

CSE421

Assignment: 1

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Section : 23

Ans to the Q. no 1

Standards define the rules and formats for how data is treated and exchanged ensuring interoperability among devices from different vendors, scalability of the internet and correct operation of applications. For example HTTP, SMTP, DNS. Without common standards, clients/servers wouldn't understand each others' messages.

Ans to the Q. no 2

The second website loads faster because HTTP/2.0 allows multiple requests and responses to be sent simultaneously over a single persistent connection unlike HTTP/1.1 which handles them one after another, causing delays. HTTP/2.0 also uses header compression and server push, reducing overhead and the number of RTTs needed to load all webpage objects, which makes data transfer significantly quicker and more efficient.

Ans to the Q. no 3

Sequence (numbered)

1. Local DNS \rightarrow .bd TLD: request NS for google.bd
• .bd TLD \rightarrow Local DNS: reply with authoritative NS for google.bd

2. Local DNS \rightarrow authoritative NS for google.bd:
request A for ww.gate.google.bd

Authoritative NS \rightarrow Local DNS: reply with A (IP)
or (CNAME then A)

3. Local DNS \rightarrow Host: returns the final IP.

Total DNS query-response pairs involved 2 pairs

1. Local \leftrightarrow TLD

2. Local \leftrightarrow Authoritative server

Ans to the Q.no 4

Partial download is helpful when:

- (1) Limited bandwidth/high latency links
- (2) Limited local storage on the client
- (3) Multi-device usage keeping consistent state on the server.

Ans to the Q.no 5

For Dipu's IoT application TCP is the suitable transport layer protocol because it ensures reliable and error-free data transmission through features like acknowledge, flow control and retransmission. Although it introduces some delay, TCP guarantees that all sensor data reaches the server correctly and in order, which is the main priority.

Ans to the Q.no 6

In reliable transport with error recovery (TCP), a sender may ~~fast~~ retransmit a missing segment before the RTO when it receives multiple duplicate ACKs. This leverages the reliability mechanisms highlighted (error recovery at transport) to retransmit proactively rather than waiting for timeout.

Ans to the Q.no 17

I. Given,

$$\text{object} = 24$$

$$\text{RTT} = 2 \times \text{one-way delay} = 2 \times 0.027 = 0.054 \text{ s}$$

However, this 0.054s is just the network RTT.

$$\begin{aligned} \text{Total RTT} &= 24 \times 0.054 + (23 \times 0.005) \\ &= 1.296 + 0.115 \\ &= 1.41 \text{ s} \end{aligned}$$

$$\approx 1.35 \text{ s (after rounding)}$$

II. From the total load time

$$4.345 = \text{Total RTT} + 24 \times t_x$$

$$4.345 - 1.35 = 24 \times t_x$$

$$= t_x = 0.124$$

At 25Mbps:

$$\begin{aligned} \text{object size} &= 25 \text{ Mbps} \times 0.124 \text{ s} \\ &= 3.1 \text{ Mb} \end{aligned}$$

(Ans)

Ans to the Q.no 18

$$\text{I. } S3 = 144, \text{ ack} = 1562$$

$$1532 + 144 = 1676$$

$$\text{next server seq for } S3 = 2142 + 365 = 2507$$

$$S3: \text{seq} \rightarrow 2507$$

$$\text{ack} \rightarrow 1676$$

II. seq: client had sent C1 (144B) starting at 1532

$$\Rightarrow 1532 + 144 = 1676$$

ack: at FIN time the client has only received S1
from the server $\Rightarrow 1910 + 232 = 2142$

III. $\pi\text{wnd}(\text{client}) = 7000$

The client has processed S1 $\rightarrow 232B$

S3 $\rightarrow 421B$

$$\text{So, } \pi\text{wnd}_{\text{FIN}} = 7000 - 421 = 6579 \text{ bytes}$$