

Application Layer

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Email-Systems: Electronic mail system.

Application layer provides client-server architecture-based services.

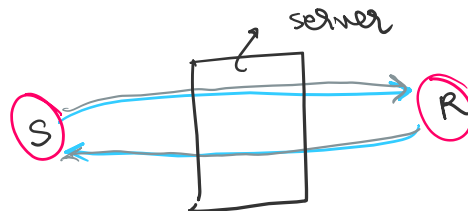
Client-Server Architecture: Client sends request, and server services the request. We have request-reply communication between the two devices.

[FTP: File Transfer Protocol]

Email

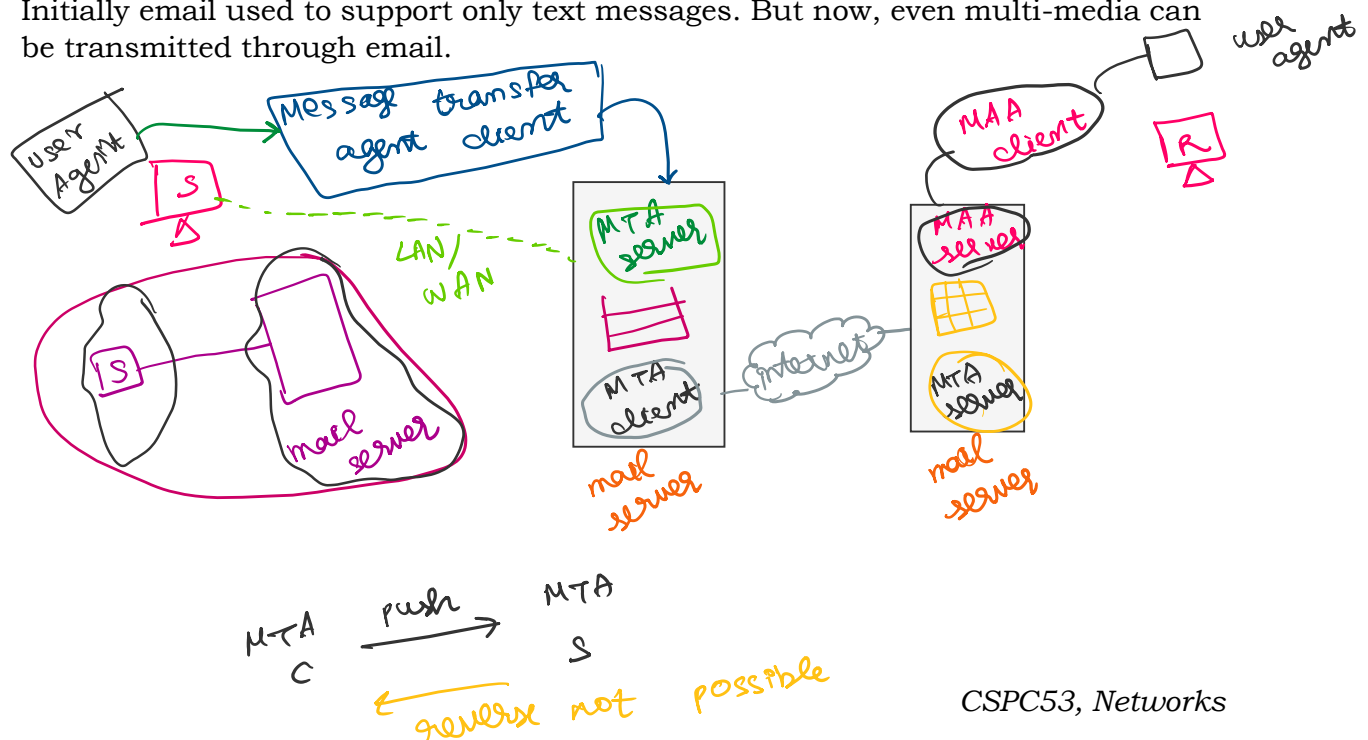
Sender sends email, receiver may or may not reply. Even if the receiver replies, then sender again may or may not reply.

But in client-server architecture-based services, when there is a request or any message, proper reply is generated, unlike an email – which is a one-way transaction – there is no need to send the reply message immediately.



Assuming server is on receiver side – Server: basic requirement – doesn't know at what time and from who it will receive a request – because a single server may have several clients. The server therefore needs to run 24x7. So, the server cannot be on the receiver side. Therefore, instead, the client-server architecture is present between the server and receiver.

Initially email used to support only text messages. But now, even multi-media can be transmitted through email.



User Agent: It is a software agent which has the responsibility of creating, replying, and formatting an email.

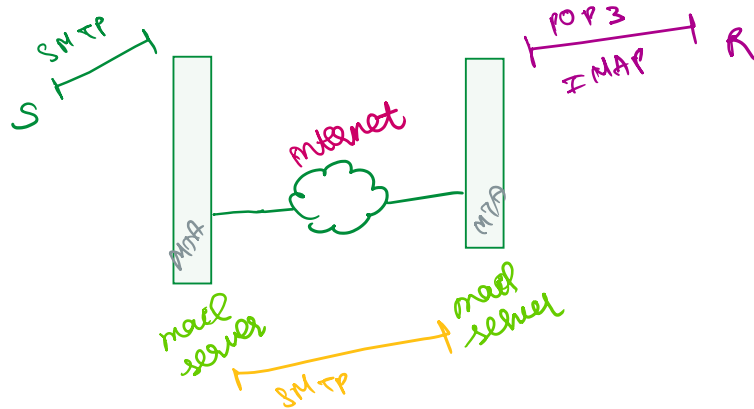
Message Transfer Agent Client: It has the responsibility of transferring email from one device to another device.

MTA Server: The MTA server receives the information.

After receiving the information, the mail server may be busy in some other activities (like sending emails to other users). So, the mail is queued. When the mail is ready to be processed, it is taken from the queue and sent to its MTA client, which sends the message via internet to the receiver.

In the receiving mail server, the mails are stored in mailboxes. Every user has a mailbox in the receiving mail server. Whenever a receiver wants to read a mail, it must extract information from the mailbox.

Mail Access Agent: When the receiver is ready, the message access information gets information from the server and gives it to the client.



SMTP: Simple Mail Transfer Protocol – MTA client and server use SMTP protocol to exchange mails.

POP3: Post Office Protocol version 3

IMAP: Internet Mail Access Protocol

POP3 – limited functionalities (very simple). Whenever a user agent in the recipient opens the TCP connection to the mail server, POP3 begins. 3 phases begin:

- 1) Authorisation – provide username and password.
- 2) Transaction
- 3) Updation

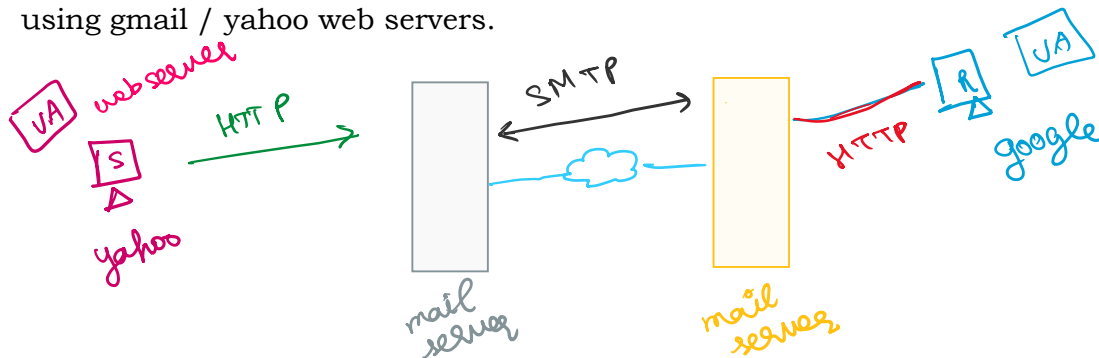
After receiving the information, the client issues the command and POP3 is terminated. During this period, all mails which are marked are deleted. This happens during the update phase.

Modes:

- 1) Delete mode – once the mails are retrieved from the mailbox, the mails are deleted.
- 2) Keep mode – mails are retained. They are deleted only if done explicitly. Useful when mails must be accessed from different devices.

In POP3 – folder organization, moving mails between folders, manually checking content before downloading – is not possible (limitations). IMAP protocol removes these limitations.

Google / Yahoo – are basically web servers, also provide email services additionally. In such cases, SMTP or POP3 cannot be used because accounts may be created using gmail / yahoo web servers.



Another Scenario: Server and its mail server are in the same network, and it uses a web server. The destination and its mail server are in different network but uses normal server. Draw the diagram.

