2. TCP IP protocol suite

Describe the TCP/IP protocol suite:

- A layered model with four layers
- Uses a set of protocols for transmission of data
- Transport control protocol with Internet protocol
- Application layer, transport layer, internet layer, network (access) layer

Layer:	Description:
Application layer	Handles access to services Define protocol used Manage data exchange
Transport layer	Handles the forwarding of packets Where TCP takes place Regulate the network connection Data broken up into packets, then sent to internet layer
Internet layer	Handles the transmission of data Routing IP addressing `--` Routes the packets around the network Adds to the IP header a source/destination address for each header Encapsulates data into datagram Passes datagram to network access layer Defines the addressing mode: subnetting, NAT
Network (access) layer	Handles how data is physically sent Encapsulates IP packets into frames for transmission Ensure correct protocol is followed

Protocols

Protocol	Purpose & Use	Description
HTTP(Hyper text transfer protocol)	`Purpose` :Transfer webpages / hypertext from server to client `Use` : Browsing website	This is the protocol responsible for correct transfer of files that makes up web pages on the world wide web

Protocol	Purpose & Use	Description
		Client/server protocol Define the format of messages sent and received
SMTP(Simple mail transfer protocol)	`purpose`: Protocol for sending email `Use`: Used by mail servers to forward email messages to another mail sever Email client sends email to email server	Text-based: if contain image, video, music – then use multipurpose internet mail extension(MIME) protocol Email is transferred from one server to another server Email client sends email to email server
POP3/4(Post office protocol)	`purpose`: Mail is held for you by a remote server until you download it // download email `Use`: To receive email	Pull protocols Does not keep the server and client in synchronization; when emails are downloaded by the client, they are then deleted from the server which means it is not further updated.
IMAP(internet message access protocol)	`Purpose`: downloading email // storing/organising emails on a remote server `Use`: To receive email	More recent than POP3/4 Keeps the server and client in synchronization; only a copy of the email is downloaded with the original remaining on the server until the client mutually deletes it
FTP(file transfer protocol)	`Purpose`: Used for interactive file transfer; To directly transfer data between two computers over the internet `Use`: Upload and download files over the internet	Anonymous ftp: Allow user to access files User does not need to identify themselves to the server ftp commands User can send instructions That are carried out on the server ftp server Central computer Stores files that are to be downloaded

BitTorrent Protocol

`Purpose`: Protocol for peer-to-peer file sharing

`Use`: Decentralized distribution of data

Properties:

- Based on peer-to-peer networking concept
- Allow fast sharing of files between computers
- Allow many computers to share files

Description:

1. Bit torrent software made available
2. A computer joins a swarm by using this to load a torrent descriptor file
3. A server called tracker keeps record of all the computer in the swarm
   … and shares their IP addresses allow them to be connected
4. One computer of the swarm must have full copy of the file to be downloaded
5. Torrent is split into small files
6. Pieces of torrent are both downloaded and uploaded
7. Rare pieces are given priority in download
8. Once a computer have downloaded a full copy it becomes a seed
9. Leech downloads more than they uploads

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1. Create small file called torrent: contains meta data about the file to be stored
2. The actual file is broken up into equal segments known as pieces
3. Others first obtains the torrent, then connect to the tracker (A central server that contains data about all computers connected to it)
4. As each peer receives a piece of file, they then become the source for that piece of file. Other peers connected to the tracker will therefore know where to find the file they need
5. Once the peer has downloaded the file completely and make the file available to the swarm, they become a seed. The more seeds in the swarm, the faster the download process.

Terms:

- Swarm: A group of peers connected together
  - All the connected shared computers
  - That have all or other parts of the file to be downloaded
  - Share a torrent

- Seed: A peer has downloaded a file and has then made it available to others in the swarm
    - Peer computer that has 100% of the file
    - It uploading the downloaded content
- Tracker:
    - This is the central server that stores details about other computers that make up the swarm
    - It will store details about all the peers uploading/downloading the file
    - Allowing the peers to locate each other using the stored IP address
    - It will share information on request from members in the swarm
    - It will provide information on which members in the swarm have copies of which files or which part of files
- Leech - A peer that has negative impact on the swarm by having a poor sharing ratio
- Lurker - A peer that downloads many files but does not make available any new content for the community as a whole

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