18124011600 1
Vishwas Acharya

Computer Network

Assignment-3

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Q.1] Explain transport layer services in detail.

Ans Transport layer services and protocols provides logical communication between app process running on different hosts.

- Transport protocols run in end systems.
  - **send side**: breaks app messages into segments, passes to network layer
  - **Recv side**: reassembles segments into messages, passes to app layer.
- More than one transport protocol available to apps
  - Internet: TCP & UDP

Now, Transport vs. network layer.

- Transport Layer: It provides logical communication between processes. It relies on and also enhances network layer services.
- Network Layer: It provides logical communication between hosts.

Q. 2) Write about Multiplexing & Demultiplexing.

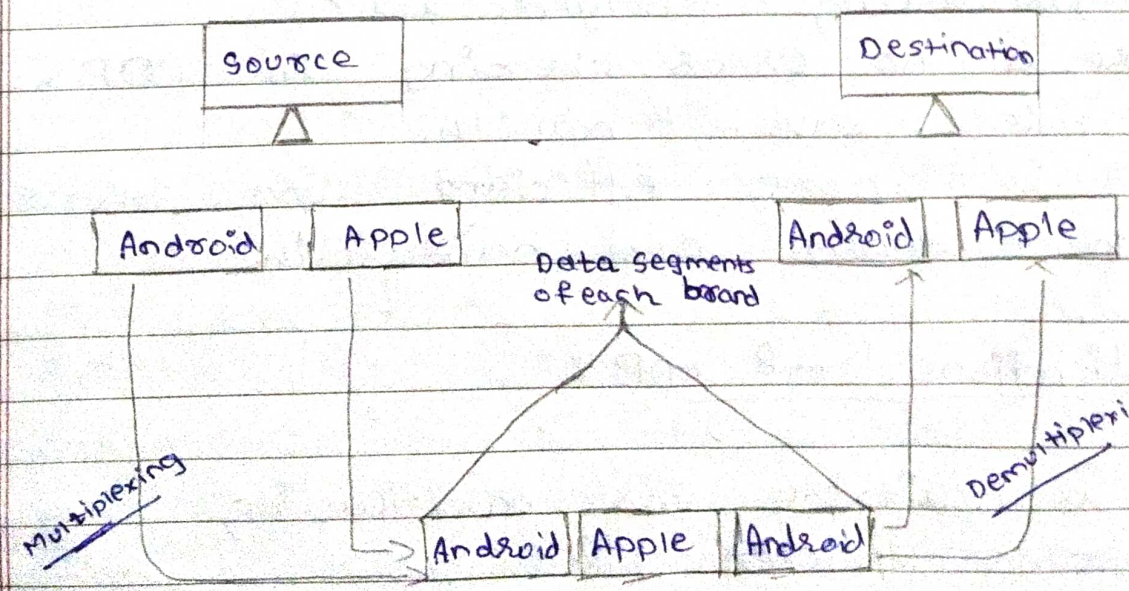
Ans Multiplexing and Demultiplexing services are provided in almost every protocol architecture ever designed.

- UDP and TCP perform the multiplexing and demultiplexing jobs by introducing two special fields in the segment headers :
  - the source port number field
  - the destination port number field.

- Multiplexing : Gathering data from the multiple application processes of senders, enveloping the data with headers and sending them as a whole to the intended receiver is called as multiplexing.

- Demultiplexing : Delivering received segments at receiver side to the correct app layer processes is called as demultiplexing.

- Figure :



- There are two types of multiplexing and Demultiplexing:

1) Connectionless mux and demux
2) Connection-Oriented mux and demux

Q.3] Write note on connectionless transport (UDP).

Ans Users Datagram Protocol (UDP) is a Transport layer protocol, UDP is a part of internet protocol suit, refressed as UDP/IP suit.
- Unlike TCP, it is unreliable and connectionless protocol.
- UDP come into picture for the realtime services like computer gaming, voice or video communication, live conferences; we need UDP.
- Since high performance is needed, UDP permits packets to be dropped instead of processing delayed packets.
- There is no errors checking in UDP, so it also save bandwith.
- UDP is more efficient in terms of both latency and bandwidth.

- Applications of UDP:

- It is suitable for multicasting as UDP supports packet switching.

- UDP is used for some routing update protocols like RIP(Routing Information Protocol).
- Used for simple request response communication when size of data is less and hence there is lesses concern about flow and error control.

- When to use UDP?

1) Reduce the requirement of computer resources.
2) When using a multicast or Broadcast to transfer.
3) The transmission of Real-time packets, mainly in multimedia applications.

Q.4] Explain connection-oriented transport (TCP) in detail.

Ans- TCP is an example of a connection-oriented protocol.
- It requires a logical connection to be established between the two processes before data is exchanged.
- The connection must be maintained during the entire time that communication is taking place, then released afterwards.
- The process is much like a telephone call, where a virtual call is established.

- the caller must know the person's telephone number and the phone must be answered - before the message can be delivered.
- TCP/IP is also a ~~connectionless~~ connection-oriented transport with orderly release,
- TCP is a layer 4 protocol which provides acknowledgement of the received packets and is also reliable as it resende the lost packets.
- It is better that UDP but due to these features it has an additional overhead.
- It is used by application protocols like HTTP and FTP.

Q.5] Write a note on congestion control.

Ans In congestion control, informally too many sources sending too much data too fast for a network to handle.
- It is also different from flow control.
- manifestations:

  • lost packets (buffer overflow at routers)
  • long delays (queueing in router buffers)

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- Congestion control is a state occuring in network layer when the message traffic is so heavy that it slows down network response time.

- Effects of congestion

- As delay increases, performance decreases.
- If delay increases, retransmission occurs, making situation worse.

⊙ Approaches towards congestion control

- There are two broad approaches towards congestion control:

- End-End congestion control:

- No explicit feedback from network.
- Congestion infered from end-system observed loss, delay.
- approach taken by TCP

- Network-assisted congestion control:

- Routers provide feedback to end systems
  - single bit indicating congestion (SNA, DECbit, TCP/IP ECN, ATM)
  - Explicit rate for senders to send at.