INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

CSN-101 (Introduction to Computer Science and Engineering)

Lecture 9: Computer Networking and Web Technology

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Piazza Class Room: https://piazza.com/iitr.ac.in/fall2019/csn101

[Access Code: csn101@2019]

Moodle Submission Site: https://moodle.iitr.ac.in/course/view.php?id=45

[Enrollment Key: csn101@2019]

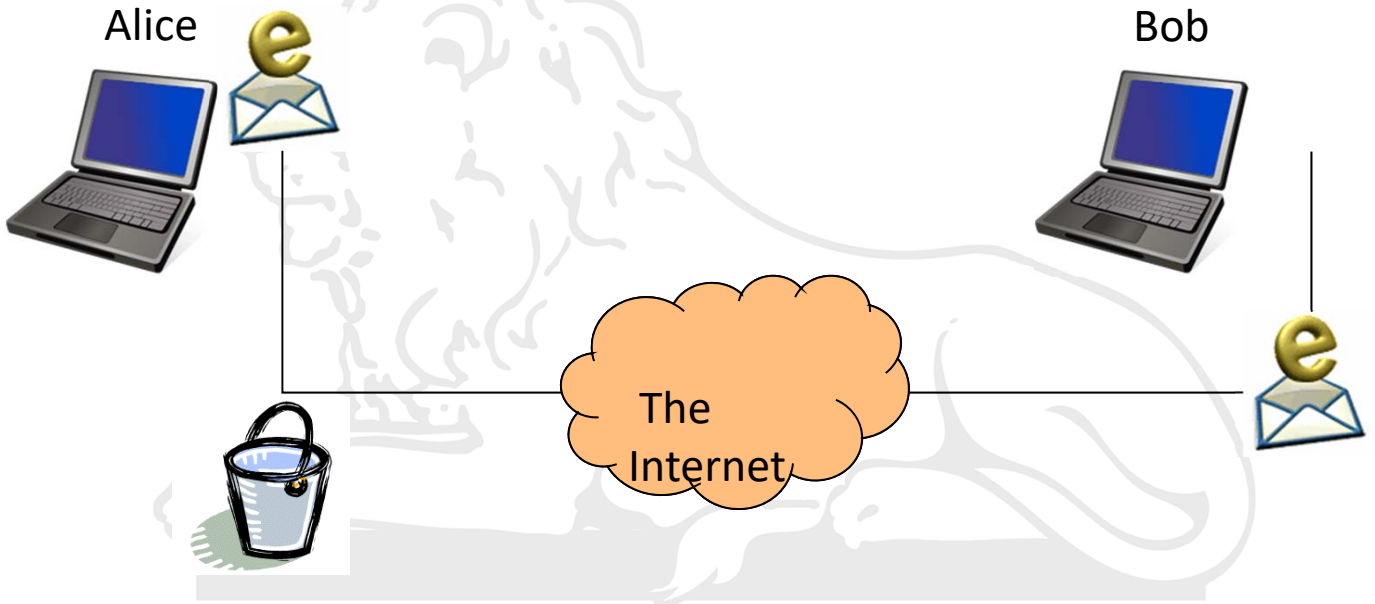
Plan for Lecture Classes in CSN-101 (Autumn, 2019-2020)

Week	Lecture 1 (Monday 4-5 PM)	Lecture 2 (Friday 5-6 PM)
1	Evolution of Computer Hardware and Moore's Law, Software and Hardware in a Computer	Computer Structure and Components, Operating Systems
2	Computer Hardware: Block Diagrams, List of Components	Computer Hardware: List of Components, Working Principles in Brief, Organization of a Computer System
3	Linux OS	Linux OS
4	Writing Pseudo-codes for Algorithms to Solve Computational Problems	Writing Pseudo-codes for Algorithms to Solve Computational Problems
5	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms
6	C Programming	C Programming
7	Number Systems: Binary, Octal, Hexadecimal, Conversions among them	Number Systems: Binary, Octal, Hexadecimal, Conversions among them
8	Number Systems: Negative number representation, Fractional (Real) number representation	Boolean Logic: Boolean Logic Basics, De Morgan's Theorem, Logic Gates: AND, OR, NOT, NOR, NAND, XOR, XNOR, Truth-tables
9	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput
10	Different layers of networking, Network components, Type of networks	Network topologies, MAC, IP Addresses, DNS, URL
11	Different fields of CSE: Computer Architecture and Chip Design	Different fields of CSE: Data Structures, Algorithms and Programming Languages
12	Different fields of CSE: Database management	Different fields of CSE: Operating systems and System softwares
13	Different fields of CSE: Computer Networking, HPCs, Web technologies	Different Applications of CSE: Image Processing, CV, ML, DL
14	Different Applications of CSE: Data mining, Computaional Geometry, Cryptography, Information Security	Different Applications of CSE: Cyber-physical systems and IoTs

Up to MTE

Packets

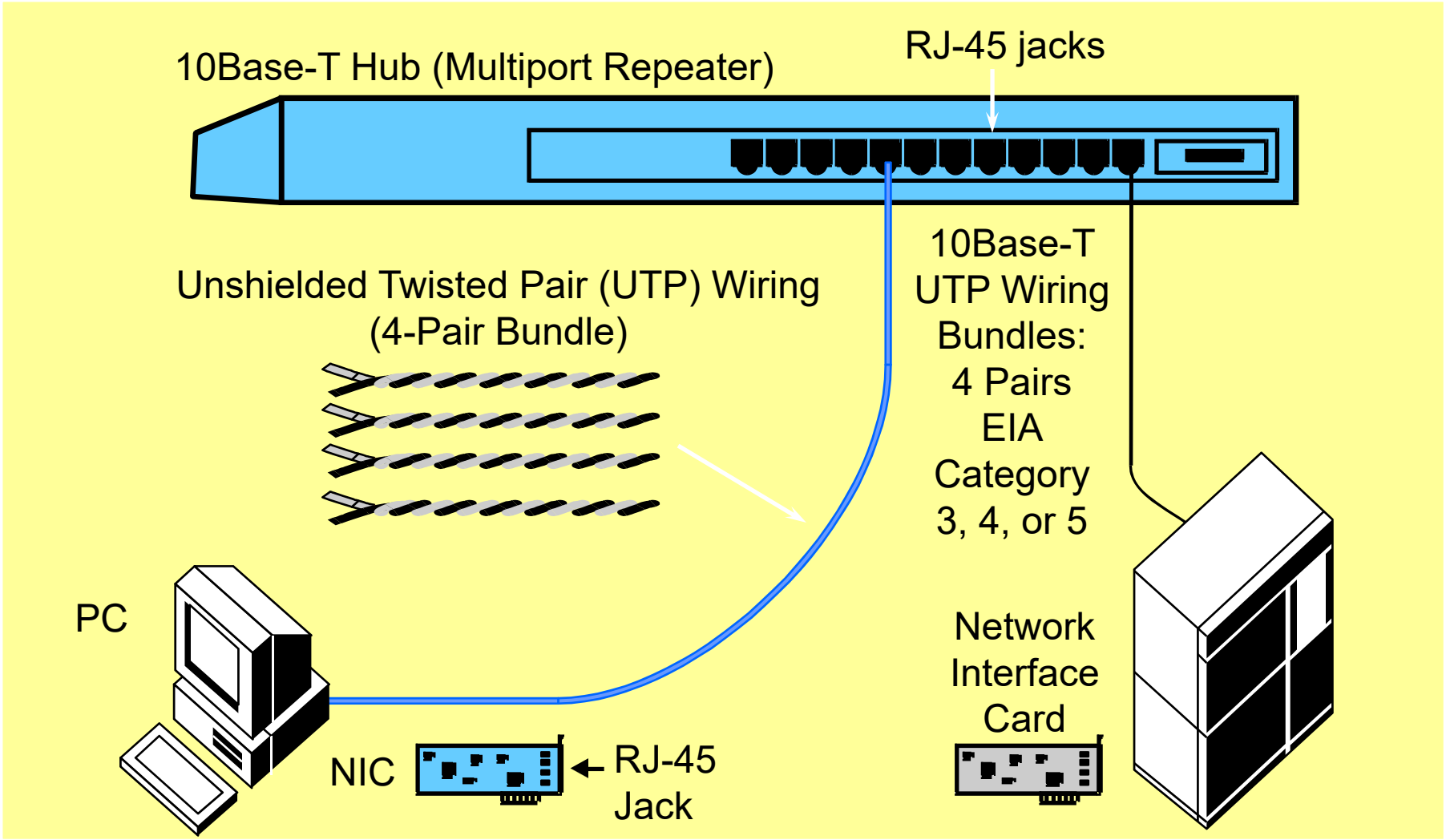
- A small chunk of data transmitted over the Internet



VPN (Virtual Private Network)

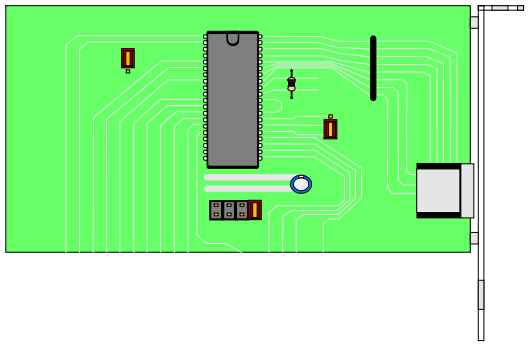
- A secure tunnel to a private network through a public network
- Once established, local node appears to be a node in the private network in a secure manner

LAN Using Ethernet 10Base-T



NICs

- Network Interface Cards
  - Implement Physical Layer
    - Plug and Electrical Signaling
  - Implements the Data Link Layer (data packaging, access control, etc.)
    - LLC (802.2)
    - MAC (802.3 MAC)

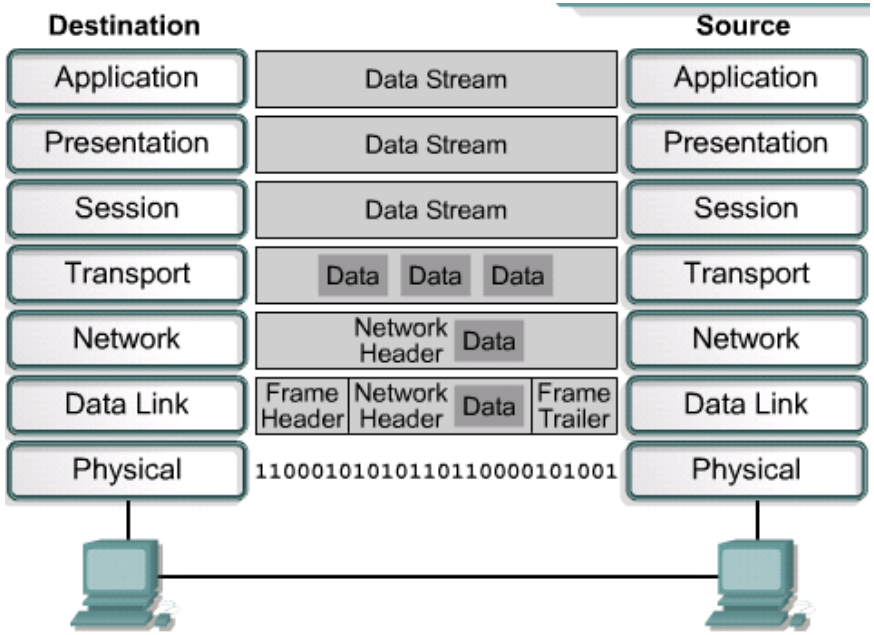


Addresses

- Ethernet address (MAC address)
  - 48-bit unique addresses hard wired in NICs (280 trillion)
  - 12 hex numbers, e.g. 00-A0-C9-9F-00-07
  - first three identify company, Intel in the example
  - how to see: IPconfig, or System Information
- IP address (number)
  - 32-bit value, not hard coded (4 billion), assigned manually or by DHCP
  - four dotted quads, each quad a decimal from 0-255, corresponding to eight bits, e.g. UBMAIL IP address is 198.202.0.25
  - to convert open Calculator select View, Scientific, decimal and type dotted quad decimal value, then select binary.

Detailed encapsulation process

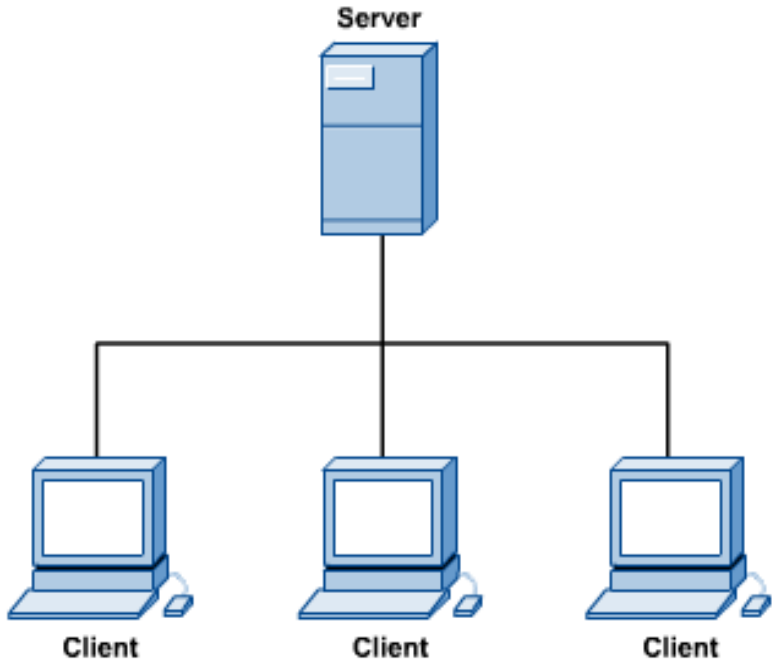
- If one computer (host A) wants to send data to another computer (host B), the data is packaged through a process called *encapsulation*
- As the data packet moves down through the layers of the OSI model, it receives headers, trailers, and other information.



Client-Server Computing

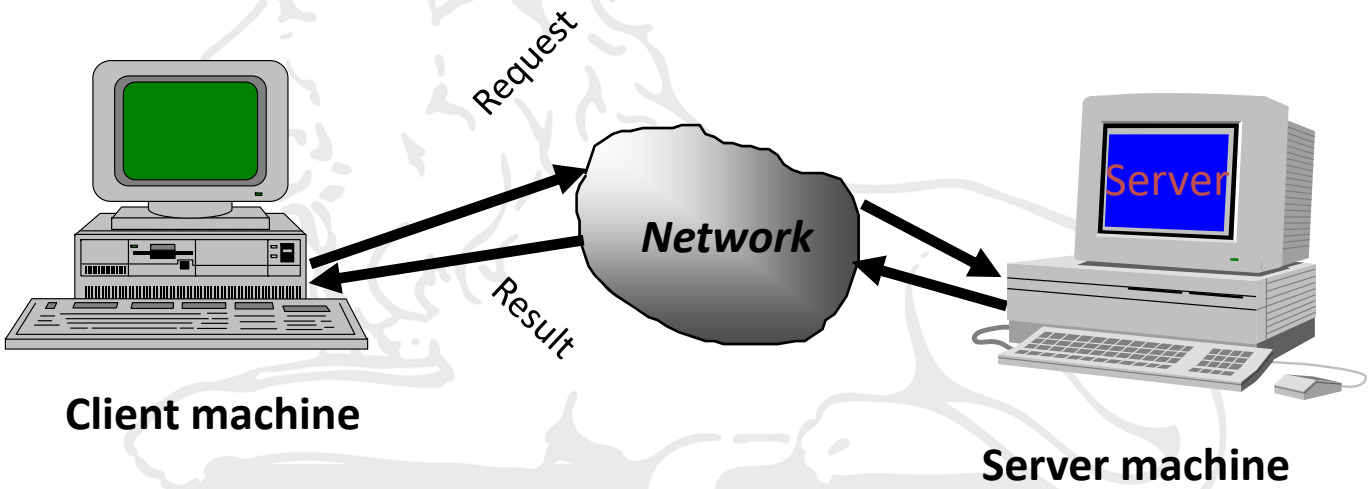
Computers: Clients and Servers

- In a client/server network arrangement, network services are located in a dedicated computer whose only function is to respond to the requests of clients.
- The server contains the file, print, application, security, and other services in a central computer that is continuously available to respond to client requests.



Client-Server (CS)

Server software accepts requests for data from client software and returns the results to the client



a client, a server, and network

Networking Terminology

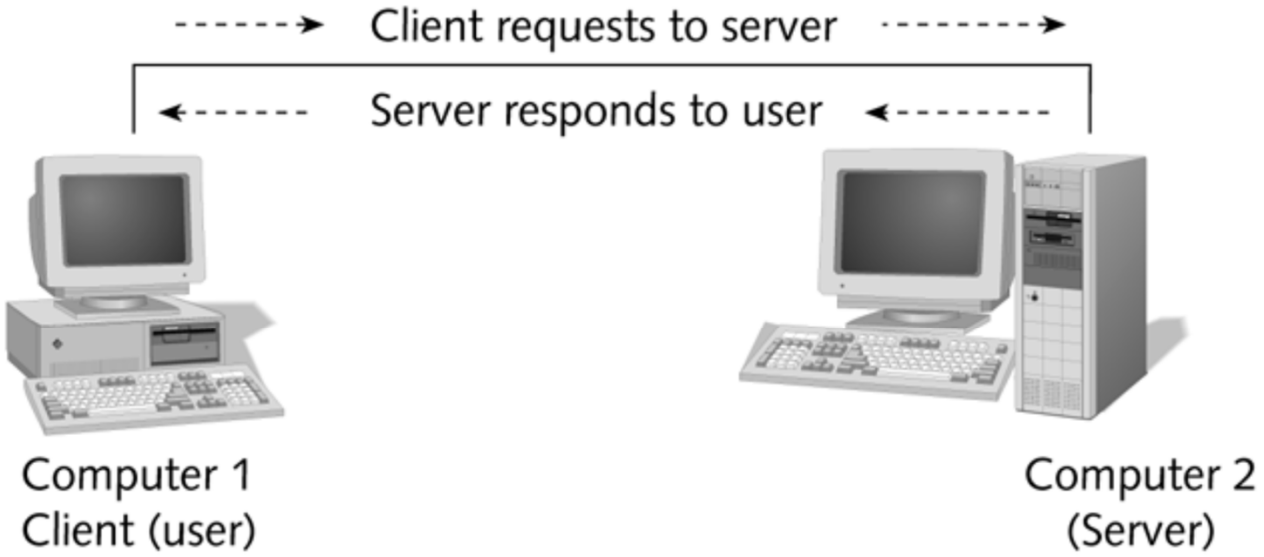


Figure 1-3 A client/server relationship

Applications

- E-mail
- Searchable Data (Web Sites)
- E-Commerce
- News Groups
- Internet Telephony (VoIP)
- Video Conferencing
- Chat Groups
- Instant Messengers
- Internet Radio

Web Technologies, HTML

Web Technologies

- HTML
- XHTML
- CSS
- XML
- JavaScript
- VBSCRIPT
- DOM
- DHTML
- AJAX
- E4X
- WMLScript
- SQL
- ASP
- ADO
- PHP
- .NET
- SMIL
- SVG
- FLASH
- Java applets
- Java servlets
- Java Server Page

HTML

- HTML stands for **H**yper **T**ext **M**arkup **L**anguage
- An HTML file is a text file containing small **markup tags**
- The markup tags tell the Web browser **how to display** the page
- An HTML file must have an **htm** or **html** file extension
- An HTML file can be created using a **simple text editor**

Best Online Tutorial: https://www.w3schools.com/html/

What the following term mean:

- Web server: a system on the internet containg one or more web site
- Web site: a collection of one or more web pages
- Web pages: single disk file with a single file name
- Home pages: first page in website

Think about the followings before working your Web pages.

- Think about the sort of information(content) you want to put on the Web.
- Set the goals for the Web site.
- Organize your content into main topics.
- Come up with a general structure for pages and topics.

What is HTML?

- Telling the browser what to do, and what props to use.
- A serises of tags that are integrated into a text document.

Tags are ;

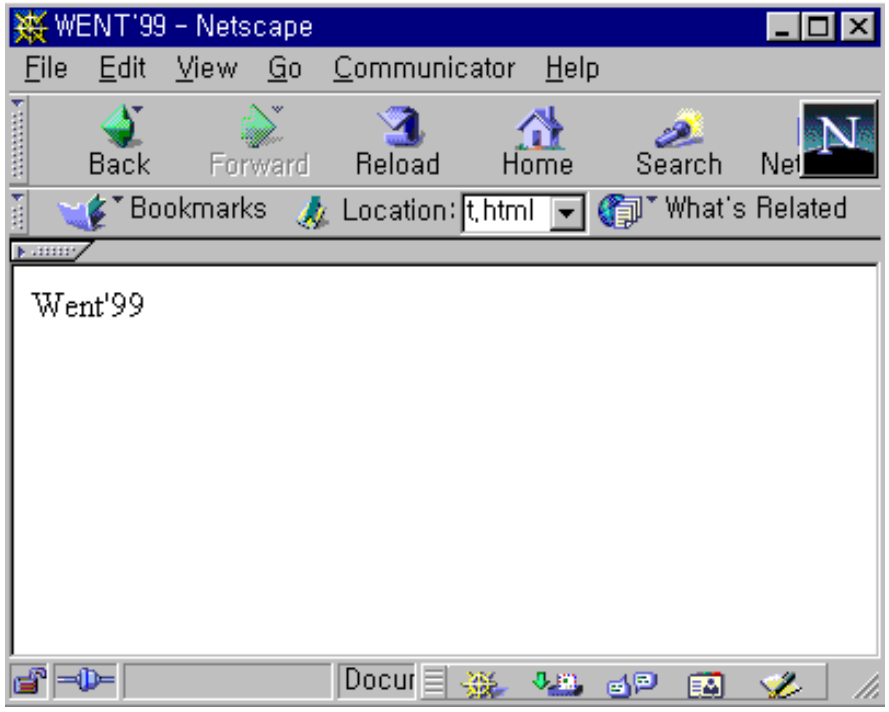
- surrounded with angle brackets like this
  - <B> or <I>.
- Most tags come in pairs
  - exceptions: <P>,
, <li> tags …
- The first tag turns the action on, and the second turns it off.

- The second tag(off switch) starts with a forward slash.
  - For example ,<B> text </B>
- can embedded, for instance, to do this:
  - <HEAD><TITLE> Your text </HEAD></TITLE> it won't work.
  - The correct order is <HEAD><TITLE> Your text </TITLE></HEAD>
- not case sensitivity.
- Many tags have attributes.
  - For example, <P ALIGN=CENTER> centers the paragraph following it.
- Some browsers don't support the some tags and some attributes.

Basic HTML Document Format

```
<HTML>
<HEAD>
 <TITLE>WENT'99</TITLE>
</HEAD>
<BODY>
  Went'99
 </BODY>
 </HTML>
```

See what it looks like:



How to Create and View an HTML document?

1. Use an text editor such as Editpad to write the document.
2. Save the file as filename.html on a PC. This is called the Document Source.
3. Open Netscape (or any browser) Off-Line
4. Switch to Netscape
5. Click on File, Open File and select the filename.html document that you just created.
6. Your HTML page should now appear just like any other Web page in Netscape.

7. You may now switch back and forth between the Source and the HTML Document
   - switch to Notepad with the Document Source
   - make changes
   - save the document again
   - switch back to Netscape
   - click on RELOAD and view the new HTML Document
   - switch to Notepad with the Document Source.....

HTML

```
<html>
    <head>
        <title> Title of page </title>
    </head>
    <body>
        This is my first homepage.
        <b> This text is bold </b>
    </body>
</html>
```

Structural Tags

<HTML>

These tags enclose the entire Web page document.

</HTML>

<HEAD>

These tags enclose the Head part of the document

</HEAD>

<TITLE>

These tags enclose the title of the document. This text appears in the title bar in the browser and on the bookmark list if someone bookmarks your web page.

</TITLE>

Sample Structure of a Web Site

```
<HTML>
    <HEAD>
        <TITLE> John Q. Public's Web Page </TITLE>
    </HEAD>

    <BODY>
        This is John Public's Webpage!
    </BODY>
</HTML>
```

The ***index.html*** file

- The file name “index.html”, or “index.htm” is reserved.
- This is the file in a directory which will be used automatically by default if a URL ends in the directory name instead of a file name.
- On most servers, the use of this file as the default helps prevent unauthorized access to the directory.
- Some servers may have a hierarchy of default file names.

Continued to Next Class…