CS 428: Final Exam (Fall’03)

This exam is out of 150. As a winter break gift you get 30 points. Answer 120 points worth of problems. If you answer a problem, you must attempt all parts. I will throw away/scale down your worst problem(s) if you answer more than 120 points worth. Your answers should be concise – short and to the point, but including the important technical issues. Be specific. Clearly state any assumptions. Good luck!

**Problem 1:** (12 points) Describe three important concepts that you learned in this class. Explain why they are important. This problem will be graded based on the importance of your selection and your explanation.

**Problem 2:** (20 points) Provide brief explanations to the following terms and how they are used:

1. Leaky bucket
2. Random Early Discard (RED) Routers
3. Congestion *Avoidance*
4. Deployment Barrier
5. Differentiated Services

**Problem 3:** (20 points) Briefly explain how the following schemes work and why they are beneficial

1. Slow start
2. Fast retransmit
3. Subnetting
4. PIM

**Problem 4:** (25 points) Provide brief explanations to the following:

- You just bought and installed a new machine. You acquire an IP number for it and want to assign it a FQDN (cyberia.cc.binghamton.edu).
  (a) (4 points) How is your machine’s name added to the DNS system?
  (b) (6 points) If someone in California wants to access your machine knowing only the FQDN, how is that accomplished? Is there a difference if they access the machine again soon?
  (c) (9 points) Suppose your machine has a dynamic IP address obtained using DHCP. Is it possible to give it an FQDN? What would be needed?
  (d) (6 points) Suppose your machine has a private IP address (behind a NAT box). Does it make sense to give it an FQDN?
**Problem 5:** (28 points) Answer any 4 of the following questions:
(a) What features of TCP make it suitable to be an end to end protocol?
(b) How is congestion control different from flow control? Can routers assist with flow control?
(c) Can we extend multicast to provide QoS guarantees?
(d) Can we use a link state routing protocol to replace BGP?
(e) Can tunneling help with supporting QoS in a way similar to how Mbone supports multicast?

**Problem 6:** (25 points) This problem is concerned with your second programming project (routing/forwarding simulation).
(a) How many threads and how many sockets did you use in your project; why?
(b) What is the most difficult bug that faced you? How did you solve it?
(c) What is a situation where you had to time your operations (make sure they happen at a certain time/frequency)? How did you accomplish that?
(d) How would you extend your project to do multicast?
(e) How would you extend your project to support QoS?

**Problem 7:** (15 points) Why is the use of network caches widespread? Explain this, as well as how they work, using examples from 3 different protocols (that do 3 different things). Suggest the use of network caches for another protocol of your choice.