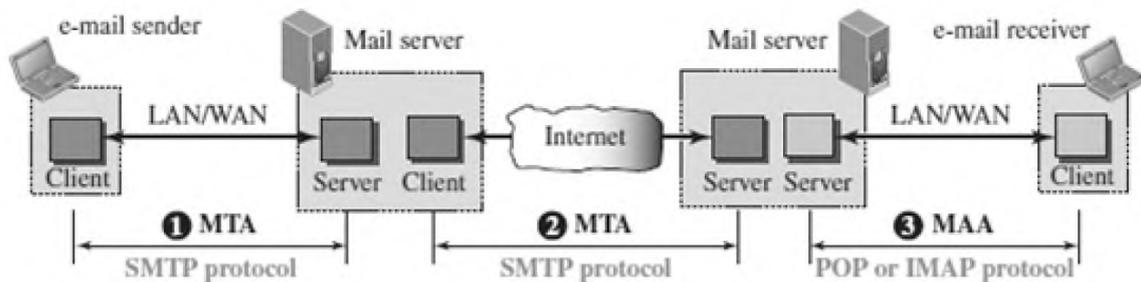


## 1.9 EMAIL (SMTP, MIME, IMAP, POP)

- One of the most popular Internet services is electronic mail (E-mail).
- Email is one of the oldest network applications.
- The three main components of an Email are
  1. User Agent (UA)
  2. Message Transfer Agent (MTA) – SMTP
  3. Message Access Agent (MAA) - IMAP , POP



- When the sender and the receiver of an e-mail are on the same system, we need only two User Agents and no Message Transfer Agent
- When the sender and the receiver of an e-mail are on different system, we need two UA, two pairs of MTA (client and server), and two MAA (client and server).

## WORKING OF EMAIL

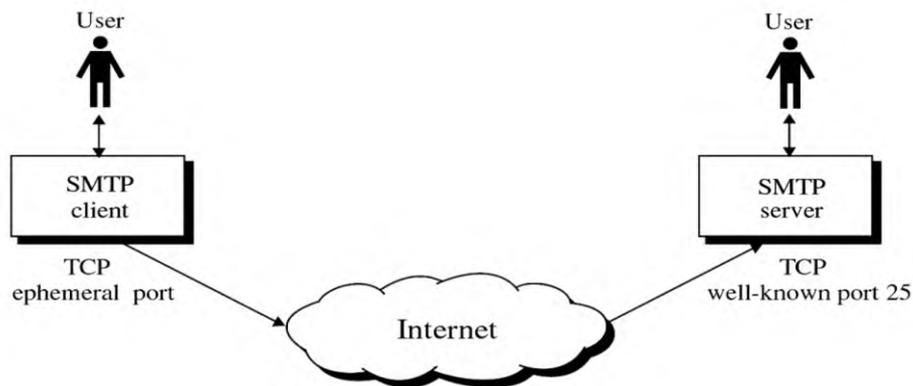


- When Alice needs to send a message to Bob, she runs a UA program to prepare the message and send it to her mail server.
- The mail server at her site uses a queue (spool) to store messages waiting to be sent. The message, however, needs to be sent through the Internet from Alice's site to Bob's site using an MTA.
- Here two message transfer agents are needed: one client and one server.
- The server needs to run all the time because it does not know when a client will ask for a connection.
- The client can be triggered by the system when there is a message in the queue to be sent.
- The user agent at the Bob site allows Bob to read the received message.
- Bob later uses an MAA client to retrieve the message from an MAA server running on the second server.

## **SIMPLE MAIL TRANSFER PROTOCOL (SMTP)**

- SMTP is the standard protocol for transferring mail between hosts in the TCP/IP protocol suite.

- SMTP is not concerned with the format or content of messages themselves.
- SMTP uses information written on the *envelope* of the mail (message header), but does not look at the *contents* (message body) of the envelope.



- SMTP clients and servers have two main components
  - **User Agents(UA)** – Prepares the message, encloses it in an envelope.
  - **Mail Transfer Agent (MTA)** – Transfers the mail across the internet

## SMTP OPERATIONS

Basic SMTP operation occurs in three phases:

1. Connection Setup
2. Mail Transfer
3. Connection Termination

### Connection Setup

- The sequence is quite simple:
  1. The sender opens a TCP connection with the receiver.
  2. Once the connection is established, the receiver identifies itself with "Service Ready".
  3. The sender identifies itself with the HELO command.
  4. The receiver accepts the sender's identification with "OK".
  5. If the mail service on the destination is unavailable, the destination host returns a "Service Not Available" reply in step 2, and the process is terminated.

## **Mail Transfer**

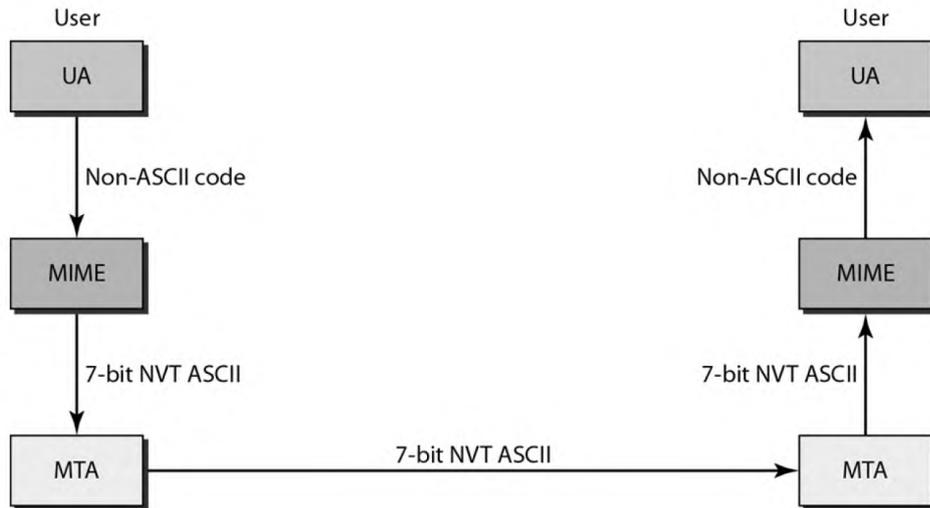
- Once a connection has been established, the SMTP sender may send one or more messages to the SMTP receiver.
- There are three logical phases to the transfer of a message:
  1. A MAIL command identifies the originator of the message.
  2. One or more RCPT commands identify the recipients for this message.
  3. A DATA command transfers the message text.

## **Connection Termination**

- The SMTP sender closes the connection in two steps.
- First, the sender sends a QUIT command and waits for a reply.
- The second step is to initiate a TCP close operation for the TCP connection.
- The receiver initiates its TCP close after sending its reply to the QUIT command.

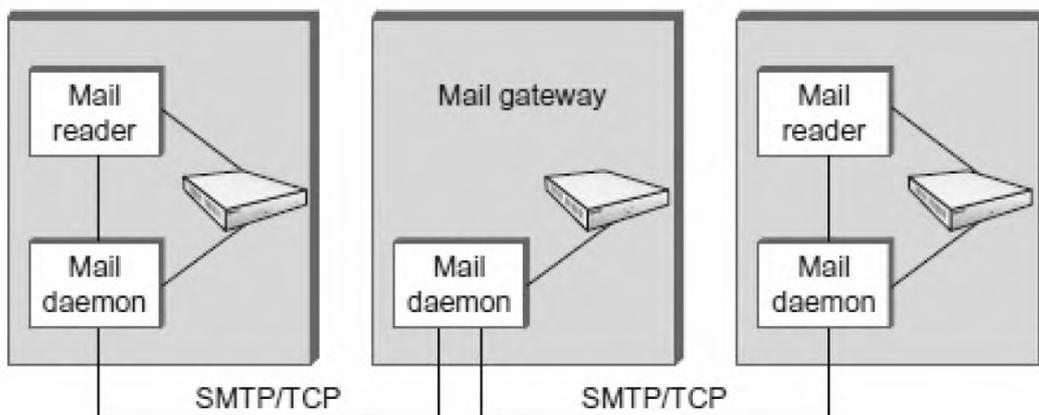
## **MULTIPURPOSE INTERNET MAIL EXTENSION (MIME)**

- SMTP provides a basic email service, while MIME adds multimedia capability to SMTP.
- MIME is an extension to SMTP and is used to overcome the problems and limitations of SMTP.
- Email system was designed to send messages only in *ASCII* format.
  - Languages such as French, Chinese, etc., are not supported.
  - Image, audio and video files cannot be sent.
- MIME is a protocol that *converts* non-ASCII data to 7-bit NVT(Network Virtual Terminal) ASCII and vice-versa.



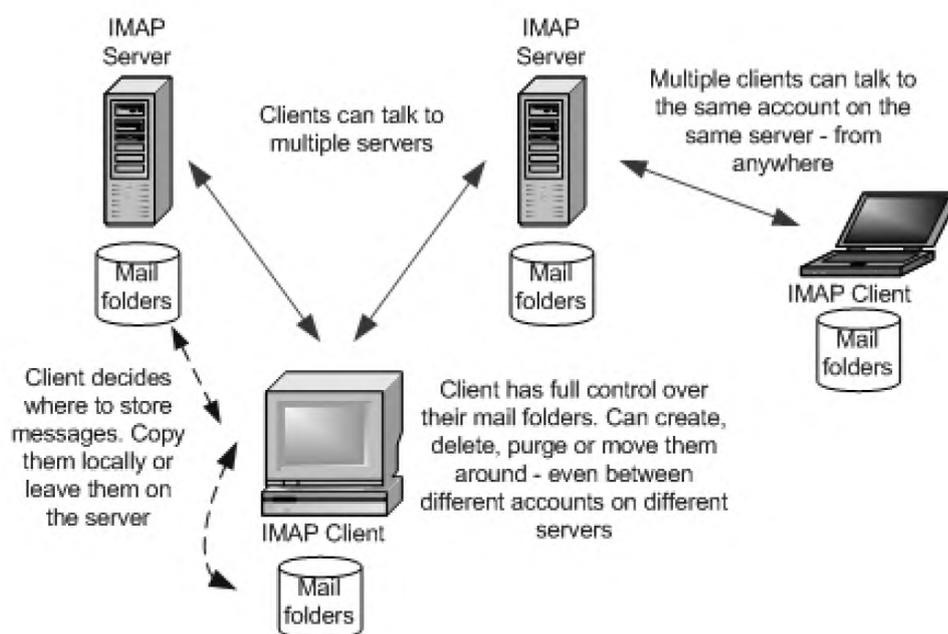
### MESSAGE TRANSFER IN MIME

- MTA is a mail daemon (sendmail) active on hosts having mailbox, used to send an email.
- Mail passes through a sequence of *gateways* before it reaches the recipient mail server.
- Each gateway stores and forwards the mail using Simple mail transfer protocol (SMTP).
- SMTP defines communication between MTAs over TCP on port 25.
- In an SMTP session, sending MTA is *client* and receiver is *server*. In each exchange



## IMAP (INTERNET MAIL ACCESS PROTOCOL)

- IMAP is an Application Layer Internet protocol that allows an e-mail client to access e-mail on a remote mail server.
- It is a method of accessing electronic mail messages that are kept on a possibly shared mail server.
- IMAP is a more capable wire protocol.
- IMAP is similar to SMTP in many ways.
- IMAP is a client/server protocol running over TCP on port 143.
- IMAP allows multiple clients simultaneously connected to the same mailbox, and through flags stored on the server, different clients accessing the same mailbox at the same or different times can detect state changes made by other clients.
- In other words, it permits a "client" email program to access remote message stores as if they were local.



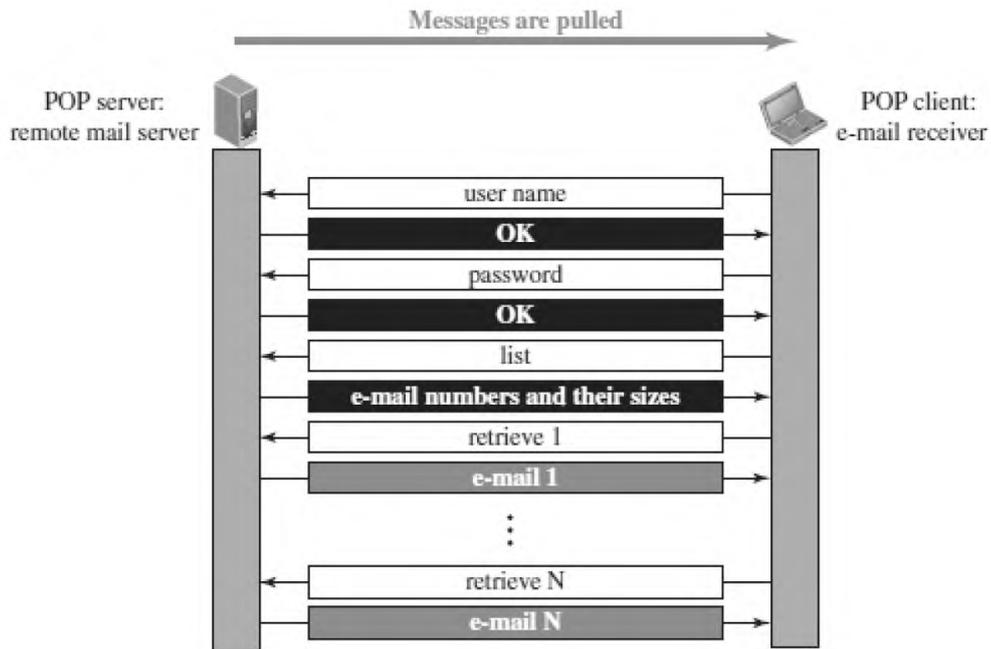
### OPERATION OF IMAP

- The mail transfer begins with the client authenticating the user and identifying the mailbox they want to access.
- **Client Commands** LOGIN, AUTHENTICATE, SELECT, EXAMINE, CLOSE, and LOGOUT

- *Server Responses* OK, NO (no permission), BAD (incorrect command),
- When user wishes to FETCH a message, server responds in MIME format.
- Message *attributes* such as size are also exchanged.
- *Flags* are used by client to report user actions. SEEN, ANSWERED, DELETED, RECENT

## **POST OFFICE PROTOCOL (POP3)**

- Post Office Protocol (POP3) is an application-layer Internet standard protocol used by local e-mail clients to retrieve e-mail from a remote server over a TCP/IP connection.
- POP is a much simpler protocol, making implementation easier.
- POP supports offline access to the messages, thus requires less internet usage time
- POP does not allow search facility.
- In order to access the messages, it is necessary to download them.
- It allows only one mailbox to be created on server.
- It is not suitable for accessing non mail data.
- POP treats the mailbox as one store, and has no concept of folders.
- POP works in two modes namely, ***delete and keep*** mode.
  - In ***delete mode***, mail is *deleted* from the mailbox after retrieval. The delete mode is normally used when the user is working at their permanent computer and can save and organize the received mail after reading or replying.
  - In ***keep mode***, mail after reading is *kept* in mailbox for later retrieval. The keep mode is normally used when the user accesses her mail away from their primary computer .



### POP3 Commands

POP commands are generally abbreviated into codes of three or four letters

1. **UID** - This command opens the connection
2. **STAT** - It is used to display number of messages currently in the mailbox
3. **LIST** - It is used to get the summary of messages
4. **RETR** - This command helps to select a mailbox to access the messages
5. **DELE** - It is used to delete a message
6. **RSET** - It is used to reset the session to its initial state
7. **QUIT** - It is used to log off the session

### DIFFERENCE BETWEEN POP AND IMAP

SNo.	POP	IMAP
1	Generally used to support single client.	Designed to handle multiple clients.
2	Messages are accessed offline.	Messages are accessed online although it also supports offline mode.
3	POP does not allow search facility.	IMAP offers ability to search emails.
4	All the messages have to be downloaded.	It allows selective transfer of messages to the client.
5	Only one mailbox can be created on the server.	Multiple mailboxes can be created on the server.
6	Not suitable for accessing non-mail data.	Suitable for accessing non-mail data i.e. attachment.