

Practice Problem 1) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P1)
True or false?

- a. A user requests a Web page that consists of some text and three images. For this page, the client will send one request message and receive four response messages.
- b. Two distinct Web pages (for example, www.mit.edu/research.html and www.mit.edu/students.html) can be sent over the same persistent connection.
- c. With nonpersistent connections between browser and origin server, it is possible for a single TCP segment to carry two distinct HTTP request messages.

Practice Problem 2) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P3)

Consider an HTTP client that wants to retrieve a Web document at a given URL. The IP address of the HTTP server is initially unknown. What transport and application-layer protocols besides HTTP are needed in this scenario?

Practice Problem 3) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P7)

Suppose within your Web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so a DNS lookup is necessary to obtain the IP address. Suppose that n DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of RTT_1, \dots, RTT_n . Further suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let RTT_0 denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the object?

Practice Problem 4) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P8)

Referring to the previous question, suppose the HTML file references eight very small objects on the same server. Neglecting transmission times, how much time elapses with:

- a. Non-persistent HTTP with no parallel TCP connections?
- b. Non-persistent HTTP with the browser configured for 5 parallel connections?
- c. Persistent HTTP?

Practice Problem 5) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P19)

P19. In this problem, we use the useful `dig` tool available on Unix and Linux hosts to explore the hierarchy of DNS servers. Recall that in Figure 2.21, a DNS server higher in the DNS hierarchy delegates a DNS query to a DNS server lower in the hierarchy, by sending back to the DNS

client the name of that lower-level DNS server. First read the man page for dig, and then answer the following questions.

a. Starting with a root DNS server (from one of the root servers [a-m].rootservers.net), initiate a sequence of queries for the IP address for your department's Web server by using dig. Show the list of the names of DNS servers in the delegation chain in answering your query.

Practice Problem 6) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P20)

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.

Practice Problem 7) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P21)

Suppose that your department has a local DNS server for all computers in the department. You are an ordinary user (i.e., not a network/system administrator). Can you determine if an external Web site was likely accessed from a computer in your department a couple of seconds ago? Explain.

Practice Problem 8) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P22)

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 $N = 10, 100, \text{ and } 1,000$ and $u = 300 \text{ Kbps}, 700 \text{ Kbps}, \text{ and } 2 \text{ Mbps}$, 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.

Practice Problem 9) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 2 P33)

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?