Homework 3

Due date: 2018/11/03 13:00pm

Please Upload your homework via CEIBA system

The file should be in pdf format and named with YourSchoolNumber_hw#.pdf

1. (25%)

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 non-persistent 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. (25%)

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 $RTT_1, \ldots, RTT_n$. 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?

3. (25%)

Referring to Problem 2, 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?

4. (25%)

Consider distributing a file of *F* bits to *N* peers using a P2P architecture. Assume a fluid model. For simplicity assume that d_{min} is very large, so that peer download bandwidth is never a bottleneck.

a. Suppose that $u_s \leq (u_s + u_1 + \cdots + u_N)/\mathrm{N}$. Specify a distribution scheme that has a distribution time of F/u_s.

b. Suppose that $\mathrm{u}_s \geq (u_s + u_1 + \cdots + u_N)/\mathrm{N}$. Specify a distribution scheme that has a distribution time of $\mathrm{NF}/(u_s + u_1 + \cdots + u_N)$.

c. Conclude that the minimum distribution time is in general given by $\max\{\mathrm{F}/u_s,\ \mathrm{NF}/(u_s + u_1 + \cdots + u_N)\}$.