YORK UNIVERSITÉ UNIVERSITY

Department of Computer Science and Engineering

CSE 3214: Computer Network Protocols and Applications

Midterm Examination

Instructor: Peter Lian
Date: February 14, 2013

Instructions:

1. Examination time: 75 min.
2. Print your name and CS student number in the space provided below.
3. This examination is closed book and closed notes. Use of calculators is allowed.
4. There are **FOUR** questions. The points for each question are given in each question. The overall maximum score is 100.
5. Answer each question in the space provided. If you need to continue an answer onto the back of a page, clearly indicate that and label the continuation with the question number.

FIRST NAME: _____

LAST NAME: _____

STUDENT #: _____

Question	Points
1	/20
2	/30
3	/30
4	/20
Total	

1. Multiple Choice Questions [20 points]

For each of the question below, select one answer and write your answer in the answer box. Each question is worth 2 points. Do not write more than one answers in the answer box.

1. There are two key functions performed by the network-core in Internet. They are:
   1. packet switching and circuit switching.
   2. routing and forwarding.
   3. store and forward.
   4. reliable data transfer and congestion control.

   Answer [B]

2. Given the following traffic intensities, which one has the largest average queuing delay?
   1. Traffic intensity=0.1.
   2. Traffic intensity=0.5.
   3. Traffic intensity=0.9.
   4. Can't decide.

Answer [C]

3. Which of the following statement is TRUE for "traceroute" program?
   1. "traceroute" program sends total 3*N special packages to the destination.
   2. Source sends *N* special packages to the destination containing *N* routers in-between.
   3. Once i^{th} router receives a package, it sends a short message to the source. The source records the time that elapses between when it sends a package and when it receives the corresponding return message.
   4. None of the above.

Answer [A]

4. Presentation and session layers in the OSI are missing in the Internet protocol stack. Which layer(s) in the Internet protocol stack is(are) responsible for these tasks?
   1. Application.
   2. Application, Transport.
   3. Transport, Network.
   4. None.

   Answer [A]

5. Which of the following statements regarding HTTP protocol is FALSE?
   1. HTTP sends its control information in-band.
   2. More than one HTTP connections may be used to download a web page and web objects referenced by the web page.
   3. HTTP/1.1 maintains persistent connections by default while HTTP/1.0 does not.
   4. HTTP/1.1 maintains user states while HTTP/1.0 is a state-less protocol.

Answer [D]

6. How many methods are commonly used in HTTP/1.0 ?
   1. 3 methods
   2. 4 methods
   3. 5 methods
   4. 6 methods

   Answer [A]

7. Which of the following statement is FALSE for FTP?
   1. FTP transfers file to a remote host.
   2. FTP follows client-server model.
   3. FTP user issues a control TCP connection with the server side on server port 21.
   4. FTP server must maintain state about the user throughout a session.

   Answer [A]

8. Which of the following statement is FALSE for SMTP?
   1. SMTP is a connection-oriented, text-based protocol.
   2. SMTP is used for email delivery and retrieving.
   3. SMTP message must be in 7-bit ASCII.
   4. SMTP transaction consists of three command/reply sequences.

Answer [B]

9. Which of the following command would not cause a DNS query to be generated?
   1. dig cse.yorku.ca
   2. dig 130.63.236.137
   3. telnet cse.yorku.ca
   4. telnet 130.63.92.157

   Answer [D]

10. Which of the following statement is FALSE for peer-to-peer (P2P) computer network?
    1. There must be at least one always-on server to track the user in a 2P network.
    2. Arbitrary end systems directly communicate in P2P network.
    3. P2P is a distributed application architecture that partitions tasks or workloads among peers.
    4. P2P network can be setup within the home or over the Internet.

    Answer [A]

2. Assume that store-and-forward is used in a packet-switching network. Propagation delay between two packet switches is 40ms. Processing delay and queuing delay are negligible. Answer the following two questions.

(i) Suppose that there are 5 packet switches between node A and note B. Given the data rate is 100,000 bps for each link, and packet size is 10,000 bytes. How long does it take to send a 300,000 bytes file from A to B?

[15 points]

Solution:
The package size is 10,000 byte, and file size is 300,000 bytes,
the number of packet= (300,000/10,000)=30.

There are 5 packet switches, link speed is 100,000 bps for each link, propagation delay between two packet switches is 40ms, time for sending the first packet from A to B is:
T1=transmission time at 5 packet switches + propagation delay on 4 links
=(10,000*8/100,000)*5+0.04*4 =0.8*5+0.04*4=4.16 (s)
(Assuming that there is no propagation delay from A to switch as well as switch to B. If you assume same 40ms delay from A to switch and switch to B, then the propagation delay is 0.04*6=0.24s instead of 0.16s)

The time sending rest 29 packets from the second last switch to the last switch is:
T2=29*(10000*8/100000+0.04)=29*(0.8+0.04)=24.36 (s)

The total time is: 4.16+24.36=28.52 (s)

(ii) Suppose that nodes A and B are connected via L links. The data rate for each link is R bps, and there are n packages of size P_1, P_2, ..., P_n bytes being sent back to back from A to B. How long does it take to send these n packages?

[15 points]

Solution:
Number of links = L, so there are (L-1) packet switches between A and B.

Assume that P_1 is the first packet, time for sending P_1 from A to B is;
T1=(P_1*8/R)*(L-1)+ 0.04*(L-2)

For rest of packets, e.g. P_2, ..., P_n, the time for sending them is:
T2= (P_2*8/R)+0.04+... + (P_n*8/R)+0.04

$$= \sum_{i=2}^{n} \left(\frac{P_i * 8}{R} + 0.04 \right)$$

Total time = T1+T2

3. Answer the following questions related to HTTP.

(i) Consider a web site that allows user to upload a file onto the server upon clicking a submit button. Which HTTP 1.1 request method should be used for file uploading? Justify your answer.

[10 points]

Solution:
PUT. File too big to embed in query string if using POST.

(ii) A user wants to retrieve 8 images from a Web page. The user clicks a base HTML file to get the base HTML file for 8 images. Suppose that the size of base HTML page is 2 KB. All images are of same size, i.e. 250KB. Assume that the data rate from client to server is 500 Kbps. The round-trip time (RTT) for sending control or HTTP requests is 0.1 seconds. What is the overall retrieve time in the case of (a) non-persistent HTTP with 4 parallel downloads, (b) persistent HTTP?

[20 points]

Solution:

1. There are 9 objects, e.g. 1 base HTML and 8 images. The user needs to download the base HTML file first, followed by 8 objects. Since there are only 5 parallel links, the client needs to open two TPC links for downloading 8 images.
   Time for downloading base HTML: 2RTT+2K*8/500K=0.232 s
   Time for downloading first 4 images: 2RTT+250K*8/(500K/4)=0.2+16=16.2 s
   Time for downloading another 4 images: 2RTT+250K*8/(500K/4)=16.2 s
   Total retrieve time: 0.232+16.2+16.2=32.632 s

2. Time for downloading base HTML, 2RTT+2K*8/500K=0.2+0.032=0.232 s
   Time for downloading 8 images: 8*(RTT+250K*8/500K)=8*(0.1+4)=32.8 s
   Total retrieve time: 0.232+32.8=33.032 s

4. The following questions are related to DNS.
   (i) What is a recursive name query?

[5 marks]

Solution:
A recursive name query puts the burden of name resolution on contacted name server.

Or:
A recursive name query is one in which a DNS client requires that the DNS server respond to the client with either the requested resource record or an error message stating that the record or domain name does not exist. The DNS server cannot just refer the DNS client to a different DNS server.

(ii) What is an iterative name query?

[5 marks]

Solution:

An iterative name query is one in which contacted server replies with name of server to contact.

Or:
An iterative name query is one in which a DNS client allows the DNS server to return the best answer it can give based on its cache or zone data. If the queried DNS server does not have an exact match for the queried name, the best possible information it can return is a referral (that is, a pointer to a DNS server authoritative for a lower level of the domain namespace). The DNS client can then query the DNS server for which it obtained a referral. It continues this

process until it locates a DNS server that is authoritative for the queried name, or until an error or time-out condition is met.

(iii) Assume you want to make your server, mylab.cse.yorku.ca, accessible only within the Department of Computer Science and Engineering (CSE). If anyone tries to connect to the server from the network other than the CSE network, he/she will receive error messages such as “No address associated with nodename” or “Cannot find server mylab.cse.yorku.ca”. What can you do to implement this access restriction?

[10 points]

Solution:
CSE admin configures their local DNS server with the hostname mylab.cse.yorku.ca, but restricts the propagation of the entry to other DNS servers outside CSE. When connecting from ISP, the ISP’s DNS server has no knowledge of the hostname, thus is unable to find its IP address.

END OF PAPER