DS ASSIGNMENT – 1

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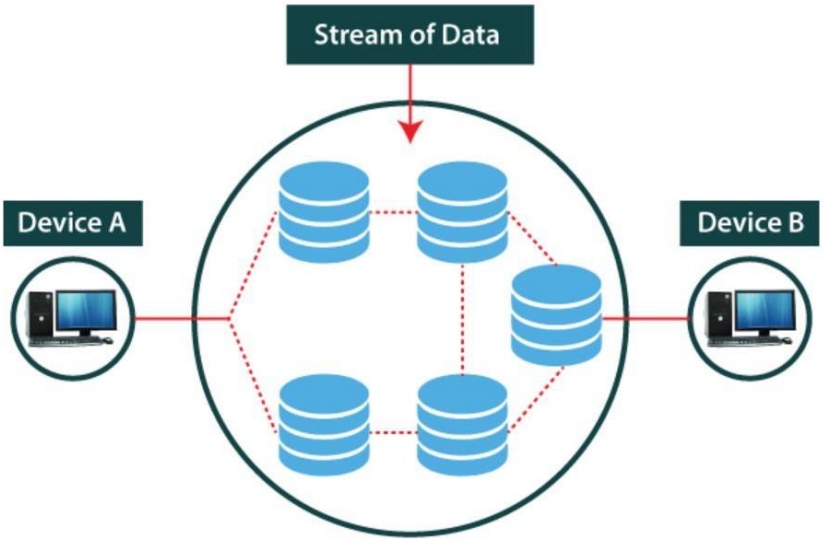
To Study the basics of connection-oriented protocol and connectionlessprotocol. Also explain the difference between them.

Data communication is a telecommunication network to send and receive data between two or more computers over the same or different network. There are two ways to establish a connection before sending data from one device to another, that are **Connection-Oriented** and **Connectionless Service**. Connection-oriented service involves the creation and termination of the connection for sending the data between two or more devices. In contrast, connectionless service does not require establishing any connection and termination process for transferring the data over a network.

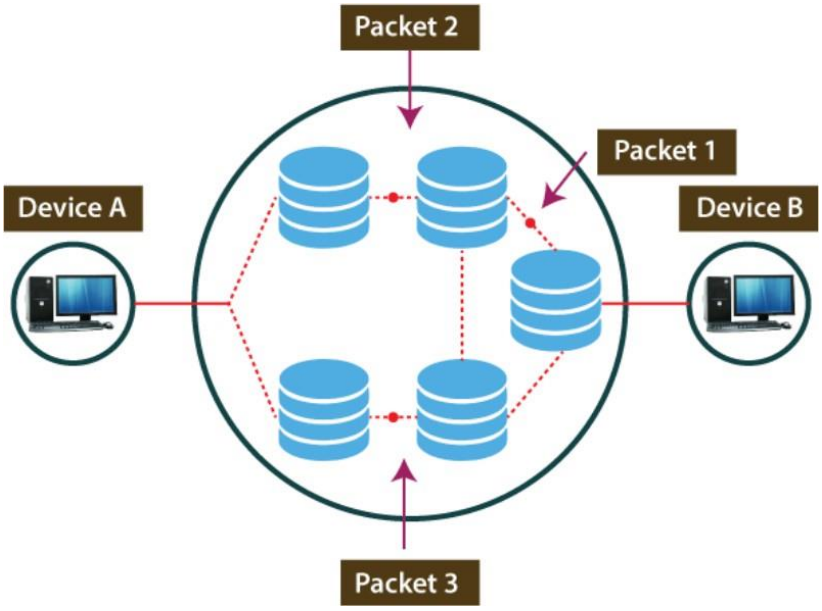
Connection-Oriented Service

A connection-oriented service is a network service that was designed and developed after the telephone system. A connection-oriented service is used to create an end to end connection between the sender and the receiver before transmitting the data over the same or different networks. In connection-oriented service, packets are transmitted to the receiver in the same order the sender has sent them. It uses a handshake method that creates a connection between the user and sender for transmitting the data over the network. Hence it is also known as a reliable network service.



Connectionless Service

A connection is similar to a postal system, in which each letter takes along different route paths from the source to the destination address. Connectionless service is used in the network system to transfer data from one end to another end without creating any connection. So, it does not require establishing a connection before sending the data from the sender to the receiver. It is not a reliable network service because it does not guarantee the transfer of data packets to the receiver, and data packets can be received in any order to the receiver. Therefore, we can say that the data packet does not follow a defined path. In connectionless service, the transmitted data packet is not received by the receiver due to network congestion, and the data may be lost.



S. No	Comparison Parameter	Connection-oriented Service	Connectionless Service
1	Related System	It is designed and developed basedon the telephone system.	It is service basedon the postal system.
2	Definition	It is used to create an end to end connection between the senders to the receiver before transmitting the data over the sameor different network.	It is used to transfer the data packets between senders to the receiver without creating any connection.
3	Virtual path	It creates a virtual path between the sender and the receiver.	It does not create any virtual connection or path between the sender and the receiver.
4	Authentication	It requires authentication	It does not require authentication

		before transmitting the data packets to the receiver.	before transferring data packets.
5	Data Packets Path	All data packets are received in thesame order as those sent by the sender.	Not all data packets are received in the same order as those sent by the sender.
6	Bandwidth Requirement	It requires a higher bandwidth to transfer the data packets.	It requires low bandwidth to transfer the data packets.
7	Data Reliability	It is a more reliable connection service because it guarantees data packets transfer from one end to the other end with a connection.	It is not a reliable connection service because it does not guarantee the transfer of data packets from one end to another for establishing a connection.
8	Congestion	There is no congestion as it provides an end- to-end connection between sender and receiver during transmission of data.	There may be congestion due to not providing an end-to-end connection between the sourceand receiver to transmit of data packets.
9	Examples	Transmission Control Protocol(TCP) is an example of a connection- oriented service.	User Datagram Protocol (UDP), Internet Protocol (IP), and Internet Control Message Protocol (ICMP) areexamples of connectionless service.

What is a TCP?

TCP (Transmission Control Protocol) is a connection-oriented protocol that allows communication between two or more computer devices by establishing connections in the same or different networks. It is the most important protocol that uses **internet protocol** to transfer the data from one end to another. Hence, it is sometimes referred to as TCP/IP. It ensures that the connection is established and maintained until the data packet is transferring between the sender and receiver is complete.

What is UDP?

The UDP (User Datagram Protocol) is a connectionless protocol that allows communication between two or more devices without establishing any connection. In this protocol, a sender sends the data packets to the receiver that holds the destination address. A UDP does not ensure to deliver the data packets to the correct destination, and it does not generate any acknowledgment about the sender's data. Similarly, it does not acknowledge the receiver about the data. Hence, it is an unreliable protocol.

Looking again at TCP/IP, it has two main protocols that operate at the transport layer of the OSI Reference Model. One is the Transmission Control Protocol (TCP), which is connection-oriented; the other, the User Datagram Protocol (UDP), is connectionless. TCP is used for applications that require the establishment of connections (as well as TCP's other service features), such as FTP; it works using a set of rules, by which a logical connection is negotiated prior to sending data. UDP is used by other applications that don't need connections or other features, but do need the faster performance that UDP can offer by not needing to make such connections before sending data.

What is the Difference Between TCP and UDP?

TCP is a connection-oriented protocol, whereas UDP is a connectionless protocol. A key difference between TCP and UDP is speed, as TCP is comparatively slower than UDP. Overall, UDP is a much faster, simpler, andefficient protocol, however, retransmission of lost data packets is only possible with TCP.

Another notable discrepancy with TCP vs UDP is that TCP provides an ordered delivery of data from user to server (and vice versa), whereas UDP is not dedicated to end-to-end communications, nor does it check the readiness ofthe receiver (requiring fewer overheads and taking up less space).

Feature	TCP	UDP
Connectionstatus	Requires an established connection to transmit data(connection should be closed once transmission is complete)	Connectionless protocolwith no requirements foropening, maintaining, orterminating a connection
Data sequencing	Able to sequence	Unable to sequence
Guaranteeddelivery	Can guarantee delivery of data to the destinationrouter	Cannot guarantee delivery of data to thedestination

Retransmission of data	Retransmission of lostpackets is possible	No retransmission of lostpackets
Error checking	Extensive error checking and acknowledgment of data	Basic error checkingmechanism using checksums
Method oftransfer	Data is read as a byte stream; messages are transmitted to segmentboundaries	UDP packets with defined boundaries; sent individually and checkedfor integrity on arrival
Speed	Slower than UDP	Faster than TCP
Broadcasting	Does not supportBroadcasting	Does supportBroadcasting
Optimal use	Used by HTTPS, HTTP, SMTP,POP, FTP, etc	Video conferencing, streaming, DNS, VoIP, etc