Computer Networks

Unit - I Application Layer

Q.1 What is domain name system? Explain how a resolver looks up a remote name with suitable eg

→ Domain Name System (DNS) is a system that translates domain name into an IP address. The DNS servers are Internet's equivalent of a phone book. They maintain the directory of the domain names and translates them into an IP add".

How a resolver looks up a remote name!

1. To map a name onto an IP address, an applicatio program calls a library procedure called the "resolvet". The name is passed on to the resolve as a parameter.
2. The resolver sends the UDP packet to the DN server which returns the corresponding IP address to the resolver.
3. The resolver sends this IP address to the caller. Then the program can establish the TCP connection with the destination or sends in the UDP packets.

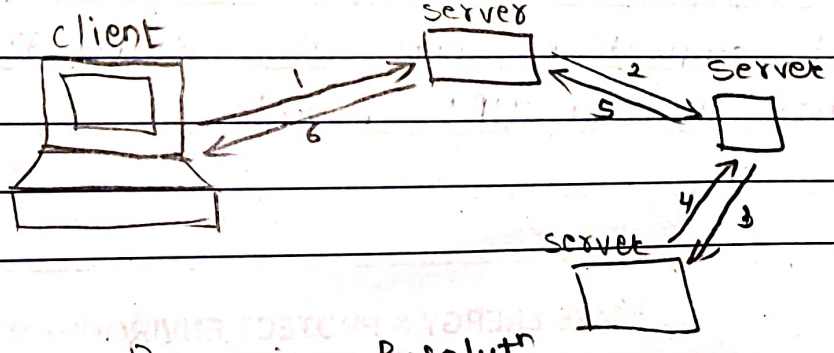
Q:- State and explain name address resolution technique in DNS.

→ The process of mapping a name to an address or vice versa is called as "name address resolution".

There are two name address resolution technique in DNS.

i) Recursive Resolution
ii) Iterative Resolution

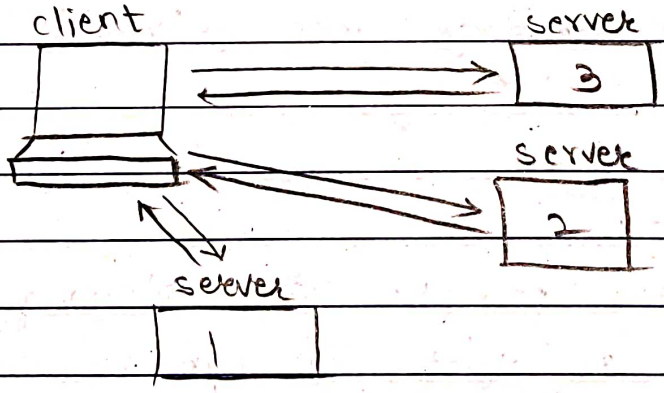
i) Recursive Resolution :-
- Sometimes client request for a recursive or final answer. If the server has the authority for the domain name, it checks its database and sends a reply
- But if server doesn't have authority, then it sends the query to the another server (usually a parent server) and waits for the response.
- If the parent server has the authority then it sends the answer, Otherwise it sends the query to the another server. When the query is solved, the response is returned back to the requesting client.
- Such type of query is called as recursive query or such type of process is called as recursive resolution.



Recursive Resolut

ii) Iterative Resolution:

- This type of mapping can be done if client does not ask for recursive answer. If the server has the authority for the domain name it ~~reply~~ will send the answer.
- But if the server doesn't have authority then it returns the IP address of the server to the client that holds the answer to the query.
- The client has to repeat the query to this new server, if this server also cannot answer the query, it sends the IP address of another server to the client.
- Now the client has to send the query to the new server.
- This process is called as iterative resolution because the client sends the same query to different server



Iterative Resolution

Q. 3 Explain E-mail and its services (OR)

Q. What are the basic functions of E-mail system Explain the importance of MIME in e-mail system

→ One of the most popular network service is electroic mail (e-mail). The Simple Mail Transfer Protocol (SMTP) is the standard mechanism for electronic mail in the internet.

E-mail system support five basic functions which are as follows :

1. Composition :
The process of creating messages and to answer them is known as composition. The system can also provide assistance with addressing & no. of header fields attach to each message.

2. Th Transfer :
The process of moving messages from sender to the receiver is known as transfer. This includes establishment of connecth from sender to destinath or some intermediate machine.

3. Reporting :
Reporting system is used to tell the sender that the message was delivered or rejected or lost.

4. Displaying :
It is the process of displaying incoming messages so that it can be read by the user. For this purpose simple conversion & formatting are required.

5. Diposition :
This is concerned with what the receiver does with the received messages. Diposition is the final step of the email system.

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• Importance of MIME in email :-

- In the early days, the email consist of only text messages in English and expressed in ASCII.
- RFC 822 was sufficient for this environment. But for the worldwide internet environment, this approach isn't adequate.
- The solution to the problem is "MIME" i.e Multipurpose Internet Mail Extension. It was purposed in the standard RFC 1341 and then updated in RFC 1521.
- MIME use the same format as RFC 822 but it gives structure to the message body (In RFC 822 there is no structure to the message body).
- In addition to this, MIME defines encoding rules for non-ASCII messages. It is possible to send MIME messages using existing mail programs and protocols.

Q.4 Explain the MIME header

→ Five new message headers are defined for MIME.

1. MIME Version : It tells the user agent that this message is MIME message and it also specify the version of MIME.

2. Content Description :-
This header used to tell what type of message is. This header is need to ~~tell~~ know the receiver whether the message is worth decoding and reading it.

3. Content - Id :-
This field identifies the contents.

4. Content - Transfer - Encoding :-
This field tells how the body is wrapped for transmission through a network.

5. Content :
It is used to specify the type of the message body.

Q.5 Write short note on SMTP

⟹ - The actual mail transfer is carried out through mail transfer agent.
- A system should have a client MTA in order to send a mail and it should have a server MTA ind order to receive a mail.
- SMTP is the protocol which defines MTA client and server in the internet.
- Simple Mail Transfer Protocol (SMTP) is the standard mechanism for electronic mail in the internet.
- As shown in the below fig:, SMTP is used twice between sender and sender's mail server and both mail servers.

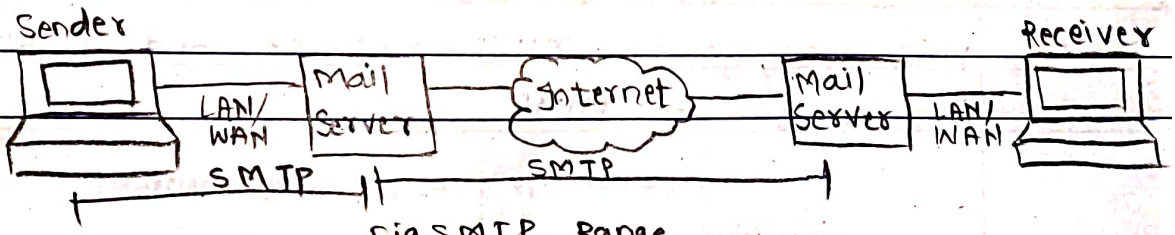


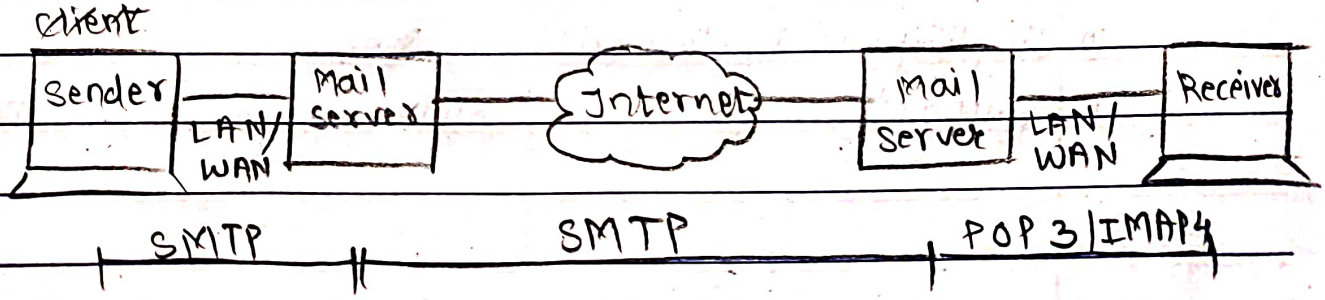
Fig. SMTP Range

- The job of SMTP is simply to define how commands & responses be sent back & forth.

Q.6 Write short note on POP3 & IMAP4

→ - SMTP is used in the first & second stages of the mail delivery. But SMTP is not used in the mail third stage, because SMTP is a push protocol, which is meant for pushing messages from client to server.
- The third stage needs a pull protocol because the client has to pull the messages from the server.
- Therefore third stage uses message access agent which is a pull protocol.
- The two message access agents available are:
1) Post Office Protocol Version 3 (POP3)
2) Internet Mail Access Protocol Version 4 (IMAP4)

- POP3 consist of client POP3 software and server POP3 software.
- The client POP3 software is installed on the receiver's computer whereas server POP3 is installed on the mail server.
- When the user wants to download the mail from the mailbox on the email server, the events takes place in the following sequence.



- Internet Mail Access Protocol Version 4 (IMAP 4) is the another mail access protocol which is similar to POP3 but has more feature.
- This makes IMAP 4 more powerful but more complex than POP 3. IMAP 4 is more sophisticated than POP3.
- IMAP4 is ideal for the user who is having multiple computers such as PC, laptop workstation.
- IMAP 4 maintains a central repository which can be accessed from any machine.
- An important feature of IMAP 4 is its ability to address mail not by arrival no. but by using attributes. That means the mailbox is like a relational database system than a linear sequence of messages.

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No	Parameter	POP3	IMAP4
1.	TCP Port Number	110	143
2.	e-mail is stored at	User's PC	Server
3.	e-mail is read	Offline	Online
4.	Use of server resources	Minimal	Extensive
5.	Time required to connect	Small	Long
6.	For mobile users	Not Good	Good
7.	Partial messages download	NO	Yes
8.	Multiple mail boxes	Not Possible	Possible
9.	Who back ups mailboxes	User	ISP
10.	Simplicity in implementatn	Yes	No
11.	Support	Wide Range	Increasing.

Q.8 What is FTP ? When & where it is used ? Why does it require 2 ports ? Explain atleast 5 user commands used in FTP ?

→ • A standard mechanism provided by internet which helps in copying files from one host to another is known as File Transfer Protocol

• Some problems in transferring files from one host to another are as follows

- Two system may use different file name convent^n
- Two system may use different text & dat in different ways.
- The directory structure of the two system may be different.

• FTP provides a simple sol^n to all these problems.

• FTP uses two types of connection betn host & server. One of the connection is for data transfer and another connection for control informat^n.

• The fact that FTP separates control and data makes it very efficient.

• As the FTP uses two types of connection, it uses two different ports. Port 20 for data transfer & port 21 for control connect^n Both these are well known TCP ports.

The following FTP commands are used for copying files.

Get	copy a file from remote host to local host
M get	copy multiples from remote host to local host
Put	Copy a file from local host to remote host
M put	copy a files (multiple) from local host to remote host

The following FTP commands are used to connect to remote host.

Command	Explaination
Open	Select remote host and initialize login session
User	Identify remote user ID
Pass	Authenticate the user
Site	Send information to remote host

Q.8 Difference betn FTP and TFTP

	Parameter	FTP	TFTP
1.	Operation	File transeffring	File Transferring
2.	Control & data	Seperated	Not Seperated
3.	Protocol	TCP	UDP
4.	Data transfer	Reliable	Unreliable
5.	Ports	20 - Data, 21 - Control	3214, 69, 4012
6.	Authentication	Yes	No
7.	Security	More Secure	less Secure

Q 10 Differentiate bet^n Persistant & Non- Persistant HTTP.

	Parameter	Persistent HTTP	Non-persistent HTTP
1.	HTTP Version	1.1	HTTP version 1.0
2.	Mode	It is default mode	It is not default mode.
3.	No. of RTT used	It uses one RTT for each object	It is used to 2 RTT for each object
4.	No. of request on TCP connect^n	Multiple request over single TCP connect^n	Multiple request over multiple TCP connect^n
5.	TCP connection	TCP connect^n is not closed	Closed after every response & request
6.	Request Method	Request method are: Get, POST, PUT, DELETE, HEAD etc	Request Method are Get, POST and HEAD.

Q.11 Explain two types of messages used in HTTP.

→ HTT messages are of two types
1. Request message 2. Response message

1. Request Message :-
The following fig shows the format of the request message. It consist of request line, header and sometimes a body.

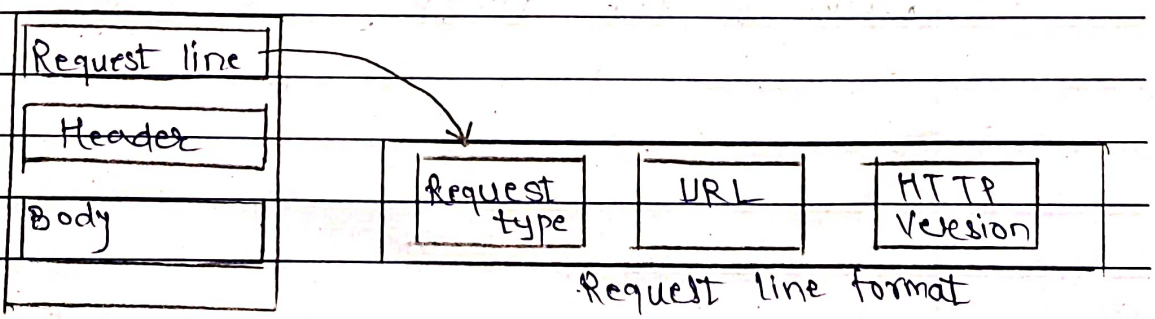

Fig. HTTP Request Message Format

1. Request line:
Request line is used for defining the request type, resource (URL) and HTTP version.

- Request type: several request types are defined such as GET, PUT, POST, COPY, MOVE, DELETE etc

- URL:
HTTP uses URL (Uniform Resource Locator) to facilitate the access of any document distributed over the world. URL defines four thing as follows

1. Method 2. Host 3. Port 4. Path

- Method:
Method is the protocol used such as FTP, HTTP.

- Host: Host is the any computer where the required information is located.

- Port: URL can optionally contain the server's port no. If the port no. is included then it should be in bet^n host & path & should be separated by colon.

- Path: Path is the name of the file where the information is located.

- Version: The field is used to define the current version of the HTTP.

2. Response Message :-

Following fig. shows the format of the response message. It consist of status line, header and sometimes a body

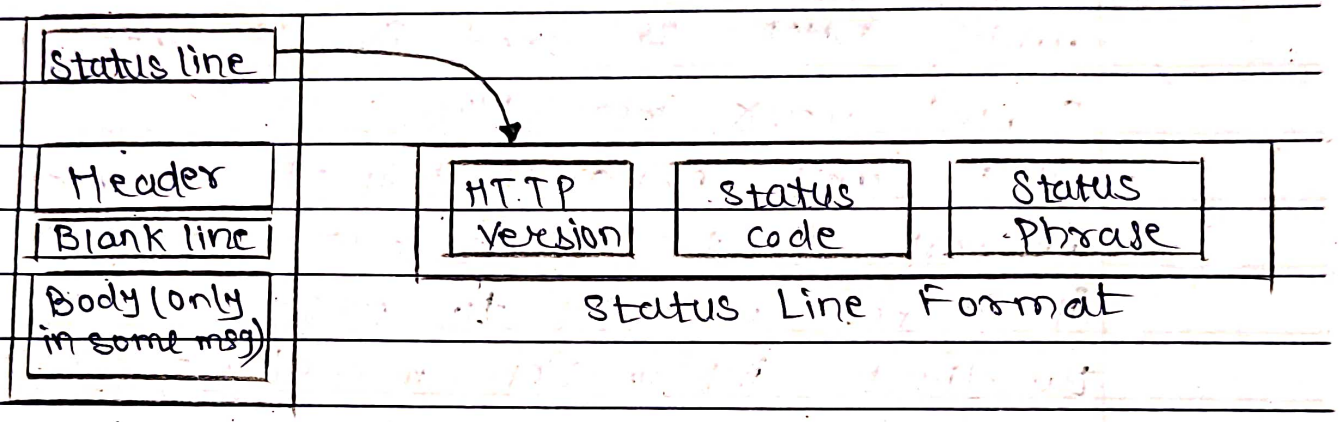

Fig. HTTP Response Message

Status line is used to define the status of the response message. It consist of HTTP version, status code and status phrase with spaces between them.

Version : It is used to define the HTTP version being used.

Status Code : It is a three digit field which is similar to those in FTP & HTTP.

Status Phrase : It is used for explaining the status code in text form.

Q. What is DHCP ? What are it's advantages ?

→ DHCP (Dynamically Host Configuration Protocol) as the name suggest is used for dynamically configuring the host on a network such as workstation, personal computers & printers.

- DHCP can help in assigning various types of information such as routing information, directory services information, default web-server and mail-servers.
- However, the most important information for which DHCP is used is IP address & subnet mask information.
- DHCP was primarily designed for managing the network & the clients automatically. With DHCP, it is not necessary to configure the network & the client information manually for individual hosts.

- Advantages of DHCP :-

1. DHCP is easy to implement
2. It does automatic assignment of IP addresses to requesting client.
3. The implementation doesn't require any additional cost.
4. Duplicate or invalid assignment of IP addresses are prevented. Hence there is no chance of conflicts in IP addresses.
5. It simplified the network administration.

- Use of DNS :

1. DNS makes it easy for the user to remember the domain name instead of IP address and access the website with the name.
2. DNS is used to access the location of the website on the Internet.
3. DNS provides a unique IP address & it uniquely identifies the webpage.