計算機網路 HW3

許博翔

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Problem 1.

a. False, since a request message will be sent for each object, four request messages will be sent instead of one.

b. True, since these two Web pages are under the same server `www.mit.edu`.

c. False, since the connection closes in a nonpersitent connection after each connection, the TCP will close after dealing with the first request, and therefore the two requests won't share the same TCP segment.

d. False, Date is the time the request was created but not that of the object last modified.

e. False, HTTP status 304 has an empty message body.

Problem 2.

a. A line containing only a period

b. HTTP has content length written in the header to indicate the length of the message body.

c. No, because they just have different formats. Besides, HTTP message may contain a line which has only a period, which can't be used to indicate the end of the message.

Problem 3. First, it needs to DNS lookup, which costs $RTT_1 + RTT_2 + \cdots + RTT_n$ time.

Next, the client sends request to the server of the Web page and then it sends back the HTML text, which costs $2RTT_0$ time.

$\therefore$ total time $= 2RTT_0 + RTT_1 + RTT_2 + \cdots + RTT_n$.

Problem 4.

a. Yes, although he is a free-rider, he can still be optimistic unchoked. If there are enough peers which have stayed in the swarm for a time that is long enough, then he can receive the complete copy of the file by optimistic unchoked by those peers.

b. He can run a client on each computer, and arranges which client to collect which part of the file. By (a), the clients can be free-riders and still get the data of their required part of the file.

Problem 5.

a. It takes $2RTT$ for each connection. Besides, it takes additional $\frac{(1 + 50 \times 5) \times 8 \text{ (kb)}}{1000 \text{ (kbps)}} = 2.008 \text{ (s)} = 2008 \text{ (ms)}$ to download the objects.

   $\therefore$ the total time it takes $= 6 \times 2 \times 100 + 2008 = 3208$ (ms).

b. It takes $2RTT$ for each connection. However, after transmitting the document object, the 5 image objects can be transmitted parallelly, which can be seen as transmitting $\lceil \frac{5}{2} \rceil = 3$ image objects serially. Besides, it takes additional $\frac{(1 + 50 \times 6) \times 8 \text{ (kb)}}{1000 \text{ (kbps)}} = 2.008 \text{ (s)} = 2008 \text{ (ms)}$ to download the objects since the download speed is bounded by the bandwidth.

   $\therefore$ the total time it takes $= 4 \times 2 \times 100 + 2008 = 2808$ (ms).

c. It takes RTT to send the request to the server. Then for each object, it takes RTT time to be sent back. Besides, it takes additional $\frac{(1 + 50 \times 5) \times 8 \text{ (kb)}}{1000 \text{ (kbps)}} = 2.008$ (s) $= 2008$ (ms) to download the objects.

   $\therefore$ the total time it takes $= (1 + 6) \times 100 + 2008 = 2708$ (ms).