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QSN - 02

a) What are the components of computer network? → 6

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### QSN - 03

a) What is Topology ? Types of Network

(8)

Topologies.

b) Explain transmission modes in networking.

(6)

### QSN - 04

a) What is OSI model ? Explain all the layers of this model.

(8)

b) Show the differences between OSI & TCP/IP model.

(6)

### QSN - 05

a) Describe the functions of application layer.

(3)

b) What are the services of this layer ?

(5)

c) Describe the protocols of application layer ?

Explain — HTTP, FTP, DNS, SMTP, POP3

(6)

QSN - 06

- a) Explain different types of application layer architecture. (2)
- b) Describe client-server model. (7)
- c) Write the pros & cons of client-server model. (5)

QSN - 07

- a) What is DNS? Why we need this? (2)
- b) What is Domain Name Space? Provide examples. (6)
- c) How DNS works? (6)

QSN - 08

- a) What mean by "Stateless Protocol"? What do you mean by HTTP status code? (4)
- b) what are the differences between HTTP & HTTPS? (6)
- c) What are the differences between TCP & UDP? (6)

QSN - 01

a) What is data communication, computer networks and internet?

Ans: Data communication refers to the transmission of digital data between two or more computers.

Computer Networks is a telecommunication network that allows computer to exchange data.

A network of networks is called an internetwork or simply the Internet.

b) Define different kinds of computer network architecture.

Ans: Computer network architecture is defined as the physical and logical design of the software, hardware, protocols and media

of the transmission of data.

There are two types of network architectures are used —

① Peer-to-peer network

② Client-server network.

① Peer-to-peer network is a network in which all the computers are linked together with equal privilege and responsibilities for processing data. It is useful for small environments usually up to 10 computers. It has no dedicated server.

Advantages of P2P network :

① Less costly

② Easy set-up & maintenance.

Disadvantages of p2p networks :

① Stored data is different in different location and have security issues.

⑪ Client-server network is a network model designed for the ~~the~~ end users called clients, to access the resources such as from a central computer known as server. Here server does all the major operations such as security and network management and also resource managing.

#### Advantages:

- ① Centralized system
- ② Easy to back-up data.
- ③ Dedicated server does all the managements.
- ④ Strong security.

#### Disadvantages:

- ① Expensive

Q) What are the features of computer networks ?

Ans: The features of computer networks are given below —

- ① Communication speed.
- ② File sharing
- ③ Back up and Roll back is easy.
- ④ Software & hardware sharing
- ⑤ Security
- ⑥ Scalability
- ⑦ Reliability

(d) What is cryptography? What are the security threats in networking?

Ans: Cryptography is a technique to encrypt the plain text data which makes it difficult to understand and interpret.

There are several cryptographic algorithms available present day as described below —

① Secret key (One key) — DES

② Public key (Individual key) — RSA

③ Message digest (Data hash) — MD5

All the security threats are international. Security threats can be divided into the following categories:

(I) Interruption: It happens when availability of resources is attacked.

(II) Privacy - breach: It means the privacy of user is compromised.

(III) Integrity: This means any alteration or modification of actual context of communication.

(IV) Authenticity: Here, the attacker poses as a genuine person and accesses the resources of others.

QSN - 2 : a) What are the components

of computer network?

Ans: Computer network components are the major parts which are needed to install the software. Some important components are NIC, switch, cable, hub, router, modem and etc.

Some of the network components are described below — (i)

① NIC :— It means network interface card.

It is used to connect a computer to another computer onto a network. The MAC address is encoded on a network chip which is stored by PROM. There are 2 types of NIC — Wired NIC, Wireless NIC.

② Hub : It is a hardware that divides the network connection among multiple devices. When computer request

③ Switch : It is more intellectual than hub. It act like hub but uses updated table to determine where the data to be sent.

④ Router : Router connect multiple networks. It is used to connect LAN with internet connection. It works on Network Layer of OSI model. It uses Routing table to send data packets. It determines the best path from all paths available.

## ⑤ Modem: A modem is a

hardware device that allows the computer to connect with to the internet over the existing telephone or cellular or cable line. It converts digital signal to analog and also the vice-versa.

Modems are 3 types —

① Standard PC / Dial-up modem.

② Cellular modem.

③ Cable modem.

## ⑥ Cables & connectors:

There are 3 types of cable used in transmission —

① Twisted pair

② Co-axial

③ Fiber-optic

(b) Describe different types of computer networks.

Ans: Computer networks are mainly four types according to their size.

They are —

- ① ~~PAN~~ PAN
- ② ~~LAN~~ LAN
- ③ MAN
- ④ WAN

① PAN (Personal Area Network): It

is a network arranged within an individual person, typically within a range of 10 meters. It is mainly used for connecting personal devices to the computer. There are 2 types of PAN —

① Wireless PAN — WiFi, Bluetooth

② Wired PAN — USB

## ② LAN (Local Area Network) :

is a network with a small area like a building, office etc. It is low costly and connected by twisted pair or co-axial cables. It is secure and speed efficient.

## ③ MAN (Metropolitan Area Network) :

This network covers a larger geographical area by connecting different LAN to form a larger network. It is mostly used by Govt. agencies to connect ~~citizens~~ citizens and industries. It is

implemented by connecting different LAN by telephone exchange line.

Mostly used MAN protocols are RS-232, ATM, ISDN, ADSL etc.

#### ④ WAN (Wide Area Network):

A ~~is~~ WAN is a network that extends over large geographical area such as

states or country. It is quite bigger than LAN. It uses telephone line, fiber-optic cable or satellite links. Internet is the biggest WAN in the world.

QSN - 3 (a) What is topology ? Explain the

types of Network topologies.

Ans: Network topologies describe the method in which all the elements of a network are mapped. There

are two types of network topologies —

- ① Physical topology
- ② Logical topology

Different types of physical topologies are described below:

① P2P (Point to point) : It is the easiest of all topologies.

In this topology, there is direct link between two

computers.

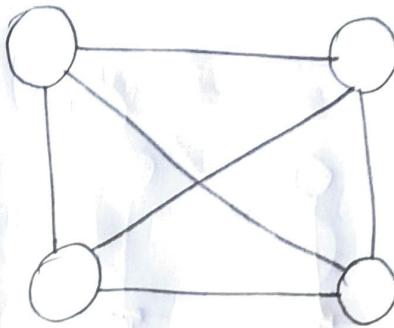


Figure — P2P topology

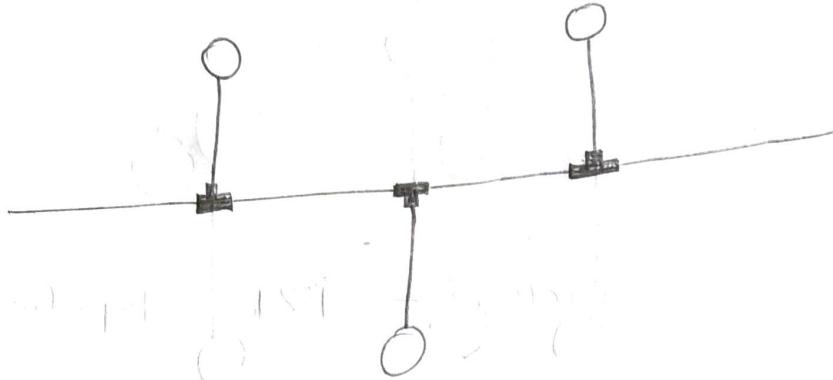
### Advantages :

- ① faster and reliable
- ② Direct connection
- ③ low cost and easy maintenance
- ④ No dedicated server and technician.
- ⑤ User provides permission.

### Disadvantages :

- ① Small area
- ② no central back-up
- ③ No security besides the user permission.

## ② Bus topology



Bus topology uses a single "cable" which connects all the included nodes. When it has two endpoints, it is known as a linear bus topology.

### Advantages:

- ① Cost is less
- ② Passive topology, so computers on the bus only listen for data being sent, that are not responsible for moving the data from one computer to others.

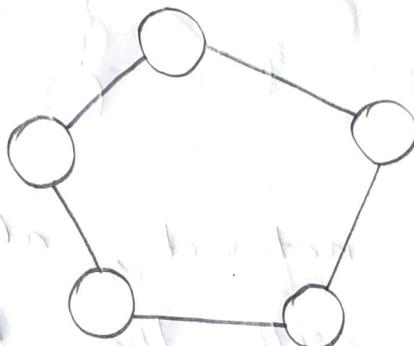
### Disadvantages:

- ① If cable fails, then the entire system will crash down.

⑪ Data collision happens

⑬ cables had limited length.

### ③ Ring topology :



In Ring network, every device has exactly two neighbouring devices for communication purpose.

#### Advantages :

① Easy to install.

② Offer equal access to all computers.

③ Faster error checking.

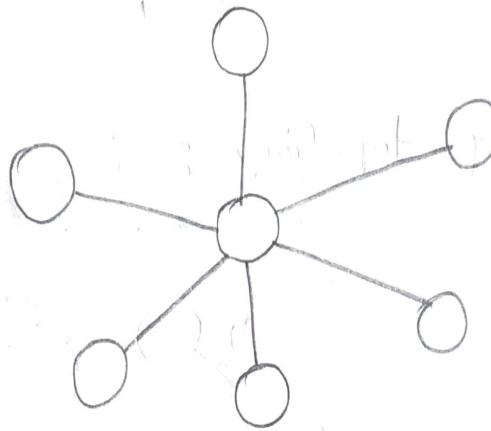
#### Disadvantages :

① ~~Undirectional traffic~~ Undirectional traffic

② Break in the ring can risk entire network.

③ High power consumption

## ④ Star topology:



In star network, all the computers connect with the help of a hub.

### Advantages:

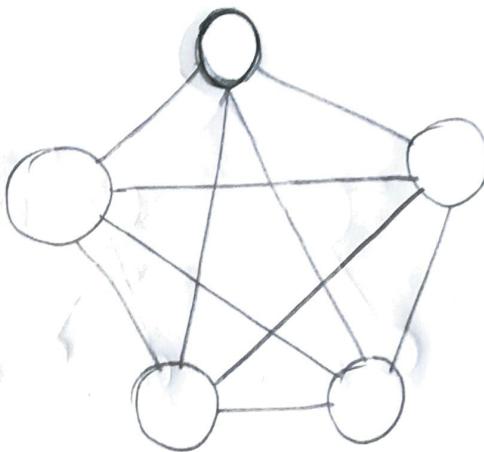
- ① Easy to set up, troubleshoot.
- ② Only those nodes are affected that has failed. Other nodes still work.
- ③ Fast performance.
- ④ Very less network traffic.

### Disadvantages:

- ① If hub fails, attached nodes are disabled.
- ② Performance depends on hub's capacity.

⑤

## Mesh topology :



The mesh topology has a unique network design in which each computer on the network connects to every other. It is develops a P2P (Point-to-point) connection between all the devices of the network.

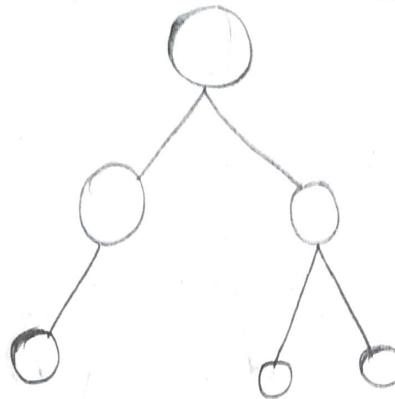
### Advantages :

- ① No traffic problems
- ② Multiple links
- ③ ~~P2P~~ links makes it secure.

### Disadvantages :

- ① complex installation .
- ② Expensive .
- ③ Need more spaces .

## ⑥ Tree topology :



Tree topologies have a root node and all other nodes are connected which ~~form~~ form a hierarchy. It is also known as hierarchical topology and Star Bus topology.

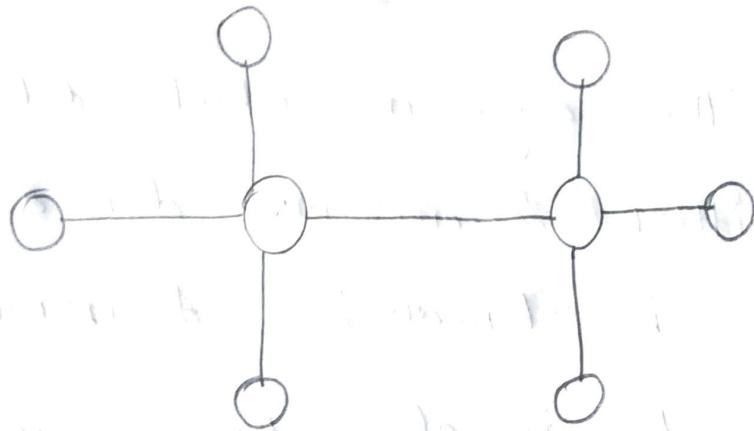
### Advantages :

- ① Expansion is fast.
- ② Error detection is easy.
- ③ Easy to manage.

### Disadvantages :

- ① Heavily cabled.
- ② If hub fails, attached nodes are also disabled.

## ⑦ Hybrid Topology:



Hybrid topology combines two or more topologies.

### Advantages:

- ① Easy to error detecting.
- ② Effective & Flexible
- ③ Scalable.

### Disadvantages:

- ① Complex
- ② Costliest

(b) Explain transmission modes in networking.

Aw. The way in which data is transmitted from one device to another device is known as transmission mode. It is also known as communication mode.

The transmission mode is divided into three categories:

- ① Simplex mode
- ② Half-duplex mode
- ③ Duplex mode

① Simplex mode : In this way, communication is Unidirectional.

A device can ~~is~~ only send or

receive data. Here we don't require response. Examples are — radio stations, keyboard, mouse, monitors etc.

### Advantages:

- ① Full utilization of the capacity of media channel.

### Disadvantages:

- ① Inter-communication not possible.
- ② Half-Duplex mode : In half-duplex channel, the direction can be reversed. Message can flow in both direction but not ~~at~~ at the same time. The entire bandwidth of the channel is utilized in one direction ~~at a time~~.

Walkie-talkie is a half-duplex communication system.

### Advantages:

- ① Both send & receive data
- ② Utilize the channel bandwidth

### Disadvantages:

- ① When one send data other have to wait.

### ③ Full-Duplex mode: In this

mode, communication is bidirectional.

Both stations can send & receive data simultaneously. It has two simplex channels. It is fastest communication mode.

Telephone is full-duplex communication.

### Advantages:

- ① Both station can send & receive data at same time

### Disadvantages:

- ① Capacity of communication channel is divided into two parts.

QSN - 04. a) What is OSI model? Explain

all the layers of OSI model.

Ans. OSI stands for Open System Interconnection is a reference model that describes how information from a software application in one computer move through a physical medium to the software application in another computer. It was developed by ISO in 1984. It has seven layers.

The seven layers of OSI model is described below:

① Physical layer: It provides a physical medium through which bits are transmitted.

② Data link Layer: It is used for error free transfer of data frames.

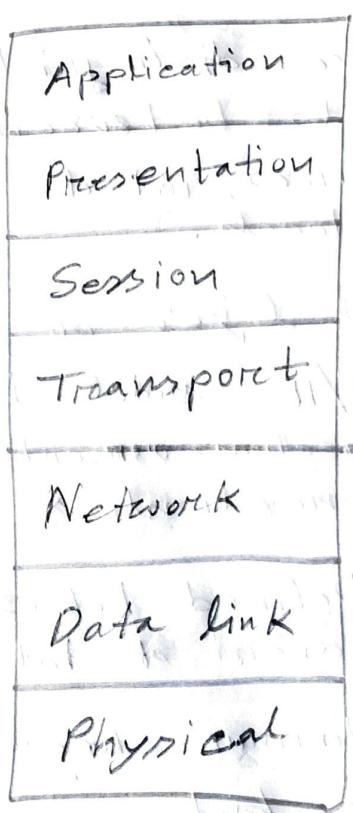
③ Network layer: It is responsible for moving the packets from source to the destination.

④ Transport layer: It provides reliable message delivery from process to process.

(V) Session : It is used to establish, manage and terminate the sessions.

(VI) Presentation : It is responsible for translation, compression & encryption.

(VII) Application : This layer provides the services to the user.



Responsibility of Host

Responsibility of Network

(b) Show the differences between OSI & TCP/IP model.

Ans. Here are some important differences between the OSI & TCP/IP models:

OSI	TCP/IP
1. Developed by ISO.	1. Developed by ARPANET.
2. Open System Interconnection	2. Transmission control protocol.
3. It has 7 layers.	3. It has 4 layers.
4. Follows Vertical Approach	4. Follows horizontal approach.
5. Provides a clear distinction between interfaces, services, and protocols.	5. Doesn't have any clear distinguishing points between services, interfaces & protocols.
6. The transport layer is only connection-oriented.	6. A layer of the TCP/IP model is both connection-oriented & connectionless.
7. Defined after the advent of Internet.	7. Defined before the advent of Internet.
8. Minimum header size 5 bytes.	8. Minimum header size 20 bytes.

OSI	TCP/IP
9. Data-Link & Physical layers are separate.	9. Data-Link & physical layers are combined.
10. OSI has session and presentation layer.	10. It has NO session & presentation layer

QSN-5 (a) What are the functions of application layer?

Ans. The application layer includes the following functions:

① Identifying communication partners.

② Determining resource availability

③ Synchronizing communication.

(b) What are the services of application layer?

Ans. Some of the services of application layer is given below:

① Network virtual terminal:

An application layer allows a user to log on to a remote host.

② FATM (File Transfer, Access & Management)

An application allows a user to access files in a remote computer, to retrieve files from a computer and to manage files in a remote computer.

③ Addressing : To obtain client-server communication, there need addressing. When client requests there the server address is included, and server response also contains the clients address.

④ Mail Service : Application layer provides Email forwarding & storage.

⑤ Directory service : This layer contains a distributed database that provides access for global information about various object and services.

⑥ Authentication : This layer authenticates the sender or receiver's message or both.

c) Describe the protocols of the application layer. Explain - HTTP, FTP, DNS, SMTP, POP3.

Ans. Application layer protocols can be divided into two categories:

① Protocols used by Users : Email.

② Protocols which helps protocols used by Users : DNS.

Protocols is a set of rules ~~data~~ are used for communications few of the application layer

protocols are described below:

① DNS (Domain Name System): DNS is

a Directory service that provides a mapping between the name of a host on the network and its numerical address. DNS translates the domain name into ip addresses. The domain name space is divided into 3 different sections :

- ① Generic domain
- ② Country domain
- ③ Inverse domain

② HTTP (Hyper Text Transfer Protocol): It

is the foundation of World wide web. It works on client-server model. It uses TCP port 80. HTTP is a Stateless Protocol.

### ③ FTP (File Transfer Protocol):

It also works on ~~TCP port~~ client-server model. It uses TCP port 21 for transferring actual data and TCP port 20 for controlling.

### ④ SMTP (Simple Mail Transfer Protocol):

It is used to transfer email from one user to another. Email client software edits the mail and make ready to send.

Then the message transfer agent uses SMTP to forward the mail to another message transfer agent. It can also

receive emails. It uses TCP port 25 and ~~2~~ 587.

### ⑤ POP3 (Post office Protocol version 3):

It is a mail retrieval protocol used by ~~use~~ client email software.

It has two mode — ① Delete mode  
② Keep mode

POP3 uses TCP port 110.

QSN - 6. a) What are the types of application layer architecture?

Ans: ~~There~~ There are two types of architecture for application layer — ① P2P architecture  
② Client-server architecture

① P2P architecture : It is

Peer-to-peer architecture. It has no dedicated server.

It is not costly and secure.

But it is not effective for large networking area.

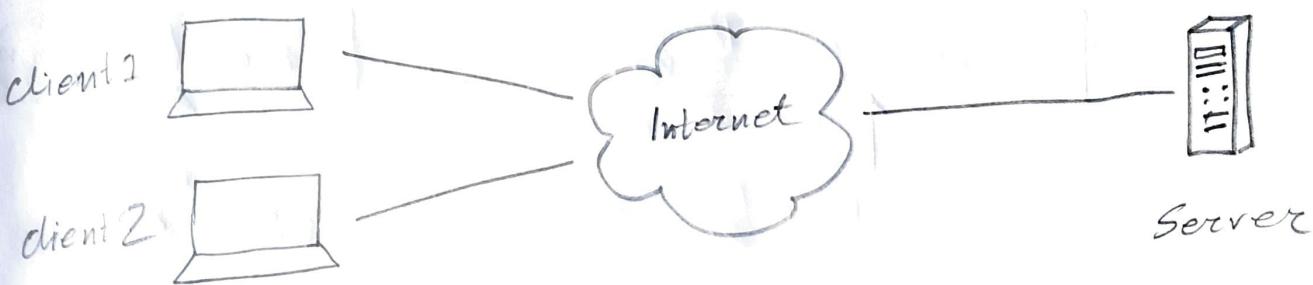
② Client-server architecture:

~~Here~~ In this model, there is a central server and some clients. Clients sends request and server responds.

It is used for large area connections.

⑥ Explain the client-server model.

Ans. A client and server networking model is a model in which computers such as servers provide the network services to the other computers such as clients to perform a user based tasks.



A client is a program that runs on the local machine requesting a service from the server. It is a finite program.

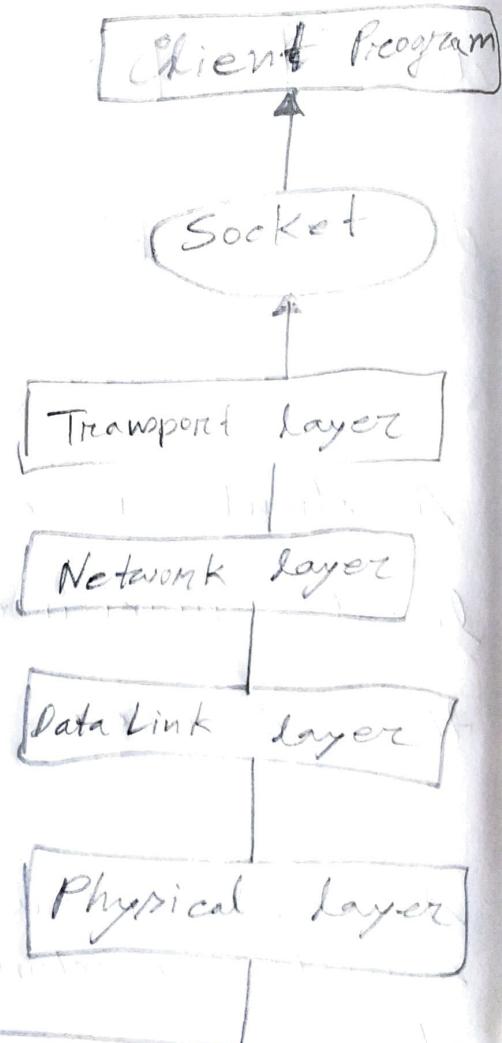
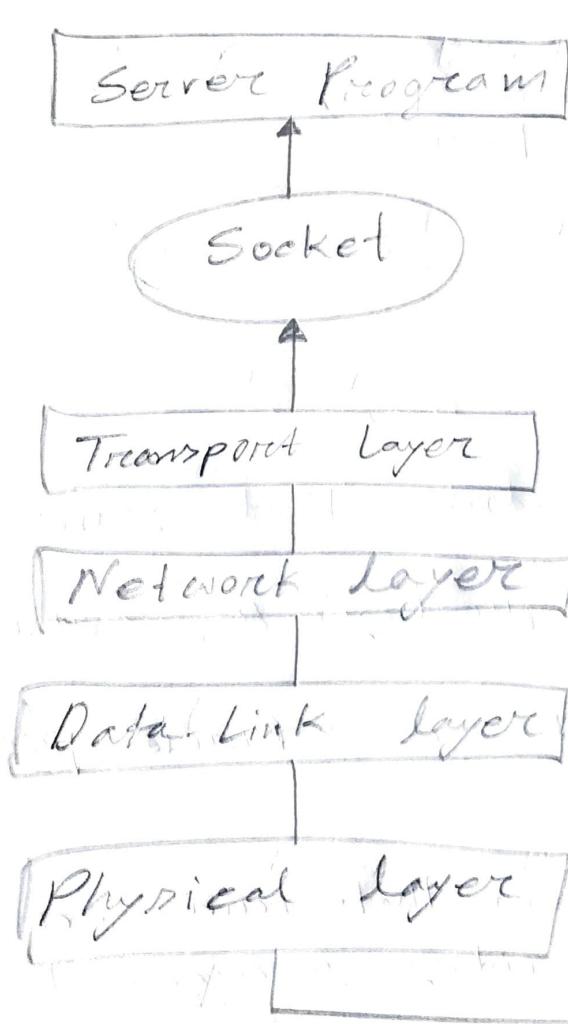
A server is a program that runs on the remote machine providing services to the clients.

There are two processes in client-server model that interact with each other by various ways:

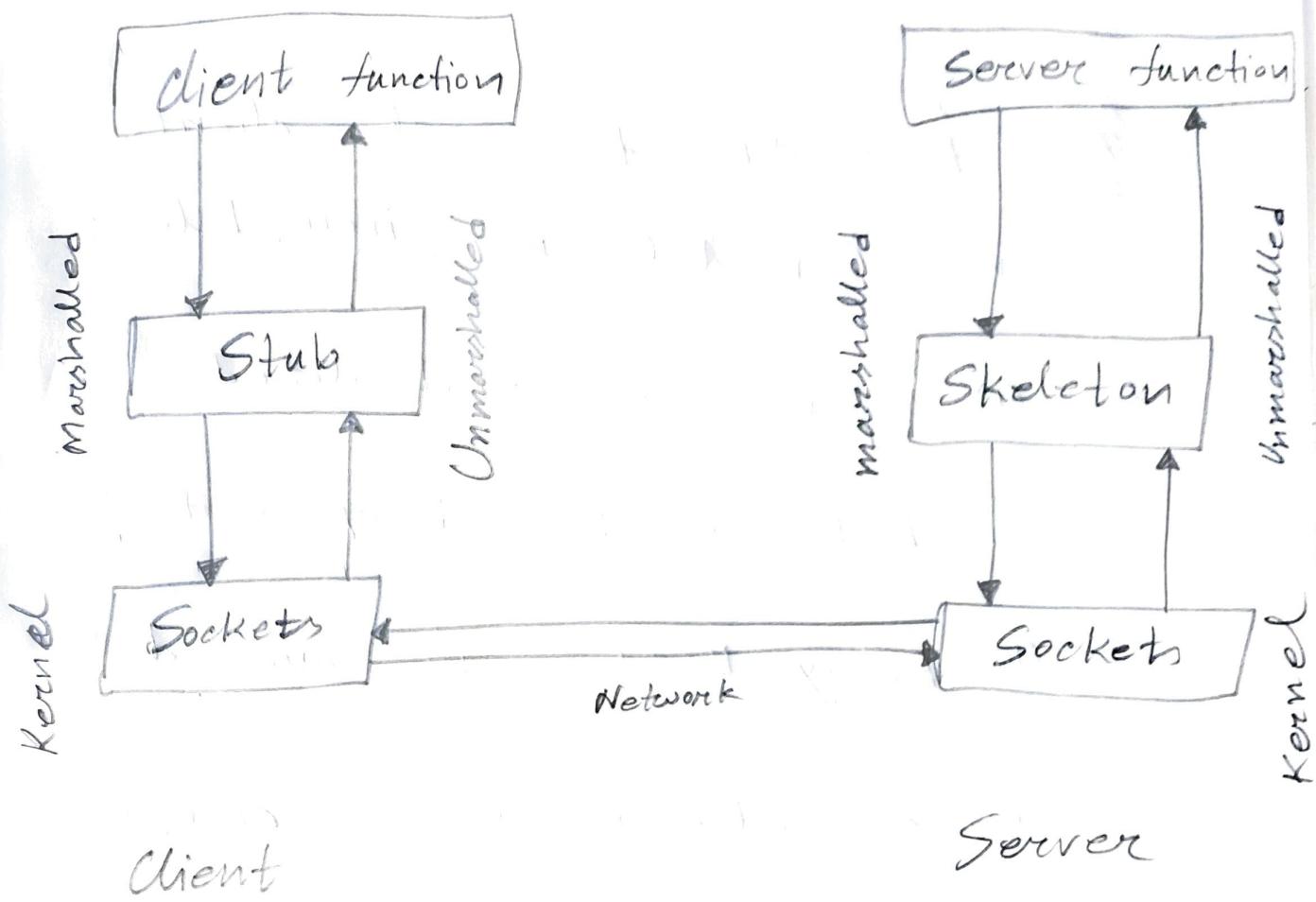
### ① Sockets

### ② RPC - Remote Procedural Call

#### ① Sockets :



## ⑪ RPC — Remote procedural call



Q) Write the pros & cons of client server model.

Ans. ~~Dis~~ Advantages of client-server model is given below:

- ① Server is centralized
- ② Data is backed up centrally.
- ③ Every client gets same data
- ④ Security is assured enough.
- ⑤ Easily scalable.

Disadvantages of client-server model is given below :

- ① Traffic congestion can ~~be~~ be occurred during

large number of clients access.

(II) If the server down, the whole network is down.

(III) Sometime, some resources can not serve certain number of clients, they need upgrades.

(IV) Sometime, resource managing software isn't accessible for all clients.

QSN-7. (a) What is DNS? Why we need this?

Ans. An application layer protocols that defines how the application processes running on different systems pass the message each other

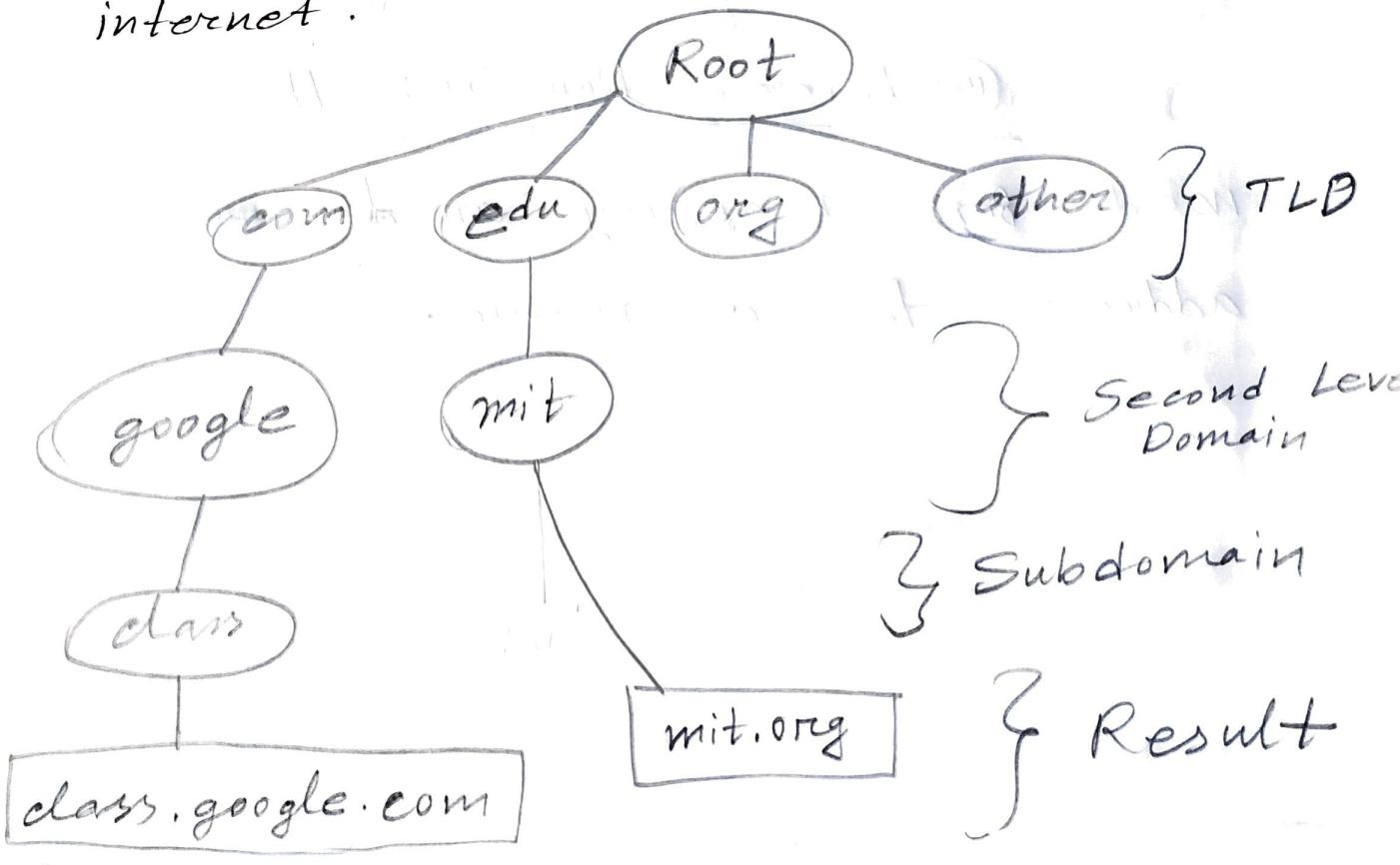
Ans. DNS is a directory service that provides a mapping between the name of a host on the network and its numerical address.

Address records and mail exchange records need to be kept up to date to ensure that access to your domain is maintained.

So, DNS server is needed for this.

(b) What are the domain name space? Provide examples.

Ans. A domain name space is a name service provided by Internet for TCP network/IP. DNS is broken into domains, a logical organization of computers that exist in a larger network. Below is an example of the hierarchy of domain naming on the internet.



There are 3 different section  
of domain namespace —

① Generic Namespace :

com, edu, gov, mil, info,  
net, org, xyz

② Country domain :

bd, us, in, pk, uk

③ Inverse-Domain : It is

used for mapping an ~~domain~~  
address to a name.

## (c) How DNS works ?

Ans. The 8 steps of DNS look up is given below —

- ① User types web ~~at~~ <sup>through</sup> web browser query into the internet and is received by a DNS recursive lookup resolver.
- ② Resolver queries a DNS root nameserver.
- ③ Root server responds resolver with the ip address of TLD DNS server.
- ④ Resolver requests to TLD server.
- ⑤ TLD server responds with IP address of Domain's server.
- ⑥ Resolver requests to Domain's server.

⑦ Domain's server responds with the IP address of domain full domain.

⑧ Resolver responds the web browser with the IP address of the domain requested initially.

Once the 8 steps of DNS took up completed and returned the IP address.

Then —

⑨ Browser make HTTP request to the IP address.

⑩ Server responds the client.

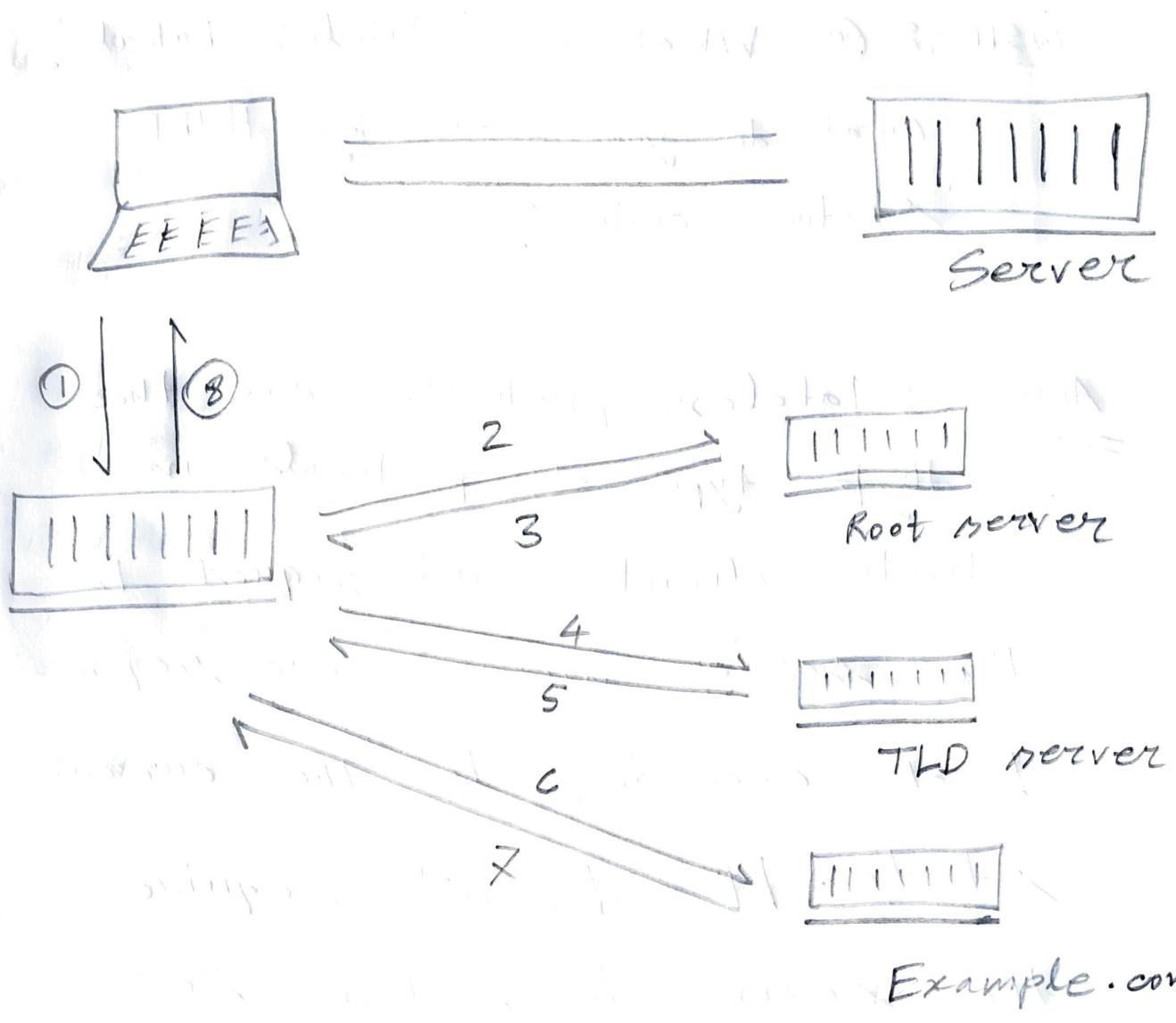


Fig - DNS Look up

QSN-8 (a) What is "Stateless Protocol"?

what do you mean by HTTP  
status code?

Ans. Stateless protocols are the ~~that~~ type of protocols in which client send request to the server and server response back according to the current state. It doesn't require the server to retain session information or a status about each communicating partner for multiple request.

Example — HTTP, UDP, DNS

HTTP status code determines whether the request made by client has been completed or not. There are five classes of this status code. The ~~IANA~~ (International Assigned Numbers Authority) contains the official registry of HTTP status code. The following are five classes defined by IANA standard:

- ① 1 \*\* — Information
- ② 2 \*\* — Success
- ③ 3 \*\* — Redirection
- ④ 4 \*\* — Client error
- ⑤ 5 \*\* — Server error

b) What are the differences between HTTP & HTTPS?

Ans. Difference between HTTP & HTTPS:

HTTP	HTTPS
① Hyper-text Transfer protocol	① Hypertext transfer protocol secure
② Less secure	② Highly secure
③ Port 80	③ Port 443
④ URL begins with <code>http://</code>	④ URL begins with <code>https://</code>
⑤ Works through TCP/IP.	⑤ It is operated using HTTP with TLS/SSL connection
⑥ No SSL certificate.	⑥ Need SSL certificate.
⑦ No encryption	⑦ Uses encryption
⑧ Fast	⑧ Slower than HTTP
⑨ Doesn't improve search ranking.	⑨ Improves search ranking.
⑩ Used for general information sharing.	⑩ Used for private data sharing.

c) What are the differences between TCP and UDP ?

Ans. Difference between TCP and UDP :

TCP	UDP
① Transmission control protocol.	① User datagram Protocol.
② Connection-oriented	② Connection less.
③ Reads data as streams of bytes and the message is transmitted <del>to segment boundaries</del> .	③ UDP message contains packets that were sent one by one.
④ Message make the way across the internet from one <del>host</del> host to another host.	④ Has <del>no</del> fixed order One program can send lots of packets to another.
⑤ Arranges data packets at specific order.	⑤ No fixed order, packets are independent
⑥ Slower	⑥ faster

TCP	UDP
⑦ Header size 20 bytes.	⑦ Header size 8 bytes.
⑧ Error checking and recovery.	⑧ No recovery
⑨ Uses handshake protocol.	⑨ No handshake protocol
⑩ Heavy-weight.	⑩ Light weight.