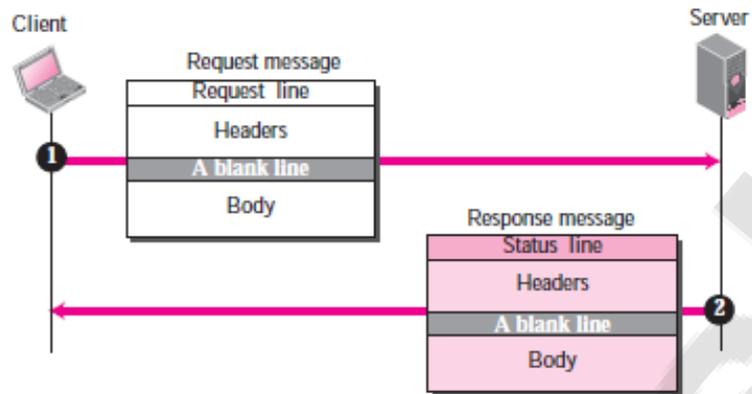


|     |   |
|-----|---|
| Q.1 | Explain Http protocol with diagram.   |
| Ans | <p><b><u>HTTP:</u></b></p> <ul style="list-style-type: none"> <li>• HTTP (Hyper Text Transfer Protocol) is the most popular protocol used for web browsing.</li> <li>• It is basically a computer networking application layer protocol provided to the applications for accessing data on the world wide web (www).</li> <li>• The <b>Hypertext Transfer Protocol (HTTP)</b> is a protocol used mainly to access data on the World Wide Web.</li> <li>• HTTP functions like a combination of FTP and SMTP. It is similar to FTP because it transfers files and uses the services of TCP.</li> <li>• However, it is much simpler than FTP because it uses only one TCP connection. There is</li> <li>• no separate control connection; only data are transferred between the client and the server.</li> <li>• HTTP is like SMTP because the data transferred between the client and the server look like SMTP messages.</li> <li>• HTTP uses the services of TCP on well-known port 80.</li> <li>• HTTP (Hypertext Transfer Protocol) is the set of rules for transferring files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. As soon as a Web user opens their Web browser, the user is indirectly making use of HTTP</li> <li>• When the browser user enters file requests by either "opening" a Web file (typing in a Uniform Resource Locator or URL) or clicking on a hypertext link, the browser builds an HTTP request and sends it to the Internet Protocol address (IP address) indicated by the URL.</li> <li>• The HTTP daemon in the destination server machine receives the request and sends back the requested file or files associated with the request. (A Web page often consists of more than one file.)</li> </ul> <p><b><u>HTTP Transaction</u></b></p> <ul style="list-style-type: none"> <li>• Figure 22.10 illustrates the HTTP transaction between the client and server.</li> <li>• Although HTTP uses the services of TCP, HTTP itself is a stateless protocol, which means that the server does not keep information about the client.</li> <li>• The client initializes the transaction by sending a request. The server replies by sending a response.</li> </ul> |

Figure 22.10 HTTP transaction



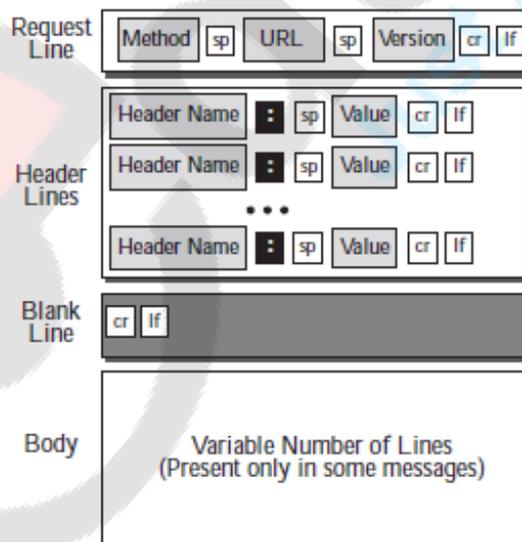
**Messages**

- The formats of the request and response messages are similar; both are shown in Figure 27.13.
- A request message consists of a request line, a header, and sometimes a body.
- A response message consists of a status line, a header, and sometimes a body.

**Request Message**

The format of the request is shown in Figure 22.11. A request message consists of a request line, a header, and sometimes a body

Figure 22.11 Format of the request message



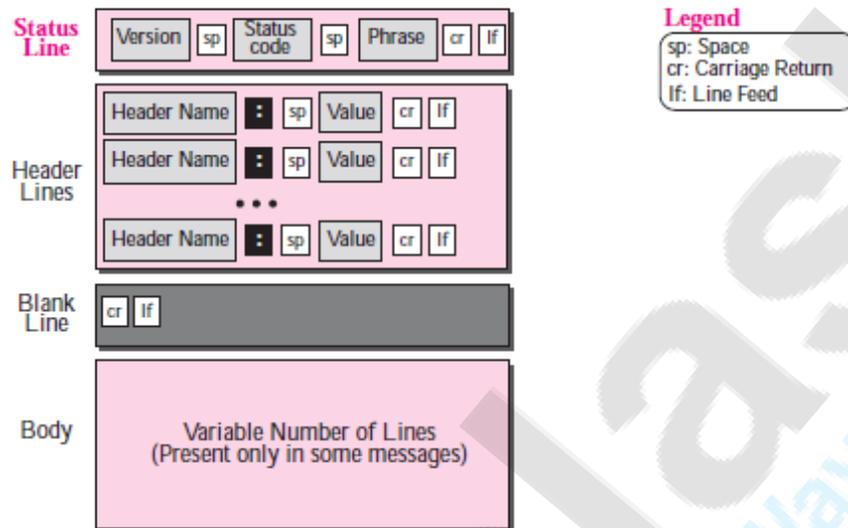
**Legend**

- sp: Space
- cr: Carriage Return
- lf: Line Feed

Response Message

The format of the response message is shown in Figure 22.12. A response message consists of a status line, header lines, a blank line and sometimes a body.

**Figure 22.12** *Format of the response message*



Q2. Explain FTP and its components with diagram.

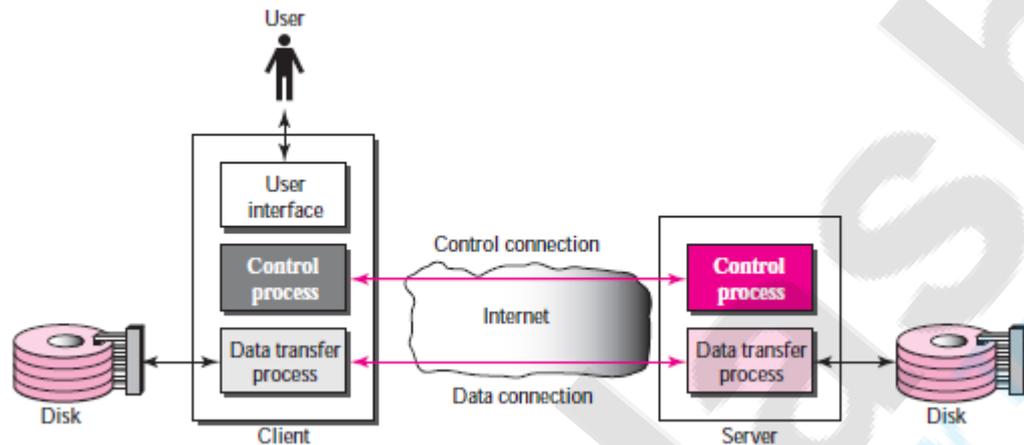
Ans **FTP:**

- File Transfer Protocol (FTP) is a standard Internet protocol for transmitting files between computers on the Internet over TCP/IP connections.
- FTP is a client-server protocol that relies on two communications channels between client and server: a command channel for controlling the conversation and a data channel for transmitting file content.
- Clients initiate conversations with servers by requesting to download a file. Using FTP, a client can upload, download, delete, rename, move and copy files on a server.
- File Transfer Protocol (FTP) is the standard mechanism provided by TCP/IP for copying a file from one host to another.
- Although transferring files from one system to another seems simple and straightforward, some problems must be dealt with first.
- For example, two systems may use different file name conventions. Two systems may have different ways to represent text and data. Two systems may have different directory structures.
- All of these problems have been solved by FTP in a very simple and elegant approach.
- FTP uses the services of TCP. It needs two TCP connections. The well-known port 21 is used for the control connection and the well-known port 20 for the data connection.

## Connections

The two FTP connections, control and data, use different strategies and different port numbers.

Figure 21.1 *FTP*

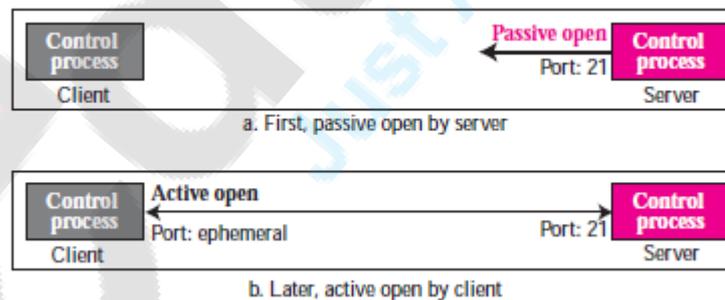


## Control Connection

The control connection is created in the same way as other application programs described so far. There are two steps:

1. The server issues a passive open on the well-known port 21 and waits for a client.
2. The client uses an ephemeral port and issues an active open.

Figure 21.2 *Opening the control connection*

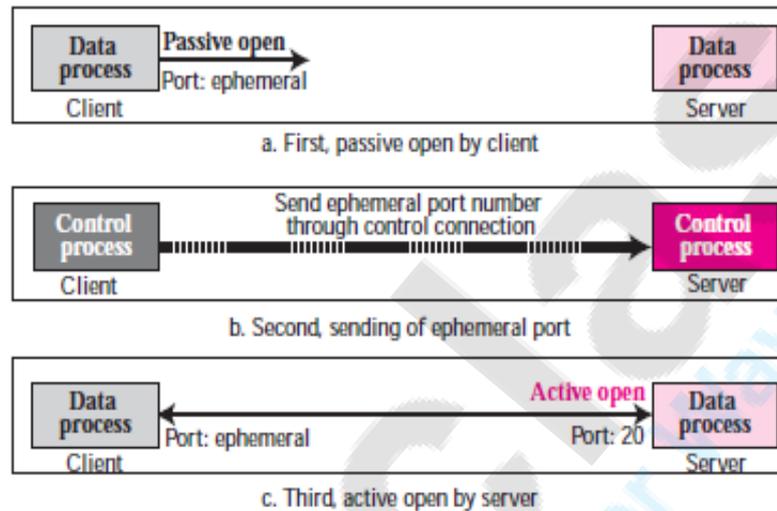


## Data Connection:

The **data connection** uses the well-known port 20 at the server site. However, the creation of a data connection is different from what we have seen so far. The following shows how FTP creates a data connection:

1. The client, not the server, issues a passive open using an ephemeral port. This must be done by the client because it is the client that issues the commands for transferring files.
2. The client sends this port number to the server using the PORT command (we will discuss this command shortly).
3. The server receives the port number and issues an active open using the wellknown port 20 and the received ephemeral port number.

**Figure 21.3** *Creating the data connection*

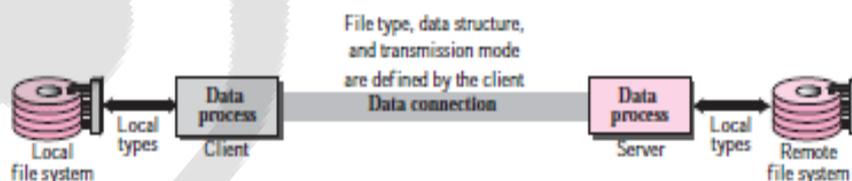


### Communication

The FTP client and server, which run on different computers, must communicate with each other.

These two computers may use different operating systems, different character sets, different file structures, and different file formats. FTP must make this heterogeneity compatible.

**Figure 21.5** *Using the data connection*



Q.3

Explain TELNET .

Ans.

**Telnet:**

- Telnet (short for TerminalNetwork) is a network protocol used to provide a command line interface for communicating with a device.
- Telnet is used most often for remote management but also sometimes for the initial setup for some devices, especially network hardware like switches, access points, etc.
- Managing files on a website is also something Telnet is sometimes used for.
- Telnet is sometimes written in uppercase as TELNET and may also be misspelled as Telenet.
- It is the standard TCP/IP protocol for virtual terminal service as proposed by ISO. TELNET enables the establishment
- of a connection to a remote system in such a way that the local terminal appears to be a terminal at the remote system.
- TELNET is a general-purpose client-server application program.

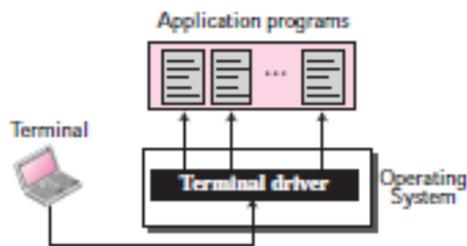
**Time-Sharing Environment**

- TELNET was designed at a time when most operating systems, such as UNIX, were operating in a time-sharing environment.
- In such an environment, a large computer supports multiple users.
- The interaction between a user and the computer occurs through a terminal, which is usually a combination of keyboard, monitor

**Login / Local login**

- In a time-sharing environment, users are part of the system with some right to access resources. Each authorized user has identification and probably a password.
- The user identification defines the user as part of the system. To access the system, the user logs into the system with a user id or login name.
- The system also includes password checking to prevent an unauthorized user from accessing the resources.

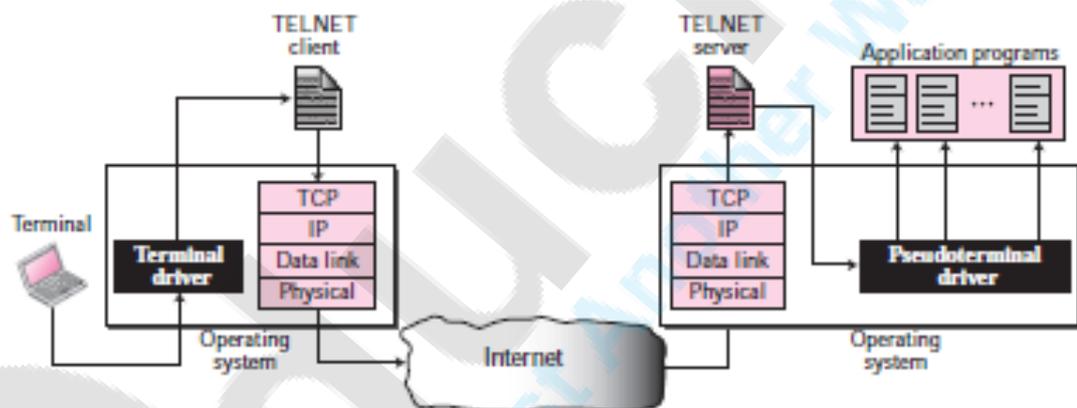
Figure 20.1 Local login



### Remote Login

- When a user wants to access an application program or utility located on a remote machine, he or she performs remote login.
- Here the TELNET client and server programs come into use.
- The user sends the keystrokes to the terminal driver where the local operating system accepts the characters but does not interpret them.
- 

Figure 20.2 Remote login



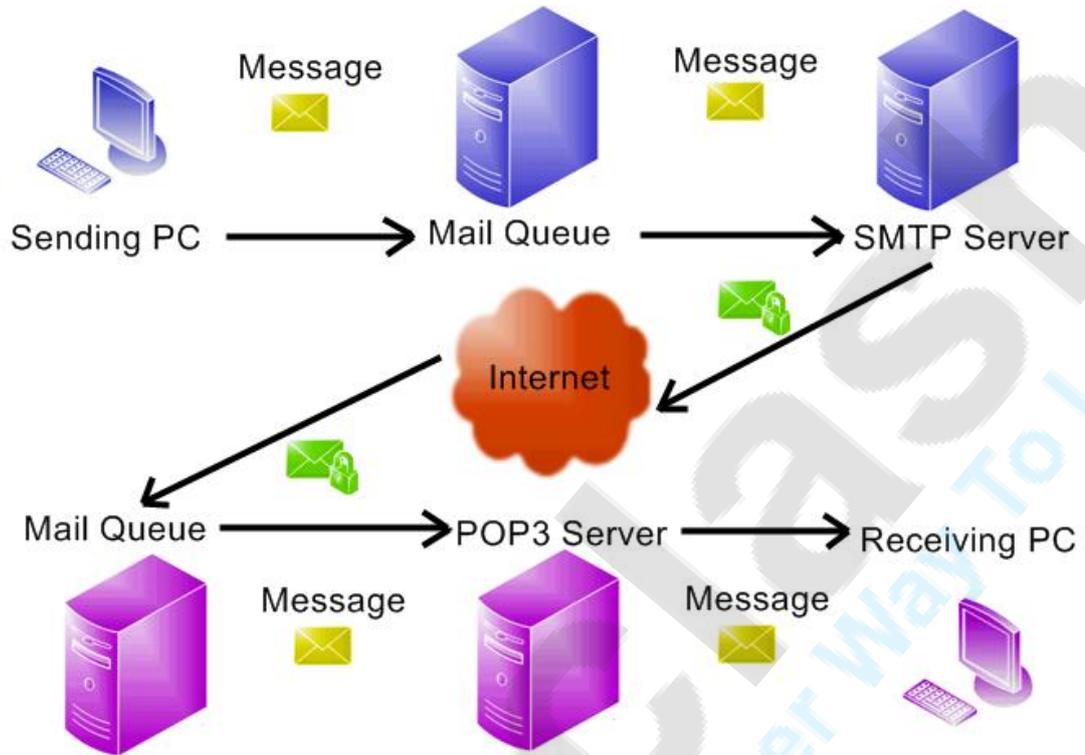
Explain and its Commands SMTP.

Q.5

### SMTP:

- SMTP (Simple Mail Transfer Protocol) is a TCP/IP protocol used in sending and receiving e-mail.
- However, since it is limited in its ability to queue messages at the receiving end, it is usually used with one of two other protocols, POP3 or IMAP that let the user save messages in a server mailbox and download them periodically from the server.
- In other words, users typically use a program that uses SMTP for sending e-mail and either POP3 or IMAP for receiving e-mail.
- The actual mail transfer is done through message transfer agents (MTAs). To send mail, a system must have the client MTA, and to receive mail, a system must have a server MTA.

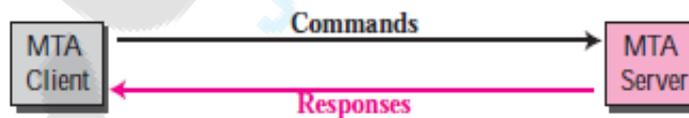
- The formal protocol that defines the MTA client and server in the Internet is called Simple Mail Transfer Protocol (SMTP).



**Commands and Responses**

SMTP uses commands and responses to transfer messages between an MTA client and an MTA server (see Figure 23.9).

**Figure 23.9** *Commands and responses*



**Commands:**

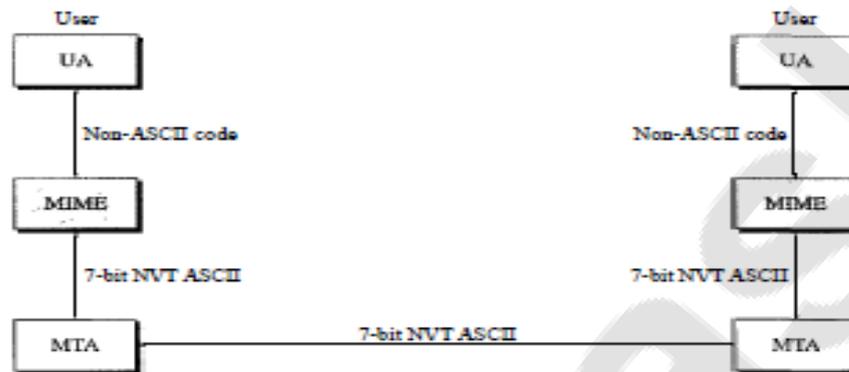
Commands are sent from the client to the server. The format of a command is shown below:

**Keyword:** argument(s)

|      |  |
|------|--|
|      | <p>❑ <b>HELO.</b> This command is used by the client to identify itself. The argument is the domain name of the client host. The format is</p> <pre style="background-color: #f0f0f0; padding: 5px; text-align: center;">HELO: challenger.atc.fhda.edu</pre> <p>❑ <b>MAIL FROM.</b> This command is used by the client to identify the sender of the message. The argument is the e-mail address of the sender (local part plus the domain name). The format is</p> <pre style="background-color: #f0f0f0; padding: 5px; text-align: center;">MAIL FROM: forouzan@challenger.atc.fhda.edu</pre> <p>❑ <b>RCPT TO.</b> This command is used by the client to identify the intended recipient of the message. The argument is the e-mail address of the recipient. If there are multiple recipients, the command is repeated. The format is</p> <pre style="background-color: #f0f0f0; padding: 5px; text-align: center;">RCPT TO: betsy@mcgraw-hill.com</pre> <p>❑ <b>DATA.</b> This command is used to send the actual message. All lines that follow the DATA command are treated as the mail message. The message is terminated by a line containing just one period. The format is</p> <pre style="background-color: #f0f0f0; padding: 5px;">DATA This is the message to be sent to the McGraw-Hill Company. .</pre> |
| Ans. | Explain MIME   |
| Q. 6 | <p><b><u>MIME:</u></b></p> <ul style="list-style-type: none"> <li>• MIME (Multi-Purpose Internet Mail Extensions) is an extension of the original Internet e-mail protocol that lets people use the protocol to exchange different kinds of data files on the Internet: audio, video, images, application programs, and other kinds, as well as the ASCII text handled in the original protocol, the Simple Mail Transport Protocol (SMTP).</li> <li>• Multipurpose Internet Mail Extensions (MIME) is a supplementary protocol that allows non-ASCII data to be sent through e-mail.</li> <li>• MIME transforms non-ASCII data at the sender site to NVT ASCII data and delivers it to the client MTA to be sent through the Internet.</li> <li>• The message at the receiving site is transformed back to the original data.</li> <li>• We can think of MIME as a set of software functions that transforms non-ASCII data to ASCII data and vice versa, as shown .</li> </ul>   |

- it has some limitations.
- It cannot be used for languages other than English (such as French, German, Hebrew, Russian, Chinese, and Japanese). Also, it cannot be used to send binary files or video or audio data.

Figure 26.14 MIME

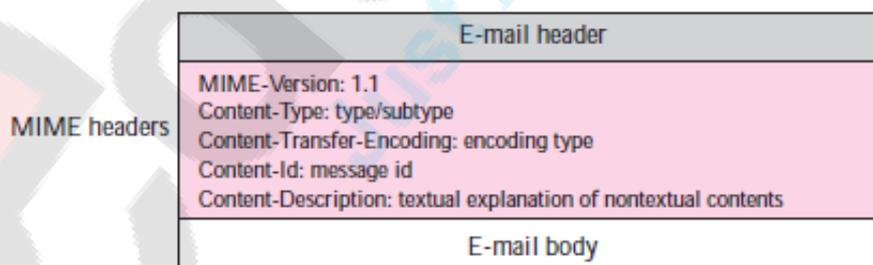


### MIME Headers

MIME defines five headers that can be added to the original e-mail header section to define the transformation parameters:

1. MIME-Version
2. Content-Type
3. Content-Transfer-Encoding
4. Content-Id
5. Content-Description

Figure 23.16 MIME header



### MIME-Version

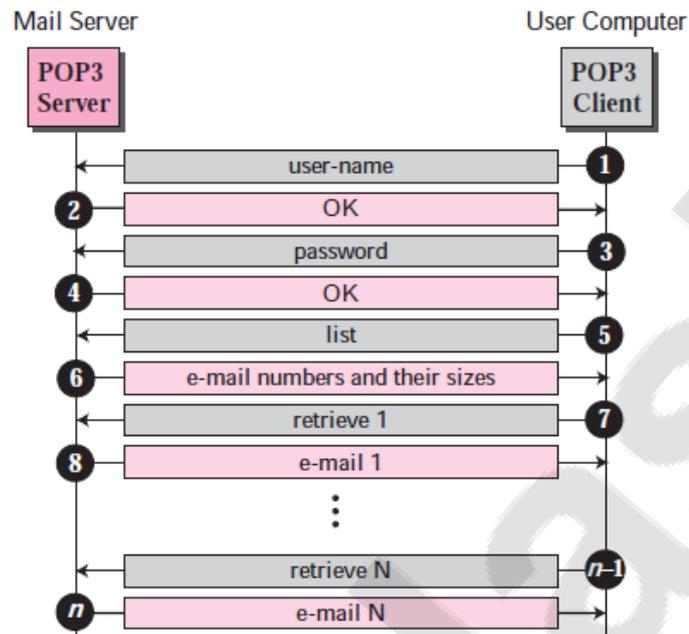
This header defines the version of MIME used

### Content-Type

- This header defines the type of data used in the body of the message.
- The contenttype and the content subtype are separated by a slash.
- Depending on the subtype, theheader may contain other parameters.

|     |  |
|-----|--|
|     | <ul style="list-style-type: none"> <li>• MIME allows seven different types of data, listed in below</li> </ul> <ol style="list-style-type: none"> <li>a. text</li> <li>b. message</li> <li>c. Audio</li> <li>d. video</li> <li>e. Application</li> </ol> <p><b><u>Content-Transfer-Encoding</u></b></p> <p>This header defines the method used to encode the messages into 0s and 1s for transport:</p> <p><b>Content-Transfer-Encoding: &lt;type&gt;</b></p> <p><b><u>Content-Id</u></b></p> <p>This header uniquely identifies the whole message in a multiple message environment.</p> <p><b><u>Content-Description</u></b></p> <p>This header defines whether the body is image, audio, or video</p> <p>.</p>  |
| Ans | Explain POP3.  |
| Q.7 | <p><b>POP3:</b></p> <p>POP3 (Post Office Protocol 3) is the most recent version of a standard protocol for receiving e-mail. POP3 is a client/server protocol in which e-mail is received and held for you by your Internet server. Periodically, you (or your client e-mail receiver) check your mail-box on the server and download any mail, probably using POP3. This standard protocol is built into most popular e-mail products, such as Eudora and Outlook Express. It's also built into the Netscape and Microsoft Internet Explorer browsers.</p> <p>POP3 is designed to delete mail on the server as soon as the user has downloaded it. However, some implementations allow users or an administrator to specify that mail be saved for some period of time. POP can be thought of as a "store-and-forward" service.</p> <p>Post Office Protocol, version 3 (POP3) is simple and limited in functionality. The client POP3 software is installed on the recipient computer; the server POP3 software is installed on the mail server.</p> <p>Mail access starts with the client when the user needs to download its e-mail from the mailbox on the mail server. The client opens a connection to the server on TCP port 110. It then sends its user name and password to access the mailbox. The user can then list and retrieve the mail messages, one by one. Figure 23.14 shows an example of downloading using POP3.</p> |

Figure 23.14 POP3



POP3 has two modes: the delete mode and the keep mode. In the delete mode, the mail is deleted from the mailbox after each retrieval. In the keep mode, the mail remains in the mailbox after retrieval. The delete mode is normally used when the user is working at her permanent computer and can save and organize the received mail after reading or replying. The keep mode is normally used when the user accesses her mail away from her primary computer (e.g., a laptop). The mail is read but kept in the system for later retrieval and organizing.

Q. 8    Imap

IMAP:

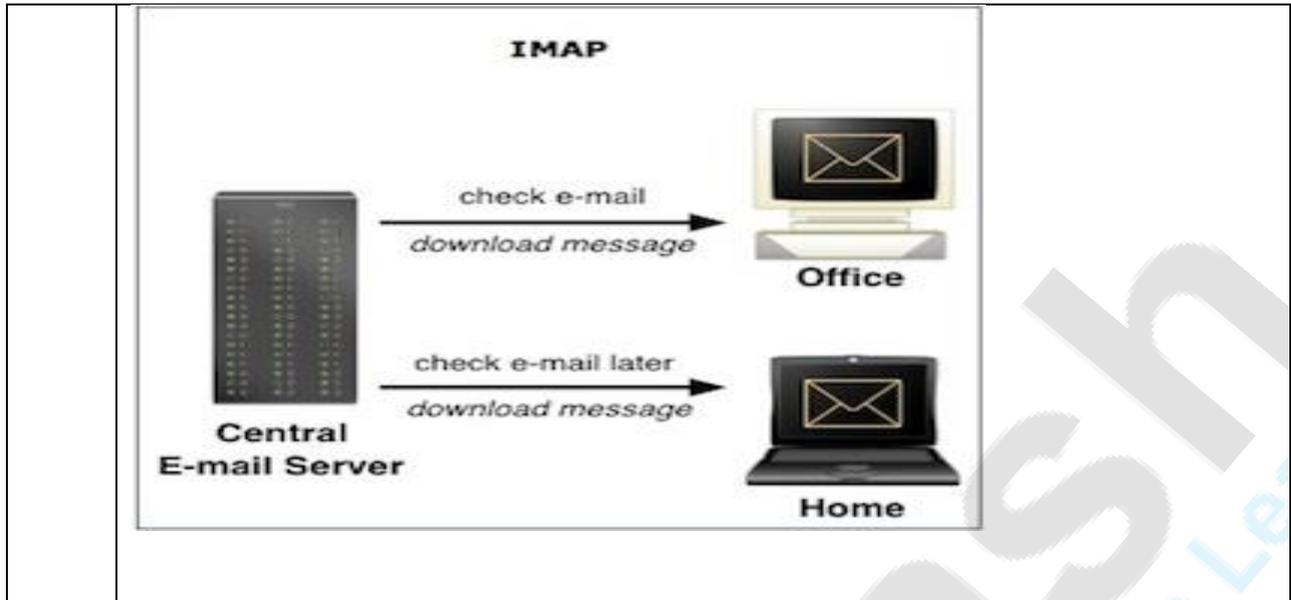
**Internet Mail Access Protocol, version 4 (IMAP4).**

IMAP4 is similar to POP3, but it has more features; IMAP4 is more powerful and more complex.

POP3 is deficient in several ways. It does not allow the user to organize her mail on the server; the user cannot have different folders on the server. (Of course, the user can create folders on her own computer.) In addition, POP3 does not allow the user to partially check the contents of the mail before downloading.

IMAP4 provides the following extra functions:

- A user can check the e-mail header prior to downloading.
- A user can search the contents of the e-mail for a specific string of characters prior to downloading.
- A user can partially download e-mail. This is especially useful if bandwidth is limited and the e-mail contains multimedia with high bandwidth requirements.
- A user can create, delete, or rename mailboxes on the mail server.
- A user can create a hierarchy of mailboxes in a folder for e-mail storage.



Q. 9

SNMP

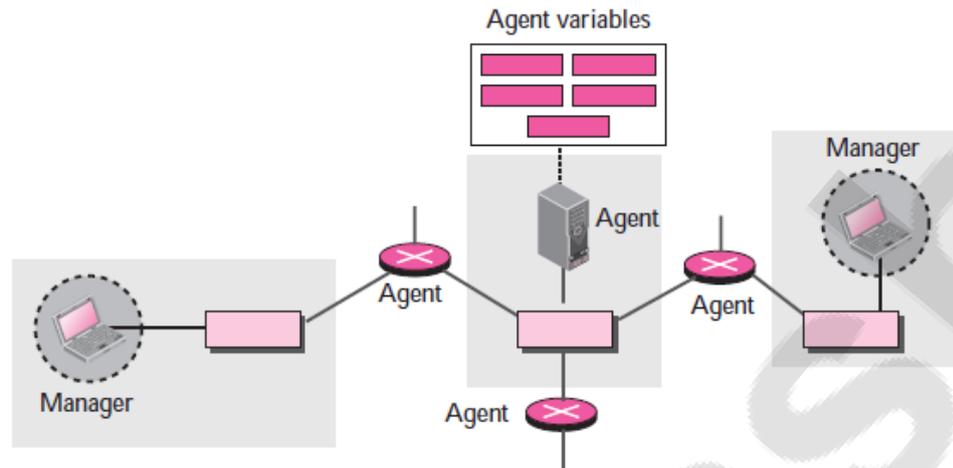
SNMP:

The Simple Network Management Protocol (SNMP) is a framework for managing devices in an internet using the TCP/IP protocol suite. It provides a set of fundamental operations for monitoring and maintaining an internet.

SNMP uses the concept of manager and agent. That is, a manager, usually a host, controls and monitors a set of agents, usually routers or servers.

SNMP is an application-level protocol in which a few manager stations control a set of agents. The protocol is designed at the application level so that it can monitor devices made by different manufacturers and installed on different physical networks. In other words, SNMP frees management tasks from both the physical characteristics of the managed devices and the underlying networking technology. It can be used in a heterogeneous internet made of different LANs and WANs connected by routers made by different manufacturers.

Figure 24.1 SNMP concept



### Managers and Agents

A management station, called a manager, is a host that runs the SNMP client program.

A managed station, called an agent, is a router (or a host) that runs the SNMP server program. Management is achieved through simple interaction between a manager and an agent.

The agent keeps performance information in a database. The manager has access to the values in the database. For example, a router can store in appropriate variables the number of packets received and forwarded.

### Role of SNMP

SNMP has some very specific roles in network management. It defines the format of the packet to be sent from a manager to an agent and vice versa. It also interprets the result and creates statistics (often with the help of other management software). The packets exchanged contain the object (variable) names and their status (values). SNMP is responsible for reading and changing these values.

DNS

Q. 10 DNS:

The domain name system (DNS) is the way that internet domain names are located and translated into internet protocol (IP) addresses. The domain name system maps the name people use to locate a website to the IP address that a computer uses to locate a website. For example, if someone types TechTarget.com into a web browser, a server behind the scenes will map that name to the IP address 206.19.49.149.

#### DNS IN THE INTERNET:

DNS is a protocol that can be used in different platforms. In the Internet, the domain name space (tree) is divided into three different sections: generic domains, country domains, and the inverse domain

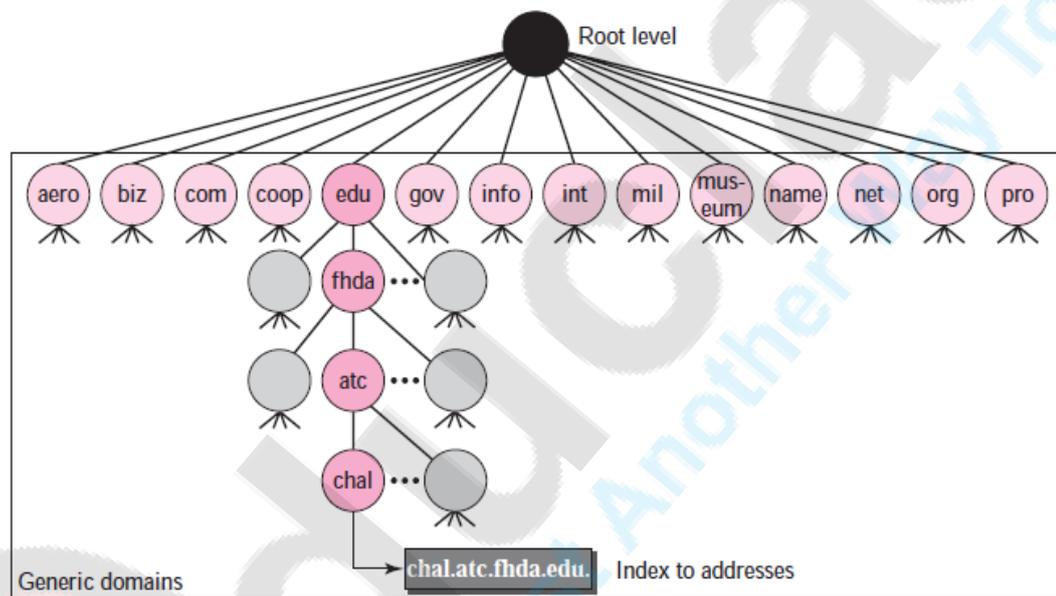
#### Generic Domains

The **generic domains** define registered hosts according to their generic behavior. Each node in the tree defines a domain, which is an index to the domain name space database (see

Figure

19.9).

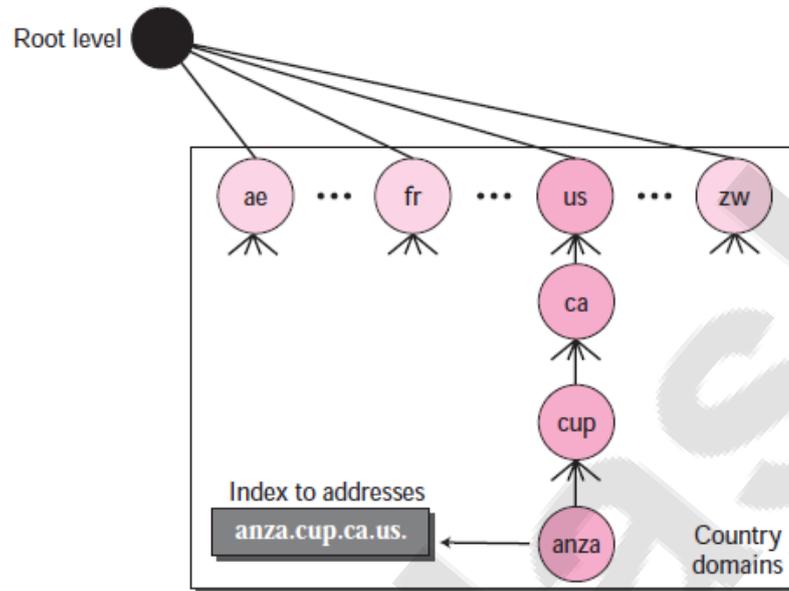
**Figure 19.9** *Generic domains*



#### Country domain

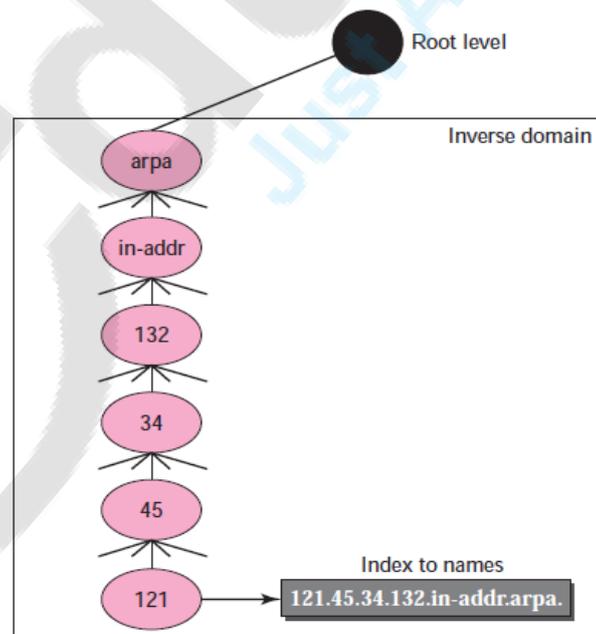
The **country domains** section uses two-character country abbreviations (e.g., us for United States). Second labels can be organizational, or they can be more specific, national designations. The United States, for example, uses state abbreviations as a subdivision of us (e.g., ca.us.).

Figure 19.10 Country domains

**Inverse Domain:**

The **inverse domain** is used to map an address to a name. This may happen, for example, when a server has received a request from a client to do a task. Although the server has a file that contains a list of authorized clients, only the IP address of the client (extracted from the received IP packet) is listed.

Figure 19.11 Inverse domain



|  |  |
|--|--|
|  |  |
|--|--|

