Understanding the Internet

Introduction

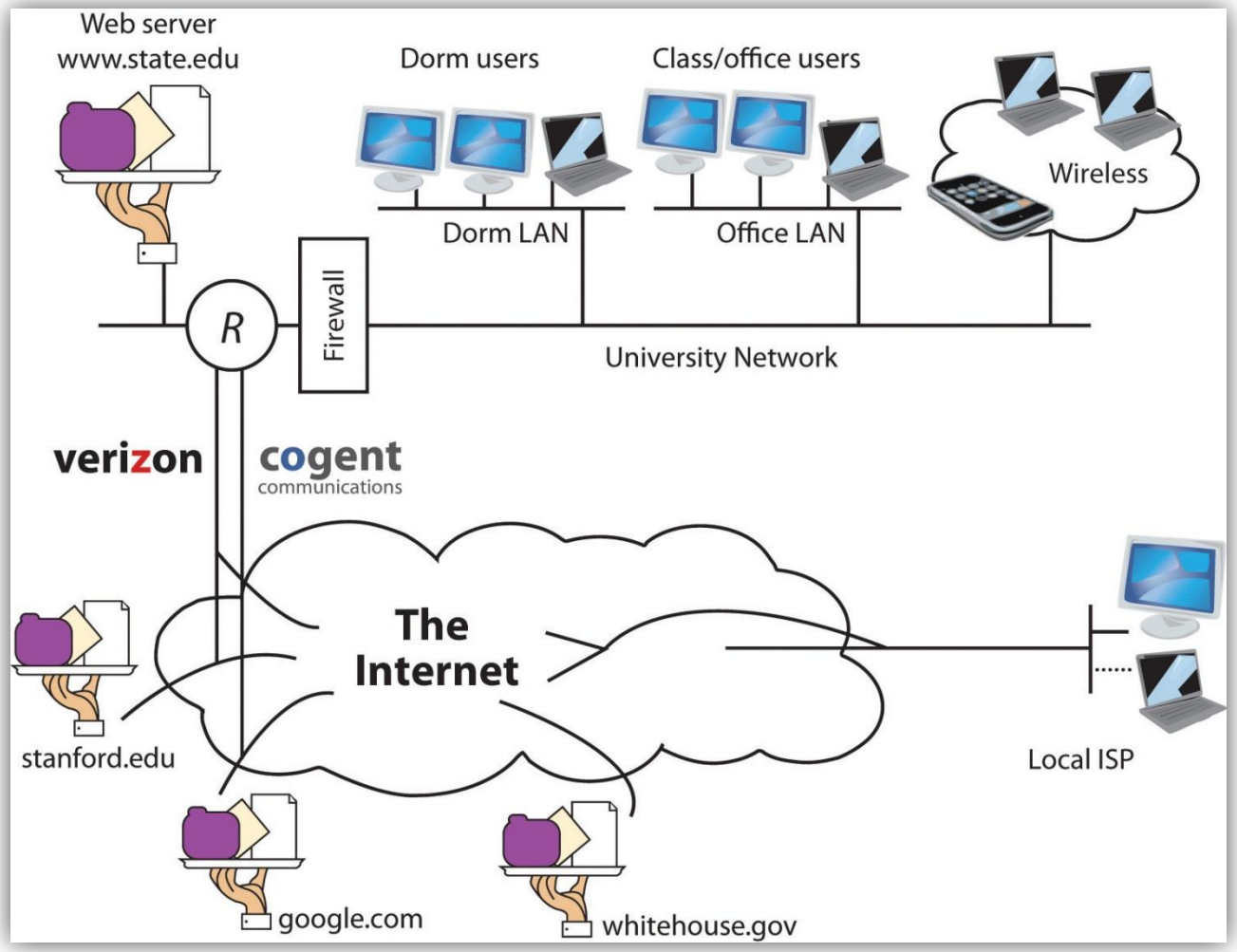
- The Internet (INTERconnected NETworks) is made up of millions of computers linked together around the world in such a way that information can be exchanged between any computer at any time.

- The Internet is often described as 'a network of networks' because all the smaller networks of organizations are linked together into the one giant network called the Internet. All computers are pretty much equal once connected to the Internet; the only differences will be the speed of the connection which is dependent on your Internet Service Provider and your own connecting device such as modem, network card.

- The Internet has no center and no one owns it. That’s a good thing. The Internet was designed to be redundant and fault-tolerant—meaning that if one network, connecting wire, or server stops working, everything else should keep on running.

Network

A **network** is a group of computers and associated devices that are connected by communications facilities. In the diagram, the "state.edu" campus network is connected to other networks of the Internet via two ISPs: Cogent and Verizon.



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The Internet

- **Internet Service Provider (ISP)** is a company that provides access to the Internet to individuals or companies.
- The Internet is the transport vehicle for the information stored in files or documents on another computer. The Internet itself does not contain information. It is a slight wrong statement to say a *"document was found on the Internet."* It would be more correct to say it was found through or using the Internet. What it was found in (or on) is one of the computers linked to the Internet.

Properties of the Internet

- Network dedicated,
- Based on the Internet suite of protocols (TCP/IP protocol),
- A non-commercial,
- Self-governing,
- Used for mostly to communication and research,
- No real center or central "Hub.",
- Not an online service,

Protocol is a set of formalized rules that describe how data is transmitted over a network.

The History of The Internet

- The Internet was born in the sixties, as a result of the "Cold War" between the former Soviet Union and the US. At that time, the defense system of the US was built up on computers, which were interconnected. A nuclear attack on this central unit could bring the complete defense system of the US to a standstill.
- If a nuclear bomb blew up one computer, another computer could instantly take over; thus, the computer network wouldn't go down. So, the Internet was created by the U.S. Department of Defense in 1969 under the name ARPANet (ARPA was the department's Advance Research Project Agency).

The History of The Internet

- It was built to serve two purposes;
  - To share research among military, industry, and university sources.
  - To provide a system for sustaining communication among military units in the event of nuclear attack.

The History of The Internet

- At first each computer was physically linked by cable to the next computer, but this approach has obvious limitations, which led to the development of networks utilizing the telephone system. So the Internet systems are based on the phone systems, The Internet traffic basically travels over phone lines. Because of this reason the Internet and phone system are similar. The pictures and table help to understand showing the similarities:
- After invention of the Internet, other organizations, such as colleges and universities, home and office users started connecting their computers to this growing network to share information.
- In 1972 - when the network included 23 computers - electronic mail, or e-mail, was developed. At the end of the 1970s, the discussion groups called newsgroups came into existence.

Internet vs. Phone System

The Internet

- Transmits data such as pictures, text, sound, and video via different types of transmission lines.
- Requires that each participant system have a unique ID, i.e., IP number, e-mail address.
- Uses various types of equipment to perform many functions-phones, computers, routers, modems, and so on.

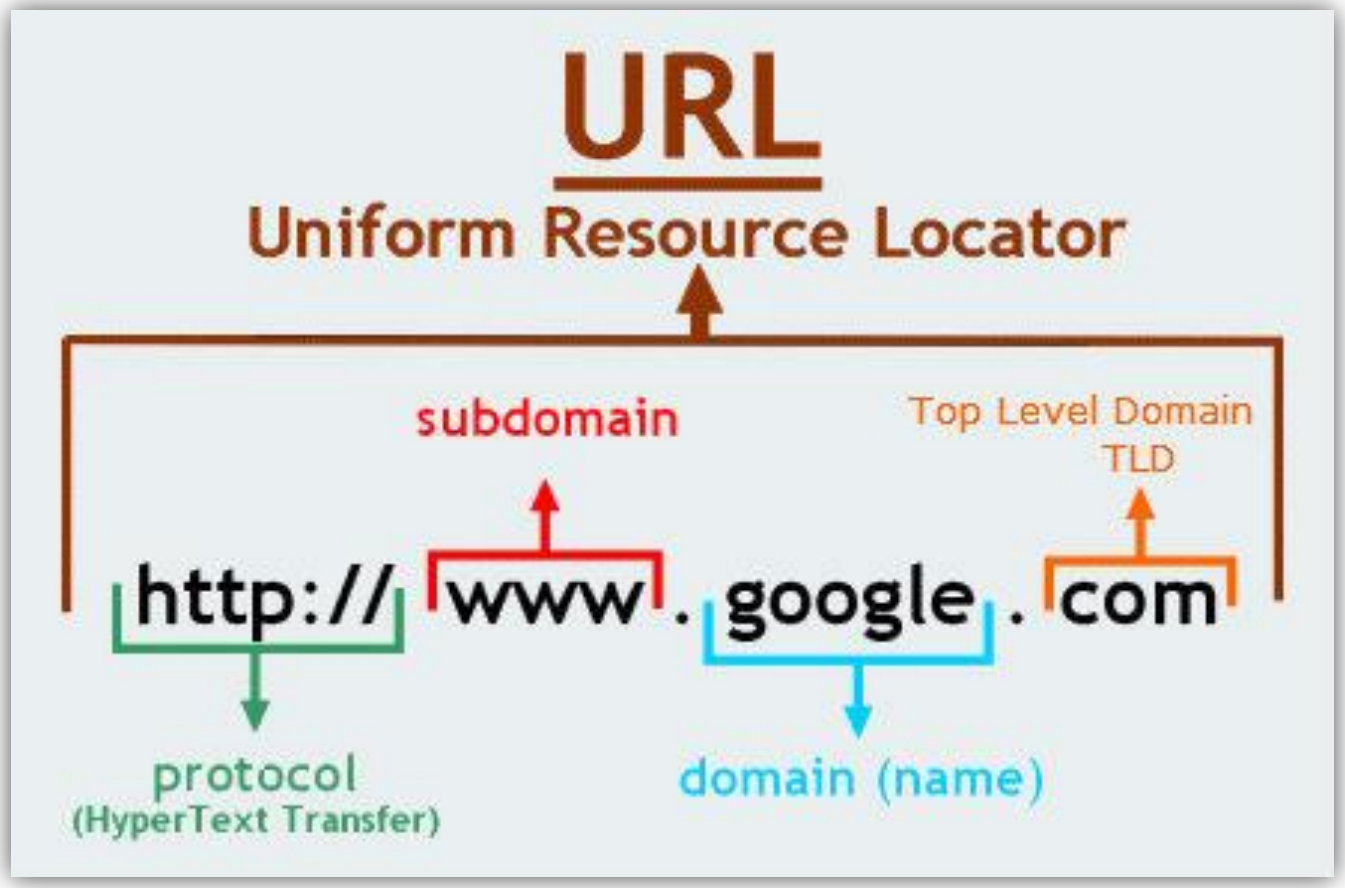
The Phone System

- Transmits data such as voice via standard telephone lines.
- Requires that each participant in the system has a unique ID, i.e., phone number.
- Uses various types of equipment to perform many functions-phones, switches, and so on

URL (Uniform Resource Locator)

- Between the 1970s and 1983, the ARPANet was connected to further networks. The large new network that resulted from these connections was called the Internet since it connected several networks with one another. Also in this year, an address system (URL) that allowed computers on the Internet to have names rather than the numbers by which they had previously been identified was established.
- **URL** is the acronym for "Uniform Resource Locator," this is the address of a resource on the Internet. World Wide Web URLs begin with http://

URL (Uniform Resource Locator)



Web Page

- Gradually, more and more countries connected to the Internet, and by 1988, more than 50,000 computers were connected to this network. Until this point, the Internet was used primarily by the academic world. In 1989 Web pages were invented. **Web page** is a page on the World Wide Web.
- A **Web page** is a document designed for viewing in a Web browser. Typically written in HTML.

Web Browser

- In 1993, a **graphical Web browser** was invented that allowed users to navigate easily from one place to another on the Internet. More and more people outside of the academic world began to use the Internet. At the beginning of the year 2005, there were more than 300 million Internet users.
- **Web Browser** is a software that gives a user access to the World Wide Web. Web browsers often provide a graphical interface that lets users click buttons, icons, and menu options to view and navigate Web pages. Microsoft Internet Explorer and Firefox are popular Web browsers.

Internet Servers

- The Internet is made up of client computers, servers, cables and network connection devices. Each has a different role in the Internet infrastructures: connection devices are responsible for data traffic whereas servers enable information and resources to be shared among the computers. Servers are configured as high performance computers and running special software to perform their tasks. They operate 24 hours a day for full time service to their clients.
- **Data** is the raw material of information. Refers mostly to the information entered into, and stored within a computer or file.

Internet Servers

Google Data Center

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Facebook Data Center

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Servers and Their Tasks (1)

- **Web Servers :** Web Servers are foundation of the Internet. The Web pages are stored in Web servers. Whenever you open up your browser and type in a Web site address, it is the server that gets you the page you request.
- **Mail Servers :** Mail Serves are as crucial as Web servers. They move and store mails over private networks and across the Internet.
- **FTP (File Transfer Protocol) Servers :** FTP servers store text files, graphic files, sound files, etc., and let the client download and upload them.
- **Database Servers :** Database Servers are specifically configured to run database software. A database is a collection of data that is organized so that its contents can easily be accessed, managed, and updated.

Servers and Their Tasks (2)

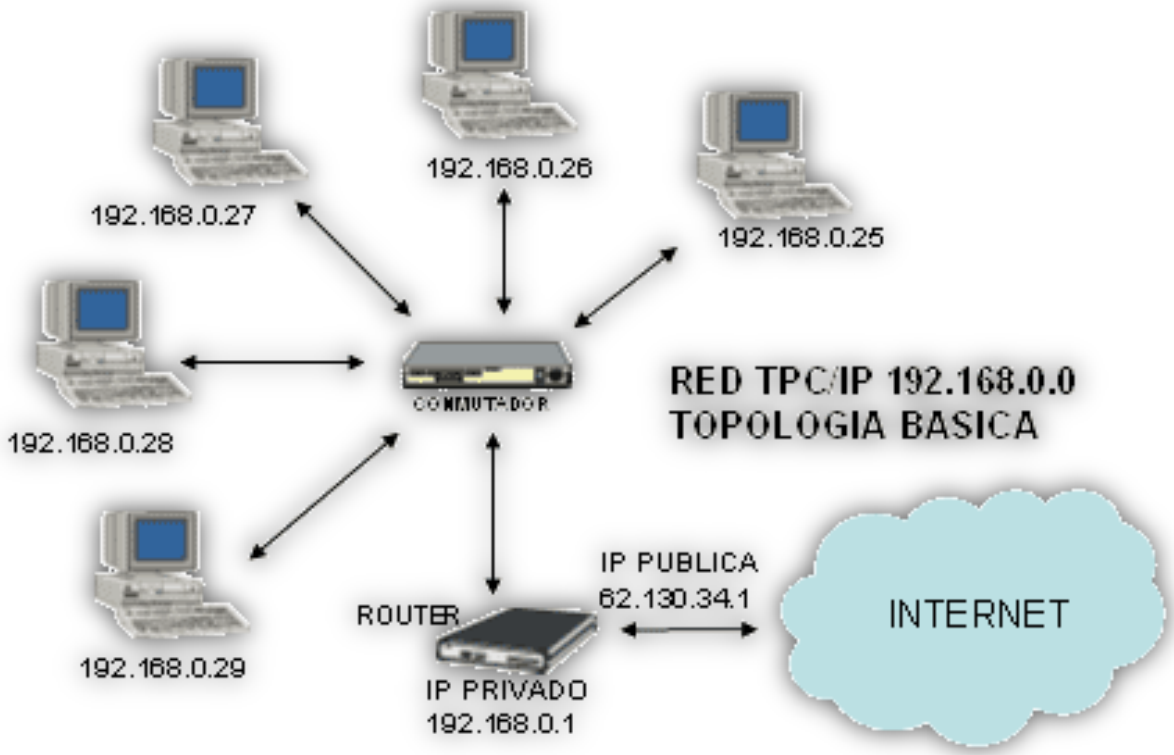
- **Content Management Servers :** Content management servers enable the process of creating, editing, storing, organizing, and publishing content on the Web.
- **Real-Time Communication Servers :** Chat, and IRC servers enable a large number of users to exchange information in an environment similar to an Internet newsgroup but with real-time discussion capabilities. Instant messaging servers, like chat servers, facilitate communication in real time. However, instant messaging generally involves one conversation between two people.

Servers and Their Tasks (3)

- **DNS (Domain Name Server) :** DNS matches up the URL of a Web site (e.g. www.youtube.com) with its proper numeric **IP address.** It translates www.youtube.com into the unique numeric IP address 212.175.211.243. Whenever you request a Web page the Web browser must consult the domain name server to find out what the numeric translation of the URL is. This is necessary because computers only understand the numeric IP address, whereas people prefer to use meaningful and more memorable text.

Servers and Their Tasks (4)

- Every computer connected to the Internet is assigned a unique number known as an **IP (Internet Protocol)** address.



Popular Use of The Internet (1)

- **Performing Research**
  - Thousands of databases, libraries, and research institutions around the world are available, to gather information on any topics of interest for work or recreation. The information can be in the form of text, pictures, or even video material.
- **Communication**
  - Keep in touch and send things to colleagues and friends using electronic mail, the Internet telephone, keyboard chat, and video conferencing.
- **Obtaining News**
  - The Internet users can stay up to date with news, sports, the weather, and any current affairs around the world with information updated daily, hourly, or instantly. www.sciencesnews.org and http://news.com are two popular news sites.

Popular Use of The Internet (2)

- **Learning**
  - Distant education (e-learning) is another possibility on the Web. Most colleges now offer courses via the Web, enabling the Internet users to earn college credit, diplomas, and degrees from home using the Internet user's computer. http://www.worldwidelearn.com and http://www.uwex.edu/ are two examples.
- **Shopping**
  - People who can not stand parking hassles, limited store hours, and check out lines, the Web provides a shopping alternative. For example; www.ebay.com , www.theinternetmall.com link to online merchants selling anything such as flowers, clothing, computers, and electronics are available on the Web. It is possible to find online shopping Web sites for each country and city.

Popular Use of The Internet (3)

- **Downloading Computer Software**
  - Software and other products that are available in cyberspace. Internet users can update their programs or download the **freeware**, **shareware** and commercial version of the products. www.download.com and www.shareware.com are two popular downloading sites. You should scan all downloaded files and programs for viruses before opening them.
- **Download** is the process of copying a file from a remote computer to your computer.
- **Freeware** is software that is available free of charge for personal use.
- **Shareware** is software that is distributed free on a trial basis with the understanding that the user may need or want to pay for it later.

Popular Use of The Internet (4)

- **Entertainment**
  - The Internet users can listen to sounds and music, and watch digital movies, Streaming media technology permits to broadcast audio and video to users across the Internet. Nowadays most of the TV and Radio stations have the Internet broadcast. The Internet connection speed is very important for receiving TV and Radio broadcasts.
- Playing video or sound in real time as it is downloaded over the Internet is called **streaming**. Streaming requires a powerful computer and fast connection since the file is not stored on your computer.
- **Broadcast** is the sending of messages or video to all points simultaneously.

Popular Use of The Internet (5)

- **Travel Plans**
  - Using the Web makes possible to organize a travel plan while sitting in front of a computer. The Internet users can search for flights, hotels and book reservations through the Internet. Also, it is possible to have your ticket delivered to your home. In addition, reviews of restaurant guides and reservations are available on the Internet. The Internet also helps to get information about the weather, maps, and regions of interests.
- **Publishing**
  - All type of information can be published on the Internet by uploading information to the Web servers.

Internet Tools

World Wide Web (WWW)

WATCH VIDEO

World Wide Web (WWW)

- Consists of an interconnected system of sites, of servers all over the world. It is a huge collection of pages. All of them are mutually interconnected with each other. These pages can contain text, pictures, films, sound and much more information. Using the Web is a bit like flipping through a huge book that has been written by millions of authors.
- Sometimes people use the words The Internet and **World Wide Web** synonymously but they are different. The **WWW** is a component of the Internet that presents information in a graphical interface. The **Internet** users can think of the WWW as the graphical version of the Internet.

Electronic Mail (E-Mail)

- Exchanging information through the electronic mail (e-mail) is the most widely used feature of the Internet. Just like regular paper mail, the Internet users can send and receive emails with people around the world, as long as they have access to a computer and the Internet. Unlike regular paper mail, e-mail is usually delivered to its destination almost instantly.

E-mail Based Discussion Groups

- Mailing lists combine e-mail and newsgroups. They are also called listservers. Listservers allow anyone to subscribe (generally at no charge) to an e-mail mailing list on a particular subject or subjects and to post messages. Maintainer of the mailing list (moderator) then sends those messages to everyone on that list.

The Internet Relay Chat (IRC)

- Some Web sites provide chat rooms, which are a way to socialize with a group of other individuals interactively and in a casual manner. Participants can type in messages for the group to view; other group members can respond immediately. Many types of chat rooms also allow private messages to be sent to specific individuals.

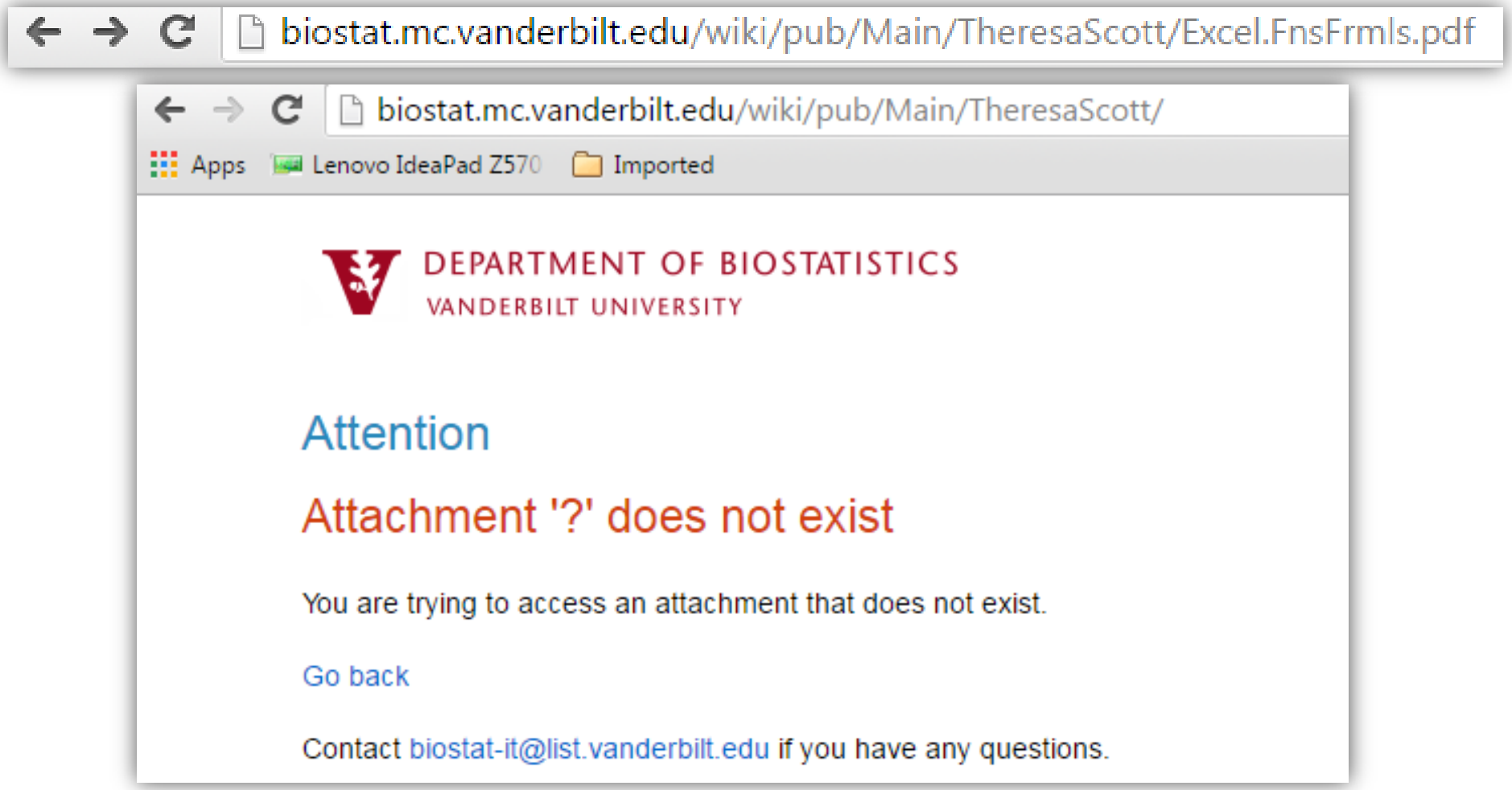
File Transfer Protocol (FTP)

- The **File Transfer Protocol** (**FTP**) is a standard network **protocol** used to **transfer** computer files between a client and server on a computer network.
- The Internet users can connect to a remote computer called an FTP site and transfer publicly available files to their own computer's hard disk.
- Some FTP sites are open to anyone anyone, so called anonymous FTP sites. Other FTP sites can be accessed only by means of a password. The Internet users can also use FTP to upload (transfer) the Internet user's files to an FTP site.

File Transfer Protocol (FTP)

- **Download** is the process of copying a file from a remote computer to your computer. **Upload** is the reverse process of downloading.
- Anonymous is a way of logging on to servers as a guest, which gives you limited access to that server. Many FTP sites allow you to login anonymously in order to download files. Directories or files requiring a secure User ID and Password will not be accessible.

File Transfer Protocol (FTP)



Telnet

- **Telnet** is an old Internet technology. **Telnet** is a terminal emulation protocol that allows Internet users to connect (log on) to a remote computer. This feature, which allows microcomputers to communicate successfully with mainframes, enables the Internet users to tap into the Internet computers and access to public-files, instead of connecting directly. Many public and university libraries employ Telnet to make their library catalogs available on the Internet, so that users can access the catalogs at home as if they were seated at one of the terminals in the library.

The Internet Programs

Dialer Programs

- Dialer programs that creates a connection to the Internet or another computer network over the analog telephone or ISDN network. Many operating systems already contain such a program for connections through the Point-to-Point-Protocol (PPP).
- **Point-to-Point Protocol (PPP)** is a protocol for communication between two computers using a serial interface, typically a personal computer connected by phone line to a server.
- Many Internet service providers offer installation-CDs which are meant to simplify the process of setting up a proper Internet connection. This is possible through either creating an entry in the Operating System's dialer or by installing a separate dialer.

Web Browsers

- Web browsers are used to access the Internet services and resources available through the World Wide Web.
- Text and images on a Web page can contain hyperlinks to other Web pages at the same or different Web sites. Web browsers allow a user to access information provided on many Web pages at many Web sites by traversing these links.
- Popular browsers available for personal computers include Microsoft Internet Explorer, Mozilla Firefox, Opera, Netscape, and Apple Safari.

Mail Programs

- Mail programs (e-mail clients or mail user agent -MUA) are used to send, receive, and organize e-mail.
- IMAP, POP3, and SMTP are fundamental e-mail protocols.
  - **IMAP** stores emails on the mail server,
  - **POP3** downloads e-mails from mail server to client computer, and
  - **SMTP** sent e-mails from client computer to mail server.

and some others…

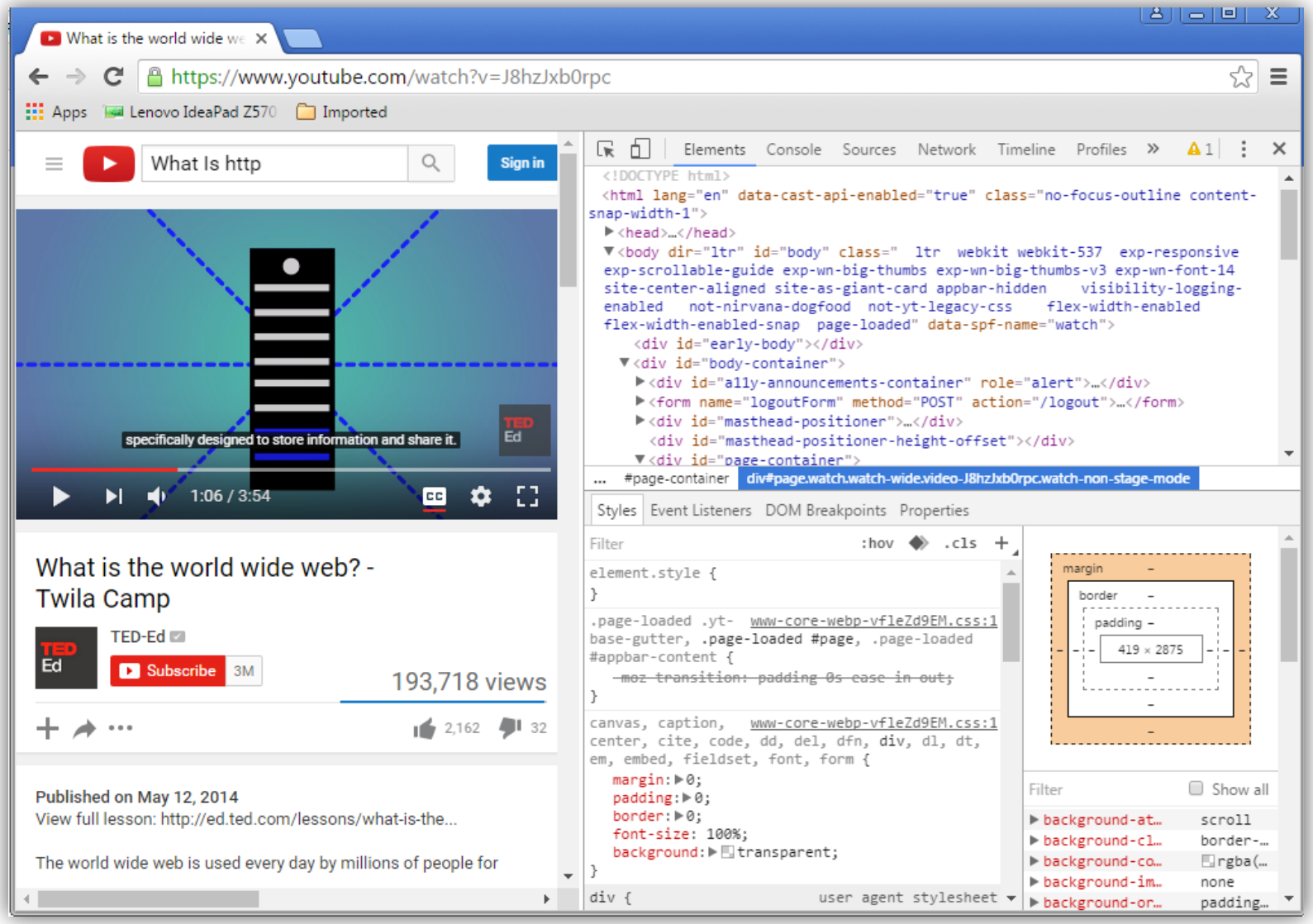
- **News Readers**
  - New readers are used to read articles on Usenet (generally known as newsgroup). Most of the newsgroups are with paid subscription.
- **Chat Programs**
  - Chat programs are used to chat on the Internet.
- **Download Clients**
  - Download clients are used to download programs, movies, documents etc.

The World Wide Web (WWW)

The World Wide Web

- The Web consists of millions of documents that are stored on millions of computers. These computers are always connected to the Internet. The documents are called Web pages. The Internet users can find Web pages on every subject imaginable.
- **HTTP** (Hypertext Transfer Protocol) is the set of rules for transferring files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web.
- The World Wide Web (WWW) allows text, pictures, sound and movies to be displayed on the Internet user's screen, via a software called Web browsers (such as Internet Explorer, Firefox, Opera) that uses a specific Internet Protocol called **HTTP**.

The World Wide Web



Inspect Element

The World Wide Web

- The World Wide Web is what the Internet users probably think of when they think about the Internet. But this is wrong. The Internet consists of many services. The World Wide Web (WWW) is a graphical part of the Internet.
- The WWW began in the late 1980's when physicist **Dr. Berners-Lee** wrote a small computer program for his own personal use. This program allowed pages, within his computer, to be linked together using keywords. It soon became possible to link documents in different computers, as long as they were connected to the Internet. The document formatting language used to link documents is called **HTML.**

The World Wide Web

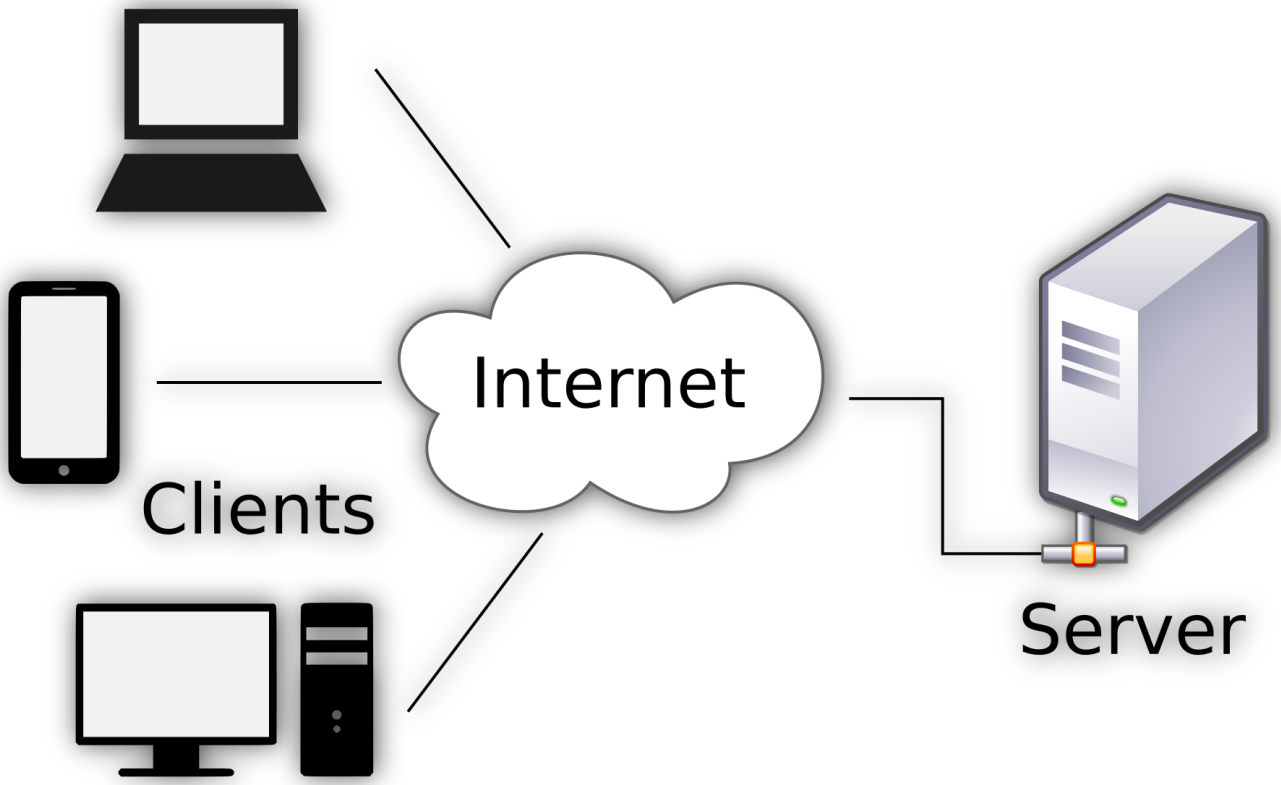
- **HTML** stands for HyperText Markup Language, the authoring language used to create documents on the World Wide Web.
- The Web remained primarily text based until 1992.
- An event occurred that year that changed the way the Web looked forever. Marc Andreessen developed a new computer program called the NCSA Mosaic and gave it away! The NCSA **Mosaic** was the first Web browser.
- The browser made it easier to access the different Web sites that had started to appear. Soon Web sites contained more than just text, they also had sound and video files.

World Wide Web Terminology

A. World Wide Web Tools

- **Browser**
  - A software program that requests, interprets, and presents World Wide Web documents. Frequently used browsers include the Internet Explorer, Opera, and Firefox.
- **Server**
  - In a general sense, a server is any computer that provides information or services to the other computers on a network. Example of a server includes a file server, a printer server and a mail server.
- **Client**
  - A client is a computer system that requests a service of another computer system (a server) on a network. A client also can be a software program that requests and acquires information from computers that store World Wide Web documents and files. For example; WWW browsers are known as clients.

A. World Wide Web Tools



Client-Server Architecture

B. Essential Units of the Web

- **HTML**
  - Hypertext Markup Language. HTML is the coding language for the World Wide Web that informs browsers how to display a document's text, links, graphics, and other media. This language forms the foundation for all Web pages.
  - Beside HTML other new programming languages for the Web is available. Such as ASP, PHP, JAVA, Java Scripts. Some of them working with in HTML but some of them perform separately.
- **Webmaster**
  - The individual responsible for maintaining and updating the content of a World Wide Web document. Webmasters are the creative forces behind the World Wide Web.

B. Essential Units of the Web

- **Domain Name**
  - The name given to any computer registered on the World Wide Web as an official provider of information and files. Domain names are usually two or more terms separated by periods. Some examples are www.google.com or www.msu.edu google is the domain (location) name and com is the domain type in the first example. Domain type denotes type of the organization. Outside of the United States, domains have another extension to identify the country. For example, .ru for Russia, .tr for Turkey. www.zambak.com.tr is a domain name for a commercial company that is Zambak in Turkey.

B. Essential Units of the Web

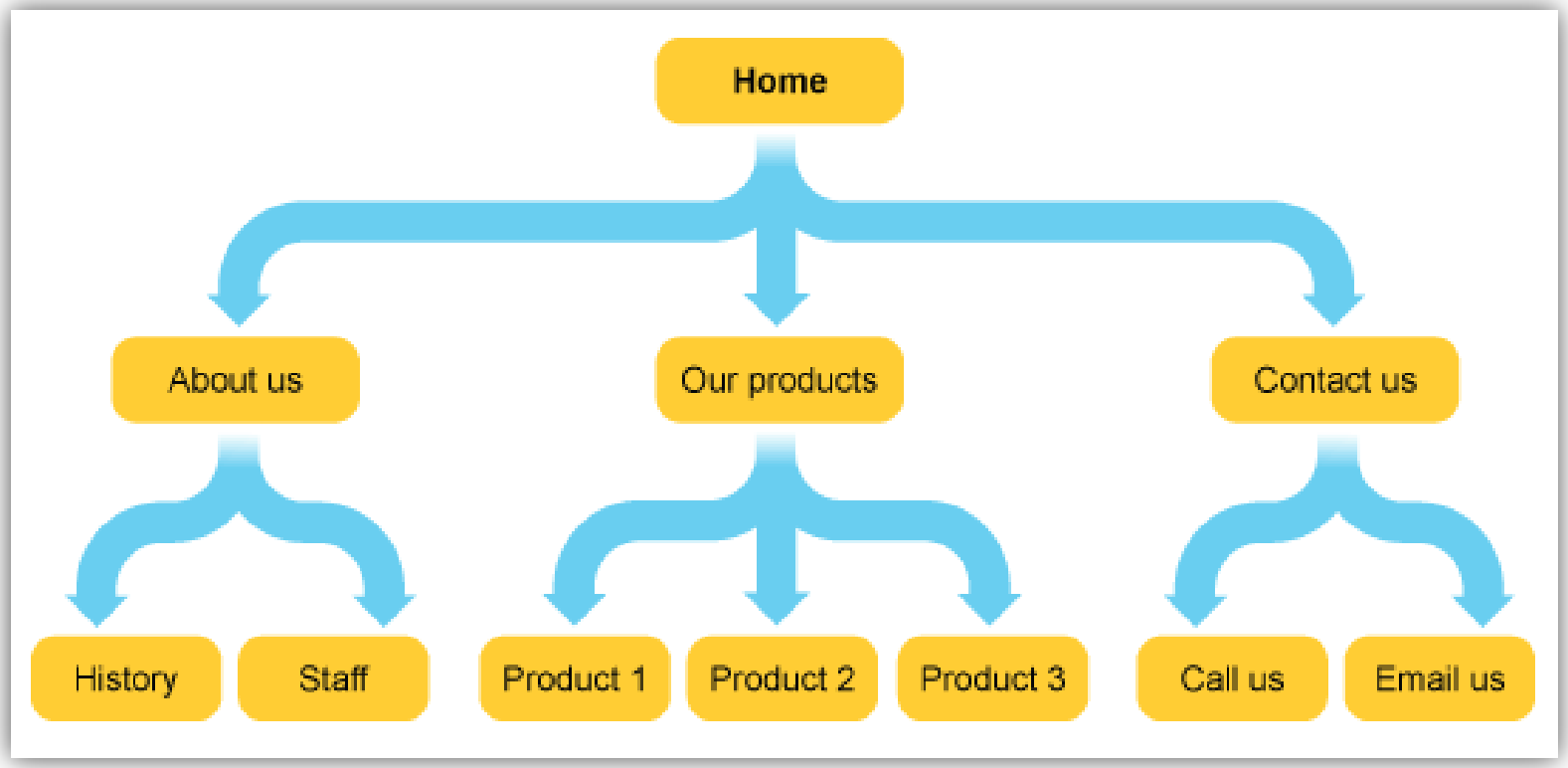
- **URL**
  - Uniform Resource Locator. A URL serves as identification for all World Wide Web documents. The URL is sometimes referred to as a World Wide Web page address. Every site and page on the World Wide Web has a URL.
- **Hotlist**
  - An option available in most World Wide Web browsers that maintains a list of frequently accessed home pages. A hotlist also refers to a list of home pages related to a particular subject that is published on an organization's home page.

Web Site Terminology

Web Site Terminology

- **Web Site**
  - A collection of World Wide Web documents, usually consisting of a home page and several related pages. The Internet users might think of a Web site as an interactive electronic book.
- **Home Page**
  - Frequently, the "cover" of a particular Web site. The home page is the main, or first page displayed for an organization's or person's World Wide Web site.

Web Site Terminology



A Simple Web Site Diagram

Web Site Terminology

- **Hyperlink**
  - Short for "hypertext link." A link provides a path that connects The Internet users from one part of a World Wide Web document to another part of the same document, a different document, or another resource. A link usually appears as a uniquely colored word that The Internet users can click to be transported to another Web page.
- **Anchor**
  - A link that takes The Internet users to a different part of the same Web page.
- **Image Map**
  - An image map enables The Internet users to click various locations in a graphic image to link to different documents.

Web Site Terminology

- **Frame**
  - A feature available on the World Wide Web that presents text, links, graphics, and other media in separate portions of the browser display. Some sections remain unchanging, whereas others serve as an exhibit of linked documents.
- **Table**
  - A feature available on the World Wide Web that presents document text, links, graphics, and other media in row and column format. Table borders may be visible in some documents but invisible in others.

SUMMARY

- **The Internet** is an international network composed of thousands of smaller networks. The Internet carries messages, documents, programs, data files between the companies, organizations and individual users. There is no single center or authority that controls the Internet.
- The Internet was created for the U.S Department of Defense for military communications purposes in 1969. It first was known as **ARPANET**. It has expanded by establishing interconnection with other networks around the world.

SUMMARY

- **TCP/IP** is the standard protocol to exchange commands and data in the Internet. Every computer (host) in the Internet has a unique IP address. People use meaningful names instead of numeric IP addresses. **Domain Name System** resolves a host name to its associated IP address.
- **The World Wide Web** is the fastest growing part of the Internet. It combines text, illustrations, and links to other files in hypertext documents. **Electronic mail** is the most popular use of the Internet. **FTP** is used to copy the data and program files between the computers. **Newsgroups** are the discussion groups that are related to one topic.

Review

- Name of the first Internet browser
  - Mosaic
- The computer network system that gave birth to the Internet.
  - ARPANET
- A group of computers and associated devices
  - Network

Research

- Find the information about inventors of the e-mail and the WWW.
- What are the advantages and disadvantages of online shopping?
- Find out the capabilities of the first Web browser Mosaic.
- Find out the advantages and disadvantages of the Internet. Make a list.

The End