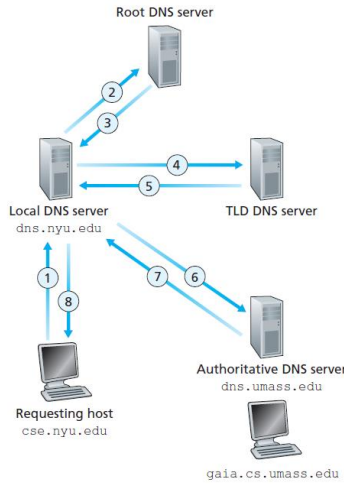
ENSC-371 – Summer 2017 Assignment#2: Due Date 13 June 2017

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

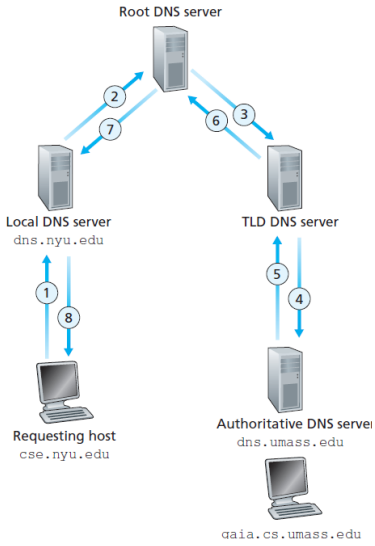
Problem-1:



Assume that the RTT between a client and the local DNS server is TT_l, while the RTT between the local DNS server and other DNS servers is RTT_r. Assume that no DNS server performs caching.

a. What is the total response time for the scenario illustrated in top figure on the right?
b. What is the total response time for the scenario illustrated in bottom figure on the right?
c. Assume now that the DNS record for the requested name is cached at the local DNS server. What is the total response time for the two scenarios?

Now suppose the HTML file references eight very small objects on the same server. Neglecting transmission times, how much time elapses with the following conditions:



d. Non-persistent HTTP with no parallel TCP connections?
e. Non-persistent HTTP with the browser configured for 5 parallel connections?
f. Persistent HTTP?

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-2:

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.

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-3:

Part-a:

Can you configure your browser to open multiple simultaneous connections to a Web site? What are the advantages and disadvantages of having a large number of simultaneous TCP connections?

Part-b:

We have seen that Internet TCP sockets treat the data being sent as a byte stream but UDP sockets recognize message boundaries. What are one advantage and one disadvantage of byte-oriented API versus having the API explicitly recognize and preserve application-defined message boundaries?

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-4:

Suppose Bob (not your instructor) joins a Bit-Torrent torrent, but he does not want to upload any data to any other peers (so called free-riding).

a. Bob claims that he can receive a complete copy of the file that is shared by the swarm. Is Bob's claim possible? Why or why not?
b. Bob further claims that he can further make his "free-riding" more efficient by using a collection of multiple computers (with distinct IP addresses) in the computer lab in his department. How can he do that?

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-5:

Suppose you installed (*don't actually install – You can if you want but not required*) and compiled Python programs TCPClient and UDPClient on one host and TCPServer and UDPServer on another host.

a. Suppose you run TCPClient before you run TCPServer. What happens? and Why?
b. Suppose you run UDPClient before you run UDPServer. What happens? and Why?
c. What happens if you use different port numbers for the client and server sides?