CSE 4213 Midterm Test
Winter 2007
February 19, 2007
Instructor: S. Datta

Name (LAST, FIRST): _____

Student number: _____

Instructions:

1. If you have not done so, put away all books, papers, cell phones and pagers. Write your name and student number NOW!
2. Check that this examination has 10 pages. There should be 4 questions together worth 60 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.

DO NOT WRITE ANYTHING ON THIS PAGE.

Q	(a)	(b)	(c)	(d)	(e)	TOTAL
1						
2						
3						
4						

Aggregate score =

1. (15 points) Try to answer each of the following parts in at most two sentences.

   (a) (4 points) Many cellular phone companies offer short text messaging service (SMS) and multimedia message service (MMS). MMS message allow pictures or audio/video to be sent. Write down one **essential** difference in the networking requirements of the two applications.

   (b) (3 points) Describe how queries are routed in the Chord P2P system.

   (c) (3 points) Web pages can be dynamically generated in many server applications. Describe a way for using dynamically generated webpages to balance the communication load at a major e-commerce site among various servers in the server farm maintained by the site.

(d) (4 points) Describe the difference between recursive queries and iterative queries in DNS.

(e) (4 points) Describe how you would design an email anonymizer site. Such sites work as follows: when A sends a mail to B using the site, B receives a mail with some sender address C (C and A are different). If B replies to that email, A gets the reply as usual.

2. (a) (4 points) Why are different protocols used in sending and accessing email on the Internet? Name one protocol used in each. Which one is push-based and which one is pull based? Do not consider web-based email services for this question.

(b) (4 points) From an application designer's point of view, what are the pros and cons of
(a) using TCP for reliable transfer of data, and
(b) implementing reliability in the application layer using UDP?

(c) (7 points) A computational grid is a wide-area network of workstations that are linked together for the purpose of running computation-intensive applications. Typically these machines are owned and used by people and serve the grid only when the regular owners are not actively using the computer. Suppose that our department agrees to participate in a grid at all times except 8 am to midnight on weekdays. Describe a overlay network that you would use to aid resource discovery – the process using which a submitted job can locate a workstation that fits its needs. Needs can include CPU type, OS type, minimum speed, minimum available memory and many other attributes.

3. (a) (5 points) You can browse electronic journals that our University subscribes to by logging on to the library site using your library card and PIN. This allows you to be automatically identified as a valid subscriber. Describe briefly the sequence of events that take place starting from your clicking the library URL for the first time to your successfully downloading a paper from a digital library.

(b) (4 points) Why are source and destination port numbers necessary? Outline scenarios where each of them is essential.

(c) (6 points) DNS is used on the Internet to "locate" nodes. Is a similar strategy sufficient if we assumed that all nodes may move, as in cellular networks? Describe a possible location scheme for such a mobile network. What are the drawbacks of your system (if any)?

4. (a) (5 points) TCP is a connection-oriented protocol. Describe what happens during connection setup. What variables does TCP initialize and what buffers does it allocate?

(b) (5 points) What is flow control and how does TCP do it? What happens when the receive window becomes zero and later becomes non-zero again, both in the course of a TCP session?

(c) (5 points) How does TCP adaptively estimate the round-trip time of a connection? Write down the appropriate formula and the definitions of the various parameters in it.