CS 587 Midterm Exam Spring 2000

March 7, 2000

Your solutions to this exam must be submitted via email prior to 5pm Friday March 10th. Postscript and PDF files are preferred; however, I will accept MS Word documents (please try to avoid the "fast save" option of MS Word).

Important. You should not discuss the contents of the exam with **anyone** (other than the instructor for this class) until the exam period has ended and you are certain that everyone has turned in their exam.

1. (20 points) On page 113, the authors note that the global state collected by the Chandy-Lamport algorithm may not be identical to any of the global states the system actually went through. Using the standard bank account system (where each account is at a different site and has a balance), describe a detailed example where the state recorded does not match any actual state of the system.

2. (5 points) On page 125, the authors claim that system throughput almost doubles when going from $1/(2T+E)$ to $1/(T+E)$. Are they nuts? Explain why the algebra makes sense.

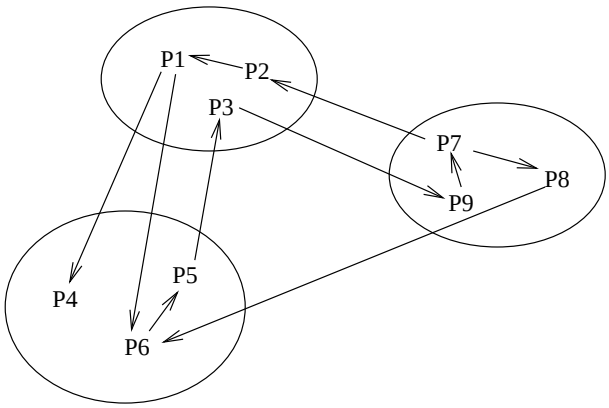
3. (10 points) In Lamport's mutual exclusion algorithm, why is L1 important? Describe an example illustrating a violation of mutual exclusion when L1 is not considered.

4. (10 points) Consider the tree shown in Figure 6.12 of your text. Give a sequence of requests (and allocations) for the token that will transform the initial tree into a tree on which all nodes other than the root are one link away from the root. If this is not possible, explain why it can't be done.

5. (10 points) Repeat the previous problem, this time turning the tree into a list. If this is not possible, explain why it can't be done.

6. (10 points) Write a solution to exercise 7.1.

7. (5 points) Consider the following global wait-for graph. Assuming that process P1 initiates the deadlock detection, show all of the probes that will be generated using the Chandra-Misra-Haas edge-chasing algorithm.



8. (10 points) Give a detailed example that explains the use of the dependent$_k(i)$ array in the Chandra-Misra-Haas algorithm.

9. (10 points) Write a solution to exercise 8.1.

10. (10 points) Write a solution to exercise 8.2.