4132COMPUTER COMMUNICATION AND NETWORKS

Module IV

PART A

Answer all questions in one word or one sentence.

1. The protocol used by E-mail is _____
   SMTP
2. The first section of a URL identifier is _____
   Protocol
3. Write down the three types of WWW documents
   Static, dynamic and active
4. List any two types of FTP transmission modes
   Stream, block and compressed
5. DNS stands for _____
   Domain Name System
6. List any four application layer protocols
   FTP, SMTP, POP, HTTP
7. SSH stands for _____
   Secure Shell or Secure Socket Shell
8. List SSH components
   Transport Layer Protocol, User Authentication Protocol, Connection Protocol
9. List two HTTP connections
   Persistent Connection and Non-persistent Connection

Question and Answers

10. Explain HTTP and its connections

    The Hypertext Transfer Protocol (HTTP) is an application-level protocol that uses TCP as an underlying transport and typically runs on port 80. HTTP is a stateless protocol i.e. server maintains no information about past client requests.

    HTTP Connections

    Non-Persistent

    Persistent

    Non-Persistent Connection:

    In this, for each object we have to create a new connection for sending that object from source to destination. There are two types:

    1. Without parallel connection: Each objection takes two RTTs (Round Trip Time), one for TCP connection and the other for HTTP image/text file.
    2. With parallel connection: requires extra overhead in transferring data.

    Persistent connection:

    The server leaves the connection open after sending a response.

    1. Non-Pipelined: first establish a connection that takes two RTTs then send all the object's images/text files which take 1 RTT each. TCP for each object is not required.
    2. Pipelined: Here 2 RTT for connection establishment and then 1 RTT for all the objects i.e. images/text.

11. Compare client – server paradigm and peer to peer paradigm

    - The main distinction between client-server and peer-to-peer networks is that client-server networks have a dedicated server and specialised clients, whereas peer-to-peer networks allow any node to operate as both a client and a server.
    - The importance of connectivity between peers is greater in the peer-to-peer architecture than in the client-server approach.

- In the client-server network, each peer has its own data, in contrast to the client-server network, where data is stored on a single server.
- In the client-server network, the server gives the client services. Peer-to-peer, on the other hand, allows each peer to both requests and deliver services.
- The client-server network is more stable and scalable than a peer-to-peer,
- The client-server network is more costly than peer-to-peer network.
- Peer-to-peer systems have distributed servers, which reduces the likelihood that a server would become bottlenecked. Client-server systems, on the other hand, have a single server that serves all the clients, increasing the likelihood that a server will become bottlenecked.

12. Describe Web documents

    A web document is a web-based document that opens with a browser, whether connected to the network or not. The owner of the record can change and modify that document anytime.

    There are three types of web documents:

    - Static
    - Dynamic
    - Active

13. What is SSH?

    SSH, or Secure Shell, is a network protocol that allows one computer to securely connect to another computer over an unsecured network, like the internet, by having a shared agreement of how to communicate. SSH is an application layer protocol.

    SSH architecture contains three layers. The components are Transport Layer Protocol, User Authentication Protocol and Connection Protocol.

    The SSH protocol architecture is an open architecture. In the architecture, the transport layer is similar to the transport layer security (TLS). The User-authentication layer can be used with the custom authentication methods, and the connection layer allows multiplexing different secondary sessions into a single SSH connection.

14. Write notes on FTP

    FTP represents File transfer protocol and it is a standard internet protocol supported by TCP/IP used for transmitting the files from one host to another. FTP needs TCP as a transport protocol to help the reliable end to end connections and executes two types of connections in managing data transfers. FTP has two connections. Control connection to port 21 and data connection to port 20. The control connection is issued for all of the control commands a client user uses to log on to the server, manipulate files, and terminate a session. FTP opens a data connection when a user concerns a command requiring a data transfer, including a request to retrieve a file or to view a list of the files available.

    The advantages of FTP are as follows −

    - **Speed** − The FTP is one of the quickest ways to transfer documents from one device to another.
    - **Security** − It can create the FTP server. We need to log in with the username and password.
    - **Efficient** − It is higher efficient as we do not require all the services to obtain the whole file.
    - **Back & forth movement** − FTP enables us to send the files back and forth.

15. Explain WWW Architecture

    WWW stands for World Wide Web. A technical definition of the World Wide Web is : all the resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP).

The World Wide Web is a way of exchanging information between computers on the Internet, tying them together into a vast collection of interactive multimedia resources.
The World Wide Web is based on several different technologies: Web browsers, Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP).

A Web browser is used to access web pages. Web browsers can be used for several tasks including conducting searches, mailing, transferring files, and much more. Some of the commonly used browsers are Internet Explorer, Opera Mini, and Google Chrome.

Features of WWW:

- HyperText Information System
- Cross-Platform
- Distributed
- Open Standards and Open Source
- Uses Web Browsers to provide a single interface for many services
- Dynamic, Interactive and Evolving.
- "Web 2.0"

Components of the Web: There are 3 components of the web:

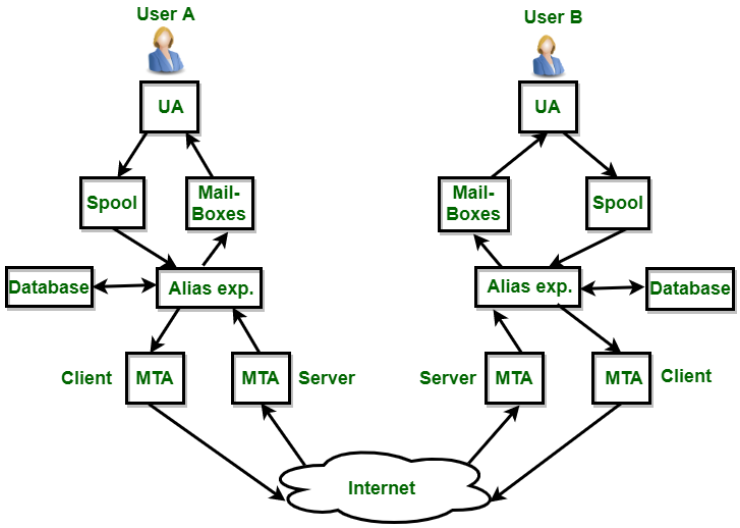
1. Uniform Resource Locator (URL): serves as a system for resources on the web.
2. Hyper Text Transfer Protocol (HTTP): specifies communication of browser and server.
   Hyper Text Markup Language (HTML): defines the structure, organisation and content of a webpage.

16. Explain E-mail Architecture

Electronic Mail (e-mail) is one of most widely used services of Internet. This service allows an Internet user to send a message in formatted manner (mail) to the other Internet user in any part of world. The person who is sending mail is called sender and person who receives mail is called recipient.
Components of E-Mail System: (figure)
The basic components of an email system are : User Agent (UA), Message Transfer Agent (MTA), Mail Box, and Spool file. These are explained as following below.

1. User Agent (UA): The UA is normally a program which is used to send and receive mail. Sometimes, it is called as mail reader. It accepts variety of commands for composing, receiving and replying to messages as well as for manipulation of the mailboxes.
2. Message Transfer Agent (MTA): MTA is actually responsible for transfer of mail from one system to another. To send a mail, a system must have client MTA and system MTA. It transfers mail to mailboxes of recipients if they are connected in the same machine. It delivers mail to peer MTA if destination mailbox is in another machine. The delivery from one MTA to another MTA is done by Simple Mail Transfer Protocol.
3. Mailbox: It is a file on local hard drive to collect mails. Delivered mails are present in this file. The user can read it delete it according to his/her requirement. To use e-mail system each user must have a mailbox. Access to mailbox is only to owner of mailbox.
   Spool file: This file contains mails that are to be sent. User agent appends outgoing mails in this file using SMTP. MTA extracts pending mail from spool file for their delivery. E-mail allows one name, an alias, to represent several

different e-mail addresses. It is known as mailing list, Whenever user have to sent a message, system checks recipient's name against alias database. If mailing list is present for defined alias, separate messages, one for each entry in the list, must be prepared and handed to MTA. If for defined alias, there is no such mailing list is present, name itself becomes naming address and a single message is delivered to mail transfer entity.



17. List the services of Application Layer
    - Network Virtual terminal: An application layer allows a user to log on to a remote host. To do so, the application creates a software emulation of a terminal at the remote host.
    - File Transfer, Access, and Management (FTAM): 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.
    - Addressing: To obtain communication between client and server, there is a need for addressing.
    - Mail Services: An application layer provides Email forwarding and storage.
    - Directory Services: An application contains a distributed database that provides access for global information about various objects and services.
18. Write notes on URL

    URL stands for Uniform Resource Locator that identifies a particular Internet resource. URL helps the user locate a web page, image, or text file locations. URLs are the standard addressing system of the www. URLs divided into three essential parts:

    Example: https://www.google.com/software

    1. Protocol (http ://)
    2. Domain name (www.google.com)
    3. Resource name (software.htm)
19. What is the purpose of DNS?

    The domain name system is responsible for translating domain names into a specific IP address so that the initiating client can load the requested Internet resources. This allows the users of networks to utilize user-friendly names when looking for other hosts instead of remembering the IP addresses. DNS servers translate requests for specific domains into IP addresses, controlling which server users with access when they enter the domain name into their browser.