

Introduction to HTML

Tags and Attributes

What is HTML?

- HTML: HyperText Markup Language,
- Language used to create Web pages
- Using HTML, you can create a Web page with
 - Text
 - Graphics
 - Sound
 - video

HTML

- Tim Berners-Lee created first HTML version in the late 1980s

HTML forms

- A **Form** is an area that can contain **Form Control/ Elements**.
- Each piece of information for a form is stored in a **Field**.
- The value itself is called **Field Value**.
- Users enter or select a field using **Form Control/ Elements**.
 - Form/Control elements include: buttons, checkboxes, text fields, radio buttons, drop-down menus, etc.
- A form usually contains a **Submit** button to send the information in the form elements to the server.

Control Elements of HTML Form

- **Input Boxes** – for text and numerical entries
- **Option Buttons**, also called **Radio Buttons** – for selecting a single option from a predefined list
- **Selection Lists** – for long lists of options, usually appearing in a **Drop-Down List Box**
- **Check Boxes** – for specifying yes or no
- **Text Areas** – for extended entries that can include several lines of text

HTML Form

- The basic construction of a HTML form is this...
 - <form>** - begin a form
 - <input>** - ask for information in one of several different ways
 - <input>** - there can be as many input areas as you wish
 - </form>** - end a form HTML form
- Forms are used to collect information.
- The information is then sent back to the server.
- Information is stored and analyzed using a program on the server.
- By giving users access to programs that react to user input, the Web became a more dynamic environment where companies and users could interact.

Forms and Server-Based Programs

- Server-Based programs provide:
 - Online databases containing customer information
 - Online catalogs for ordering and purchasing merchandise
 - Dynamic Web sites with content that is constantly modified and updated
 - Message boards for hosting online discussion forums

Tags

- The essence of HTML programming is tags
- A tag is a keyword enclosed by angle brackets (Example: <BODY>)
- There are opening and closing tags for many but not all tags.
- The affected text is between the two tags

More Tags...

- The opening and closing tags use the same command except the closing tag contains an additional forward slash /
- For example,
` Warning `

It would cause the word 'Warning' to appear in bold face on a Web page

Anatomy of an HTML tag

Each tag has a "start tag", "end tag", some content in between, and optional attributes.

```
<tagname attribute="value">  
  content  
</tagname>  
  
<a href="http://www.google.com" >  
  Google  
</a>
```

Think of a tag as a "command" to the browser and of the attributes as modifiers of that command.

HTML Tags

- All HTML tags are
 - made up of a tag name
 - Enclosed within < and > brackets.
 - Sometimes followed by an optional list of attributes which all appear between angle brackets < >
 - Attributes are properties that extend or refine the tag's functions
- **Nothing within the brackets will be displayed by the browser**

Tags and attributes...

Attributes

<body bgcolor="khaki" text="#000000" >

- Attributes are added within a tag to extend a tag's action.
- You can add multiple attributes within a single tag.
- Attributes come after the tag name;
- Each attribute should be separated by one or more spaces.
- Most attributes take values, which follow an equal sign "=" after the attribute's name.

Standalone Tags

There are a few HTML tags which do not use an end tag and are used for standalone elements on the page:

<code></code>	to display an image
<code>
</code>	Line break
<code><HR></code>	horizontal line

Nested Tags

- Whenever you have HTML tags within other HTML tags, you must close the nearest tag first
- Example:

`<H1> <I> The Nation </I> </H1>`

Comments

Browser will NOT display comment text

```
<!-- This is a comment      -->
```

```
<!-- This is another  
comment  
-->
```

<!DOCTYPE> Declaration

- The <!DOCTYPE> declaration is not an HTML tag
- It is an instruction to the web browser about what version of HTML the page is written in.

Structure of a Web Page

- All Web pages share a common structure
- All Web pages should contain a pair of `<HTML>`, `<HEAD>`, `<TITLE>`, and `<BODY>` tags

`<HTML>`

`<HEAD>`

`<TITLE> Example </TITLE>`

`</HEAD>`

`<BODY>`

This is where you would include the text and images on your Web page.

`</BODY>`

`</HTML>`

Creating HTML page

- Write the HTML tags in a notepad and save the file as *name*.html
- Now open the file in any browser to see the HTML page.

The <TITLE> Tag

- Choose the title of your Web page carefully. The title of a Web page determines its ranking in certain search engines
- The title will also appear on Favorite lists, History lists, and Bookmark lists to identify your page
- **<head>**
 <title> My First Page </title>
 </head>

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>
```

Header Tags

Header Tags -- Used for marking sections and subsections in a document.

<H1>Header 1 -- Giant-sized and bold </H1>

<H2>Header 2 -- Large and bold </H2>

<H3>Header 3 -- Normal-sized and bold </H3>

<H4>Header 4 -- Small and bold </H4>

<H5>Header 5 -- Very Small and bold </H5>

<H6>Header 6 -- Tiny and bold </H6>

Header Tags (cont.)

H1 = Giant-sized and bold

H2 = Large and bold

H3 = Normal-sized and bold

H4 = Small and bold

H5 = Very Small and bold

H6 = Tiny and bold

Breaking Lines and Paragraphs

- `<P> text </P>`
 - Paragraph tag
 - Most browsers render (process) this with blank lines between each paragraph
- `
`
 - Line break tag
 - Used when the webmaster wants a carriage return but doesn't want a blank line to follow

Example:

`<p>text a</p>`

`<p>text b<`

`
text c`

`
text d`



text a

text b

text c

text d

Horizontal Rule

The <HR> tag puts a graphical line across the page.

Ex:

Horizontal Rule Attributes:

NOSHADE -- A solid line with no shading

WIDTH="xx%/xx" -- Controls the width of the line. You may specify either percentage of the width of a page or actual pixel length

SIZE="xx" -- Controls the height of the line. You need to specify the dimension in pixels.

ALIGN="left/center/right" -- This allows the line to be aligned to the left, right, or center of the page

Text Formatting Tags

Some basic text formatting styles:

Tag	Result
<I> Italics </I>	<i>Italics</i>
 Bold 	Bold
<PRE> Preformatted Text </PRE>	Preformatted Text
 Strong 	Strong
<ADDRESS> Address </ADDRESS>	<i>Address</i>
<CITE> Citations </CITE>	<i>Citations</i>
<CODE> Source Code </CODE>	Source Code

Font modifications

Web creators can also change the way text looks by using the tag

SIZE="number" - changes size of the font; 1=smallest, 7 = largest

```
<FONT SIZE="7">Big</FONT> <FONT SIZE="1">Small</FONT>
```

Big Small

COLOR="color-name" - changes text color

```
<FONT COLOR="red">This is red</FONT>
```

This is red

FACE="font-name" - changes font

```
<FONT FACE="verdana">This is the verdana font;</FONT> <FONT FACE="chicago">this is the chicago font.</FONT>
```

This is the verdana font; this is chicago font.

 modifications (cont.)

One can combine font modifications:

```
<FONT SIZE="7" FACE="courier" COLOR="red">Big, Courier & Red</FONT>
```

Big, Courier & Red

```
<FONT SIZE="7"><FONT FACE="courier">Big & Courier</FONT> - Just Big</FONT>
```

Big & Courier - Just Big

Lists -- Unordered Lists

Unordered lists:

Item One

Item Two

Item Three

Item Four



- Item One
- Item Two
- Item Three
- Item Four

Unordered List Attributes:

type="disc/circle/square"

- Disc (default)
- ◉ Circle
- ◻ Square

Lists -- Ordered Lists

Ordered (Numbered) Lists:

 Item One

 Item Two

 Item Three

 Item Four



1. Item One

2. Item Two

3. Item Three

4. Item Four

Ordered List Attributes:

type="i/I/a/A/1"

(default)

i = i. Item One

I = I. Item One

a = a. Item One

A = A. Item One

1 = 1. Item One

ii. Item Two

II. Item Two

b. Item Two

B. Item Two

2. Item Two

iii. Item Three

III. Item Three

c. Item Three

C. Item Three

3. Item Three

iv. Item Four

IV. Item Four

d. Item Four

D. Item Four

4. Item Four

start="xx"

- This attribute lets you specify which number/letter will start the list

Lists -- Definition Lists

Definition Lists:

<DL>

<DT>List Name One

<DD>This is where information about List Name One would go</DD>

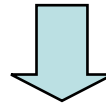
</DT>

<DT>List Name Two

<DD>This is where information about List Name Two would go</DD>

</DT>

</DL>



List Name One

This is where information about List Name One
would go

List Name Two

This is where information about List Name Two
would go

Links

The anchor tag `<A>` is used to link one document to another or from one part of a document to another part of the same document.

Basic Links:

```
<A HREF="http://www.stanford.edu/">Stanford University</A>
```

Inter-document Links:

```
<A HREF="#spot">Point to 'spot' in this document</A>
```

Defining a point in a document:

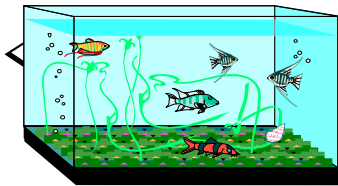
```
<A NAME="spot">Spot</A>
```

Email links:

```
<A HREF="mailto:someone@somehost.com">Email someone@somehost.com</A>
```


Graphics

To have a graphic appear on a webpage, web designers must to put the tag in with the address where the graphic "lives":



``

Graphics attributes:

`alt="text"`: insert a description of the graphic for those who are using browsers that cannot process images (e.g., page readers for the blind)

`width="xx/xx%"`: width in pixels/percentage

`height="xx/xx%"`: height in pixels/percentage

`border="xx"`: pixel length of the border surrounding the image.

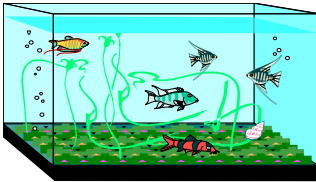
`hspace="xx"`: places a buffer of space horizontally around the image

`vspace="xx"`: places a buffer of space vertically around the image

`align="top/middle/bottom/right/left"`: aligns image in relation to the text (see next 2 slides)

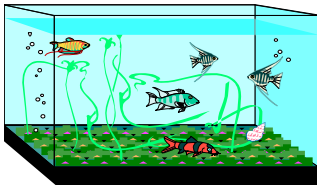
Graphics (cont.)

`All about Fish`



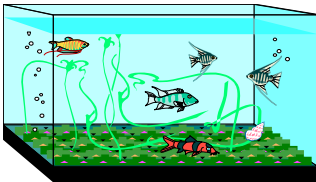
All about Fish

`All about Fish`



All about Fish

`All about Fish`

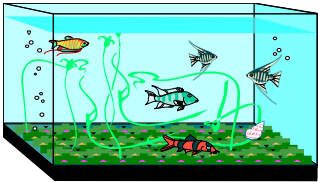


All about Fish

Graphics (cont.)

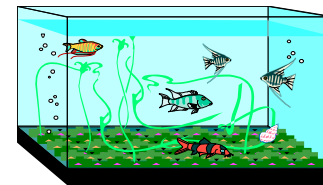
```

```



```

```



Text Formatting Tags

`<U> Underline </U>`

`..`: Defines bold text

`<big>..</big>`: Defines big text

`..`: Defines emphasized text

`<i>..</i>`: Defines italic text

`<small>..</small>`: Defines small text

`..`: Defines strong text

`_{..}`: Defines subscripted text

`^{..}`: Defines superscripted text

`<strike>..</strike>`: defines strike tag

`<center> ..</center>`: indicates a section that is center aligned.

`<left> ..</left>`: indicates a section that is left aligned.

Paragraphs

```
<p>Paragraph 1</p>
```

```
<p>Paragraph 2</p>
```

```
<p>Paragraph 3</p>
```

Paragraph 1

Paragraph 2

Paragraph 3

Line Breaks

```
<p>  
Imagine there's no Heaven <br>  
It's easy if you try <br>  
No hell below us <br>  
Above us only sky <br>  
</p>
```

Imagine there's no Heaven
It's easy if you try
No hell below us
Above us only sky

Notice: This tag does not need to be closed, since it doesn't encapsulate anything.

Changing the Font

** ... **

It can be used to change the font of the enclosed text

** **

where n is a number between 1 and 7

It can change the size of text use the expression

Changing the Font

- *.... *
- It can change the color. The color can also be defined using hexadecimal representation (Example: #ffffff)
- These attributes can be combined to change the font, size, and color of the text all at once;
- For example,
*
*

...

- *The tag is not supported in HTML5.*

Headings

- Web pages are typically organized into sections with headings
- To create a heading use the expression `<Hn>....</Hn>` where n is a number between 1 and 7
- In this case, the 1 corresponds to the largest size heading while the 7 corresponds to the smallest size

Headlines

```
<h1>Header 1</h1>  
<h2>Header 2</h2>  
...  
<h6>Header 6</h6>
```

Header 1

Header 2

...

Header 6

Aligning Text

- The ALIGN attribute can be inserted in the <P> and <Hn> tags to right justify, center, or left justify the text
- For example,
- **<H1 ALIGN=CENTER> *The New York Times* </H1>**
- It would create a centered heading of the largest size

Page Formatting

- To define the background color, use the BGCOLOR attribute in the <BODY> tag
- To define the text color, use the TEXT attribute in the <BODY> tag
- To define the size of the text, type <BASEFONT SIZE=n>

Example

```
<HTML>
```

```
<HEAD>
```

```
<TITLE> Example </TITLE>
```

```
</HEAD>
```

```
<BODY BGCOLOR="black" TEXT="white">
```

```
<BASEFONT SIZE=7>
```

This is where you would include the text and images on your Web page.

```
</BODY>
```

```
</HTML>
```

Attributes of <BODY> Tag

- [bgcolor](#) color Specifies the background color of a document
- [text](#) color Specifies the color of the text in a document
- [background](#) URL Specifies a background image for a document

- [alink](#) color Specifies the color of an active link in a document
- [link](#) color Specifies the color of unvisited links in a Doc
- [vlink](#) color Specifies the color of visited links in a document

Different ways of specifying color

Color	Color HEX	Color RGB	Color Name
	#FF0000	rgb(255,0,0)	Red
	#00FF00	rgb(0,255,0)	Green
	#0000FF	rgb(0,0,255)	Blue

Internet and Web Programming

Course Code: CSE4001

Unit 1

Dr. Amrendra Singh Yadav

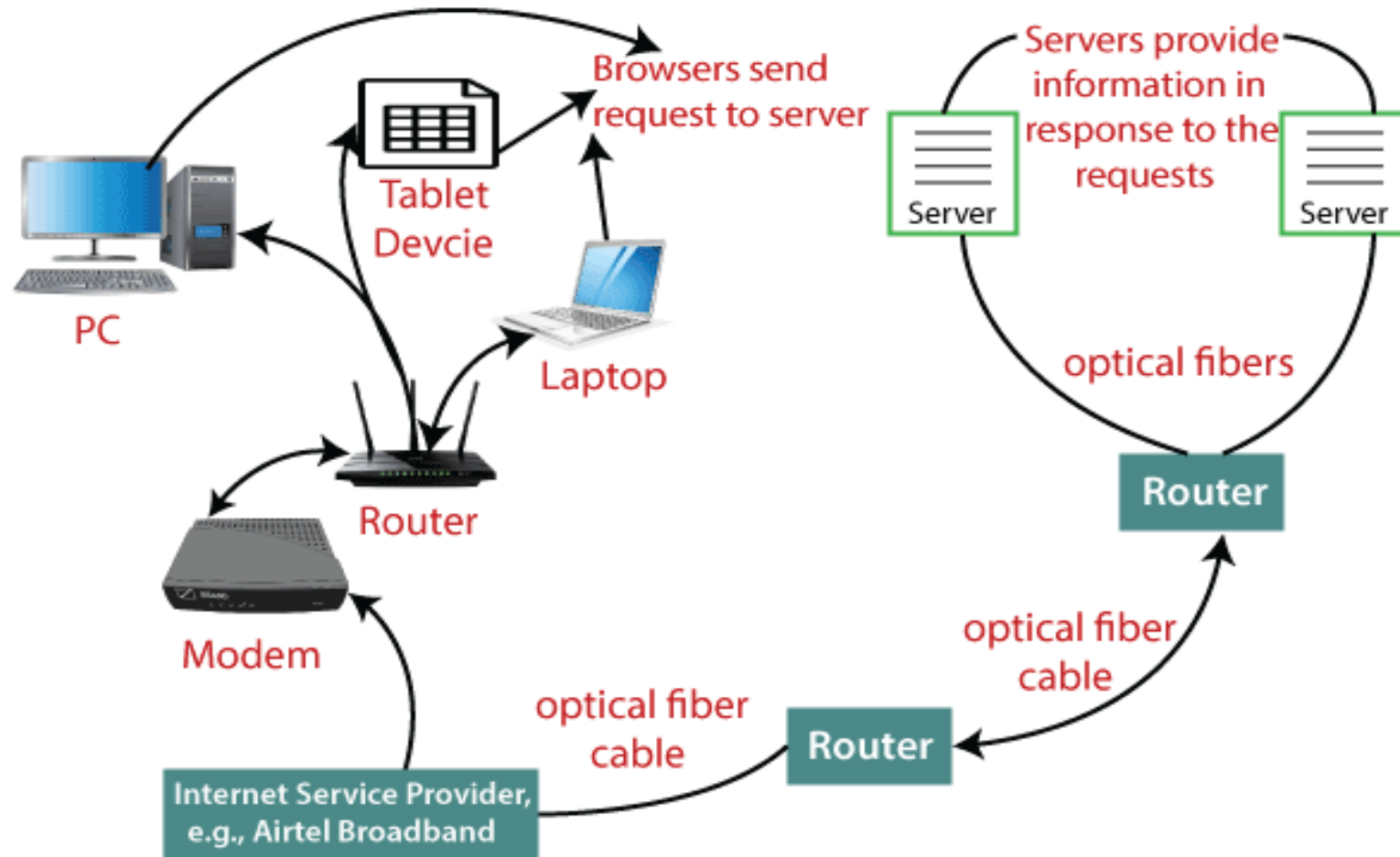
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Computer Science and Engineering,
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Internet Overview- WWW

- The Internet is essentially a global network of computing resources. You can think of the Internet as a physical collection of routers and circuits as a set of shared resources.
- It uses standard internet protocol suite (TCP/IP) to connect billions of computer users worldwide.
- It is set up by using cables such as optical fibers and other wireless and networking technologies.
- At present, internet is the fastest mean of sending or exchanging information and data between computers across the world.

Cont'd...



Internet basics

- The Internet and the WWW (World Wide Web) are not the same.
- The WWW is explored using a browser and the act of browsing the Internet is commonly referred to as surfing.
- Users browse websites and web pages by following hyperlinks that point to an address more commonly referred to as a URL.
- Finding information on the Internet is achieved using a search engine.
- Files, pictures, songs, and video can be shared by downloading (receiving) and uploading (sending).
- The Internet utilizes the TCP/IP protocol and is accessed using a dial-up modem, broadband, 3G, 4G, or network connected through an ISP.
- With broadband, many computers and devices use Wi-Fi to connect to a router and share an Internet connection.
- The computer you're using to view this web page is considered a host and it's connected to our server to view this page.

Internet services

- In addition to browsing the Internet with a browser, the Internet has the following other services.
 - Chat
 - E-mail
 - Forum
 - FTP
 - Online gaming
 - Social network
 - VoIP

Why do people use the Internet?

- Today, the Internet is the best place to communicate and share information with people from anywhere on the globe.
- It also supplies an endless supply of knowledge and entertainment.
- **Why is the Internet considered a network?**
 - The Internet is the world's largest network because it's a collection of computers and servers that are connected to each other globally using routers and switches.
 - The Internet works the same way a network would in a home or office but has millions of more computers, routers, and switches.

Advantages of the Internet

- **Instant Messaging:** You can send messages or communicate to anyone using internet, such as email, voice chat, video conferencing, etc.
- **Get directions:** Using GPS technology, you can get directions to almost every place in a city, country, etc. You can find restaurants, malls, or any other service near your location.
- **Online Shopping:** It allows you to shop online such as you can be clothes, shoes, book movie tickets, railway tickets, flight tickets, and more.
- **Pay Bills:** You can pay your bills online, such as electricity bills, gas bills, college fees, etc.
- **Online Banking:** It allows you to use internet banking in which you can check your balance, receive or transfer money, get a statement, request cheque-book, etc.
- **Online Selling:** You can sell your products or services online. It helps you reach more customers and thus increases your sales and profit.
- **Work from Home:** In case you need to work from home, you can do it using a system with internet access. Today, many companies allow their employees to work from home.
- **Entertainment:** You can listen to online music, watch videos or movies, play online games.

Internet protocols

- The way that someone who wants to use a service talks with that service
- Internet protocols consist of a suite of communication protocols
 - Transmission Control Protocol (TCP)
 - Internet Protocol (IP)
- Also specifies common applications such as electronic mail, terminal emulation, and file transfer

TCP/IP

- First developed in the mid-1970s, by Defense Advanced Research Projects Agency (DARPA)
 - establishing a packet-switched network that would facilitate communication between dissimilar computer systems at research institutions
- The foundation on which the Internet and the World Wide Web (WWW) are based.

TCP/IP

- Provides reliable transmission of data in an IP environment.
- Services TCP provides
 - Stream data transfer
 - TCP delivers an unstructured stream of bytes identified by sequence numbers
 - TCP groups bytes into segments and passes them to IP for delivery.
 - Reliability
 - Providing connection-oriented, end-to-end reliable packet delivery

TCP/IP

- Efficient flow control
 - When sending acknowledgments back to the source, the receiving TCP process indicates the highest sequence number it can receive without overflowing its internal buffers
- Full-duplex operation
 - TCP processes can both send and receive at the same time
- Multiplexing
 - Simultaneous upper-layer conversations can be multiplexed over a single connection

TCP/IP

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Cont'd...

- **SMTP(Simple Mail Transfer Protocol):** These protocols are important for sending and distributing outgoing emails. This protocol uses the header of the mail to get the email id of the receiver and enters the mail into the queue of outgoing mails. And as soon as, it delivers the mail to the receiving email id, it removes the email from the outgoing list.
- **PPP(Point to Point Protocol):** It is a communication protocol that is used to create a direct connection between two communicating devices. This protocol defines the rules using which two devices will authenticate with each other and exchange information with each other. For example, A user connects his PC to the server of an Internet Service Provider also uses PPP.

Cont'd...

- **FTP (File Transfer Protocol):** This protocol is used for transferring files from one system to the other. This works on a client-server model. When a machine requests for file transfer from another machine, the FTO sets up a connection between the two and authenticates each other using their ID and Password. And, the desired file transfer takes place between the machines.
- **SFTP(Secure File Transfer Protocol):** SFTP which is also known as SSH FTP refers to File Transfer Protocol (FTP) over Secure Shell (SSH) as it encrypts both commands and data while in transmission. SFTP acts as an extension to SSH and encrypts files and data then sends them over a secure

Cont'd...

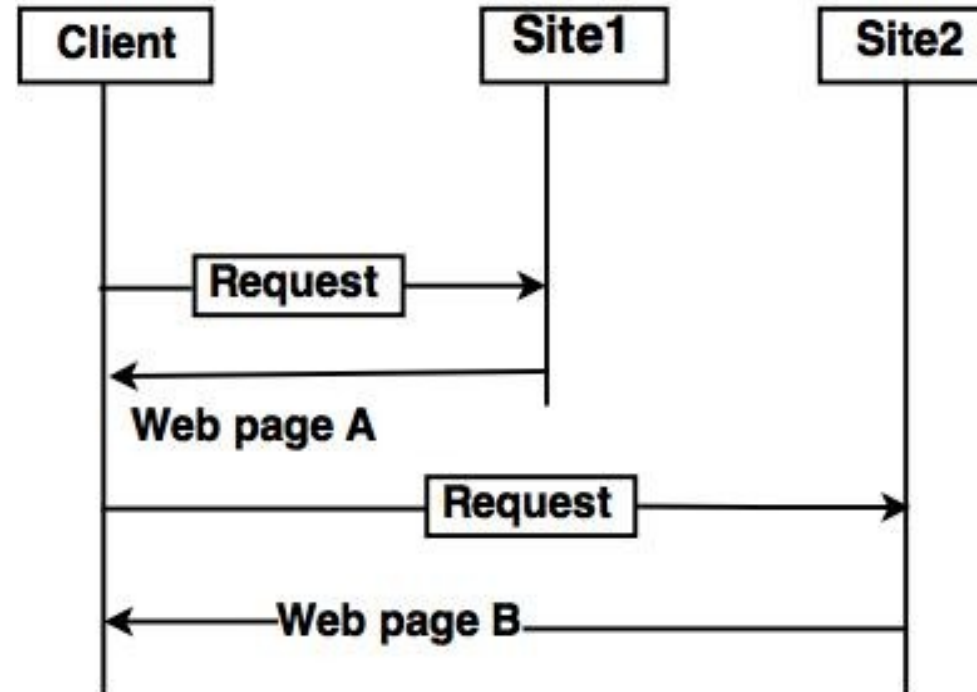
- **TELNET(Terminal Network):** TELNET is a standard TCP/IP protocol used for virtual terminal service given by ISO. This enables one local machine to connect with another. The computer which is being connected is called a remote computer and which is connecting is called the local computer. TELNET operation lets us display anything being performed on the remote computer in the local computer.
- **POP3(Post Office Protocol 3):** POP3 stands for Post Office Protocol version 3. It has two Message Access Agents (MAAs) where one is client MAA (Message Access Agent) and another is server MAA(Message Access Agent) for accessing the messages from the mailbox. This protocol helps us

Introduction to World Wide Web

- The World Wide Web (WWW) is a collection of documents and other web resources which are identified by URLs, interlinked by hypertext links, and can be accessed and searched by browsers via the Internet.
- World Wide Web is also called the Web and it was invented by Tim Berners-Lee in 1989.
- Website is a collection of web pages belonging to a particular organization.
- The pages can be retrieved and viewed by using browser.

Cont'd...

- **Let us go through the scenario shown in fig.**
 - The client wants to see some information that belongs to site 1.
 - It sends a request through its browser to the server at site 2.
 - The server at site 1 finds the document and sends it to the client.



Architecture of WWW

Client (Browser)

- Web browser is a program, which is used to communicate with web server on the Internet.
- Each browser consists of three parts: a controller, client protocol and interpreter.
- The controller receives input from input device and use the programs to access the documents.
- After accessing the document, the controller uses one of the interpreters to display the document on the screen.

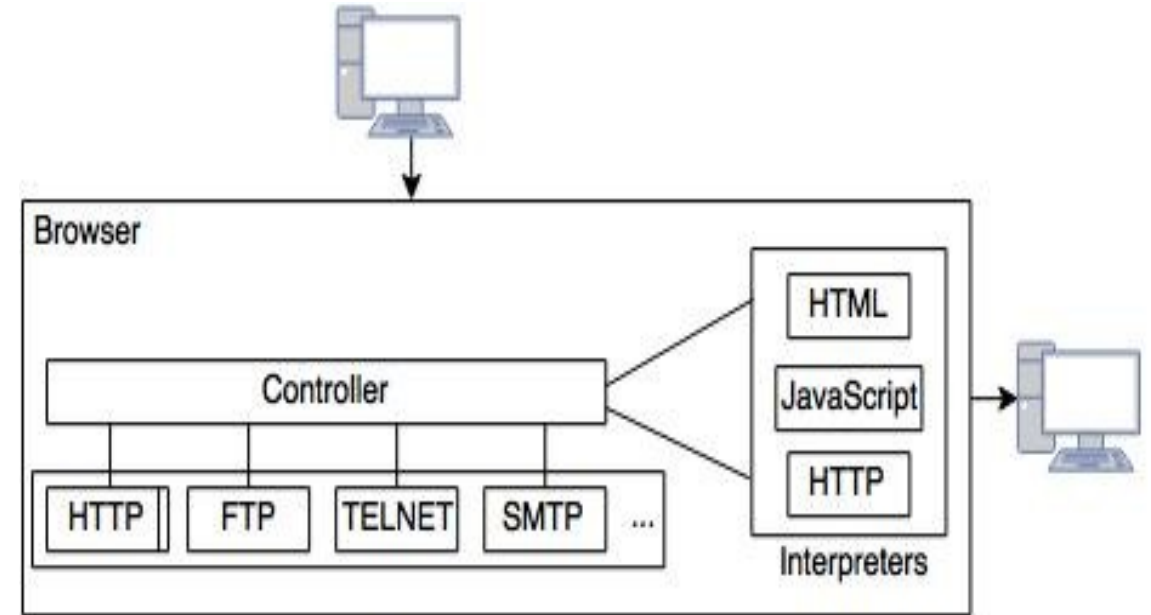


Fig: Client (Browser)

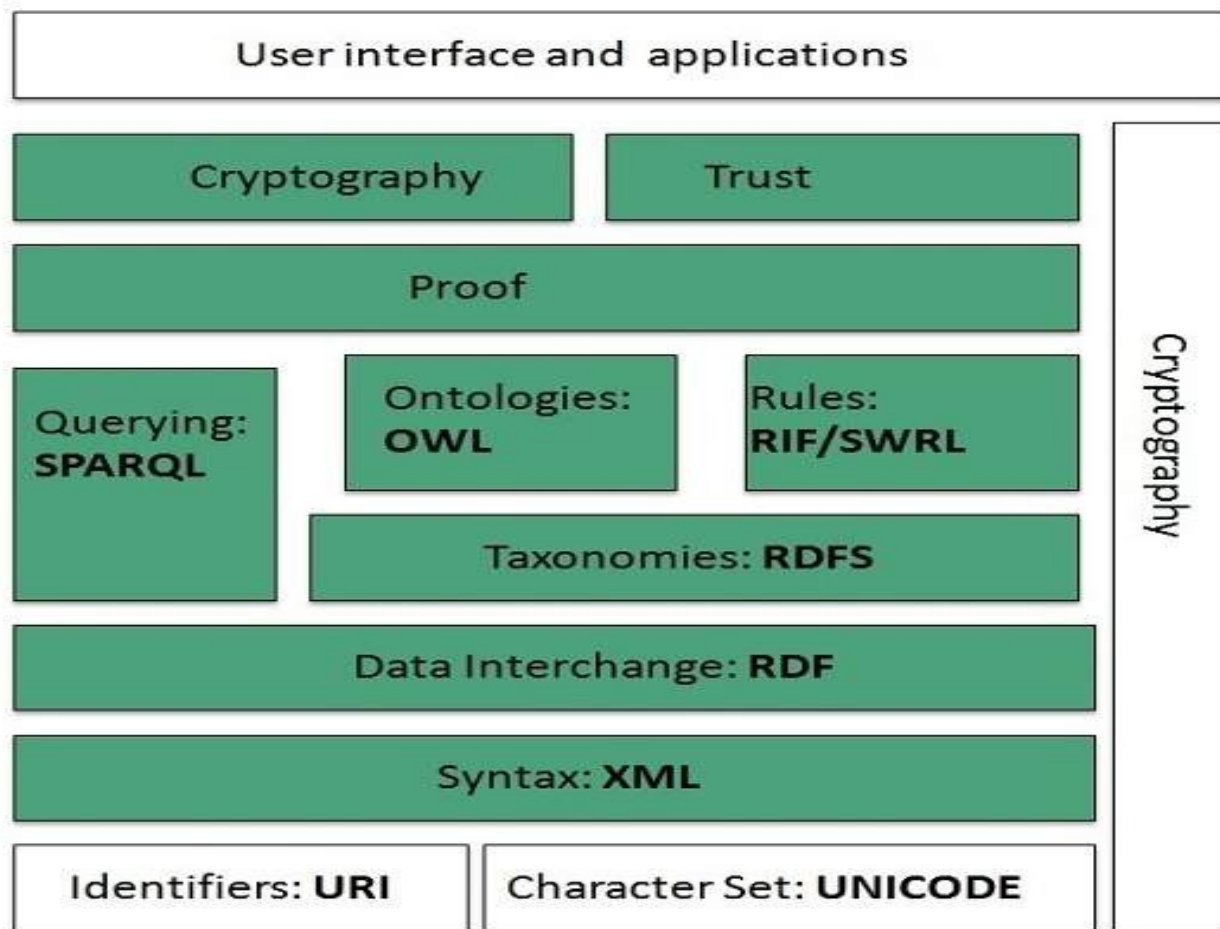
Server

- A computer which is available for the network resources and provides service to the other computer on request is known as server.
- The web pages are stored at the server.
- Server accepts a TCP connection from a client browser.
- It gets the name of the file required.
- Server gets the stored file. Returns the file to the client and releases the top connection.

Uniform Resource Locator (URL)

- The URL is a standard for specifying any kind of information on the Internet.
- The URL consists of four parts: protocol, host computer, port and path.
- The protocol is the client or server program which is used to retrieve the document or file.
The protocol can be ftp or http.
- The host is the name of computer on which the information is located.
- The URL can optionally contain the port number and it is separated from the host name by a colon.
- Path is the pathname of the file where the file is stored.

WWW Architecture



Cont'd...

- Identifiers and Character Set
 - **Uniform Resource Identifier (URI)** is used to uniquely identify resources on the web and **UNICODE** makes it possible to build web pages that can be read and write in human languages.
- Syntax
 - **XML (Extensible Markup Language)** helps to define common syntax in semantic web.
- Data Interchange
 - **Resource Description Framework (RDF)** framework helps in defining core representation of data for web. RDF represents data about resource in graph form.

What is the URL

- A URL is a type of uniform resource identifier and is address of a resource on the World Wide Web and the protocol used to access it. It is used to indicate the location of a web resource to access the web pages.
- For example, to visit the java point website, you will go to the URL www.javatpoint.com, which is the URL for the java point website.
- The URL sends users to a specific resource online such as video, webpage, or other resources. When you search any query on Google, it will display the multiple URLs of the resource that are all related to your search query.
- The displayed URLs are the hyperlink to access the webpages.

Cont'd...

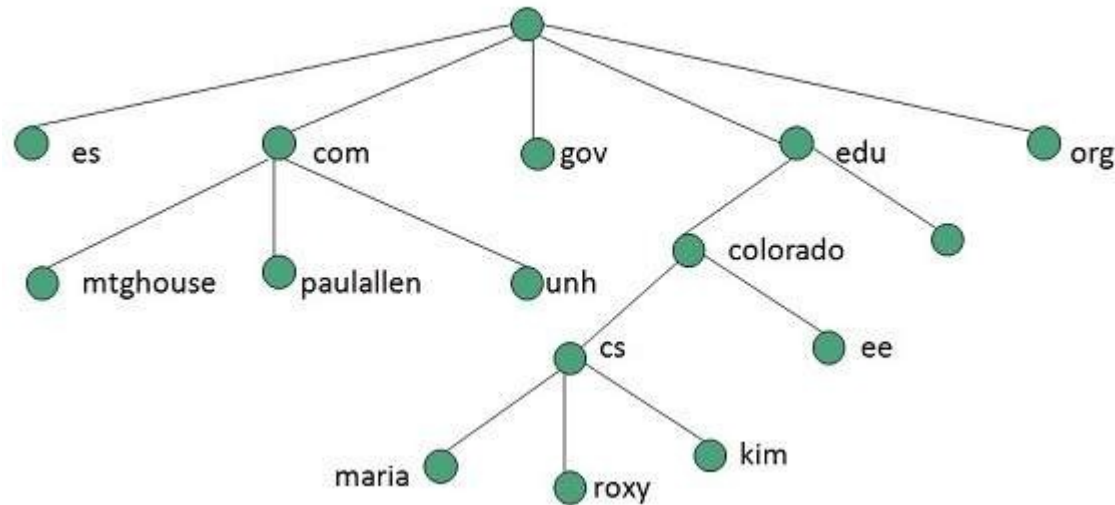
- A URL (Uniform Resource Locator) contains the information, which is as follows:
- The port number on the server, which is optional.
- It contains a protocol that is used to access the resource.
- The location of the server
- A fragment identifier
- In the directory structure of the server, it contains the location of the resource.

Domain Name

- A domain name is the part of your Internet address that comes after "www". For example, in Tutorialspoint.com the domain name is tutorialspoint.com.
- A domain name becomes your Business Address so care should be taken to select a domain name. Your domain name should be easy to remember and easy to type.

Cont'd...

- The domain name space refers a hierarchy in the internet naming structure.
- This hierarchy has multiple levels (from 0 to 127), with a root at the top.
- The following diagram shows the domain name space hierarchy:



Domain Extension Types

- There are many types of domain extensions you can choose for your domain name. This depends on your business nature.
- For example, if you are going to register a domain name for education purpose then you can choose **.edu** extension.
 - **.com** – Stands for company/commercial, but it can be used for any website.
 - **.net** – Stands for network and is usually used for a network of sites.
 - **.org** – Stands for organization and is supposed to be for non-profit bodies.
 - **.us, .in** – They are based on your country names so that you can go for country specific domain extensions
 - **.biz** – A newer extension on the Internet and can be used to indicate that this site is purely related to business.
 - **.info** – Stands for information. This domain name extension can be very useful, and as a new comer it's doing well.
 - **.tv** – Stands for Television and are more appropriate for TV channel sites.

Subject Name: Introduction to Web Technology

Module Number: 1

Dr. Amrendra Singh Yadav

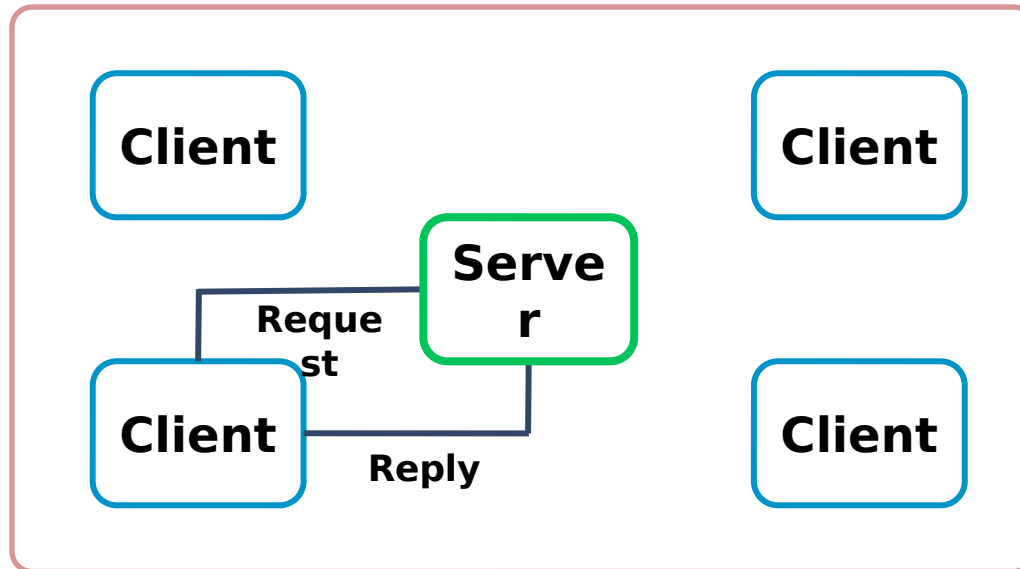
CONTENTS

- Introduction to Internet
- Internet Design Principles
- Internet Protocols
- World Wide Web
- Hyper Text Transfer Protocol
- Web Technologies and Web Services

Client and Server

Client – hardware/software that accesses a service made available by a server.

Server – hardware/software that provides services to other users.

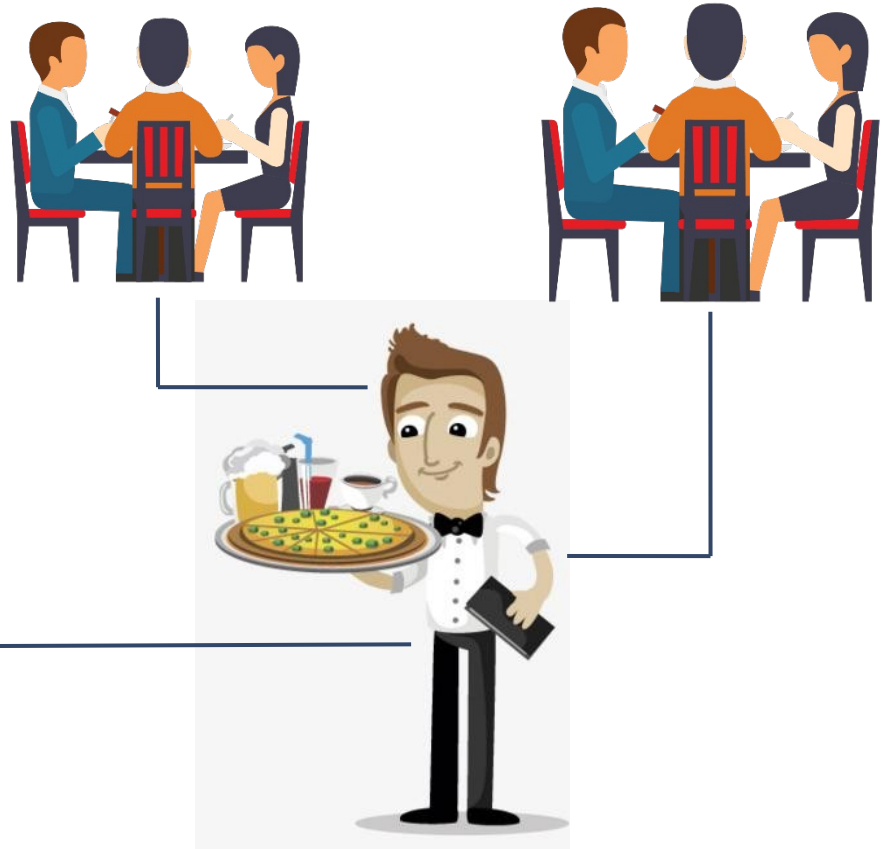


Client Server Analogy

Server is like waiter

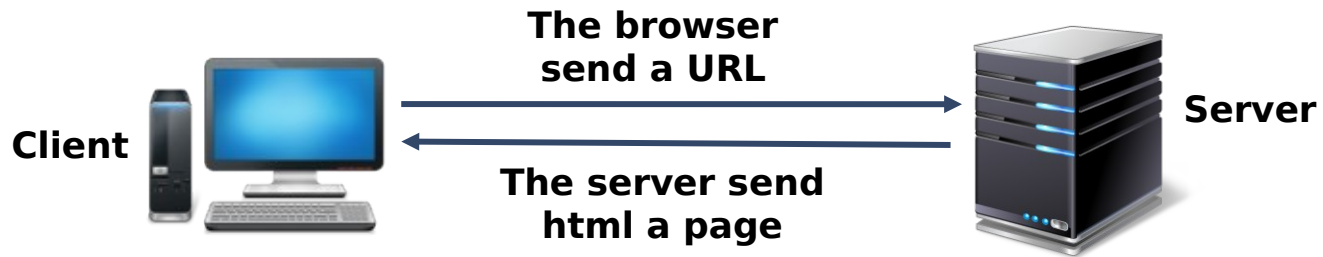
Clients are like customers

- Asks the server for food
- Not allowed in to the kitchen



Client Server Communication

The process of establishing a connection between a client and a server is called as **Client-Server Communication**



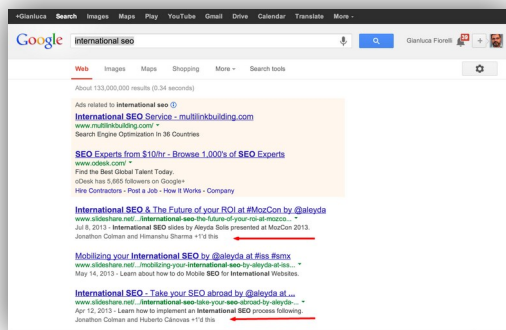
The Internet uses the Client-Server model.



Have you sent an email to a friend living in United States?



Have you connected with friends all over the world on Facebook?



Have you searched something on the internet?

How is it possible for you to communicate with a friend who might be on a different continent?

You and your friend both need to be connected to the internet to be able to do all these things.

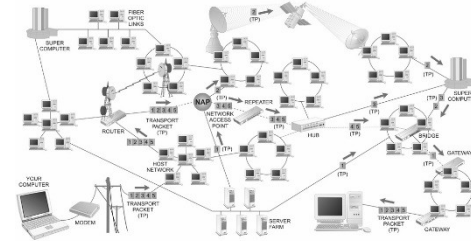
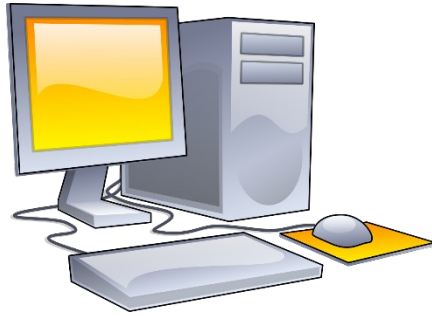


So What is Internet?

Internet is a global network of **interconnected networks and devices** that exchange information.



Evolution of Internet



- **Standalone Computers**
 - When computers were first created they were stand alone.
- **Networks**
 - **The need for sharing resources among the computers** led to connecting computers into a network.
- **Inter-network**
 - These networks were then connected together to create what is today called the 'Internet'.

Need for sharing resources led to the creation of networks and ultimately the 'Internet'.



Internet – How it came to be?

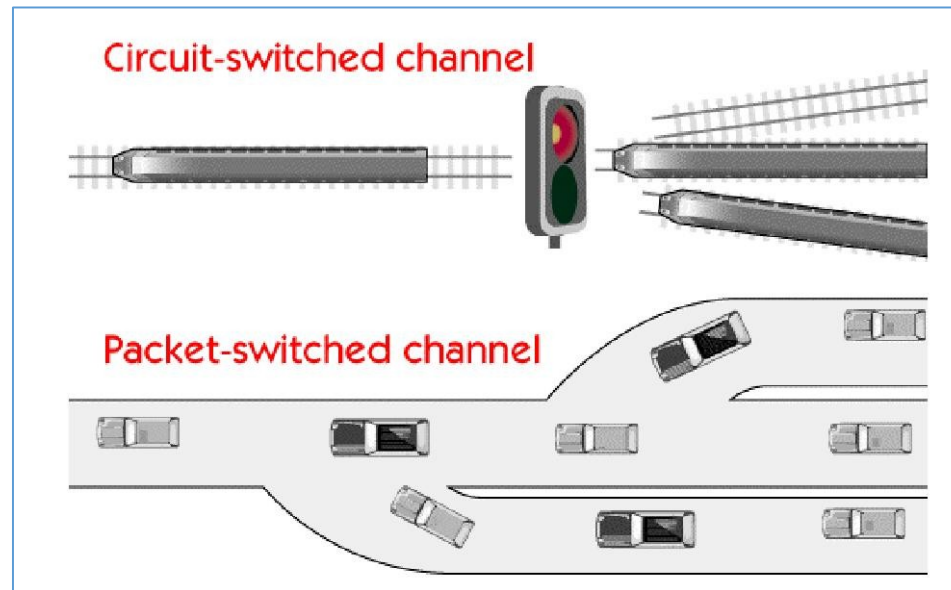
History of Internet

- The Advanced Research Projects Agency Network or ARPANET funded by the United States Department of Defense in **1969**.
- In **1971** Ray Tomlinson developed a system to send electronic mail.
- Dr. Robert M. Metcalfe developed **Ethernet** in **1973**.
- In the **early 80s** the, the current versions of Transmission Control Protocol (TCP) and IP (Internet Protocol) were developed.
- In **1992**, The Computer Emergency Rescue Team (CERT) released the first version of the “World Wide Web”.
- In **1996**, IPV6 – Internet Protocol Version 6 was created.
- In **1999**, a wireless technology called 802.11b or popularly known as “Wi-Fi” was standardized.

History of Internet

The Beginning

- In 1964, when **Packet Switching** was invented it opened the doors for computers to connect and communicate.
- Unlike **Circuit Switching**, which required a dedicated channel for the duration of transmission, packet switching divided the data into small parts called ‘packets’ which were then transmitted over the network.



History of Internet

Advanced Research project Agency Network (ARPANET) – ancestor of today's Internet.

- The American Defense Advance Research Projects Agency (DARPA) was ordered by the American government to create a network spanning the United States so that information exchange could be ensured during a potential atomic attack by USSR.
- The network that was developed was called the '*ARPANET*' short for Advanced Research project Agency Network.
- It was a basic network based on packet switching and providing messaging services for sharing information. By 1977, over a 100 nodes were connected through ARPANET.

History of Internet

Electronic Mail – the initial networking application

- In 1972, the initial network application – the electronic mail was introduced.
- March Ray Tomlinson wrote the basic email software motivated by the need of the ARPANET users for an easy and better coordination mechanism.
- Email remained the largest network application for over a decade.

The commonly used email protocols are :

1. **Simple Mail Transfer Protocol (SMTP)** used for sending email messages.
2. **Post Office Protocol (POP)** used for retrieving email messages.

History of Internet

Ethernet – the network technology is born

- Developed by Bob Metcalfe at Xerox PARC in 1973, and is now a dominant network technology in the Internet.
- Ethernet is a relatively low cost, reasonably fast and very popular LAN technology.

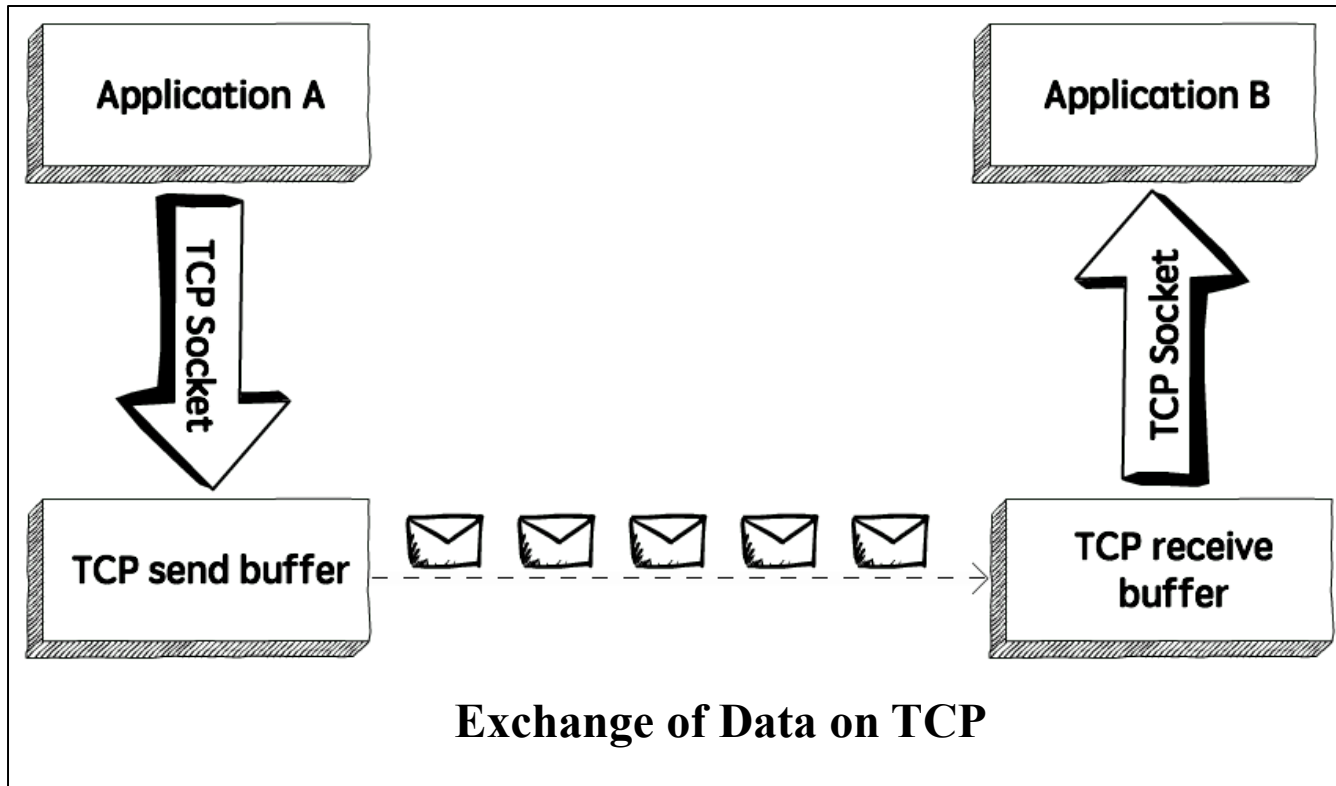


Ethernet Cable

History of Internet

ARPANET adopts Transmission Control Protocol (TCP/IP)

In 1974, ARPANET adopted the TCP/IP protocol created by Robert Kahn and Vint Cerf. By mid 70s.



The Internet emerges!

The original **ARPANET** grew into the ‘internet’.

“The internet design philosophy has changed considerably from the first proposal to the current standards.”

- Dave Clark

Design principles of the internet

1. Multiplexed utilization of existing interconnected networks

Sharing a single communication channel.

2. Survivability in the face of failure

The ability of the internet to keep up the communication services despite loss of networks or gateways.

3. Types of Services

The internet must support multiple types of services.

4. Support for a variety of Network

The internet architecture must accommodate and provide a way for different networks like Local Area Networks, home networks and business networks to connect with each other and exchange information.

Design principles of the internet

5. Distributed management

The critical resources are managed in a distributed fashion by various entities to ensure the fundamental right to freedom is not violated.

6. Cost effectiveness

Making this technology affordable will ensure it is accessible to all and avoid info-exclusion.

7. Host attachment

connecting a device to the internet should be as effortless as possible to ensure less overhead and better experience.

8. Accountability

Accountability is not intrinsic to the current internet architecture, migration towards the accountability framework is ongoing through **Host Identity Protocol (HIP)** and **Accountable Internet Protocol (AIP)**.

What is a Protocol ?

- A protocol can be thought of as an **‘accepted standard’**.
- A protocol is a set of rules that the computers use over a network when they communicate.
- These are rules accepted and followed by the network to successfully transmit data.
- There are a host of protocols which allow users to communicate over the internet. Some of the important ones will be discussed in this chapter.

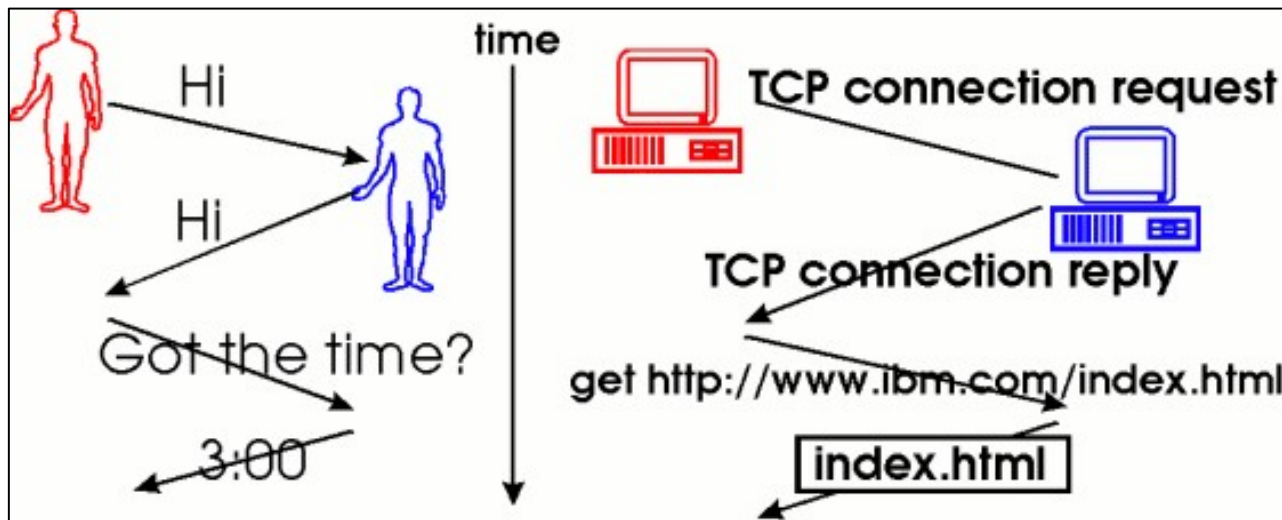


Diagram: Human protocol and a computer network protocol

Transmission Control Protocol (TCP)

The Transmission Control Protocol provides reliable transmission of data in an IP environment.

Among the services it provides are:

- **Stream data transfer**
- **Reliability**
- **Efficient flow control**
- **Full-duplex operation**
- **Multiplexing**

User Datagram Protocol (UDP)

- The User Datagram Protocol is an alternative communication protocol to TCP.
- It is a **connection-less protocol** that does not provide reliability, order or error-checking, but is much faster than TCP.
- UDP is more suitable for real-time applications like video calls.

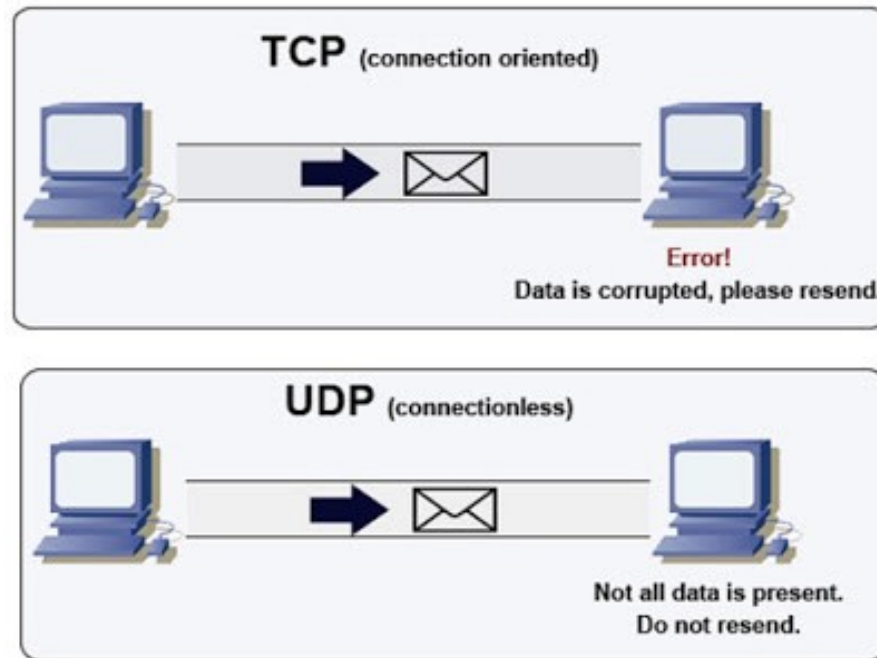


Diagram: TCP vs. UDP

Internet Protocol (IP)

Internet Protocol (IP) has the task of delivering packets from the source host to the destination host solely based on the IP addresses in the packet headers.

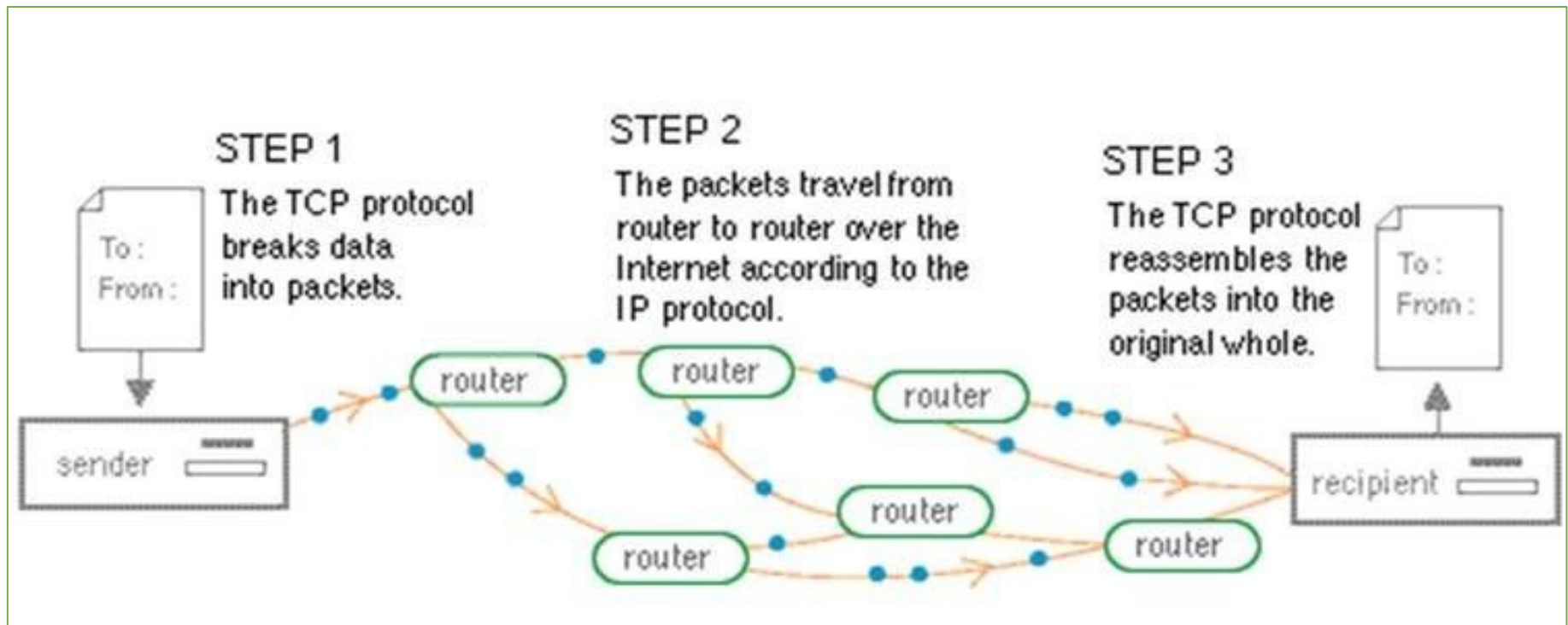


Diagram: The Internet Protocol

IP Address

In the same sense that someone needs your mailing address to send you a letter, a remote computer needs your IP address to communicate with your computer.

There are two standards for IP addresses:

- **IP Version 4 (IPv4)**
- **IP Version 6 (IPv6)**

IPv4

- An IPv4 address is expressed by four numbers separated by dots.
- Each number is the decimal (base-10) representation for an eight-digit binary (base-2) number, also called an **octet**.

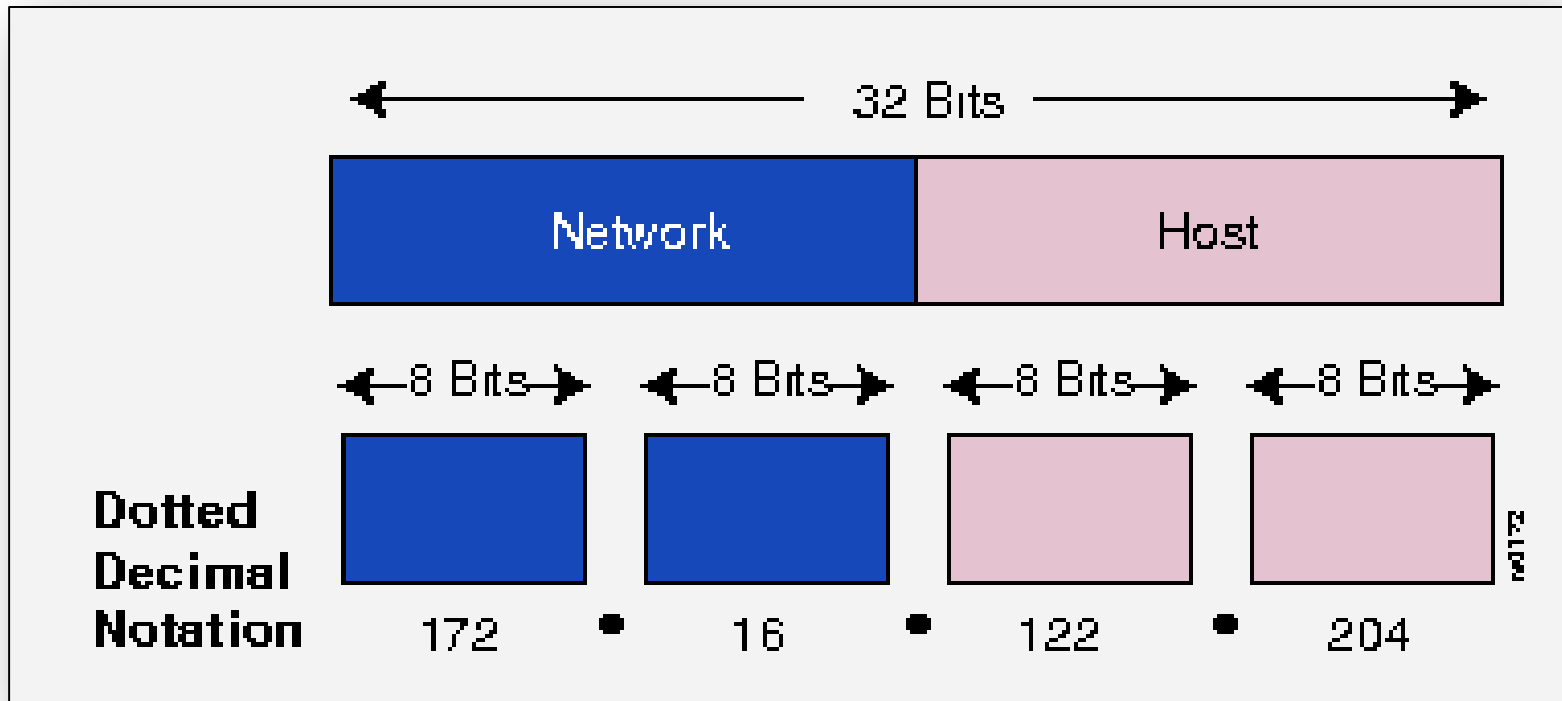


Diagram: IPV4 Address Format

IPV6

- The explosive growth in mobile devices including mobile phones, notebooks and other wireless handheld devices created the need for additional blocks of IP addresses.
- IPv6 uses **128 bit addresses** and offers **2^{128}** or approximately **3.4×10^{38}** addresses.

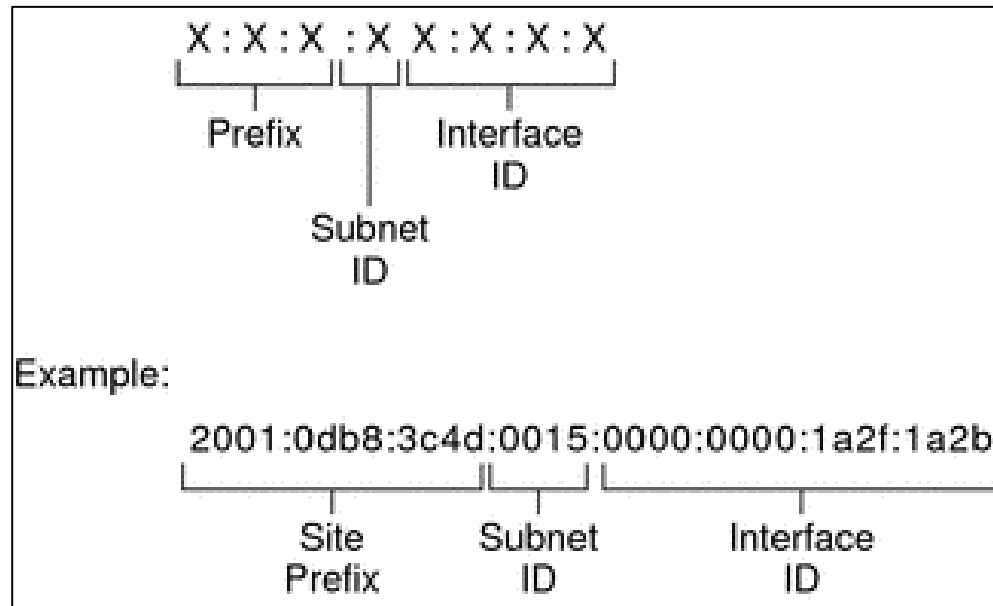


Diagram: IPV6 Address Format

Name or Number!
which is easier to remember?

Domain Name System

- “Domain Name is the name given for any website” (ex: yahoo.com).
- “Domain Name System (DNS) is like a phone directory which stores all the domain names across the web“.

Domain Name Server

Domain Name Server(**DNS**) maps a domain name with its corresponding IP address.

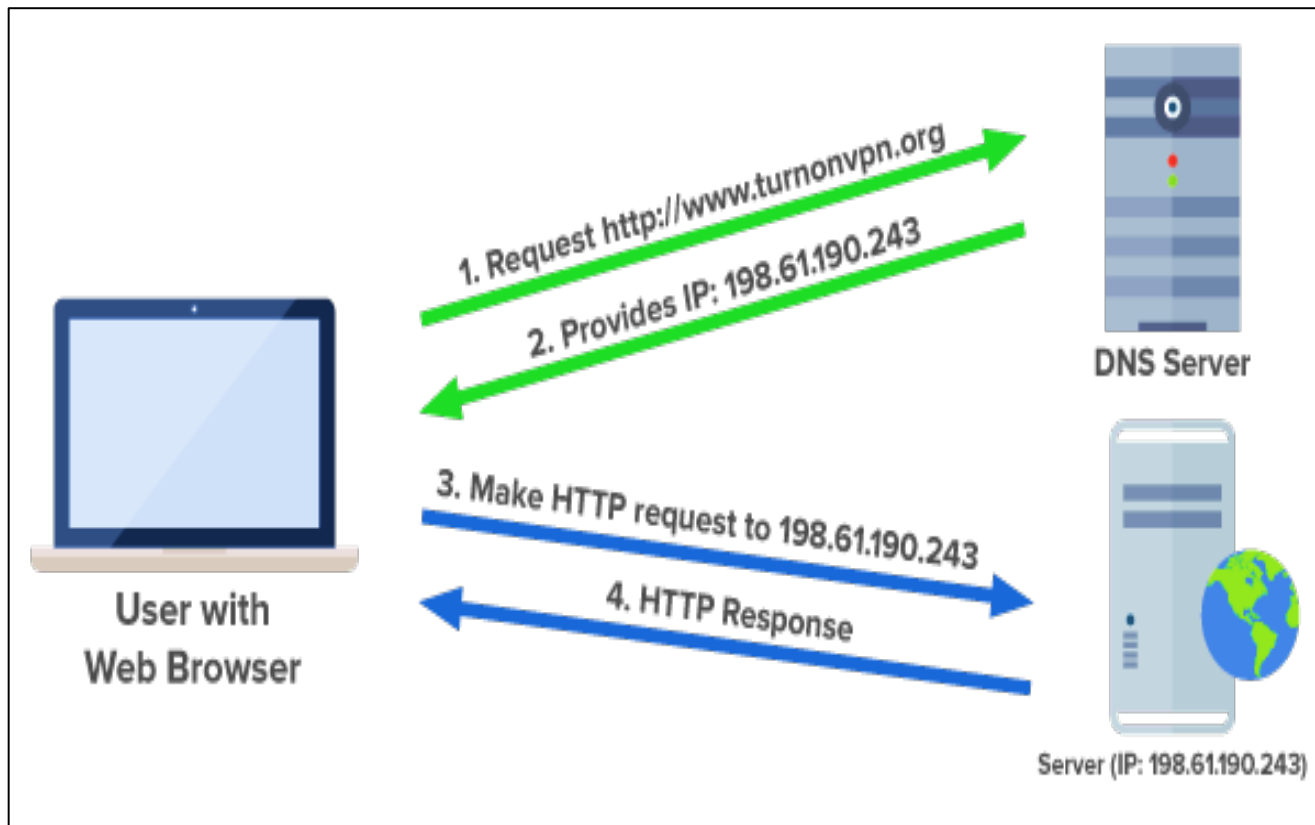


Diagram: Domain Name Server

File Transfer Protocol (FTP)

- The File Transfer Protocol is used to transfer files from one host computer to the other over a TCP/IP network. It creates two different connections – a **control connection** and a **data connection**.
- The control connection is used for sending control information and the data connection is used for sending the actual file.
- Port 21 is used for control connection whereas data connection uses port 20.

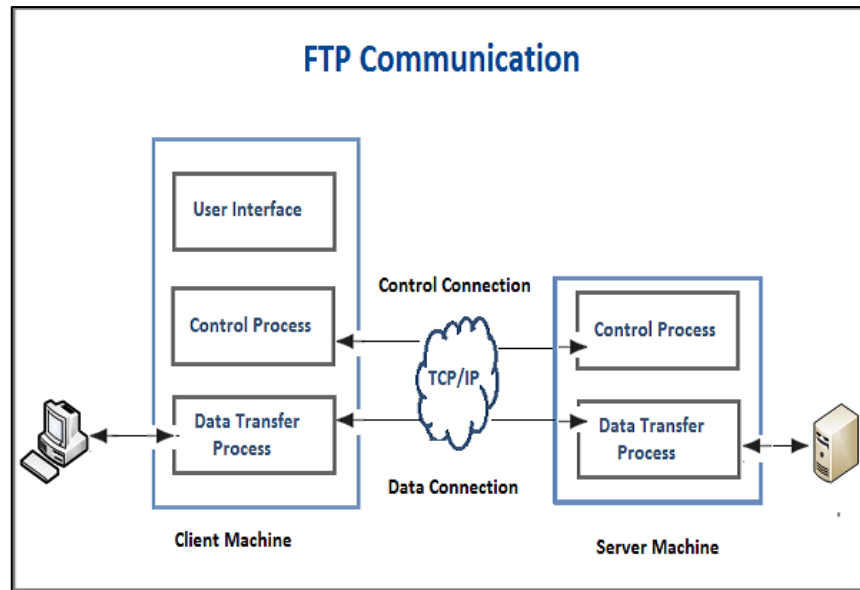


Diagram: File Transfer protocol

SMTP (Simple Mail Transfer Protocol)

- The Simple Mail Transfer Protocol is used for sending e-mail messages between servers.
- It uses the port 25.
- SMTP because it is limited in its ability to queue messages at the receiving end, it is used with one of two other protocols – POP (Post Office Protocol) or IMAP (Internet Message Access Protocol) which allow the user to save the messages in a mailbox on the server and retrieve them when they want.

POP3 (Post Office Protocol)

- This protocol is used by local e-mail clients to **retrieve e-mail** from the server.
- It uses TCP port 110 to establish connection with the server and then it sends a request for a particular mailbox using user name and password.
- The user can then retrieve the list of mail messages one by one. POP3 has two modes - Delete and keep. In the delete mode, mail is deleted from mailbox and in the keep mode, mail resides in the mailbox.

SMTP and POP3 Protocols

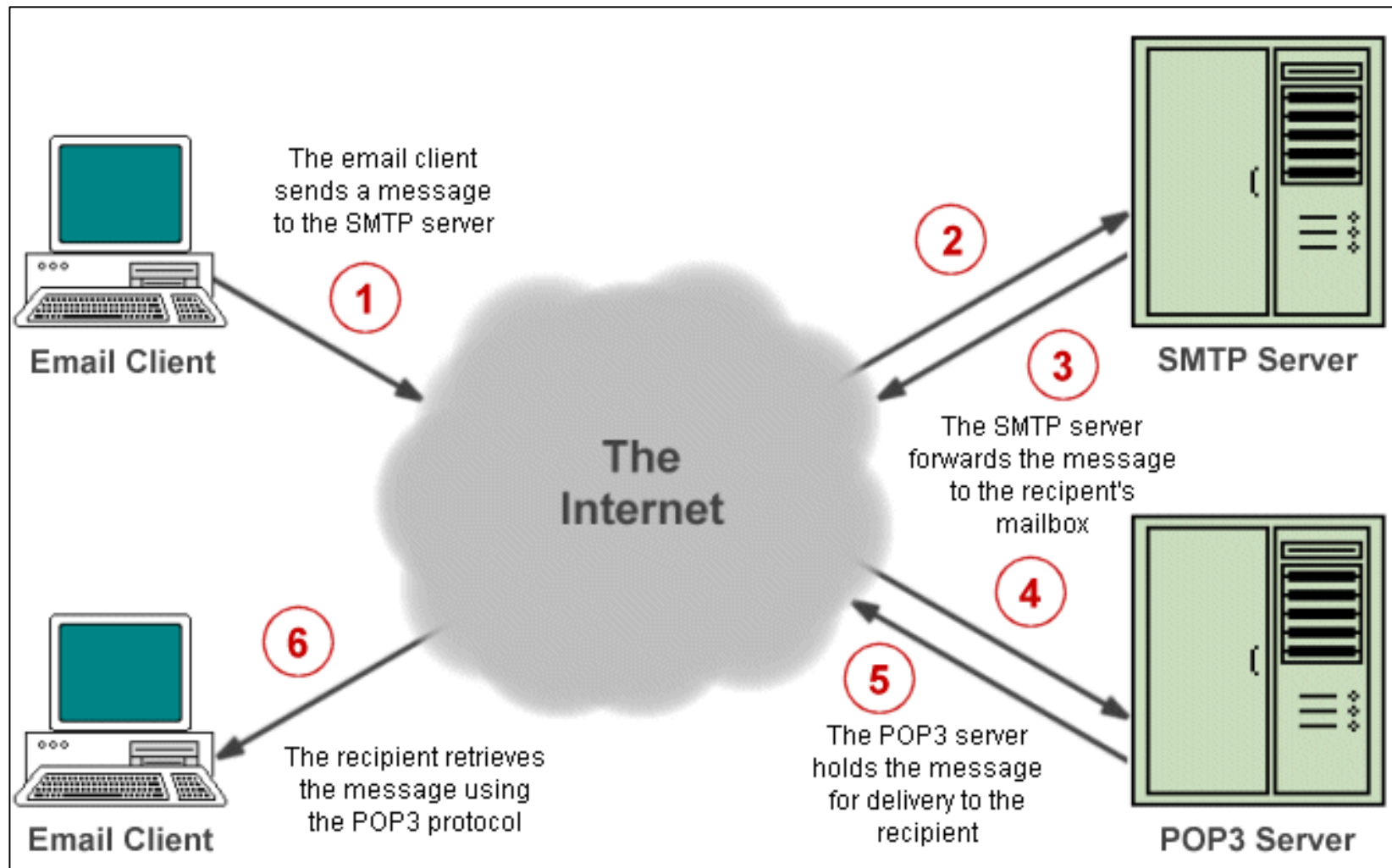


Diagram: SMTP and POP3 protocols

Interactive Mail Access Protocol (IMAP)

- By default, messages that have been downloaded to a recipient's computer are deleted from the mail server.
- The **Interactive Mail Access Protocol (IMAP)** is a more sophisticated mail protocol that stores all incoming and outgoing mail on the server so that mail clients with mailboxes on the server can access their e-mail from anywhere.
- Mail is not downloaded to the user's PC, and is only deleted from the client's mailbox if the client specifies that it is to be deleted.

TELNET (Telecommunications Network)

- Telnet is a remote login protocol.
- The basic purpose of Telnet is to provide a means by which keyboard commands typed by a remote user can cross the network and become input for a different computer. Screen output related to the session then crosses the network from that different computer (the server) to the client system.
- However, because of security issues its use over public internet should be avoided.

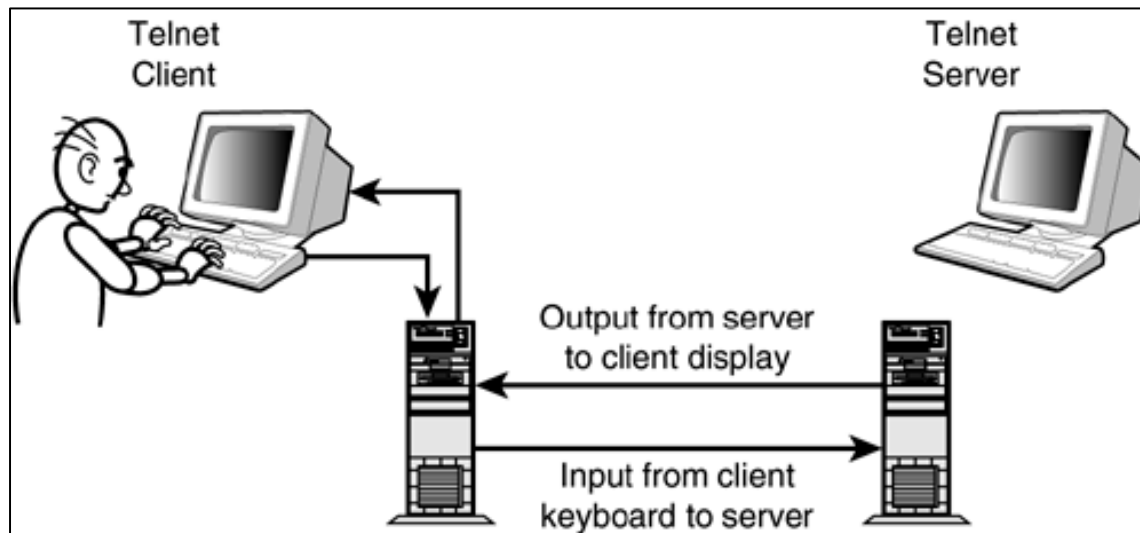
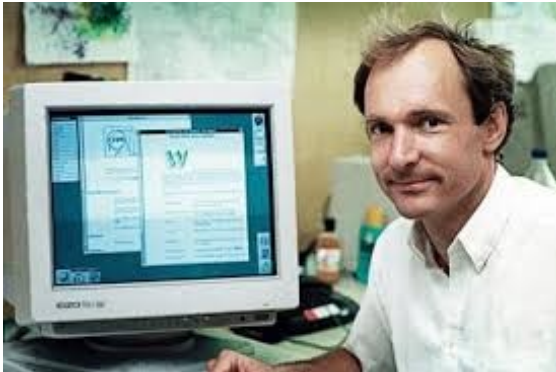


Diagram: Telnet Protocol

Is the Internet same as the World Wide Web?

WHY?

The web was born at **CERN** in Geneva in 1990, to allow its researchers who were geographically dispersed to share documents using a hypertext system.



Tim Berners Lee
Father of World Wide
Web

The web is not the same as the internet, it is a service provided by the internet.

**The World Wide Web is a
system of interlinked hypertext
documents accessed via the
internet.**

History of the Web

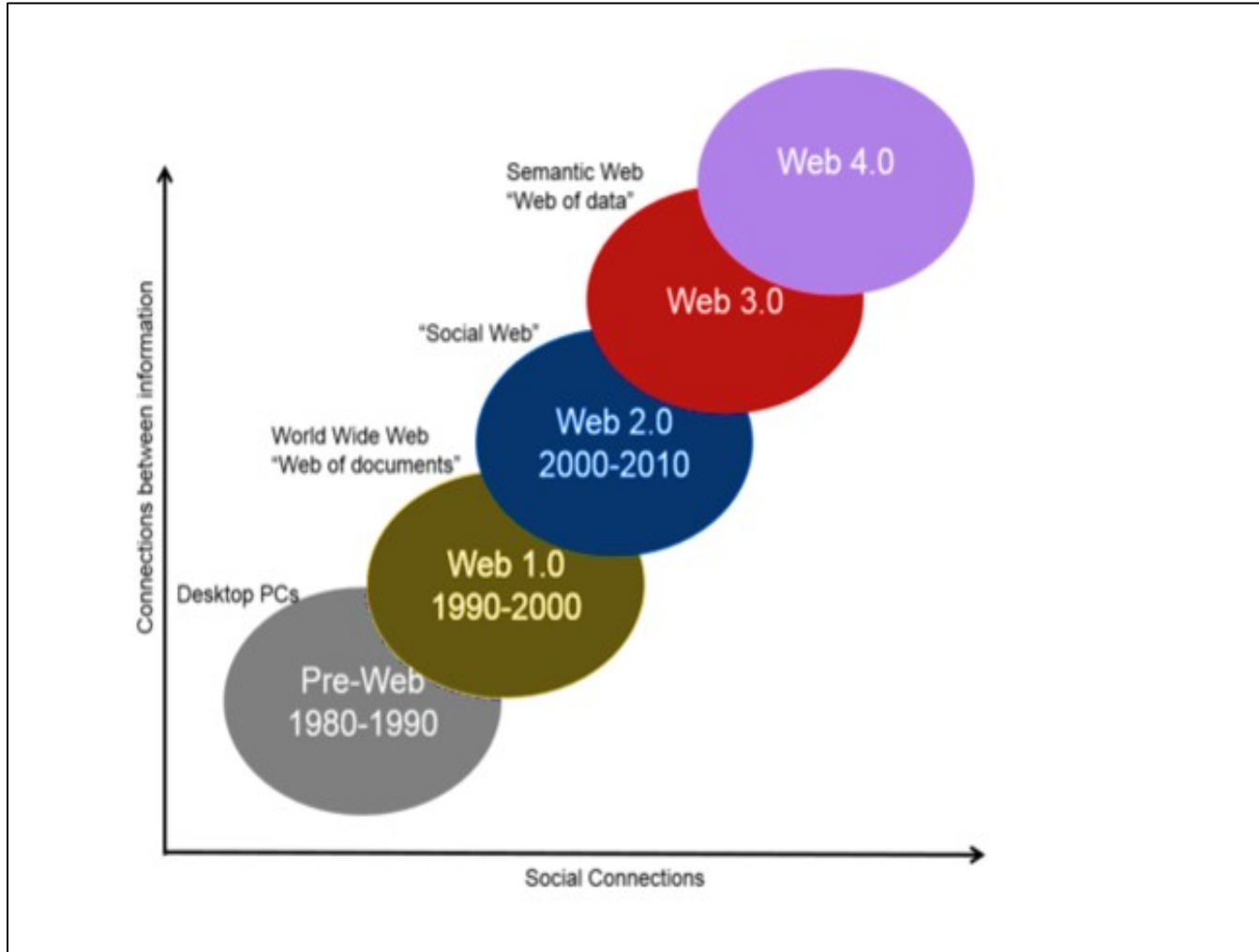


Diagram: World Wide Web Timeline

Web 1.0



Diagram: Internet Explorer web page from 1995

Web 2.0



Web 3.0

SEMANTIC WEB

- ✓ Semantic Web concepts bring meaning to the Web.
- ✓ Data is represented in a way such that, machines can understand it.
- ✓ Data to Smart Data.

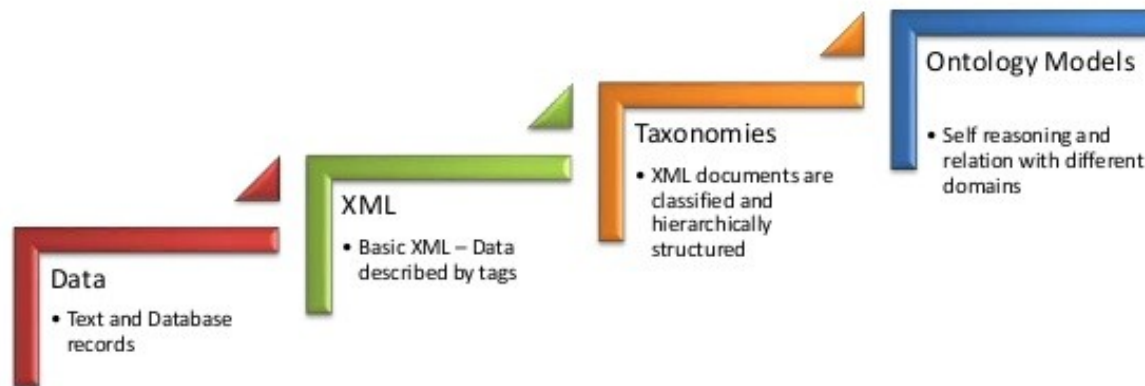


Diagram: The Semantic Web


Web 1.0 / 2.0 / 3.0 Summary

Crawl	Walk	Run
Web 1.0	Web 2.0	Web 3.0
Mostly Read-Only	Wildly Read-Write	Portable & Personal
Company Focus	Community Focus	Individual Focus
Home Pages	Blogs / Wikis	Lifestreams / Waves
Owning Content	Sharing Content	Consolidating Content
Web Forms	Web Applications	Smart Applications
Directories	Tagging	User Behavior
Page Views	Cost Per Click	User Engagement
Banner Advertising	Interactive Advertising	Behavioral Advertising
Britannica Online	Wikipedia	The Semantic Web
HTML / Portals	XML / RSS	RDF / RDFS / OWL

The World Wide Web Consortium

In 1994, Tim Berners-Lee with the help of Massachusetts Institute of Technology founded the World Wide Web Consortium (W3C), an international community which is devoted to developing ‘Open web standards’.

The W3C describes itself as,



“The World Wide Web Consortium exists to realize the full potential of the web”



Web Architecture

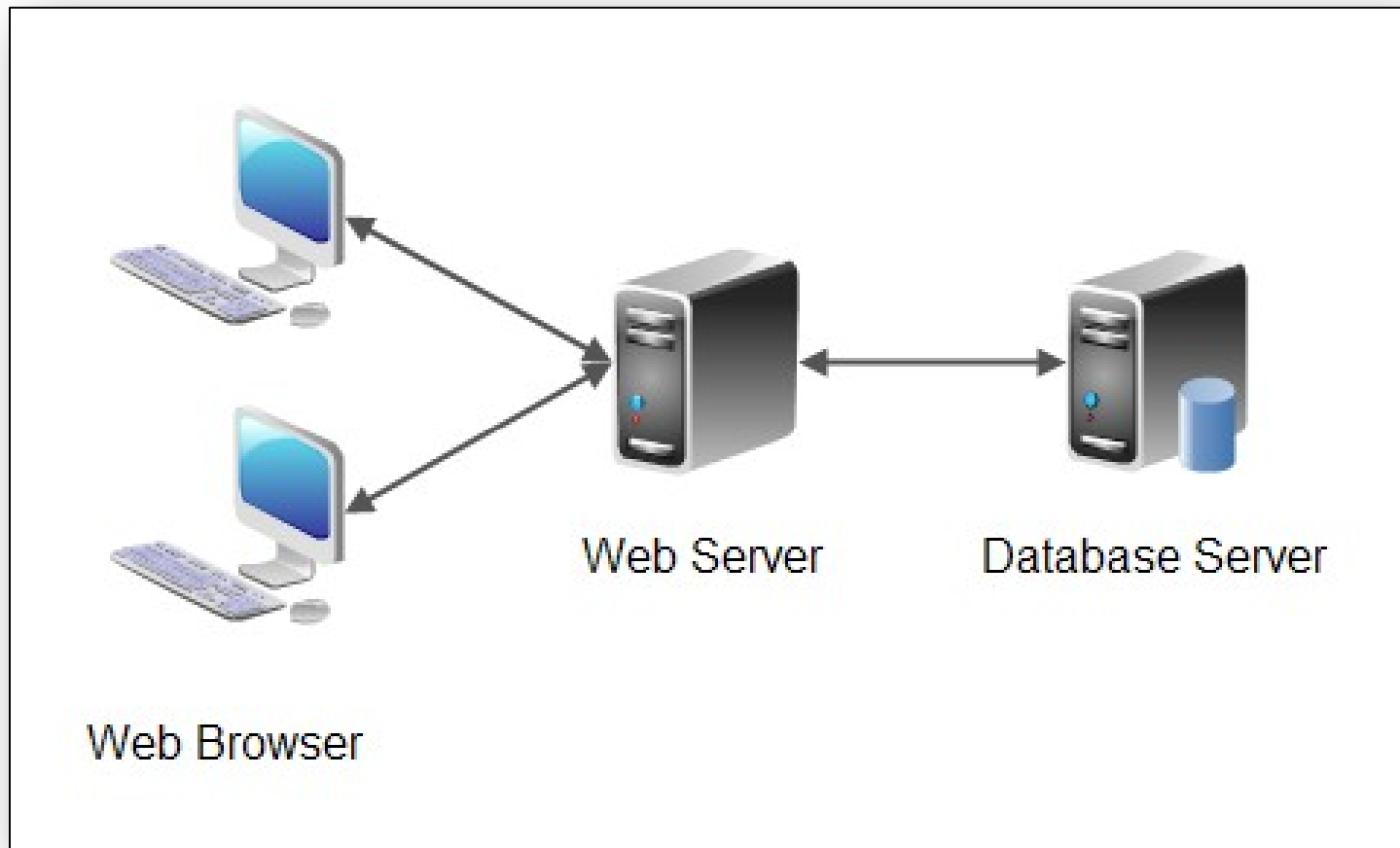


Diagram: The Web Architecture

Web Server



- A web server can be both software and hardware.
- It is a program that responds to the requests made by the client.
- A computer where the websites are hosted or stored can also be called as a web server.

Web Clients

- A web client can be both software and hardware.
- A web client is an application that communicates with a web server, using Hypertext Transfer Protocol (HTTP).
- A Web client contains two parts: dynamic Web pages and the Web browser.
- Dynamic Web pages are produced by components that run in the Web tier, and a Web browser delivers Web pages received from the server.



Unified Resource Identifier (URI)

- The web servers **host web resources**.
- A web resource is a content source, it can be anything from a static file, a live image from a camera or dynamic content resources.
- Each web server resource has a name to identify the resource uniquely called the ‘**Uniform Resource Identifier**’ or **URI**.
- For example:

Below is an example of an image resource URI.

<http://www.example.com/specials/polar.gif>

The Uniform Resource Identifier has two forms:

1. Uniform Resource Locator
2. Uniform Resource Name

Unified Resource Locator (URL)

Uniform Resource Locator is the most common form of resource identifier.

A URL defines the specific location of the resource on a particular server.

Example: <http://www.yahoo.com/images/logo.gif> is the URL for the Yahoo! Website's logo.

http://

Scheme

www.yahoo.com

Address

/images/logo.gif

**Resource
location**

Unified Resource Name (URN)

- **Uniform Resource Name** serves as a unique name to a resource irrespective of the location where it resides.
- Being location-independent these resources can move freely and can be accessed by multiple network access protocols.
- Uniform Resource Names are still in experimental stage and not yet widely adopted.
- For example,

The Uniform Resource Name *urn:ietf:rfc:2141* can be used to name the internet standards document “*RFC 2141*”.

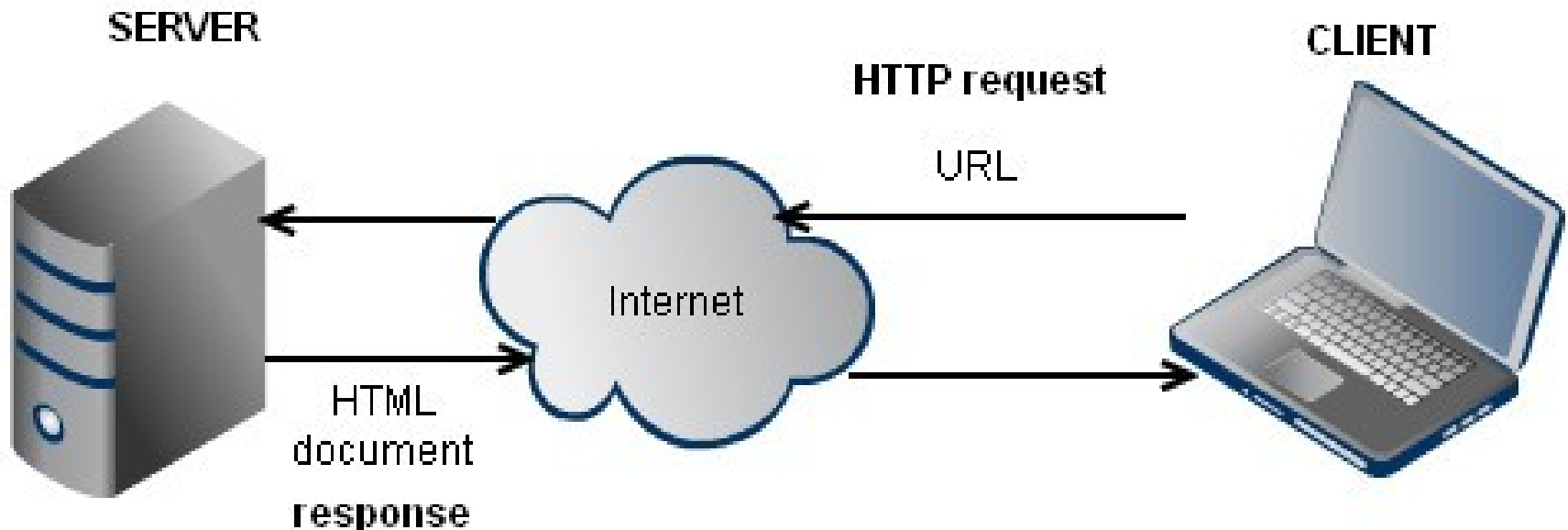
Web Browser

- A web browser is an application program used to request, view and traverse the web pages.
- It can display information in the form of text, images, multimedia and more.
- We can upload or download files using the browser.



Hyper Text Transfer Protocol

Hyper Text Transfer Protocol or HTTP is the protocol that is used to enable a web browser and a web server to communicate.



The Hyper Text Transfer Protocol

HTTP Kitchen Analogy

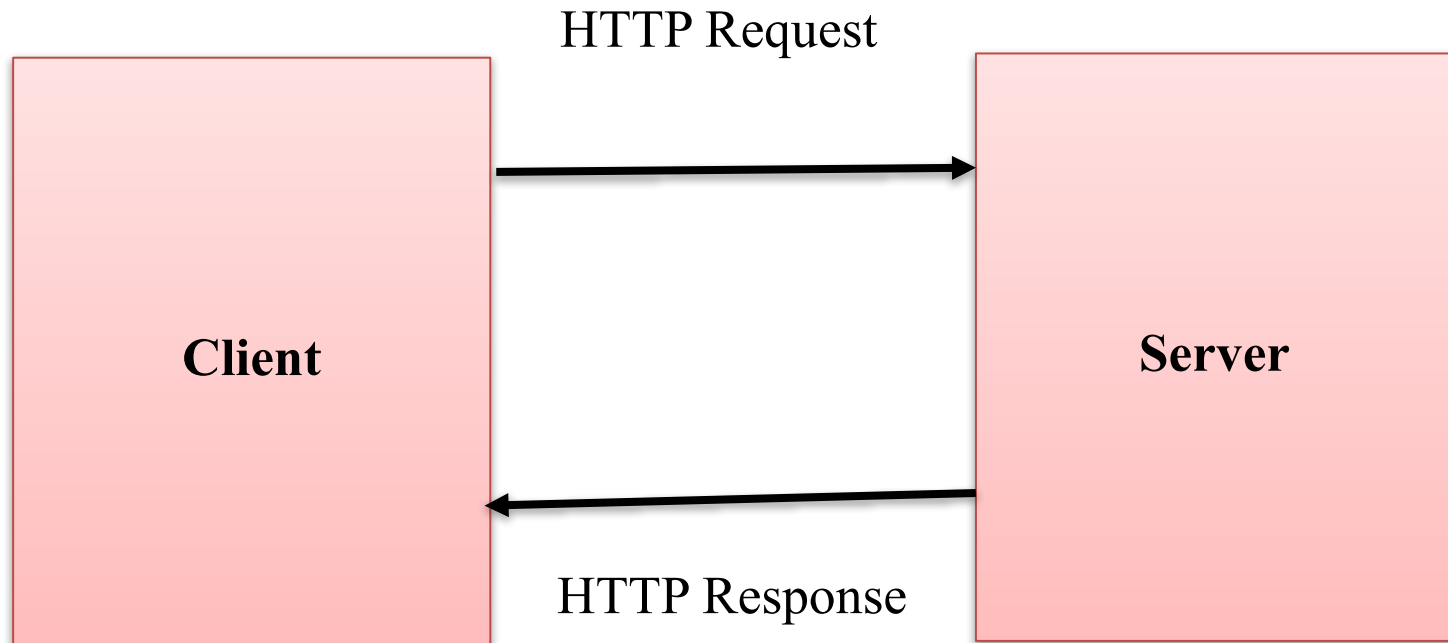
Hyper Text Transfer Protocol

1. Suppose I want to access a web page like *www.example.com/myvideos/vid1*.
2. The HTTP protocol uses the URL to identify the server, it makes a connection and sends the request to the server and terminates the connection.
3. The server receives the request and checks if the requested resource is available, if so it reestablishes the connection with the client and sends the response.
4. The browser can make multiple requests and each request is processed independent of the previous requests.

Eating in a Restaurant

1. The first thing you need to do is find the restaurant you want to eat from.
2. Once in the restaurant you would send an order to the kitchen for whatever you like to eat.
3. The kitchen checks to see if the ordered item is available, if yes it is delivered to you on your table.
4. You can make multiple orders while in the restaurant and the kitchen while processing a given order does not keep in mind what your previous orders were.

HTTP Client-Server Model



HTTP MIME(Multipurpose Internet Mail Extensions) Types

Document	MIME type
HTML formatted text document	<i>text/html</i>
Plain ASCII text document	<i>text/plain</i>
JPEG version	<i>image/jpeg</i>
GIF format	<i>image/gif</i>
Apple quick time movie	<i>video/quicktime</i>
Microsoft power point presentation	<i>application/vnd.ms-powerpoint</i>

HTTP Transaction

<i>Method URI HTTP version</i>	<i>HTTP version Status code</i>	Start line
<i>Name1: value1</i> <i>Name2: value2</i> <i>Name3: value3</i>	<i>Name1: value1</i> <i>Name2: value2</i> <i>Name3: value3</i>	Headers
	<i>Requested Resource</i>	Body

Request Message

Response Message

HTTP Message Formats

Using the format let us write request and response messages for our index.html example.

Request Message

```
GET    /index.html  HTTP 1.0  
Host: www.example.com  
Accept: text/html  
Accept-language: en-us
```

Response Message

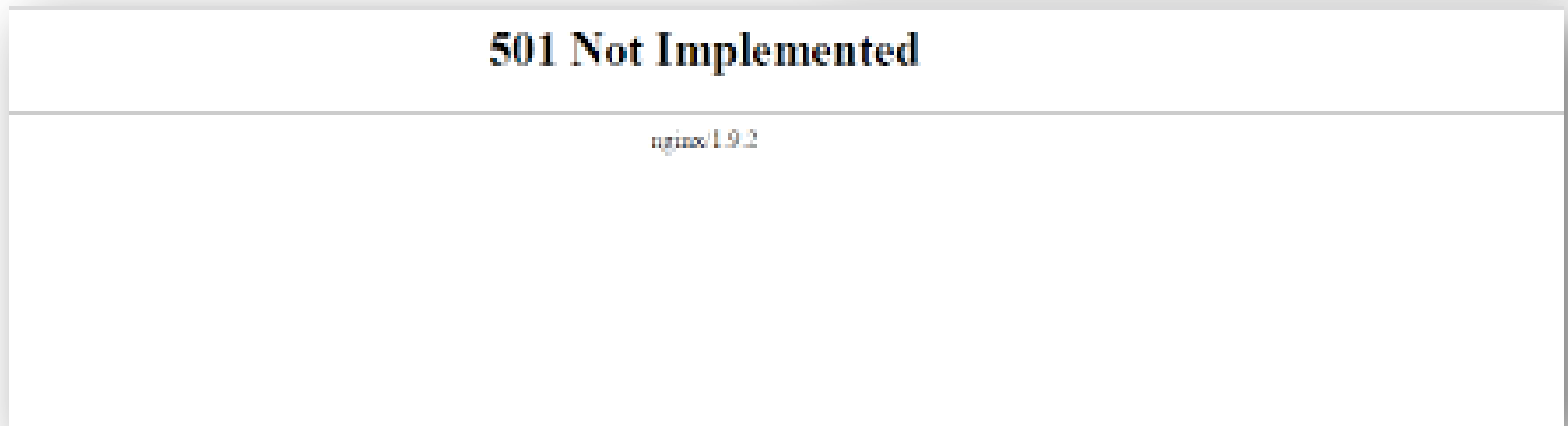
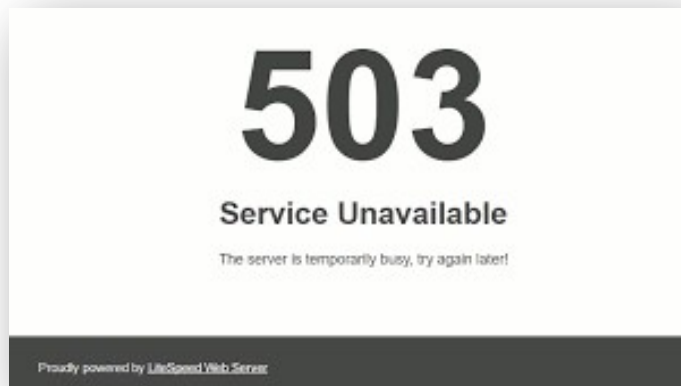
```
HTTP 1.0    200 : OK  
Host: www.example.com  
Accept: text/html  
Accept-language: en-us  
index.html
```

Request and Response Messages

HTTP Methods

Method	Description
GET	Used to get a named resource from the server using URI.
PUT	Replace all representations of the resource with the new upload.
POST	Used to send data to the server like customer information using HTML form
DELETE	Deletes the resource from the server
HEAD	Similar to GET, but transfers the status line and header section of the message
CONNECT	Establishes a connection with the server identified by the URI

The HTTP Status Codes



Web Application

A **Web application** (Web app) is an **application** program that is stored on a remote server and delivered over the Internet through a browser interface.

It can be:

Static Web Application

- A collection of related web pages that may contain text, links, audio, images and videos.
- It requires only client-side processing.

Dynamic Web Application

- A dynamic web application is interactive.
- They can automatically update different sections based on information from other applications or databases. Users see different inputs based on the input given.
- Dynamic web applications require back-end processing in addition to client-side processing.
- Facebook app is an example of dynamic web application.

Static and Dynamic Web Applications

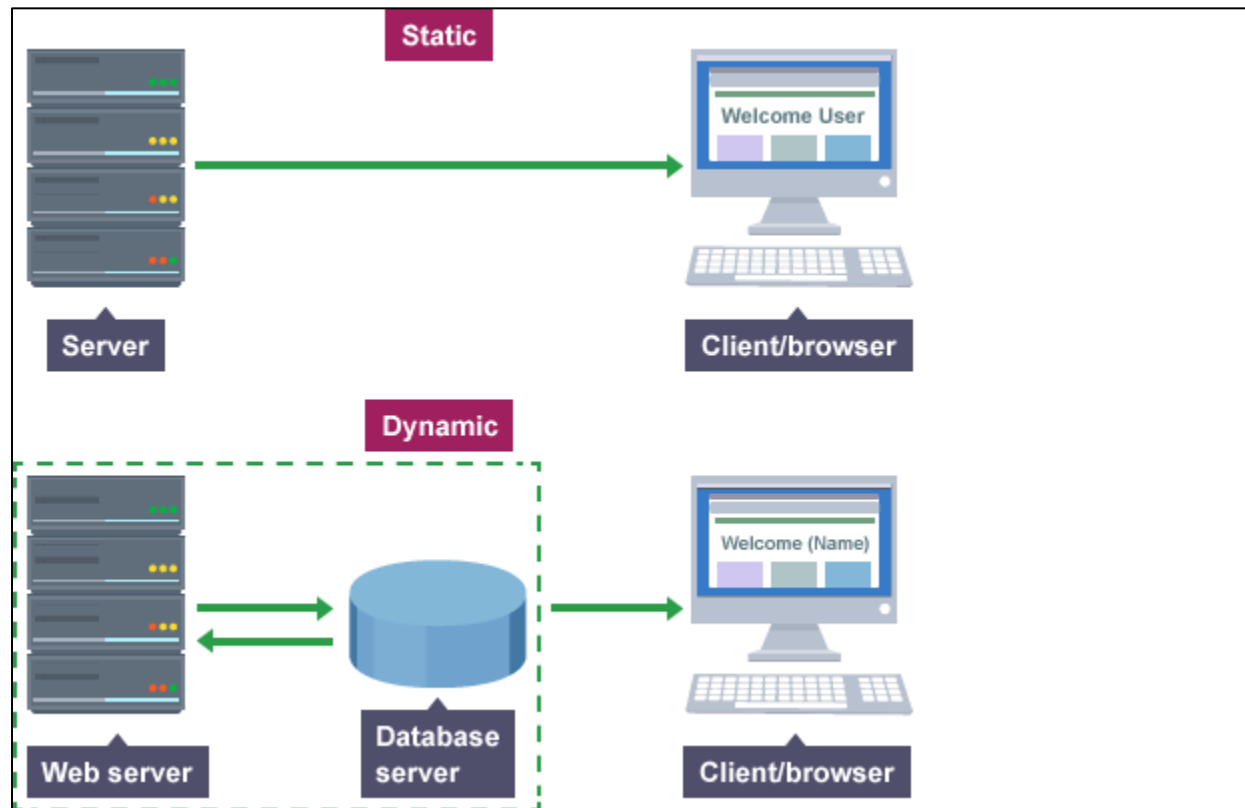


Diagram: Static vs. Dynamic Web Applications

Front-end and Back-end Web Development

The **web development functions** can be categorized into five areas:

1. Preparing page structure.
2. Organizing and managing content hierarchy.
3. Serving content to the user.
4. Capturing user input.
5. Performing back-end processing and integration.

Different web technologies are required to accomplish these functions. Web development can be divided into **two categories**:

6. Front-end Web Development

7. Back-end Web Development

Front-end Development is also called the client-side development

- It is used for developing what the user sees when they open a website or load a web application.
- It is used to develop the structure and design of websites.

Back-end development - Most of the code that makes a web application work is on the back-end.

- The back-end code runs on the server therefore, a back-end developer must have a good understanding of the programming languages, database and server architecture.
- The server-side programming can be divided into four main components:
 - ❖ **The Servers**
 - ❖ **Databases**
 - ❖ **Middleware**
 - ❖ **Programming languages and framework.**

Web Technologies

Web technologies is a general term referring to the many languages and multimedia packages that are used in conjunction with one another, to produce dynamic web sites. Some of the important technologies are:

- **Hyper Text Markup Language (HTML)** - HTML is the **standard markup language for creating web pages** and web applications.
- **Cascading Style Sheets (CSS)** - the Cascading Styling Sheets is used to style an HTML document.
- **JavaScript** - It is a dynamic programming language which when applied to a HTML document can make the websites interactive with the user.
- **Extensible Markup Language (XML)** - it is an extensible language which can be used to create specific mark-up languages such as chemical mark-up.
- **ASP.NET** - ASP .NET is a web framework for building dynamic web sites, web applications and web services.

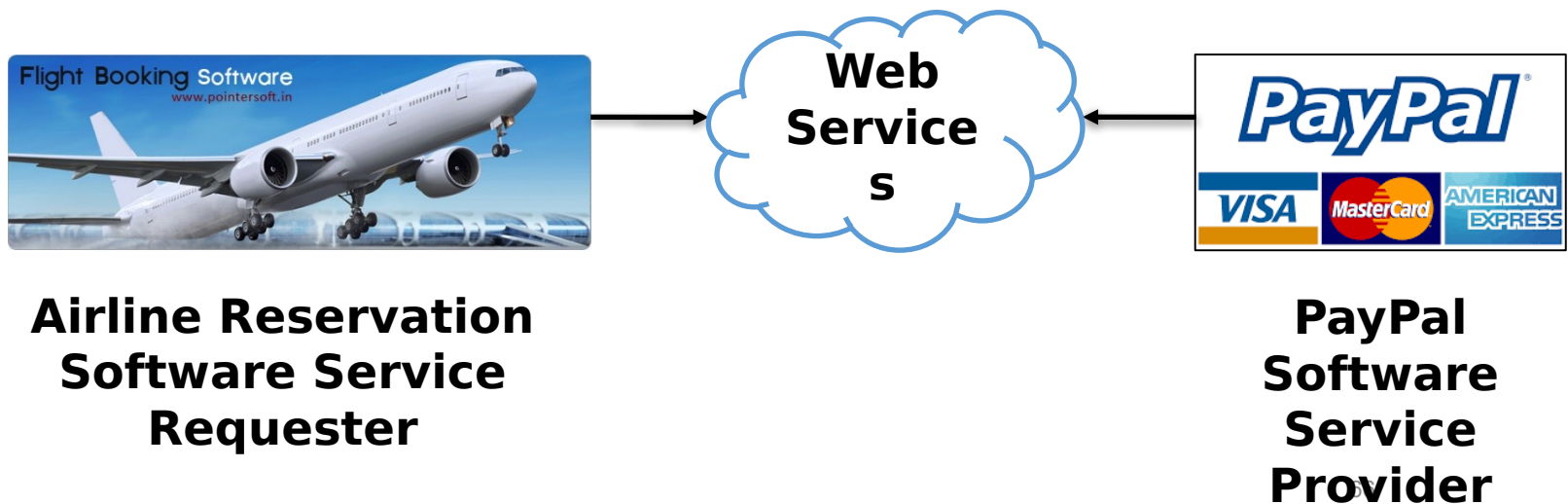
Web Technologies

- **Servlets** – It is a server-side programming language. An efficient and powerful solution for creating dynamic web content.
- **Java Server Pages (JSP)** - The Java Server Pages is a server-side technology that is used to create dynamic web pages based on HTML, XML or other document types. Java code is inserted into HTML using JSP tag `<% ----Java code----%>`.
- **Hypertext Preprocessor (PHP)** - PHP is an open source general purpose scripting language for server-side development. It can be embedded in HTML.
- **Asynchronous JavaScript And XML (AJAX)** - AJAX is not a programming language in itself. It uses the XMLHttpRequest object to request data from the server and java script and HTML DOM to display or use the data. The most appealing characteristic of the AJAX is that it can communicate with the server, exchange data and update a page without even refreshing the page.

Web Services analogy

Consider the **aircraft reservation software**,

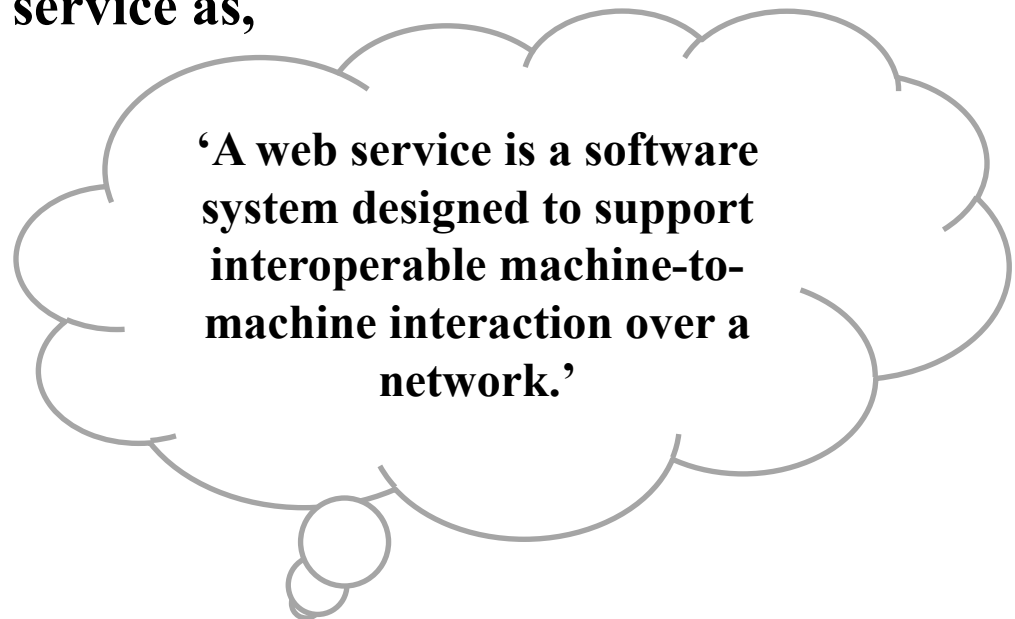
- In addition to doing reservations, the software also requires to communicate with e-commerce sites like **PayPal for payments** made online.
- But we know that the reservation system and the PayPal software are separate systems written in different languages.
- Communication between the two **heterogeneous** software systems happens through a special kind of web application known as a **web service**.



Web Services

- Web service is a service offered by one electronic device to another via the World Wide Web.

The W3C defines a web service as,

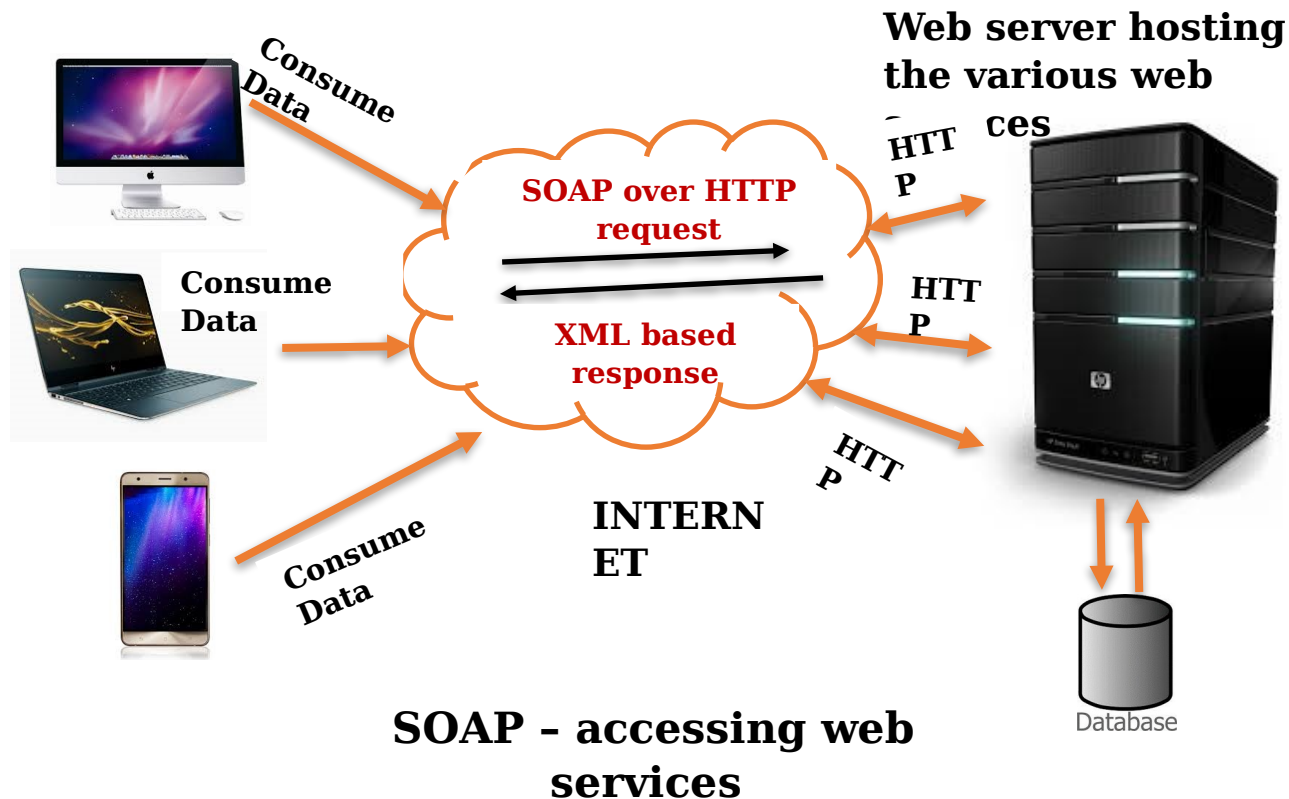


Web Service Components

- **SOAP** – Simple Object Access Protocol
- **REST** – Representational State Transfer
- **WSDL** – Web Services Description Language
- **UDDI** – Universal Description, Discovery and Integration

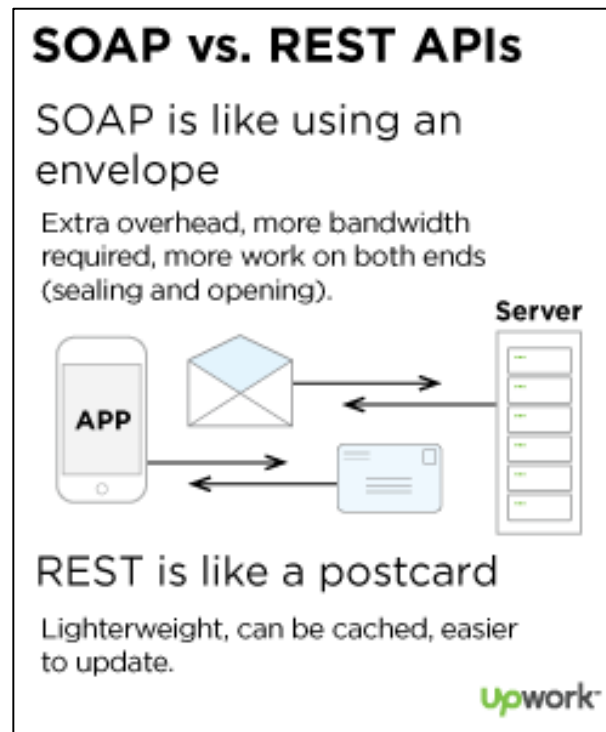
SOAP – Simple Object Access Protocol

SOAP is an XML based messaging protocol which allows programs running on different operating systems such as Windows and Linux to communicate using HTTP and XML.



REST – Representational State Transfer

- REST was defined by Roy Fielding in 2000.
- REST is an architectural style for developing web services. It uses HTTP for accessing resources, but unlike SOAP the web service developed using REST are light weight and use less bandwidth.



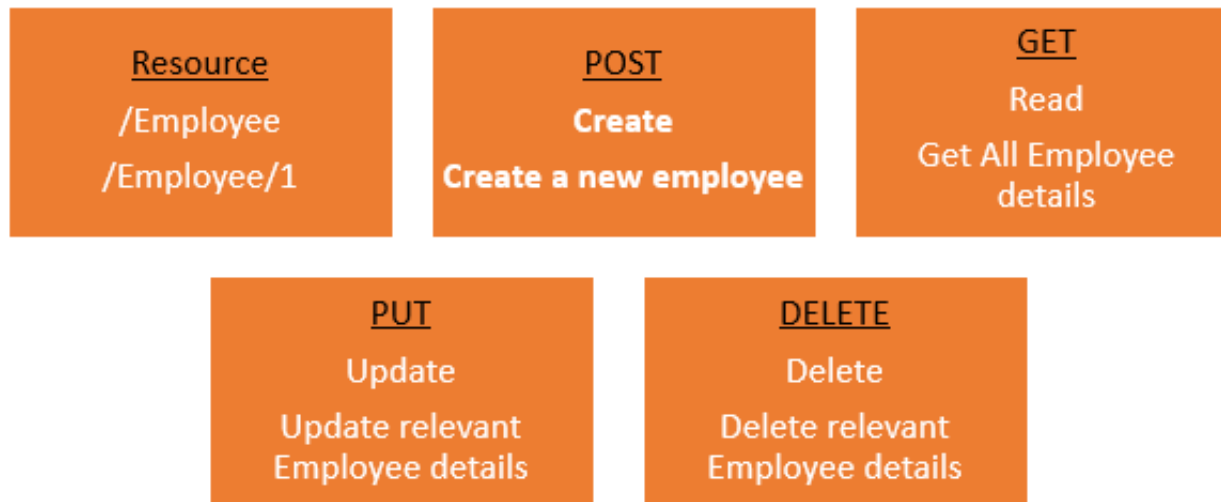
REST – Representational State Transfer

- REST defines a way of accessing resources such as documents, pictures or videos which reside on a different environment.
- The key elements of RESTful implementation are:
 1. **Resources** – the resource itself.
 2. **Request Verbs** – to describe what to do with the resource. The verbs include **GET, POST, DELETE, PUT**.
 3. **Request Header** – additional information such as authorization details.
 4. **Request Body** – contains Data, usually sent when POST is used.
 5. **Response Body** – an XML document with the data.
 6. **Response Status Codes** – returned with the response indicating whether there is any error or response has been sent.

REST - Example

Let us assume a RESTful web service is defined at a particular location. The client can use any HTTP verbs to make the request. For Example,

- **POST** – This would be used to create a new employee using the RESTful web service
- **GET** - This would be used to get a list of all employee using the RESTful web service
- **PUT** - This would be used to update all employee using the RESTful web service
- **DELETE** - This would be used to delete all employee using the RESTful web service



Request Verbs on a single employee record

HTML Continued..

Tags and Attributes

Lists

Lists are used to organize items in the browser window:

Unordered list: Bulleted list (most popular), list items with no particular order

Ordered list: Numbered list

Definition List

Ordered Lists

- Ordered lists are a list of numbered items.
- To create an ordered list, type:

``

`` This is step one.

`` This is step two.

`` This is step three.

``

Here's how it would look on the Web:

- 1. This is step one.**
- 2. This is step two.**
- 3. This is step three.**

More Ordered Lists....

- The TYPE=x attribute allows you to change the the kind of symbol that appears in the list.
 - A is for capital letters
 - a is for lowercase letters
 - I is for capital roman numerals
 - i is for lowercase roman numerals

Unordered Lists

- An unordered list is a list of bulleted items
- To create an unordered list, type:

 First item in list

 Second item in
list

 Third item in list

Here's how it would look on the Web:

- **First item in list**
- **Second item in list**
- **Third item in list**

More Unordered Lists...

- The TYPE=shape attribute allows you to change the type of bullet that appears
 - *circle* corresponds to an empty round bullet
 - *square* corresponds to a square bullet
 - *disc* corresponds to a solid round bullet; this is the default value

Definition List

- A description list, with terms and descriptions:
- `<dl>`
 - `<dt>Coffee</dt>`
 - `<dd>Black hot drink</dd>`
 - `<dt>Milk</dt>`
 - `<dd>White cold drink</dd>``</dl>`

EXAMPLE

<OL TYPE="i">

 List item ...

 List item ...

<P> text</P>

<OL TYPE="i" START="5">

 List item now starts from 5
...

- i. List item ...
- ii. List item ...

text

- v. List item now starts
from 5 ...

Nested List

```
<OL TYPE =“I”>  
<LI> List item 1 ...</LI>  
<LI> List item 2 ..</LI>  
  <ol type = "a">  
    <li> 1.1  
    <li> 1.2  
  </ol>  
<LI> List item 3 ..</LI>  
</OL>
```

```
List item 1 ...  
List item 2 ..  
  1.1  
  1.2  
List item 3 ..
```

Horizontal Rule <HR>

- The <HR> element causes the browser to display a horizontal line (rule) in your document.
- <HR> does not use a closing tag, </HR>.

Attribute	Description	Default Value
SIZE	Height of the rule in pixels	2 pixels
WIDTH	Width of the rule in pixels or percentage of screen width	100%
NOSHADE	Draw the rule with a flat look instead of a 3D look	Not set (3D look)
ALIGN	Aligns the line (Left, Center, Right)	Center
COLOR	Sets a color for the rule (IE 3.0 or later)	Not set

Inserting Images

- Type ``, where `image.JPG` indicates the location of the image file
- The `WIDTH=n` and `HEIGHT=n` attributes can be used to adjust the size of an image
- The attribute `BORDER=n` can be used to add a border `n` pixels thick around the image

Alternate Text

- Some browsers don't support images. In this case, the ALT attribute can be used to create text that appears instead of the image.
- Example:
**

...

- **Image File (SRC:source):** This value will be a URL (location of the image)
- **Alternate Text (ALT):** This is a text field that describes an image when the image cannot be displayed.
- **Alignment (ALIGN):** This allows you to align the image on your page.
- **Width (WIDTH):** is the width of the image in pixels.
- **Height (HEIGHT):** is the height of the image in pixels.
- **Border (BORDER):** is for a border around the image, specified in pixels.
- **HSPACE:** is for Horizontal Space on both sides of the image specified in pixels. A setting of 5 will put 5 pixels of invisible space on both sides of the image.
- **VSPACE:** is for Vertical Space on top and bottom of the image specified in pixels. A setting of 5 will put 5 pixels of invisible space above and below the image.

Links

- A link lets you move from one page to another, play movies and sound, send email, download files, and more....
- A link has three parts: a **destination**, a **label**, and a **target**
- To create a link type
` label `

Anatomy of a Link

* label *

- In the above link, “page.html” is the destination. The destination specifies the address of the Web page or file the user will access when he/she clicks on the link.
- The label is the text that will appear underlined or highlighted on the page

Changing the Color of Links

- The LINK, VLINK, and ALINK attributes can be inserted in the <BODY> tag to define the color of a link
 - **LINK** defines the color of links that have not been visited
 - **VLINK** defines the color of links that have already been visited
 - **ALINK** defines the color of a link when a user clicks on it

Using Links to Send Email

- To create a link to an email address, type

*** MAIL ME***

Anchors

- Anchors enable a user to jump to a specific place on a Web site
- Two steps are necessary to create an anchor. First you must create the anchor itself. Then you must create a link to the anchor from another point in the document.

Anchors

- To create the anchor itself, type
`label`
at the point in the Web page where you want the user to jump to
- To create the link, type
`label`
at the point in the text where you want the link to appear

Example: Anchor

Table of Contents

[Introduction](#)
[Chapter One](#)
[Chapter Two](#)

Introduction

(Text for Introduction)

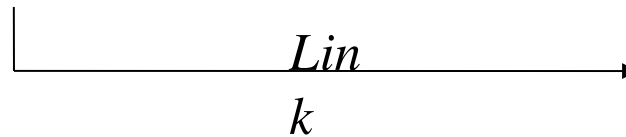
Chapter 1

(Text for Chapter 1)

Chapter 2

(Text for Chapter 2)

`Chapter Two
`



`Chapter 2 `

Anchor →

Internal Links/ Bookmarks

- HTML bookmarks are used to allow readers to jump to specific parts of a Web page

- First, create a bookmark with the id attribute:

`<h2 id="tips">Useful Tips Section</h2>`

- Then, add a link to the bookmark, from within the same page:

`Visit the Useful Tips Section`

- Or, add a link to the bookmark from another page:

`Visit the Useful Tips
Section`

Image as Hyperlink

**

**

**

Scrolling text using the <marquee> tag

```
<html>
```

```
<head><title> scrolling  
text</title></head>
```

```
<marquee><font
```

```
face="sand">Welcome to my website!
```

```
Be sure to visit again ! </font>
```

```
</marquee>
```

HTML

Tables

Tables

- Tables can be used to display rows and columns of data, create multi-column text, captions for images, and sidebars
- The `<TABLE>` tag is used to create a table; the `<TR>` tag defines the beginning of a row while the `<TD>` tag defines the beginning of a cell

<table>

- Tables use a very simple tag structure with these four sub-elements:

Table Row	<TR>...</TR>.
Table Header	<TH>...</TH>.
Table Data	<TD>...</TD>.

<table> attributes

<TABLE ALIGN="left" BORDER=0 BGCOLOR="cyan" width=600
cellpadding=0 cellspacing=0>

- **Align:** "left", "center" or "right" - "left" is the default
- **Border:** thickness of the border in pixels - 0 for no borders
- **Bgcolor:** is background color in HEX or as a name color
- **Background=url** (works with IE only)
- **Cellpadding=n** (n is number of pixels (space) between cell content and its border)
- **Cellspacing=n** (n is number of pixels (space) between cells)
- **Height=n** (height of table in pixels or percentages 100%)
- **Width=n** (Width of table in pixels or percentages 100%)

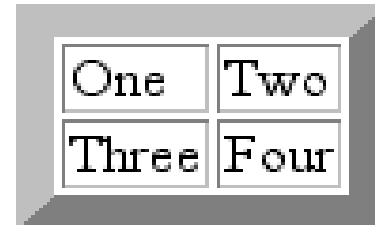
Adding a Border

- The `BORDER=n` attribute allows you to add a border `n` pixels thick around the table
- To make a solid border color, use the `BORDERCOLOR="color"` attribute

Creating Simple Table

```
<TABLE BORDER=10>
  <TR>
    <TD>One</TD>
    <TD>Two</TD>
  </TR>
  <TR>
    <TD>Three</TD>
    <TD>Four</TD>
  </TR>
</TABLE>
```

- Here's how it would look on the Web:



One	Two
Three	Four

```
<TABLE BORDER="1" WIDTH="300"
  HEIGHT="100"
  BORDERCOLOR="BLUE">
```

```
<CAPTION ALIGN="TOP" >This table
lists movies with their ticket
prices</CAPTION>
```

```
<TR >
<TH>Movie</TH>
<TH>Ticket Price</TH>
</TR>
```

```
<TR>
<TD>MI6</TD>
<TD>250</TD>
</TR>
```

```
<TR>
<TD>Minions</TD>
<TD>300</TD>
</TR>
```

```
</TABLE>
```

This table lists movies with their ticket prices

Movie	Ticket Price
MI6	250
Minions	300

Centering a Table

- There are two ways to center a table
 - Type `<TABLE ALIGN=CENTER>`
 - Enclose the `<TABLE>` tags in opening and closing `<CENTER>` tags

Controlling Cell Spacing

- Cell spacing is the space *between* cells while cell padding is the space *around* the contents of a cell
- To control both types of spacing, use the CELLSPACING =n and CELLPADDING=n attributes in the <TABLE> tag

TD or TH Attributes

- **Colspan:** Specifies how many cell columns of the table this cell should span.
- **Rowspan:** Specifies how many cell rows of the table this cell should span.
- **Align:** cell data can have left, right, or center alignment.
- **Valign:** cell data can have top, middle, or bottom alignment.

```
<table border=1 cellpadding =2>
<tr>
<th> Column 1 Header</th>
  <th> Column 2 Header</th>
</tr>

  <tr>
<td colspan=2> Row 1 Col 1</td>
  </tr>

  <tr>
<td rowspan=2>Row 2 Col 1</td>
  <td> Row 2 Col2</td>
  </tr>

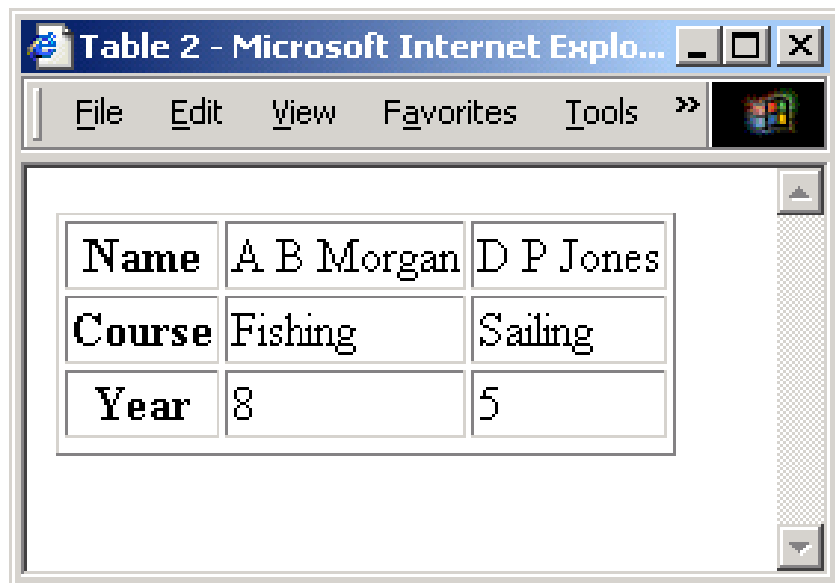
  <tr>
<td> Row 3 Col2</td>
  </tr> </table>
```

Output

Column 1 Header	Column 2 Header
Row 1 Col 1	
Row 2 Col 1	Row 2 Col 2
	Row 3 Col 2

Tables

Row -column format

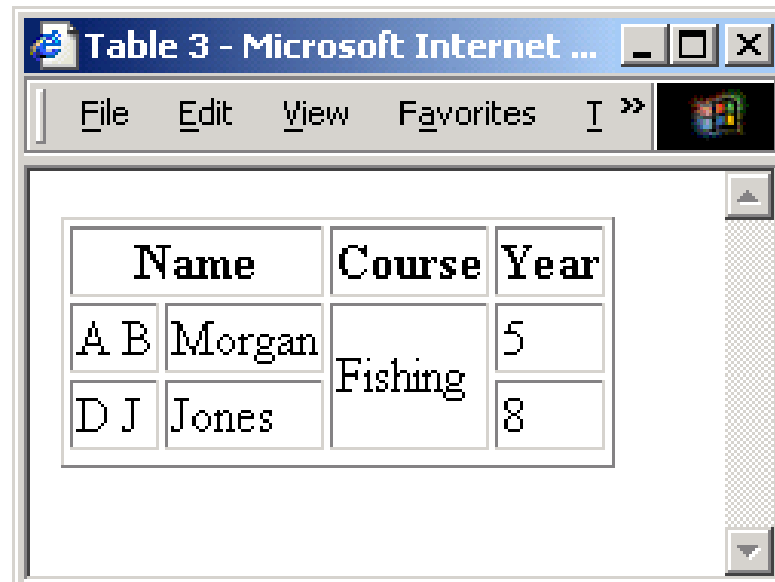


A screenshot of a Microsoft Internet Explorer browser window. The title bar reads 'Table 2 - Microsoft Internet Explo...'. The menu bar includes 'File', 'Edit', 'View', 'Favorites', 'Tools', and a '»' button. The main content area displays a table with a border. The table has three columns and three rows. The first row contains 'Name', 'A B Morgan', and 'D P Jones'. The second row contains 'Course', 'Fishing', and 'Sailing'. The third row contains 'Year', '8', and '5'.

Name	A B Morgan	D P Jones
Course	Fishing	Sailing
Year	8	5

```
<table border="1">  
  <tr>  
    <th>Name</th>  
    <td>A B Morgan</td>  
    <td>D P Jones</td>  
  </tr>
```

...



A screenshot of a Microsoft Internet Explorer browser window. The title bar reads 'Table 3 - Microsoft Internet ...'. The menu bar includes 'File', 'Edit', 'View', 'Favorites', 'I', and a '»' button. The main content area displays a table with a border. The table has four columns and three rows. The first row contains 'Name', 'Course', and 'Year'. The second row contains 'A B', 'Morgan', 'Fishing', and '5'. The third row contains 'D J', 'Jones', and '8'.

Name	Course	Year	
A B	Morgan	Fishing	5
D J	Jones	8	

```
<table border="1">  
  <tr>  
    <th colspan="2">Name</th>  
    <th>Course</th>  
    <th>Year</th>  
  </tr>
```

...

...

Changing a Cell's Color

- To change a cell's color, add the `BGCOLOR="color"` attribute to the `<TD>` tag
- Example:
`<TD BGCOLOR="blue">`

Controlling Line Breaks

- Unless you specify otherwise a browser will divide the lines in a cell as it sees fit.
- The NOWRAP attribute placed within the `<TD>` tag forces the browser to keep all the text in a cell on one line
- Example:
 - `<TD NOWRAP>`Washington, D.C.

Nesting Tables

- Create the inner table
- Create the outer table and determine which cell of the outer table will hold the inner table
- Test both tables separately to make sure they work
- Copy the inner table into the cell of the outer table
- Don't nest too many tables. If you find yourself doing that, find an easier way to lay out your Web page

HTML

Frames

HTML FRAMES

A framed page is actually made up of multiple HTML pages

A frame

- Partitions a web browser window
- Display multiple web documents simultaneously.

Creating frames

Tags

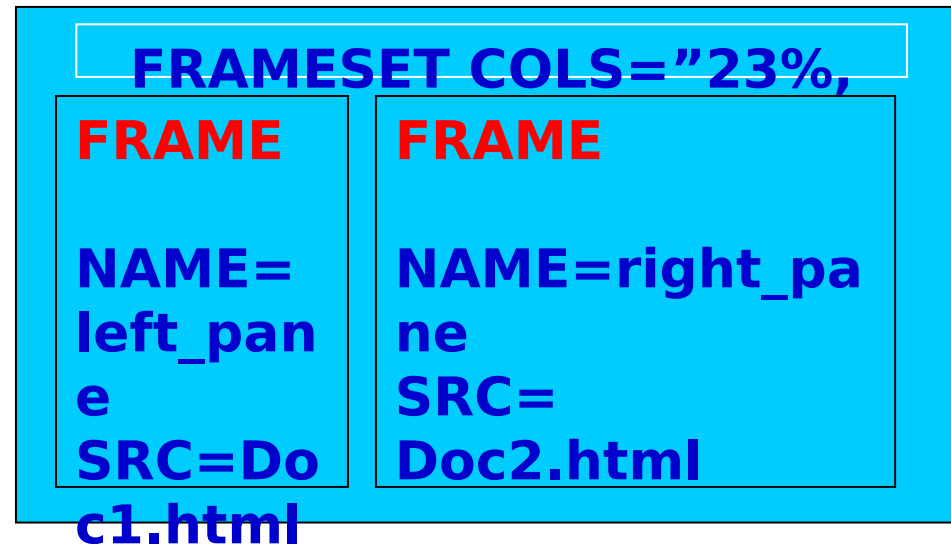
- **<FRAMESET>** - divides the screen into **ROWS** or **COLS**.
- **<FRAME>** elements, **one per division** of the browser window.

Note: Because there is no **BODY** container, FRAMESET pages can't have background images and background colors associated with them.

Example

```
<HTML>
<HEAD>
<TITLE> Framed Page </TITLE>
<FRAMESET COLS="23%,77%">
<FRAME SRC="Doc1.html">
<FRAME SRC="Doc2.html">
</FRAMESET>
</HEAD>

</HTML>
```



Attributes for <FRAMESET>

- **ROWS** : Determines the size and number of rectangular rows within a <FRAMESET>.
- **COLS**: Determines the size and number of rectangular columns within a <FRAMESET>.
- **FRAMEBORDER** : Possible values **0**, **1**, **YES**, **NO**. A setting of zero will create a borderless frame.
- **FRAMESPACING**: This attribute is specified in **pixels**. If you go to borderless frames you will need to set this value to zero as well, or you will have a gap between your frames where the border used to be.
- **BORDER(thickness of the Frame)**: This attribute specified in pixels. A setting of zero will create a borderless frame. Default value is 5.
- **BORDERCOLOR**: This attribute is allows you choose a color for your border. This attribute is rarely used.

Attributes for <FRAME>

- **SRC:** provides the URL for the page that will be displayed in the frame.
- **NAME:** Required for frames that will allow targeting by other HTML documents. Works in conjunction with the target attribute of the <A>, <AREA>, <BASE>, and <FORM> tags.
- **MARGINWIDTH:** Optional attribute stated in pixels. Determines horizontal space between the <FRAME> contents and the frame's borders.
- **MARGINHEIGHT:** Optional attribute stated in pixels. Determines vertical space between the <FRAME> contents and the frame's borders.
- **SCROLLING:** Displays a scroll bar(s) in the frame. Possible values are:
 1. **Yes** – always display scroll bar(s).
 2. **No** – never display scroll bar(s).
 3. **Auto** – browser will decide based on frame contents.

By default: scrolling is auto.

What will be the output?

<HTML>

<HEAD> </HEAD>

<frameset rows="25%, *, 25%">

<frame src="" >

<frameset cols="25%, *">

<frame src="">

<frame src="" >

</frameset>

<frame src="" >

</frameset>

</HTML>

[illegible]

Frame Formatting

- **Example:**

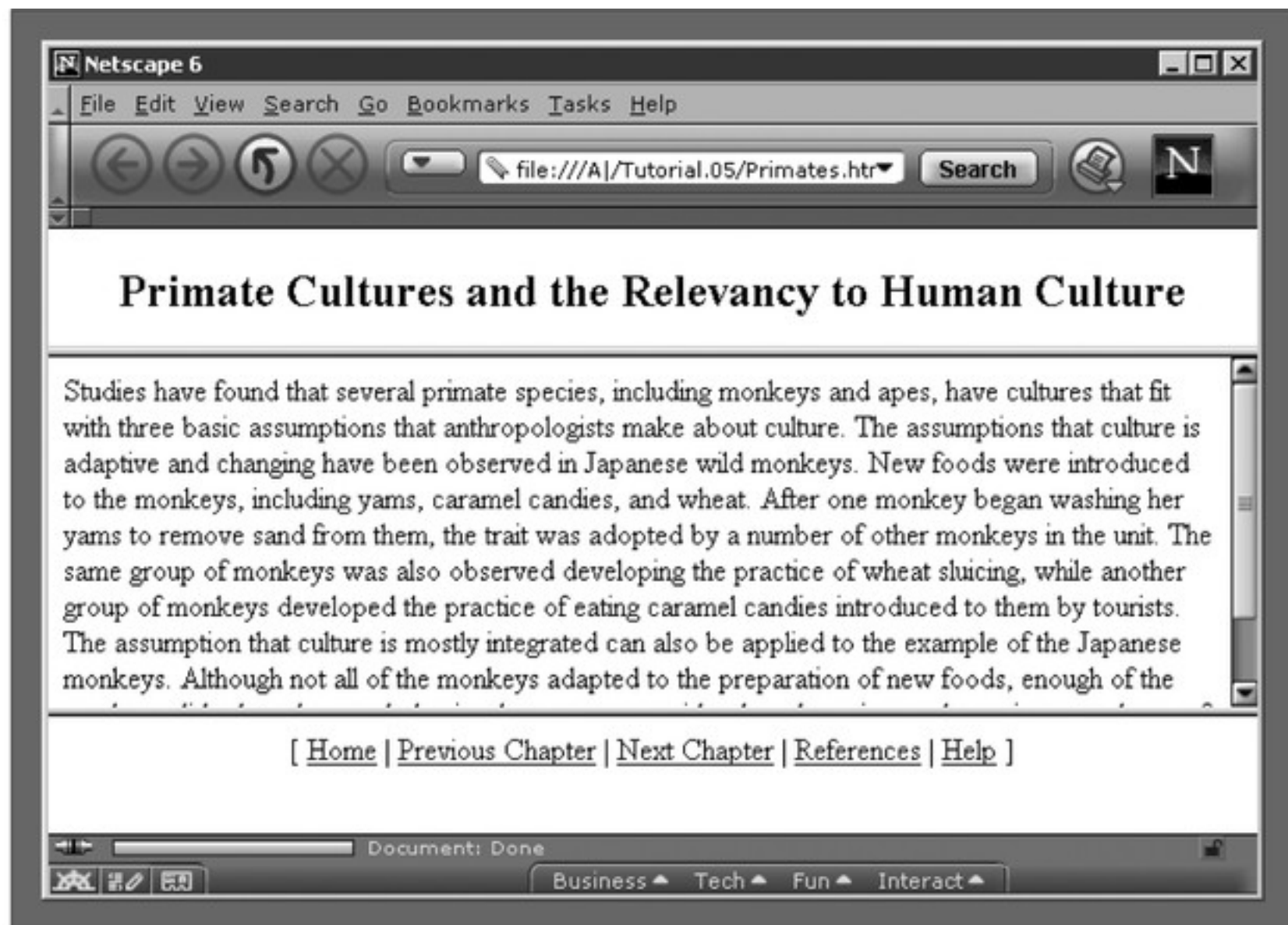
```
<frameset rows="20%, *, 20%">
```

```
  <frame src="header.html" noresize  
  scrolling=no>
```

```
  <frame src="body.html">
```

```
  <frame src="navigationbar.html" noresize  
  scrolling=no>
```

```
</frameset>
```



Output of program that includes NORESIZE and SCROLLING attributes

Nested framesets

```
html>
<head><title>Frames 2</title></head>
<frameset cols="140,*">
  <frame name="mainF" src="navigation.html">
    <frameset rows="30%,70%">
      <frame name="upperF" src="intro.html">
        <frame name="lowerF" src="course.html">
      </frameset>
    </frameset>
  </frameset>
</html>
```



navigation.html

- The anchor tag has a `target` attribute
takes the name of the frame used to display the information
- All anchors below are targeted to the "`mainF`" frame

```
html><head><title>Navigation Bar</title></head>
<body><center>
  <a href="course.html" target="mainF">HTML Course</a><br><br>
  <a href="paragraph.html" target="mainF">Paragraphs</a><br>
  <a href="headings.html" target="mainF">Headings</a><br>
  <a href="ulists.html" target="mainF">Unordered lists</a><br>
  <a href="olists.html" target="mainF">Ordered lists</a><br>
  <a href="nlists.html" target="mainF">Nested lists</a><br>
  <a href="intro.html" target="mainF">Home</a><br>
</center></body>
</html>
```

Target _self
 _blank
 "frame name"

Noframes

- Some browsers cannot process frames. Alternative content should be provided using the `noframes` element

```
html>
<head><title>Frames 1</title></head>
<frameset cols="140,*">
  <frame name="navF" src="navigation.html">
  <frame name="mainF" src="intro.html">
</frameset>
<noframes>
  <body>
    Something here for browsers not supporting frames
  </body>
</noframes>
</html>
```