CHAPTER

7

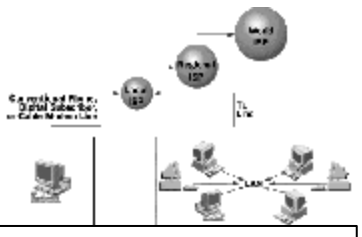
The Internet, Intranets, and Extranets

What is the Internet

- Millions of computers, all linked together on a computer network.
  - A home computer usually links to the Internet using a phone line and a modem that talks to an Internet Service Provider (ISP) or Online Service
  - A business computer has a NIC that connects to a LAN that connects to an ISP using a broadband connection.

What is the Internet cont'd.

Those ISPs then connect to larger ISPs which maintain fiber-optic backbones



Every computer on the Internet is thus connected to every other computer on the Internet.

How do your packets find the correct computer?

- On a LAN, every packet is seen by every computer.
- This process would bring the Internet (and every computer on it) to a standstill.
- Enter the Router:
  - A device or, in some cases, software in a computer, that determines the next network point to which a packet should be forwarded toward its destination.

The Role of the Router

- Joins two networks, passing information from one to the other
  - Determines the best route (packet-switching)
  - Prevents unnecessary traffic from spilling over to the other network
  - Enforces security

Packet Switching

- Routing packets via the best available route using configuration tables
  - Routers communicate with each other
  - Balances the load on the Internet
  - Avoids problems with certain routes
  - tracert www.csus.edu
    http://www.visualware.com/visualroute/livedemo.html
- Denial of Service Attacks

Internet Service Providers (ISPs)

- Internet Service Provider (ISP)
  - Any company that provides individuals or companies with access to the Internet.
  - Thousands of providers including large communications companies.
- Online Service
  - Provides Internet access and value-added services

Internet Presence Providers (IPPs)

- Internet Presence Provider (IPP)
  - A company that provides the disk space, high-speed Internet connection, and possibly the web site design and other services for companies, organizations, or individuals
  - Using an IPP means that the owner of the Web site doesn't need to have the files for it served from the owner's computer.

Internet Services

- **World Wide Web (WWW)**
- **E-mail**
- **Telnet**
- **FTP**
- **Usenet and newsgroups**
- **Chat rooms**
- **Internet phone**
- **Internet videoconferencing**
- **Content streaming**

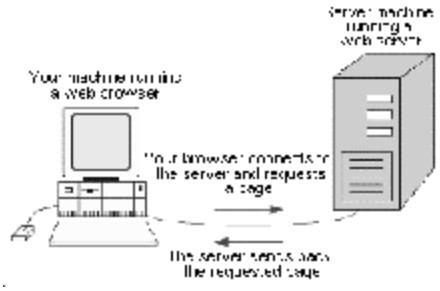
What is the WWW?

- All the resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP)
- HTTP: The set of rules for exchanging files (text, graphic images, sound, video, and other multimedia files) on the web

Retrieving a Web Page

- Say you wanted to learn about course offerings at Sac State and clicked on the link:
  - http://www.csus.edu/webpages/courses.htm

How the Web Works



In more detail...

- Your browser broke the URL into 3 parts:
  - The protocol (http)
  - The server name (www.csus.edu)
  - The file name (/webpages/courses.htm)
- Your browser communicated with a name server to translate the name www.csus.edu into an IP address which it uses to connect to the server machine

In more detail...

- The browser formed a connection to the server at that IP address.
- Using the HTTP protocol, the browser sent a request (along with cookies) to the server, asking for the file /webpages/courses.htm.
- The server then sent HTML text (along with cookies) for the web page to the browser.

In more detail...

6) The browser reads the HTML tags and formats the page on your screen

Clients and Servers

- In general, all of the machines on the Internet can be categorized as:
  - Servers (to service your request)
  - Clients (making requests)
- It is possible and common for a machine to be both a client and a server.

IP Addresses

- Each machine on the Internet is assigned a unique IP address.
- 32-bit numbers expressed as 4 "octets"
  e.g. 216.27.61.137
  - Each octet can have 2^8 (255) possible values
- Servers generally have static IP addresses
- Clients often have an IP address assigned by the ISP
  - Therefore, an ISP requires only one IP address for each modem

Domain Names

- All servers on the Internet have domain names, as well as IP addresses
  - Easier to remember
  - Never change
  - Who Is?
- Web server names have 3 parts:
  - The host name (www)
  - The domain name (csus)
  - The top-level domain name (edu)

Domain Names cont'd.

- The top-level domain name is managed by the The Internet Corporation for Assigned Names and Numbers
  - (com, net, org, gov, edu, mil, int + countries)
- The domain name is managed by Network Solutions www.networksolutions.net
- The host name is created by the company hosting the domain

Domain Name Servers

- A set of database servers which map domain names to IP addresses
  - Distributed all over the Internet
  - More than one name server may be involved in resolving a domain name

More Details

- Security
  - Password-protected pages
  - Encrypted connections (https)
- Dynamic Pages (forms, search engines)
  - CGI scripts (Common Gateway Interface)
  - Not just sent, but instead executed by the server
- Applet
  - A small application that runs within a web page
  - Often written in Java

Cookie Basics

- A piece of text that a web server can store on a user's hard disk. Cookies allow a web site to store information on a user's machine and later retrieve it.
- c:\windows\cookies
- You can accept or decline cookies

How Cookie Data Moves

- For example:
  - When your browser sends a request to Amazon.com it will send any relevant cookies
  - Amazon uses the cookies to reference information about you
  - If there are no cookies, Amazon creates an ID for you and sends you a cookie

How Cookies Are Used

- Track unique visitors and frequency
- Allow customization of site (preferences, zip code, portfolios, etc.)
- Create shopping carts

Problems with Cookies

- People share machines
- People use multiple machines
- Cookies get erased
  - This is why sites ask you to register
- Concerns about privacy

Search Engines

- Internet Search Engines
  - Search the Internet based on important words
  - Keep an index of the words they find and where they found them
  - Allow users to look for words in that index

Search Engine Terminology

- Spiders: Software robots that search the web to build lists of words
- Web crawling: The spider process
- Meta-tags: Unseen portion of a web page containing key words for indexing
- Weighting: Giving more priority to words that appear often, near the top, in meta-tags, in the title, in links, etc.

Conducting Searches

- Use the search tips for your specific engine
- Try natural language queries
  - www.askjeeves.com

Other Internet Services

- Newsgroups
  - Online discussion groups on specific topics via e-mail
- Chat Room
  - Enables two or more people to engage in an interactive conversation
- Voice-Over-IP
  - Routing phone calls and fax transmissions over data networks
- Internet Videoconferencing
  - Supports voice and visual communications

Other Internet Services

- Content Streaming
  - A method for transferring multimedia files over the Internet so that the data stream of voice and pictures plays continuously, without a break, or very few of them.
- Instant Messaging
  - On-line, directed, real-time communication
- Push Technology
  - Webcasting – Automatically sending customized information over the Internet

Digital Signature

- An electronic rather than a written signature that can be used by someone to authenticate the identity of the sender of a message or of the signer of a document.
- Can also be used to ensure that the original content of the message or document that has been conveyed is unchanged.
- As of October 2000, Congress made the use of a digital signature as legally valid as a traditional signature written in ink on paper

Intranets and Extranets

- Intranet
  - An internal corporate network built using Internet and World Wide Web standards and products that allows employees of an organization to gain access to corporate information
- Extranet
  - A network based on Web technologies that links selected resources of the intranet of a company with its customers, suppliers, or other business partners (e.g. Schwab)

Limiting Access

- Firewall
  - A device that sits between your internal network and the outside Internet, examines every packet, and limits access into and out of your network based on your organization's access policy.
- Virtual Private Network
  - A private data network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling protocol and security procedures (encryption/decryption)