KIIT POLYTECHNIC

LECTURE NOTES

ON

INTERNET AND WEB TECHNOLOGY

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INTERNET BASICS

Data Communications : Data communications are the exchange of data between two devices viasome form of transmission medium such as a wire cable.

Components of Data Communication:

The different components of Data communication are shown in the following figure.

1. Message: The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.

2. Sender: The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.

3. Receiver: The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.

4. Transmission medium: The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves.

5. Protocol: A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices.

Computer Networks :

- ☐ A network is a set of nodes connected by communication links.

- ☐ A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.

Categories of networks

- ☐ Network divided in to three primary categories: LAN, MAN, WAN. In to which category a network falls is determined by its Size, Ownership, Distance it covers, and Physical architecture

  ### 1. Local-Area Network(LAN) :

  - LAN is usually Privately owned and Links devices in single office, building or campus.
  - LAN size is Limited to few kilometres.
  - LANs are designed to allow resources (i.e. hardware or software) to be shared between PCs and workstations.
  - LAN will use a single transmission media.
  - The most common LAN Topologies are Ring, bus, star.
  ### 2. Metropolitan-Area Network (MAN):

  - A MAN is designed to extend over an entire city.
  - It may be single network such as cable television network, or it may be a means of connecting number of LANs in to a larger networks.

▪ A MAN be wholly Owned and operated by a private company, or it may be a Service provider by Public company such as a local telephone company.

3. Wide-Area Network(WAN):

WAN provides long-transmission of data, voice, image and video information over large geographic areas that may comprise a country, a continent or even the whole world.

WAN that is wholly owned and used by a single company is often referred to as an enterprise network.

Application of Computer Network:

- Sharing of resources such as printers
- Sharing of expensive software's and database
- Communication from one computer to another computer
- Exchange of data and information among users via network
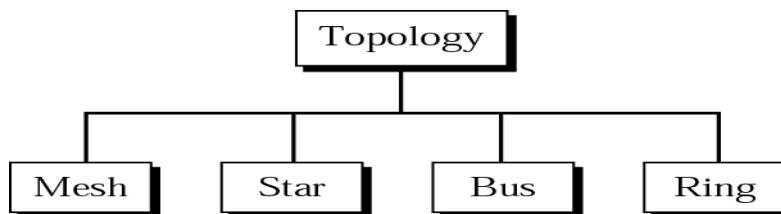- Sharing of informationover geographically   wide areas.

TOPOLOGY:

1. Topology refers to the way in which a network is laid out physically.

2. The topology of a network is the geometric representation of the relationship of all the links and linking devices (usually called nodes) to one another.

Categories of topology:

There are four basic topologies possible.

1. Mesh topology:

1. In a mesh topology, every device has a dedicated point-to-point link to every other device.

2. The term *dedicated* means that the link carries traffic only between the two devices it connects.

3. A fully connected mesh network therefore has **$n(n-1)/2$** physical channels link n devices.

To accommodate that many links, every device on the network must have *n* - 1

input/output (*I/O)* ports to be connected to the other *n* - 1 stations.
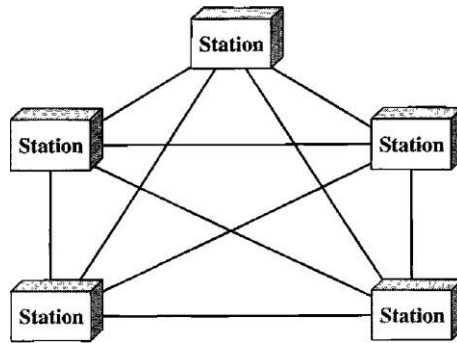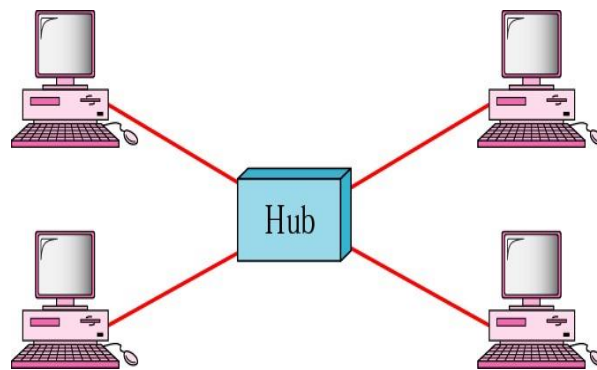

Advantages:

1. The use of dedicated links guarantees that each connection can carry its own data load, thus eliminating the traffic problems
2. A mesh topology is robust. i.e. If one link becomes unusable, it does not incapacitate the entire system.

3. There is the advantage of privacy or security.
4. point-to-point links make fault identification and fault isolation easy.

Disadvantages:

1. Because every device must be connected to every other device, installation and reconnection are difficult.
2. The bulk of the wiring can be greater than the available space (in walls, ceilings, or floors) can accommodate.

2.*Star Topology:*

1. In a star topology, each device has a dedicated point-to-point link only to a central controller, usually called a hub.
2. The devices are not directly linked to one another.
3. A star topology does not allow direct traffic between devices. The controller acts as an exchange: If one device wants to send data to another, it sends the data to the controller, which then relays the data to the other connected devices.

Advantages:

1. A star topology is less expensive than a mesh topology.
2. It is easy to install and reconfigure.
3. Other advantages include robustness
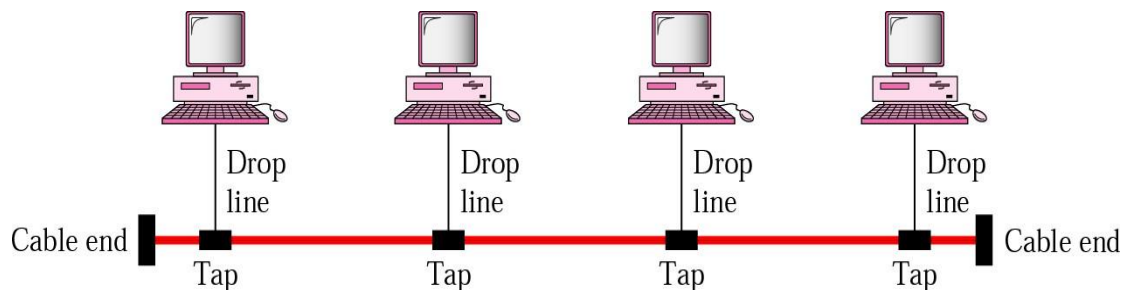
Disadvantage:

> The dependency of the whole topology on one single point, the hub. If the hub goes down, the whole system is dead.

3.Bus Topology:

1. A bus topology, is multipoint connected . One long cable acts as a backbone to link all the devices in a network.

2. Nodes are connected to the bus cable by drop lines and taps. A drop line is a connection

Running between the device and the main cable. A tap is a connector that either splices into the main cable or punctures the sheathing of a cable to create a contact with the metallic core.

Advantages

1. Advantages of a bus topology include ease of installation
2. Bus uses less cabling.

Disadvantages:

1. Difficult reconnection and fault isolation is also difficult.
2. Signal reflection at the taps can cause degradation in quality.

4.Ring topology:

- In a ring topology, each device has a dedicated point-to-point connection with only the two devices on either side of it.
- A signal is passed along the ring in one direction, from device to device, until it reaches its destination.
- Each device in the ring incorporates a repeater. When a device receives a signal intended for another device, its repeater regenerates the bits and passes them along.
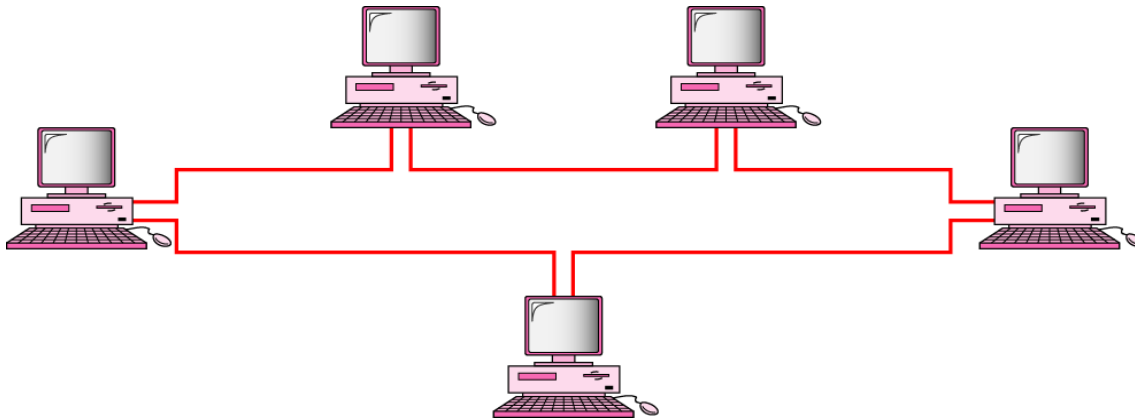
Advantages:

1. A ring is relatively easy to install and reconfigure.
2. Fault isolation is simplified.

Disadvantage:
    Unidirectional traffic can be a disadvantage.

INTERNET

Internet is a worldwide network of networks that uses the standard Internet protocol suite (TCP/IP) to link several billion devices worldwide.

Hardware and software Requirements

To connect to the Internet we need the following four things:

1. A computer

2. A modem and telephone line (if you are using dial up access)
    A data line of some sort (if you are not using dial up access)
3. An Internet browser (software) and software to connect you to the ISP
4. An account with an Internet Service Provider (ISP) Souvenirs

Applications of Internet:

- Sending and receiving email
- Searching and browsing information archives
- Copying files between computers
- Conducting financial transactions
- Navigating (in your car, smart scooter, smart bike, or other)
- Playing interactive games.
- Video and music streaming
- Chat or voice communication (direct messaging, video conferencing) etc.

Intranet

An intranet is a computer network for sharing information, collaboration tools, operational systems, and other computing services within an organization, usually to the exclusion of access by outsiders.

Uses of the intranet:

- Streamlining everyday activities by making repeated tasks more feasible.
- Centralizing and managing important information and company data in a single database.
- Making collaboration easier since information can be shared across the entire network.
- Providing personalized content to employees based on their role within the company.
- Improving internal communication by making employee directories, company news and organization charts readily available.
- Providing fast and easy access to information about company policies, benefits and updates.

Extranet:

The extranet is a private network that uses the internet that allows people outside a business partners, vendors or authorized customers to access business information.

Parameter	Internet	Intranet
Usage	Public	Private
User Types	Any user having dial up of Internet access line.	Organization employees and Internal company departments
Usage	Access all kind of information	Internal employee communication , telephone directories etc.
Security	Low security. Configured under 0 security level in firewall	High security. Configured under 100 security level in firewall
Regulated by	Internet Architecture Board (IAB): Oversees the technical and engineering development of the IETF and IRTF. Internet Corporation for Assigned Names and Numbers (ICANN).	It is regulated by an organization.
Coverage	Wide Area	Within an organization
Access	Large number of users	Limited number of users
System failure	Unpredictable	System availability is high since system is monitored by authority

MODEM

Modem, ("*mo*dulator/*dem*odulator") is electronic device that convert digital data signals into modulated analog signals suitable for transmission over analog telecommunications circuits.

Working principle of MODEM

Modulator:

• This unit is used to convert the digital data from computer into analog data This process is called modulation
• This is done by adding a carrier signal to the digital signal.

Demodulator:

• This unit is used to convert the analog data from telephone system into digital data
• This is done by eliminating the carrier signal from analog signal

Types of modems

Two types of modem
 ☐ **Internal modem:** Internal Modem is modem that plugged directly into the CPU. Physically internal modem in the form of a card that is plugged into one of the expansion slots on the mainboard, usually on the ISA or PCI slot.
 ☐ **External modem:** External Modem is modem that installed outside of the CPU. External modem connected to the CPU via the COM port or USB. This type of modem typically uses separate voltage source in the form of an adapter.

Difference between Internal and External Modem

Internal Modem	External Modem
An internal modem is a modem that fits inside of a computer. Internal modems typically ship with the computer and come pre-installed.	he external modem sits outside the computer. The external modem can be used when a computer is unable to fit an internal modem inside of it.
Low in Price.	Comparatively high in price.
No external accessory has to buy.	In an external modem, RS232 interface cable has to buy.
It is difficult to move the internal modem to another computer.	The external modem can be moved easily.
The internal modem is powered by PC.	The external modem needs plugs into the wall to power on.

Features of Modems:

- **Speed**: The speed at which the modem can send data in bps (bits per second). Typically modem speeds are: 300, 600, 1200, 2400, 4800, 9600, 14.4K, 19.2K, 28.8K bps
- **Auto Dial /Redial**: Smart Modems can dial the phone number and & auto redial if a busy signal is received.
- **Auto Answer**: Most modems can automatically answer the phone when an incoming call comes in. They have Ring Detect capability.
- **Self-Testing:** New modems have self-testing features. They can test the digital connection to the terminal /computer and the analog connection to a remote modem. They can also check the modem's internal electronics.
- **Voice over Data:** Voice over Data modems allow a voice conversation to take place while data is being transmitted. This requires both the source and destination modems to have this feature.
- **Synchronous or Asynchronous Transmission:** Newer modems allow a choice of synchronous or asynchronous transmission of data. Normally, modem transmission is asynchronous. We send individual characters with just start and stop bits. Synchronous transmission or packet transmission is used in specific applications.

Functions of Modems:

- **Data Compression:** Data compression is the ability of the modem to take data in from the computer, reduce it in volume, and then send it out via the modem.

- **Error correction:** Error correction standards provide a way of correcting errors that result from outside interference, such as noise on the phone line. Error correction ensures that data coming out of the receiving modem is exactly the same as data going into the sending modem.
- **Flow Control:** Individual modems send information at different speeds. It's necessary for faster modems to slow down so that slower modems can catch up, otherwise the slower modem will receive more data than it can process.

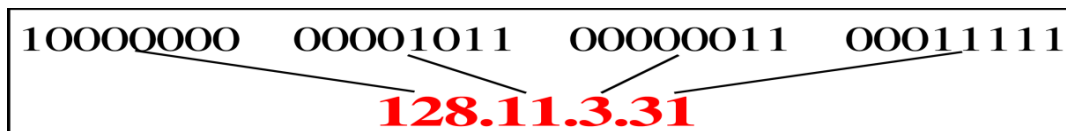<p align="center"><u>IP ADDRESS :</u></p>

- ☐ An IP (Internet Protocol) address is a 32 bit binary number which uniquely identify a node or host connection on an IP network.
- ☐ Each Internet address consists of 4 bytes (32-bits) defining 3 fields: class type, network identification (netid) and host identification (hosted).
- ☐ These parts are of varying lengths, depending on the class of the address
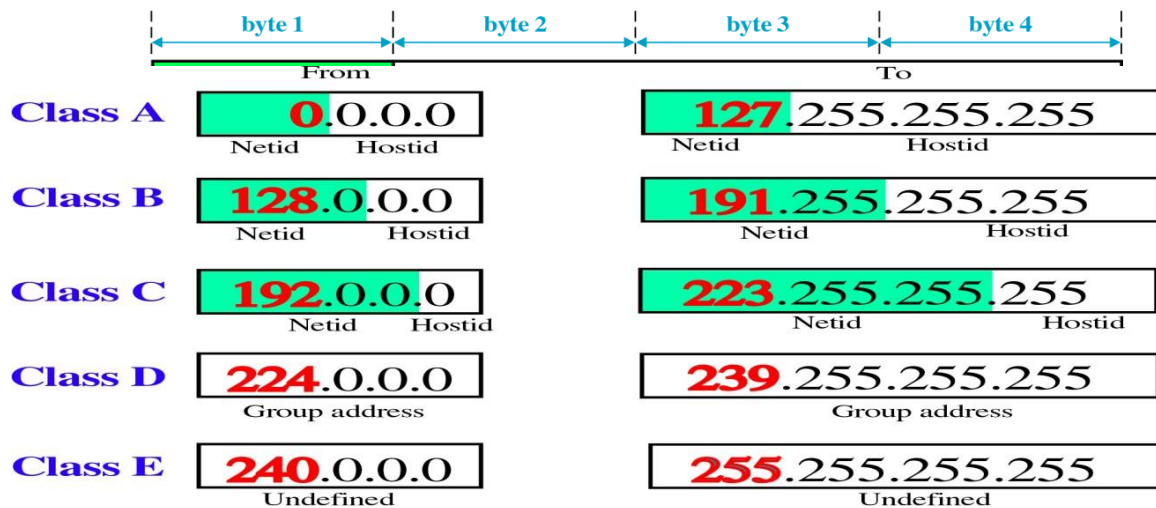
Dotted decimal notation:

- ☐ Machines read the IP address as a stream of 32 bits.
- ☐ However, for human consumption, the IP address is written in dotted decimal notation.
  - – The 32-bit address is divided into 4 groups of 8 bits (an octet or a byte).
  - – Each octet is written as a decimal number ranging from 0 to 255.
  - – The decimal numbers are separated by periods, or dots.

| 10000000 | 00001011 | 00000011 | 00011111 |

128.11.3.31

ADDRESS CLASSES

The designers of the Internet decided to create classes of networks based on network size. For the small number of networks possessing a very large number of nodes, they created the rank *Class A network*. At the other extreme is the *Class C network*, reserved for the numerous networks with a small number of nodes. The class distinction for networks in between very large and very small is predictably called a *Class B network*. How one would subdivide an IP address into a network and node address is determined by the class designation of one's network.

- ☐ There are 5 different address classes (A, B,C,D and E). We can determine which class any IP address is in by examining the first 4 bits of the IP address.

	byte 1	byte 2	byte 3	byte 4
	From		To	
Class A	0.0.0.0 (Netid Hostid)		127.255.255.255 (Netid Hostid)	
Class B	128.0.0.0 (Netid Hostid)		191.255.255.255 (Netid Hostid)	
Class C	192.0.0.0 (Netid Hostid)		223.255.255.255 (Netid Hostid)	
Class D	224.0.0.0 (Group address)		239.255.255.255 (Group address)	
Class E	240.0.0.0 (Undefined)		255.255.255.255 (Undefined)	

- ☐ Class A – C widely used. Class D for multicasting (allows copies of a datagram to be passed to select group of hosts rather than to an individual host.) and class E for future use.**Class Ranges of Internet Addresses**

Class A addresses were designed for large organizations with a large number of attached hosts or routers. Class B addresses were designed for midsize organizations with tens of thousands of attached hosts or routers. Class C addresses were designed for small organizations with a small number of attached hosts or routers.

Flaw in Classful Address

- A block in class A address is too large for almost any organization
- A block in class B is also very large, probably too large for any of the organizations that received a class B block.
- A block in class C is probably too small.
- A and B always wasted. But C is always not enough
- In Overall, classful addressing, a large part of the available addresses were wasted.

Domain Name System (DNS)

- DNS Stands for *Domain Name System* (or *Service* or *Server*).
- It is an Internet service that translates *domain names* into IP addresses.
- Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service musttranslate the name into the corresponding IP address. For example, the domain name *www.example.com* might translate to *198.105.232.4*.

Three main components of DNS

1. Name resolver
2. Name server
3. database of resource records(RRs)

DNS resolver

The client-side of the DNS is called a DNS resolver. It is responsible for initiating and sequencing the queries that ultimately lead to a full resolution (translation) of the resource sought, e.g., translation of adomain name into an IP address.

Name Sever

Server responsible for answering DNS queries

- Exists at all levels of hierarchy.
- Authoritative name servers hold part of the DNS database.
- One name server can serve more then one zone.
- Many name servers "should" serve the same zone.
- Some name servers are authoritative for certain zones.

STRUCTURE

The structure of DNS is hierarchical or tree structure. At the top node is called the root and it is the startof all other branches in the DNS tree. It is designated with a period. Each branch moves down from levelto level. When referring to DNS addresses, they are referred to from the bottom up with the root designator (period) at the far right. Example: "myhost.mycompany.com.".
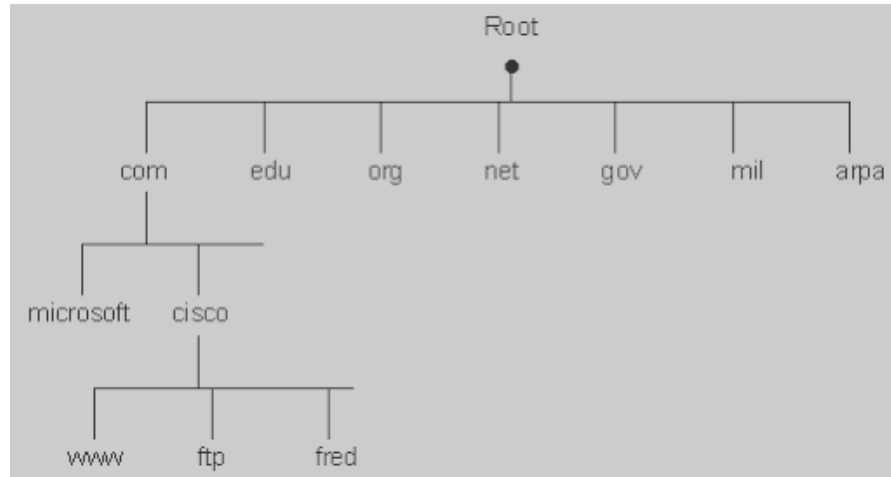
DNS is hierarchical in structure. A domain is a subtree of the domain name space. From the root, theassigned top-level domains in the U.S. are:
- GOV - Government body.
- EDU - Educational body.
- INT - International organization
- NET - Networks
- COM - Commercial entity.
- MIL - U. S. Military.
- ORG - Any other organization not previously listed.

MAPPING OF DOMAIN NAME TO IP ADDRESS

The domain mechanism for making name to addresses consists of a mane server. In name server there is a serverapplication does the work of mapping of domain name to IP address. When the name is translated from client to name server , the task is performed by a client software called name resolver.

FOR EXAMPLE:-

Step 1: Your PC sends a resolution request to its configured DNS Server, typically at your ISP.

Your PC

ISP "Recursive" DNS server
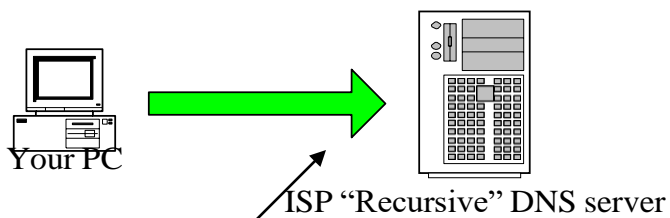
Tell me the Address of "www.google.com

Step 2: Your ISPs recursive name server starts by asking one of the root servers predefined in its

"hints" file

Tell me the Address of "www.google.com"

ISP "Recursive"
DNS server

Root
Servers
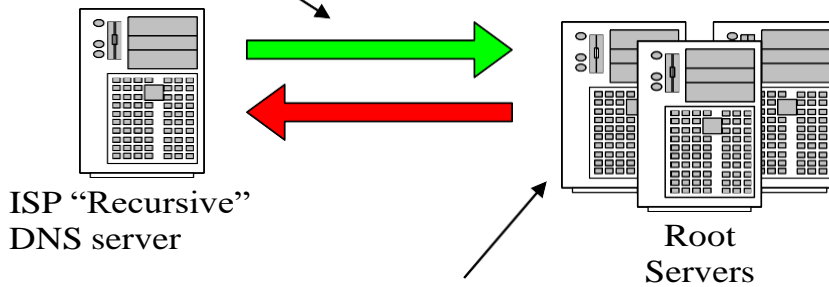
I don't know the address but I know who's authoritative for the"com" domain ask them

Step 3: Your ISPs recursive name server then asks one of the "com" name servers as directed.

Tell me the Address of" www.google.com "

ISP "Recursive"
DNS server

"com" DNS
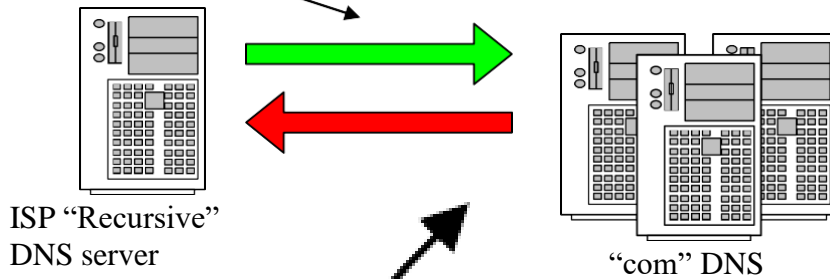
*I don't know the address
but I know who's
authoritative for the
"google.com" domain
ask them*

Step 4: Your ISPs recursive name server then asks one of the "google.com" name servers as directed.

Tell me the Address of "www.google.com"

ISP "Recursive" DNS server   google.com DNS server
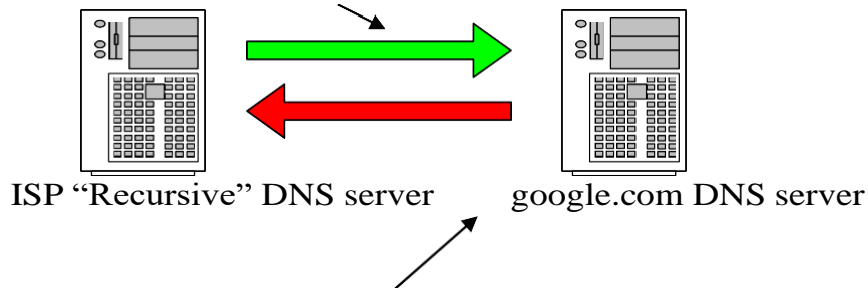
The Address of www.google.com is 216.239.53.99

Step 5: ISP DNS server then send the answer back to your PC. The DNS server will

"remember" the answer for a period of time.
Your PC
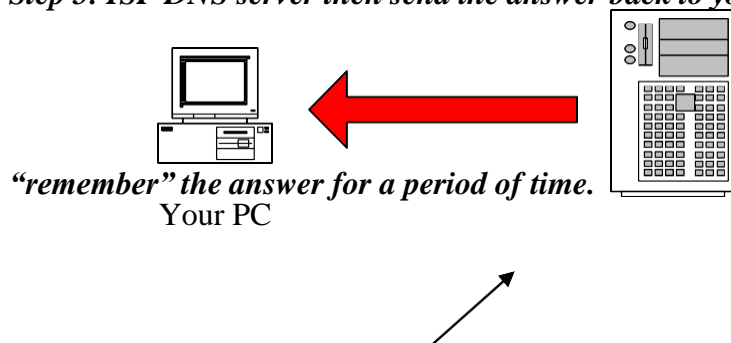
ISP "Recursive" DNS server
The Address of www.google.com is 216.239.53.99

Step 6: Your PC can then make the actual HTTP request to the web server.

Your PC

www.google.com web server
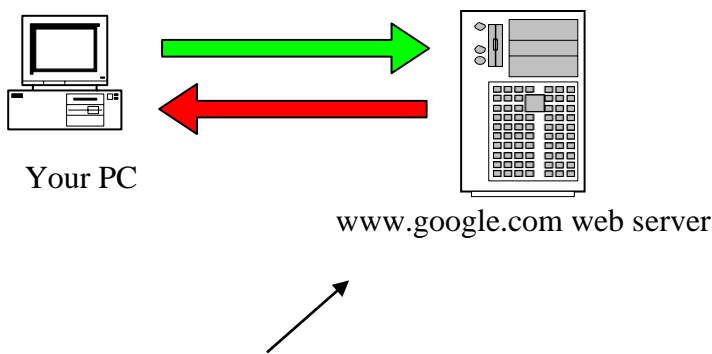
Here it is!

INTERNET SERVICE PROVIDER

An Internet service provider (ISP) is an organization that provides a myriad of services for accessing,using, or participating in the Internet.

Factors to consider when choosing ISP

- **Bandwidth :** Data transferring speed provided by ISP Company**.**
- **Availability :** Availiability of Network & performance to its users
- **COST** : Refers pricing of the connection as well as services
- **Network security :** It is an important issue related to the network over the Internet. Everyone hasits own private information being safe on their servers & nodes.
- **Customer Services** : Better Customer service is highly required an ISP.
- **Location & they need for speed** : It is an also a important factor, when we looking an Internetprovider is the location where we live or work. A better location refers a good level of customers support.

CIDR Notation

CIDR, which stands for Classless Inter-Domain Routing, is an IP addressing scheme that improves theallocation of IP addresses. It replaces the old system based on classes A, B, and C.

How does CIDR work?

CIDR is based on variable-length subnet masking (VLSM). This allows it to define prefixes of arbitrary lengths making it much more efficient than the old system. CIDR IP addresses are composed of two setsof numbers. The network address is written as a prefix, like you would see a normal IP address (e.g.
192.255.255.255). The second part is the suffix which indicates how many bits are in the entire address(e.g. /12). Putting it together, a CIDR IP address would look like the following:

192.255.255.255/12

The network prefix is also specified as part of the IP address. This varies depending upon the number ofbits required. Therefore, taking the example above, we can say that the first 12 bits are the network partof the address while the last 20 bits are for host addresses.

Subnetting

- • Basically without subnetting, most of organization is limited to two levels of hierarchy
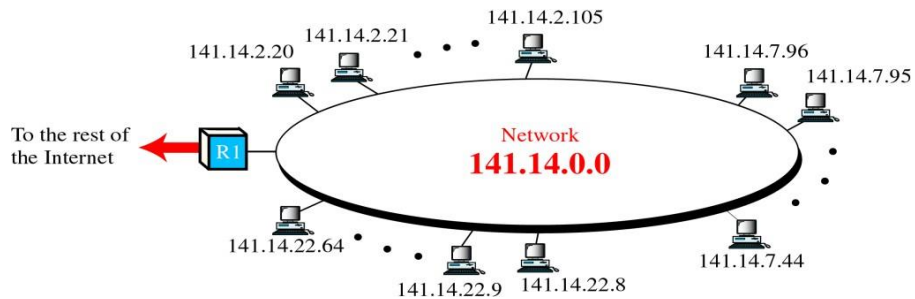
(**A Network with Two Levels of Hierarchy**)

- • In this case, the hosts cannot be organized into groups, and all of the hosts are at the same level.
- • As a result the organization has one network with many many hosts .
- • To make a network more organize, three levels of hierarchy is implemented.
- • Subnetting creates an intermediate level of hierarchy in the IP addressing system. Now we have 3 levels: netid, subnetid, and hostid.
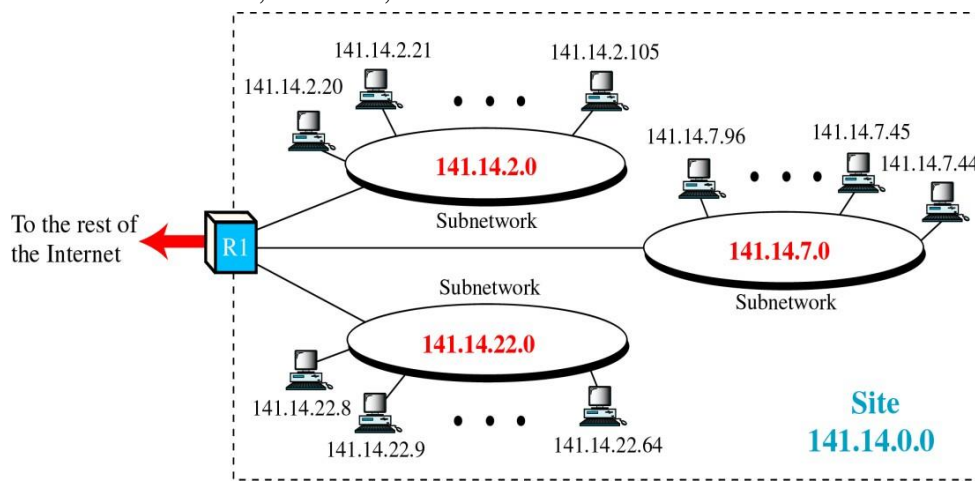
(**A Network with Three Levels of Hierarchy**)
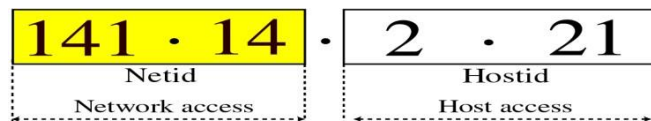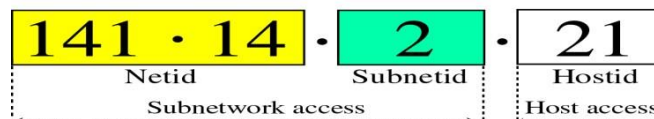
(**Addresses with and without Subnetting**)

Masking

- A process that extracts the address of the physical network from an IP address.
- Masking can be done whether we have subnetting or not.
- If we have not subnetted the network, masking extracts the network address from an IP address.
- If we have subnetted, masking extracts the subnetwork address from an IP address.

141.14.2.21 IP address	Mask 255.255.0.0	141.14.0.0 Network address

a. Without subnetting

141.14.2.21 IP address	Mask 255.255.255.0	141.14.2.0 Subnetwork address

b. With subnetting
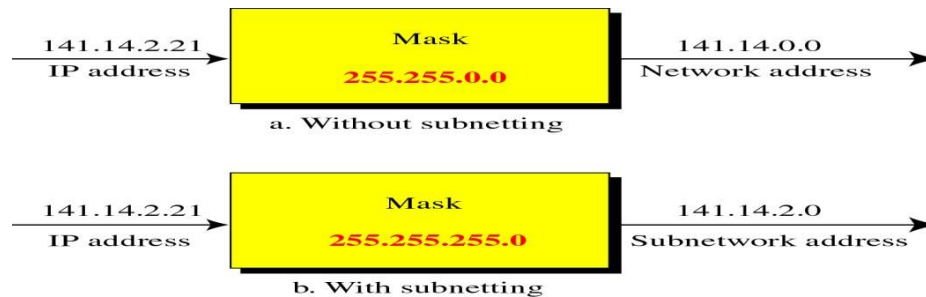
Finding the subnetwork address

To find the subnetwork address , apply the mask to the IP address.

Boundary Level Masking:

If the masking is at the boundary level the mask numbers are either 255 or 0),finding the subnetwork address is very easy. Follow these two rules:

1. The bytes in the IP address that correspond to 255 in the mask will be repeated in the subnetwork address.
2. The bytes in the IP address that correspond to 0 in the mask will change to 0 in the subnetwork address.

Example

IP address	45	.	23	.	21	.	8
Mask	255	.	255	.	0	.	0
Subnetwork address	45	.	23	.	0	.	0

Example

IP address	173	.	23	.	21	.	8
Mask	255	.	255	.	255	.	0
Subnetwork address	173	.	23	.	21	.	0

onboundary Level Masking:

If the masking is not at the boundary level (the mask numbers are not just 255 or 0),finding the subnetwork address involves using the bit-wise AND operator. Follow these two rules:

1. The bytes in the IP address that correspond to 255 in the mask will be repeated in the subnetwork address.
2. The bytes in the IP address that correspond to 0 in the mask will change to 0 in the subnetwork address.
3. For other bytes, use bit-wise AND operator.

Example

IP address	45	.	23	.	21	.	8
Mask	255	.	192	.	0	.	0
Subnetwork address	45	.	64	.	0	.	0

Example

IP address	213	.	23	.	47	.	37
Mask	255	.	255	.	255	.	240
Subnetwork address	213	.	23	.	47	.	32

TCP/IP Protocol Suite

TCP/IP Suite consists of Four layer

1.Network Interface layer:
- It include the function of physical layer and data link layer
- It is the bottom layer of TCP/IP Model lies below the Internet Layer.
- Function of this layer is to connect the Host To Network & inform the upperlayers so that they could start sending the data packets.
- This layer varies from network to network.
- Host To Network Layer protocols
    ➢ SLIP(Serial Line IP)
    ➢ PPP(Point To Point Protocol)

2. Internet Layer :

- The internet layer is exactly same to the network layer of OSI model
- IP is the primary protocol operating at this layer and it provides data encapsulation routing, addressing and fragmentation services to the protocols atthe transport layer above it.
- The fives network layer protocol are as follows:-
- The fives network layer protocol are as follows:-

TCP/IP

Application

Transport

Internet

Network Interface

1. ARP
2. RARP
3. IP
4. ICMP
5. IGMP

- IP is an Important protocol in this layer.

ARP (Address resolution protocol)

- Every machine on internet has one address, these address cannot actually be used for sendingpackets data because data link layer does not understand the internet address.
- ARP Provides an essential services when TCP/IP is running in LAN.

RARP (Reverse Address Resolution Protocol)

- The Reverse Address Resolution Protocol is used to obtain the IP address of a Host basedon Its physical address. That is , it preform a job that is exactly opposite to that of ARP.
- RARP works in a very similar way to ARP. but in the exactly opposite direction , as shown inthe side figure.

Internet Protocol (IP)
- Internet Protocol is very important protocol present in this network layer.
- IP is the protocol responsible for carrying data, generated by nearly all the other TCP/IP protocol,from the source system to its destination .
- IP Features : -
  - Unreliable : IP is unreliable , it means that it does not provide a guarantee that adatagram send from a source computer definitely will arrive at the destination.
  - Connectionless : IP services is similar to the postal service.
- It is possible that the order in which the message are sent and the order in which they arereceived is different.

3.Transport Layer

- The transport layer runs on the top of internet layer and is mainly concerned with transport ofpackets from the source to the destination.

- The main function of transport layer is to deliver packets between the end points.

- In TCP/IP, the transport layer include to protocols : TCP and

  UDP.Comparison between TCP And UDP

Parameter	UDP	TCP
Data Transfer	Data is sent in discrete packages by theapplication.	Data is sent by the application with no particular structure.
Transmissio nspeed	Very High	High but not as high sUDP
Protocol connection setup	Connectionless	Connection oriented
Used	UDP is useful when speedof delivery is critical	TCP is useful for transmission of datawithout error.

4. Application Layer

- The TCP/IP Model Does Not have Session or presentation layer on the top of the transport layer.

- It is just has the application layer. It contains all higher level protocols.

- Higher Level Protocols Used in application layer are as Follows:

- TELNET: - the virtual terminal protocol allows a user on one machine to log onto a distantmachine and work there.

- FTP: - File Transfer protocol provides a way to move data efficiently from one machine toanother.

- SMTP: - Simple mail transfer protocol developed for email transfer.

- DNS: -Domain Name System Protocol is used for mapping the host names onto their networkaddress.

- HTTP: -hyper Text transfer Protocol is used for fetching pages on the world wide web (WWW)and many others.

Comparison Between OSI and TCP/IP

TCP/IP	OSI
Implementation of OSI model	Reference model
Model around which Internet is developed	This is a theoretical model
Has only 4 layers	Has 7 layers
Considered more reliable	Considered a reference tool
Protocols are not strictly defined	Stricter boundaries for the protocols
Horizontal approach	Vertical approach
Combines the session and presentation layer in the application layer	Has separate session and presentation layer
Protocols were developed first and then the model was developed	Model was developed before the development of protocols
Supports only connectionless communication in the network layer	Supports connectionless and connection-oriented communication in the network layer
Protocol dependent standard	Protocol independent standard

UNIT-2
Internet Connectivity & WWW

Different types of internet connectivity:

1) Dial-up Connections:
  - ☐ A dial-up connection allows you to connect to the internet via a local server using a standard 56k modem.
  - ☐ Your PC literally dials (hence the name) a phone number (provided by your ISP) and connects to the server and therefore the internet.

2) Leased Line Connection:
  - ☐ Leased connection is also known as direct Internet access.
  - ☐ It is the secure, dedicated and most expensive, level of Internet connection.
  - ☐ With leased connection, our computer is dedicatedly and directly connected to the Internet using high speed transmission lines.
  - ☐ It is on-line twenty-four hours a day, seven days a week.

3) ISDN
  - ☐ ISDN is acronym of Integrated Services Digital Network. It establishes the connection using the phone lines which carry digital signals instead of analog signals.
  - ☐ There are two techniques to deliver ISDN services:
  - ☐ Basic Rate Interface (BRI)
  - ☐ Primary Rate Interface (PRI)

4) DSL

DSL is acronym of Digital Subscriber Line. It is a form of broadband connection as itprovides connection over ordinary telephone lines.

Following are the several versions of DSL technique available today:
  - ☐ Asymmetric DSL (ADSL)
  - ☐ Symmetric DSL (SDSL)
  - ☐ High bit-rate DSL (HDSL)
  - ☐ Rate adaptive DSL (RDSL)
  - ☐ Very high bit-rate DSL (VDSL)
  - ☐ ISDN DSL (IDSL)

All of the above mentioned technologies differ in their upload and download speed, bit transfer rate and level of service.

ADSL (Asymmetric Digital Subscribers Line) Connections:

The connections work by splitting your phone line into two separate channels, one for data (internet) and one for voice (phone calls), which means you can talk on the phone and be connected to the internet at the same time.

5) Cable connections:
  - ☐ Through the use of a <u>cable modem</u> you can have a broadband Internet connection that is designed to operate over cable TV lines.
  - ☐ Cable Internet works by using TV channel space for data transmission, with certain channels used for downstream transmission, and other channels for upstream transmission.

6) **VSAT(very small aperture terminal):**
   - It is an earthbound station used in satellite communications of data, voice and video signals, excluding broadcast television.
   - A VSAT consists of two parts, a transceiver that is placed outdoors in direct line of sight to the satellite and a device that is placed indoors to interface the transceiver with the end user's communications device, such as a PC.

7) **Wireless Internet Connection**

   Wireless Internet Connection makes use of radio frequency bands to connect to the internet and offers a very high speed. The wireless internet connection can be obtained by either WiFi or Bluetooth.

WORLD WIDE WEB (WWW)

- World Wide Web (WWW) is global, seamless environment in which all information (text, image, audio, video, computational service) are accessible in a consistent and simple way by using a standard set of naming and access convention from internet.
- WWW was initially developed by Tim Berners-Lee and others at CERN, Switzerland.
- It is also called WWW or W3 or Web.

ARCHITECTURE:
- The WWW today is a distributed client/server service, in which a client using a browser
can access a service using a server. However, the service provided is distributed over many locations called *sites*.
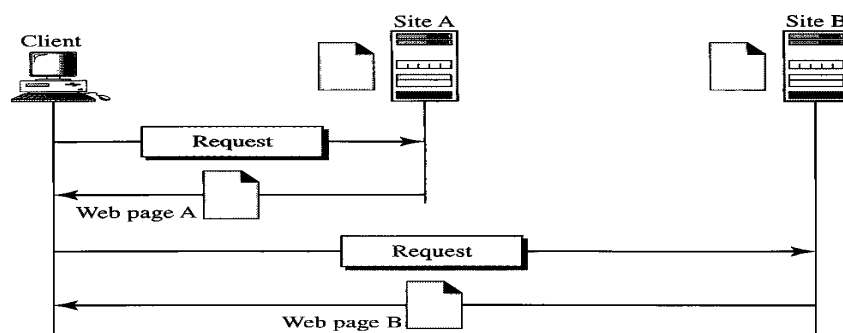
- Each site holds one or more documents, referred to as *Web pages.* Each Web page can contain a link to other pages in the same site or at other sites. The pages can be retrieved
and viewed by using browsers.

Principles of WWW:
- There would be no central control. The web works because people work within the agreed-to guidelines. As part of this the web ethic is that any one publish, and anyone(authorized user) can read information.
- All web servers would use the same protocols/mechanism etc.
- *http* is a fast, stateless, extensible transport mechanism would be used to communicate within the Web.
- httpd or http daemons, would be the base server which receive messages and providing data as requested.
- URLs would be used for network-wide addressing.
- All web browsers would use the same basic language- HTML.

Features of WWW:

The Web has unique features:
1. It is grand globally distributed internet service.
2. It is platform independent.
3. It has GUI features with easy navigability through hypertext and multimedia links.
4. It is interactive, because of search engine has push technology features like Web casting etc.
5. It is continuously expandable and each updated almost by a minute.
6. By processing the Web contents using CGI, Servlets, JavaScript, ASP, and JSP. The services for e-mail, e-com, and m-com are also vi.

APPLICATION LAYER PROTOCOLS

There are several protocols which work for users in Application Layer.Application layer protocols can be broadly divided into two categories:

• Protocols which are used by users. For email for example, E-Mail

• Protocols which help and support protocols used by users. For example DNSFew of Application layer protocols are described below:

1. Hyper Text Transfer Protocol (HTTP) :

The HyperText Transfer Protocol (HTTP) is used to define how the client serverprograms can be written to retrieve web pages from the Web.

• An HTTP client sends a request; an HTTP server returns a response. Theserver uses the port number 80

• HTTP uses the services of TCP. This means that, before any transactionbetween the client and the server can take place, a connection needs to be established between them. After the transaction, the connection should beterminated.

2. Domain Name System:

• DNS Stands for Domain Name System (or Service or Server).

• It is an Internet service that translates domain names into IP addresses.

• Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domainname, therefore, a DNS service must translate the name into the correspondingIP address. For example, the domain name www.example.com might translate to 198.105.232.4.

3. File Transfer Protocol:

☐ File Transfer Protocol (FTP) is the standard mechanism provided by TCP/IP for copying a file from one host to another or transferring filesfrom one system to another.

☐ It is not only a protocol but also a service as well as application.

☐ Some problems in transferring files are two systems may use different filename conventions, two systems may have different ways to represent textand data, two systems may have different directory structures. All these problems have been solved by FTP in a very simple and elegant approach.

4. Simple Mail Transfer Protocol :

☐ This is the method protocol computer use to send messages by messagetransfer agents (MTA) on the internet.

☐ MTA are client & server programs that perform e-mail services such assending or receiving mail for a host computer.

5. TELNET:

- Telnet is a protocol or set of rules that enables one computer to connect another computer. This process is also known as remote login.
- The user computer which initiates connection is referred as local computer and the machine being connected to which accepts the connection is referred as the remote or host computer.

- To start telnet session you must login to the server by entering a valid user name and password.
- Telnet is both TCP/IP application and a protocol for connecting a local computer to a remote computer.
- Telnet operates on client server principle. The local computer uses a telnet client program to establish the connection and display data on local computer monitor.

Web Browser

- Browsers are world Wide Web client side software that enables the user to access resources on the web.
- Each browser usually consists of three parts: a controller, client protocol, and interpreters.
- The controller receives input from the keyboard or the mouse and uses the client programs to access the document.
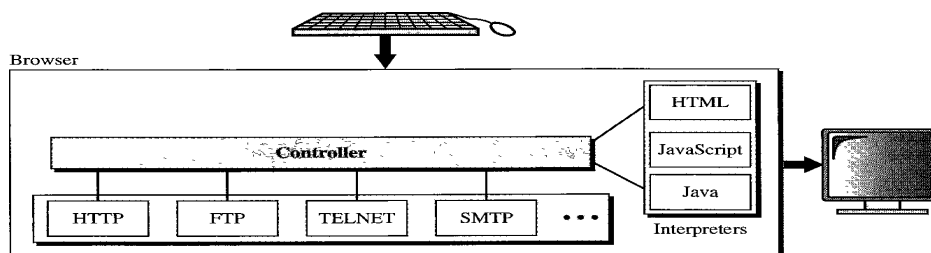
- After the document has been accessed, the controller uses one of the interpreters to display the document on the screen.
- The interpreter can be HTML, Java, or JavaScript, depending on the type of document.

Features of Web Browser

- The most popular browsers have a number of features in common. They allow users to set bookmarks and browse in a private mode. They also can be customized with extensions, and some of them provide a sync service.
- Most browsers have these user interface features:
- Allow the user to open multiple pages at the same time, either in different browser windows or in different tabs of the same window
- Back and forward buttons to go back to the previous page visited or forward to the next one.
- A refresh or reload button to reload the current page.
- As top button to cancel loading the page. (In some browsers, the stop button is merged with the reload button.)
- A home button to return to the user's home page.
- An address bar to input the URL of a page and display it.
- A search bar to input terms into a search engine. (In some browsers, the search bar is merged with the address bar.)
- One of the main feature of a browser is to search the information on the current page as well as search the WWW itself.

☐ Browser give you the facility to save a Web page in a file on your com pull print a Web page on your computer, and send the contents of a Web page e-Mail to others on the Internet.

☐ Few Web browser are complete Internet package, means they come with components like e-Mail client, newsgroup client an HTML composer, telnet client, ftpclient, etc.

☐ Web browser should be able to handle text, images of the World Wide Web, as well as the hyperlinks to digital video, or other types of information.

How Browsers work?

World Wide Web works on the client server model. A user computer works as a client which can receive and send data to the server. When a web page is requested by a user, the browser contacts the requested server (where the website is stored) and by fetching and interpreting the requested files, it displays the web page on the computer screen.

The whole process takes place in these three steps:

1. **Contact to DNS Server**: When a user enters a URL into the address bar and hits enter '', at first browser contacts the DNS server. A DNS server stores the IP addresses of the server associated with the corresponding domain names. The DNS server takes the domain name from the browser and returns the corresponding IP address to the browser.

2. **Contact to Server**: After getting the IP address of the server for the requested webpage, browser sends a request to that server for the desired files.

3 **Rendering** :The entire process followed by a browser from fetching the webpage to displaying it on the screen is called Rendering.

Uniform Resource Locator (URL)

- *Uniform Resource Locator is* the global address of documents and other resources on the World Wide Web.
- The URL defines four things: protocol, host computer, port, and path.

- The *protocol* is the client/server program used to retrieve the document. Many different protocols can retrieve a document; among them are FTP or HTTP.
- The host is the computer on which the information is located, although the name of the computer can be an alias. Web pages are usually stored in computers, and computers are given alias names that usually begin with the characters "www".
- The URL can optionally contain the port number of the server. If the *port* is included,it is inserted between the host and the path, and it is separated from the host by a colon.
- Path is the pathname of the file where the information is located. Note that the path can itself contain slashes.

Example:

http://en.wikipedia.org/wiki/File:Raster_to_Vector_Mechanical_Example.jpg

Absolute vs. relative URLs:

An absolute URL is one that completely specifies the desired resource starting from the root of the resource name space. It is unique, meaning that if two absolute URLs are identical, they point to the same resource.

An example is:
http://en.wikipedia.org/wiki/File:Raster_to_Vector_Mechanical_Example.jpg

A relative URL points to the location of a resource relative to a base URL. It is preceded by two dots *(../directory_path/file.txt)* for the directory above, one dot *(./directory_path/file.txt)* for the current directory or without the beginning slash (directory_path/file.txt) which is also the current directory. No dots *(/directory_path/file.txt)* for the root directory or domain.
Which results to
http://www.webreference.com/directory_path/file.txt

URI

- Uniform Resource Identifier (URI) is a string of characters used to identify a resource
- Such identification enables interaction with representations of the resource over a network, typically the World Wide Web, using specific protocols.
- Schemes specifying a concrete syntax and associated protocols define each URI
- To guarantee uniformity, all URIs follow a predefined set of syntax rules, but also maintain extensibility through a separately defined hierarchical naming scheme (e.g.http://).

URN

URN stands for Uniform Resource Name. URN is also the subset of URI. One of the best examples of URN is ISBN number which is used to uniquely identify a book. URN is completely different than URL as it doesn't include any protocol.

Difference between URL and URI:

URL	URI
URL is used to describe the identity of an item.	URI provides a technique for defining the identity of an item.
URL links a web page, a component of a web page or a program on a web page with the help of accessing methods like protocols.	URI is used to distinguish one resource from other regardless of the method used.
URL provides the details about what type of protocol is to be used.	URI doesn't contains the protocol specification.
URL is a type of URI.	URI is the superset of URL.

Hypertext

- ☐ Hypertext is text which contains links to other texts.
- ☐ By clicking on a link in a hypertext document, a user can quickly jump to different content.
- ☐ The term was coined by Ted Nelson around 1965.

Characteristics of good hypertext

- **Lots of documents:** Much of the hypertext's power comes from its ability to make large quantities of information accessible. If all the text in your system can be printed on ten pages, it would be just as simple to read through it from beginning to end and forget all this hypertext silliness.

  •**Lots of links:**If each document has just one link, then it is little more than normal, sequential text. A hypertext document should present the reader with several links, offering a choice about where to go next. Ideally, a document should present as many relevant links as the reader can easily comprehend and select among.

- **Range of detail:**The great advantage of hypertext is that it permits readers to explore to a breadth and depth that is simply not feasible in print. To make this accessible, available hypertext documents should range from the broadest possible overview of a subject, down to its gritty details**.**
- **Correct links:**This may seem trivial, but it's amazing how many Web links point nowhere. In general, be careful linking to any hypertext document not under your direct control.

Hyperlink

- A hyperlink is a word, phrase, or image that you can click on to jump to a new document or a new section within the current document.
- Hyperlinks are found in nearly all Web pages, allowing users to click their way from page to page.
- When you move the cursor over a hyperlink, whether it is text or an image, the arrow should change to a small hand pointing at the link. When you click it, a new page or place in the current page will open.
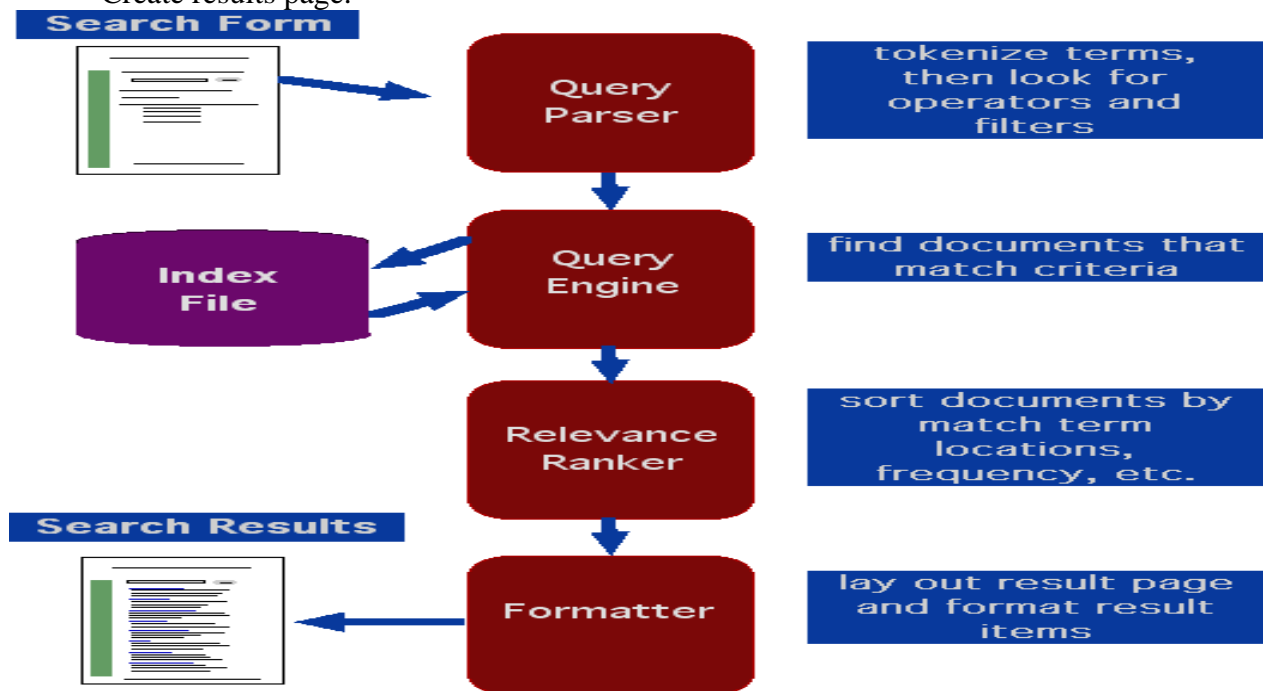
Hypermedia

Hypermedia , an extension of the term hypertext, is a nonlinear medium of information that includes graphics, audio, video, plain text and hyperlinks. This designation contrasts with the broader term multimedia , which may include non interactive linear presentations as well as hypermedia

Search Engine

Search engines are programs that search documents for specified keywordsand returns a list of the documents where the keywords were found.

Search Engine Functions

- Accept query
- Look in index for words that match
- Extract documents that match all criteria.
- Sort by relevance (matches, location, link analysis)
- Create results page.

Search Form

Query Parser — tokenize terms, then look for operators and filters

Index File → Query Engine — find documents that match criteria

Relevance Ranker — sort documents by match term locations, frequency, etc.

Search Results

Formatter — lay out result page and format result items

How does a Search Engine work.

Search engine works by following steps:

- Crawling
- Indexing
- Processing Queries
- Ranking

1. Crawling

- Search engines run automated programs, called "robots" or "spiders" that usethe hyperlink structure of the web to "crawl" the pages and documents that make up the World Wide Web.
- once a new page is found the spider reads the Content & also checks forImages.

2. Indexing

- Once a page has been crawled by robots, its contents can be "indexed" - stored in a giant database of search engines called an "index". This index allows the Search Engine to sort all the documents in fractions of a second.
- This indexed data is stored in encoded format to save space.
-

Contents of index
- Basic information for document or record like
  - File name / URL / record ID
  - Title or equivalent
  - Size, date, MIME type
- Full text of item
- More metadata like
  - Product name, picture ID
  - Category, topic, or subject
  - Other attributes, for relevance ranking and display

3. Processing Queries:
- When a request for information comes into the search engine, the search engine retrieves all the documents from the index and tries to match them with the query.
- A match is determined if the term or phrase is found on the page in the manner specified in the query.
- The search engine found millions of matching information, so it uses an algorithm to decide in which order to display the results.

4. Ranking:
- Once the search engine has determined which results are a match for the query, the engine's algorithm runs calculations on each of the results to determine which is most relevant to the given query.
- They sort these on the results pages in order from most to least relevant so that users can make a choice about which to select.

Common Gateway Interface(CGI)

The Common Gateway Interface CGI) is a specification defining how a program interacts with a Hyper Text Transfer Protocol (HTTP) server.

- The Common Gateway Interface (CGI) provides the middleware between WWW servers and external databases and information sources.

Working of CGI (Common Gateway Interface)
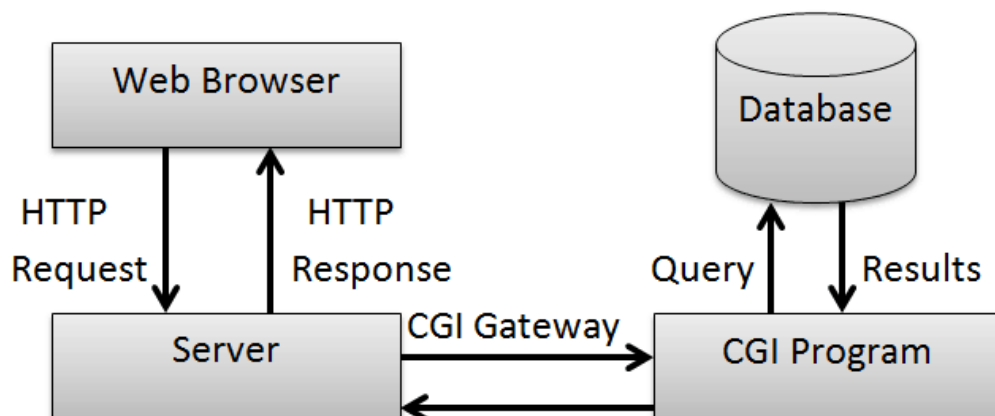
The sequence of events for creating a dynamic HTML document on the fly through CGI scripting is as follows:

1. A client makes an HTTP request by means of a URL. This URL could be typed into the 'Location' window of a browser, be a hyperlink or be specified in the 'Action' attribute of an HTML <form> tag.

2. From the URL, the Web server determines that it should activate the gateway program listed in the URL and send any parameters passed via the URL to that program.

3. The gateway program processes the information and returns HTML text to the Webserver. The server, in turn, adds a MIME header and returns the HTML text to the Web browser.

4. The Web browser displays the document received from the Web server.

PROXY SERVER

A proxy server provides a gateway between users and the internet. It is a server, referred to as an "intermediary" because it goes between end-users and the web pages they visit online.

When a computer connects to the internet, it uses an IP address. This is similar to your home's street address, telling incoming data where to go and marking outgoing data with a return address for other devices to authenticate. A proxy server is essentially a computer on the internet that has an IP address of its own.

Proxy Services

The main purpose of a proxy service is to filter requests to ensure that no dangerous traffic creeps in by applying strict routing rules and to boost the performance of the system. A proxy service works simply – when a proxy service receives a request, for example, to open a Web page, it looks for the already cached pages. If it finds the requested page in the already cached page, it returns it to the user. If the page is not yet cached, proxy service uses its own IP address to fetch the page from the server for the client.

Proxy services are mainly of two types – forward proxy and reverse proxy. Forward proxy is an Internet-facing proxy that is used to retrieve a range of sources. A reverse proxy is particularly used for protection and security of the server. It includes tasks like caching, authentication and decryption. Other types of proxies include transparent proxies, anonymous proxies, DNS proxies and highly anonymous proxies.

Dreamweaver

Dreamweaver is a web development tool.

Developed by Adobe Systems, Dreamweaver is a proprietary web development tool first created by Macromedia in 1997. Dreamweaver helps developers build web sites for the Internet or an intranet, letting developers design, code and manage websites as well as mobile content. It is currently available for OS X and Windows.

Dreamweaver combines a visual design surface, known as Live View, and a code editor with features such as code collapsing, code completion and syntax highlighting.

UNIT-3

Internet Security

INTERNET SECURITY

Internet security is a branch of computer security which comprises various security measures exercised for ensuring the security of transactions done online

In the process, the internet security prevents attacks targeted at browsers, network, operating systems, and other applications.

Types of security

Network layer security

• TCP/IP can be made secure with the help of cryptographic methods and protocols.

• These protocols include Secure Sockets Layer (SSL), succeeded by Transport Layer Security (TLS) for webtraffic, Pretty Good Privacy (PGP) for email, and IPsec for the network layer security.

Internet

Protocol Security (IPsec)

• This protocol is designed to protect communication in a secure manner using TCP/IP.

• It is a set of security extensions developed by the Internet Task force IETF, and it provides

security and authentication at the IP layer by transforming data using encryption.

• Two main types of transformation that form the basis of IPsec : the Authentication Header (AH) and Encapsulating Security Payload (ESP).

• These two protocols provide data integrity, data origin authentication, and anti replay service.

Electronic mail security (E mail)

• Email messages are composed, delivered, and stored in a multiple step process, which starts with the message s composition. When the user finishes composing the message and sends it, the message is transformed into a standard format: an RFC 2822 formatted message

• Afterwards, the message can be transmitted. Using a network connection, the mail client, referred to as a mail user agent (MUA), connects to a mail transfer agent (MTA) operating on the mail server.

• he mail client then provides the sender s identity to the server. Next, using the mail server commands, the client sends the recipient list to the mail server.

• The client then supplies the message. Once the mail server receives and processes the message, several events occur: recipient server identification, connection establishment, and message transmission.

• Using (DNS) services, the sender s mail server determines the mail server(s) for the recipient(s). Then,the server opens up a connection(s) to the recipient mail server(s) and sends the message employing a process similar to that used by the originating client, delivering the message to the recipient(s).

Pretty Good Privacy (PGP)

• Pretty Good Privacy provides confidentiality by encrypting messages to be

transmitted ordata files to be stored using an encryption algorithm such Triple DES

or CAST 128

• Email messages can be protected by using cryptography in various ways, such as the following:
   – Signing an email message to ensure its integrity and confirm the identity of its sender.
   – Encrypting the body of an email message to ensure its confidentiality.
   – Encrypting the communications between mail servers to protect the confidentiality of bothmessage body and message header.

Multipurpose Internet Mail Extensions (MIME)

•MIME transforms non ASCII data at the sender s site to Network Virtual Terminal (NVT) ASCII data anddelivers it to client s Simple Mail Transfer Protocol (SMTP) to be sent through the Internet

• The server SMTP at the receiver s side receives the NVT ASCII data and delivers it to MIME to betransformed back to the original non ASCII data.

Message Authentication Code

• A Message authentication code (MAC) is a cryptography method that uses a secret key to encrypt amessage.

• This method outputs a MAC value that can be decrypted by the receiver, using the same secret keyused by the sender.

• The Message Authentication Code protects both a message s data integrity as well as its authenticity.

Authentication & Authorization

Authentication: It is a process of identifying and verifying who is sending request

Authorization : It is a process to provide access rights to the individuals.

General Process of authentication
   1. The sender obtains the necessary credential.
   2. The sender sends a request with the credential to the recipient.
   3. The recipient uses the credential to verify the sender truly sent the request.
   4. If yes, the recipient processes the request. If no, the recipient rejects the request and respondsaccordingly.

   The following diagram shows a simplified version of an authentication process.
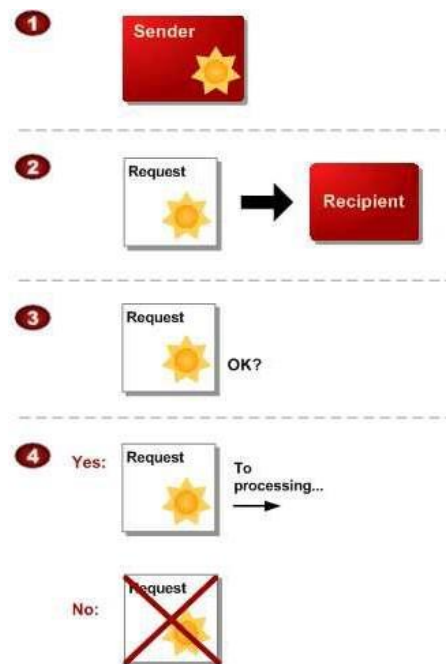
Types of Authentication

Cybercriminals always improve their attacks. As a result, security teams are facing plenty of authentication-related challenges. The list below reviews some common authentication methods used to secure modern systems.

1. Password-based authentication

Passwords are the most common methods of authentication. Passwords can be in the form of a string of letters, numbers, or special characters. To protect yourself you need to create strong passwords that include a combination of all possible options.

2. Multi-factor authentication

Multi-Factor Authentication (MFA) is an authentication method that requires two or more independent ways to identify a user. Examples include codes generated from the user's smartphone, Captcha tests, fingerprints, or facial recognition.

3. Certificate-based authentication

Certificate-based authentication technologies identify users, machines or devices by using digital certificates. A digital certificate is an electronic document based on the idea of a driver's license or a passport.

4. Biometric authentication

Biometrics authentication is a security process that relies on the unique biological characteristics of an individual. Here are key advantages of using biometric authentication technologies:

- Biological characteristics can be easily compared to authorized features saved in a database.
- Biometric authentication can control physical access when installed on gates and doors.
- You can add biometrics into your multi-factor authentication process.

5. Token-based authentication

Token-based authentication technologies enable users to enter their credentials once and receive aunique encrypted string of random characters in exchange. You can then use the token to access protected systems instead of entering your credentials all over again. The digital token proves that you already have access permission.

Firewall

A Firewall is simply a program or hardware device that filters the information coming through theinternet connection into your private network or computer system

The Role of Firewalls

A firewall is a term used for a ``barrier'' between a network of machines and users that operateunder a common security policy and generally trust each other, and the outside world.

There are two basic reasons for using a firewall at present: to save money in concentrating your security on a small number of components, and to simplify the architecture of a system by restrictingaccess only to machines that trust each other.

Firewall components

A firewall is a collection of hardware and software that, when used together, prevent unauthorizedaccess to a portion of a network. A firewall consists of the following components:

- **Hardware:** Firewall hardware typically consists of a separate computer or device dedicated torunning the firewall software functions.

- **Software:** Firewall software provides a variety of applications. In terms of network security, a firewallprovides these security controls through a variety of technologies:

  - Internet Protocol (IP) packet filtering
  - Network address translation (NAT) services
  - SOCKS server
  - Proxy servers for a variety of services such as HTTP, Telnet, FTP, and so forth
  - Mail relay services
  - Split Domain Name System (DNS)
  - Logging
  - Real-time monitoring

Types of Firewalls

Firewalls can be divided into two types: host-based and network-based firewalls
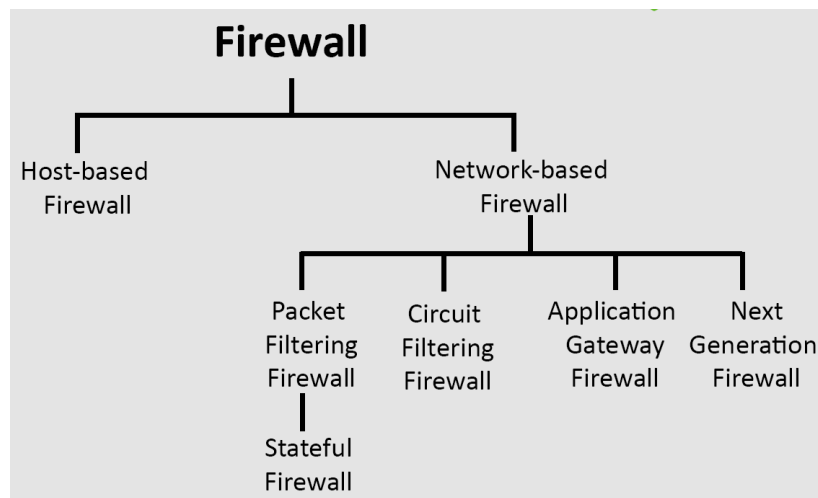
1. Host-based Firewalls

A host-based firewall is installed on each network node, which controls each incoming and outgoing packet. It is a software application or suite of applications that come as a part of theoperating system. Host firewall protects each host from attacks and unauthorized access.

2. Network-based Firewalls

Network firewall functions on the network level by employing two or more network interface cards (NICs). In other words, these firewalls filter all incoming and outgoing traffic across the network byusing firewall rules. A network-based firewall is typically a dedicated system with proprietary software installed.

Firewall categories have evolved over the years. In addition to the above broad classifications,here are the five distinct types of firewalls that continue to play a significant role in network security.

A) Packet filtering firewall

Packet filtering firewalls operate in line at junction points where devices such as routers and switches do their work. These firewalls don't route packets but compare each packet to a set ofestablished criteria — such as the allowed IP addresses, packet type, port number, and other aspects of the packet protocol headers. Packets that are flagged as troublesome are dropped.

B) Circuit-level gateway

Circuit-level gateways monitor TCP handshakes and other network protocol session initiation messages across the network as they are established between the local and remote hosts to determine whether the session being initiated is legitimate, whether the remote system is considered trusted. They don't inspect the packets themselves. However, they provide a quickway to identify malicious content

KIIT POLYTECHNIC

C) Stateful inspection firewall

State-aware devices examine each packet and keep track of whether that packet is part of anestablished TCP or other network sessions. Such provision offers more security than packet filtering or circuit monitoring alone but takes a greater toll on network performance.

Another variant of stateful inspection is the multilayer inspection firewall, which considers the flowof transactions in process across multiple protocol layers of the seven-layer open systems interconnection (OSI) model.

D) Application-level gateway

Application-level gateway, also known as a proxy or a proxy firewall, combines some of the attributes of packet filtering firewalls with those of circuit-level gateways. They filter packets according to the service they are intended for (specified by the destination port) and certain othercharacteristics, such as the HTTP request string.

E) Next-generation firewall (NGFW)

NGFW combines packet inspection with stateful inspection, including a variety of deep packet inspection, along with other network security systems, such as intrusion detection/prevention,malware filtering, and antivirus.

Advantages of firewall:

- Concentration of security all modified software and logging is located on the firewall system asopposed to being distributed on many hosts;
- Protocol filtering, where the firewall filters protocols and services that are either not necessary or thatcannot be adequately secured from exploitation;
- Information hiding, in which a firewall can ``hide'' names of internal systems or electronic mailaddresses, thereby revealing less information to outside hosts;
- Application gateways, where the firewall requires inside or outside users to connect first to the firewallbefore connecting further, thereby filtering the protocol;

Disadvantages of firewall

- The most obvious being that certain types of network access may be hampered or even blocked forsome hosts, including telnet, ftp, X Windows, NFS, NIS, etc.
- A second disadvantage with a firewall system is that it concentrates security in one spot as opposed todistributing it among systems, thus a compromise of the firewall could be disastrous to other less protected systems on the subnet.

Internet & Web Technology   36   *Abhaya Kumar Panda*

Encryption and Decryption

Encryption: Encryption is a process of encoding a message so that its meaning is not
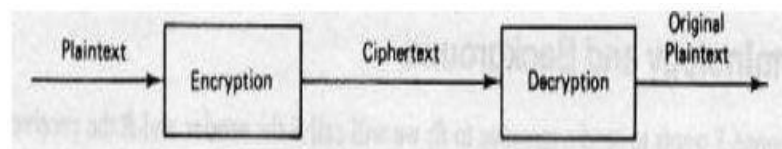
obviousplaintext to ciphertext:encryption

$$C = E(P)$$

Decryption : The conversion of encrypted data into its original form is called Decryption. It isgenerally a reverse process of encryption.

ciphertext to plaintext:decryption:

$$P = D(C)$$

requirement: $P = D(E(P))$

- Encoding : It is the process of translating entire words or phrases to other words or phrases
- Enciphering : It is the process of translating letters or symbols individually
- Encryption : it is the group term that covers both encoding and enciphering

The Elements of Encryption

There are many different ways that you can use a computer to encrypt or decrypt information.Nevertheless, each of these so-called encryption systems share common elements:

Encryption algorithm: The encryption algorithm is the function, usually with some mathematicalfoundations, which performs the task of encrypting and decrypting your data.

Encryption keys: Encryption keys are used by the encryption algorithm to determine how data is encrypted or decrypted. Keys are similar to computer passwords: when a piece of information isencrypted, you need to specify the correct key to access it again.

Plaintext: The information which you wish to encrypt.

Ciphertext: The information after it is encrypted.

Encryption Techniques:

1. Symmetric key encryption
2. Asymmetric key encryption

Symmetric key encryption

•In this encryption techniques, Sender and recipient share a common key

• All traditional schemes are symmetric / single key / private key encryption

algorithms, witha single key , used for both encryption and decryption, since both

sender and receiver are equivalent, either can encrypt or decrypt messages using that

common key.

Requirements

•Two requirements for secure use of symmetric encryption:

–a strong encryption algorithm

–a secret key known only to sender
/receiver

$$Y = EK(X)$$

$$X = DK(Y)$$

Here, plaintext X, cipher text Y,
key K,encryption algorithm Ek,
decryption algorithmDk.
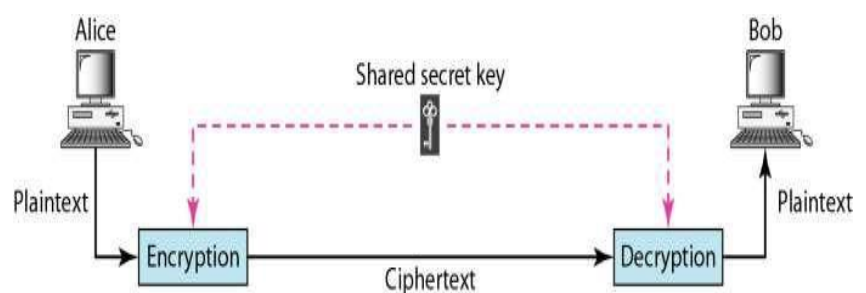
•Assume encryption algorithm is known

•Implies a secure channel to distribute key

• Symmetric encryption is generally more efficient than asymmetric encryption and therefore
preferredwhen large amounts of data need to be exchanged.

Advantages:
• It is Simple to implement
• It is Faster

Disadvantages:
• Key must exchanges in secure way
• Easy for hacker to get a key as it is passed in unsecure way.

Asymmetric encryption

•Asymmetric encryption use two keys, one to encrypt the data, and another key to decrypt the data.

•These keys are generated together

•.One is named as Public key and is distributed freely. The other is named as Private Key and it iskept hidden.

•Both Sender & Recipient has to share their Public Keys for Encryption and has to use their PrivateKeys for Decryption.
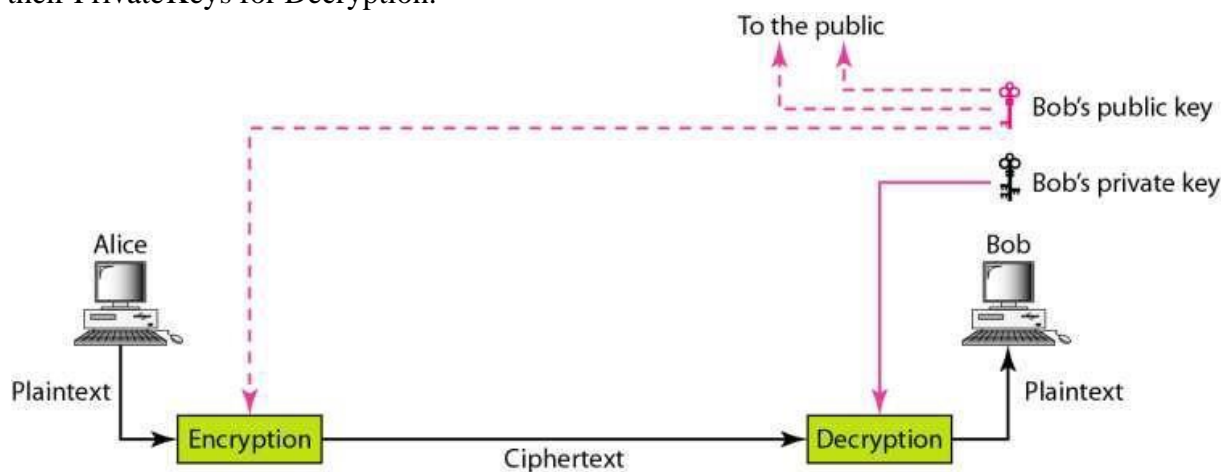
Advantages

1. It is More Secured
2. It is provides more Authentication

Disadvantages

It is Relatively Complex to implement.

Difference between Symmetric key encryption and Asymmetric keyencryption

Characteristic	Symmetric Cryptography	Asymmetric Cryptography
Key used for encryption/decryption	Same key is used	One key is used for encryption and another for decryption
Speed of encryption/decryption	Very fast	Slower
Size of resulting encrypted text	Usually same as or less than the original plaintext size	More than the original plaintext size
Known keys	Both parties should know the key in symmetric key encryption	One of the keys is known by the two parties in public key encryption
Usage	Confidentiality	Confidentiality, Digital signature

UNIT-4

Internet Application

ELECTRONIC MAIL (E-Mail):-

Internet provides main communication services that are E-Mail, Newsgroup (Usenet).

E-Mail :- E-mail is a private communication between two parties who have accounts on internet.

Advantages:-

➢ It is faster, easier.
➢ E-mail is more convenient than traditional mail.
➢ E-mail is cheap.
➢ It is
flexible.

E-mail Networks:-

Data and messages can be transmitted from one computer to another using telephone lines, microwave links, communication satellites or other telecommunication equipments.

The same message can be sent to a number of different addresses.

E-mail is sent through a company's local area network or beyond through a nationwide communication network.

E-mail services use a central computer to store messages and data and route them to their intended destination with a subscription to a public network and individual PC. It needs only is modem and a telephone to send and receive written or vocal message.

E-Mail clients:-

If you are accessing the internet at home through an ISP you will need a program which can send and receive E-mail. This is known as E-mail client.

Example:-

Microsoft's Outlook
ExpressNetscape Mail

Structure / format of mail:-

➢ E-mail address
➢ Header
➢ Body
➢ Signature
➢ Attachment

Header:-

The e-mail header contains from and to addresses and the subject and date of themessage. This information is in a standardized format.

Body:-

The body of a piece of E-mail is usually just the message typed by the sender.

Signature:-

People often append a signature to the body of the E-mail. This makes easy for the receiver to find information on the sender.

Attachment:-

You can send more than simple text in your E-mail message. You can also attach computer documents including word processor, spreadsheet, graphics and video files to an E-mail message.

Protocols of E-mail:-

1- POP3 (Post Office Protocol 3):-
POP3 is a protocol that define how e-mail messages are to be retrieved from a mail server. POP3 is one of the two protocol that a PC mail should be able to use if it is tosend and receive e-mail over the internet.
SMTP & POP3 can share information with each other. So we don't need to use the same e-mail client.

2- SMTP (Simple Mail Transfer Protocol) :-
This is the method protocol computer use to send messages by message transfer agents (MTA) on the internet.
MTA are client & server programs that perform e-mail services such as sending or receiving mail for a host computer.

3- MIME (Multipurpose Internet Mail Extension):-
It represents a standard for describing data types. It gives information about data.
It was designed as an extension to the simple mail transfer protocol allowing people to send binary data.   A particular MIME type is a pair of elements deliminated by "/". The 1st element describes the type of data and 2nd element describe the formatof data.
Example:-
Text/ HTML
Image/JPEG
Video/
MPEG

4- IMAP (Internet Message Access Protocol):-
- It is a method of accessing e-mail or bulletin board messages that have kept on a mail server.
- The latest version, *IMAP4,* is similar to *POP3* but supports some additional features.
- For example, with IMAP4, you can search through your e-mail messagesfor keywords while the messages are still on mail server.
- In other words, it permits a client in a program to access remote message storesas if they were local.

Example:-
E-mail stored in a IMAP server can be manipulated from a desktop computer at home, a work station at office and a notebook computer while travelling without the need to transfer messages or files back and forth between these computers.

TELNET (Terminal Network):-

- Telnet is a protocol or set of rules that enables one computer to connect another computer. This process is also known as remote login.
- The user computer which initiates connection is referred as local computer and the machine being connected to which accepts the connection is referred as the remote or host computer.
- To start telnet session you must login to the server by entering a valid user name and password.
- Telnet is both TCP/IP application and a protocol for connecting a local computer to a remote computer.

- Telnet operates on client server principle. The local computer uses a telnet client program to establish the connection and display data on local computer monitor.
- The remote or host computer uses a telnet server program to accept the connection and sends response to request for information back to the local computer.
- The telnet application acts as a terminal emulator i.e. whatever commands are typed in local computer are sent across the network for the execution by the remote computer.

File Transfer Protocol (FTP)

- File Transfer Protocol (FTP) is the standard mechanism provided by *TCP/IP* for copying a filefrom one host to another or transferring files from one system to another.
- It is not only a protocol but also a service as well as application.
- Some problems in transferring files are two systems may use different file name conventions, twosystems may have different ways to represent text and data, two systems may have different directory structures. All these problems have been solved by FTP in a very simple and elegant approach.

FTP Server and FTP Client:
- In host computer program called a FTP server, when the server or host is one that uses the FTPfor transferring files to client.
- A FTP client is a user program that downloads a file from the server.
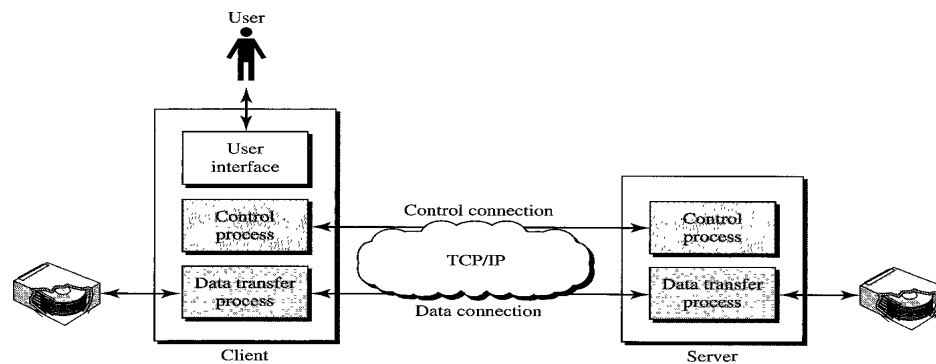
- FTP establishes two connections between the hosts. One connection is used for data transfer, theother for control information (commands and responses). So separation of commands and data transfer makes FTP more efficient.
- FTP uses two well-known TCP ports: Port 21 is used for the control connection,and port 20 is used for the data connection.
- The client has three components: user interface, client control process, and the client data transferprocess.
- The server has two components: the server control process and the server data transfer process.The control connection is made between the control processes. The data connection is made between the data transfer processes.
- The control connection remains connected during the entire interactive FTP session. The data connection is opened and then closed for each file transferred. It opens each time commands that involve transferring files are used, and it closes when the file is transferred.**Types of FTP:**

In networking, the FTP is divided in to two types according to role of the FTP Server:
1. Active FTP
2. Passive FTP

1. **Active FTP***:*
If we maintaining a active FTP server, the FTP Server is the active part during the wholesession. When a client starts an active FTP Session, the server will initiate data transfer.

Passive FTP*:*
Passive FTP requires the client to be the active part, i.e. once control session is established it will ask for aport with which data connection will take place, and finally initiate data connection with the port received. Passive FTP is considered more secure than active FTP.

Newsgroup

A newsgroup is an online discussion forum accessible through Usenet. Each newsgroup contains discussions about a specific topic, indicated in the newsgroup name. You can browse newsgroups andpost or reply to topics using a newsreader program. Access to newsgroups also requires a Usenet subscription.

Newsgroups may be either moderated or unmoderated. In a moderated newsgroup, a moderator must approve posts in order for them to become part of the discussion. In an unmoderated group, everythingposted is included in the discussion. Some newsgroups may also use bots to moderate the content, automatically eliminating posts that are deemed offensive or off topic.

Chat rooms

Chat rooms are Web sites or programs that allow people to send text messages to one another in real time.The chat room works as a virtual room, where groups of people send messages that others can read instantaneously.

IRC (Internet Relay chart):-

i)   IRC is form of real time internet charge or synchronous conferencing. It is mainly designed for group communication in discussion forums called channel.

ii)   It also allows one to one communication via private message, as well as chart and data transfer via client to client.

IRC Channel:IRC establish a communication IRC session, is called an IRC channel.**IRC Network:-** There are thousands of IRC networks in the world. They run various implementation of IRC server and are administered by various group of IRC operator.

IRC Server: An IRCD (Internet Relay Chart Daemon) is a server software that implement the

IRCprotocol, which enables people to talk with each other via internet.

Video conferencing

Videoconferencing (or video conference) means to conduct a conference between two or more participants at different sites by using computer networks to transmit audio and video data. For example, a point-to-point (two-person) video conferencing system works much like a video telephone. Each participant has a video camera, microphone, and speakers mounted on his or her computer. As the two participants speak to one another, their voices are carried over the network and delivered to the other's speakers, and whatever images appear in front of the video camera appear in a window on the other participant's monitor

E-COMMERCE

- E-COMMERCE ☐ Commonly known as Electronic Marketing.
- It consist of buying and selling goods and services over an electronic systems Such as the internet and other computer networks. ☐
- E-commerce is the purchasing, selling and exchanging goods and services over computer networks (internet) through which transaction or terms of sale are performed Electronically.

THE PROCESS OF E-COMMERCE

- A consumer uses Web browser to connect to the home page of a merchant's Web site on the Internet. ☐ The consumer browses the catalog of products featured on the site and selects items to purchase. The selected items are placed in the electronic equivalent of a shopping cart.
- When the consumer is ready to complete the purchase of selected items, she provides a bill-to and ship-to address for purchase and delivery
- When the merchant's Web server receives this information, it computes the total cost of the order including tax, shipping, and handling charges-and then displays the total to the customer.
- The customer can now provide payment information, such as a credit card number, and then submit the order.
- When the credit card number is validated and the order is completed at the Commerce Server site, the merchant's site displays a receipt confirming the customer's purchase.
- ☐The Commerce Server site then forwards the order to a Processing Network for payment processing and fulfilment

TYPES OF E-COMMERCE

1. **BUSINESS-TO-BUSINESS (B2B) :**
   - ☐ B2B stands for Business to Business. It consists of largest form of Ecommerce. This model defines that Buyer and seller are two different entities. It is similar to manufacturer issuing goods to the retailer or wholesaler.
   - ☐ E.g.:-Dell deals computers and other associated accessories online but it is does not make up all those products. So, in govern to deal those products, first step is to purchases them from unlike businesses i.e. the producers of those products.

2. **BUSINESS-TO-CONSUMER (B2C):**
   - ☐ It is the model taking businesses and consumers interaction. The basic concept of this model is to sell the product online to the consumers.
   - ☐ B2C is the direct trade between the company and consumers. It provides direct selling through online. For example: if you want to sell goods and services to customer so that anybody can purchase any products directly from supplier's website.

3. **BUSINESS-TO-EMPLOYEE (B2E) :**
   - ☐ Business-to-employee (B2E) electronic commerce uses an intra business network which allows companies to provide products and/or services to their employees.
   - ☐ Typically, companies use B2E networks to automate employee-related corporate processes.

4. **CONSUMER-TO-CONSUMER (C2C) :** There are many sites offering free classifieds, auctions, and forums where individuals can buy and sell thanks to online payment systems.

5. **M-COMMERCE (MOBILE COMMERCE)**
   - ☐ M-commerce (mobile commerce) is the buying and selling of goods and services through wireless handheld devices such as cellular telephone and personal digital assistants (PDAs).
   - ☐ Known as next-generation e-commerce, mcommerce enables users to access the Internet without needing to find a place to plug in.

Advantages of E-Commerce:

- ☐ No checkout queues.
- ☐ Reduce prices.
- ☐ ☐You can shop anywhere in the world.
- ☐ Easy access 24 hours a day.
- ☐ Wide selection to cater for all consumers.

Disadvantages of E-Commerce:

- ☐ Unable to examine products personally.

- ☐ Not everyone is connected to the Internet.

- ☐ There is the possibility of credit card number theft.

UNIT-5

Website Classifications

Websites

- Website is a collection of related web pages that may contain text, images, audio and video.
- The first page of a website is called home page. Each website has specific internet address (URL) that you needto enter in your browser to access a website.
- Website is hosted on one or more servers and can be accessed by visiting its homepage using a computernetwork.
- A website is managed by its owner that can be an individual, company or an organization.
- A website can be of two types:
  - o Static Website
  - o Dynamic Website

Static Websites

- A static website contains Web pages with fixed content.
- Each page is coded in HTML and displays the same information to every visitor.
- Static sites are the most basic type of website and are the easiest to create.
- A static site can be built by simply creating a few HTML pages and publishing them to a Web server
- Since static Web pages contain fixed code, the content of each page does not change unless it is man
- This works well for small websites, but it can make large sites with hundreds or thousands of pages difficult tomaintain updated by the webmaster.

Advantages of the Static Website

1) It is quick to develop.

2) It is cheaper to develop.

3) It is easier to host.

4) It is ideal for small websites.

5) It is easier for search engines to index.

6) It is faster to transfer on slow

connections.

Disadvantages of static website:

1) It may cost more for long run.

2) For any changes you'll need to wait until your web designer has time to make the changes.

3) Limited functionality

4) Website editors need significant training and skills to develop the web site to modernday standards andpractices. This is often time consuming, expensive and ongoing.

Dynamic Website

- A dynamic website contains information that changes, depending on the viewer, the time of the day, thetime zone, the viewer's native language, and other factors.
- Dynamic websites contain Web pages that are generated in real-time.
- These pages include Web scripting code, such as PHP or ASP.
- When a dynamic page is accessed, the code within the page is parsed on the Web server and the resultingHTML is sent to the client's Web browser.
- The word "parse" means to analyze an object specifically.
- Most large websites are dynamic, since they are easier to maintain than static websites. This is because static pages each contain unique content, meaning they must be manually opened, edited, and publishedwhenever a change is made.
- Dynamic websites that access information from a database are also called database-driven websites.
- Dynamic pages, on the other hand, access information from a database. Therefore, to alter the content of adynamic page, the webmaster may only need to update a database record.

Advantages :

1. Restructuring of dynamic websites is simpler, so ensuring its longevity

2. Access to be able to content manage the web site from any laptop, anyplace in the world (that has web connection)

3. Website content contributors/editors only need basic content editing skills

4. Multiple user access for updating/content managing – Users or employees who are 'experts' in their subject will add information to their relevant section of the web site.

5. A Dynamic web site permits you to archive past material on a certain date or permits an item to be revealed or removed at a certain date automatically.

6. As the content is held within a database it permits the user to search the information for content, also a website map is automatically generated as content is added.

Disadvantages

1) For smaller firms a Dynamic web site might be too expensive or seen as unnecessary that the investment maynot be even

2) Slightly longer initial development time.

3) Cost of implementing training of Content management system to Client.

Differences between static websites and dynamic websites

Static website	Dynamic website
A static website contains information that does not change. It remains the same, or static, for every viewer of the site.	A dynamic website contains information that changes, depending on the viewer, the time of the day, the time zone, the viewer's native language, and other factors.
It requires HTML, CSS and JavaScript.	It requires HTML, CSS and JavaScript as well as PHP or ASP.Net or JSP and database MySQL, SQL,Oracle.
Easy to develop and a bit experienced people can develop it.	websites not easy to develop because require qualify developers to develop it.
It never uses database connectivity.	It deals with database and generate the contents dynamically using database queries.
Websites are highly secure than dynamic sites because it behaves as a half duplex approach so only one way communication is possible i.e. server to client.	Websites are less secure because it behaves as full duplex approach so both side communications is possible so user can change the server data.

Web portal

• A web portal is a specially designed website that often serves as the single point of access for information.

• It can also be considered a library of personalized and categorized content.

• A web portal helps in search navigation, personalization, notification and information integration, and often provides features like task management, collaboration, and business intelligence and application integration.

Classification of Web portal

Web portals are classified as horizontal or vertical.

• A horizontal portal is used as a platform to several companies in the same economic sector or to the same type of manufacturers or distributors

. ☐ A vertical portal (also known as a "vortal") is a specialized entry point to a specific market or industry niche, subject area, or interest. Some vertical portals are known as "vertical information portals" (VIPs). VIPs provide news, editorial content, digital publications, and e-commerce capabilities.

Social Networking Site (SNS)

• A social networking site is an online platform that allows users to create a public profile and interact with other users.

• Social networking sites usually allow a new user to provide a list of people with whom they share a connection, and then allow the people on the list to confirm or deny the connection.

• After connections are established, the new user can search the networks of connections to make more connections.

Pros of Social Networking Sites

• Social networking gives you a chance to connect with people around the world.

• This technology gives us access to easy, instant communication tools.

• Social networking creates brand exposure for businesses.

• The possibility of unlimited communication with other users.

• Real-time access to news and important information.

• Social networking reduces feelings of loneliness.

Cons of Social Networking Sites

• Risks of Fraud or Identity Theft

• Time Waster

• Corporate Invasion of Privacy

• It creates an association with depression with frequent use.

• Social networking can lower productivity levels and academic performance

RSS FEEDS

RSS (Really Simple Syndication)

• RSS is a type of web feed that allows users and applications to receive regular updates from a website or blog of their choice.

• The acronym RSS stands for Really Simple Syndication or Rich Site Summary. It is sometimes referred to as the feed or RSS feed.

•In the early days of internet, if you wanted to keep track of updates on your favorite website, then you had to bookmark it and then manually visit to see if there were any updates.
• RSS feed solved that problem by allowing users to keep track of their favorite websites without having to manually visit the website each time.

• RSS allows bloggers and publishers to automatically syndicate their content, so that people can read it in their email, feed reader and other devices.

How Does RSS Feed Work?

• RSS feeds work by publishing your latest content in a structured XML document. This feed contains your full articles or the summary, and metadata for each item like date, author, category, etc.

• This XML document can then be fetched and read with a RSS feed reader. There are many RSS feed reader software available for all operating systems, desktops, and mobile devices.

• All WordPress blogs come with built-in support for RSS feeds. By default, each page of your WordPress site contains a meta tag that points to your website's RSS feed location.

• You can disable RSS feeds in WordPress, but continue reading and you might change your mind about disabling them.

What are The Benefits of RSS?

• RSS makes it easy for users to subscribe to your content. Using an RSS feed, they can receive updates from your blog or website directly in their feed readers, desktop applications, and many other devices.

• Subscribers don't have to remember your website URL because they can bring the content into a central location where they like to read all of their favorite websites at once.

• Your content also becomes portable, and your subscribers can even take it with them for offline reading.

• RSS feeds help you build and nurture a loyal following around your blog. RSS subscribers are more likely

to share your content on social media. Many of our readers automatically tweet every new WPBeginner article using RSS feed.

•

How to Use RSS Feeds to Read Your Favorite Websites?

• You can subscribe to RSS feeds by using apps called feed readers. There are many free feed readers available on themarket for all popular operating systems and devices.

• Following are just a few of the top RSS feed reader apps that you can use. • Feedly – (Web, Browser Add-ons, iOS,Android, Kindle)

• Innoreader – (Web, Android, iOS)

• The Old Reader (Web, Mac, Windows, Android, iOS, and more)

• Bloglovin' (Web, Android, iOS)
<u>Blog</u>

A Blog is an abbreviated word used for term "Weblog", This is a word used to describe different type of Websites andPortals specific which share information on topics or wider categories. It usually includes Features like Blog Posts, Videos, Comments, Links to other websites, Widgets, etc.

<u>Blogging</u>

Each and every skill you need to run and a Blog is called blogging. includes Skills Like manage Blogging Engine Optimization, Social Search Media Marketing, Writing, Editing and Publishing Posts, Designing and Maintaining theDesign of your Website, etc.

Things Needed for a Blog:

1. **Domain Name**

 Domain name is a name people use to reach your website or Blog just like www.customizeblogging.com is a Domain name and you reach Blogging game by entering that URL in your browser's Web AddressBar. You can register a Domain name by going to any Domain name registrar's website and choosing a domain name and yes you if that nameis already registered you have to choose another one.

2. **Web Hosting**
   You need a Computer or you can say that server to store all of your website's data so that people could see it. Youwill store your all data in some Web hosting company's server.

Netiquette

Netiquette is a code of good behavior on the Internet. This includes several aspects of the Internet, such as email, social media, online chat, web forums, website comments, multiplayer gaming, and other types of onlinecommunication.

While there is no official list of netiquette rules or guidelines, the general idea is to respect others online. Beloware ten examples of rules to follow for good netiquette:

1. Avoid posting inflammatory or offensive comments online (a.k.a flaming).
2. Respect others' privacy by not sharing personal information, photos, or videos that another personmay not want published online.
3. Never spam others by sending large amounts of unsolicited email.
4. Show good sportsmanship when playing online games, whether you win or lose.
5. Don't troll people in web forums or website comments by repeatedly nagging or annoying them.
6. Stick to the topic when posting in online forums or when commenting on photos or videos, suchas YouTube or Facebook comments.
7. Don't swear or use offensive language.
8. Avoid replying to negative comments with more negative comments. Instead, break the cycle with apositive post.
9. If someone asks a question and you know the answer, offer to help.
10. Thank others who help you online.

<u>**UNIT-6**</u>

<u>**Development of Portals Using HTML**</u>

Design a webpage
The web design process in 7 simple steps
In order to design, build, and launch your website, it's important to follow these steps:
1. **Goal identification:** In this initial stage, the designer needs to identify the end goal of the website design, usually in close collaboration with the client or other stakeholders.
2. **Scope definition**
   One of the most common and difficult problems plaguing web design projects is scope creep. The client sets out with one goal in mind, but this gradually expands, evolves, orchanges altogether during the design.

2. **Sitemap and wireframe creation**
   The sitemap provides the foundation for any well-designed website. It helps give webdesigners a clear idea of the website's information architecture and explains the relationships between the various pages and content elements.
3. **Content creation**
   Once your website's framework is in place, you can start with the most important aspectof the site: the written content.
   Purpose 1. Content drives engagement and action
   First, content engages readers and drives them to take the actions necessary to fulfilla site's goals. This is affected by both the content itself (the writing), and how it's presented (the typography and structural elements).
   Purpose 2: SEO
   Content also boosts a site's visibility for search engines. The practice of creation andimproving content to rank well in search is known as search engine optimization, or SEO.
   Getting your keywords and key-phrases right is essential for the success of anywebsite. I always use Google Keyword Planner.
   5. Visual elements
   Finally, it's time to create the visual style for the site. This part of the design process will often be shaped by existing branding elements, colour choices, and logos, as stipulated by the client. But it's also the stage of the web design process where a goodweb designer can really shine.
   6. Testing
   Thoroughly test each page to make sure all links are working and that the website loads properly on all devices and browsers. Errors may be the result of small codingmistakes, and while it is often a pain to find and fix them, it's better to do it now thanpresent a broken site to the public.
   7. Launch
   Now it's time for everyone's favorite part of the website design process: When everything has been thoroughly tested, and you're happy with the site, it's time tolaunch.

HTML

- Hyper Text Markup Language (HTML) is the main markup language for creating

webpages and other information that can be displayed in a web browser.

- A markup language is a set of markup tags.

- The tags describe document content

Features of HTML.
- HTMLis the predominant markup language for web pages.
- HTML elements form the building blocks of all websites.
- It is easy to learn and easy to use.
- It is platform independent
- HTML allows images and objects to be embedded and can be used to create interactive forms.
- It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items.
- Images, video and audio can be added to a web page.
- Hypertext can be added to text.
- It is a markup language.
- It can embed scripts in languages such as JavaScript which affect the behavior of HTML WebPages.
- Web browsers can also refer to Cascading Style Sheets (CSS) to define the appearance and layout of text and other material.

Why learn HTML?

- It is a simple markup language. Its implementation is easy.
- It is used to create a website.
- Helps in developing fundamentals about web programming.
- Boost professional career.

Advantages:
- HTML is used to build websites.
- It is supported by all browsers.
- HTML is Simple to Edit
- HTML is Lightweight
- It can be integrated with other languages like CSS, JavaScript etc.
- Display Changes Instantly
- HTML is User-Friendly

Disadvantages:
- HTML can only create static web pages. For dynamic web pages, otherlanguages have to be used.
- A large amount of code has to be written to create a simple web page.
- Security feature is not good.
  - If we need to write long code for making a webpage then it producessome complexity.

Basic Html Tags

Tag: `<p> </p>` (Has a closing tag) `</>` *means closed.*
What it Does: Puts 2 breaks between lines of text.

Attributes:
Align=left, right, center

Code Example:
`<p align=left>`This is a paragraph tag`</p>`
`<p align=left >`This is a paragraph tag`</p>`

What it looks like:
This is a paragraph tag.

This is a paragraph tag.

Break Tags

Tag: `<br>` (Has no closing tag)

What it Does: Puts a one line break between text.

Code Example:
This is a break tag. `<br>`
This is another break tag.

What it looks like:
This is a break tag.
This is another break tag.

Bold Tags

Tag: `<b></b>`(Has closing tag) `</>` *means closed.*

What it Does: Creates bold text

Code Example: `<b>`this is bold. `</b>`**What**

it looks like:

this is bold.

Italic Tags

Tag: <i></i>(Has closing tag) *</> means closed.*

What it Does: Creates Italic text.

Code Example: **<i>** This text is italic. **</i>**

What it looks like:
This text is italic.

Unordered List Tags

**Tag: <ul> ** (Has closing tag) *</> means closed.*

What it Does: The UL tag lists items using bullets. Also indents your list tags.

Code Example:
**
This is a ul tag
**

What it looks like:
> This is a ul tag.

List Tags

**Tag: <li> ** (Has closing tag) *</> means closed.*

What it Does: Creates a bulleted list.

Code Example:
Apple
Orange
Peach

What it looks like:
- Apple
- Orange
- Peach

Hyperlink Tag

**Tag: ** Has closing tag) *</>* *means closed.*

What it does: Creates a hyperlink to another page.

Attributes:
Target="new" *This opens up a new window.*

Code Example:
****document ****

What it looks like:

Document

To create a "hotlink" email reference:
janiceg@projecta.com

Table Tags

Tag: <table></table> Creates a table
Tag: <tr></tr> Sets off each row in a table
Tag: <td></td> Sets off Each cell in a table>

Attributes:
>align=left, right,
>centerborder=x
>cellpadding=x
>cellspacing=x
>width=
>height=

How these work and look: All these tags must be closed. *</>*

```
<table border=1 cellpadding=2 cellspacing=2>
      <tr>
            <td>cell 1</td>
            <td>cell 2</td>
      </tr>
</table>
```
How it looks:

Cell 1	Cell 2

Image Tags

Tag: <img src="imagename.gif" alt="description"> there is no closing tag

Attributes:
> alt="description
> " Align=right or
> leftBorder=0

What it does: Inserts an image into the page. Always have an alt tag in your images. Alt tags are part of **priorityone ADA compliance**. The site will not be compliant without this tag.

Code Example: This is an image <img src="images/arrow.gif" alt="arrow">.

What it looks like: This is an image ⬤.

1. Always use alt tags (alternative text) in images
2. Close your tags </>

Email Tags

**Gordon@sno-cat.com **

Image Tags with locations

To insert an image into text area

<img src="images/imagemanager/filename.gif(jpg)"alt="Title of Image">To

place this in a left, center or right position you would:

<center><img   src="images/imagemanager/filename.gif(jpg)"alt="Title   of Image"></center>

Note: Sometimes the code is particular about the image name being all on one line. If yourimage doesn't display properly on the page, then check for the file name being split on two lines.

CSS

- CSS stands for Cascading Style Sheets.
- CSS describes how HTML elements are to be displayed on screen, paper, or in other media.
- CSS saves a lot of work. It can control the layout of multiple web pages all at once.
- External style sheets are stored in CSS files.
- CSS is used to define styles for your web pages, including the design, layout and variations indisplay for different devices and screen sizes.

CSS Example

```html
<!DOCTYPE html>
<html>
   <head>
      <title>This is document title</title>
      <style>
      h1 {
         color: #36CFFF;
      }
      </style>
   </head>
   <body>
      <h1>Hello World!</h1>
   </body>
</html>
```

Separation of Style and Structure

The basic idea behind CSS is to separate the structure of a document from the presentation of the document. HTML is meant for structure. It was never intended for anything else. All those attributesyou add to style your pages were added later as the viewing public demanded it. All those additionsthough make HTML clumsy and work against it's main purpose of structuring a document. HTML is there to let a browser know that this block of text is a paragraph and that block of text is a heading for this paragraph.

Without all the extra HTML for styling the structure of your document is much more readable making it easier to update with out breaking the document. All of your CSS can be moved to aseparate file making it easier to update your styles as well.

Types of CSS

Style sheets come in three types:

1. inline = style attributes are used inline with the HTML tags. For example:

   <p style="color: red">When in the course...</p>

   This would style the paragraph red, but just this one paragraph on the page. Using this type of style sheet, you would have to individually style other p tags on the page if you also want those to be red. This is an inefficient style sheet concept.

2. embedded (internal) = style information is in a <style> tag which is nested in the <head> tag of a single Web page. For example:
   <style
   type="text/css">p
   {color: red;}
   </style>

   This would style all the paragraphs on this one Web page red. This is more powerful, but if you want to style all the p tags on your other Web pages using this model, then you'd have to add this code to them all. If your site contains hundreds of pages, this could take a while.

3. linked (external) = the style is in one .css file that is linked to multiple Web pages. The link tag on the page is connected to the external file. For example:

   <link rel="stylesheet" type="text/css" href="styles.css" />

   In a case like this, all the Web pages in an entire site -- and there could be dozens, hundreds, or thousands! -- could be linked to this one external style sheet file. If that file contained a selector that specified the p tag was red, all the p tags throughout all the pages of the site would be styled that color.

CSS Rules

A *CSS rule* is a grouping of one or more CSS properties which are to be applied to one or more target HTML elements.

A CSS rule consists of a CSS selector and a set of CSS properties. The CSS selector determines what HTML elements to target with the CSS rule. The CSS properties specifies whatto style of the targeted HTML elements.
Here is a CSS rule example:

```
div {
    border    : 1px solid black;
    font-size : 18px;
}
```

This example creates a CSS rule that targets all divelements, and the set the CSS properties borderand font-sizefor the targeted elements.

The CSS selector part a CSS rule is the part before the first {. In the example above it is the divpart of the CSS rule. The CSS properties are listed inside the { ... }block.

CSS rules have to be specified inside either a styleelement or inside an external CSS file.

Advantages of using CSS

- ☐ Easier to maintain and update.
- ☐ Greater consistency in design.
- ☐ More formatting options.
- ☐ Lightweight code.
- ☐ Faster download times.
- ☐ Search engine optimization benefits.
- ☐ Ease of presenting different styles to different viewers.
- ☐ Greater accessibility.

UNIT-7

Client side Scripting with JavaScript

Introduction to script

A scripting or script language is a programming language for a special run-time environment that automates the execution of tasks, the tasks could alternatively be executed one-by-one by a human operator. Scripting languages are often interpreted, rather than compiled.

JavaScript

JavaScript (js) is a light-weight object-oriented programming language which is used by several websites for scripting the webpages. It is an interpreted, full-fledged programming language that enables dynamic interactivity on websites when applied to an HTML document.

Advantages of JavaScript:

1. JavaScript is a client side language.
2. JavaScript is an easy language to learn.
3. JavaScript is comparatively fast for the end user.
4. Extended functionality to web pages
5. No compilation needed
6. Easy to debug and test
7. Platform independent
8. Event-Based Programming language
9. Procedural programming capabilities

Client-side scripting

Client-side scripting (embedded scripts) is code that exists inside the client's HTML page. This code will be processed on the client machine and the HTML page will NOT perform a Post Back to the web-server. Traditionally, client-side scripting is used for page navigation, data validation and formatting. The language used in this scripting is JavaScript. JavaScript is compatible and is able to run on any internet browser.

Advantages of Client-side scripting
- More interactive since it responds immediately to the user action.
- Quick Execution because they don't require a trip to the server.
- improve the user experience for the user whose browser support script.
- An alternative option is available for the user whose browser didn't support script.
- Reusable and obtainable from many resources.

Disadvantages of client-side scripting.
- it is not supported by all browsers. if no alternative is given for the script than the user might get an error.
- Need more testing. because of the different browser and its version support script differently.
- If the Script is not available through other resources than more development time and effort required.
- Developers have more control over the look and behaviour of their Web widgets; however, usability issuescan arise if a Web widget seems like a standard control but behaves different way or vice-versa.

JavaScript Variables

Like many other programming languages, JavaScript has variables. Variables can be thought of as named containers. You can place data into these containers and then refer to the data simply by naming the container. Before you use a variable in a JavaScript program, you must declare it. Variables are declared with the var keywordas follows.

```
<script type="text/javascript">
<!--
var m
oney;var
nam e;
//-->
</script>
```

Common Built-in Functions

- JavaScript provides number of built-in functions.

Functions	Description
isNan()	**Returns true,** if the object is Not a Number. **Returns false,** if the object is a number.
parseFloat (string)	If the string begins with a number, the function reads through the string until it finds the end of the number; cuts off the remainder of the string and returns theresult. If the string does not begin with a number, the function returns NaN.
parseInt (string)	If the string begins with an integer, the function reads through the string until itfinds the end of the integer, cuts off the remainder of the string and returns theresult. If the string does not begin with an integer, the function returns NaN (Not a Number).
String (object)	Converts the object into a string.
eval()	Returns the result of evaluating an arithmetic expression.

JavaScript Array

JavaScript array is an object that represents a collection of similar type of elements.The syntax of creating array directly is given below:

    var arrayname=new Array();

Here, **new keyword** is used to create instance of array.

Javascript Operators

JavaScript includes operators as in other languages. An operator performs some operation on single or multiple operands(data value) and produces a result.
JavaScript includes following categories of operators.

1. Arithmetic Operators(
2. Comparison Operators
3. Logical Operators
4. Assignment Operators
5. Conditional Operators

Arithmetic Operators

Arithmetic operators are used to perform mathematical operations between numeric operands.

Operator	Description
+	Adds two numeric operands.
-	Subtract right operand from left operand
*	Multiply two numeric operands.
/	Divide left operand by right operand.
%	Modulus operator. Returns remainder of two operands.
++	Increment operator. Increase operand value by one.
--	Decrement operator. Decrease value by one.

Comparison Operators

JavaScript language includes operators that compare two operands and return Boolean value true or false.

Operators	Description
==	Compares the equality of two operands without considering type.
===	Compares equality of two operands with type.
!=	Compares inequality of two operands.
>	Checks whether left side value is greater than right side value. If yes then returns true otherwisefalse.
<	Checks whether left operand is less than right operand. If yes then returns true otherwise false.
>=	Checks whether left operand is greater than or equal to right operand. If yes then returns trueotherwise false.
<=	Checks whether left operand is less than or equal to right operand. If yes then returns true otherwise false.

Logical Operators

Logical operators are used to combine two or more conditions. JavaScript includes following logical operators.

Operator	Description
&&	&& is known as AND operator. It checks whether two operands are non-zero (0, false, undefined, null or "" are considered as zero), if yes then returns 1 otherwise 0.
||	|| is known as OR operator. It checks whether any one of the two operands is non-zero (0, false, undefined, null or "" is considered as zero).
!	! is known as NOT operator. It reverses the boolean result of the operand (or condition)

Assignment Operators

JavaScript includes assignment operators to assign values to variables with less key strokes.

Assignment operators	Description
=	Assigns right operand value to left operand.
+=	Sums up left and right operand values and assign the result to the left operand.
-=	Subtract right operand value from left operand value and assign the result to the left operand.
*=	Multiply left and right operand values and assign the result to the left operand.
/=	Divide left operand value by right operand value and assign the result to the left operand.
%=	Get the modulus of left operand divide by right operand and assign resulted modulus to the left operand.

Ternary Operator

JavaScript includes special operator called ternary operator :? that assigns a value to a variable based on some condition. This is like short form of if-else condition.

Syntax:

<condition> ? <value1> : <value2>;

Ternary operator starts with conditional expression followed by ? operator. Second part (after ? and before : operator) will be executed if condition turns out to be true. If condition becomes false then third part (after :) will be executed.

Conditional statements

In JavaScript we have the following conditional statements:

- ☐ Use if to specify a block of code to be executed, if a specified condition is true
- ☐ Use else to specify a block of code to be executed, if the same condition is false
- ☐ Use else if to specify a new condition to test, if the first condition is false
- ☐ Use switch to specify many alternative blocks of code to be executed

The if Statement

Use the if statement to specify a block of JavaScript code to be executed if a condition is true.

Syntax

```
if (condition) {
 //  block of code to be executed if the condition is true
}
```

The else Statement

Use the else statement to specify a block of code to be executed if the condition is

```
false.if (condition) {
 //  block of code to be executed if the condition is true
} else {
 //  block of code to be executed if the condition is false
}
```

The else if Statement

Use the else if statement to specify a new condition if the first condition is false.

Syntax

```
if (condition1) {
 //  block of code to be executed if condition1 is true
} else if (condition2) {
 //  block of code to be executed if the condition1 is false and condition2 is true
} else {
 //  block of code to be executed if the condition1 is false and condition2 is false
}
```

The JavaScript Switch Statement

Use the switch statement to select one of many code blocks to be executed.

Syntax

```
switch(expression
 ) { case x:
  // code
  blockbreak;
 case y:
  // code
 blockbreak;
 default:
  // code block
}
```

JavaScript Loops

Loops are handy, if you want to run the same code over and over again, each time with a different value. The statements for loops provided in JavaScript are:
- for statement
- do...while statement
- while statement

for statement

A for loop repeats until a specified condition evaluates to false. The JavaScript for loop is similar to the Java and C for loop.

A for statement looks as follows:

for ([initialExpression]; [conditionExpression]; [incrementExpression])

  statement

do...while statement

The do...while statement repeats until a specified condition evaluates to false.
A do...while statement looks as follows:
do
 statement
while (condition);

while statement

A while statement executes its statements as long as a specified condition evaluates to true. A while statementlooks as follows:

while
 (condition)
 statement

Document Object Model

Every web page resides inside a browser window which can be considered as an object.
A Document object represents the HTML document that is displayed in that window. The Document object has various properties that refer to other objects which allow access to and modification of document content.

The way a document content is accessed and modified is called the **Document Object Model**, or **DOM**. The Objects are organized in a hierarchy. This hierarchical structure applies to the organization of objects in a Web document.

- **Window object** − Top of the hierarchy. It is the outmost element of the object hierarchy.
- **Document object** − Each HTML document that gets loaded into a window becomes a document object. The document contains the contents of the page.
- **Form object** − Everything enclosed in the <form>...</form> tags sets the form object.
- **Form control elements** − The form object contains all the elements defined for that object such as textfields, buttons, radio buttons, and checkboxes.

DOM compatibility

If you want to write a script with the flexibility to use either W3C DOM or IE 4 DOM depending on their availability, then you can use a capability-testing approach that first checks for the existence of a method or property to
determine whether the browser has the capability you desire. For
example −if (document.getElementById) {

```
  // If the W3C method exists, use it
} else if (document.all) {
  // If the all[] array exists, use it
} else {
  // Otherwise use the legacy DOM
}
```

Creating Functions,

A JavaScript function is defined with the function keyword, followed by a name, followed by

parentheses ().Function names can contain letters, digits, underscores, and dollar signs (same rules

as variables).

The parentheses may include parameter names separated by commas:
(parameter1, parameter2, ...)

The code to be executed, by the function, is placed inside curly brackets:

```
{ }function name(parameter1, parameter2, parameter3) {
 // code to be executed
}
```

Event handling in JavaScript

Introduction to Event Handling

- Event Handling is a software routine that processes actions, such as keystrokes and mouse movements.
- It is the receipt of an event at some event handler from an event producer and subsequent processes.

Functions of Event Handling

- Event Handling identifies where an event should be forwarded.
- It makes the forward event.
- It receives the forwarded event.
- It takes some kind of appropriate action in response, such as writing to a log, sending an error or recovery routine or sending a message.
- The event handler may ultimately forward the event to an event consumer.

Event Handlers

Event Handler	Description
onAbort	It executes when the user aborts loading an image.
onBlur	It executes when the input focus leaves the field of a text, textarea or a select option.
onChange	It executes when the input focus exits the field after the user modifies its text.
onClick	In this, a function is called when an object in a button is clicked, a link is pushed, a checkbox is checked or an image map is selected. It can return false to cancel the action.
onError	It executes when an error occurs while loading a document or an image.
onFocus	It executes when input focus enters the field by tabbing in or by clicking but not selecting input from the field.
onLoad	It executes when a window or image finishes loading.
onMouseOver	The JavaScript code is called when the mouse is placed over a specific link or an object.
onMouseOut	The JavaScript code is called when the mouse leaves a specific link or an object.

onReset	It executes when the user resets a form by clicking on the reset button.
onSelect	It executes when the user selects some of the text within a text or textarea field.
onSubmit	It calls when the form is submitted.
onUnload	It calls when a document is exited.

Example : Simple Program on onload() Event handler

```
<html>
  <head>
  <script
  type="text/javascript">
  function time()
  {
    var d = new Date();
    var ty = d.getHours() +
    ":"+d.getMinutes()+":"+d.getSeconds();
    document.frmty.timetxt.value=ty;
    setInterval("time()",1000)
  }
  </script>
  </head>
<body onload="time()">
  <center><h2>Displaying Time</h2>
    <form name="frmty">
       <input type=text name=timetxt size="8">
    </form>
  </center>
</body>
</html>
```

Embedding JavaScript in HTML

Client-side JavaScript code is embedded within HTML documents in a number of ways:

- Between a pair of `<script>` and `</script>` tags

- From an external file specified by the `src` attribute of a `<script>` tag

- In an event handler, specified as the value of an HTML attribute such as `onclick` or `onmouseover`

- As the body of a URL that uses the special `javascript:` protocol

The `<script>` Tag

Client-side JavaScript scripts are part of an HTML file and are coded within `<script>` and `</script>` tags

You may place any number of JavaScript statements between these tags; they are executed in order of appearance, as part of the document loading process. `<script>` tags may appear in either the `<head>` or `<body>` of an HTML document.

Including JavaScript Files

As of JavaScript 1.1, the `<script>` tag supports a `src` attribute. The value of this attribute specifies the URL of a file containing JavaScript code. It is used like this:

```
<script src="../../javascript/util.js"></script>
```

A JavaScript file typically has a *.js* extension and contains pure JavaScript, without `<script>` tags or any other HTML.

Event Handlers

JavaScript code in a script is executed once, when the HTML file that contains it is read into the web browser. A program that uses only this sort of static script cannot dynamically respond to the user. More

dynamic programs define event handlers that are automatically invoked by the web browser when certain events occur

```
<input type="checkbox" name="opts" value="ignore-case"
       onclick="ignore-case = this.checked;"
>
```

Cookies
- Cookies are data, stored in small text files, on your computer.
- When a web server has sent a web page to a browser, the connection is shut down, and the server forgets everything about the user.
- Cookies were invented to solve the problem "how to remember information about the user":
- When a user visits a web page, his/her name can be stored in a cookie.
- Next time the user visits the page, the cookie "remembers" his/her name.

Create a Cookie with JavaScript
JavaScript can create, read, and delete cookies with the document.cookie property. With JavaScript, a cookie can becreated like this:
document.cookie = "username=John Doe";

UNIT-8

Server Side Scripting

Introduction to server side Scripting:

Server side scripting is defined as "web server technology in which the user's request is fulfilled by running a script directly on a web server to generate dynamic web pages"

Server side scripts runs on the server rather than our computer. When we visit a website, the script will create the webpage on dynamically, In case of server side scripting, the client Needs the request on the machine and then sends the result to the client machine
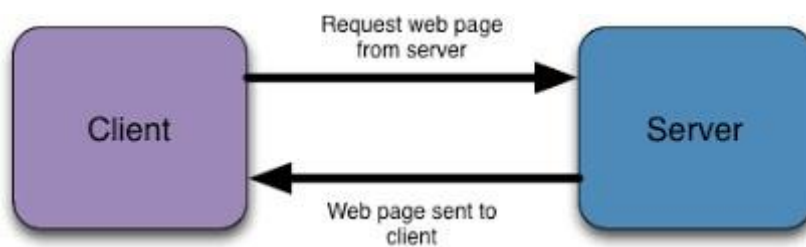
Popular server-side scripting languages include Perl PHP, ASP, JSP, Ruby, Cold fusion and Python.

Advantages:

1. Load times are generally faster than client side scripting.

2. It does not require the user to download plugins like JAVA or flash.

3. We can create a single website template for the entire website. Each new dynamic page we create will automatically use it.

4. Our scripts are hidden from view, Users only see HTML output, even when they view the source

Components of server side Scripting:

The Components of server-side Scripting are:

1. Web Server: A web server is a software that continuously monitors for any request that has been made from client. It reads any request; it retrieves the particular file or values from the database and sends any the results to the client machine.

e.g. PWS (Personal Web Server), IIS (Internet Information Server), Apache

2. Scripting Files: The second part of the server-side scripting is the scripting files that are executed on the request of the client. These files are developed in any of the server-side scripting languages that are available with us: ASP (Active Server Pages), JSP (Java Server Pages), PHP (Personal Home Pages), Servlets.

3. Database Files : The third part of working of the server side scripting is the database files. These database files can be designed in any of the available database such that: MS Access, SQL Server, My SQL, ORACLE.

4. SQL:

SQL is Structured Query Language that is used to interact with the databases. It is any Relational Database integral part of Management System (RDBMS) package system. SQL uses some syntaxed statements predefined to perform various database operations like.

5. Scripting Methods : The main scripting methods that are used in server side scripting are mentioned as under: (a) ASP (b) JSP

Difference between CSS and SSS

Server side scripting	Client side scripting
Used to create dynamic pages based a number of conditions when the user's browser makes a request to the server.	used when the user's browser already has all the code and the page is altered on the basis of the users input.
The Web Server executes the server-side that produces the page to be sent to the browser.	The Web Browser executes the client scripting that resides at the user's computer
Server executes server-side scripts to send out a page but it does not execute client-side scripts	The browser receives the page sent by the server and executes the client-side scripts.
Used to connect to the databases that reside on the web server.	Cannot be used to connect to the databases on the web server.
an access the file system residing at the web server.	can't access the file system that resides web server. at the web server
The settings that belong to Web server can be accessed using server-side	The files and settings that are local at the user's computer can be accessed
can't be blocked by the user	possible to be blocked by the user.
Response from a server-side script is slower as compared to a client-side script	Response from a client-side script is faster as compared to a server-side script
Examples: PHP, JSP, ASP. Net, Ruby, Perl.	Examples: Javascript, VB script, etc.

Server-side Scripting method

some of the server side scripting methods are:

1. (Common Gateway Interface): Simple scripting mechanisms supported by practically web servers. Most commonly written in Perl, C, C++, or Python.

2. Java Servlets: Ability to execute Java objects on the server. Newer, less common technology but has dramatic performance advantages over CGI.

JavaScript on server

JavaScript extends the capabilities of the server. By providing a scripting language the software can do more without calling an external program. This makes it easier for Webmasters to add features to their sites that browsers can take advantage of. And it can reduce the load on the server by keeping the processing within the server software.

1. **Request Object:** Each time a browser wants more information it sends a request to a server. Data about these requests are available on the server from the request object in JavaScript. If we have written CGl scripts.

2. **Client Object:** Each time a new client accesses the server application, a new client object is created. However, there are no built-in properties for the client object. If we need information retained about the client, then we create a property.

3. **JavaScript and CGls**: When we are building websites, we have dealt with Common Gateway Interface (CGI) scripts. Prior to JavaScript, this was the primary means of creating interactive applications. Libraries of CGI scripts include counters, e-mailers, message boards, and many other functions.

LiveWire can replace CGI programming. Instead of calling external programs, the server software runs applications that are closely integrated to it. JavaScript is the language of these applications. Applications are developed with three tools. We build these applications using LiveWire's Site manager. The source files for the applications are developed using the same HTML editors used to build browser JavaScript pages. The applications run in response to requests from Netscape Navigator.

4. **The JavaScript Balancing Act :**when interactivity was only done with a CGI, all of the processing was done on the server. Because Cpt can run on both the server and the browser, writing a successful application requires we to properly allocate the processing between the two.

5. Exchanging Information between the Browser and Server:

From Client to Server: User responses are submitted just as we currently handle forms. The user completes the form and clicks the submit button. The data from the radio buttons, checkboxes, textboxes, and text area are sent to the server. The server then places this data into the request object. Each element of the form has a corresponding property.

 From Server to Client: Usually a server only returns a static page in response to a browser request. In LiveWire, the response is still a page, but the contents of the page vary. User input can result in changes to default form values, new values of hidden form elements, or direct substitutions.

Example:

<INPUT TYPE="text" NAME="example" VALUE="request.agent'>

SQL (STRUCTURED QUERY LANGUAGE)

It is used to interact with the databases. It is integral part of any Relational Database Management Svstem (RDBMS) package system. SQL uses some predefined syntaxed statements to perform various database operations like.

1. Retrieving lnformation from a Table:

SQL uses the select statement for this purpose.

Syntax:

Select column names from table names;

where; (i) Column names is the list of columns (separated by (,) comma) or * for listing all columns.

(ii) and Table name is the name of the table.

Hence, the statement can be written as: Select from emp;

and the above statement retrieves all the columns and rows from the emp table.

2. Inserting Records into a Table:

For inserting rows or records into the database tables, the SQL uses following syntax:

insert into table name values (set of values);

Example: To insert any record in a table having name emp and having field empno and sol. we can issue a SQL statement:

insert into emp values (1, 1000)

3. Deletion of Records:

This SQL statement is used for the deletion of the records from a table. It uses the following syntax:

Delete from table name;
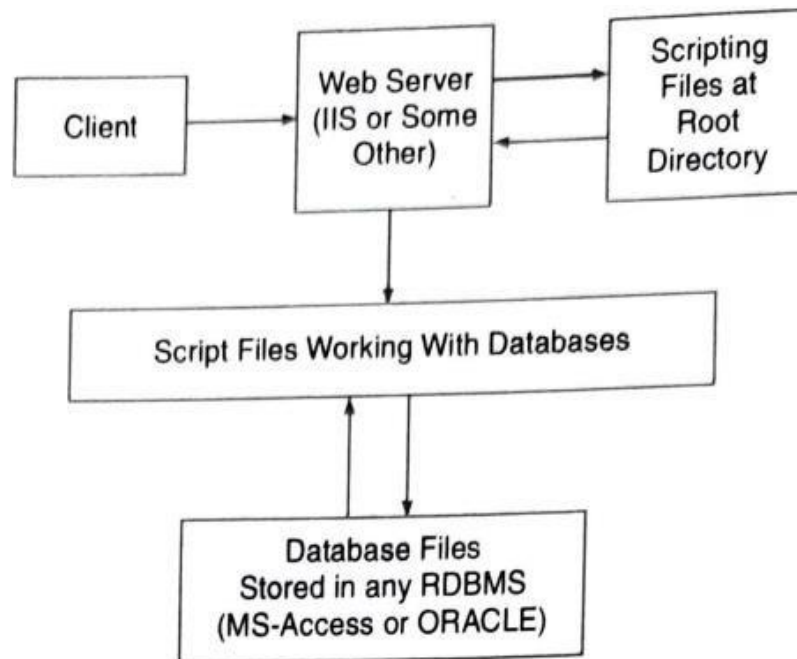
Example: If one wants to delete all the records present in the emp table, the SQL statement would be like

Delete from emp;

4. Updation of Records

For updating the already existing records:

Update table name set column name = new value;

UNIT-9

Server Side Programming using PHP

Introduction to PHP:

The PHP stands for *Hypertext Preprocessor*. PHP is a server-side scripting language designed specifically for web development. It is open-source which means it is free to download and use. It is very simple to learn and use. The files have the extension ".php". It is an interpreted language and it does not require a compiler.

- ☐ PHP code is executed in the server.
- ☐ It can be integrated with many databases such as Oracle, Microsoft SQL Server, MySQL, PostgreSQL, Sybase, Informix.
- ☐ It supports main protocols like HTTP Basic, HTTP Digest, IMAP, FTP, and others.
- ☐ One of the main reasons behind this is that PHP can be easily embedded in HTML files and HTML codes can also be written in a PHP file.

Advantages of PHP:

- It is supported by all Operating Systems like Windows, Linux, Unix, etc.
- It is integrated with other programming languages (HTML, CSS, JavaScript, etc) and databased.
- It is easy to connect with the database to store and retrieve data from the database. Multiple databases can also be integrated with PHP.
- It is the fastest programming language compared to other programming languages.
- PHP frameworks and tools are used to protect web applications from outer attacks and security threats.

Variables:

Variables in a program are used to store some values or data that can be used later in a program. Any variables declared in PHP must begin with a dollar sign ($), followed by the variable name. PHP variables are case-sensitive, i.e., $sum and $SUM are treated differently. A valid variable name starts with a letter Or underscore, followed by any number of letters, numbers, or underscores.

Example

```php
<?php
$txt = "Hello world!";
$x = 5;
$y = 10.5;
?>
```

STRINGS

Strings can be seen as a stream of characters. For example, 'K' is a character and 'KIIT' is a string.

Creating Strings:

There are four ways of creating strings in PHP:

1. Single-quote strings: The simplest way to specify a string is to enclose it in single quotes (the character). This type of string does not process special characters inside quotes.

```php
<?php

// single-quote strings

$site = 'Welcome to KIIT';

echo $site;

?>
```

2.Double-quote strings : Unlike single-quote strings, double-quote strings in PHP are capable of processing special characters.

```php
<?php

// double-quote strings

echo "Welcome to KIIT \n";

$site = "KIIT";

echo "Welcome to $site";

?>
```

3. Heredoc: The syntax of Heredoc (<<<) is another way to delimit PHP strings. An identifier is given after the heredoc (<<<) operator, after which any text can be written as a new line is started. To close the syntax, the same identifier is given without any tab or space. Heredoc syntax is similar to the double-quoted string, without the quotes.

```php
<?php

$input = <<<testHeredoc

Welcome to KIIT.
Started content writing !.
I am enjoying this.

testHeredoc;

echo $input;

?>
```

4. Nowdoc: Nowdoc is very much similar to the heredoc other than the parsing done in heredoc. The syntax is similar to the heredoc syntax with symbol <<< followed by an identifier enclosed in single-quote. The rule for nowdoc is the same as heredoc. Nowdoc syntax is similar to the single-quoted string.

```php
<?php

$input = <<<'testNowdoc'

Welcome to KIIT.
Started content writing!.

testNowdoc;

echo $input;

// Directly printing string without any variable
echo <<<'Nowdoc'
<br/>
Welcome to KP .
Learning PHP is fun in KP.

Nowdoc;

?>
```

PHP Operators

Operators are used to perform operations on variables and values.

PHP divides the operators in the following groups:

- Arithmetic operators
- Assignment operators
- Comparison operators
- Increment/Decrement operators
- Logical operators
- String operators
- Array operators
- Conditional assignment operators

Arithmetic Operators

The PHP arithmetic operators are used with numeric values to perform common arithmetical operations, such as addition, subtraction, multiplication etc.

Operator	Name	Example	Result
+	Addition	$x + $y	Sum of $x and $y
-	Subtraction	$x - $y	Difference of $x and $y
*	Multiplication	$x * $y	Product of $x and $y
/	Division	$x / $y	Quotient of $x and $y
%	Modulus	$x % $y	Remainder of $x divided by $y
**	Exponentiation	$x ** $y	Result of raising $x to the $y'th power

Assignment Operators

The PHP assignment operators are used with numeric values to write a value to a variable.

The basic assignment operator in PHP is "=". It means that the left operand gets set to the value of the assignment expression on the right.

Assignment	Same as...	Description
x = y	x = y	The left operand gets set to the value of the expression on the right
x += y	x = x + y	Addition
x -= y	x = x - y	Subtraction
x *= y	x = x * y	Multiplication
x /= y	x = x / y	Division
x %= y	x = x % y	Modulus

Comparison Operators

The PHP comparison operators are used to compare two values (number or string):

Operator	Name	Example	Result
==	Equal	$x == $y	Returns true if $x is equal to $y
===	Identical	$x === $y	Returns true if $x is equal to $y, and they are of the same type
!=	Not equal	$x != $y	Returns true if $x is not equal to $y
<>	Not equal	$x <> $y	Returns true if $x is not equal to $y
!==	Not identical	$x !== $y	Returns true if $x is not equal to $y, or they are not of the same type
>	Greater than	$x > $y	Returns true if $x is greater than $y
<	Less than	$x < $y	Returns true if $x is less than $y
>=	Greater than or equal to	$x >= $y	Returns true if $x is greater than or equal to $y
<=	Less than or equal to	$x <= $y	Returns true if $x is less than or equal to $y
<=>	Spaceship	$x <=> $y	Returns an integer less than, equal to, or greater than zero, depending on if $x is less than, equal to, or greater than $y. Introduced in PHP 7.

Increment / Decrement Operators

The PHP increment operators are used to increment a variable's value.

The PHP decrement operators are used to decrement a variable's value.

Operator	Name	Description
++$x	Pre-increment	Increments $x by one, then returns $x
$x++	Post-increment	Returns $x, then increments $x by one
--$x	Pre-decrement	Decrements $x by one, then returns $x
$x--	Post-decrement	Returns $x, then decrements $x by one

Logical Operators

The PHP logical operators are used to combine conditional statements.

Operator	Name	Example	Result
and	And	$x and $y	True if both $x and $y are true
or	Or	$x or $y	True if either $x or $y is true
xor	Xor	$x xor $y	True if either $x or $y is true, but not both
&&	And	$x && $y	True if both $x and $y are true
||	Or	$x || $y	True if either $x or $y is true
!	Not	!$x	True if $x is not true

String Operators

PHP has two operators that are specially designed for strings.

Operator	Name	Example	Result
.	Concatenation	$txt1 . $txt2	Concatenation of $txt1 and $txt2
.=	Concatenation assignment	$txt1 .= $txt2	Appends $txt2 to $txt1

Array Operators

The PHP array operators are used to compare arrays.

Operator	Name	Example	Result
+	Union	$x + $y	Union of $x and $y
==	Equality	$x == $y	Returns true if $x and $y have the same key/value pairs
===	Identity	$x === $y	Returns true if $x and $y have the same key/value pairs in the same order and of the same types
!=	Inequality	$x != $y	Returns true if $x is not equal to $y
<>	Inequality	$x <> $y	Returns true if $x is not equal to $y
!==	Non-identity	$x !== $y	Returns true if $x is not identical to $y

Conditional Assignment Operators

The PHP conditional assignment operators are used to set a value depending on conditions:

Operator	Name	Example	Result
?:	Ternary	$x = expr1 ? expr2 : expr3	Returns the value of $x. The value of $x is *expr2* if *expr1* = TRUE. The value of $x is *expr3* if *expr1* = FALSE
??	Null coalescing	$x = expr1 ?? expr2	Returns the value of $x. The value of $x is *expr1* if *expr1* exists, and is not NULL. If *expr1* does not exist, or is NULL, the value of $x is *expr2*. Introduced in PHP 7

Conditional statement
Conditional statements are used to perform different actions based on different conditions.

In PHP we have the following conditional statements:

- if statement - executes some code if one condition is true
- if...else statement - executes some code if a condition is true and another code if that condition is false
- if...elseif...else statement - executes different codes for more than two conditions
- switch statement - selects one of many blocks of code to be executed

The if Statement
The if statement executes some code if one condition is true.
Syntax
if (condition) {
  code to be executed if condition is true;
}
Example
Output "Have a good day!" if the current time (HOUR) is less than 20:

```
<?php
$t = date("H");

if ($t < "20") {
  echo "Have a good day!";
}
?>
```

The if...else Statement

The if...else statement executes some code if a condition is true and another code if that condition is false.

Syntax
```
if (condition) {
  code to be executed if condition is true;
} else {
  code to be executed if condition is false;
}
```
Example

Output "Have a good day!" if the current time is less than 20, and "Have a good night!" otherwise:

```
<?php
$t = date("H");

if ($t < "20") {
  echo "Have a good day!";
} else {
  echo "Have a good night!";
}
?>
```

The if...elseif...else Statement

The if...elseif...else statement executes different codes for more than two conditions.

Syntax
```
if (condition) {
  code to be executed if this condition is true;
} elseif (condition) {
  code to be executed if first condition is false and this condition is true;
} else {
  code to be executed if all conditions are false;
}
```
Example

Output "Have a good morning!" if the current time is less than 10, and "Have a good day!" if the current time is less than 20. Otherwise it will output "Have a good night!":

```
<?php
$t = date("H");

if ($t < "10") {
  echo "Have a good morning!";
} elseif ($t < "20") {
  echo "Have a good day!";
} else {
  echo "Have a good night!";
}
?>
```

switch Statement
Use the switch statement to select one of many blocks of code to be executed.

Syntax
```
switch (n) {
case label1:
   code to be executed if n=label1;
   break;
 case label2:
   code to be executed if n=label2;
   break;
 case label3:
   code to be executed if n=label3;
   break;
   ...
 default:
   code to be executed if n is different from all labels;
}
```
This is how it works: First we have a single expression n (most often a variable), that is evaluated once. The value of the expression is then compared with the values for each case in the structure. If there is a match, the block of code associated with that case is executed. Use break to prevent the code from running into the next case automatically. The default statement is used if no match is found.

Example
```php
<?php
$favcolor = "red";

switch ($favcolor) {
  case "red":
   echo "Your favorite color is red!";
   break;
  case "blue":
   echo "Your favorite color is blue!";
   break;
  case "green":
   echo "Your favorite color is green!";
   break;
  default:
   echo "Your favorite color is neither red, blue, nor green!";
}
?>
```

PHP Loops

Loops are used to execute the same block of code again and again, as long as a certain condition is true.

In PHP, we have the following loop types:
- while - loops through a block of code as long as the specified condition is true
- do...while - loops through a block of code once, and then repeats the loop as long as the specified condition is true
- for - loops through a block of code a specified number of times
- foreach - loops through a block of code for each element in an array

while Loop
The while loop executes a block of code as long as the specified condition is true.

Syntax
while (condition is true) {
  code to be executed;
}
Examples
The example below displays the numbers from 1 to 5:

Example
```php
<?php
$x = 1;

while($x <= 5) {
  echo "The number is: $x <br>";
  $x++;
}
?>
```
do...while Loop
The do...while loop will always execute the block of code once, it will then check the condition, and repeat the loop while the specified condition is true.

Syntax
do {
  code to be executed;
} while (condition is true);
Examples
The example below first sets a variable $x to 1 ($x = 1). Then, the do while loop will write some output, and then increment the variable $x with 1. Then the condition is checked (is $x less than, or equal to 5?), and the loop will continue to run as long as $x is less than, or equal to 5:

Example
```php
<?php
$x = 1;

do {
  echo "The number is: $x <br>";
  $x++;
} while ($x <= 5);
?>
```

for Loop

The for loop is used when you know in advance how many times the script should run.

Syntax
```
for (init counter; test counter; increment counter) {
  code to be executed for each iteration;
}
```

Parameters:

init counter: Initialize the loop counter value

test counter: Evaluated for each loop iteration. If it evaluates to TRUE, the loop continues. If it evaluates to FALSE, the loop ends.

increment counter: Increases the loop counter value

Examples

The example below displays the numbers from 0 to 10:

Example
```php
<?php
for ($x = 0; $x <= 10; $x++) {
  echo "The number is: $x <br>";
}
?>
```

foreach Loop

The foreach loop works only on arrays, and is used to loop through each key/value pair in an array.

Syntax
```
foreach ($array as $value) {
  code to be executed;
}
```

For every loop iteration, the value of the current array element is assigned to $value and the array pointer is moved by one, until it reaches the last array element.

Examples

The following example will output the values of the given array ($colors):

Example
```php
<?php
$colors = array("red", "green", "blue", "yellow");

foreach ($colors as $value) {
  echo "$value <br>";
}
?>
```

Array

An array is a special variable, which can hold more than one value at a time.

If you have a list of items (a list of car names, for example), storing the cars in single variables could look like this:

$cars1 = "Volvo";

$cars2 = "BMW";
$cars3 = "Toyota";
However, what if you want to loop through the cars and find a specific one? And what if you had not 3 cars, but 300?

The solution is to create an array!

An array can hold many values under a single name, and you can access the values by referring to an index number.

Create an Array in PHP
In PHP, the array() function is used to create an array:

array();
In PHP, there are three types of arrays:

1.Indexed arrays - Arrays with a numeric index
2.Associative arrays - Arrays with named keys
3.Multidimensional arrays - Arrays containing one or more arrays
1.Indexed Arrays
There are two ways to create indexed arrays:

The index can be assigned automatically (index always starts at 0), like this:

$cars = array("Volvo", "BMW", "Toyota");
or the index can be assigned manually:

$cars[0] = "Volvo";
$cars[1] = "BMW";
$cars[2] = "Toyota";
The following example creates an indexed array named $cars, assigns three elements to it, and then prints a text containing the array values:
Example
```
<?php
$cars = array("Volvo", "BMW", "Toyota");
echo "I like " . $cars[0] . ", " . $cars[1] . " and " . $cars[2] . ".";
?>
```
2. Associative Arrays
Associative arrays are arrays that use named keys that you assign to them.

There are two ways to create an associative array:

$age = array("Peter"=>"35", "Ben"=>"37", "Joe"=>"43");
or:

$age['Peter'] = "35";
$age['Ben'] = "37";
$age['Joe'] = "43";
The named keys can then be used in a script:

Example
```
<?php
$age = array("Peter"=>"35", "Ben"=>"37", "Joe"=>"43");
echo "Peter is " . $age['Peter'] . " years old.";
?>
```
3.Multidimensional Arrays
A multidimensional array is an array containing one or more arrays.

PHP supports multidimensional arrays that are two, three, four, five, or more levels deep. However, arrays more than three levels deep are hard to manage for most people.

The dimension of an array indicates the number of indices you need to select an element.

For a two-dimensional array you need two indices to select an element
For a three-dimensional array you need three indices to select an element.

<div align="center">

GET and POST Method
</div>

There are two ways the browser client can send information to the web server. The GET method The POST method.

GET Method: In the GET method, the data is sent as URL parameters that are usually strings of name and value pairs separated by ampersands (&). In general, a URL with GET data will look like this:
Example: Consider the below example:
http://www.example.com/action.php?**name**=*Sam*&**weight**=*55*
Here, the bold parts in the URL denote the GET parameters and the italic parts denote the value of those parameters. More than one parameter=value can be embedded in the URL by concatenating with ampersands (&). One can only send simple text data via GET method.

Example:

```
<?php
error_reporting(0);
if( $_GET["name"] || $_GET["weight"] )
{
        echo "Welcome ". $_GET['name']. "<br />";
     echo "You are ". $_GET['weight']. " kgs in weight.";
     exit();
}
?>
<html>
```

```
<body>
<form action="<?php $_PHP_SELF ?>" method="GET">
        Name: <input type="text" name="name" />
        Weight:<input type="text" name="weight" />
                <input type="submit" />
</form>
</body>
</html>
```

Advantages:
- It is more secure than GET because user-entered information is never visible in the URL query string or in the server logs.
- There is a much larger limit on the amount of data that can be passed and one can send text data as well as binary data (uploading a file) using POST.

Disadvantages:
- Since the data sent by the POST method is not visible in the URL, so it is not possible to bookmark the page with a specific query.
- POST requests are never cached
- POST requests do not remain in the browser history.

POST Method: In the POST method, the data is sent to the server as a package in a separate communication with the processing script. Data sent through the POST method will not be visible in the URL.

The query string (name/weight) is sent in the HTTP message body of a POST request.

Example:
```
<?php
error_reporting(0);
if( $_POST["name"] || $_POST["weight"] )
        {
                if (preg_match("/[^A-Za-z'-]/",$_POST['name'] ))
                {
                die ("invalid name and name should be alpha");
                }
        echo "Welcome ". $_POST['name']. "<br />";
        echo "You are ". $_POST['weight']. " kgs in weight.";
        exit();
                }
?>
<html>
<body>
<form action = "<?php $_PHP_SELF ?>" method = "POST">
        Name:  <input type  = "text"  name = "name" />
        Weight: <input type = "text" name = "weight" />
                        <input type = "submit" />
</form>
</body>
</html>
```

Advantages:
- It is more secure than GET because user-entered information is never visible in the URL query string or in the server logs.
- There is a much larger limit on the amount of data that can be passed and one can send text data as well as binary data (uploading a file) using POST.

Disadvantages:
- Since the data sent by the POST method is not visible in the URL, so it is not possible to bookmark the page with a specific query.
- POST requests are never cached
- POST requests do not remain in the browser history.

Sessions

A PHP session is used to store data on a server rather than the computer of the user. Session identifiers or SID is a unique number which is used to identify every user in a session based environment. The SID is used to link the user with his information on the server like posts, emails etc.

Below are different steps involved in PHP sessions:

Starting a PHP Session: The first step is to start up a session. After a session is started, session variables can be created to store information. The PHP **session_start()** function is used to begin a new session.It als creates a new session ID for the user.

Below is the PHP code to start a new session:

```php
<?php

session_start();

?>
```

Storing Session Data: Session data in key-value pairs using the **$_SESSION[]** superglobal array. The stored data can be accessed during lifetime of a session.

Below is the PHP code to store a session with two session variables Rollnumber and Name:

```php
<?php

session_start();

$_SESSION["Rollnumber"] = "11";
$_SESSION["Name"] = "Ajay";

?>
```

Accessing Session Data: Data stored in sessions can be easily accessed by firstly calling **session_start()** and then by passing the corresponding key to the **$_SESSION** associative array.

The PHP code to access a session data with two session variables Rollnumber and Name is shown below:

```php
<?php

session_start();

echo 'The Name of the student is :' . $_SESSION["Name"] . '<br>';
echo 'The Roll number of the student is :' . $_SESSION["Rollnumber"] . '<br>';

?>
```

Destroying Certain Session Data: To delete only a certain session data,the unset feature can be used with the corresponding session variable in the **$_SESSION** associative array. The PHP code to unset only the "Rollnumber" session variable from the associative session array:

```php
<?php

session_start();

if(isset($_SESSION["Name"])){
        unset($_SESSION["Rollnumber"]);
}

?>
```

Destroying Complete Session: The **session_destroy()** function is used to completely destroy a session. The session_destroy() function does not require any argument.

```php
<?php

session_start();
session_destroy();

?>
```

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