HW#2

1 Questions: 56 pts/total

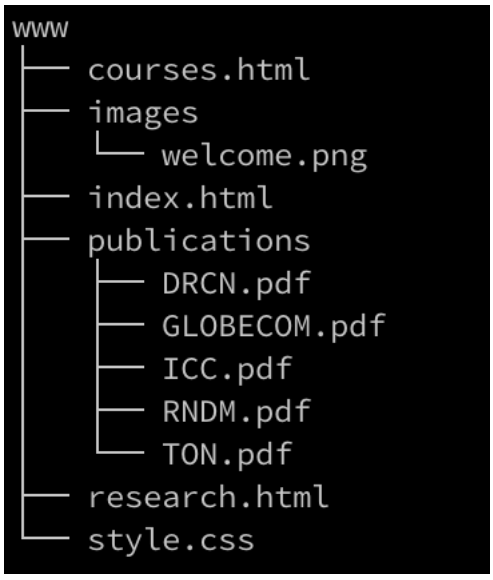
1. What are the "identifiers" required for a client (browser) to access a web server? (2 pts)

2. What is RFC (request for comments)? Find the RFC numbers for HTTP, SMTP, TCP, UDP, IPv4, and ICMP protocols. (4 pts)

3. The design of TCP and UDP does not have the encryption/decryption mechanism. How to supplement it? (2 pts)

4. When using HTTP or FTP protocols to download webpages/files, the underlying transport-layer protocol is TCP. Why don't we use UDP? (2 pts)

5. Given the web directory structure on find-me-if-you-can.bradley.edu, where all the web contents reside in the "www" directory. Provide the URI to access the image file "welcome.png". (2 pts)



6. Given an HTML page whose content contains 3 images, 1 CSS stylesheet, and 1 JavaScript files. When using a web browser to download the full content of this HTML page, how many RTTs does it take to complete the download if we use (1) non-persistent HTTP and (2) persistent HTTP? Here, we neglect the file transmission/download time. (4 pts)

7. What does it mean if your browser receive a 404 response status code? What about the 301 code? (2 pts)

8. Provide the URI to query "Bradley University" through Google Search. Note: "Bradley University" is separated by a space. (2 pts)

9. What are the characters required to separate the header field and message body of an HTTP message? (2 pts)

10. What are the purposes for the web sites to use cookies? What information is kept in a cookie? (2 pts)

11. Web caching: given the following assumptions – (1) the clients on average send out 3 requests per second (2) one average each request would download 5 Mbits of data (3) the round-trip-time from the access router to one of the servers is 1 seconds (4) the access link rate is 15 Mbps (5) the LAN has link rate 100 Mbps.

    i. What is the LAN utilization? (2 pts)

    ii. What is the access link utilization? (2 pts)

    iii. What is the total response time for the client to complete the web requests? (2 pts)

12. Following the same setting above, after adding a proxy server in the LAN, 60% of the original requests are now fulfilled by the proxy server. We also know that it takes 20 ms for clients to access the content on the proxy server.

    i. What is the access link utilization? (2 pts)

    ii. What is the total response time for the client to complete the web requests? (2 pts)

13. (1) Provide some examples of the top-level domains. (2 pts) (2) What are the authoritative DNS servers at Bradley University? What are the commands you use to get the authoritative DNS servers? (4 pts)

14. Illustrate the iterated query and recursive query when you send out a DNS query from your machine (student.bradley.edu) to the site www.mit.edu. (4 pts)

15. Why the root domain name servers are not often visited by end systems? (2 pts)

16. When you create a non-profit organization ABC, you would like to get a domain name **abc.org**, set up your own web site/server **www.abc.org**, and run a mail server **smtp.abc.org**. You would also make **dns.abc.org** the authoritative DNS server. (1) What resource records (RRs) should be added to the .org TLD? (2) What RRs should be added to your authoritative DNS server? (4 pts) (**Note:** we

assume that your network has IP addresses in 136.176.0.0/16, so you can assign the IP addresses within the range of 136.176.0.1 – 136.176.255.254 to all the servers. Each service/server uses a unique IP addreess.)

17. P2P vs. Client/Server: how much time does it take to distribute a 1 Gigabits file to 5 different clients? Assume that the server's upload capacity is 50 Mbps, each client has upload capacity of 5 Mbps and download capacity of 10 Mbps.

    (a) Client-Server (2 pts)

    (b) Peer-to-Peer (2 pts)

    (c) If the number of clients is changed from 5 to 50. What will be the time for client-server and peer-to-peer structures? (2 pts)

2 How to submit the assignment

All the assignments should be submitted electronically to GitHub.

If you prefer to write your answers on papers, please take photos of your written assignments and submit them to GitHub.

Note: If you upload photos, please make sure that the resolution and quality of the photos should be acceptable (readable.) If the quality is too bad so the instructor cannot read/understand your work, it will be rejected and you'll be required to redo the assignment.