STUDY ON SOCKET PROGRAMMING!

What is computer network?

computer network is a of *connected devices* that can share resources and communicate with each other.

These networks can vary in size and scope.They can be LAN(local area network) and WAN(Wide area network).

What is a node?

The device which are connected to network are called nodes.They can be computers,servers,smartphones,printers.

What is a link?

They are the communication path that connect nodes.links can be physical or wireless.

What are routers?

Devices that *connect different network together* and use IP addresses to forward data between networks.

What are protocols?

Set of rules that governs data communication over network.

TCP-transfer control protocol

HTTP-HypterText Transfer protocol

FTP-File transfer Protocol

What is socket programming?

Socket programming is a way of connecting two nodes on a networks to communicate with one another.

SOCKET:

Socket is a *endpoint* for communication *between two machines* over a network.(A network that is connected with two devices as a link to execute two-way communication on the network).It allows for data to be sent and received between devices in a network.

The socket is a type of mechanism that is used to *exchange data between different processes.* Here these processes are either present in different devices or the same device which are connected over a network. Once the connection for the socket is created, then the data can be sent in both directions and continues until one of the endpoints closes the connection.

"They are used to connection between a client and a server,so they can communicate with each other."

So what is client or server?

CLIENT	**SERVER**
Client is a device or a program that *request service, resources* from server.	Server is a device or program thar *provides resources or services* to the client.
Clients initiate communication and send requests to server	Server waits for incoming request from the user(client)
They provide UI(user Interface) for end-users to interact with services provided by server.	They handle the incoming requests and send back the appropriate response or data.They can handle multiple clients simultaneously.

- The socket address is a combination of IP address and port.

IP address?

It is the *unique address* assigned to each device connected to a network that uses IP for communication.

FUNCTIONS:identifies hosts,location of host in network TYPES:IPv4,IPv6

Public vs private IP addresses?

Public IP is provided by ISP(internet service provider),they are used on the internet.They are routable on internet!

Private IP address:They are used within private networks,not routable on the internet.

RANGE:192.168.0.0 to 192.168.255.255

And 10.0.0.0 to 10.255.255.255

Port?

Port is *numerical identifier* in networking *to specify particular process* or services *on a device within a network*.

RANGE:0-65535

NOTE:0-1023 are reserved for well-known services and protocols

- HTTP uses port 80,
- HTTPS uses port 443

"Now,in the TCP or IP layer socket is bound as a port number which can identify whether the data is to be sent to a applicant or not."

TYPES OF SOCKETS:

There are two types of sockets TCP(transfer control protocol) AND UDP(user datagram protocol)

TCP(transfer control protocol)	**UDP(user datagram protocol)**
Connection-oriented	*Connectionless*
Reliable(ensures data is received in order)Order in which *data received is guaranteed.*	*Unreliable*(no guarantee of the data itself)No *guarantee of order* of data.

Dtata transmission is *stream based*(there is continuous flow of data)	Datagram-based(individual packets) Datagram-refers to self-conatined,*independent packets* of data that is sent over a network.
Connection setup happens in a *3WAY handshake manner*. (SYN,SYN-ACK,ACK)	No connection setup required.
Automatic retransmission of lost packets.	No retransmission.
Higher overhead due to reliability,hence *slow*	*Lower overhead*,hence *fast*
Ex:HTTPS,HTTP,FTP **USE:**suitable for application where reliablity and data integrity is critical. Ie)web browsing,email,file transfer.	**Ex:*DNS-Domain name system*** **USE:** suitable when speed is critical and occasional data loss is acceptable.ie)gaming,video streaming.

THREE-WAY HANDSHAKE:

In context of TCP

SYN:Synchronise

The client send a TCP packet with SYN flag set to server,this packet indicates that the clint wants to establish a connection.

SYN-ACK:Synchronise-Acknowledge

The server responds to the client with a TCP packet that has both SYN and ACK flag set.This packet acknowledges the receipt(client's SYN packet) and also contains SYN flag indicating server is willing to make/establish connection.

ACK:Acknowledge

The client sends a final TCP packet with the ACK flag to set to the server.

This packet acknowledges the receipt of the servers's SYN-ACK packet.

PROCEDURE IN CLIENT-SEVER COMMUNICATION:

1.socket:*creates new communication* endpoint

2.Bind:*attach a local address* to a socket

3.Listen: Announce a *willingness to make/accept connections*

4.connect: Actively *attempt to establish connection*

5.send:send some dat over the connection

6.Receive:receive some data over the connection

7.close:release the connection