Stanford University
Computer Science Department
CS 240 Quiz 2
Winter 2002

This is an open-book exam. You have 50 minutes to answer 8 out of 10 questions. Write all of your answers directly on the paper. Make your answers as concise as possible. Sentence fragments ok.

NOTE: We will take off points if a correct answer also includes incorrect or irrelevant information. (I.e., don't put in everything you know in hopes of saying the correct buzzword.)

Question	Score
1 - 3	
4 - 6	
7 - 8	
9 - 10	
total	

Stanford University Honor Code

In accordance with both the letter and the spirit of the Honor Code, I did not cheat on this exam nor will I assist someone else cheating.

Name and Stanford ID:

Signature:

1. Short-attention-span questions (40 points)
Answer **8 of the following 10 questions** (i.e., skip two). and, in a sentence or two, say *why* your answer holds. Please state any assumptions you make in your answer. (5 points each).

1. The duality paper describes how to map monitor constructs onto message-passing constructs and vice versa. We can do this mapping for errors as well. What would a monitor-level race condition map to in a message-passing system?

2. You rerun the FLASH experiments on a two processor machine. Give two changes in the graphs you might expect to see.

3. Assume we have a router that does exactly three things: (1) receives packets, (2) processes packets, and (3) transmits packets. If we use a 3-CPU multiprocessor and put each of these on a single dedicated CPU, can we still livelock? Are there any other problems with this approach?

4. Give two ways that the MTV music video award webserver could suffer from livelock despite the fact that everyone connects to it using TCP, which is flow-controlled.

5. What is the minimum packet size for a 1 meter, Gbit/second Ethernet and why does it need it? (Assume that light propagates at 2/3 its normal speed of $3 * 10^6 m/s$.) Please either get the answer completely right or explain your calculations.

6. A bus is a network: the CPU sends messages to memory, and memory sends messages to the CPU. From an end-to-end argument perspective what determines how reliable this network has to be?

7. To usher in the new millennium, you rewrite NFS to send operations over TCP instead of UDP. Since TCP provides a reliable byte stream, does it solve the problem that some NFS operations are not idempotent? (Hint: you need to think about more than just lost packets.)

8. As a humanitarian gesture, John H. gives you access to Berkeley's network (you can send arbitrary packets and monitor all network traffic). Give one attack you can do to an NFS client and one attack you can do to an NFS server that would allow you to read, write, or provide arbitrary data.

9. Google's database grew from 100 million to more than 2 billion pages. Name three data structure changes that could have been necessary to support this dramatic increase.

10. Given just the data structures in the Google paper, how could you identify queries that (probably) contained misspelled words?