Exam 1 Information

CMPSC 381
Data Communications and Networks
Spring 2016
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Exam 1 Information

The first midterm examination will be given in class on Monday, 22 February. It is closed book, closed notes. Use of calculators or other electronic devices is not allowed. If an answer requires numerical calculation it can be left in partially-evaluated form as \( A \times 10^P \) where \( A \) may be a simple arithmetic expression and \( P \) is a single integer.

The exam will cover material from the beginning of the semester through Wednesday, 17 February (chapters 1 and 2 in Kurose & Ross, plus sections 3.1 through 3.3 of chapter 3).

Here are examples of the kinds of questions that might be asked. This is not intended to be a sample exam; the topics covered below are not intended to be an exhaustive review. In particular, knowing the answers to all the questions below will not guarantee a good grade on the exam!

1. Define the following acronyms:

   (a) ISP  
   (b) DNS  
   (c) RFC  
   (d) DHT

2. Figure 1 is a snapshot of a TCP session involving two processes at ports 51539 and 12345.

<table>
<thead>
<tr>
<th>No.</th>
<th>Src Port</th>
<th>Dest Port</th>
<th>Proto</th>
<th>Info</th>
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</thead>
<tbody>
<tr>
<td>3</td>
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<td>12345</td>
<td>TCP</td>
<td>51539</td>
</tr>
<tr>
<td>4</td>
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<tr>
<td>15</td>
<td>51539</td>
<td>12345</td>
<td>TCP</td>
<td>51539</td>
</tr>
</tbody>
</table>

Figure 1: See problem 2

(a) Which process initiated the session?
(b) Which packet numbers were involved in the three-way handshake?
(c) Which process requested termination of the session?
(d) Which packet numbers were involved in the shutdown of the session?
3. A 6000-bit packet must be transmitted from host A to host B in one hop. Host A transmits at a rate of 3 Mbps. Neglecting propagation delay, how long will it take to transmit?

4. A single packet of size 500 bytes must be transmitted from host A to host B over a wire of length 200 kilometers. If A transmits at a rate of 2 Mbps and the propagation speed is $2 \times 10^8$ meters/sec, how long will it take until the last bit of the packet reaches B?

5. Name, in order, the layers of the TCP/IP protocol stack.

6. Define the terms “root server,” “TLD server,” and “authoritative server” as they apply to the DNS application.

7. Name one major difference between the HTTP/1.0 protocol and the HTTP/1.1 protocol.

8. The following questions are all connected:
   (a) A user requests a web page at $\text{http://www.biguni.edu/sites/einstein/}$. What does the GET request line look like?
   (b) The Web server responds with the web page and these headers:

   
   
   HTTP/1.1 200 OK
   Date: Wed, 17 Feb 2016 11:40:51 GMT
   Server: Apache/2.2.22 (Ubuntu)
   Last-Modified: Fri, 22 Jan 2016 01:33:28 GMT
   ... etc. ...

   Very soon afterward, the user requests the same page. What does the “If-modified-since:” header look like in the request message?
   (c) What are the two possible responses to the second request (in terms of whether or not the requested page is returned) and under what circumstances does each occur?

9. How does BitTorrent discourage “free riders” (users who want to download files but don’t want to upload files)?

10. For each of the following applications, which transport protocol is used—TCP or UDP?
    (a) SMTP
    (b) FTP
    (c) HTTP
    (d) DNS

11. In a Python program, the following lines appear:

   ```python
   import socket
   mysocket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
   ```

   What kind of socket is `mysocket`—TCP or UDP? How do you know?

12. In a Python program, the following line
message = clientsocket.recv(1024)

Which of the following statements is true?

(a) The statement is in error because there is no “address” information to indicate where the message came from
(b) The socket is a TCP socket
(c) A process at port number 1024 sent this message
(d) The socket is a UDP socket

13. Describe each of the different sources of delay in a packet-switched network.

14. An average of 100 packets per second arrives at a given router, where each packet consists of 5000 bits. The router can transmit at a rate of 1 Mbps.

(a) What is the traffic intensity at the router?
(b) What can be said about queueing delay and/or packet loss at this router?

15. In Figure 2 if peer number 1 requests the value for key number 55, how many messages are needed (including the response)?

![Figure 2: See problem 15]

Tomorrow afternoon’s lab will contain more review exercises.