Name:

CS 6/73201

Final Exam

Advanced OS

Wednesday 9 May 2001

- 1. For each of the following pairs of terms, briefly explain how the two are similar and are different (note that I am **not** asking you to **define** the terms!):
 - a. SIMD, MIMD (5 points)

b. Multiprocessor, multicomputer (5 points)

c. UMA, NUMA (5 points)

d. NUMA, DSM (5 points)

2. Define "connection oriented communication". (5 points)

3. Summarize Lamport's algorithm for distributed mutual exclusion. (25 points)

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4. What is a "false deadlock" and why is it bad to report one? (10 points)

5. Explain how the "probe" message in Chandy, Misra, and Haas' algorithm for distributed deadlock detection follows the path of a circular hold and wait, and thus detects a deadlock. (15 points)

- 6. Two common concurrency control mechanisms for atomic transactions are two-phase locking and strict two-phase locking. The major difference between these two mechanisms is that two-phase locking has a shrinking phase as locks are released, while in strict two-phase locking all locks are held until the transaction completes.
 - a. What problem does this shrinking phase cause in two-phase locking? (10 points)

b. Strict two-phase locking eliminates the shrinking phase to avoid this problem, but eliminating the shrinking phase adds a new problem. Explain. (10 points)

7. With regard to distributed file systems, what is "UNIX semantics"? (10 points)

8. In process migration, three alternatives in transferring the address space are total freeze, pretransfer, and transfer on reference. Briefly explain these three alternatives. (15 points)

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9. Explain how a sender-initiated load distribution algorithm can become unstable at high system loads. (10 points)

10. How does a cluster differ from a distributed system, in terms of architecture, and in terms of tasks for which the system is typically used? (20 points)