CSCE 416 Introduction to Computer Networks

Homework #2 solutions (10 points)

[1] HTTP

a. Is it possible for an organization’s web server and mail server to have exactly the same alias for a hostname (for example, foo.com)? What would be the type for the RR that describes the hostname of the mail server?

**Answer: Yes. As a client queries a DNS server for a mail server or a web server, RR records with different types will be returned to identify the correct hostnames and IP addresses. For instance, the hostname of the mail server in the domain of “foo.com” is described by an RR record with a type of MX; the hostname of a web server (foo.com) is described by an RR record with a type of CNAME.**

b. **(2 points)** Try to access [www.cse.sc.edu/~wyxu/foo.html](http://www.cse.sc.edu/~wyxu/foo.html) by following the steps listed below:

Step 1: “telnet [www.cse.sc.edu](http://www.cse.sc.edu) 80”

Step 2: Manually create an HTTP request message in your telnet session.

What message did you type in to get the webpage foo.html? Do you have to include the header line “Host: [www.cse.sc.edu](http://www.cse.sc.edu)” in your HTTP request to access the webpage?

**Answer: The HTTP request looks like the following:**

**GET /~wyxu/foo.html http/1.1**

**Host:** [**www.cse.sc.edu**](http://www.cse.sc.edu)

**The header line “Host:www.cse.sc.edu” has to be included if HTTP/1.1 is used. If HTTP/1.0 is used, then the host header line is not mandatory.**

c. **(4 points)** Are the following statements true or false, if it is false, explain why

* HTTP response messages never have an empty message body.

**Answer: false. In a conditional get, the response message will have an empty message body if the webpage has not been modified since the date that is specified in the If-modified-since header.**

* The Date: header in the HTTP response message indicates when the object in the response was last modified

**Answer: false. The Date:header indicates the time when the HTTP response is generated.**

* Consider two distinct Web pages that belong to the same Web server. Both webpages can be sent over the same persistent TCP connection between a client and a Web server.

**Answer: True.**

* With nonpersistent connections between browser and origin server, it is possible for a single TCP segment to carry two distinct HTTP request messages.

**Answer: False. Only one HTTP request message and one HTTP response messages can be sent through the same TCP connection in nonpersistent connections.**

[2] In BitTorrent, suppose Alice provides chunks to Bob throughout a 30-second interval. Will Bob necessary return the favor and provide chunks to Alice in this same interval? Why or why not?

**Answer. It is not necessary that Bob will also provide chunks to Alice. Alice has to be in the top 4 neighbors of Bob for Bob to send out chunks to her; this might not occur even if Alice is provides chunks to Bob throughout a 30-second interval.**

[3] **(1 pts)**  What is out-of-band communication? Do HTTP, FTP, SMTP or DNS use out of band communication?

**Answer: When the data and commands are sent over different TCP connections, we call it out of band communication. Only FTP uses out-of-band communication.**

[4] 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 UP address from DNS; the successive visits incur and RTT (round trip time) of ****. Further suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let ****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?

**Answer: The total amount of time to get the IP address is**

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Once the IP address is known,  elapses to set up the TCP connection and another  elapses to request and receive the small object. The total response time is



[5] **(3 pts)** Let RTTbe the round trip delay between the client and the server. Suppose the HTML file references 20 very small objects on the same server. Neglecting transmission times or TCP slow start, how much time elapses with

a. Non-persistent HTTP with no parallel TCP connections? **Answer: 2\*RTT + 20 \* 2\*RTT = 42RTT**

b. Non-persistent HTTP with up to 5 parallel connections? **Answer: 2\*RTT + 20/5 \* 2\*RTT = 10RTT**

c. Persistent HTTP? **Answer: 2\*RTT + RTT = 3RTT**