**The client-server architecture**

**Client**: a person or service that wants to use a server

**Server**: A device or software that offers a service to a client

Clients issue a request to the server and the server issues a response to the client.

Although web browsers communicate with web servers, it is actually the web client portion of the web browser that allows the 2 to communicate, this is technically layer 7 of the OSI model.

The downside is that the clients are always the ones to initiate “conversation”.

**Peer-To-Peer Networks (P2P)**

Does not require the client to initiate conversation. Peer networks can send signals / messages/ packets of data to the client to indicate that something has happened without the need for the client to request the data.

**N-tier network architectures**

Client-server architecture is 2 tier (client / server).

P2P architecture is 1 tier (Everyone is equal).

With a 3 tier approach, the client and server remain the same but the 3rd tier becomes the backend and the server provides a connection to the backend (Sort of an API)

**Application layer protocols**

**Email**

* X.400
* SMTP

**X.400:** This service offers email transfer but the way it does it is as follows.

It uses area codes and names to specify how to reach the recipient.

* C (Country) field
* ADMD or A (Administration Management Domain) field
* PRMD or P (Private Management Domain)
* (Organisation name) field
* OU (Organisational Unit) field
* G (Given name)
* I (Initials)
* S (Surname)

Eg. "I=J;S=Doe;O=acme;OU=sales;A=sapo;C=za"

**SMTP (Simple mail transfer protocol)**

This email uses 2 types of agents

* Mail User Agent (MUA or UA)
  + Where the email system interacts with the user.
* Mail Transfer Agents
  + Used to send mails from one UA to another UA.

MTA’s send emails from one email server to another, these email servers are then accessed by the user (UA)

To use SMTP the user starts off by typing either HELO or EHLO. A response will hopefully be in the 200 range, codes 300-500 indicate an error message.

To check messages the user needs to type “MAIL FROM:” Reverse-path and to reply the response needs to be "RCPT TO:" …

To exit the system the client must type QUIT

SMTP servers typically wait on port **25!!**

**The submit port is 587**

**POP3 (Post office protocol version 3)**

Used in conjunction with SMTP, POP3 will as a user for a username and password by Going USER  
Repose being +OK if its valid and same for PASS.

To retrieve messages the RETR 1 will get the first message and so on.

To delete a message the user needs to type DELE 1.

Poret **110** is used by POP3 servers.

**IMAP4 (Internet Message Access Protocol version 4)**

POP3 assumes that users manage their mailboxes on their local computers. IMAP4 assumes that users manage the mailbox on the email server.

**SSH**

SSH is a more trusted way of connecting to a virtual terminal as it encrypts all messages over the network.

A well-known port to run SSH is port 22.

**FTP**

Uses get and put or mget and mput to get multiple files.

To change directories:

* Locally: lcd
* In the server: cd

FTP servers may be configured to be used anonymously by using the username anonymous or ftp.

FTP servers are typically held on port 21.

There are 2 connections made to a more modern ftp server, a data connection and a control connection.

Data: used when data actually needs to be transferred

Control: Used for authentication and sending commands.

Even if the data connection is active, a command sent via the command connection can abort the data transfer.

**The Web**

**HTTP**

Runs on port 80 and is not secure.

**HTTPS**

Runs on port 443 and is secure.

The encryption is located on the transport layer (Layer 4).

**Other application layer protocols**

**NTP**: Network time protocol, used to get the time from a server that is trusted to give the correct time of that area.

**VoIP**: Voice-over IP, used to transmit voice over the network using the session layer (Layer 5).

The protocol is called the SIP: session initiation protocol.

**SMB**: Server message block, used to mount remote file systems on a local host.

**NFS**: Same as SMB but for UNIX

**RTSP**: used to stream multimedia content at real time.