all messages, store them on the user's device as new messages, messages will be deleted from the server
- User can only view and manage the messages only using that device
- Although most POP clients have an option to leave mail on server after download

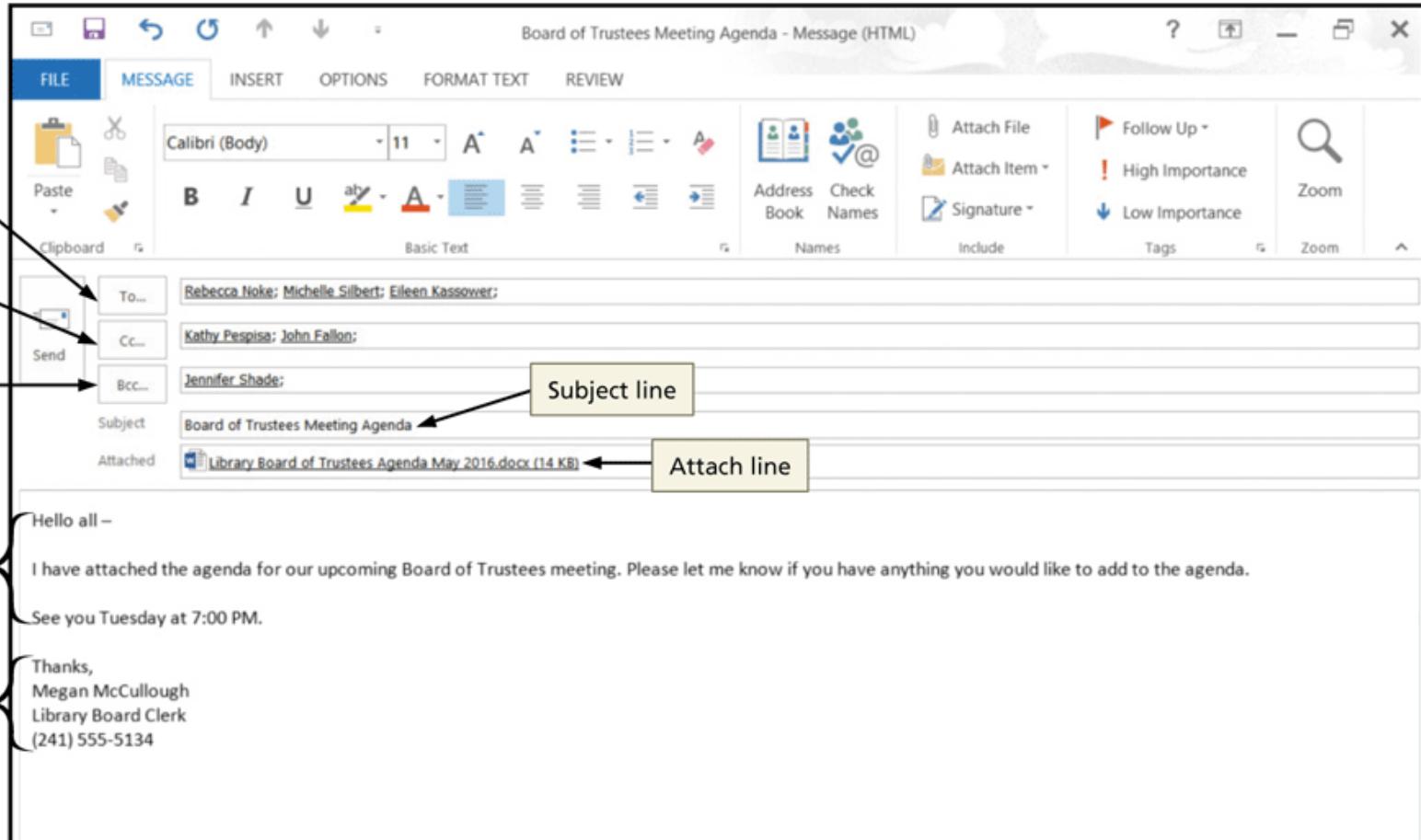
## ➤ Slowly being outdated by IMAP

# IMAP

---

- Provides mail management functions on the server
  - Messages can be archived in folders on the server
  - Mailboxes can be shared
  - Users can easily access multiple mail servers
  - Users can choose only to read header information about an attached file without opening the file
  - Attached files need not be downloaded with every message

# Email Systems



# To, Cc and Bcc

---

- To
  - One or more email addresses of the message's recipient(s) will receive the message
- Cc (Carbon copy or Courtesy copy)
  - Recipient(s) will receive a courtesy copy of the message
- Bcc (Blind carbon copy or Blind courtesy copy)
  - Bcc recipient(s) will only see his/her email address or name and cannot see addresses for others in the Bcc line.

# Using Email

A program that copies itself repeatedly, for example, in memory or on a network, using up resources and possibly shutting down the computer, device, or network

## ➤ Email Viruses and Worms

- **Worm**
- **Trojan horse**
- Use caution in opening email messages
- Install virus protection software on your computer and keep it up to date
- Virus hoaxes

A program that hides within or looks like a legitimate program

A virus hoax is a false warning about a computer virus. Typically, the warning arrives in an e-mail note or is distributed through a note in a company's internal network. These notes are usually forwarded using distribution lists and they will typically suggest that the recipient forward the note to other distribution lists.

# Using Email

## ➤ Junk Email Options

- Malicious spam types include:
  - **Phishing**
  - **Stock-manipulation schemes**
  - **“Nigerian Sting” operations**  
Fraudulent requests for money
- **Spam-filtering services** allow you to filter out and either block or move messages to the Spam folder
- You can set options to block junk email and set exceptions to the blocking process

Phishing is a scam in which a perpetrator sends an official looking email message that attempts to obtain one's personal and/or financial information

Scams encouraging unwary investors to buy a specific stock, thereby artificially inflating the stock's value

# Social Media

Web 2.0 - technologies and practices are designed to make users' web experiences interactive by incorporating social media and user-driven content into web pages

- **Social media** refers to online tools that allow people to communicate, collaborate, and share over the Internet
- Social networking websites and apps, such as Facebook, LinkedIn, Google+, provide a medium in which friends, colleagues, and school alumni can share personal information or photographs, résumés and networking opportunities, or information about events

# Social Media

---

## ➤ Social Networking

- Social networking sites typically offer a combination of online communication tools:
  - Email
  - Discussion groups
  - Blogs ←
  - Instant messaging
  - P2P networking
  - Real-time chat

**Weblog** (short form is **blog**) is a personal journal published on the World Wide Web consisting of discrete entries ("posts") typically displayed in reverse chronological order so the most recent post appears first.

# Social Media



# Social Media

---

## ➤ Blogging and Microblogging

- Variety of blogs available is collectively called the **blogosphere**
- Blogs are highly popular and powerful tools for sharing thoughts and ideas across a wide spectrum of interests and audiences
- Microblogging, which resembles a combination of blogging and instant messaging, involves broadcasting brief (typically 140 characters or less) messages to a public website or sending email or text messages to subscribers

# Blogging and Microblogging

The screenshot shows a Twitter search results page for the hashtag #Fortune500. The interface includes a navigation bar with Home, Notifications, Discover, Me, and a search bar. The search results are titled "Results for #Fortune500".

**Left sidebar:** A sidebar on the left lists search filters: "Everything" (selected), People, Photos, Videos, News, Timelines, Advanced Search, "All people" (selected), "People you follow", "Everywhere" (selected), and "Near you". Below this is a "Trends" section with hashtags like #MeAgainstBigOil, #Promoted by Verizon Wireless, #WorldCup, #MEXvsNED, #Glastonbury, #Dolly, #VamosMexico, #NEDvsMEX, #Gater, Van Gaal, and Netherlands.

**Search results:** The main area displays search results. At the top, there are two cards from IBM SaaS: "IBM SaaS supports 47 of the top 50 Fortune 500 companies" and "See how Caterpillar is linking employee engagement to performance with IBM SaaS". Below these are two more cards: "IBM SaaS supports 47 of the top 50 Fortune 500 companies" and "5 WAYS FORTUNE 500s GENERATE MILLIONS".

**Bottom tweets:** Three tweets are shown at the bottom:

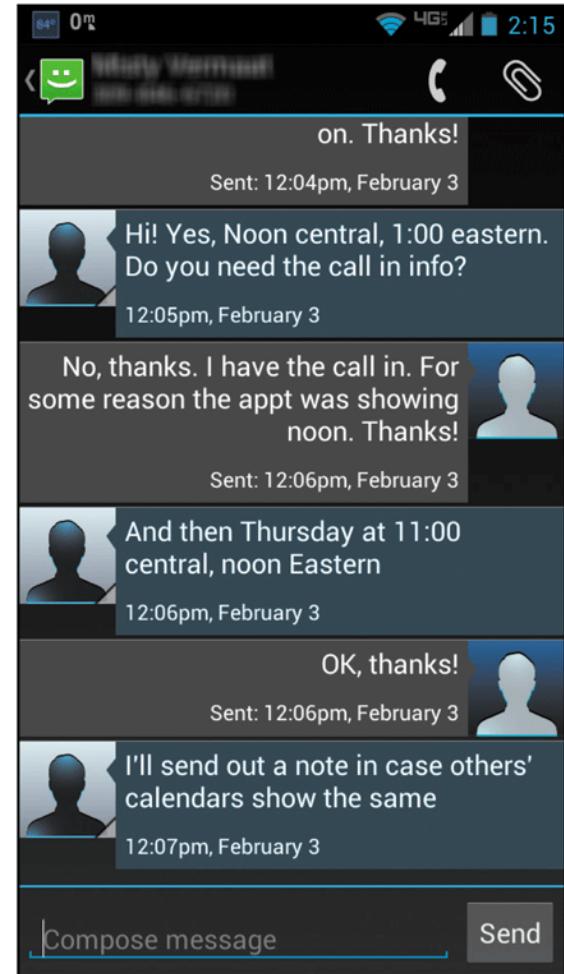
- Chandru (@chandrakumar)** - 2h: 40% of #Fortune500 companies were started by #immigrants or children of immigrants. —@SteveCase [@tom\\_peters](http://ow.ly/x3V7p)
- Mert DAMLAPINAR (@MertDP)** - 16h: 429 of the original Fortune 500 companies (1955) are no longer in business today. Adapt or die. #Fortune500 #BusinessEvolution
- Mike Quindazzi (@MikeQuindazzi)** - 16h: Tencent Holdings Ltd (WeChat & QQ) increased market cap 1,047% over the last 5 years. #fortune500 [plc.twitter.com/N0HTcs0Vin](http://plc.twitter.com/N0HTcs0Vin)

**Annotations:** Callout boxes highlight specific elements:

- A box labeled "photos that use the #Fortune500 hashtag" points to the sidebar search filters.
- A box labeled "search results webpage for #Fortune500 hashtag" points to the top search result card.
- A box labeled "tweets that include #Fortune500 hashtag" points to the bottom tweets.

# Social Media

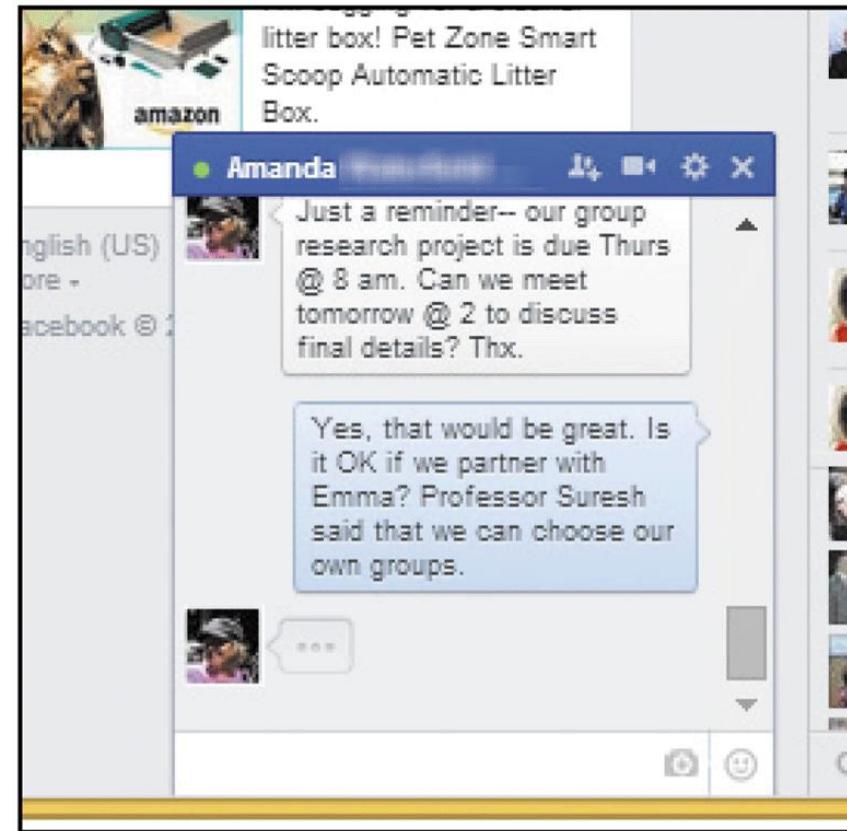
- Text Messaging
  - Text and multimedia messaging, also called **Short Message Service (SMS)** and **Multimedia Messaging Service (MMS)**, respectively, allow users to send short messages containing text only or text, audio, and video to and from smartphones



# Social Media

## ➤ Chat

- A facility that allows two or more people to exchange text or multimedia messages in real-time using a special client, or mobile or web app
- **Web-based chat** allows real-time communication using a web browser or web or mobile app



# Social Media

## ➤ Chat (continued)

- Instant messaging (IM) is a private means of exchanging real-time messages with one or several people using the Internet



# Social Media

- Collaboration and Sharing
  - A **wiki** consists of webpages in which authorized users can make edits to content

The screenshot shows a Wikipedia article page for "Responsive web design". The page has a standard Wikipedia layout with a sidebar on the left containing links like Main page, Contents, and Tools. The main content area features the title "Responsive web design" and a paragraph about what RWD is. Below this is a bulleted list of how RWD adapts layouts. To the right of the main content, there's a sidebar titled "Cascading Style Sheets" with links to various CSS-related topics. At the bottom of the page, there are "Related concepts" and a "Contents" link.

# Social Media

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- Collaboration and Sharing (continued)
  - **Social bookmarking and content sharing websites**, also called **social tagging websites**, allow users to post a webpage link or image bookmark to a public website, then tag the bookmark with keywords or hashtags
  - Tagging helps organize the bookmarks and makes it easy to search by topic

# Social Media

The image is a composite screenshot illustrating the interconnected nature of social media and search engines. On the left, a Pinterest board titled "Green cleaning" is displayed. The board owner is Jennifer Campbell, and it has 9 Pins and 123 Followers. One pin features a list titled "Declutter in a Jiffy" with various items to get rid of. Another pin shows a bottle of Hydrogen Peroxide. On the right, a Delicious search results page for the hashtag "#typography" is shown. The search bar on Delicious also contains the term "#typography". The results list several links, all of which are related to typography, such as "Putting the Sans in Comic Sans" and "Sign Generator 1.0". A callout box on the Pinterest board points to the Delicious search bar, and another callout box on the Delicious results page points to the search term "#typography". A vertical bracket on the right side of the Delicious results page groups the search term and the results, labeled "#typography search results".

#typography is the current search

Links for #typography

Popular Recent All Time

Putting the Sans in Comic Sans | IconicHipster.com - Your Muse into the 22nd Century

iconichipster.com

1088 documentary typography

Sign Generator 1.0 abstraction-now.at

1219 design generator typography eps symbol norm generative signs lines

FFFFFOUND! | Lovely Type by Beato | Allan Peters ffffound.com

1219 typography

Zf3TS.png (996×667) imgur.com

1120 design post tools typography

30 Free Serif Fonts to Download | Vandelay Design Blog vandelaydesign.com

2010 fonts free serif good typeface serifs typography design freefonts font

How it happened « Bits and Pieces bitsandpieces.us

1241 comedy design post typography

Add a Pin

Jennifer Campbell

9 Pins 123 Followers

Search

Pinterest

Jennifer

Edit Board Send Board

Declutter in a Jiffy

HANGERS from the dry cleaner  
SWEATERS with fuzz balls  
SHOES that hurt your feet  
CLOTHES with stains  
plastic stadium CUPS  
DISHES you never use  
COOKBOOKS you never use  
difficult, time-consuming or expensive RECIPES  
dried up cans of PAINT  
broken ELECTRONICS  
flawed VASES  
PAPERBACK BOOKS that you'll never reread  
greeting CARDS  
TROPHIES from your childhood  
bad PHOTOS  
SCHEDULES and REMINDERS from past events  
expired COUPONS  
JUNK MAIL  
grocery store RECEIPTS  
tossed BROCHURES  
MANUALS to items you don't own anymore  
expired WARRANTIES and CONTRACTS  
unrecognizable BUSINESS CARDS  
uninteresting charity SOLICITATIONS

Declutter Your Home in a Jiffy –  
Things to Get Rid Of with No Regret

Hydrogen Pe

from One Goo

10/12/

10/11/

10/10/

10/7/

10/6/

10/5/

#typography search results

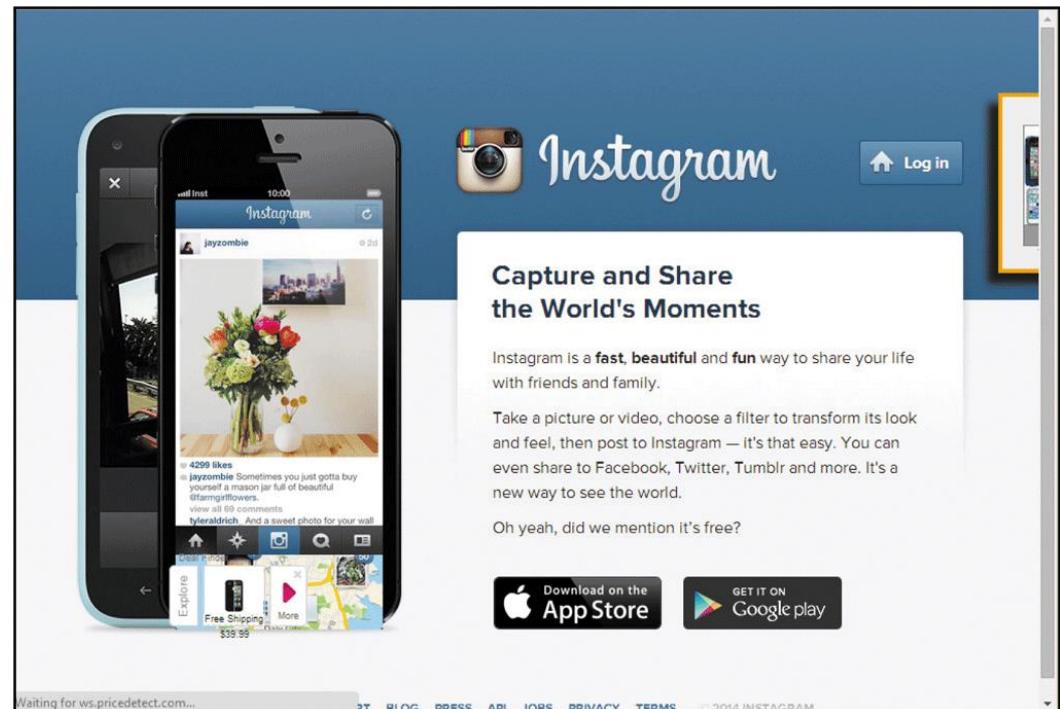
help · apps · tools · blog  
© Delicious Science, LLC

# Social Media

## ➤ Collaboration and Sharing (continued)

- People use photo sharing websites or apps to manage their photo and/or video collections

- Flickr
- Shutterfly
- Instagram
- YouTube



# Social Media

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- Collaboration and Sharing (continued)
  - Consumers visit **social opinion websites** to check out user reviews for products, movies, books, travel accommodations, local restaurants, appliances, and local service providers
    - Angie's List
    - Yelp
    - Amazon.com and TripAdvisor integrate social opinion features

# Social Media

## Best of Yelp: San Jose

Category	Count
Restaurants	5,465 reviewed
Food	3,341 reviewed
Shopping	5,340 reviewed
Nightlife	689 reviewed
Japanese	325 reviewed
Coffee & Tea	702 reviewed
Chinese	562 reviewed
Bars	432 reviewed
Beauty & Spas	3,578 reviewed
Automotive	2,912 reviewed
Home Services	6,179 reviewed
Health & Medical	5,207 reviewed
Local Services	3,177 reviewed
More Categories	

### Food

- 1. San Jose Tofu Company**  
★★★★★ 215 reviews  
  
It's seriously the best soy milk I ever had.
- 2. Charlie's Cheesecake Works**  
★★★★★ 327 reviews  
  
This place is sooo yummy I ordered the 35peice cheesecake poppers.
- 3. Treat Ice Cream Company**  
★★★★★ 154 reviews  
  
Tin Roof Sundae I can't wait to see you when I get home tonight.
- 4. Shuei-Do Manju Shop**  
★★★★★ 458 reviews  
  
Hands down my absolute FAVE place to get mochi.
- 5. House of Bagels**  
★★★★★ 296 reviews  
  
Fast and friendly service - love my bagel and soy latte.

### Recent Activity

# Social Media

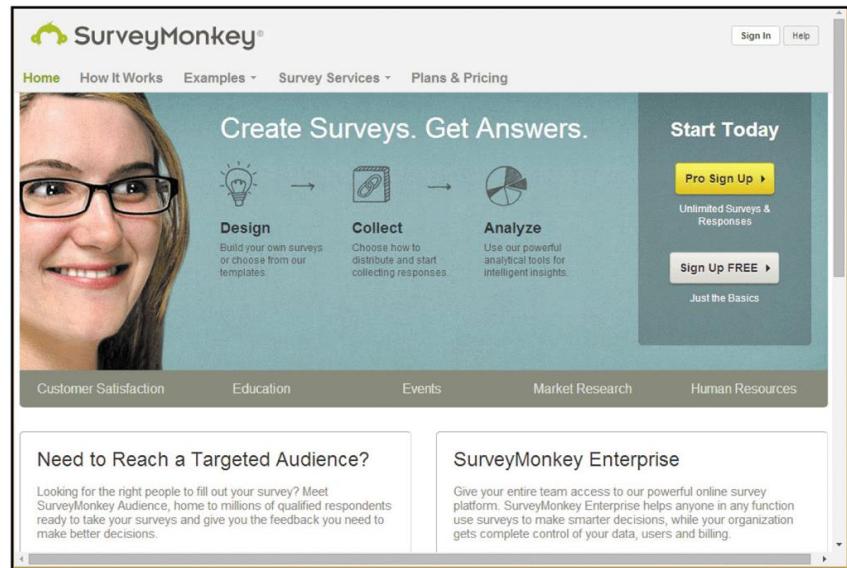
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- Email Marketing and Online Survey Technologies
  - **Email marketing software** helps organizations send email and track the success of a marketing campaign by keeping track of the number users who read the email, how many times the recipients tapped or clicked a link in the email, and how many times the recipients purchased a product or enrolled in a service
  - **Online survey technology** companies offer companies and organizations the ability to send an online survey using email

# Social Media



The Constant Contact homepage features a large banner with the headline "Successful Marketing Starts Here." Below it, a sub-headline reads "Bring your marketing together with the Constant Contact Toolkit." There are input fields for "First Name," "Last Name," and "Email," followed by a yellow button labeled "Try it FREE or Buy Now." The background shows a stylized town scene with buildings, a sun, and mountains. At the bottom, there are links for "Features," "Pricing," "Blog," "Partner," "Careers," and "Investors," along with a phone number "Call Us: 855-339-8028".



The SurveyMonkey homepage has a top navigation bar with links for "Home," "How It Works," "Examples," "Survey Services," and "Plans & Pricing." A "LOG IN" link is in the top right. The main heading is "Create Surveys. Get Answers." Below it, there's a large photo of a smiling woman wearing glasses. To her left, there's a "Design" section with a lightbulb icon, a "Collect" section with a clipboard icon, and an "Analyze" section with a pie chart icon. To the right, there's a "Start Today" button and two smaller buttons for "Pro Sign Up" and "Sign Up FREE." Below the main heading, there are categories: "Customer Satisfaction," "Education," "Events," "Market Research," and "Human Resources." A "Need to Reach a Targeted Audience?" section discusses SurveyMonkey Audience, and a "SurveyMonkey Enterprise" section describes the platform for entire teams.

# Social Media

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## ➤ VoIP

- **VoIP (voice over Internet telephony)** is technology used to make phone calls over the Internet
- To use, you must have:
  - Broadband connection
  - Microphone
  - Speaker
  - Software or app (such as Skype)

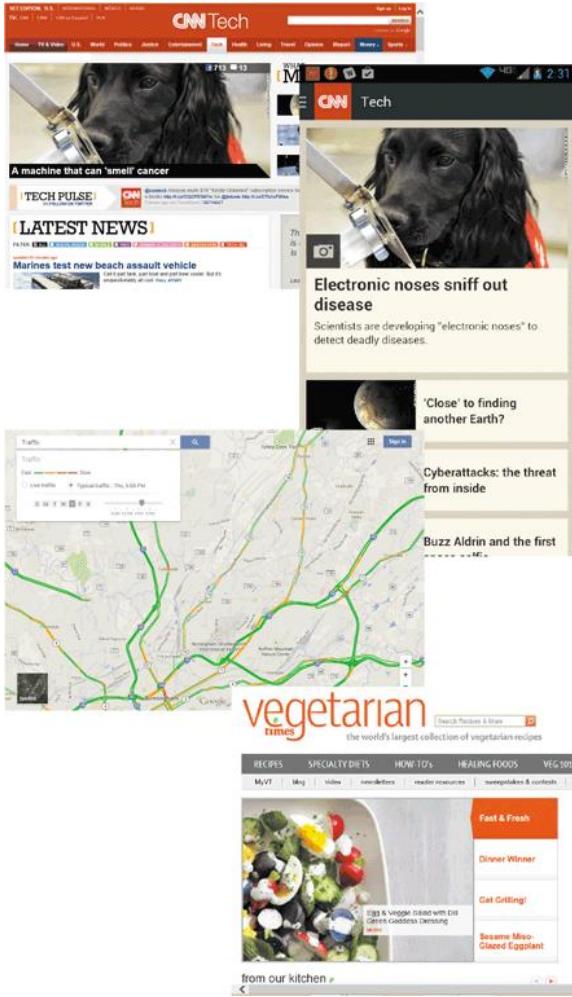
# Social Media

**Usenet** is a worldwide distributed Internet discussion system

## ➤ Newsgroups and Web-Based Discussion Groups

- **Web-based discussion groups** are online discussion forums often hosted by a portal
- Outgrowth of **newsgroups**, which are online bulletin boards first made available in the 1980s over the **Usenet network**
- Usenet consists of a number of servers that use the **Network News Transfer Protocol (NNTP)** to send newsgroup messages over an IP network
- Users access newsgroup content using a **newsreader**

# 5 | Getting More Out of the Internet (Lecture 08)



## Discovering the Internet, 5<sup>th</sup> Edition

# Objectives

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- Share files over the Internet
- Discuss server-side scripting and client-side scripting
- Describe Common Gateway Interface
- Identify scripting languages

# Download and File-Sharing Sites

---

- Downloading paid content, such as music files, software, stock photos, and so forth, is one of the most popular Internet activities
- Freeware and shareware, including games or utilities, can be downloaded from a number of websites
- Transferring files between Internet-connected computers is widely used and convenient activity

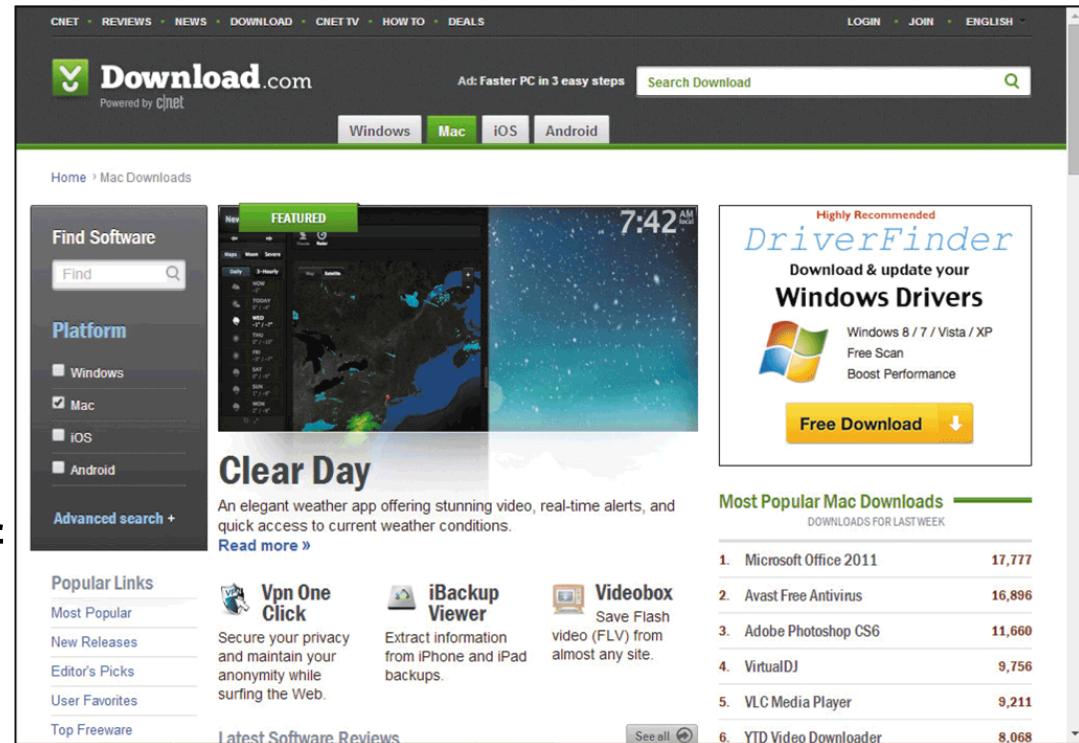
# Download and File-Sharing Sites

The screenshot shows the Rhapsody website interface. At the top, there's a navigation bar with links for 'Browse' (which is underlined), 'Featured', 'My Music', 'unRadio', and a settings gear icon. A search bar is also at the top right. Below the navigation, a breadcrumb trail shows 'All Genres > Classical'. The main title 'Classical' is displayed in large letters. On the left, there's a collage of classical figures (including Beethoven and Mozart) and a portrait of Lindsey Stirling. Below this collage are tabs for 'Overview' (which is selected and highlighted in orange), 'Artists', 'Albums', 'Tracks', 'Radio', 'Listeners', and 'Posts'. The 'Overview' section contains a list of tracks with play buttons and '+' icons for adding to playlists. The first track listed is 'Fur Elise' by Ludwig van Beethoven. To the right of the track list is a player window showing 'Fur Elise' by Ludwig van Beethoven, currently at 0:09 of a 2:56 track. Below the player is a 'Mixer' sidebar with a list of tracks including 'Movement' by Ludwig van Beethoven, 'Rolling in the Deep' by The Piano Guys, 'The Cello Song' by The Piano Guys, 'Zi-Zi's Journey' by Lindsey Stirling, 'Elements (Orchestral Verison)' by Lindsey Stirling, 'Suite No2 in B Minor, BWV 1067: Sarabande' by Johann Sebastian Bach, and another instance of 'Fur Elise' by Ludwig van Beethoven.

# Download and File-Sharing Sites

## ➤ Download Websites

- **Freeware** is software that the author allows you to download and use without charge, but requires that you follow copyright laws and restrictions
- **Shareware** is software that you can download and try out but are expected to pay for if you decide to use on a permanent basis

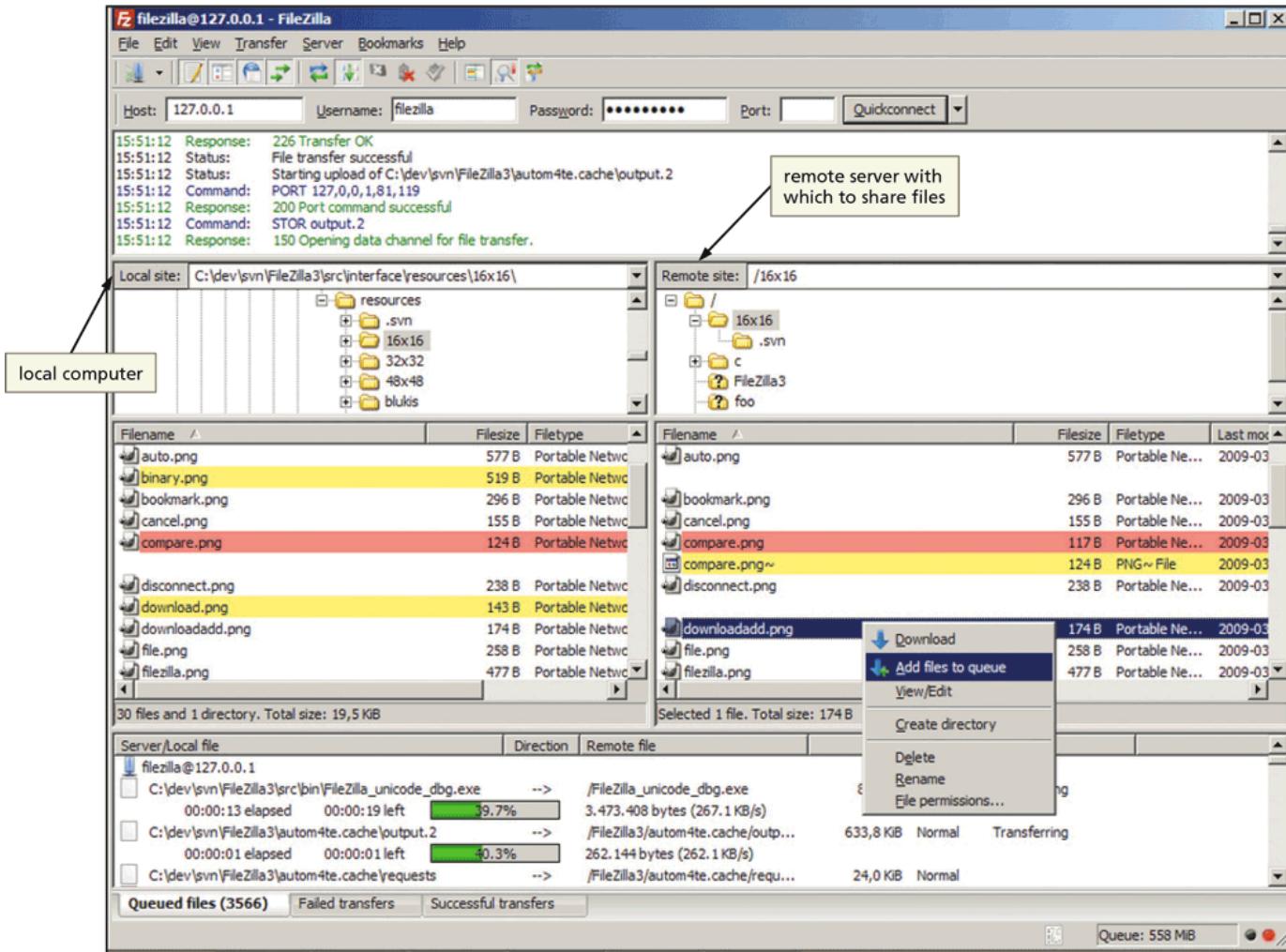


# Download and File-Sharing Sites

---

- File Transfer Protocol (FTP)
  - Users can download and upload files located on a remote computer, called an **FTP website**
    - **Anonymous FTP websites** are public FTP websites that do not require a unique username
    - Private FTP sites restrict access by requiring a unique username and password
  - Files can be downloaded or uploaded using an **FTP client** program, a browser, or your file management program

# Download and File-Sharing Sites



# Download and File-Sharing Sites

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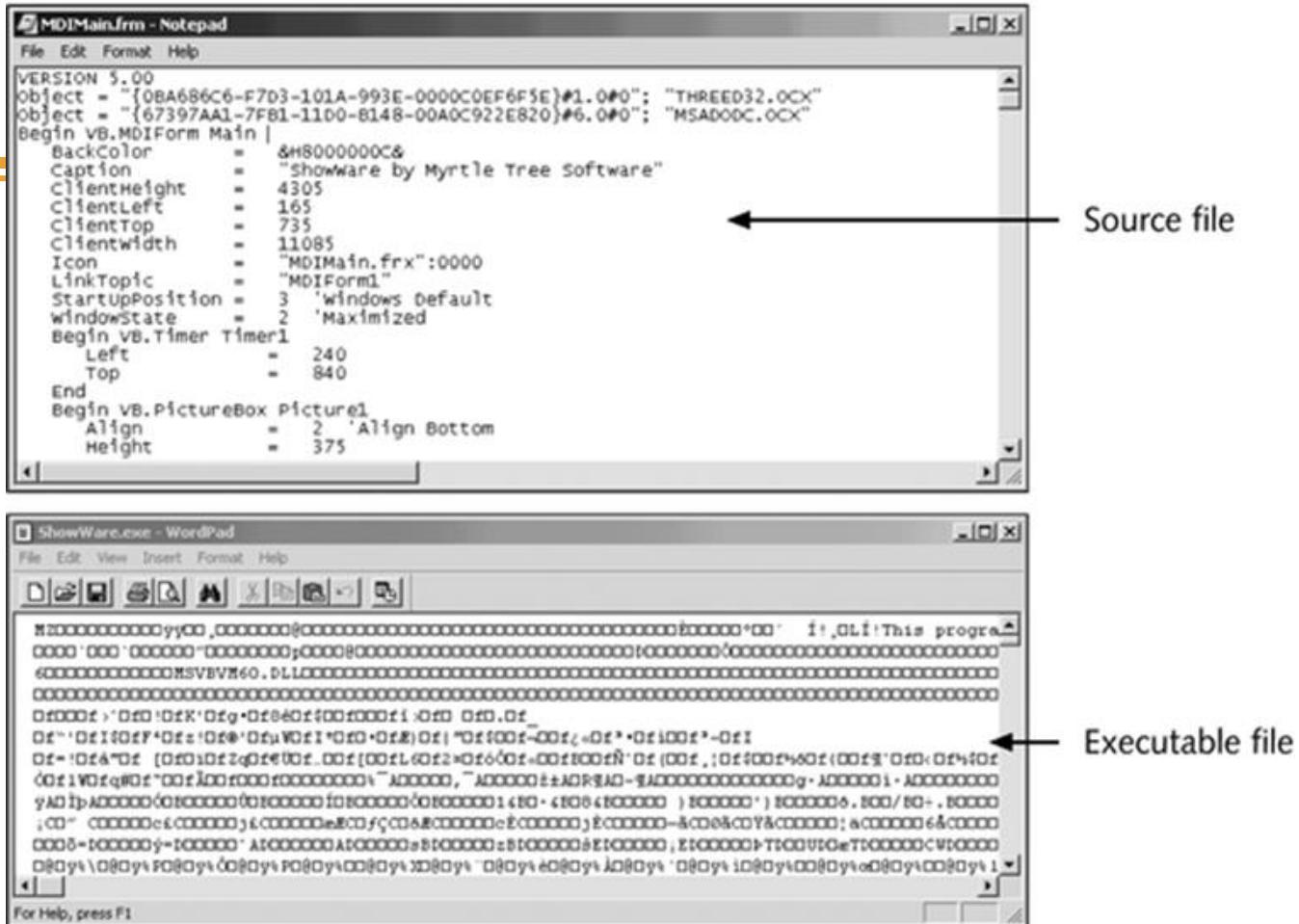
## ➤ P2P File-Sharing Networks

- A **peer-to-peer (P2P) file-sharing network** allows files to be transferred between individual personal computers located on the same local area network or between individual computers connected to the Internet
- Music and movie industries are working to stop piracy of copyrighted material over P2P file-sharing networks
- P2P sharing of copyrighted material accounts for job loss and revenue; also, potential litigation
- Commercial applications of P2P file-sharing include sharing product information and training materials

# Programming

---

- A **program** is a list of instructions that are executed by the operating system or other software
- Sometimes the program is written into a text file called a **source file** and then assembled into a coded binary format called **object code**
- Object code is combined with utilities that it needs and then converted and stored into an **executable file**



A program source file is written and read by programmers, but the executable file cannot be read by humans

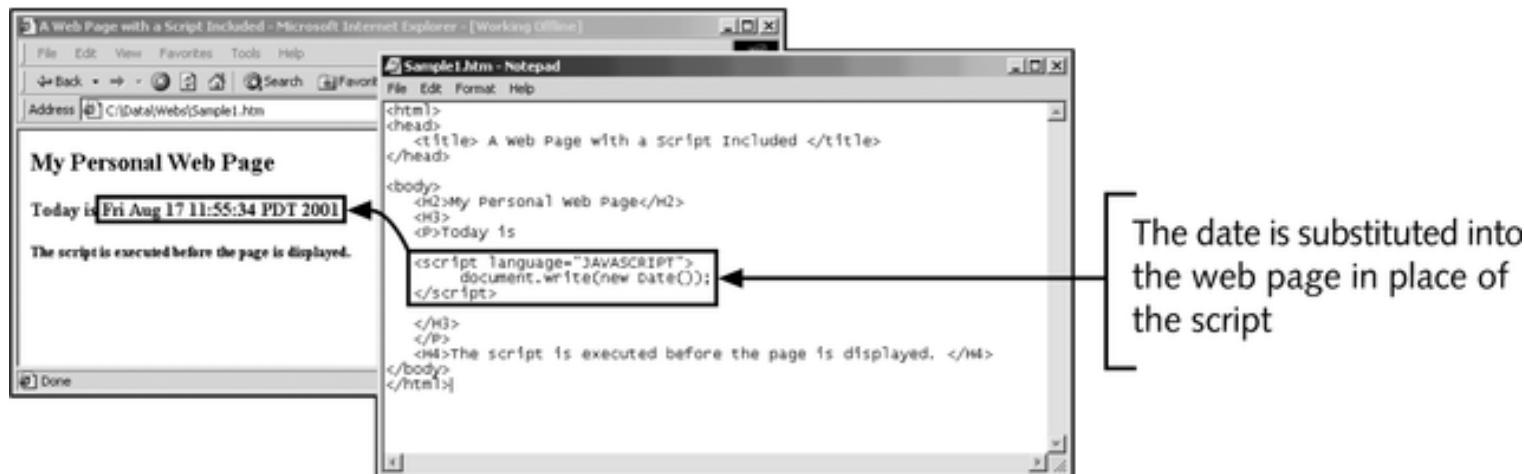
# Programming

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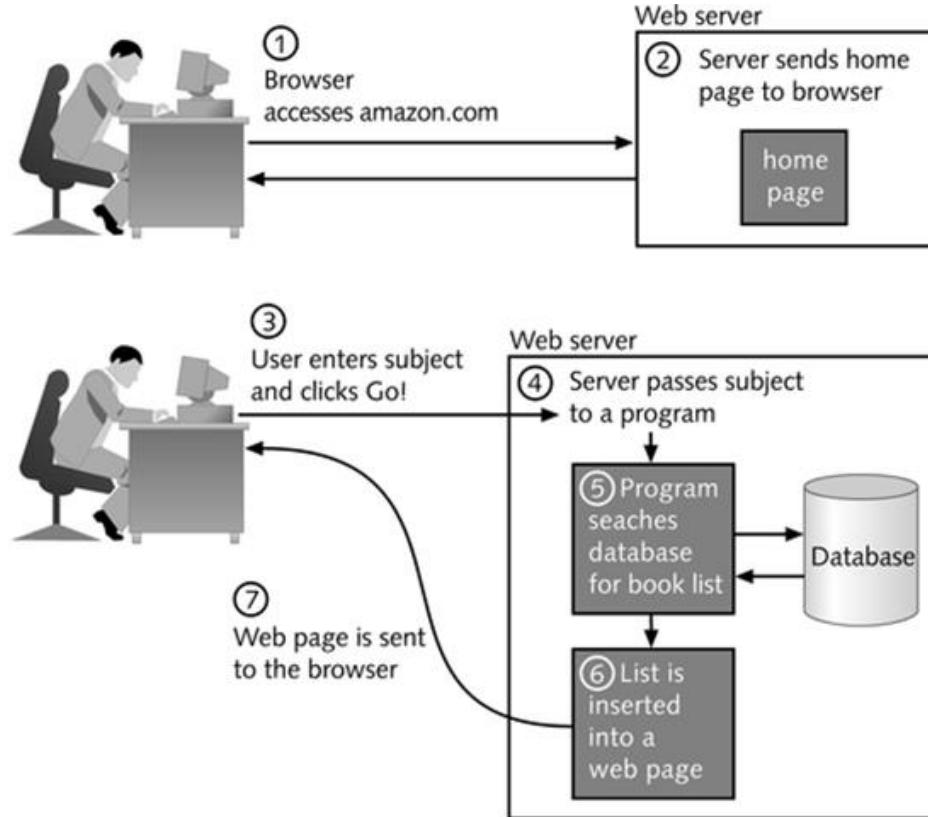
- Compiling
  - Process of translating programming code into binary code
- Scripts
  - Programs written as plain text and included in a document
- Dynamic web pages (dynamic HTML or DHTML)
  - Can change their content
- Static web pages
  - Do not change their content

# Why Programming?

- Enables a browser to customize a web page based on user activity or the PC environment
- Enables a web server to customize a web page for a specific browser request
- Example:

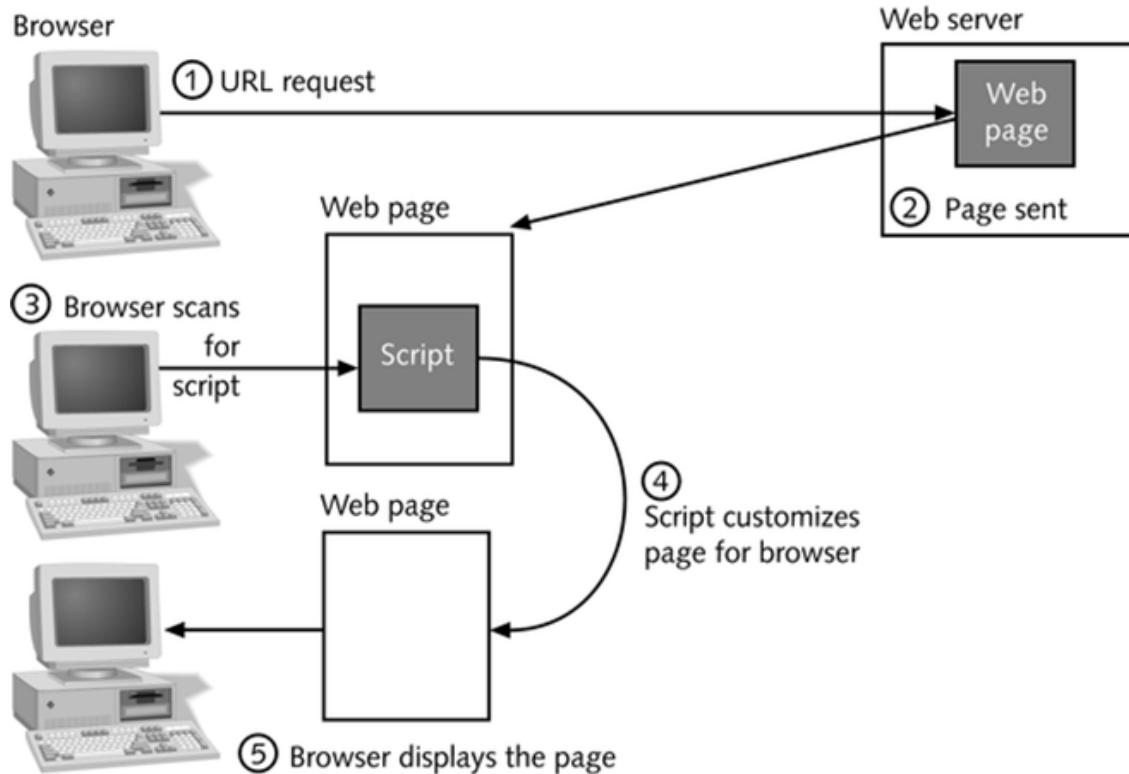


# How a Web Site Displays Different Lists to the User



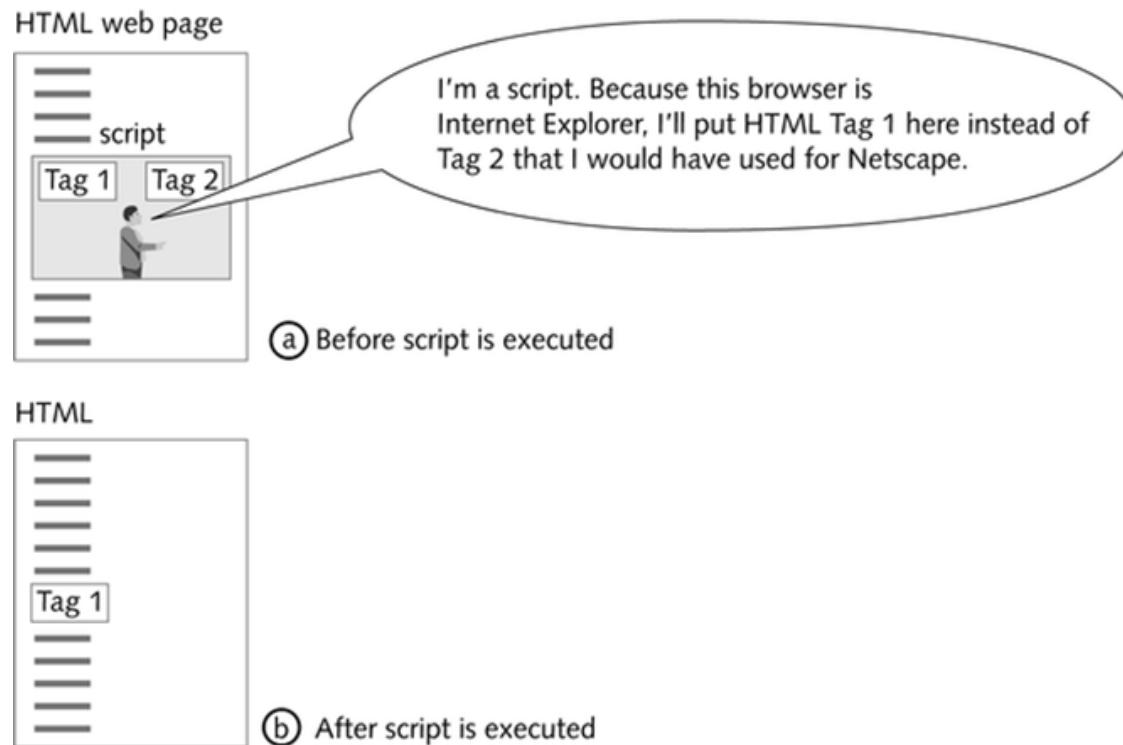
A program on the web server is responsible for changing the content of a web page based on information given by the user

# How a Browser Can be Made Responsive to User Input



A common use of a client-side script is to customize a web page to meet the needs of a particular browser

# How a Browser Can be Made Responsive to User Input



A browser executes a script; the script inserts HTML tags and text into the page, and then the browser displays the page

# Two Kinds of Programs

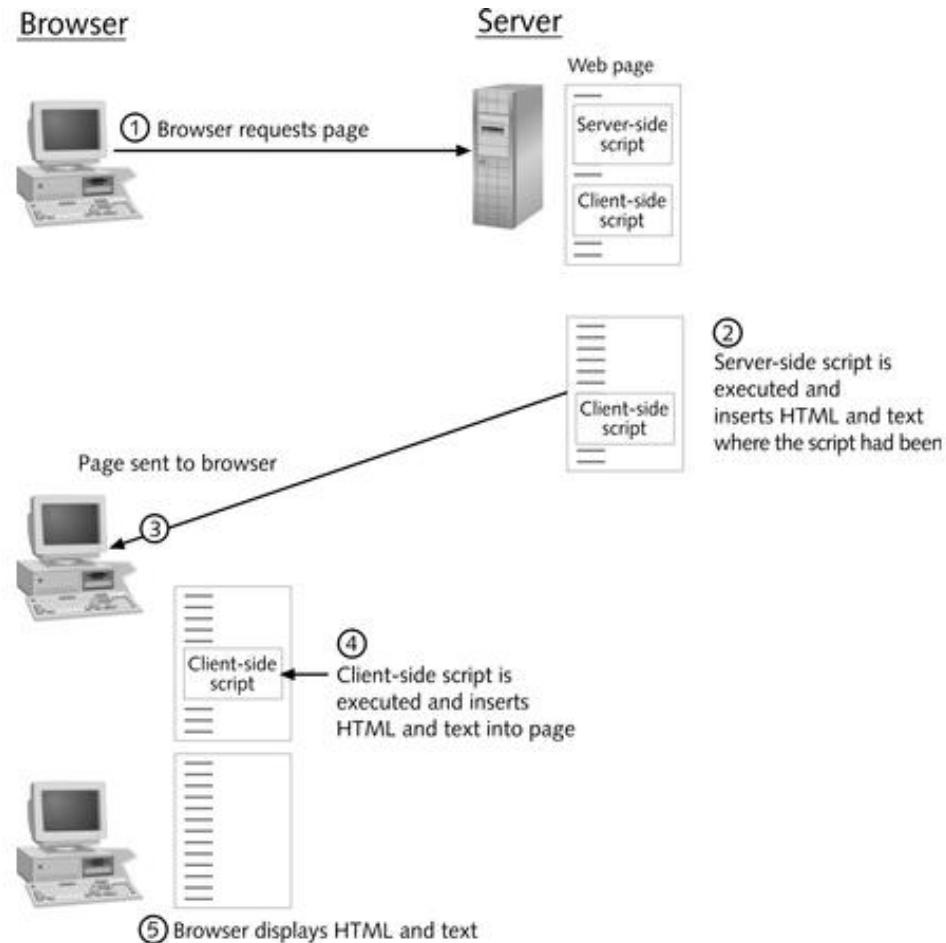
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- Server-side script
  - Performed by the server before a web page is downloaded to the browser
  - Can be stored alone in a CGI file or embedded in a web page
- Client-side script
  - Performed by the browser either before the browser displays the page or when the user clicks a button or performs another action on the page
  - Embedded in a web page



**Common Gateway Interface – a set of specifications that defines how a web server passes a web user's input to an application program running on the server, receives a response, and passes data back to the user.**

# Server-side Vs Client-side Scripting

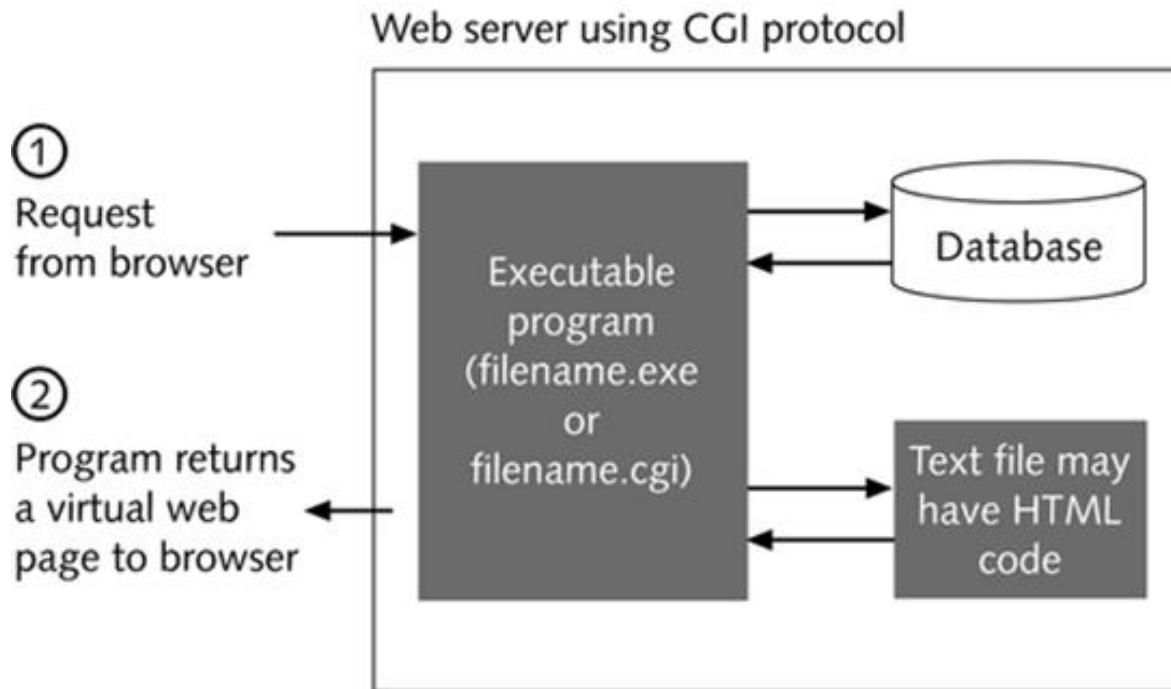


# CGI (Common Gateway Interface)

---

- Originally developed for UNIX; first and still popular way for a program or script to interact with a Web server
- Browser points to a CGI program that generates a virtual web page using various elements on the server
- The web page is customized based on information sent to it by the browser
- Can work with many web servers; only needs rewriting when ported to a different OS platform
- Uses most any programming language

# How the CGI Protocol Works



A CGI program or script constructs a web page from resources on the server

# JSP (Java Server Pages)

---

- Developed by Sun Microsystems; similar to and competes with ASP 

Active Server Pages
- Allows Java programming segments (Java servlets) to be written into a web page and executed by the server before the page is downloaded to the browser
- JavaBean
  - Small Java object designed to work as a reusable component in many different situations

# Programming Languages Used by Server and Client

---

- Popular languages used by CGI:
  - Perl (Practical Extension and Report Language)
  - C and C++
  - Java
  - PHP (Hypertext Preprocessing)
  - Visual Basic (VB)
  - VBScript, PerlScript, JavaScript, and JScript

# Java

---

- An object-oriented programming language developed by Sun Microsystems
- Highly portable

# Scripting Languages: VBScript, PerlScript, JavaScript, and JScript

---

- Commands are designed to be included on a web page and executed either by the web server or the web browser
- Not compiled; the commands, or source code, are readily available on the web page as text and can be easily edited

# VBScript

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- A subset of Visual Basic for Applications, which is a subset of Visual Basic
- Designed for writing scripts than can be inserted into web pages

# JavaScript

---

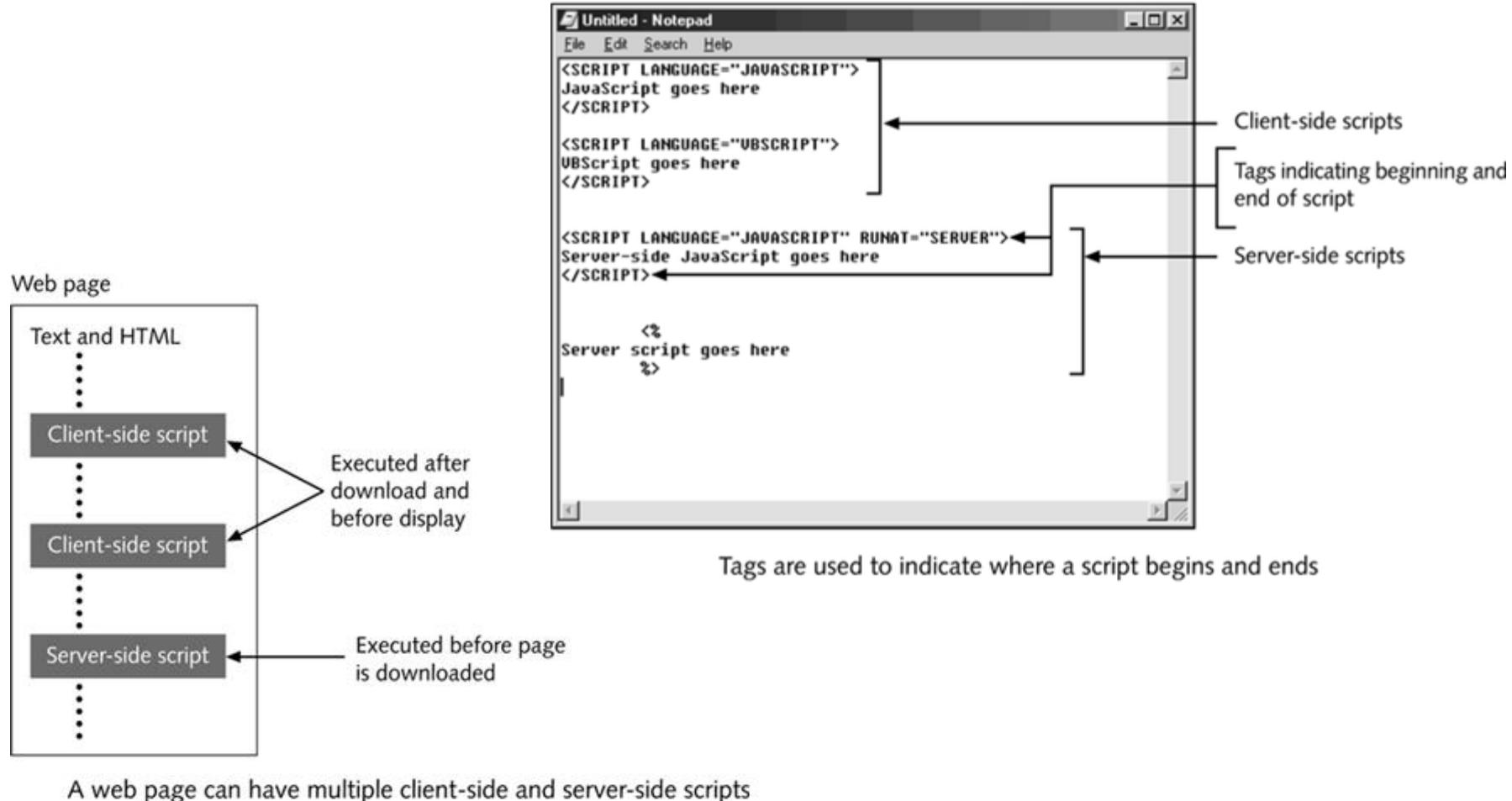
- Developed by Netscape for use with Netscape Navigator
- Can now be used by web servers as well as clients
- Scripting language of choice; can be interpreted by most browsers
- Easy to learn
- Jscript
  - Microsoft's version of JavaScript developed for use with Internet Explorer

# Learning to Use Scripts

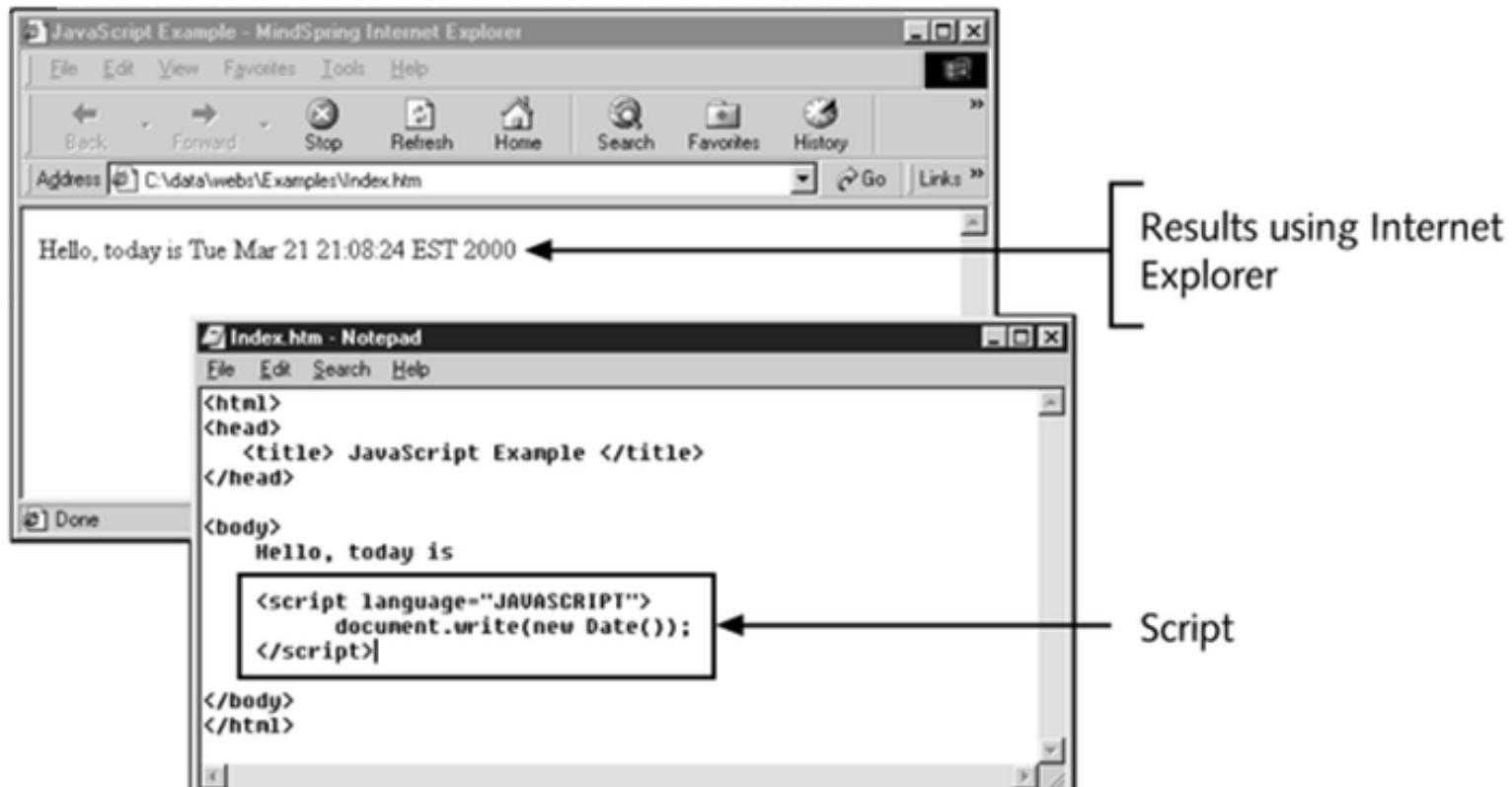
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- All you need to execute a client-side script is a browser
- Learning to use server-side scripts requires a web server to interpret the script
- To insert scripts in a web page, include tags to mark beginning and end of script
- Server and client scripts in HTML are marked using <SCRIPT> and </SCRIPT> tags
- A server script can also be marked using <% and %> tags

# How Script Tags Are Entered in HTML Code



# Example: Including the Date in a Web Page



A simple JavaScript that displays the system date

# Server-Side Scripting

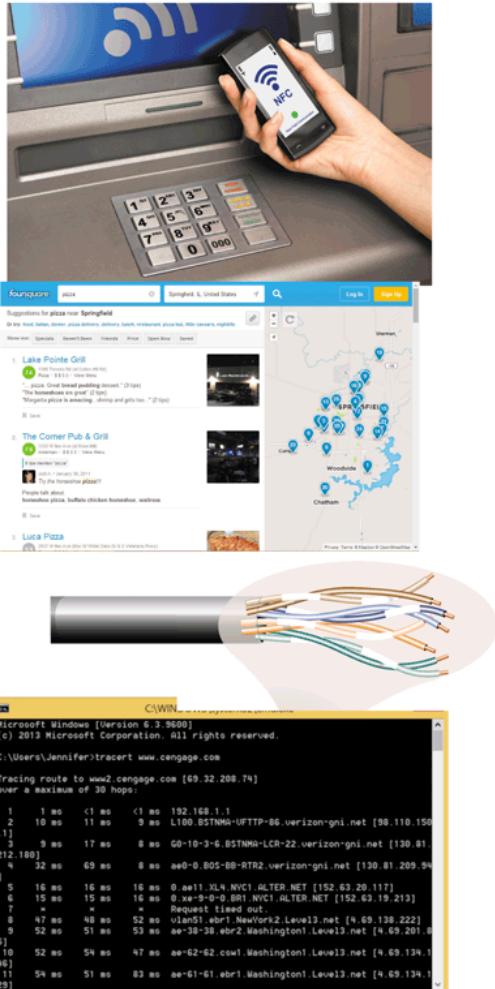
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- Executed by server before Web page is downloaded to browser
- Receives information passed to it from the browser and from files and databases available to it on the server
- Maintains a conversation between a web browser and a web server
- Can be stored alone in a CGI file or embedded on a web page

# 6

# Understanding Internet Technologies and Security

(Lecture 09)



Discovering the  
Internet,  
5<sup>th</sup> Edition

# Objectives

---

- Discuss basic networking technologies
- Describe 2-tier and 3-tier models

# Networking Basics

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- A network connects two or more computers, printers, or other devices together with cables or wireless media allowing users to share
  - Data
  - Peripheral devices
  - Software and apps
  - Other network resources (such as an Internet connection)

# Networking Basics

---

- Local, Metropolitan, and Wide Area Networks
    - Modern networks can be categorized by the physical area they cover
      - Local area network (LAN) - home, office, building, or several buildings
      - Metropolitan area network (MAN) - region
  - Wide area network (WAN) - across the country or around the world
- ## Local Area Networks
- Local area networks are configured in one of two basic structures
    - Peer-to-peer
    - Client/server

# Networking Basics

---

## ➤ Local Area Networks (continued)

### – Peer-to-peer LAN

- 10 or fewer personal computers connected
- One or more of the computers may also have a printer, scanner, or external storage device
- Each node must have built-in networking capabilities or a **network interface card (NIC)**
- Each node may be connected to a single cable or may be connected at a common connection point using a **hub**
- Users can access files stored on any computer and any peripheral device connected to a computer on the network
- Simple to configure and inexpensive to use

# Networking Basics



# Networking Basics

---

## ➤ Local Area Networks (continued)

- **Client/server network** consists of multiple personal computers and devices or workstations (clients), one or more servers, and other devices such as printers
- Uses a network operating system to manage data, printer access, communications, Internet connections, security, and network administration
- Examples include Microsoft Windows Server, OS X Server, Novell NetWare, Cisco IOS, UNIX, and Linux

# Networking Basics

---

## ➤ Local Area Networks (continued)

- Advantages over a peer-to-peer network
  - Supports shared data storage
  - Provides network maintenance tools
  - Promotes more efficient data backups
- Disadvantages compared to a peer-to-peer network
  - More expensive
  - More difficult to configure
  - Requires more technical expertise to manage

# Networking Basics

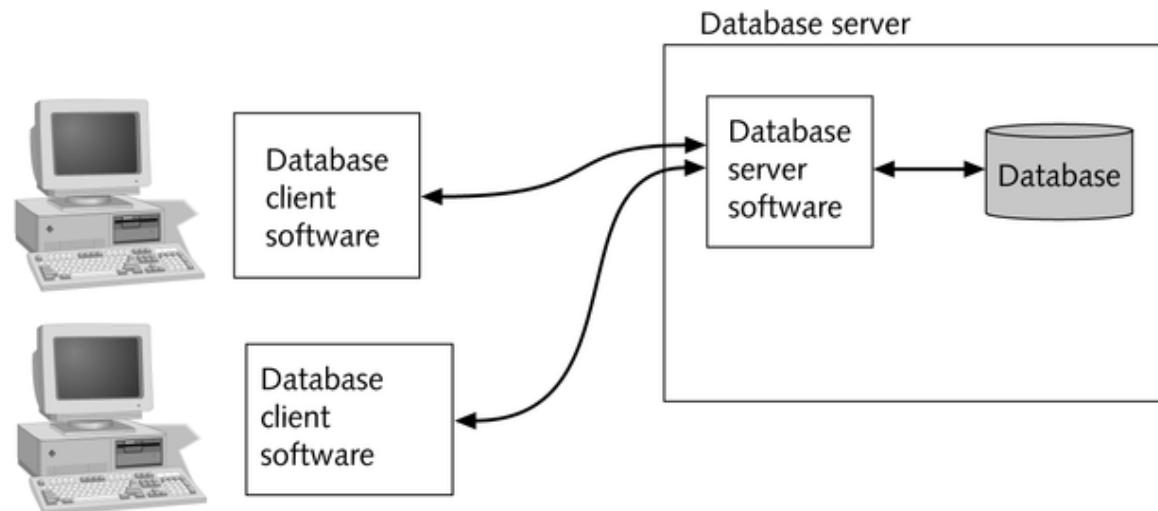
## Network Operating System Services

Service	Benefit
File Services	Permit the centralized storage of files on a file server, which can be accessed by any authorized user on the network. Maintain backup copies of critical files and protect against accidentally deleted files, damaged files, or files lost to natural or man-made disasters. Files stored centrally on a file server are backed up more easily than files stored on individual computers or devices.
Print Services	Enable users to share printers across a network. Replacing multiple individual printers with one or two high-speed networked printers can reduce equipment costs and increase productivity.
Mail Services	Manage the sending, receiving, routing, and storage of email messages. Email is a critical component of any organization's communications with employees, clients, and vendors. Enable email communications to flow smoothly.
Communications Services	Allow authorized users to connect to the network when out of the office. Communications services permit remote users to connect to the network.
Internet Services	Manage internal web-based services, external Internet access, and other Internet-based services such as web servers, web browsers, and email. Organizations use email to send and receive messages from clients or vendors outside the organization. Many organizations also use internal webpages to support internal business operations. External webpages are used to sell products and services and provide customer support. Internet services help manage these critical operations.
Management Services	Enable network administrators to manage the security and operation of the network by determining the level of network activity, monitoring network access and activity, detecting and solving network hardware and software problems, and distributing software to users.

# Client/Server Database Model

## ➤ **2-tier model** (client and server)

- Some database management software is on the client, some is on the server that contains the database
- Used in most Internet applications today



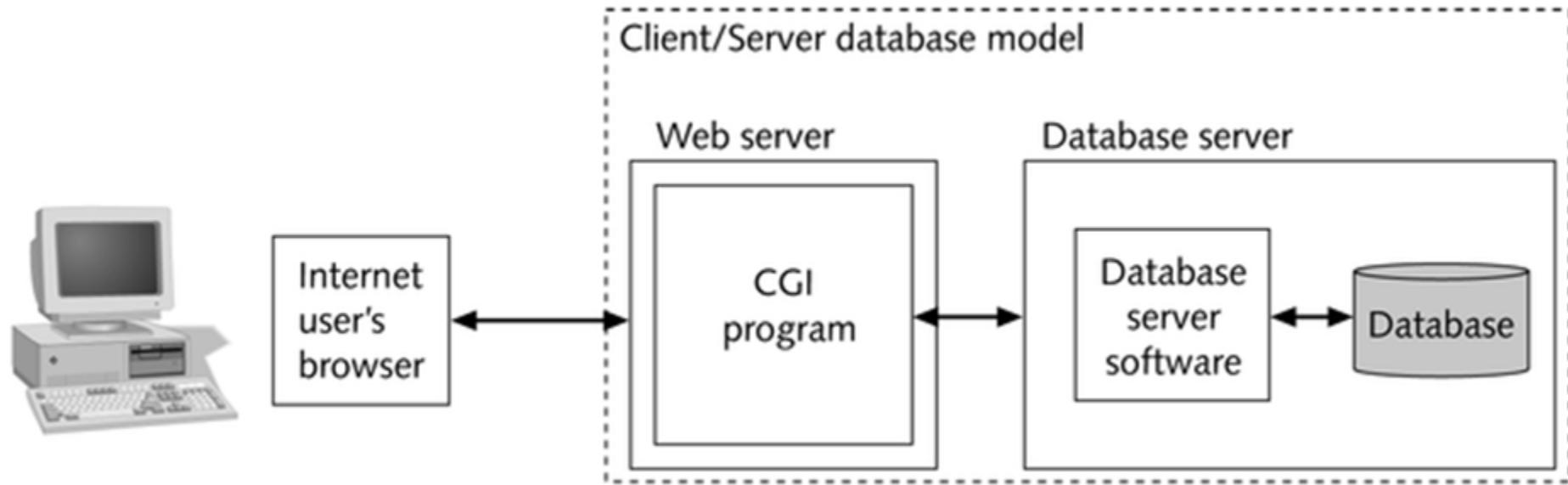
# Internet Client/Server Database Model

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- **3-tier model** (browser or client, Web server and database server)
  - Differs from traditional client/server model:
  - Neither client nor server portions of database software are on the PC of the Internet user
  - The browser on the user's PC accesses a database via the client/server model (client is on the web site and server has direct access to the database)
  - Advantage
    - Client PC does not need to contain database management software

# Internet Client/Server Database Model

- **3-tier model** (cont'd)



# Networking Basics

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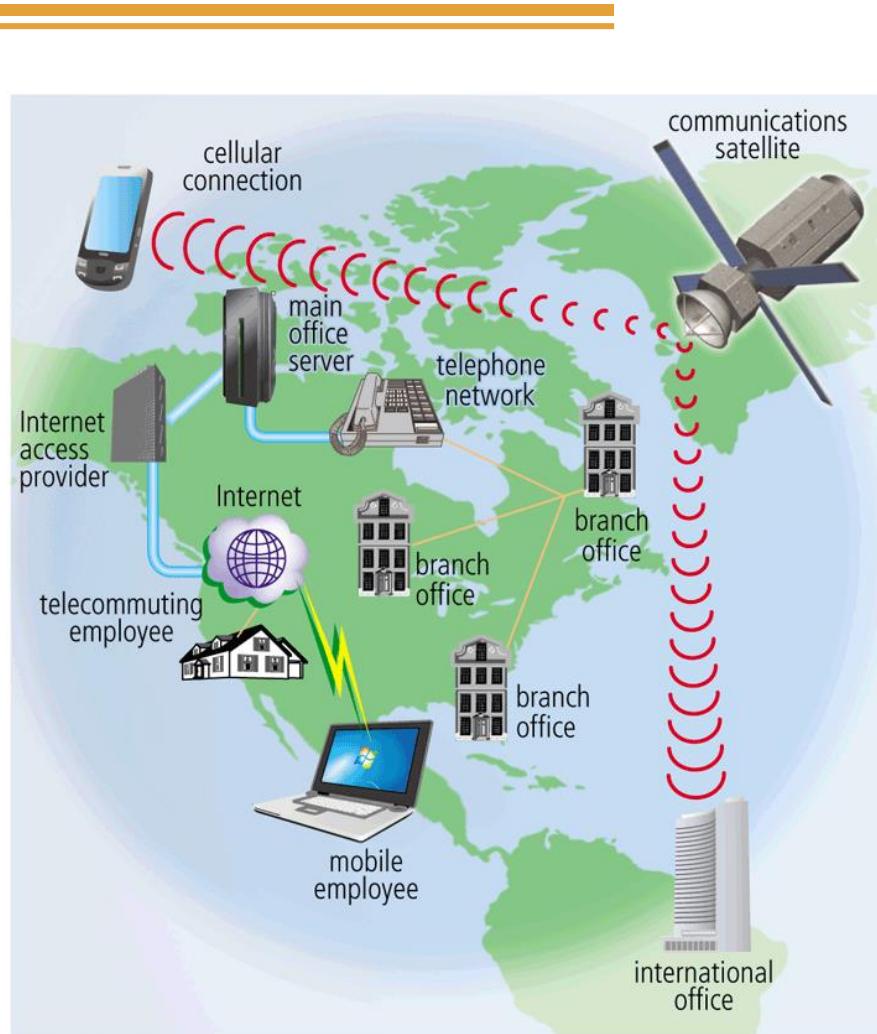
## ➤ Metropolitan Area Networks (MANs)

- Connects clients and servers in a region that is larger than a single office or building
  - Multiple buildings across a city or multiple educational, research, or government facilities across a state
- Generally are owned by a consortium of users of a single network provider that sells high-speed network services to multiple users

# Networking Basics

## ➤ Wide Area Networks (WANs)

- Cover a very wide geographical area
  - Can be a single network or multiple connected LANs located across the country or around the world
  - Most WANs are private, corporately owned networks
  - The Internet is the world's largest public WAN



# Networking Basics

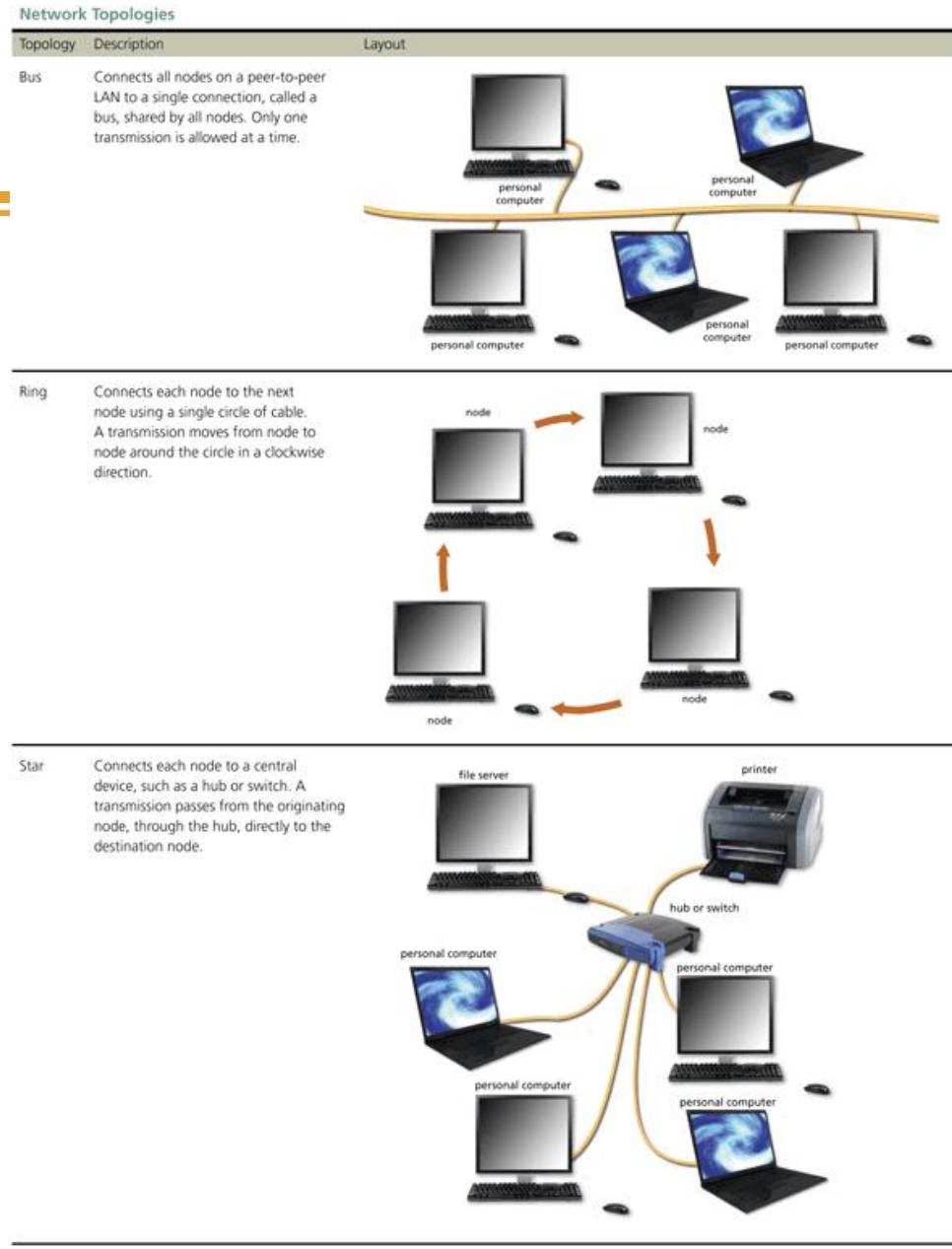
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- Network Topologies, Access Methods, and Transmission Media
  - **Physical topology** is the arrangement of a network's computers, printers
  - **Access method** is how data is transmitted from node to node across the network
  - **Transmission media** – are the physical or wireless communication media used to carry transmissions
  - These three characteristics define the **throughput**, which is the amount of data that can travel node to node in a specified amount of time

# Networking Basics

## ➤ Network Topologies, Access Methods, and Transmission Media (continued)

- Three basic LAN physical topologies
  - Bus
  - Ring
  - Star
- Today, many LANs use a hybrid physical topology that combines some elements of these three topologies

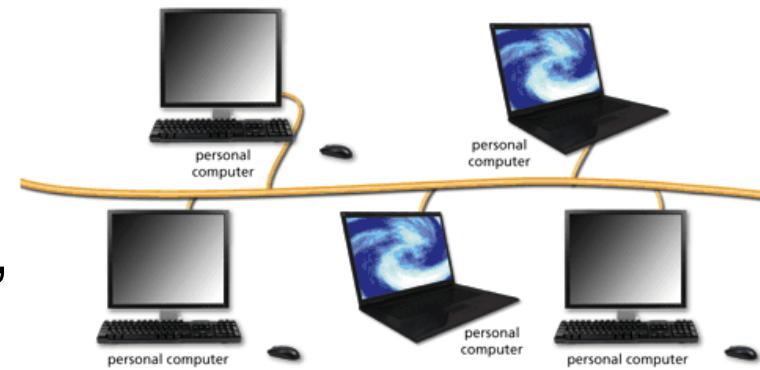


# Networking Basics – Network Topologies

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## ➤ Bus topology

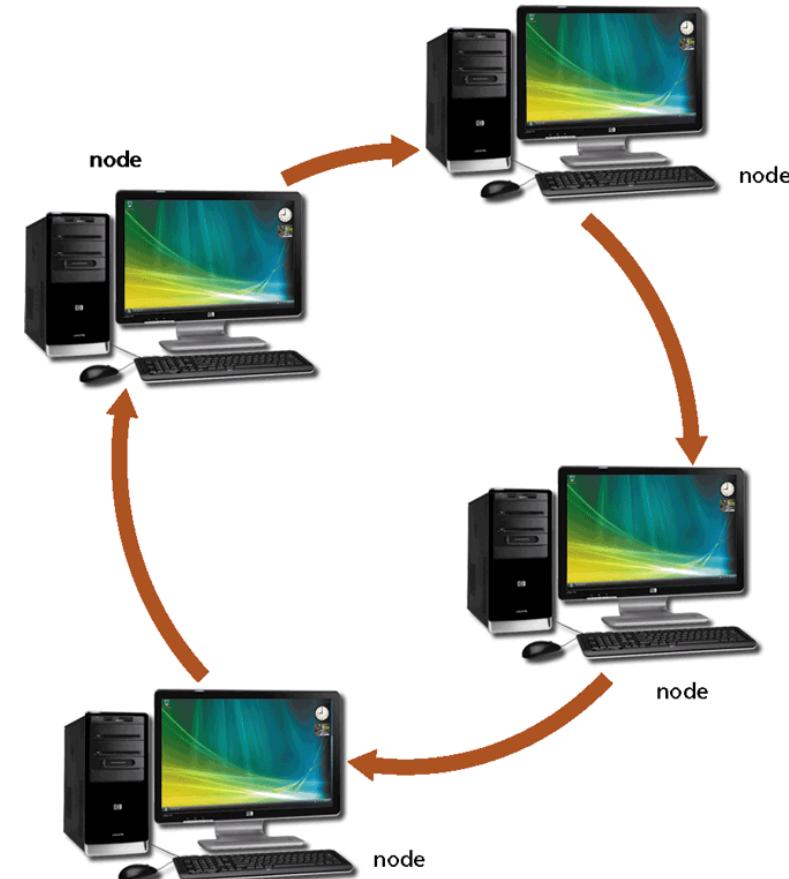
- Connects all nodes on a peer-to-peer LAN with a single cable called a bus
- Only one transmission allowed at a time
- A node announces to the entire network when it is ready to send a transmission
- All nodes except the destination node ignore the transmission
- If a problem occurs with the bus, the entire network becomes inoperable



# Networking Basics – Network Topologies

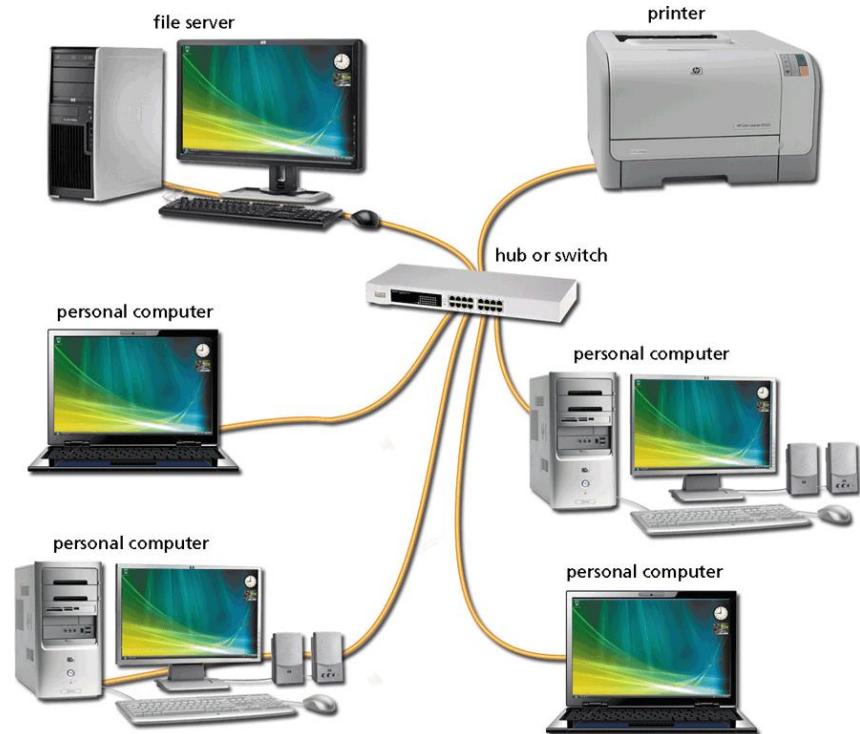
## ➤ Ring topology

- Connects each node to the next node via a single circle of cable
- A transmission moves from node to node around the circle clockwise
- Each node accepts any data addressed to it and then forwards the transmission to the next node
- Failure of one node can affect all the nodes following it



# Networking Basics – Network Topologies

- **Star topology**
  - Connects each node to a central device, such as a hub or switch
  - A transmission passes from the originating node, through the hub, directly to the destination node
  - Failure of a single node does not make the entire network inoperable

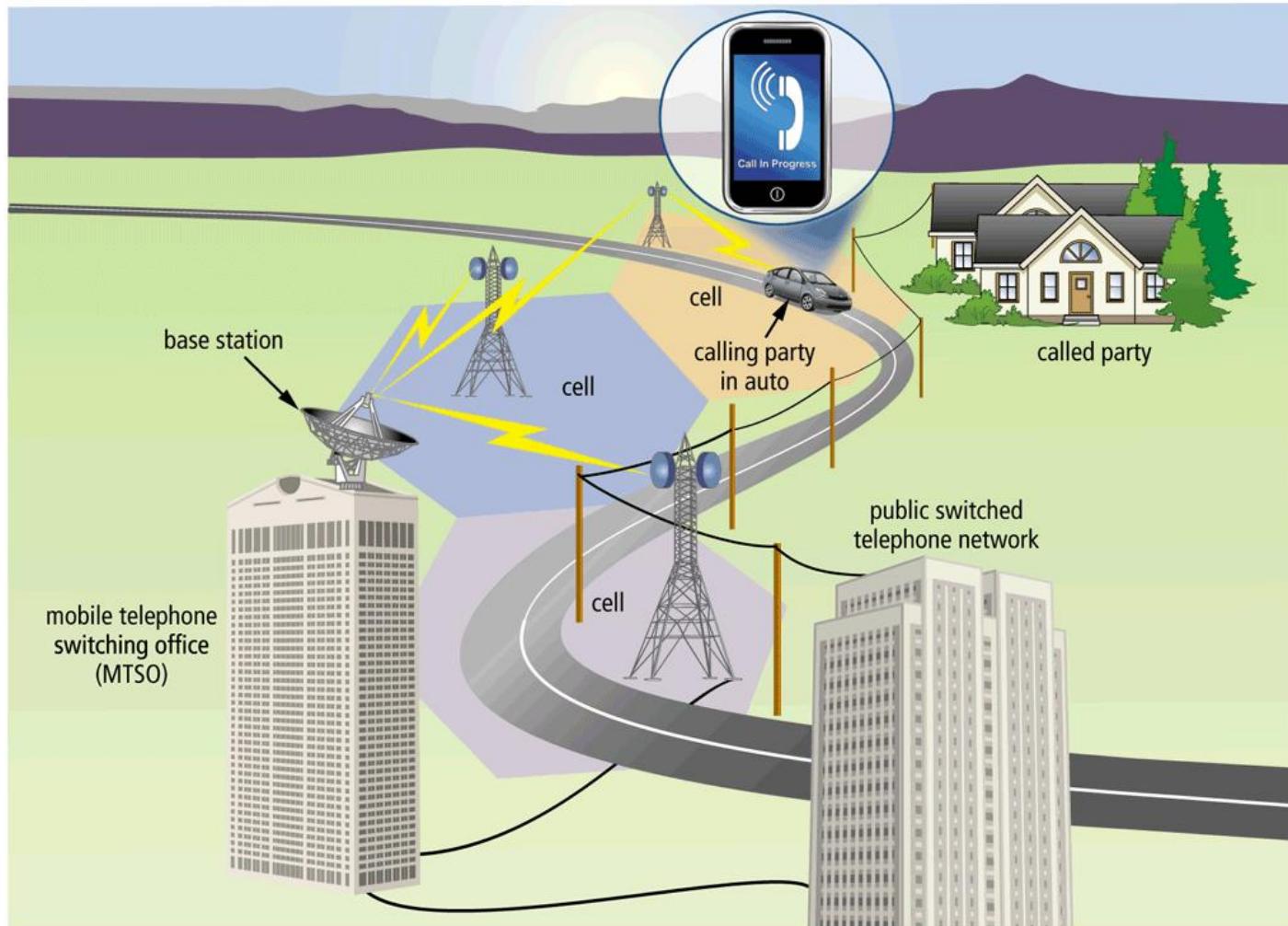


# Networking Basics

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- Network Topologies, Access Methods, and Transmission Media (continued)
  - Access Methods
    - Sometimes called **logical topology**
    - **Ethernet** – a node attempting to transmit data first must determine whether or not another node is sending a transmission
    - **Token ring** – passes **tokens**, small packets of data, clockwise in a circle from node to node
  - Transmission Media
    - **Cellular transmissions** travel wirelessly over land cells using transceivers, or cell sites; cellular networks can transfer voice and data over a large, almost limitless area

# Networking Basics



# Networking Basics

## ➤ Network Topologies, Access Methods, and Transmission Media (continued)

### — Transmission Media (continued)

- **Infrared (IR) transmissions** use infrared light-wave signals as short-range transmission medium; require line-of-sight transmissions
- **Near field communication (NFC) transmissions** use radio waves to connect devices that are touching or nearby (generally within 10 centimeters)



# Networking Basics

- Network Topologies, Access Methods, and Transmission Media (continued)
  - Transmission Media (continued)
    - **Radio frequency (RF) transmissions** use broadcast radio waves to transmit data over short distances; some wireless devices use **transceiver**, a single component and receives transmissions
    - **Bluetooth** is a short-range RF technology
      - Designed for **wireless personal area networks (WPANs)**, which have a range of approximately 33 feet (10 meters)
      - To enable two Bluetooth devices to work together, **pair** them

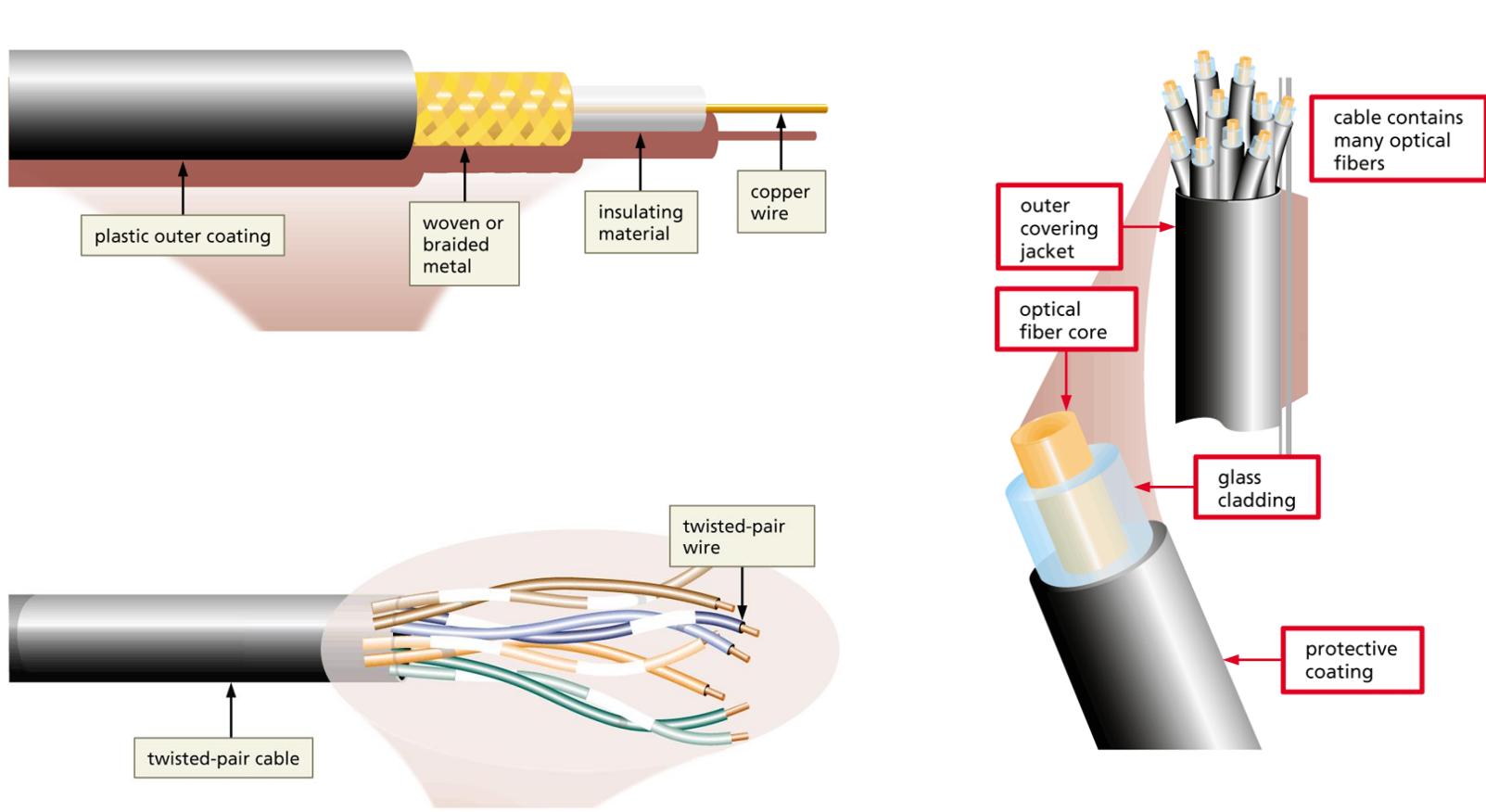


# Networking Basics

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- Network Topologies, Access Methods, and Transmission Media (continued)
  - Transmission Media (continued)
    - A **Wi-Fi network**, or **wireless LAN (WLAN)** uses a wireless medium — such as radio frequency transmissions — to connect computers and mobile devices, printers, and other devices
    - Physical transmission media
      - **Coaxial cable** (pronounced KO-ax); although was the choice for many early networks, not used in most modern networks because it does not transmit data as fast as other media
      - **Twisted-pair cable** commonly used as a LAN transmission medium
      - **Fiber-optic cable** commonly used as a MAN or WAN transmission medium

# Networking Basics



# Networking Basics

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## ➤ Connectivity Hardware and Software

- Hardware connectivity devices connect nodes on the same network, connect nodes across multiple networks, and forward packets between nodes
- **Segments** are multiple groups of computers or devices that share a common function
- Hubs
  - Hub – inexpensive hardware device used to connect multiple nodes on the same network

# Networking Basics

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## ➤ Connectivity Hardware and Software (continued)

### – Bridges

- **Bridge** – intelligent connectivity device with one input port and one output port that connects two segments on the same LAN or two separate LANs
- Each node on the network has a **MAC (Media Access Control Address)**
- Bridge creates a database of all the MAC addresses for nodes on its segment or LAN

### – Data Switches

- **Data switch** – intelligent device that also interprets MAC addresses and filters and forwards data packets to network segments
- Can be a less-expensive choice than a bridge for networks with a large number of nodes

# Networking Basics

## ➤ Connectivity Hardware and Software (continued)

### — Routers

Route packets over specific paths between nodes

- **Router** is an intelligent device with multiple ports; a specialized computers that connect LAN segments, two LANs, or multiple LANs on a WAN
  - Determines the best route for packets
  - Fall into three categories: wireless, mobile, or broadband
  - Use **static routing** or **dynamic routing**
  - Internet routers are complex, fast, expensive devices that send packets from one router to another in a series of **hops** until they reach their destination network

Allows a router to determine the best route between two nodes automatically and then store this information in a routing table

# Networking Basics

## ➤ Connectivity Hardware and Software (continued)

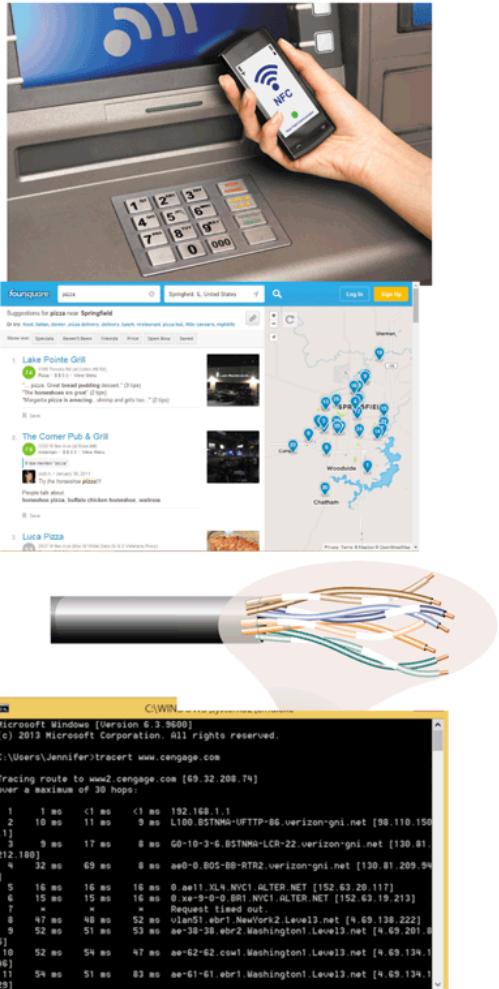
### – Gateways

- A **gateway** is a hardware or software that runs on a mainframe computer, server, individual workstation or router; connects two or more networks or network segments that use different packet formatting, different communication protocols, and different access methods

Types of Gateways	
Name	Description
Cloud gateway	Integrates standard networking protocols with cloud services to connect to the cloud.
Email gateway	Converts email messages created by one type of email system so that they can be read by a different type of email system.
Internet gateway	Allows LAN users to access the Internet. Can be used to define which users have Internet access or to restrict access to certain Internet services or websites.
LAN gateway	Connects LAN segments that use different access methods and communication protocols.
SMS gateway	Enables a computer to send SMS (short message service) messages, such as text messages. Many include the capability to convert text messages to email.
Voice/data gateway	Allows data packets to be sent over a voice network or voice to be sent over a data network by translating between voice circuit switching and data packet switching.
Wireless gateway	Integrates wireless devices such as laptops, PDAs, and cell phones with a wired network.

# 6 | Understanding Internet Technologies and Security

(Lecture 10)



Discovering the  
Internet,  
5<sup>th</sup> Edition

# Objectives

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- Describe the infrastructure of the Internet
- Discuss GPS and identify wireless location-based services
- Explain the convergence of the Internet with telephony and conferencing
- Discuss internal and external network security threats, transactional risks, and virtual private networks

# Internet Infrastructure

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- Network Service Providers
  - **Network service providers (NSPs)** provide the public and private network infrastructure for the Internet that enables wireless, cellular, and other capabilities
    - AT&T, Sprint, Verizon, T-Mobile, and others
  - An **Internet exchange point (IXP)** is a physical infrastructure that enables ISPs to communicate among their networks, which limits the upstream traffic an ISP must handle
    - **Metropolitan Area Exchange (MAE)** – a specific type of high-speed Ethernet connection within a metropolitan area
    - **Peering** is the exchange of Internet traffic and router information between NSPs and ISPs at an exchange point

# Internet Infrastructure

## ➤ TCP/IP Stack

- **TCP/IP stack** –set of standard Internet protocols on which communications across the Internet and many private networks rely
  - TCP, IP, and UDP are core subprotocols required for all TCP/IP transmissions
- **IP network** is another name for a network running TCP/IP

TCP/IP Stack	
Subprotocol	Description
Address Resolution Protocol (ARP)	Converts a computer's IP address to its physical MAC address.
Dynamic Host Configuration Protocol (DHCP)	Automatically assigns IP addresses to network devices.
File Transfer Protocol (FTP)	Enables uploading and downloading of files between a local and remote computer.
Hypertext Transfer Protocol (HTTP)	Allows web servers and web browsers to communicate.
Internet Control Message Protocol (ICMP)	Sends error messages to routers and host computers when problems occur with data transmissions.
Internet Message Access Protocol version 4 (IMAP4)	Provides remote access to a mail server, allowing users to manage their stored messages; functions similar to POP3.
Internet Protocol (IP)	Sends packets and provides routers with the address information needed to deliver the packets.
Post Office Protocol version 3 (POP3)	Manages storage of email messages on a mail server and forwarding of email messages from a mail server to a user's mailbox.
Reverse ARP (RARP)	Converts a computer's physical MAC address to its IP address.
Simple Mail Transfer Protocol (SMTP)	Routes email messages from mail server to mail server across an IP network such as the Internet.
Telnet	Allows a computer to act as a terminal for logging on to remote devices such as a computer or router.
Transmission Control Protocol (TCP)	Breaks data into packets, verifies packet integrity, and reassembles error-free packets at their destination.
User Datagram Protocol (UDP)	Sends packets without checking for errors or verifying receipt of the packets. UDP is used to broadcast live video or audio over the Internet.

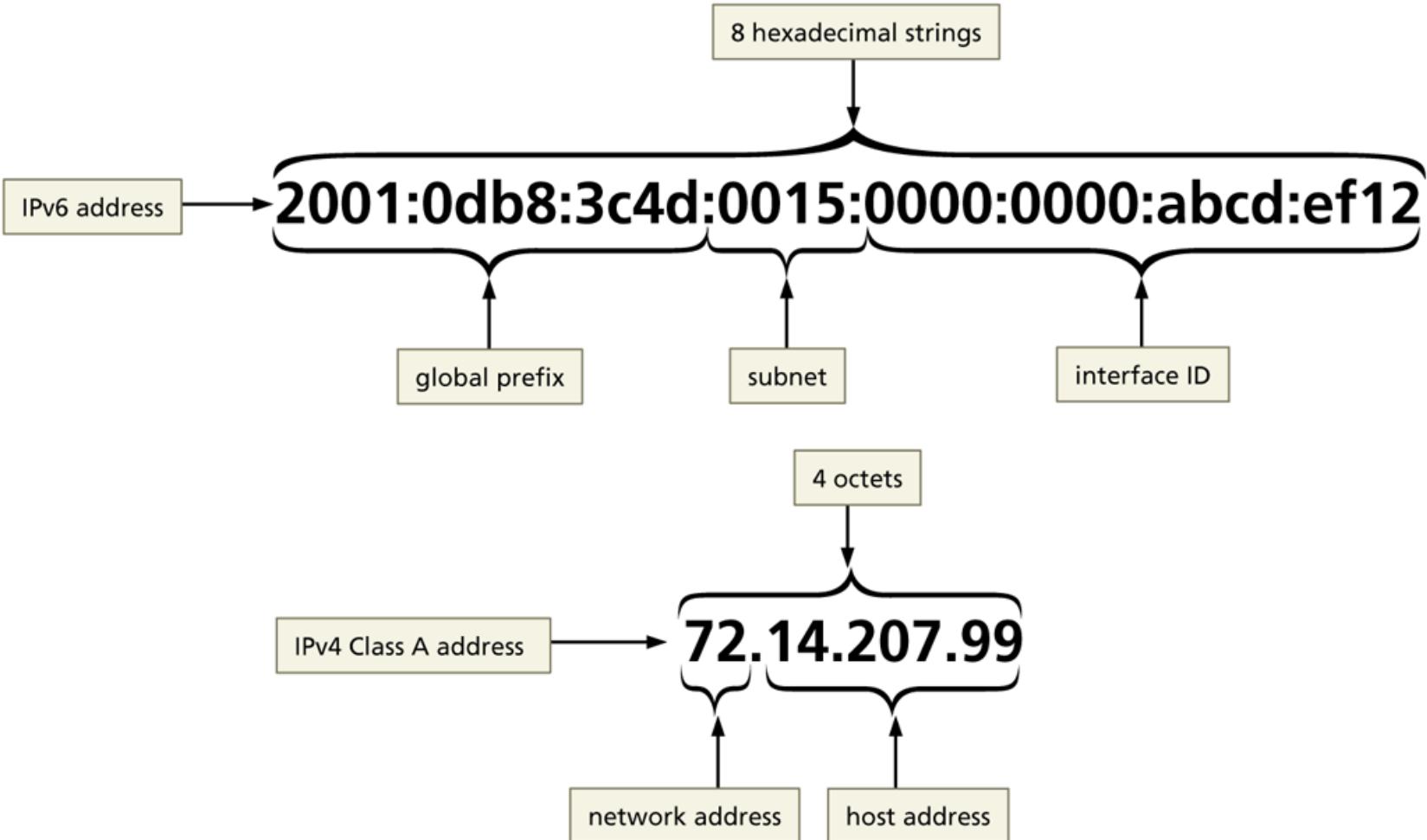
# Internet Infrastructure

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## ➤ IP Addresses

- In addition to a MAC address, each node on an IP network has a **logical address**, called an IP address
- IP address is the unique address of each node on a network
  - The current IP standard, **IPv6**, lengthens IP addresses from 32 bits to 128 bits

# Internet Infrastructure



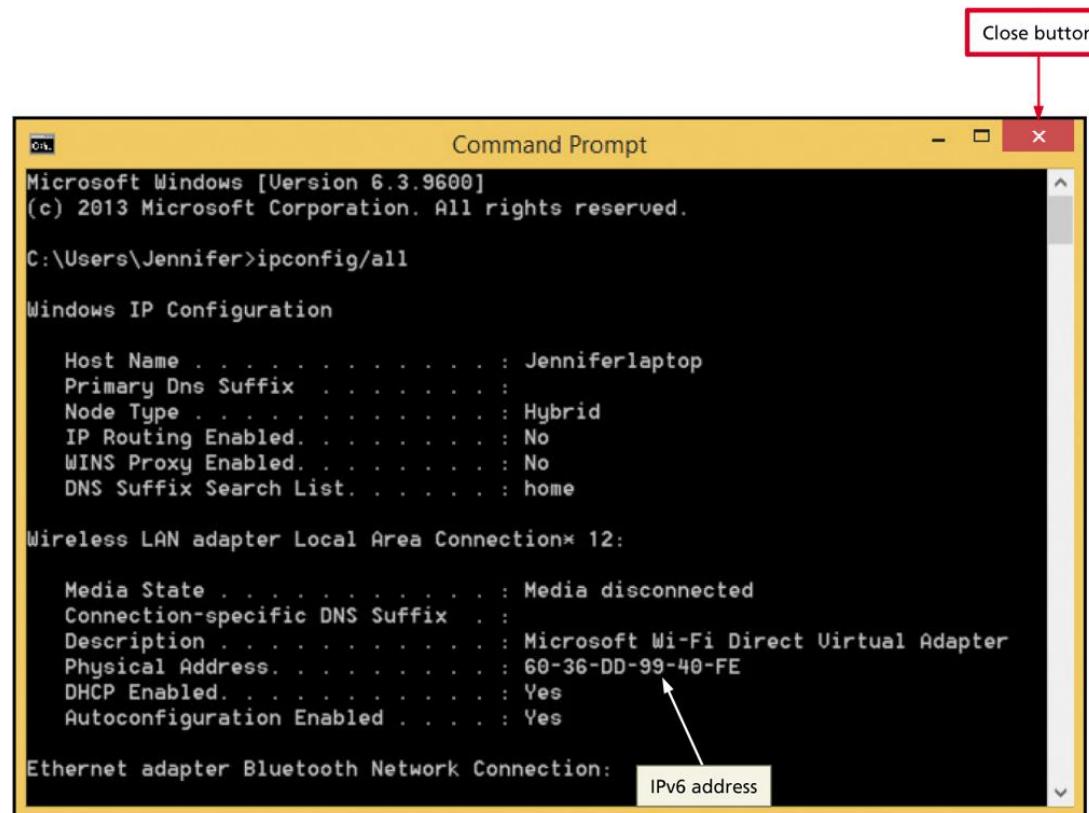
# Internet Infrastructure

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- IP Addresses (continued)
  - **Classful routing system** used originally
  - **Classless routing system**, called **Classless Inter-Domain Routing (CIDR)** allows network administrators to expand the number of network nodes assigned to an IP address
    - Used extensively on the Internet
    - Used in large private networks

# Viewing a Networked Computer's IP Address

- Open the Command Prompt window.
- Enter ipconfig /all at the command-line prompt to instruct the operating system to display all IP information about your networked computer.
- Press the ENTER key to display your computer's host name, IP address, and other IP information.



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window displays the output of the "ipconfig /all" command. The output includes the following sections:

- Windows IP Configuration**:
  - Host Name . . . . . : Jenniferlaptop
  - Primary Dns Suffix . . . . . :
  - Node Type . . . . . : Hybrid
  - IP Routing Enabled. . . . . : No
  - WINS Proxy Enabled. . . . . : No
  - DNS Suffix Search List. . . . . : home
- Wireless LAN adapter Local Area Connectionx 12:**
  - Media State . . . . . : Media disconnected
  - Connection-specific DNS Suffix . . . . . :
  - Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
  - Physical Address. . . . . : 60-36-DD-99-40-FE
  - DHCP Enabled. . . . . : Yes
  - Autoconfiguration Enabled . . . . . : Yes
- Ethernet adapter Bluetooth Network Connection:**
  - IPv6 address

# Internet Infrastructure

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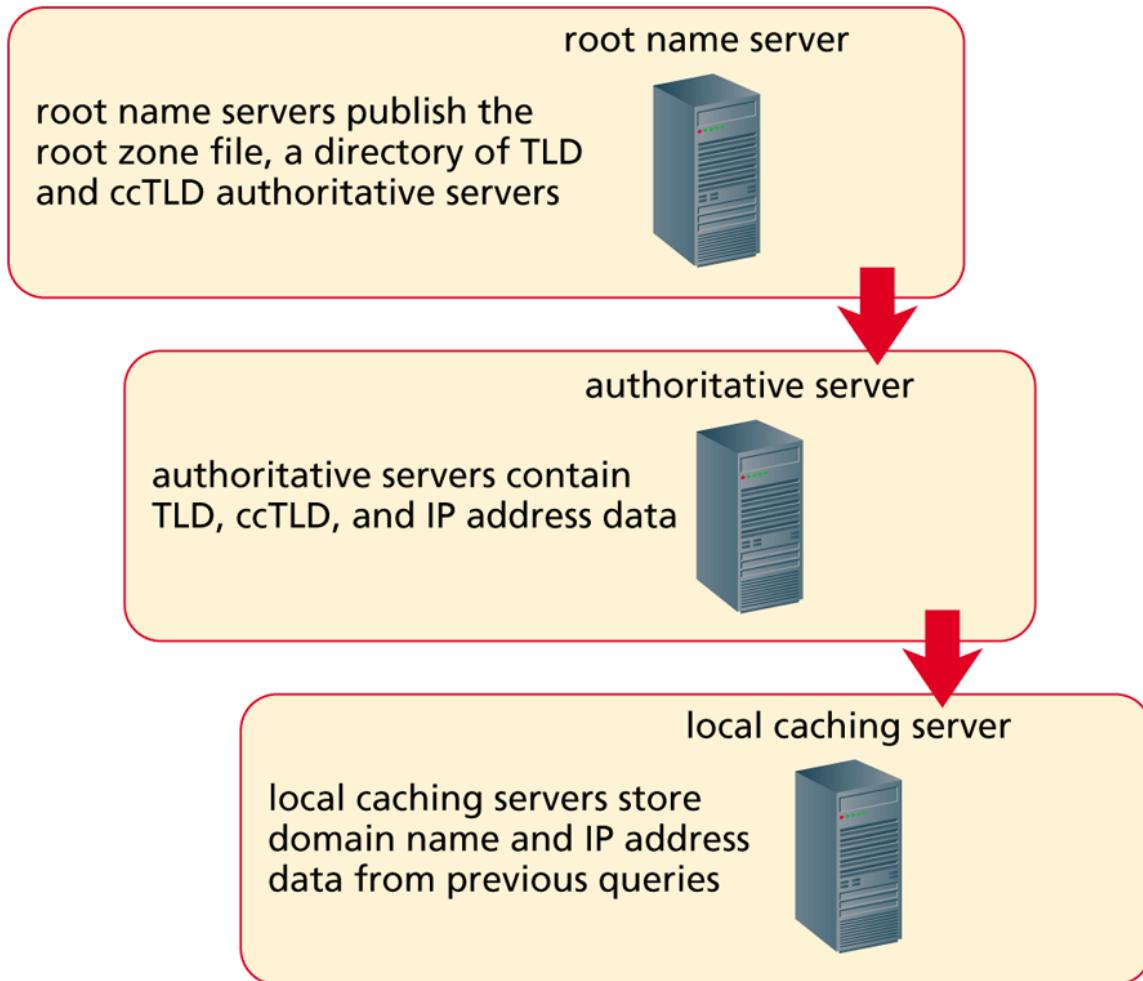
- Domain Name System (DNS)
  - The DNS is a hierarchy of servers used to translate domain names into IP addresses in a process called **resolving** the domain name
  - Twelve different organizations, such as VeriSign, NASA, the University of Maryland, and the University of Southern California, operate the **root name servers**

# Internet Infrastructure

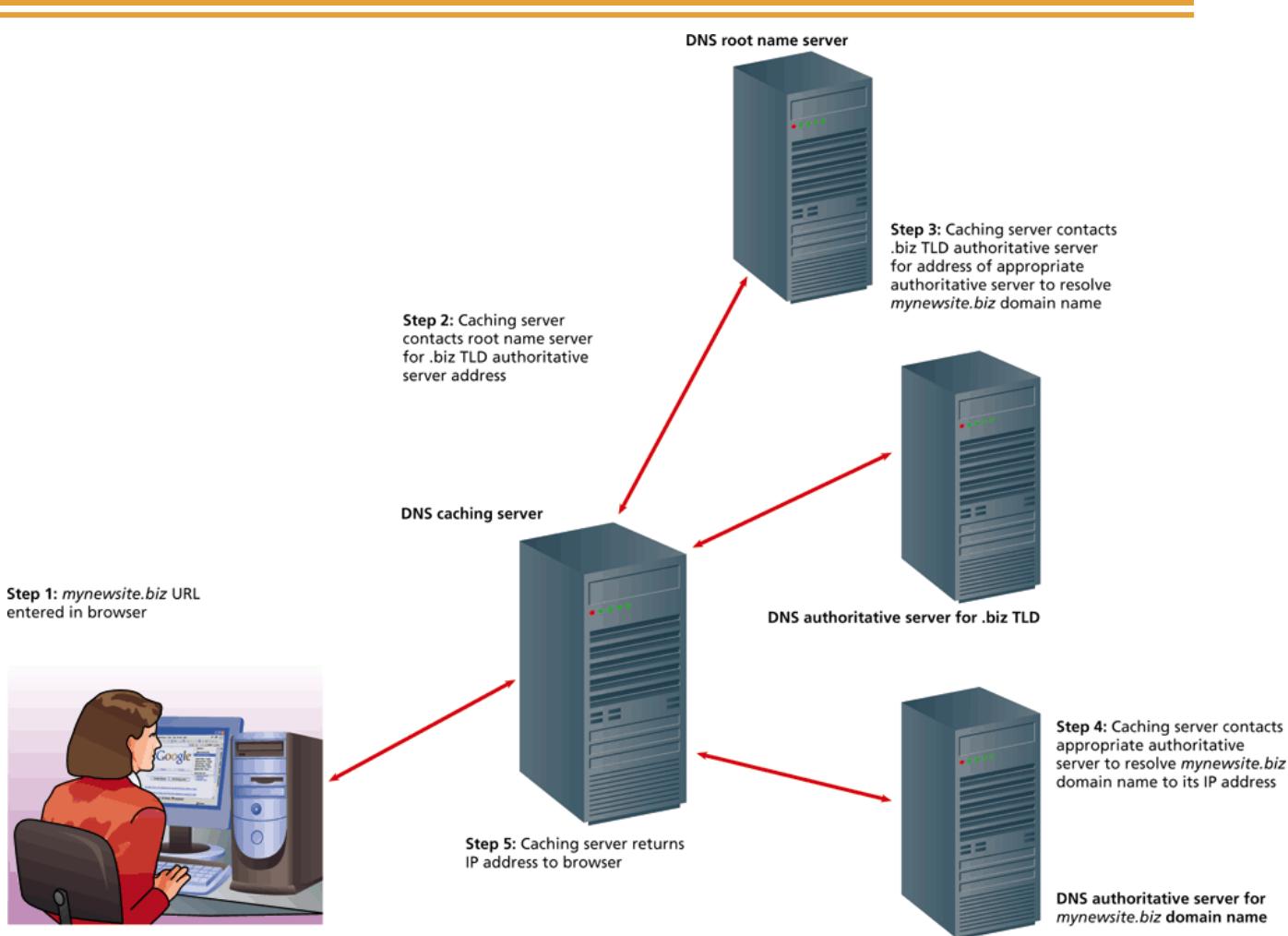
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- Domain Name System (DNS) (continued)
  - **Authoritative servers** contain IP information for the TLD and ccTLD domains and their registrants
  - Caching servers **operated** by ISPs and company IT departments contain stored domain name and IP address information
  - **DNS namespace** consists of all information in the DNS databases
  - Process of resolving a domain name begins with local caching server

# Internet Infrastructure



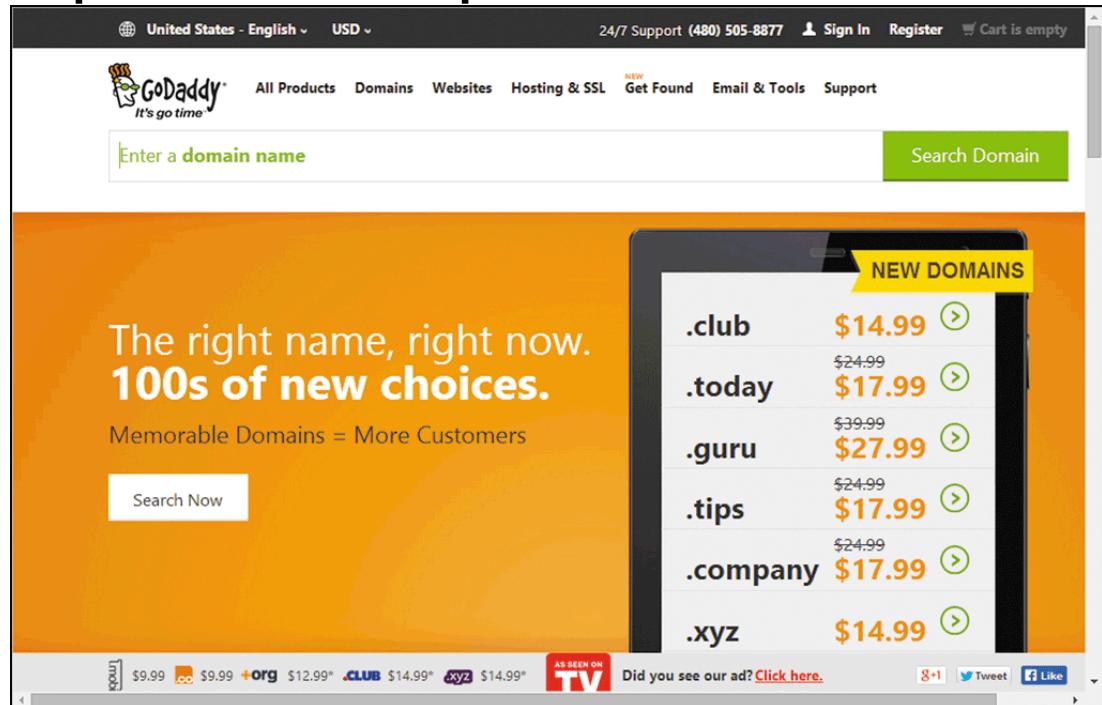
# Internet Infrastructure



**Figure 6-24** The process of resolving a domain name using the DNS begins with a local caching server.

# Internet Infrastructure

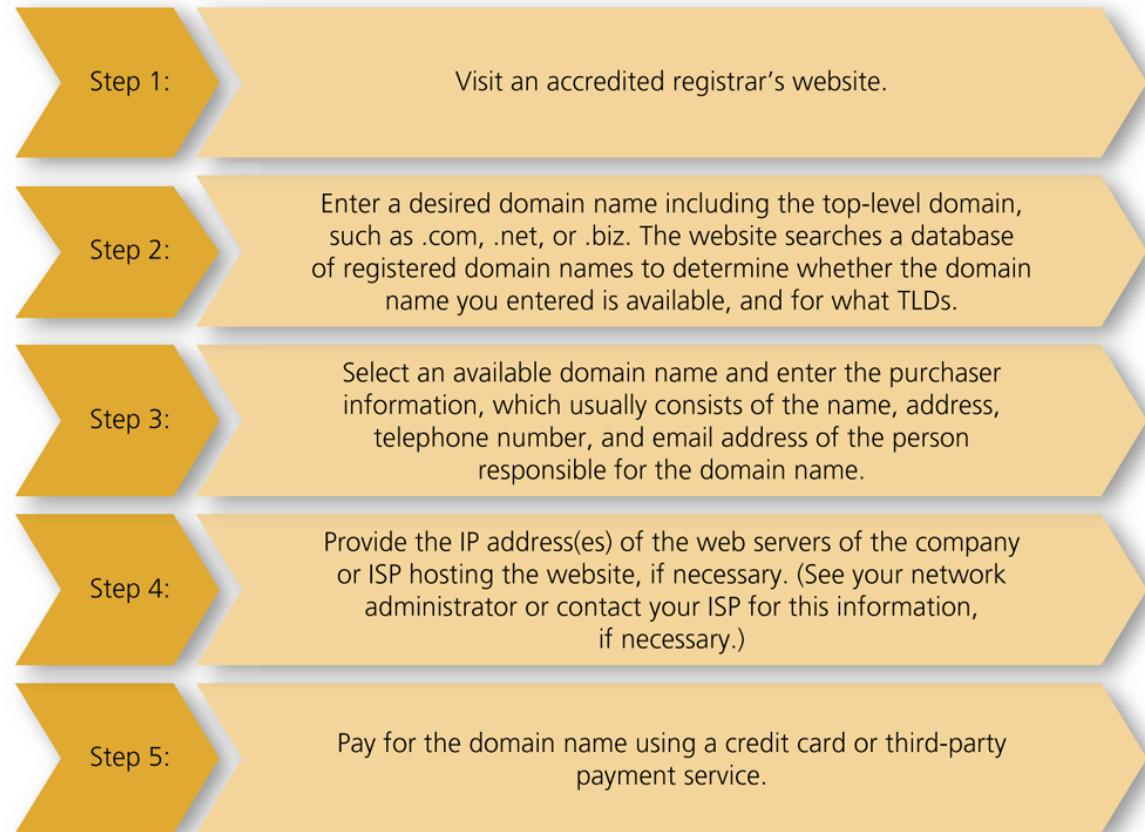
- Domain Name System (DNS) (continued)
  - **Shared Registration System (SRS)** is registration system that allows private companies, called **accredited registrars**, to handle registration of domain names



# Internet Infrastructure

## ➤ Domain Name System (DNS) (continued)

- Process of registering domain name varies by registrar
- If chosen name is taken, reconsider website name



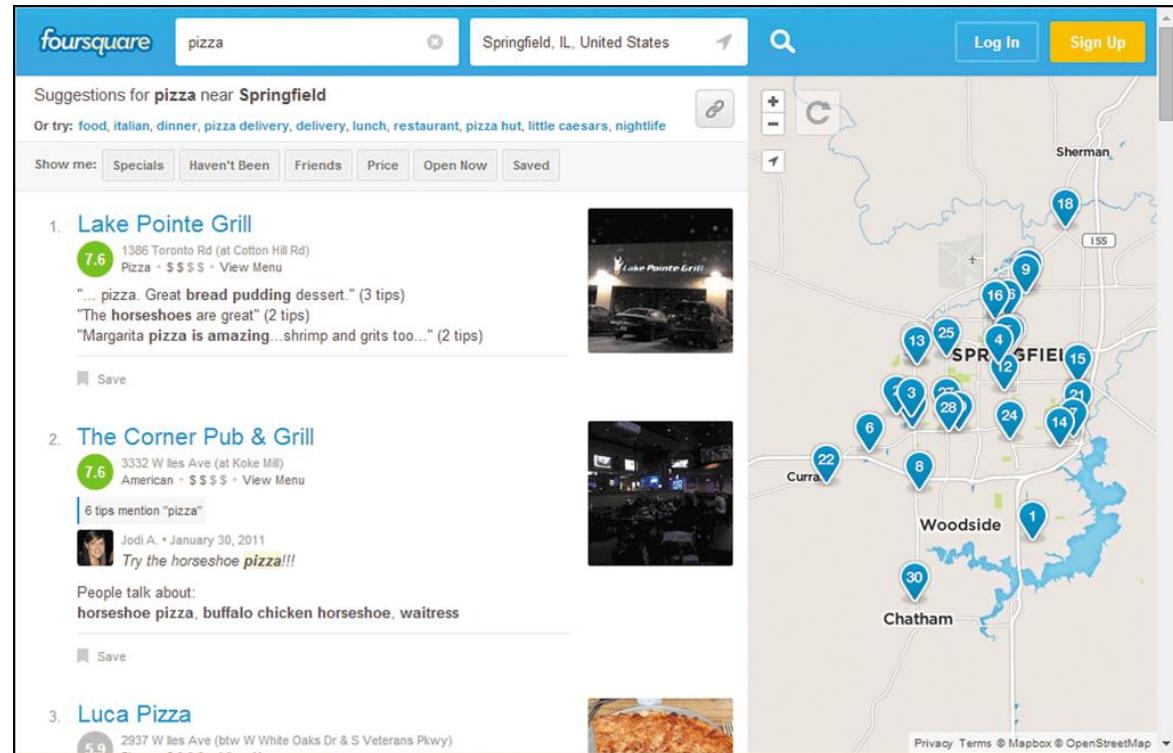
# Location-Based Services and GPS

- **Location-based service (LBS)** is a wireless service offered to customers based on their physical location
  - Example: E9-1-1
- **Global Positioning System (GPS)** satellite network and receivers mounted in automobiles or placed in mobile phones, watches, tablets, or other handheld devices



# Location-Based Services and GPS

- Geosocial networking is a term used to describe the combination of LBS with social networking providers



# Internet Telephony and Web Conferencing

## ➤ Internet Telephony

- IP telephony or Voice over IP (VoIP)
- Uses TCP/IP and packet switching to send voice transmissions over private or public IP network
  - VoIP providers, such as Vonage, offer telephone broadband Internet connections.
  - Computer to computer calling using special software, such as Skype



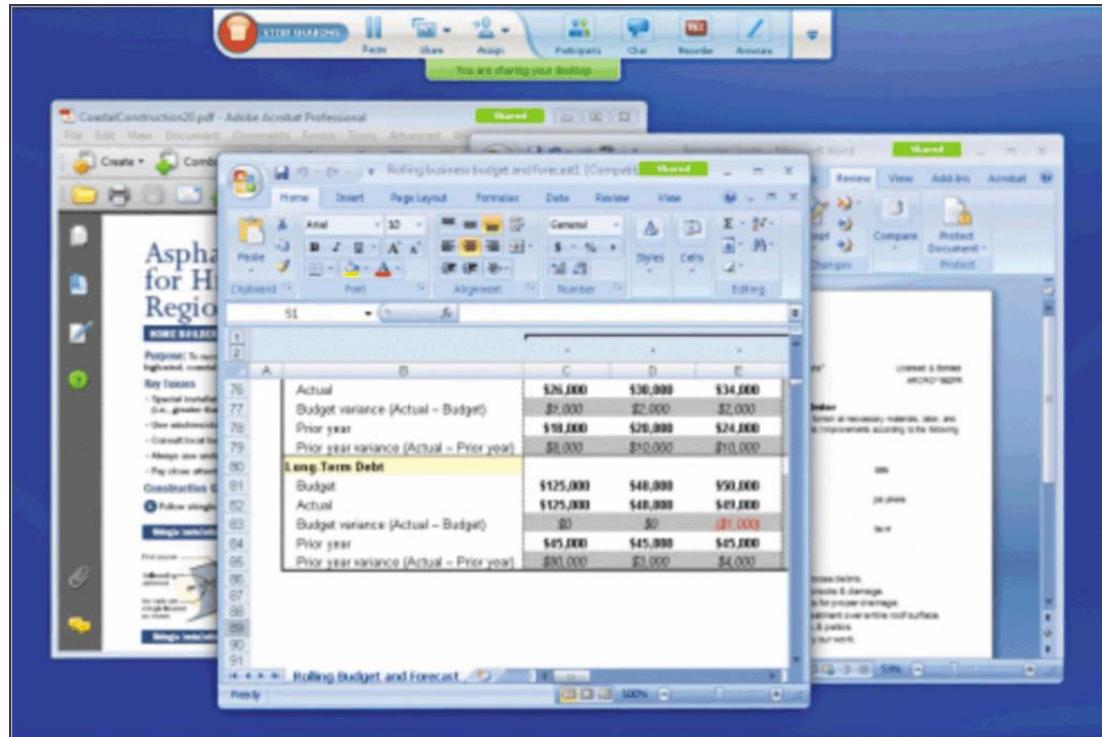
# Internet Telephony and Web Conferencing

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- Virtual Meetings, Conversations, and Web Conferencing
- A **virtual meeting** allows collaboration between participants, such as a group of employees, by allowing invitees to log on to their network and sign in to a meeting in which they communicate with each other as well as view, share, and work collaboratively on files
- **Video conferencing**, an expanded virtual meeting that sometimes includes hundreds or thousands of participants, involves real-time transmission of video and audio between two locations

# Internet Telephony and Web Conferencing

- Virtual Meetings, Conversations, and Web Conferencing
- A **virtual conversation** is a video chat using services such as Google Hangouts or FaceTime
- **Web conferencing** is a virtual meeting conducted using a browser and the web



# Network Security Issues and Technologies

## ➤ Internal Network Security Threats

- Security Policies and Procedures
- Authorized Network Access
  - User ID and passwords

### Effective Passwords

Do This	Do Not Do This
Z89\$33Q	Wilson (last name)
D33f084	012664 (birthday)
66G13b9	apple
7y3MF98F	user

# Network Security Issues and Technologies

## ➤ Internal Network Security Threats (continued)

- **Biometrics** – using devices to measure biological data to identify a user
- **Smart card** – plastic card the size of a credit card that contains memory chips that can store special access codes or biometric information
- Wireless Network Security
  - **LAN jacking or war driving** Act of driving around with a laptop, antenna, and wireless card, looking for unsecured wireless networks to access
  - **Spoofing** Technique intruders use to make their network or Internet transmission appear legitimate to a victim computer or network
  - **Rogue WLAN**
- Data Storage, Backup, and Restore
  - **Cloud storage** A hacker can create a rogue WLAN by installing a wireless router that uses network resources and exposes the network to security threats

# Network Security Issues and Technologies

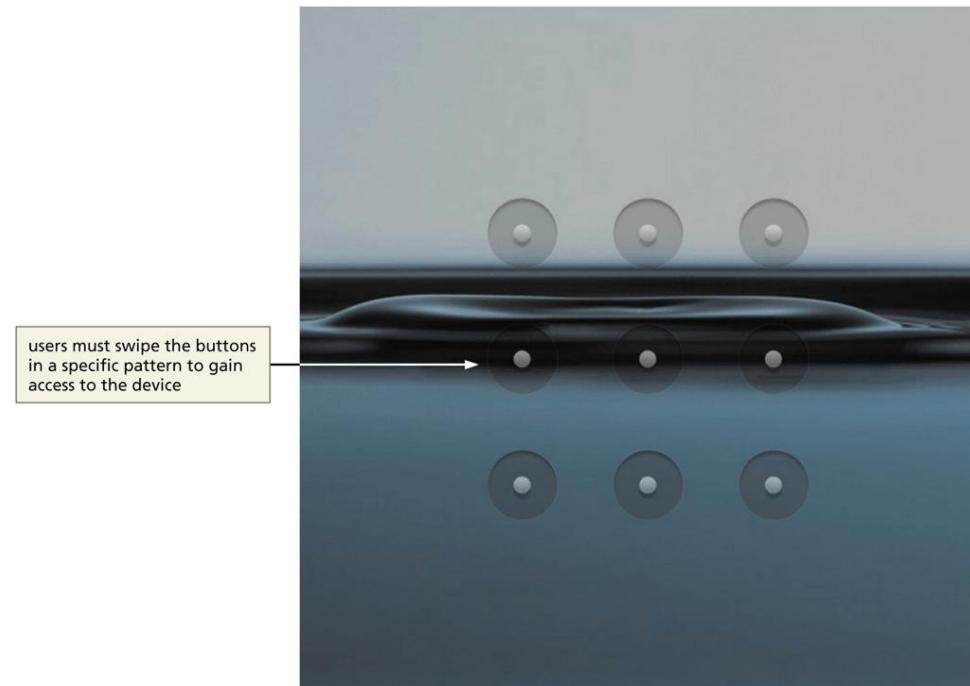
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- Internal Network Security Threats (continued)
  - Disaster Recovery Planning
    - Techniques to protect against accidental or deliberate physical damage to network equipment and data
    - **Disaster recovery plan** covers how an organization deals with a natural or man-made disaster to ensure the organization's viability
- External Network Security Threats
  - Unauthorized Network Access
    - **Distributed denial of service (DDoS)** attacks
    - Hackers may break into network to steal account information, such as credit card numbers, user passwords, and other personal information to steal a person's identity, make unauthorized credit card purchases, or open accounts in a user's name for illegal purposes

# Network Security Issues and Technologies

## ➤ External Network Security Threats (continued)

- Computer Viruses
- Worm
- Trojan horse
- Protect against viruses with virus protection apps
  - Symantec
  - McAfee
  - Swipe codes



# Network Security Issues and Technologies

## ➤ External Network Security Threats (continued)

### – Web Page Hacking

- **Hijacking** occurs when hackers redirect a URL to an alternate website
- Web Application Security Consortium and its sponsored Web Hacking Incidents Database is a good learning resource

The screenshot shows a wiki page titled "Web-Hacking-Incident-Database". The page content is organized into numbered sections:

- Project Overview
- Project Leader
- Project Contributors
- Project Sponsors
- Keep Track of the Latest WHID Entries
  - WHID Mail-list
  - Twitter Feed
- Submit an Incident
- Real-Time Statistics
  - Top Attack Methods (All Entries)
  - Top Application Weaknesses (All Entries)
  - Top Impacts/Outcomes (All Entries)
- Search the WHID Database
  - Management View
  - Security Analyst View
  - Developer View
  - Geographic WHID View
- Reports
- Presentations
  - The Web Hacking Incident Database Update for 2009 by Ryan Barnett at the OWASP AppSec DC Conf 2009
  - Analysis of the Web Hacking Incident Database (WHID) 2008 by Ofer Shezaf at the OWASP AppSec NYC Conf 2008
- Disclaimers

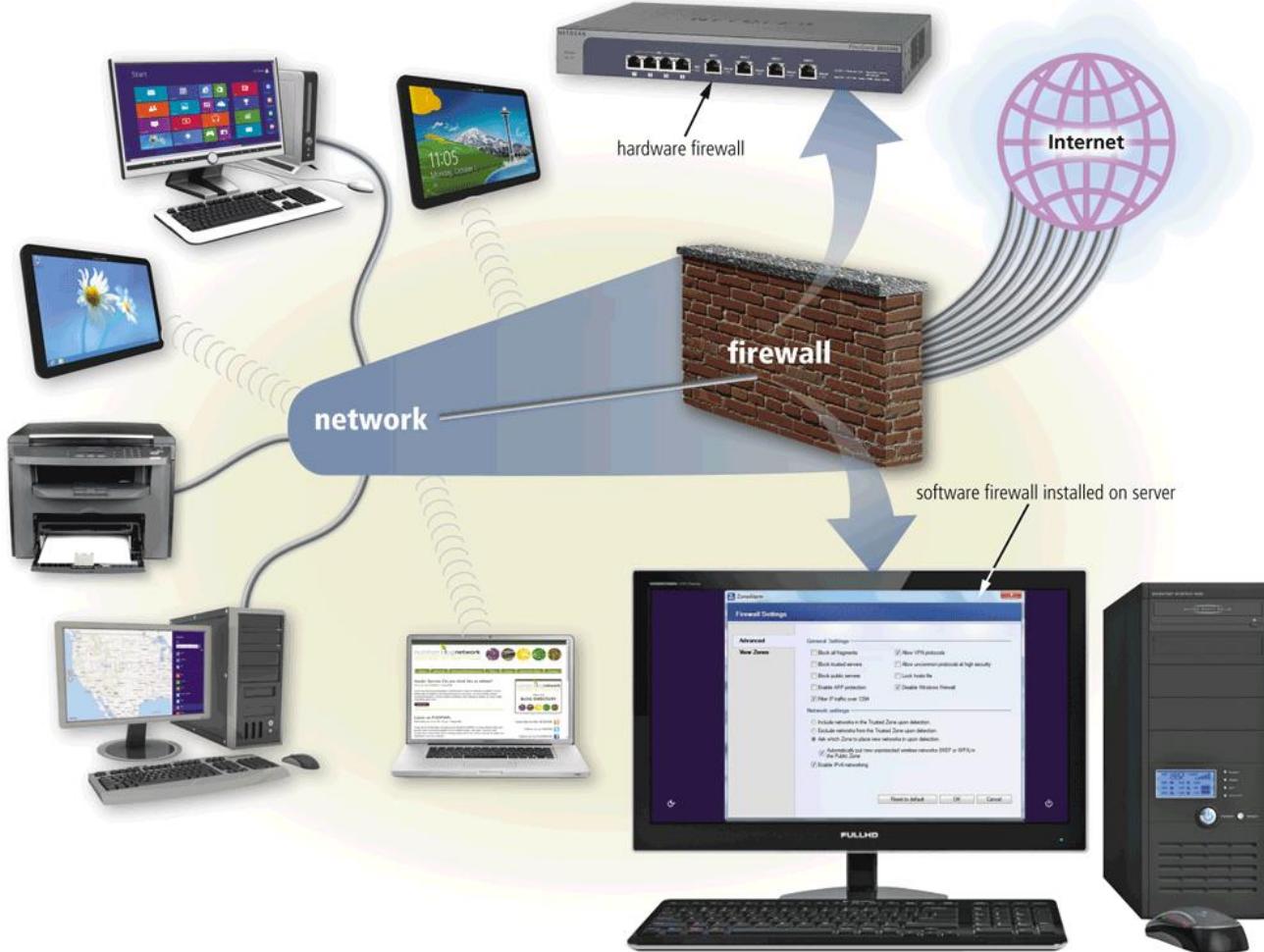
The sidebar contains links to various WASC projects and resources, such as "Distributed Open Proxy Honeypots", "Script Mapping", and "Static Analysis Technologies Evaluation Criteria (NEW)". It also lists the "WASC Project Leaders" and provides links to the "WASC Main Website", "WASC Mailing Lists", "WASC on Twitter", and "Join us on LinkedIn!".

# Network Security Issues and Technologies

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- External Network Security Threats (continued)
  - Firewalls and Proxy Servers
    - **Network firewall** is a combination of hardware and software that filters traffic between private networks or between a private network and a public network, such as the Internet
    - **Proxy server** is a computer or application that hides an internal IP address from the outside world by substituting its own IP address for a source computer's IP address before sending outgoing email or webpage requests

# Network Security Issues and Technologies



# Network Security Issues and Technologies

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- External Network Security Threats (continued)
  - Internet Filtering Software
    - WebSpy
    - Websense
  - Security Audits
    - **Network security audit** – reviews overall security policies, employee security policy and procedure training, data backup and restore policies and procedures, and the physical security of network equipment and data
    - **Penetration testing** – security audit personnel try to hack into network

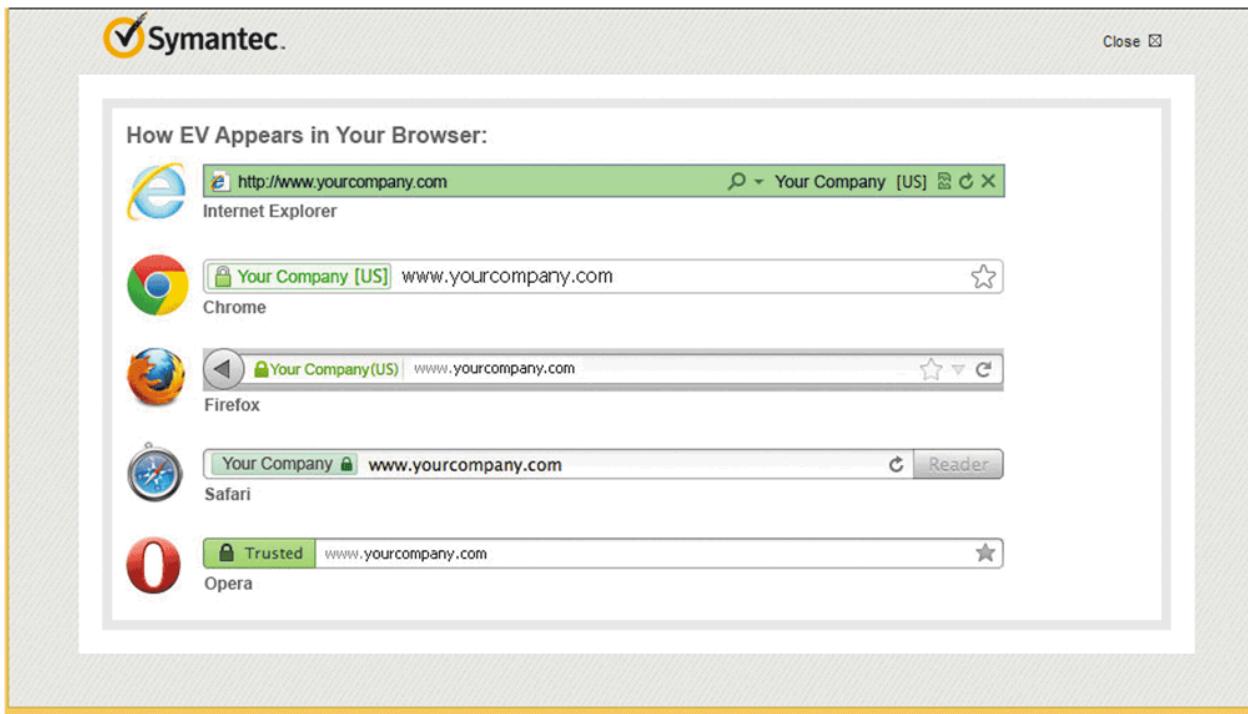
# Network Security Issues and Technologies

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- Transactional Risks
  - Authentication, integrity, nonrepudiation, confidentiality
  - **Encryption** – translating readable data into unreadable data to prevent unauthorized access or use
  - **Certificate authority (CA)** creates encryption keys (public and private) for a fee
    - **Public key** encrypts data and is posted by CA to publicly accessible directory
    - **Private key** is known only to organization and is used to decrypt incoming data

# Network Security Issues and Technologies

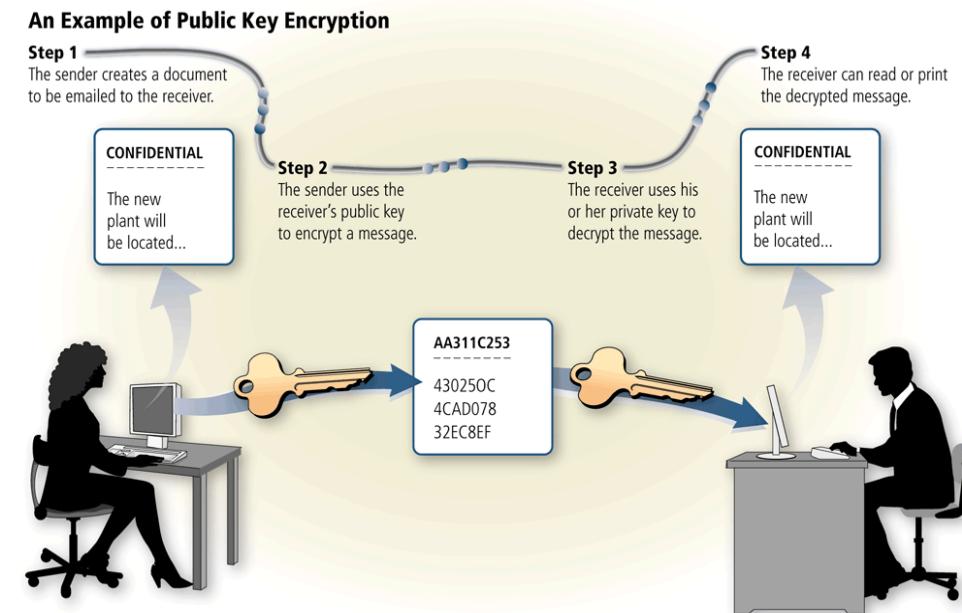
- Transactional Risks (continued)
  - **Digital certificate** electronically authenticates organization's or individual's identity



# Network Security Issues and Technologies

## ➤ Transactional Risks (continued)

- **Public key infrastructure** is combination of organizations or individuals sending and receiving encrypted data, their public and private keys, and the CAs that issue the keys and digital certificates.



# Virtual Private Networks

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- A **virtual private network** uses a large public IP network, such as the Internet, to transmit its data
  - **Tunneling** is a process that encapsulates one protocol inside another protocol
  - At destination network, the IP protocol information is removed and the tunneling protocol transmits the data to its final destination computer
  - VPNs also use public and private key encryption, digital certificates and special security protocols

# 7

# Understanding E-Business

## (Lecture 11)



# Discovering the Internet, 5<sup>th</sup> Edition

# Objectives

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- Describe the origins of electronic business transactions, including the electronic funds transfer (EFT) system, the electronic data interchange (EDI) standard, and value-added networks (VANs)
- Discuss unique e-business factors and identify e-businesses that use them
- Define common e-business models and explain how each model generates revenue

# E-Business Origins

- Electronic business activities originated in the 1960s and 1970s



# E-Business Origins

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## ➤ Electronic Funds Transfer (EFT)

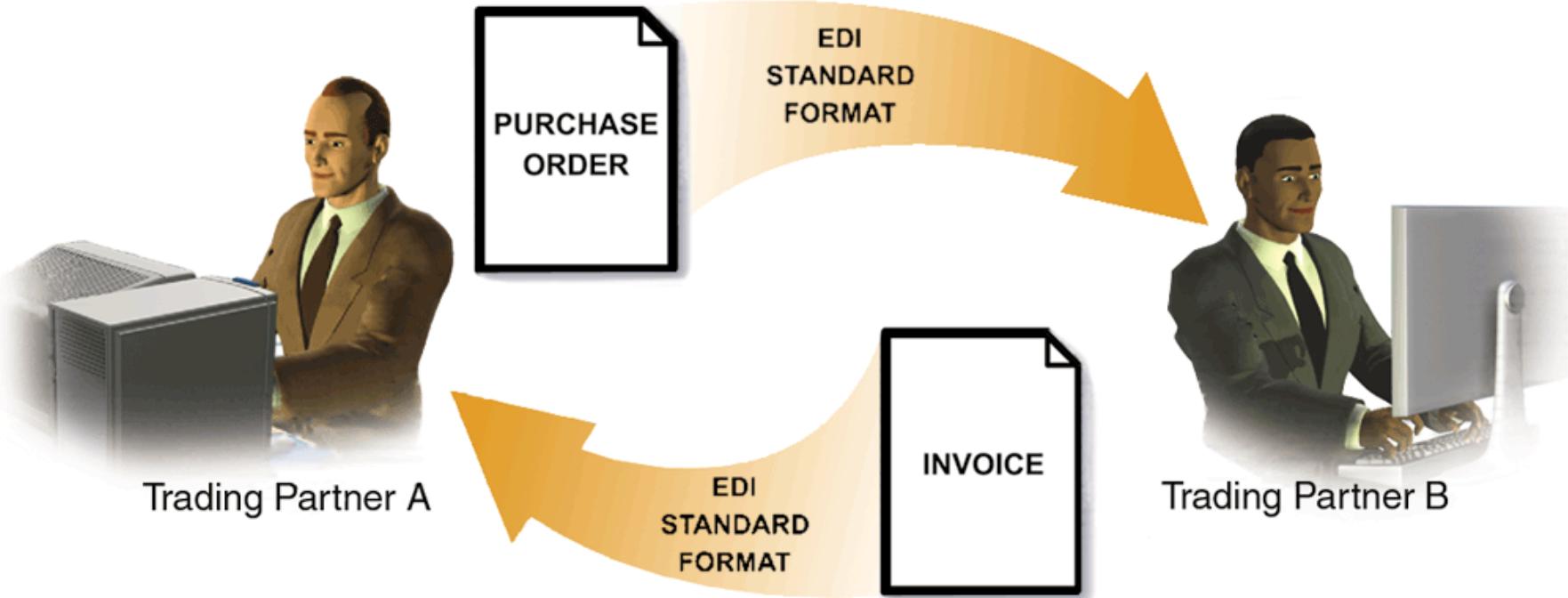
- Allows the electronic exchange of money between banks – without the exchange of paper currency – via the **Automated Clearing House (ACH)** network

## ➤ Electronic Data Interchange (EDI)

- Standard that specifies the layout or format a company uses to exchange electronic business data with its suppliers and customers
- Participants in EDI are called **trading partners**
- Before the Internet, used **value-added networks (VANs)**

# E-Business Origins

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# Unique E-Business Factors

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- E-business advantages include worldwide sales opportunities, reduced transaction and purchasing costs, and access to small, niche markets
- Other unique e-business factors include
  - Geography, time, and space on the online marketplace
  - The network effect
  - Redefining markets
  - Personalization and customization

# Unique E-Business Factors

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- Geography, Time, and Space
  - Geography, time, and space are limiting factors for brick-and-mortar businesses
    - Geography – Physical location must be near potential customers
    - Time – Operating hours may be limited to peak shopping hours
    - Space – Inventory is limited to storage and shelf space

# Unique E-Business Factors

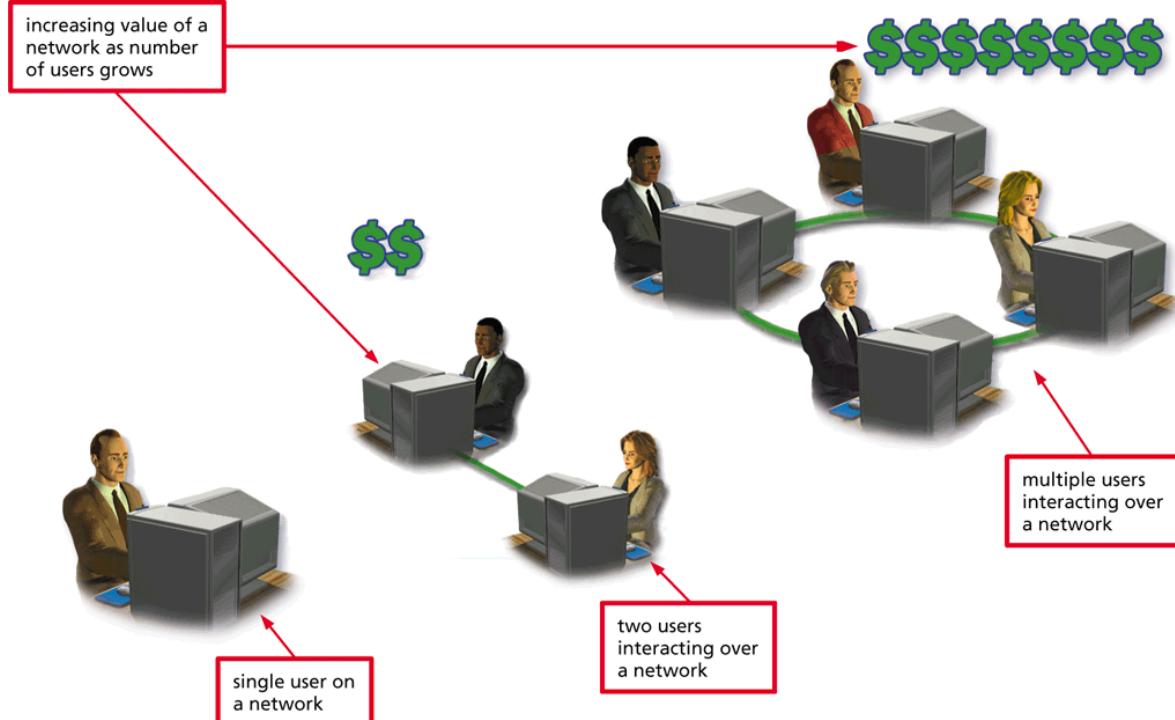
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- Geography, Time, and Space (cont'd)
  - Online marketspace is not confined by geography, time, and space
    - Geography – Physical location is not a factor; an online store is available anywhere in the world that Internet access is available
    - Time – Online stores operate 24 x 7
    - Space – Product selection and shelf space is virtually limitless

# Unique E-Business Factors

## ➤ The Network Effect

- The **network effect** refers to the increasing value of a network as it grows
  - Network becomes more valuable to its users as more and more users connect to it



# Unique E-Business Factors

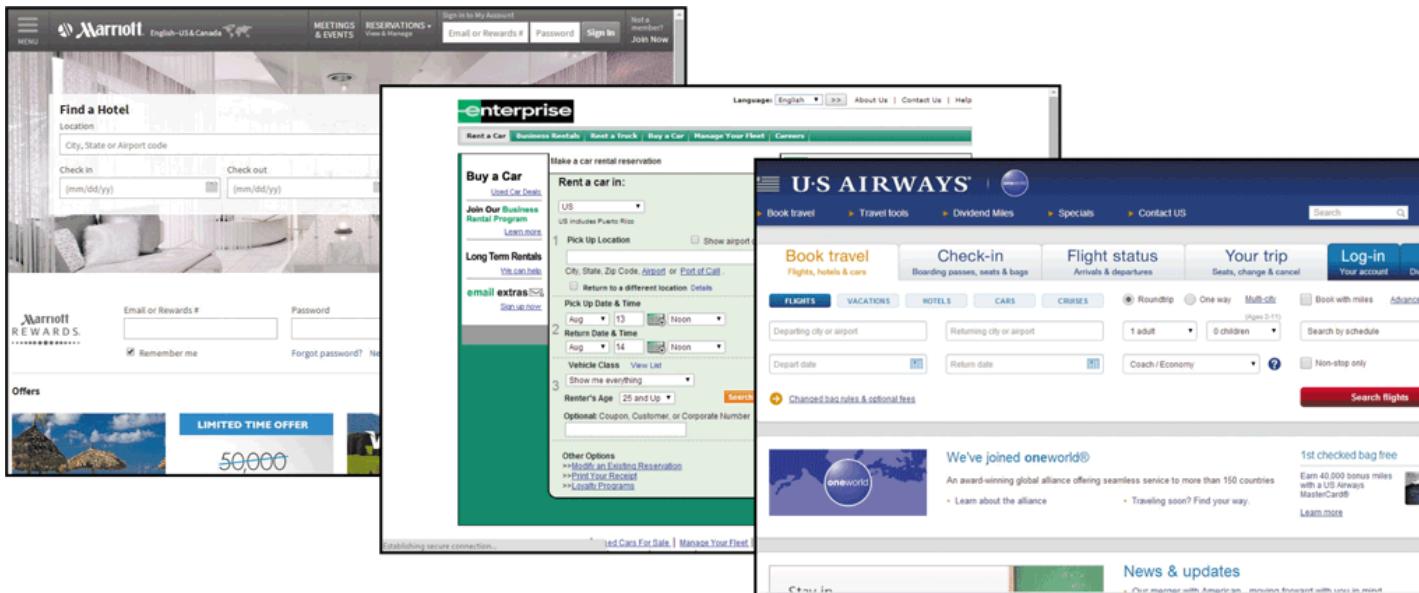
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## ➤ Redefining Markets

- Market redefinition usually takes place in one of two ways
  - By removing traditional marketplace intermediaries (disintermediation)
  - By creating new ways to add value to business transactions, often by introducing new types of intermediaries (reintermediation)

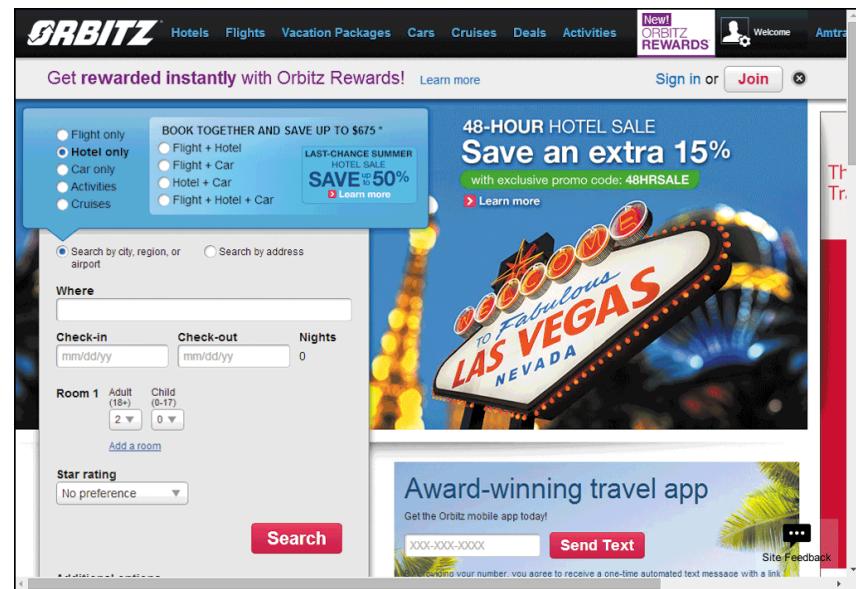
# Unique E-Business Factors

- Redefining Markets (continued)
  - **Disintermediation** occurs when a market removes its traditional intermediaries
    - Computer industry (Dell)
    - Travel industry



# Unique E-Business Factors

- Redefining Markets  
(continued)
  - Reintermediation occurs when an e-business introduces a new type of **intermediary** into the marketspace
    - Dell, Hewlett-Packard, and other online versions of stores
    - Orbitz and Hotels.com in the travel industry



# Unique E-Business Factors

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- Personalization and Customization
  - **Personalization** is an automatic process that tailors webpage content to fit the profile of a specific target audience, or that automatically tailors webpage content for an individual visitor based on his or her actions at a site
  - **Customization** is a manual process that allows a viewer to manage webpage content by selecting viewing preferences or by creating and updating a personal profile

# E-Business Models

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- Exactly how a commercial website generates revenue might not be obvious
  - **Business model** is the way a company operates to generate revenue, create profits (the excess of revenue over expenses), and continue as a viable business entity
  - Individual e-businesses optimize factors such as geography, time, space, the network effect, personalization, and customization within the framework of their e-business model

# E-Business Models

## E-Business Models

Targeted Customer	E-Business Model	Description	Example
Consumers	Business-to-Consumer (B2C)	An e-business sells products or services directly to consumers.	Lands' End Amazon.com
Consumers	Consumer-to-Consumer (C2C)	A consumer sells products or services directly to another consumer.	eBay etsy
Businesses	Consumer-to-Business (C2B)	A consumer names a price for a product or service that competing businesses accept or decline.	Priceline.com
Businesses	Business-to-Business (B2B)	An e-business sells products or services to other businesses; brings multiple buyers and sellers together in a central online marketspace; sells e-business technologies; or transacts business activities over the Internet with trading partners.	Physician Sales & Service Storage Guardian
Government agencies and other businesses	Business-to-Government (B2G)	An e-business provides information about government agencies currently accepting bids for products and services; brings sellers and government agency buyers together in an online marketspace; or sells bidding and procurement technologies.	Fedmarket Onvia

# E-Business Models

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- E-businesses often operate using a mix of e-business models and revenue-generation methods
  - Offering subscription-based content
  - Selling advertising space
  - Earning referral fees by providing links to other e-businesses
  - Selling proprietary e-business technologies
  - Providing a channel for business partners
  - Participating in an affiliate marketing program

# E-Business Models

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- **Business-to-Consumer (B2C)**
  - **E-retail** business model that generates revenues by
    - Selling products and services directly to consumers
    - Selling website advertising space
    - Charging subscription or member fees for premium content
  - Most traditional brick-and-mortar retailers and catalog merchants now are brick-and-click e-retailers

# E-Business Models

## ➤ Business-to-Consumer (B2C) (continued)

- **Pure-play e-retailers** operate only online
- **Niche market** is a small segment within a larger market and enables some pure-play e-retailers to succeed by avoiding competition with larger e-businesses
- Advertising Revenues – some B2C e-businesses offer free content (apps, information, links games, etc.) and generate revenue by selling advertising at their sites
  - Go directly to advertised website by clicking a **click-through**
  - **Per-click** revenue method
  - **Cost per impression (CPI) method**

CPI counts the number of times a page that includes an ad is loaded in the browser; reimbursement for CPI is often for a certain number of impressions, such as per thousand

# E-Business Models

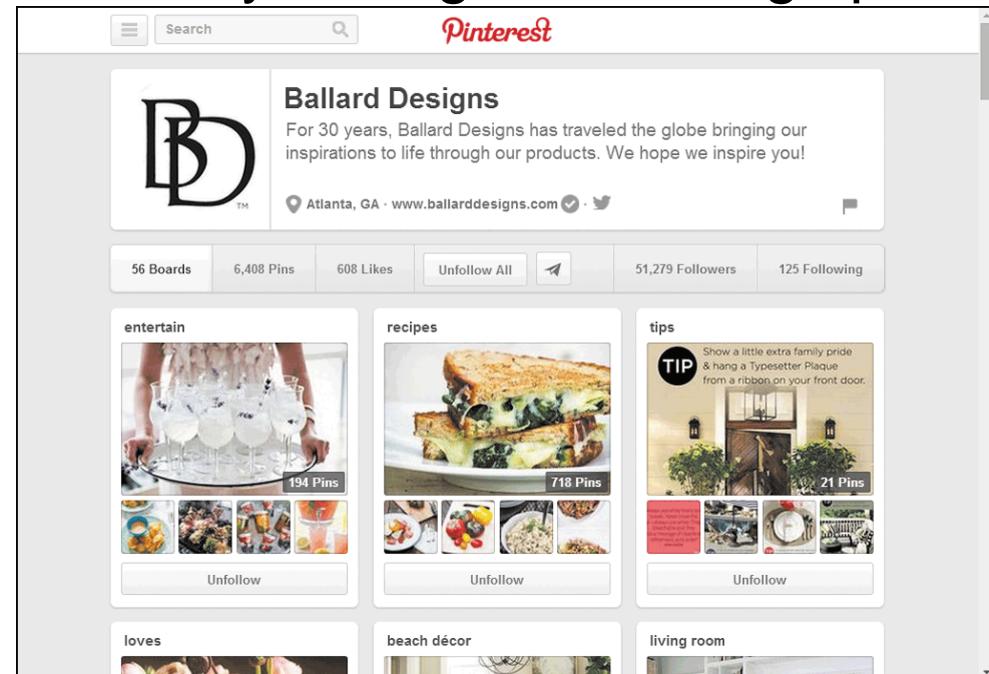
- Business-to-Consumer (B2C) (continued)
  - Subscription Fees – Another way for B2C e-business to generate revenue involving fees for premium content or an app

The screenshot shows the homepage of WebDesign.com. At the top, there's a navigation bar with links for SIGN UP, SCHEDULE, LIBRARY, BLOG, and LOG IN. The main headline reads "Learn WordPress live." Below this, there's a large image of a laptop displaying a WordPress dashboard with a hand cursor pointing at it. To the right of the laptop, text says "From beginner to advanced topics, our live webinars walk you through how to do all kinds of fun stuff with WordPress." At the bottom right, there's a blue button with the text "Start learning now".

# E-Business Models

## ➤ Business-to-Consumer (B2C) (continued)

- Businesses use social media to promote individual businesses and specific industries, to sell products and services, or to generate revenue by selling advertising space
- Businesses use social media to show pictures and links to products



# E-Business Models

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## ➤ Consumer-to-Business (C2B)

- Allows a buyer to name his or her own price for specific goods or services which are then presented to multiple sellers (**reverse auction**)
  - When a seller accepts a buyer's offer, the buyer's credit card is immediately charged
  - Revenues are generated via booking fees and commissions on accepted offers

# E-Business Models

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## ➤ Consumer-to-Consumer (C2C)

- Brings individual buyers and sellers together in an online marketspace (**forward auctions**)
- Generates revenues via transaction fees, sales commissions, subscription fees, and personal ad fees
- Some allow members to exchange items of equal value
  - Generate revenue via small subscription or membership fee, advertising, or charging for extra services

# E-Business Models

The screenshot shows the homepage of the Paperback Swap website. At the top, there's a navigation bar with links for CDs, DVDs, and a search bar showing member savings of \$37,855,060.56. Below the header, there's a banner for "Swap Used Books for Free - Buy New Books at Great Prices!" with a search bar and social media links. On the left, there's a form for joining with fields for full name, email, and password, and a "Sign Up" button. A video thumbnail on the right shows two people talking about the service. The main content area features a section titled "Trade Books for Free with our online Book Swap..." with a list of benefits. Below this, a callout box says "We're NOT just Paperback Books! Enjoy trading Hardbacks, Audio Books, Textbooks and more." At the bottom, there are sections for "Free Books Available in Highly Rated" (with book covers for "The Mermaid Chair" by Sue Monk Kidd and "Earl Mindell's Herb Bible"), "Recently Posted Books", and a grid of category links like Arts & Photography, Biographies & Memoirs, Business & Money, Children's Books, Comics & Graphic Novels, Computers & Technology, Cookbooks, Food & Wine, Crafts, Hobbies & Home, Engineering & Transport..., History, Horror, Humor & Entertainment, Literature & Fiction, Medicine, Mystery, Thriller & Suspense, Nonfiction, Outdoors & Nature, Parenting & Relationships, Reference, Religion & Spirituality, Romance, Science & Math, Science Fiction & Fantasy, Sports & Outdoors, Teen & Young Adult, Travel, and Westerns.

# E-Business Models

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- Business-to-Business (B2B)
  - Transactions account for largest share of total e-business revenue
  - B2B e-business models generate revenues in a number of ways
    - Business directory listing fees
    - Website advertising
    - Subscription or membership fees
    - Referral fees
    - Transaction fees

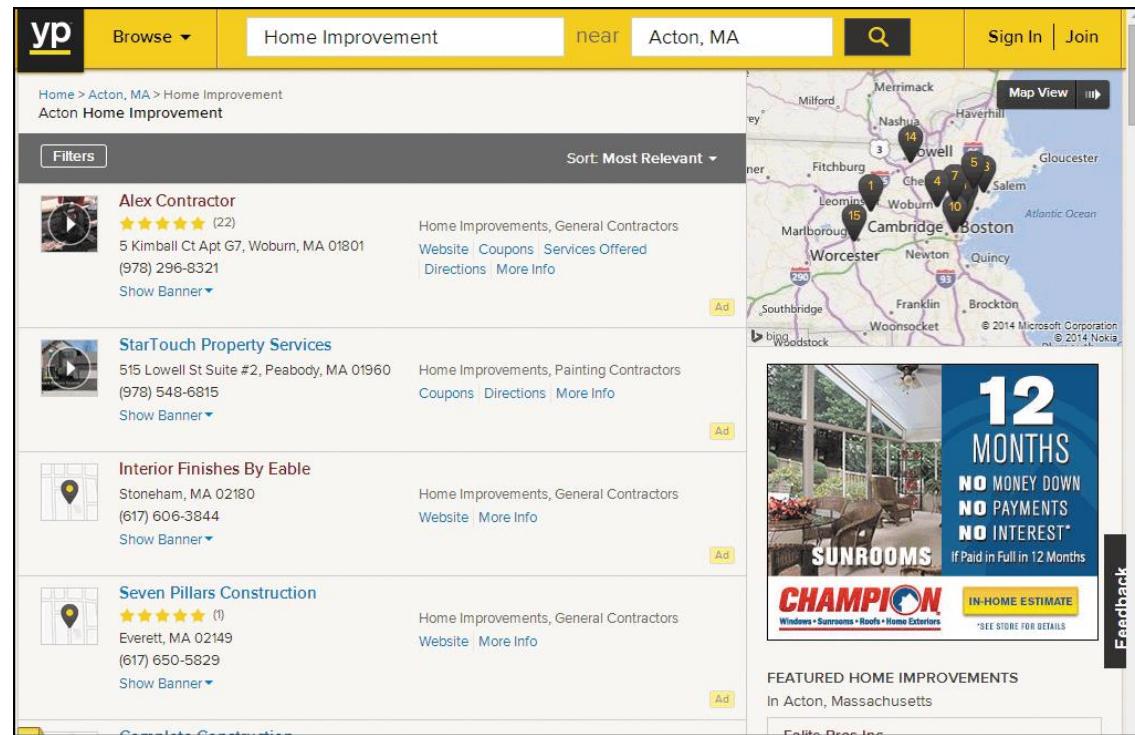
# E-Business Models

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- Business-to-Business (B2B) (continued)
  - B2B e-business models generate revenues in a number of ways
    - Sales commissions
    - Website hosting fees
    - File storage fees
    - Software licensing and rental fees
    - Affiliate marketing programs

# E-Business Models

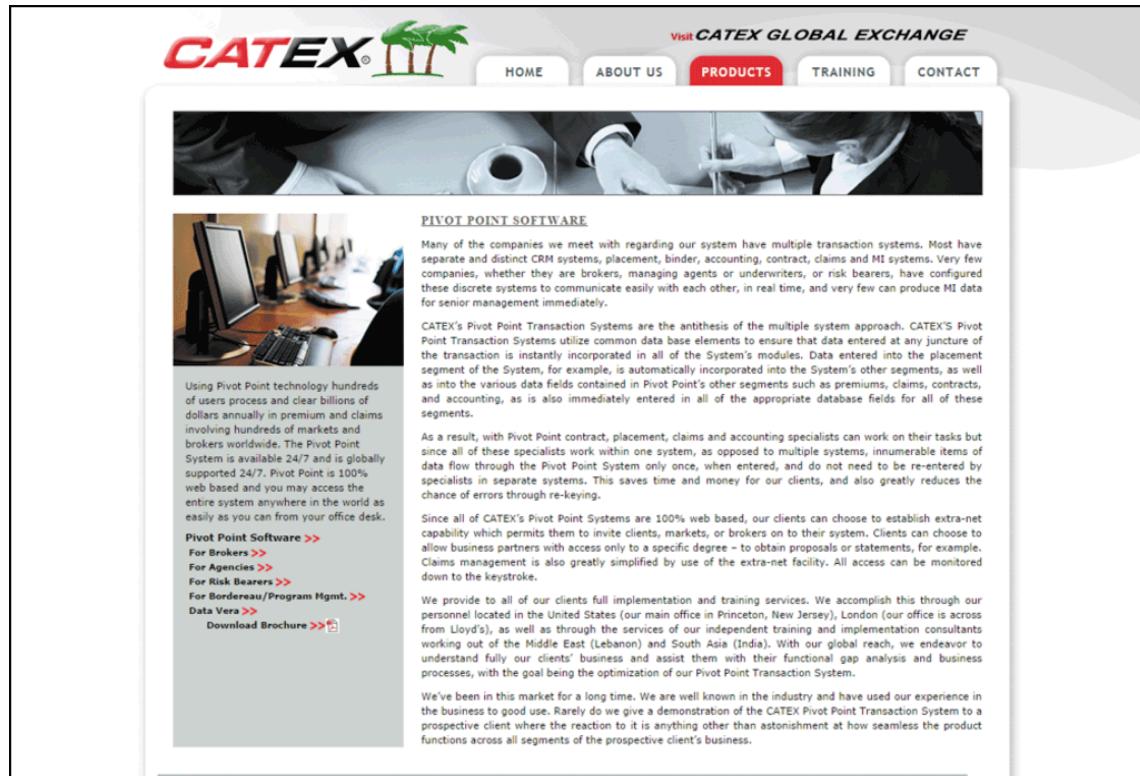
- Business-to-Business (B2B) (continued)
  - Some B2B e-businesses aggregate business information and generate revenue from directory listing fees and advertising



# E-Business Models

## ➤ Business-to-Business (B2B) (continued)

- B2B Exchanges -- create online marketspaces in which businesses can buy and sell with each other following predetermined exchange rules.



The screenshot shows the homepage of CATEX Global Exchange. At the top, there's a navigation bar with links for HOME, ABOUT US, PRODUCTS (which is highlighted in red), TRAINING, and CONTACT. The main header features the word "CATEX" in red with two palm trees to its right, and a sub-header "visit CATEX GLOBAL EXCHANGE". Below the header is a large banner image showing several people in business attire working at desks with computers. Underneath this, there's a section titled "PIVOT POINT SOFTWARE" with a sub-section titled "Using Pivot Point technology hundreds of users process and clear billions of dollars annually in premiums and claims involving hundreds of markets and brokers worldwide. The Pivot Point System is available 24/7 and is globally supported 24/7. Pivot Point is 100% web based and you may access the entire system anywhere in the world as easily as you can from your office desk." It includes links for "Pivot Point Software >>" and "Download Brochure >>". To the right of this text, there's a detailed paragraph about the software's capabilities and benefits, followed by another paragraph about training services, and finally a paragraph about the company's global reach and experience.

# E-Business Models

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- Business-to-Business (B2B) (continued)
  - Affiliate Marketing Programs
    - **Affiliate marketing program** is a referral marketing program designed to drive visitor traffic to a website
      - Affiliate marketing program participant, sometimes called associate, adds a link to the e-business website from own website
      - Associate earns a commission or referral fee when viewer clicks-through to the sponsoring e-business' website; sometimes earns more if the visitor makes a purchase
        - » Amazon Associates program

# E-Business Models

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- Business-to-Business (B2B) (continued)
  - Technology Providers
    - Portion of total B2B e-business is conducted between e-businesses and their technology providers
      - ISPs (Internet service providers) and NSPs (network service providers) provide the Internet communications infrastructure (AOL, Verizon, Comcast, AT&T)
      - Other technology providers develop and sell the networking hardware and software that enables online business activities (Oracle, Microsoft, IBM, HP, SAP, and Cisco Systems)
      - E-businesses that sell their proprietary technologies to other e-businesses

# E-Business Models

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- Business-to-Business (B2B) (continued)
  - Technology Providers
    - **Web hosting** companies provide web and database server storage and server administration services
      - **Shared hosting** – multiple e-businesses share a single web server owned by the hosting company
      - **Dedicated hosting** – exclusive use of an entire server(s)
      - **Colocation** – e-business have their own servers, yet contract with web hosting to store their servers at the host's facility
      - **Managed hosting** – web hosting company builds, customizes, manages, and supports dedicated e-business servers for clients, who pay a flat monthly fee

# E-Business Models

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- Business-to-Business (B2B) (continued)
  - Technology Providers
    - **Online storage service** uses remote server or the cloud to store data
    - **Application service provider (ASP)** develops and maintains its own business application software
    - Employee collaboration software allows employees to share documents, calendars, contacts, and other information
    - **Content delivery network (CDN)** is a dedicated network of servers located in different geographical areas of the country that store, or cache, webpage content from high-traffic websites for a fee

# E-Business Models

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- Business-to-Business (B2B) (continued)
  - Supply Chain Management
    - A **supply chain** consists of all the entities involved in creating and distributing products to end users
    - Many transactions are conducted over an **extranet**, which is a private network that uses Internet technologies to connect a business with its suppliers and business partners
      - Less expensive option than value-added networks (VANs)

# E-Business Models

- Business-to-Government (B2G)
  - Online businesses that market and sell directly to government agencies
  - Creates a marketspace, similar to B2B exchange, that provides businesses with information on bidding opportunities for government agency contracts
  - Sells technologies to manage the bidding and procurement process



# 7

# Understanding E-Business

## (Lecture 12)



# Discovering the Internet, 5<sup>th</sup> Edition

# Objectives

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- Describe the e-retailing storefront software, merchant accounts, and payment-processing services needed to create and operate an online store

# Creating an Online Store

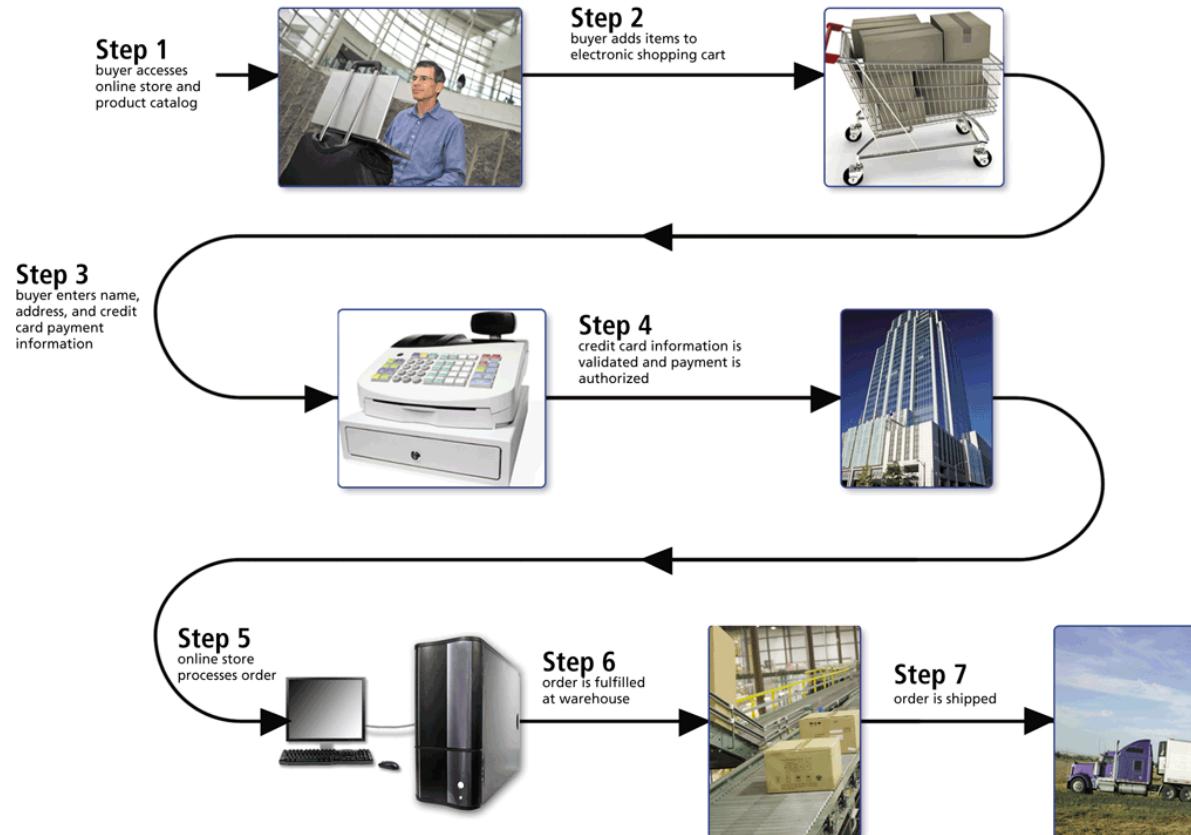
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- Thousands of men and women become e-business entrepreneurs by starting and operating an online business
- Famous and successful e-business entrepreneurs
  - Evan Williams (Twitter)
  - Jeff Bezos (Amazon.com)
  - Michael Dell (Dell, Inc.)
  - Reed Hastings (Netflix)

# Creating an Online Store

## ➤ Storefront Software

- A typical e-retail transaction consists of several steps



# Creating an Online Store

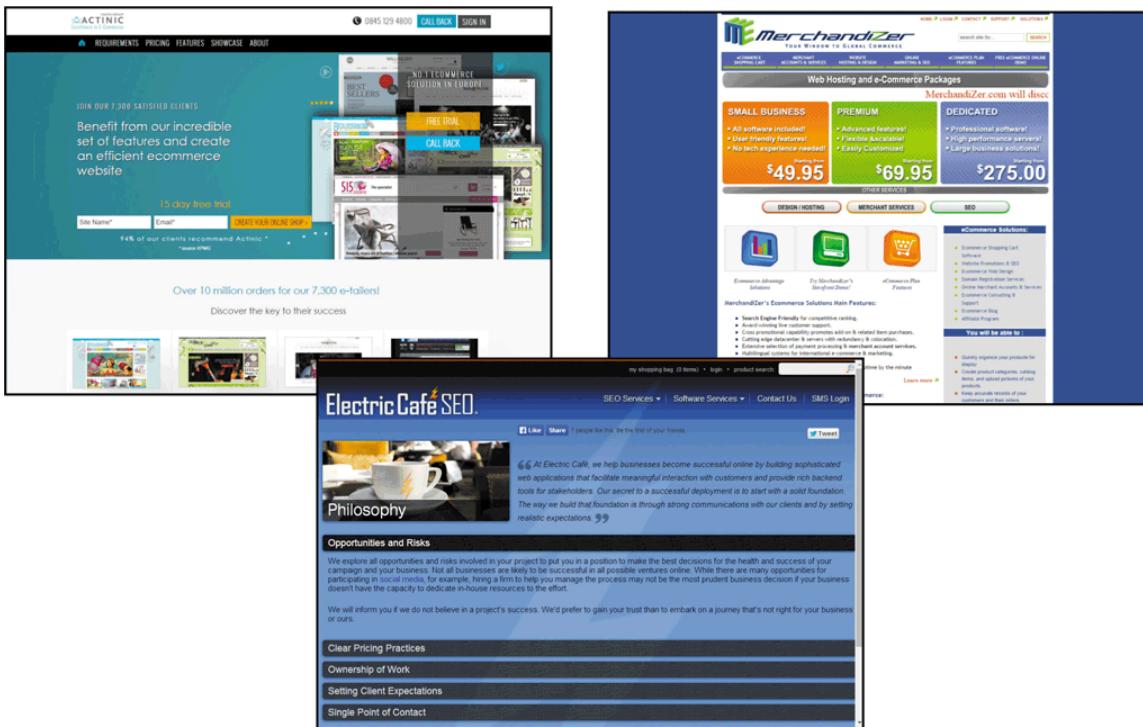
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- **Storefront Software (continued)**
  - **Storefront software** (also called **e-commerce software**) provides tools to build and maintain webpages and the underlying product databases
  - Also contains **shopping cart software** that tracks items selected for purchase and handles the checkout process
    - Summarizing the order
    - Calculating shipping and taxes
    - Calculating the total order
    - Processing the payment

# Creating an Online Store

## ➤ Storefront Software (continued)

- **Installed storefront software** is customizable software that resides on an e-retailer's web server

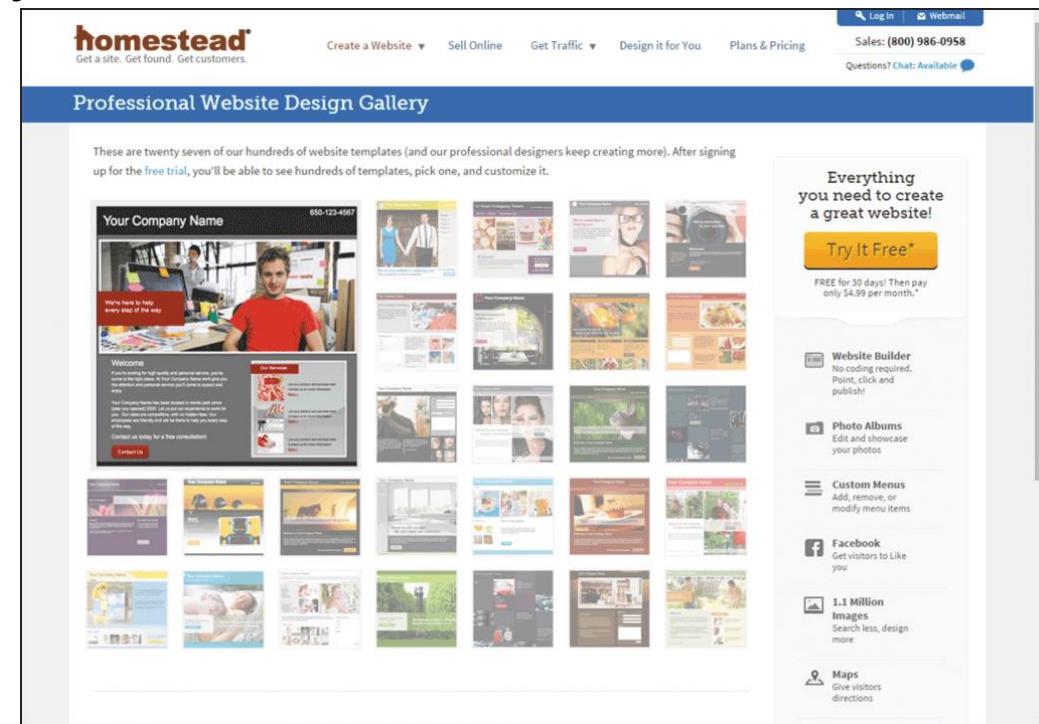


# Creating an Online Store

## ➤ Storefront Software (continued)

- **Hosted storefront software** uses webpage templates that allow you to create a store and add products to your online catalog

- May have fees
- Some vendors provide software demos or allow review of their software on a free trial basis



# Creating an Online Store

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- Credit Card Authorization and Processing
  - Many online purchases are paid for by credit card
  - Third-party payment processors
    - PayPal
    - Google Wallet
  - An e-retailer that accepts credit cards must have two things
    - Account for credit card receipt deposits
    - Service that authorizes and processes credit card transactions

# Creating an Online Store

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- Credit Card Authorization and Processing (continued)
  - **Merchant account** is an e-business account with a financial institution that stores money from credit card purchases
    - Any business that accepts credit cards must have merchant account
    - Can withdraw funds, but only can deposit credit card receipts

# Creating an Online Store

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- Credit Card Authorization and Processing (continued)
  - Fees might include
    - Setup fees
    - Monthly access fees
    - Per-item transaction fees
    - **Discount rate**, which is the percentage of each transaction that the financial institution will charge the e-business

# Creating an Online Store

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- Credit Card Authorization and Processing (continued)
  - An online store must be able to connect to a payment-processing service that can verify, authorize, and process secure credit card transactions
  - Some vendors offer online payment-processing services, called **payment gateways**

# Creating an Online Store

The image displays two side-by-side screenshots of payment processing websites.

**Authorize.Net Screenshot:** The top navigation bar includes 'FEATURES', 'GET STARTED', and a 'SIGN IN' button. Below the navigation is a blue header with three icons: a computer monitor, a smartphone, and a storefront. The main heading 'Accept Payments. Anywhere.' is displayed in white. Below it, a subtext reads: 'Helping your business grow, we simplify the payments process and give you tools to succeed.' Two buttons are present: a yellow 'GET STARTED' button and a white 'WATCH VIDEO' button. At the bottom, a dark footer bar contains the text 'Authorize.Net offers affordable, month-to-month pricing.' and a 'GET STARTED ▶' button.

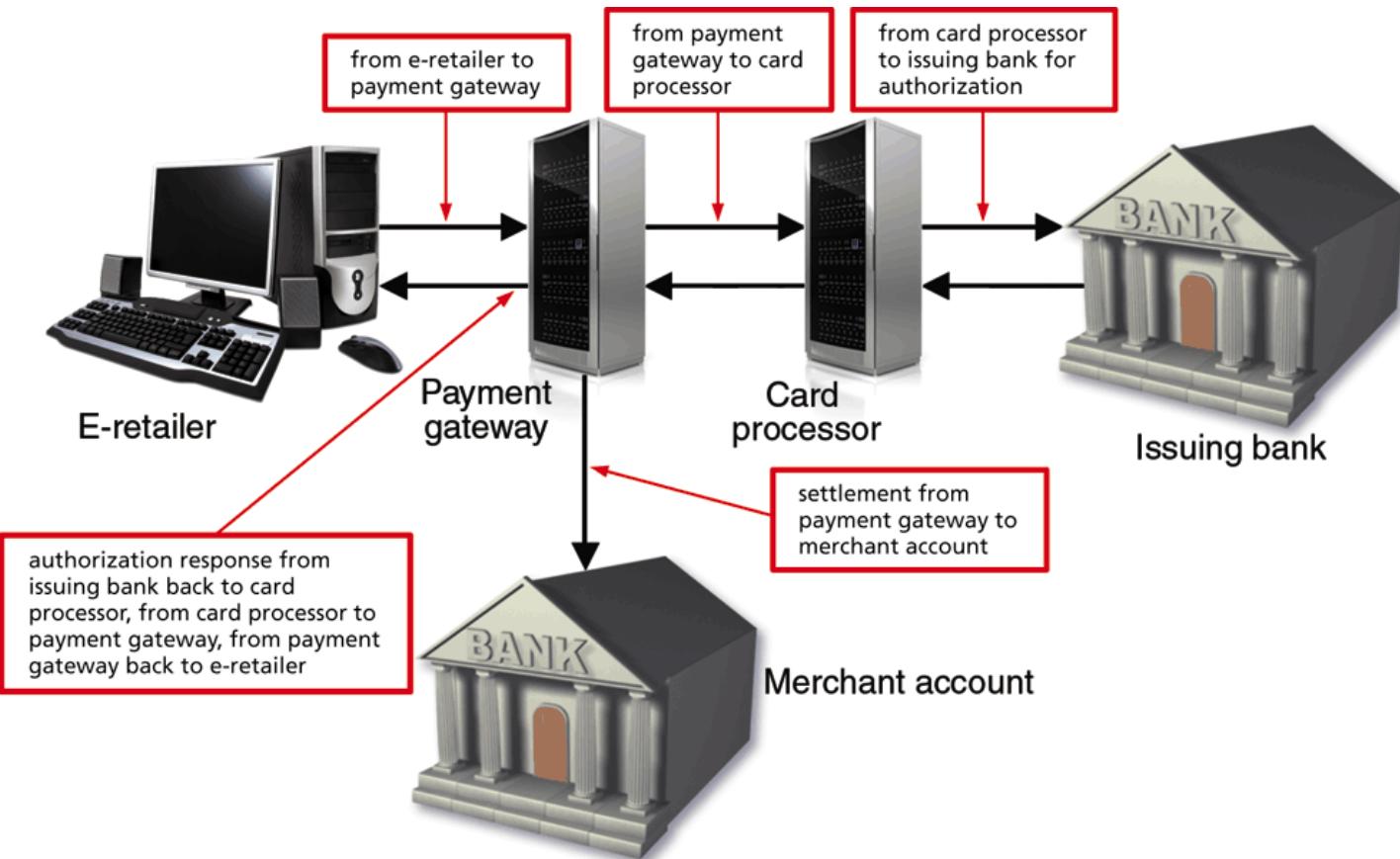
**iTransact Screenshot:** The top navigation bar includes 'LOGIN', 'Home', 'Merchant Services', 'Request a Quote', 'iTransact Trusted Advisor Program', 'Resellers', 'About Us', and 'Support'. The main heading 'We Guarantee Good News' is displayed in large green text. Below it, a subtext reads: 'We will save merchants 10-25% or more on fees' and 'Or we will reassure you that you already have an exceptional rate'. To the right, there is an illustration of a hand holding a green credit card and inserting it into a white piggy bank with a green 'iTransact' logo. A form on the right side is titled 'GET A QUOTE & START SAVING' and includes fields for 'Your Name', 'Who Introduced You to iTransact?', 'Your Email', and 'Phone'. A green 'START SAVING' button is located at the bottom right of the form. The bottom section features three columns: 'Merchant Services', 'Credit Card Processing', and 'Merchant Accounts', each with descriptive text and arrows pointing to the right.

# Creating an Online Store

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- Credit Card Authorization and Processing (continued)
  - When selecting storefront software, a payment gateway, and merchant account, be certain all three are compatible.
  - **Order fulfillment** is the process e-retailers have for packaging and shipping products
    - Many e-retailers save time and money by using third-party fulfillment or logistics companies

# Credit Card Authorization and Processing



**Figure 7-40** A payment gateway service verifies, authorizes, and processes secure credit card transactions.

# Credit Card Authorization and Processing



**Figure 7-41** iTraasct is a payment gateway vendor.