CSE 3214 Midterm Test
Winter 2014
February 25, 2014
Instructor: S. Datta

Name (LAST, FIRST): _____

Student number: _____

Instructions:

1. If you have not done so, put away all books, papers, and electronic communication devices. Write your name and student number NOW!
2. Check that this examination has 10 pages. There should be 4 questions together worth 40 points.
3. You have 120 minutes to complete the exam. Use your time judiciously.
4. Show all your work. Partial credit is possible for an answer, but only if you show the intermediate steps in obtaining the answer.
5. If you need to make an assumption to answer a question, please state the assumption clearly.
6. Points will be deducted for vague and ambiguous answers.
7. Your answers MUST be LEGIBLE.
8. Good luck!

Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page.

1. (10 points) (a) (1 point) Why does TCP not allow applications to control the transmission times of packets?

(b) (2 points) The formula used by TCP to compute the estimated roundtrip time between 2 hosts is $\text{EstimatedRTT} = (1 - \alpha)\text{EstimatedRTT} + \alpha\text{SampleRTT}$.
What effect does α have on the estimated roundtrip time? What is the RTT value set to in TCP?

(c) (1 point) What are the primary disadvantages of proxy servers from the point of view of content providers?

(d) (2 points) Why is reliable delivery implemented as a service in the transport layer instead of (say) the link layer in the internet?

(e) (2 points) Using the analogy of cars being packets and a tolled road network being the network, provide analogs of propagation delay, queuing delay and transmission delay.

(f) (2 points) HTTP is called a pull protocol but SMTP is called a push protocol in the book. What do these terms mean?

2. (13 points) (a) (2+2 points) What are the pros and cons of having congestion control in the transport layer as opposed to the network layer?

(b) (2 points) List some possible security/privacy problems created by the existence of cookies.

(c) (3 points) Describe briefly the three main function of DNS *other than* providing IP address lookup service.

(d) (2 points) State Little's Law, defining all the variables involved.

(e) (2 points) Briefly describe what optimistic unchoking means in the context of BitTorrent.

3. (9 points) (a) (3 points) Suppose you are writing a video streaming application. Would you use a single TCP connection like HTTP or two TCP connections like FTP, and why? What are the benefits to making the control connection TCP-based and the data connection UDP-based?

(b) (2 points) What would happen to the usage of different servers if DNS queries are never cached?

(c) (4 points) Suppose a trunk router satisfies the requirements of a M/M/1 queue. That is, assume it has infinite buffer space and the incoming traffic is Poisson with a mean arrival rate λ and the packet processing times follow an exponential distribution with parameter μ. Assume $\mu = 10000$ pkts/sec. List the utilization and the expected number of packets in the buffer for $\lambda = 5000, 9000, 9900$ packets/second. What is the conclusion rom your numbers?

4. (8 points) (a) (4 points) Imagine a wireless network where each node is mobile and is equipped with a GPS unit. The normal algorithms for routing would be problematic because routing tables would store stale information and further, a lot of communication would be spent updating routing tables. How would you do addressing and routing in such networks? Your system should try to minimize the overhead (number of bits transmitted for routing).

(b) (4 points) If the Internet designers were thinking of security issues, what would they do differently in DNS services and in the network layer?

Use this page if you need extra space. Mark the question number clearly.