

CS118 Homework 2

Due: 11:59pm, April 16, 2014

1. 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 (e.g. www.ucla.edu/research.html and www.ucla.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.
 - d. The 'Date:' header in the HTTP response message indicates when the object in the response was last modified.
 - e. HTTP response messages never have an empty message body.
2. Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use TCP or UDP? Why? (Book: Chapter 2, Question 6)
3. 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 the DNS; the successive visits incur a RTT of RTT_1, \dots, RTT_n . Further suppose that the Web page associated with 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? (Book: Chapter 2, Problem 7)
4. Referring to the previous problem, suppose the HTML file references eight very small objects on the same server. Neglecting transmission times, how much time elapses with (Book: Chapter 2, Problem 7)
 - a. Non-persistent HTTP with no parallel TCP connections?
 - b. Non-persistent HTTP with the browser configured for 5 parallel connections?
 - c. Persistent HTTP?

5. Consider a short, ten-meter link over which a sender can transmit at a rate of 150 bits/sec in both directions. Suppose that packets containing data are 100,000 bits long, and packets containing only control (e.g. ACK or handshaking) are 200 bits long. Suppose that N parallel connections get $1/N$ of the link bandwidth. Now consider the HTTP protocol and suppose that each downloaded object is 100Kbits long, and that the initial downloaded file contains 10 referenced objects from the same sender. Would parallel downloads via parallel instances of non-persistent HTTP make sense in this case? Now consider persistent HTTP. Do you expect significant gains over the non-persistent case? Justify and explain your answer. (Book: Chapter 2, Problem 10)