NPS

Assignment

CO3.

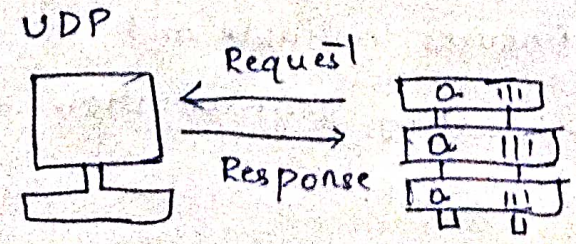
1. TCP (Transmission control Protocol) is a widely used protocol for transmitting data reliably over networks such as the internet TCP Connection.
   - TCP operates on the transport layer of the OSI model and provides a connection oriented reliable and error-checked byte stream over an IP network.
   - It is established blw two hosts typically a client & a server before data transmission can occur.

TCP segment :-

- TCP breaks data into smaller units called segments for transmission each segment contains a header and a payload.
- The payload carries the actual data being transmitted

TCP handshaking signals include SYN, ACK and FIN SYN initiates connection establishment ACK acknowledges received segments, and FIN signals the intent to terminate the connection.

2) User Datagram Protocol (UDP) is a Transport layer protocol. UDP is a part of the Internet Protocol site, referred to as UDP/IP suite. It provides assured delivery, reliability and more but all these services cost we additional overhead and latency. Here UDP comes into the picture. For real-time services like computer gaming voice or video communication and like conferences. we need UDP.



Use Case :- Video conferencing.

3) TCP / UDP / SCTP.

Protocol	TCP (Transmission control Protocol)	UDP (User Datagram Protocol)	SCTP (Stream control transmiss-ion protocol)
Connection Type	Connection Oziented	Connection-less	Connection-Oziented.
Reliability	Reliable data delivery with error detection, retransmitting of acknowledgement mechanisms.	Unreliable data delivery without error recovery or acknowledg-ment.	Reliable data delivery with error detection, retransmi-ssion, and acknowledgment mechanisms.
Speed	slower due to reliability mechanisms.	faster due to minimal overhead.	comparable to TCP slower than UDP due to additional functionality.
Applications	web browsing email transfer, file transfer	Real-time communication, video streaming online gaming ons	Telecommunication voice and video over IP signalling transport.

4) i) Application-layer :- Handles communication blw end-user applications and the network, such as web-browsers on email clients.

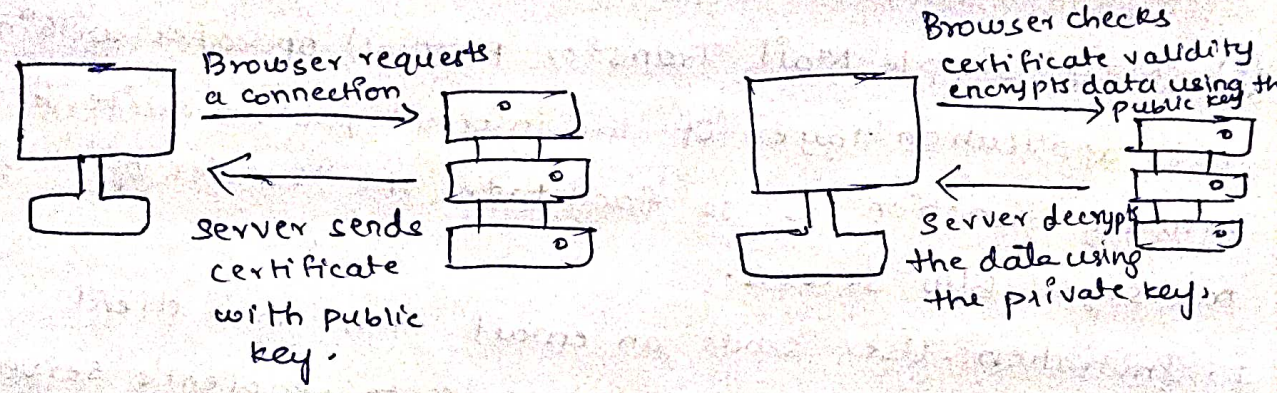
ii) Presentation layer :- Translates data blw the application layer and the network, dealing with tasks like data formatting and encryption.

iii) session layer :- Manages connection blw applications, synchronizing data exchange and controlling dialogues.

iv) Transport layer :- Ensures reliable and efficient data transfer blw hosts, handling segmentation error checking and flow control.

5) * In order to provide a high degree of privacy, SSL encrypts data that is transmitted across the web. This means that anyone who tries to intercept this data will only see a garbled mix of characters that is nearly impossible to decrypt.

* SSL initiates an authentication process called a handshake b/w two communicating devices to ensure that both devices are really who they claim to be.



6) The Domain Name System (DNS) is the phone book of the internet. Human-readable access information online through domain names, like nytimes.com or espn.com. web browsers interact through internet protocol addresses DNS translates domain names to IP address so browsers can load internet resources.

ex: Imagine you want to visit a website, let's say "example.com". Instead of typing in its IP address, you type the domain name "example.com" into your browser. Your device asks a DNS server. "What's the IP address for example.com?". The DNS server looks up the IP address associated with "example.com" and tells your device. Now your device knows the IP address can connect to the website.

7) DNS stands for Domain Name System. It is a decentralized naming system for computers, services or any resource connected to the internet or a private network. It translates domain names into IP addresses allowing users to access websites and other services using human-readable names.

Types of DNS domains include:-

1) Top-level Domain
2) second-level Domain
3) Third-level Domain
4) subdomain
5) Reverse DNS
6) Root Domain
7) Internationalized Domain Name.

(8) SMTP (simple Mail Transfer protocol) operates within the application layer of the internet protocol suite. Its primary function is so facilitate the transfer of email messages blw servers.

1. Initiation:- User sends an email from their client.
2. Connection: senders server connects to recipient's server over port 25.
3. Handshake:- Servers exchange transmission details.
4. Transfer:- sender's server sends the email to recipient's server.
5. Delivery: Recipient's server performs checks and delivers the email to the recipient.
6. Notification: Optional delivery status notification may be sent back.
7. storage/Forwarding:- Email is stored or forwarded as necessary.

(9) POP 3 (Post office protocol version 3):

1. Connection: client connects to server over port 110.
2. Authentication: client logs in with username and password.
3. Download:- Emails are downloaded to the client's device.
4. Deletion:- Optionally, emails can be deleted from the server after download.

5. Disconnection: client disconnects once download is complete.
6. local storage emails are stored locally.

IMAP (Internet Message Access Protocol):

1. connection: Client connects to server over port 143 (or 993 for encrypted).
2. Authentication: Client logs in with username and password.
3. Folder sync: client syncs with servers folder structure.
4. Message Retrieval :- client downloads selective parts of emails.
5. Flags and status: supports marking emails as read, etc. synced with the error.
6. local cache: Maintains a local cache for offline access.

(10) congestion refers to a situation in which demand for a particular resource, such as network bandwith, transportation infrastructure, or physical space, exceeds its capacity to efficiently handle that demand congestion can occur in various contents;- transportation, networks, urban areas.

To control congestion serval strategies can be implemented:

i) Infrastructure expansion:- Building more roads, high-ways, public transportation systems, and network infrastructure can help increase capacity and reduce congestion.

ii) Traffic Management :- Implementing traffic management strategies such as traffic signals, lane management, and tools can help regulate the flow of vehicles and reduce congestion.

iii) Public Transportation Improvement :- Investing in improving public transporting systems can encourage

people to use alternatives to driving, reducing the number of vehicles on the road.

(11) Leaky Bucket :-

* Incoming packets are stored temporarily in a bucket.
* There's a constant outflow rate from the bucket.
* If the bucket overflows, packets are dropped.
* Ensures smooth outgoing traffic.

Token Buckets:-

* Tokens are added to a bucket at a constant ~~rate~~.
* Each packet consumes tokens for transmission.
* If there are not enough tokens, the packet is delayed or dropped.
* Allows bursts of traffic is enough tokens are available.