CSc 552 Final Exam

December 17, 2002

Name:

SID:

You may not use books, notes, or calculators. You have 2 hours to complete the exam. The number in parenthesis at the beginning of each question indicates the number of points given to the question. Do all work on these sheets, using the backs if necessary.

Problem	Points Scored	Points Possible
1		20
2		10
3		15
4		25
5		15
6		15
Total		100

True or False

1. (20 points) For each of the following statements indicate whether it is true or false, and give a **one-sentence** justification.

(a) The Sprite file system ensures cache consistency during concurrent write-sharing by disabling client caching of the file.

(b) A Multics process must invoke the "make known" system call before it can access a segment.

(c) NFS uses stateless servers to improve file access performance.

(d) The Low-Bandwidth network file system reduces network traffic by using *copy-on-write* to only send the modified bytes of a file to the server.

(e) The Synthesis kernel uses *procedure chaining* to defer handling a signal that arrives during interrupt handling until after the interrupt handler finishes.

(f) Munin provides *release consistency* of shared variables.

(g) In the Andrew file system a user authenticates himself/herself to a Vice server by binding to it using his/her password as the key.

(h) A Plan-9 process has its own private namespace, making it difficult for processes to share files.

(i) The Cooperative File System (CFS) uses a virtual server abstraction to balance loads across physical servers with different capacities.

(j) With Scheduler Activations, a process is given one activation for every thread it creates.

2. (10 points) Describe a scenerio in which using Mach’s external pagers can cause a deadlock.

3. (15 points) Suppose Bob wants to read the file */foo/bar/baz.txt* that Alice has stored on CFS. He wants to be sure that the file was created by Alice, and Charlie has not modified it. Describe how CFS enables Bob to do this.

4. (25 points) For each of the following scenerios, describe how it is handled in the NFS, Sprite, and AFS file systems, and whether or not it is possible for applications to read stale data.

(a) A source file is compiled on one client immediately after being edited and saved on another.

(b) One client opens and continually writes to a log file (keeping it open), while another client opens and reads from it.

(c) Two clients simultaneously open, write, and close the same file.

(d) One client deletes a file while another client is reading from it.

5. (15 points) What is the difference between *idempotent* and *non-idempotent* operations? Give an example of each. Why is this distinction important to *at-least-once* vs. *at-most-once* RPC semantics?

6. (15 points) LFS originally used a greedy cleaning policy, choosing to clean the segment containing the fewest live bytes. Surprisingly, this was found to lead to poor cleaning performance (high write cost). Explain why.