SOLUTION ASSIGNMENT-02 6C & 6A

PART-01

REVIEW QUESTIONS

R6.

You would use UDP. With UDP, the transaction can be completed in one roundtrip time (RTT) - the client sends the transaction request into a UDP socket, and the server sends the reply back to the client's UDP socket. With TCP, a minimum of two RTTs are needed - one to set-up the TCP connection, and another for the client to send the request, and for the server to send back the reply.

R10. A protocol uses handshaking if the two communicating entities first exchange control packets before sending data to each other. SMTP uses handshaking at the application layer whereas HTTP does not.

R11. The applications associated with those protocols require that all application data be received in the correct order and without gaps. TCP provides this service whereas UDP does not.

R13. Web caching can bring the desired content "closer" to the user, possibly to the same LAN to which the user's host is connected. Web caching can reduce the delay for all objects, even objects that are not cached, since caching reduces the traffic on links.

PROBLEMS

Problem 1.

a) F
b) T
c) F
d) F
e) F

Problem 7.

The total amount of time to get the IP address is
$RTT_1 + RTT_2 + \cdots + RTT_n$.
Once the IP address is known, RTT_O elapses to set up the TCP connection and another RTT_O elapses to request and receive the small object. The total response time is
$2RTT_o + RTT_1 + RTT_2 + \cdots + RTT_n$

Problem 13.

The MAIL FROM: in SMTP is a message from the SMTP client that identifies the sender of the mail message to the SMTP server. The From: on the mail message itself is NOT an SMTP message, but rather is just a line in the body of the mail message.

Question1 [4*1Marks]   [CLO 2]

Was the server able to send the file?

✘ No, the 404 Not Found status means the file is missing.

Is the HTTP connection persistent or non-persistent?

✘ Non-persistent, as Connection: Close closes the TCP connection.

What is the type of the file?

✔ HTML file, indicated by Content-Type: text/html.

What is the file size in bytes?

✔ 258 bytes, as shown in Content-Length: 258.

What is the name & version of the server?

✔ Apache/2.2.3 (CentOS) from the Server header.

Question2 [5Marks]   [CLO 2]

3 x 6 + 1 x 5 + 1 x 4 = 27 frame times needed

First when frames are interleaved, then 1 frame is taken from video clip and each of the images.

Therefore, 27 frame times are needed until all five images are sent. The fifth image will be sent till 18th

frame, fourth till 23rd frame while first three images will be sent till 27th frame. So only 27 frame time are

needed. All remaining frames from frame 28th till frame 2022 belong to video clip.

Question3 [5Marks]   [CLO 2]

Where does the local DNS server check first?

The local DNS resolver first checks its cache to see if it has a recent record of the requested domain.

Where does the local DNS server check next?

If the record is not found in cache, the local DNS server sends a query to a Root DNS server.

Where does the local DNS server check after that?

The Root DNS server responds with a referral to the TLD (Top-Level Domain) DNS server, which is queried next.
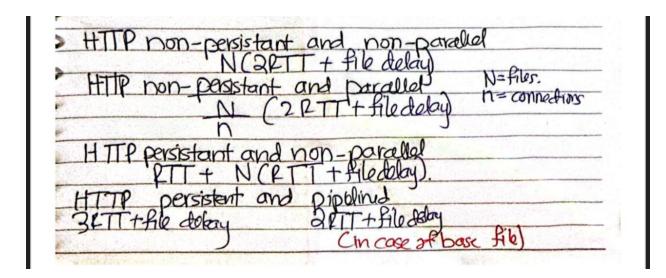
The TLD DNS server then provides the address of the Authoritative DNS server, which is queried to get the final IP address.

What type of DNS Record (RR) is returned in response to this DNS Query?

The A Record (IPv4 Address) or AAAA Record (IPv6 Address) is returned if the query is successful.

Question4 [4+5 Marks]   [CLO 2]

➤ HTTP non-persistant and non-parallel
$$N(2RTT + \text{file delay})$$
➤ HTTP non-pesistant and parallel
$$\frac{N}{n}(2RTT + \text{file delay})$$

N = files.
n = connections

HTTP persistant and non-parallel
$$RTT + N(RTT + \text{file delay}).$$

HTTP persistent and pipelined
$$3RTT + \text{file delay} \qquad 2RTT + \text{file delay}$$
$$\text{(In case of base file)}$$

Solution:

Transmission Time of HTML base file = L/R = 40KB/10Mbps = 0.032 secs

Transmission Time of One embedded Object = 15KB/10Mbps = 0.012 secs

(a) Non-Persistent (No Parallel Connections):

Time to fetch base file = 2 RTT + Transmission Time = 2* (0.05) + 0.032 = 0.132 seconds

Time to fetch one embedded object = 2 RTT + Transmission Time = 2*(0.05) + 0.012 = 0.112 seconds

Time to fetch 10 embedded objects = 10* 0.112 = 1.12 seconds

Total Time = 0.132 + 1.12 = 1.252 seconds

OR

Total RTTs = 2* 11 = 22 RTTs

Total time = (22* 0.05) + 0.032 + (10* 0.012) = 1.252 seconds or 1252 milliseconds

(b) Persistent Connection:

Connection setup time = 0.05 seconds

Time to fetch base file = RTT + Transmission Time = 0.05 + 0.032 = 0.082 seconds

Time to fetch one embedded object = RTT + Transmission Time = 0.05 + 0.012 = 0.062 seconds

Time to fetch 10 objects = 10* 0.062 = 0.62 seconds

Total Time = 0.05 + 0.082 + 0.62 = 0.752 seconds

OR

Total RTTs = 12

Total time = 12*0.05 + 0.032 + (10* 0.012) = 0.752 seconds or 752 milliseconds