

EE450 Introduction to Computer Networks - Fall 2019 - HW 5

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1 Reading Assignment:

Chapter 2

2 Problems to be solved:

2.1 Chapter 2, Page 171: R11 (15 points) Why do HTTP, SMTP, and POP3 run on top of TCP rather than UDP?

HTTP is used for transmitting web objects between a client and server pair, SMTP and POP3 are both mail transmission protocols, they all require reliable transmission. TCP offers a reliable, connection-based transmission service with re-transmission mechanism. UDP is unreliable, connectionless and thus cannot be adopted by the above three protocols.

2.2 Chapter 2, Page 172: R19 (15 points) Is it possible for an organization's Web server and mail server to have exactly the same alias for a hostname (for example, foo.com)? What would be the type for the RR that contains the hostname of the mail server?

Yes, web server and mail server can have the same hostname. The type of RR record will be MX.

2.3 Chapter 2, Page 172: R21 (15 points) In BitTorrent, suppose Alice provides chunks to Bob throughout a 30-second interval. Will Bob necessarily return the favor and provide chunks to Alice in this same interval? Why or why not?

No. Bob might not exchange chunks with Alice in return because Alice may not be one of the "top uploaders" of Bob's. Bob will only send chunks to the peers who send data with the highest rate to him.

2.4 Chapter 2, Page 172: R25 (15 points) Besides network related considerations such as delay, loss, and bandwidth performance, there are other important factors that go into designing a CDN server selection strategy. What are they?

Several other important factors:

- File Distribution
- Distributed Computing
- Geological Location (Some CDN servers at certain areas might not have the copies of the requested videos)

2.5 Chapter 2, Page 175: P7 (20 points)

The total amount of time to get the IP address:

$$T_1 = RTT_1 + RTT_2 + \dots + RTT_n \quad (1)$$

After acquire the IP address, the client and server will build up a connection with 3-handshake process and then begins the transmission. The total time will be:

$$T_2 = 2 \times RTT_0 \quad (2)$$

Therefore the total time is:

$$T = T_1 + T_2 = 2RTT_0 + RTT_1 + RTT_2 + \dots + RTT_n \quad (3)$$

2.6 Chapter 2, Page 178: P20 (20 points) Suppose you can access the caches in the local DNS servers of your department. Can you propose a way to roughly determine the Web servers (outside your department) that are most popular among the users in your department? Explain.

Just make a statistics of the numbers of web servers' show-up time in the DNS cache. Larger the number is, then DNS requests for that web server is more frequently sent by the users, also meaning more frequent the web is visited by the residents of the apartment.