HNDIT1106 – Web Development

Chapter 2: Internet Basics

Course Content

- The Internet: Then and Now
- How Internet Works
- Major Features of the Internet

The Internet: Then and Now

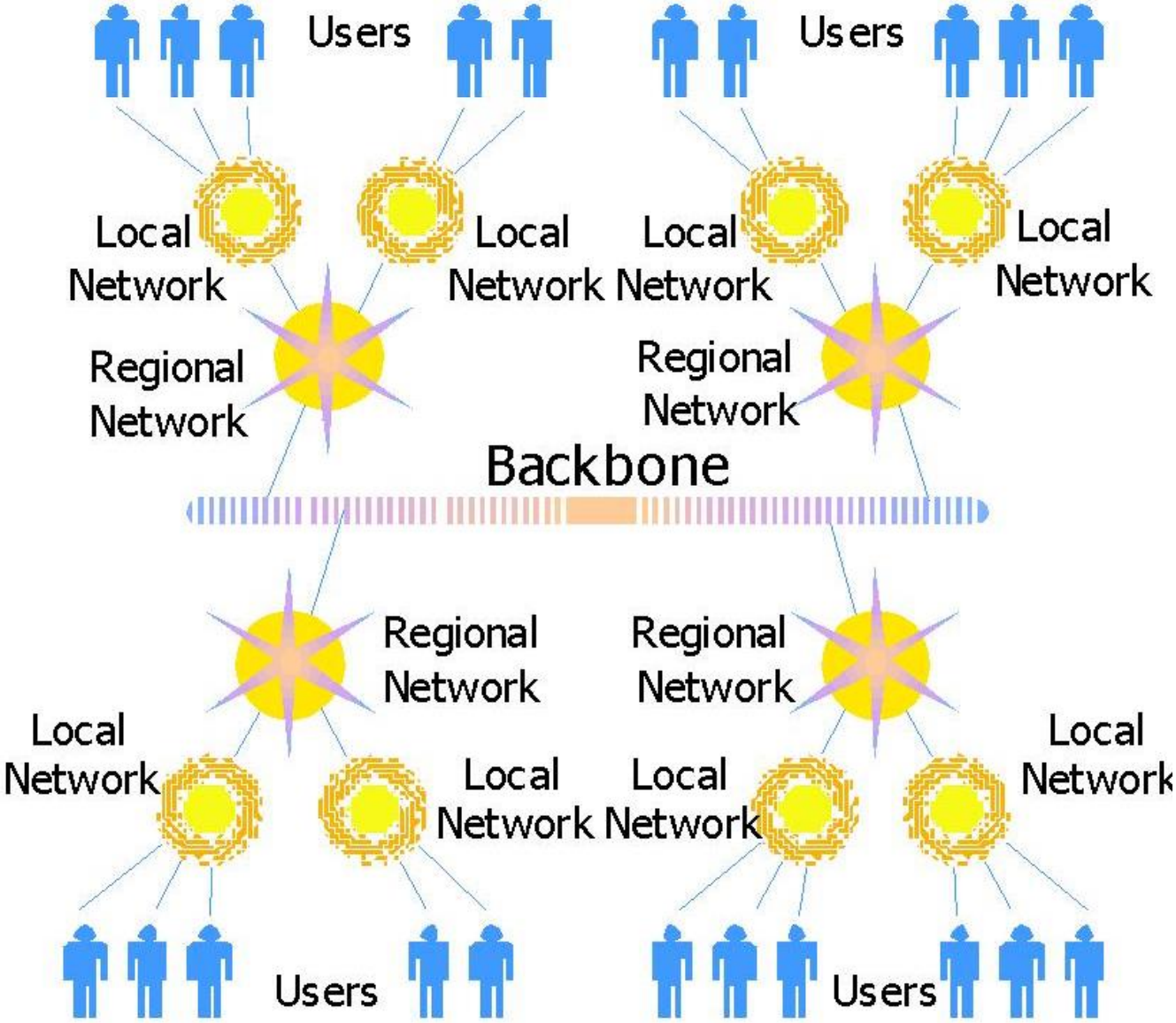
- The Internet was created by the Advanced Research Projects Agency (ARPA) and the U.S. Department of Defense (DOD) for scientific and military communications.

- The Internet is a network of interconnected networks. Even if part of its infrastructure was destroyed, data could flow through the remaining networks.

- The Internet uses high-speed data lines, called backbones, to carry data. Smaller networks connect to the backbone, enabling any user on any network to exchange data with any other user.

- ARPANET, NSFnet, Internet

- ***Internetworking :*** the process of connecting separate networks


Users
Users
Local Network
Local Network
Local Network
Local Network
Regional Network
Regional Network
Backbone
Regional Network
Regional Network
Local Network
Local Network
Local Network
Local Network
Users
Users

How Internet Works

- TCP/IP
- Routing Traffic Across the Internet
- Addressing Schemes
- Domains and Sub domains

How Internet Works…

TCP/IP

- Every computer and network on the Internet uses the same protocols (set of guidelines or rules and procedures) to control timing and data format.
- The protocol used by the Internet is the Transmission Control Protocol/Internet Protocol, or TCP/IP.
- No matter what type of computer system you connect to the Internet, if it uses TCP/IP, it can exchange data with any other type of computer.

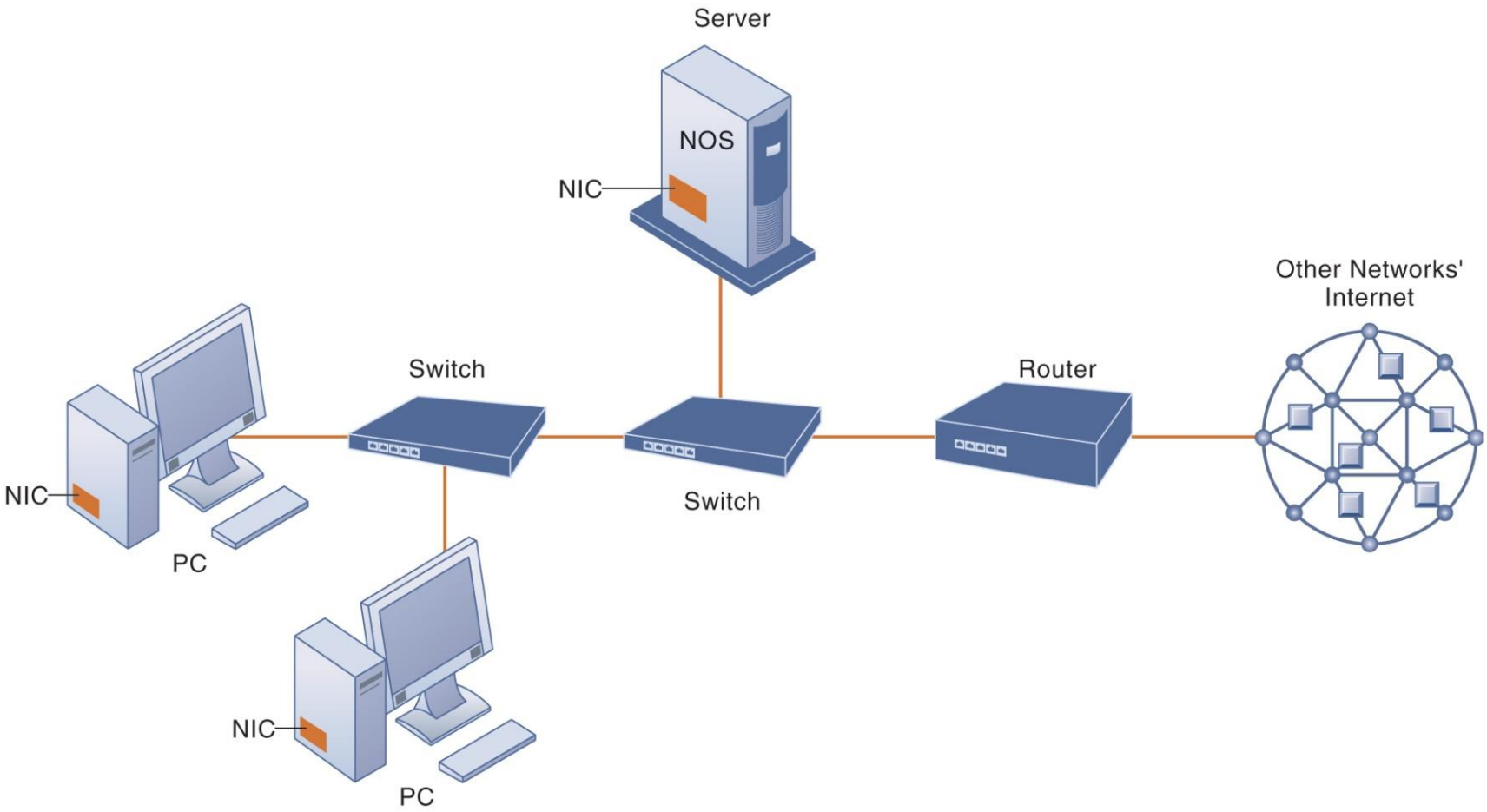
TCP/IP (Cont.)

- Single, common, worldwide standard

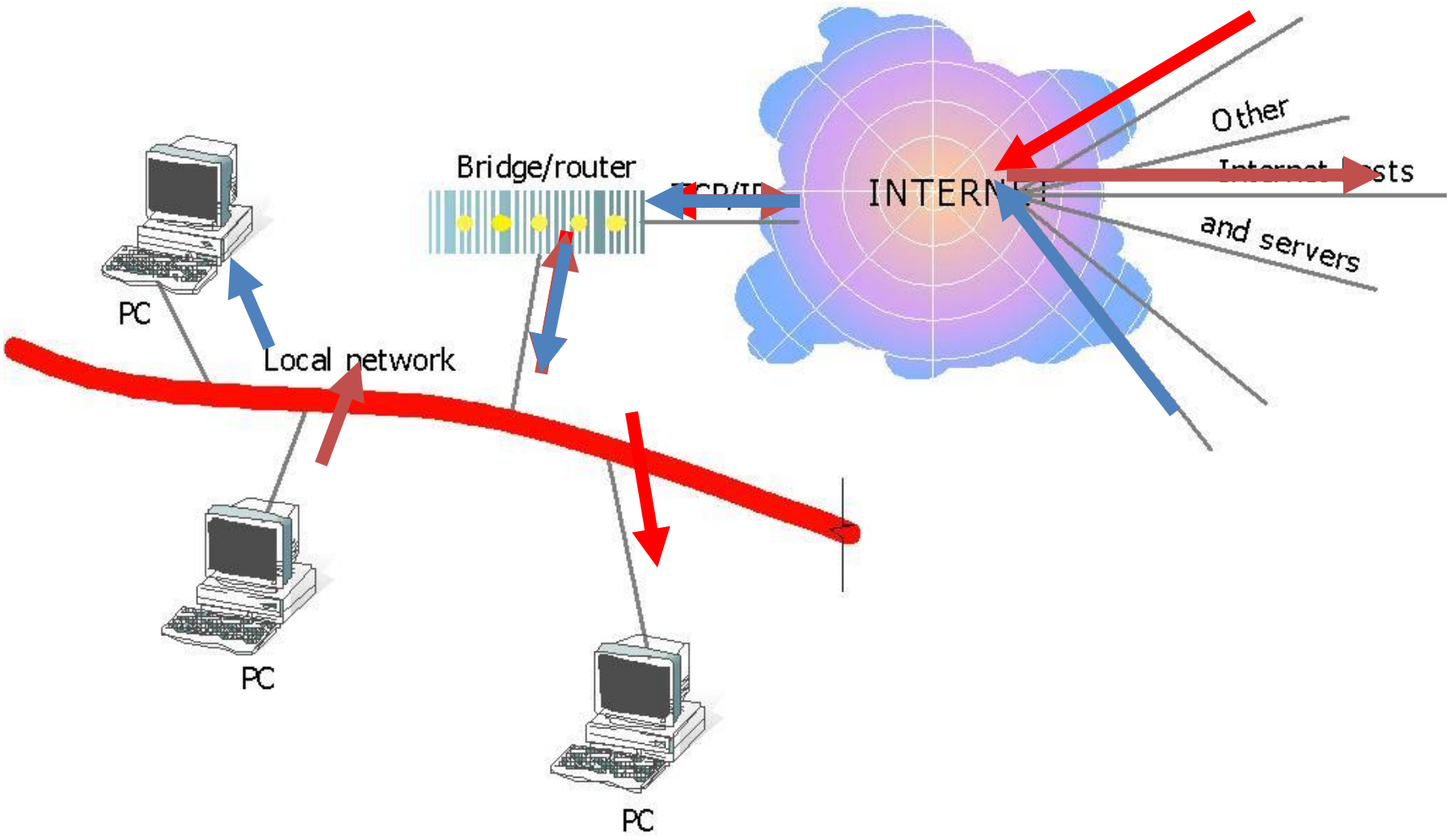
- US Department of Defense
  - TCP, transmission control protocol
    - » Handle the movement of data
    - » *Breaks the original massage in to small packets & sequentially labels them.*
  - IP, Internet Protocol
    - » Delivery of packets
    - » Disassembling and reassembling of packets

Routing Traffic Across the Internet

- Most computers don't connect directly to the Internet. Instead, they connect to a smaller network that is connected to the Internet backbone.
- The Internet includes thousands of host computers (servers), which provide data and services as requested by client systems.
- When you use the Internet, your PC (a client) requests data from a host system. The request and data are broken into packets and travel across multiple networks before being reassembled at their destination.



Network: consist of two or more connected computers


Bridge/router
INTERNET
Other
and servers
PC
Local network
PC
PC

Addressing Schemes

- In order to communicate across the Internet, a computer must have a unique address.
- Every computer on the Internet has a unique numeric identifier, called an Internet Protocol (IP) address.
- Each IP address has four parts – each part a number between 0 and 255. An IP address might look like this:
  e.g. 205.46.117.104

How Internet Works …

Domains and Sub domains

- In addition to an IP address, most Internet hosts or servers have a Domain Name System (DNS) address, which uses words.

- A domain name identifies the type of institution that owns the computer. An Internet server owned by IBM might have the domain name ibm.com.

- The last part of the domain name is called the *Top-Level Domain (TLD)* or *Zone* and is either two or three letters long.
- The second-to-last part of the domain name is called the *Second-Level Domain*, and It chosen by the organization that owns the computer. *e.g.* *whitehouse.gov*
  ibm.com
  slt.net

Three-letter zones (mainly used in the U.S.) indicate the type of organization that owns the domain.

Internet Domains

Domain	Type of Organization	Example
.com	Business (commercial)	ibm.com (International Business Machines Corp.)
.edu	Educational	center.edu (Centre College, Danville, KY)
.gov	Government	Whitehouse.gov (The White House)
.mil	Military	Navy.mil (The United States Navy)
.net	Gateway or host (or business/commercial)	Mindspring.net (A regional Internet service provider)
.org	Other organization (typically nonprofit)	isoc.org (The Internet Society)

Domains and Sub domains (cont.)

- The two-letter zones indicate the country in which the organization that owns the computer is located.

  e.g. U.S. - .us
  Canadian - .ca
  Sri Lankan - .lk

- Some enterprises have multiple servers, and identify them with sub domains

  e.g. products.ibm.com.

- Currently, domains in the *com, edu, net* and *org* zones are assigned by Network Solutions' InterNIC Registration Services, at http://www.internic.net

Internet governances

Internet governance is the development and application of shared principles, norms, rules, decision-making procedures, and programs that shape the evolution and use of the **Internet**.

Principals of name spaces are administered by the Internet Corporation for Assigned Names and Numbers (ICANN) Including :

- ❖domain names
- ❖Internet Protocol (IP) addresses
- ❖application port numbers in the transport protocol

& many other parameters.

Internet governances…..

- The internet is a globally distributed network comprising many voluntarily interconnected autonomous network. It operates a central governing…

- However,

  to maintain interoperability, all technical & policy aspects of the underlying core infrastructure & the principal name spaces are administered by the Internet Corporation for Assigned Names & Numbers.. (ICANN)

Major Features of the Internet …

- **Internet is network of networks:**
  - ✓ There are several layers and modes of communications among the layers.
  - ✓ Some standards have been raised to allow proper level of communication across networks.
  - ✓ These standards do not restrict the access of information to a particular location.
  - ✓ The information flows freely across the networks in the standardized manner.
- **Flexibility:**
  - ✓ Flexibility on the transfer of the data.
  - ✓ Internet is basically a network that carries information in digital form in majority of the' cases instead of voice information in analog form.

Major Features of the Internet …

- **Ubiquitous:**
  - ✓ Internet connections are not fixed from point to point for the duration of the Data sent over the internet is in form of packets.
  - ✓ It transmits a small part of the data, verifies it is correct and then sends more information toward-the destination.
  - ✓ Internet does not require all of the information to be delivered through the same path at same time.
- **client sever architecture:**
  - ✓ Server is a computer loaded with a software package that provides requested information to clients.
  - ✓ A client is a software program that contacts to a server and requests information.

Major Features of the Internet …

- The World Wide Web
- E-Mail
- News
- Telnet
- File Transfer Protocol (FTP)
- Internet Relay Chat (IRC)

Major Features of the Internet…

The World Wide Web (WWW)

- The **World Wide Web**, abbreviated as **WWW** and commonly known as **the Web**, is a system of interlinked hypertext documents accessed via the Internet.

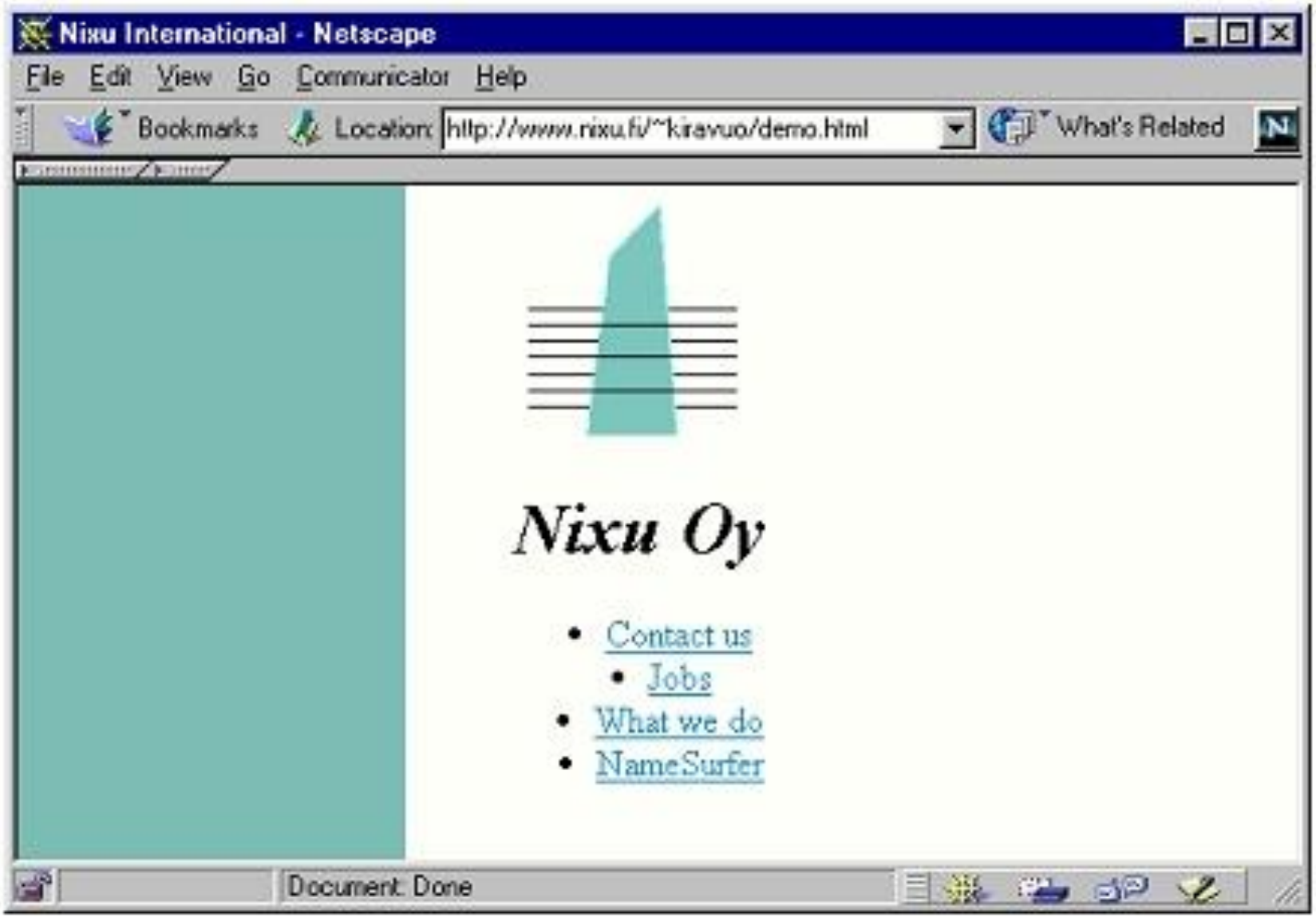
- WWW is a part of the Internet, which supports hypertext documents, allowing users to view and navigate different types of data.

- With a web browser, one can view web pages that may contain text, images, videos, and other multimedia and navigate between them via hyperlinks.

- Every Web page has an address, a Uniform Resource Locator (URL).

Hypertext

- Hypertext is text which contains links to other texts.
- **Hypertext**, made famous by the World Wide Web, is most simply a way of constructing documents that reference other documents.
- Hypertext document is written in HTML Language.
  - ✓ Hyper Text Markup Language
  - ✓ Based on SGML (Standard Generalized Markup Language)
  - ✓ Describes the Structure of the document


Nixu International - Netscape
File Edit View Go Communicator Help
Bookmarks Location: http://www.nixu.fi/~kiravuo/demo.html
What's Related
Nixu Oy
Contact us
Jobs
What we do
NameSurfer
Document: Done

HTML Code

```
<HTML>
  <HEAD>
    <TITLE>Nixu International</TITLE>
  </HEAD>
  <BODY background="/gfx/back1.gif">
    <CENTER>
      <IMG SRC="/gfx/logo.gif" ALT="Nixu Oy"><BR>
      <H1><I>Nixu Oy</I></H1>
      <UL>
        <LI><A HREF="/yhteysti.html">Contact us</A>
        <LI><A HREF="/avoimett/">Jobs</A>
        <LI><A HREF="/palvelut/">What we do</A>
        <LI><A HREF="http://www.namesurfer.com/">
              NameSurfer</A>
      </UL>
    </CENTER>
  </BODY> </HTML>
```

URL

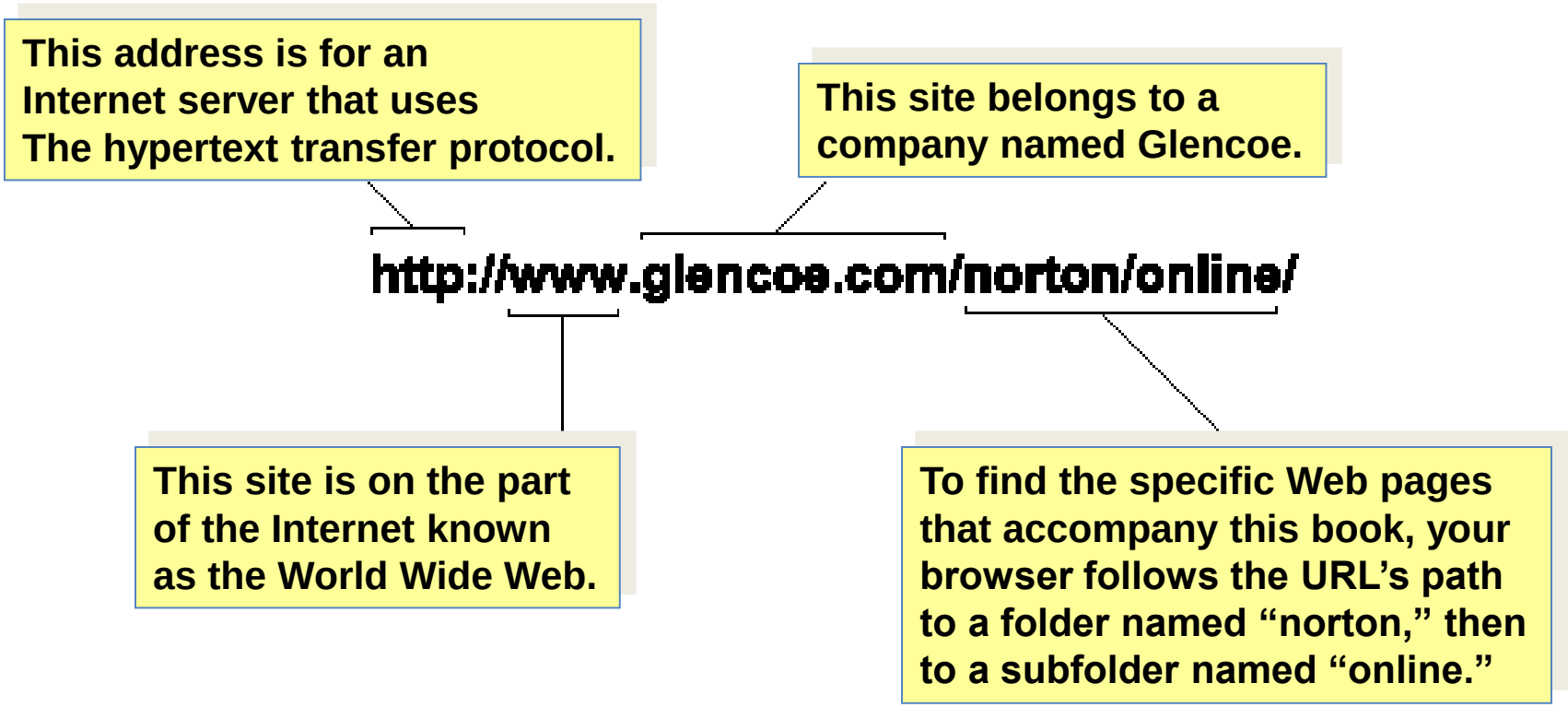
- Universal Resource Locator
- URL is an address to the current location of information

```
protocol://host[:server port]/path/file.html
protocol://host[:server port]/path/
```

- For example

```
http://www.hut.fi/
http://www.nixu.fi/~kiravuo/etiketti/index.html
news:sfnet.harrastus.retkeily
ftp://ftp.funet.fi/rfc/
```

- WWW browser uses the URL address to retrieve a document over the network


This address is for an Internet server that uses The hypertext transfer protocol.
This site belongs to a company named Glencoe.
http://www.glencoe.com/norton/online/
This site is on the part of the Internet known as the World Wide Web.
To find the specific Web pages that accompany this book, your browser follows the URL's path to a folder named "norton," then to a subfolder named "online."

Hyperlink

- In computing, a **hyperlink** (or *link*) is a reference to a document that the reader can directly follow, or that is followed automatically.

- A hyperlink points to a whole document or to a specific element within a document.

  - HTML allows designers to link content together via hyperlinks.

Web Browser

- A **web browser** or **Internet browser** is a *software application* for retrieving, presenting, and traversing information resources on the World Wide Web.

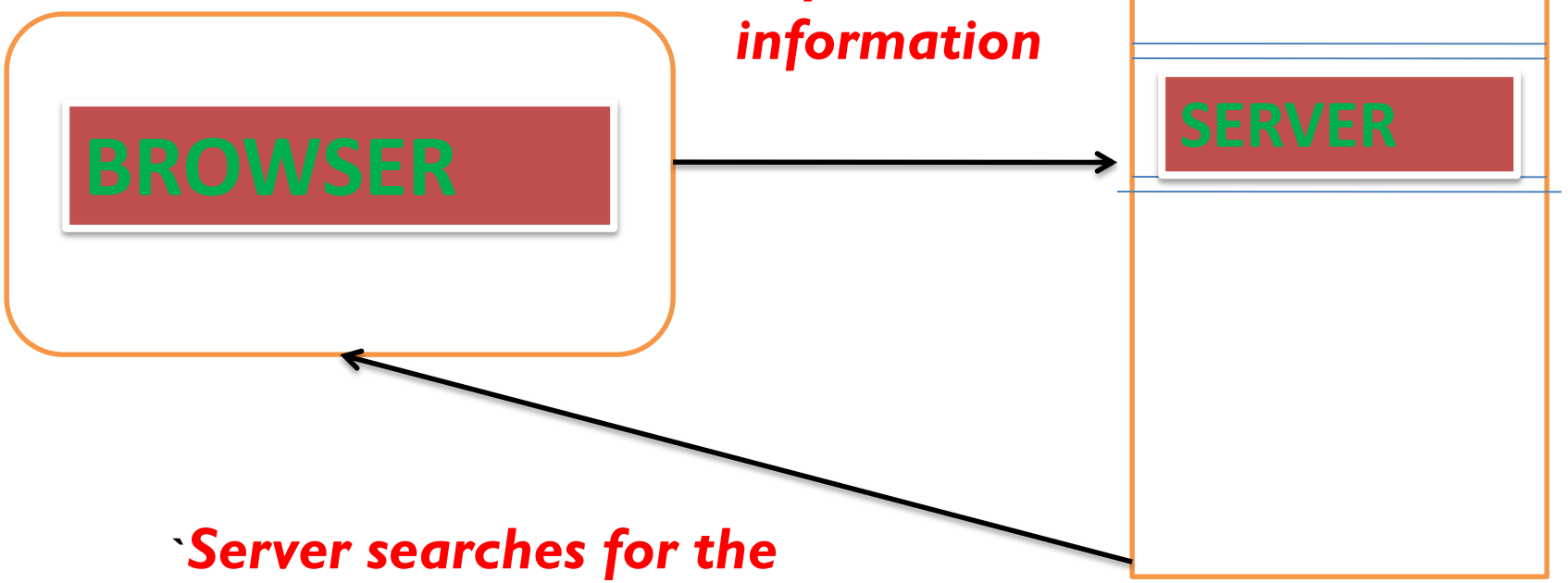
Web Browsers

- The very first web browser was written by Tim burners Lee.
- Mosaic (1993) was first point-and-click browser, which was written by Marc Andreessen and other undergraduate students at the National Center for Supercomputing Applications NCSA) in the United States.

E.g.

- Internet Explore(IE)
- Firefox
- Opera
- Chrome
- Safari
- Netscape Navigator

Process of web browser



Search Engines

- A search engine is a piece of application software that sits on a powerful computer (a server) on the Internet.
- Search engines keep track of information available on the Internet.

E.g.

- Googlewww.google.com)
- Excitewww.excite.com)
- Lycoswww.lycos.com)
- Info seek Guide(www.infoseek.com)
- WebCrawler(www.webcrawler.com)
- World wide web worm (www.goto.com)
- AltaVista (www.altavista.com)

Search Engines…

Advantages

- Control over search: search terms can be combined as required
- search can be limited to period of time, field, source type etc..
- Currency of information made possible by regular addition by web spiders.
- Best suited for complex keyword/concept searches.

Disadvantages

- False positives
- Search engines vary in terms of search techniques/syntax
- Dead links, redundant links(same document gets displayed)
- Spamming (salting of pages)

Web Server

- Web servers are computers that deliver (*serves up*) Web pages.
- In 1989 Tim Berners-Lee proposed The web servers
- Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet.
- web server refers to ***both hardware and software***.
- E.g.
    - Apache
    - *IIS* (Internet Information Server)
    - Tomcat
    - *Glassfish*

The world's first web server

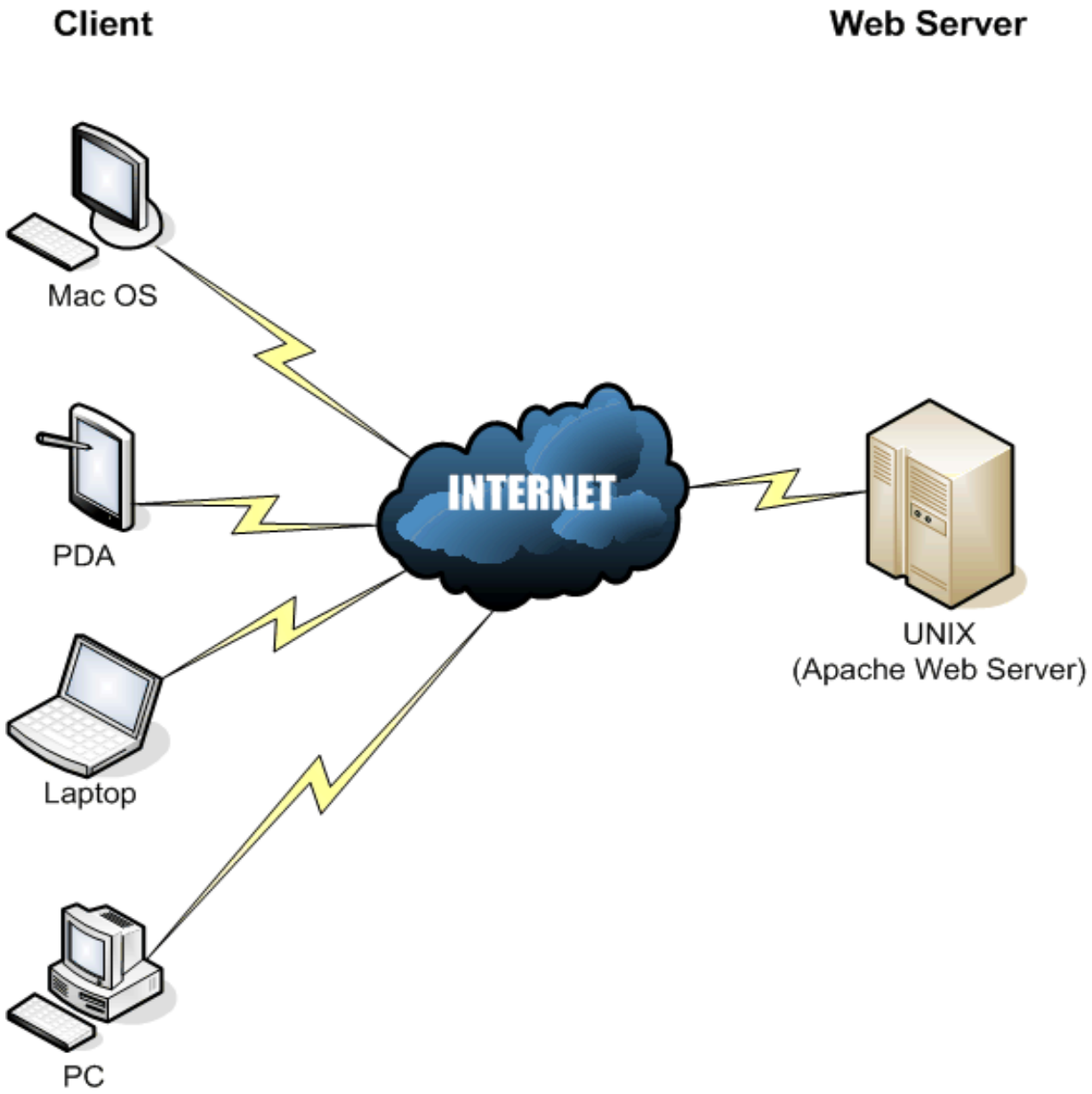
Client server architecture

- The **client-server** model is a pattern of network communication in which clients send requests to servers over a computer network and the servers send back responses.

- ***Servers*** are powerful computers or processes dedicated to managing disk drives (*file servers*), printers (*print servers*), or network traffic (*network servers).*
  - Each Web server has a unique address (IP address) and domain name
  - Provide services such as Web hosting

- ***Clients*** are PCs or workstations on which users run applications.

Main process of web sever



Client-Side languages/styles

- **HTML** (Hyper Text Mark up Language) – designing for the statistic web pages
- **CSS** (Cascade Style Sheets) – used to add styles for the HTML pages.
- **XML** (Extensible Markup Language) - XML was designed to transport and store data.
- **Java Scripts** - JavaScript is *THE* scripting language of the Web.

Server-Side languages/styles

- **PHP (Hypertext Preprocessor)** - PHP is a powerful tool for making dynamic and interactive Web pages. Also Provides simple, but powerful database access.

- **ASP.NET (Active Server Pages)** - ASP.NET is an entirely new technology for server-side Programming.

- **JSP/Servlet** – Server side technologies using the Java Programming languages.

Major Features of the Internet…

E-Mail

- Electronic mail (e-mail) is the most popular reason people use the Internet.
- To create, send, and receive e-mail messages, you need an e-mail program and an account on an Internet mail server with a domain name.
- To use e-mail, a user must have an e-mail address, which you create by adding your user name to the e-mail server's domain name, as in

  e.g jsmith@gmail.com.

Major Features of the Internet…

News

- One Internet-based service, called news, includes tens of thousands of newsgroups.
- Each newsgroup hosts discussions on a specific topic. A newsgroup's name indicates its users' special topic of interest, such as alt.food.cake.
- To participate in a newsgroup, you need a newsreader program that lets you read articles that have been posted on a news server. You can post articles for others to read and respond to.

Common Usenet Domains	
Domain	Type of Organization
comp	Computer-related topics
sci	Science and technology (except computers)
soc	Social issues and politics
news	Topics related to Usenet
rec	Hobbies, arts, and recreational activities
misc	Topics that do not fit into one of the other domains
The most important alternative topics include:	
alt	Alternative newsgroups
bionet	Biological sciences
biz	Business topics, including advertisements
clari	News from the Associated Press and Reuters, supplied through a service called Clarinet
k12	Newsgroups for primary and secondary schools

Major Features of the Internet…

Telnet

- Telnet is a specialized service that lets you use one computer to access the contents of another computer – a Telnet host.
- A Telnet program creates a "window" into the host so you can access files, issue commands, and exchange data.
- Telnet is widely used by libraries, to allow visitors to look up information, find articles, and so on.

Major Features of the Internet…

File Transfer Protocol (FTP)

- File transfer protocol (FTP) is the Internet tool used to copy files from one computer to another.
- Using a special FTP program or a Web browser, you can log into an FTP host computer over the Internet and copy files onto your computer.
- FTP is handy for finding and copying software files, articles, and other types of data. Universities and software companies use FTP servers to provide visitors with access to data.

FTP (cont.)

- ***FTP,*** the protocol for exchanging files over the Internet.
- FTP works in the same way as *HTTP* for transferring Web pages from a server to a user's browser and *SMTP* for transferring electronic mail across the Internet in that, like these technologies, FTP uses the Internet's TCP/IP protocols to enable data transfer.

FTP is most commonly used to download a file from a server using the Internet or to upload a file to a server (e.g., uploading a Web page file to a server).

- Transfer data reliably and efficiently

Anonymous FTP

- Using the Internet's File Transfer Protocol (FTP), anonymous FTP is a method for giving users access to files so that they don't need to identify themselves to the server.
- Using an FTP program or the FTP command interface, the user enters "anonymous" as a user ID. Usually, the password is defaulted or furnished by the FTP server.
- Anonymous FTP is a common way to get access to a server in order to view or download files that are publicly available.
- If someone tells you to use anonymous FTP and gives you the server name, just remember to use the word "anonymous" for your user ID. Usually, you can enter anything as a password.

FTP Client Commands (issued by user interface)

Command	Description
get filename	Retrieve file from server
mget filename*	Retrieve multiple files from server*
put filename	Copy local file to server
mput filename*	Copy multiple local files to server*
open server	Begin login to server
bye / close / exit	Logoff server
ls / dir	List files in current remote dir on server
lcd	Change local directory
cd	Change remote directory
rhelp / remotehelp	Lists commands the server accepts

Internet Relay Chat (IRC)

- Internet Relay Chat (IRC) is a service that allows users to communicate in real time by typing text in a special window.
- Like news, there are hundreds of IRC "channels," each devoted to a subject or user group.
- You can use a special IRC program to participate in chatroom discussions, but many chatrooms are set up in Web sites, enabling visitors to chat directly in their browser window.

Online Services

- An online service is a company that provides access to e-mail, discussion groups, databases on various subjects, and the Internet.

- America Online, CompuServe, and Prodigy are examples of popular online services.

Questions?

Lesson Review

- Name two organizations that created the network now called the Internet.
- Explain the importance of TCP/IP to the Internet.
- Describe the basic structure of the Internet.
- Describe how Internet operate.
- List major services the Internet provides to its users.