Assignment 01

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CSE421:Computer Networks

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November 10, 2025

Answers: Fall 2024 Set A

Q1

i. Application Layer
ii. Network Layer
iii. Network Layer

Q2

The individual browser manages the cookies of that particular website. As the browser is changing, the cookies of another browser can't be accessed & reused. So, it is not showing the personalized content.

Q3

During the live streaming of FIFA World Cup, the transport layer protocol used is UDP chosen for its Low latency, connectionless delivery. The client's source port, 60001 is a dynamic port, temporarily assigned for the session. The server differentiates multiple requests with the same source port by using the combination of source IP address and source port, ensuring each client's stream is handled seperately.

Q4

User 1 (Browser) $\xrightarrow{\text{DNS (UDP/TCP)}}$ DNS server

User 1 (Browser) $\xrightarrow{\text{HTTPS(TCP)}}$ web Mail/ Server

Web Mail/ Server $\xrightarrow{\text{SMTP}}$ User 1 Mail/ Server

User 1 Mail Server $\xrightarrow{\text{SMTP}}$ User 2 Mail Server

User 2 (outlook) $\xrightarrow{\text{DNS (UDP/TCP)}}$ DNS server

User 2 (Outlook) $\xrightarrow{\text{POP3/IMAP}}$ User 2 Mail/ Server

Q9 To make the website www.gamefall.com reachable, the domain's DNS must include specific resource records. First, NS (Name Server) records must be registered to designate the authoritative DNS servers for the domain, such as ns1.gameforall.com. Each of these name server must have an A (Address) record linking the hostname to its IPaddress so that clients can contact them. Finally, web server itself requires an A record that maps www.gameforall.com to its IP address 200.10.20.8, allowing users to reach the hosted webpage. Together, these records ensure that requests for the domain are correctly resolved by the authoritative DNS and routed to the web server.

Q10 (I) TCP setup RTT = 35 ms
HTTP req/res = 30 ms
∴ Total per object = 35 + 30 = 65 ms

For 34 objects = 34 × 65 = 2210 ms
+ 1 RTT for base HML = 65 ms
∴ Total = 2275 ms

(II) Each object transmission time = 4 MB = 32 Mb
Server rate = 64 Mbps.
∴ Transmission = $\frac{32}{64}$ = 0.5 sec = 500 ms
∴ 35 objects's transmission time = 500 × 35 = 17500 ms

Q7

(i) $0.4 \times 15 + 0.3 \times (15+30) + 0.3 \times (15+30+100+200)$

$= 123$ ms

(ii) Exact Response time $= 15 + 30 = 45$ ms

Q8

(I) The Server retransmits S1 because it never saw the ACK that would have cumulatively acknowledged S1. Its RTO expired for the oldest un-ACKed data, so, it resent the oldest outstanding segment (S1)

The client, using selective repeat, already has S1. When it receives the retransmitted S1 it recognizes it as a duplicate and discards the payload and continues to send/maintain the same ACK for the next expected byte. In practice, the client will send/keep an ACK acknowledging the highest contiguous byte received.

(II) (i) client ISN = 1910 = C1's initial

∴ C1 carries 421 byte

∴ Next sequence number = C2's segment = $1910 + 1 + 421$

$= 2332$

Server's ISN = 1532

~~∴ S1's segment # = 1532~~ | next byte expected after S1 = $1532 + 1 + 260$

$= 1793$

∴ next byte expected after S2 = $1793 + 220 = 2013$

∴ Acknowledgment of C2 = 2013

(II) Initial server rwnd = 12000 byte.

Total buffered = 421 + 111 = 532

∴ Remaining rwnd = 12000 - 532 = 11468 bytes after c3 (Ans)