In the name of beauty

2nd problem set of ComNet course

Q1)

Determine the following statements as true or false with enough reasons.

a- The UDP's freedom on imposing no congestion control is always an advantage compared to TCP as it offers more effective throughput for communicating processes.

b- Peer-to peer applications work more efficiently and successfully if users are persuaded to volunteer bandwidth, storage, and computation resources to the applications.

c- In a peer-to-peer architecture, no client and no server can be defined in contrast to the client-server architecture.

d- The process initiated at the client has to only refer to the IP address of the server for sending packets.

e- Cookies are used to keep track of user IDs in a stateless HTTP server.

Q2)

How does the DNS server perform load distribution among replicated servers, such as replicated Web servers? What is the motivation?

Q3)

Assume a client sends an HTTP request message to retrieve an HTML webpage containing 5 image URLs. The HTML webpage itself has negligible amount of data while each image is 1Kbytes. Considering the end-to-end throughput to be 100Kbps and the RTT be 1msec, how much time would it take for the client to fully download the webpage and all the images if

a- non-persistent connection is used

b- persistent connection is used

assuming that HTTP runs on top of TCP? Compare the two schemes and explain differences.

Q4)

In the following network topology, two users want to independently request data from the Internet. User 1 has a request rate of $15\frac{\text{requests}}{\text{sec}}$ and the request rate of user 2 obeys a uniform distribution between $8\frac{\text{requests}}{\text{sec}}$ and $12\frac{\text{requests}}{\text{sec}}$. Each request is 1Mbytes long and the request and response messages are exchanged between the users and the internet through a link with total capacity of 1Mbps.
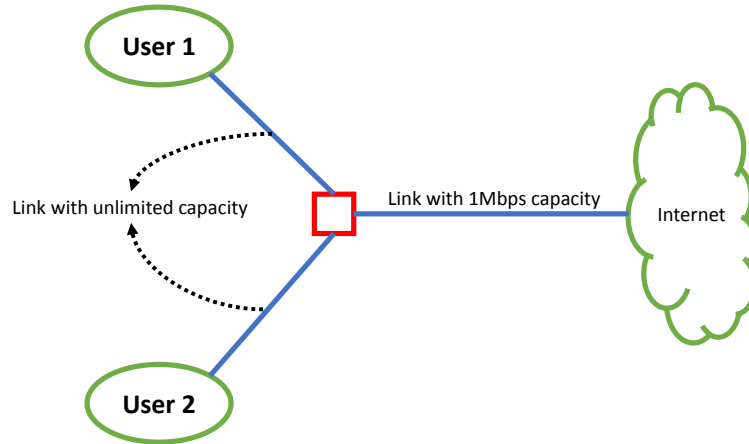
a- What would the total average delay be for both the users?

b- Assuming that a proxy server can on average fulfill 40 percent of all the requests (from both user 1 and 2) and the interconnecting link (between users and the proxy server) has a total capacity of 10Mbps, how much would the total average delay decrease? (Refer to the following topology)
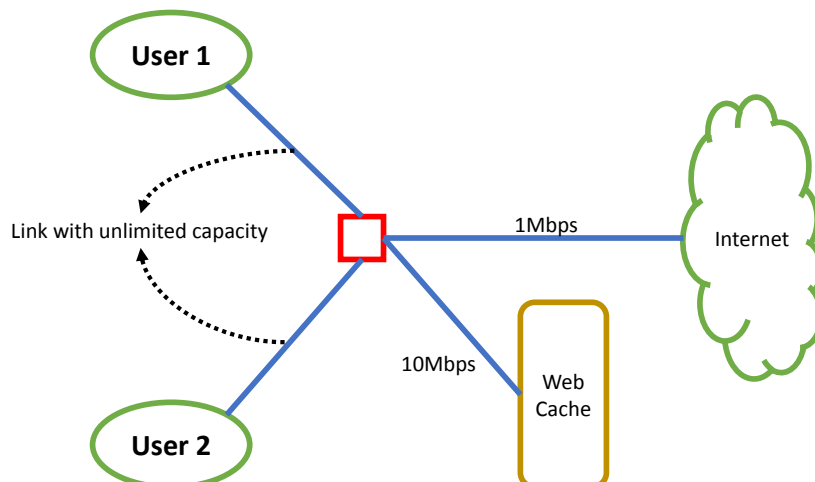
Q5)

Consider distributing a file of F = 15 Gbits to N peers. The server has an upload rate of u_s = 30 Mbps, and each peer has a download rate of d_i = 2 Mbps and an upload rate of u. For N = 10, 100, and 1,000 and u = 300 Kbps, 700 Kbps, and 2 Mbps, prepare a chart giving the minimum distribution time for each of the combinations of N and u for both client-server distribution and P2P distribution.

(Hint: The distribution time is the time it takes to get a copy of the file to all N peers. At the beginning of the distribution in P2P file sharing, only the server has the file. To get this file into the community of peers, the server must send each bit of the file at least once into its access link.)