

NAME: \_\_\_\_\_ (FIRST NAME FIRST) SCORE: \_\_\_\_\_

**COSC 6360**

**FINAL EXAMINATION**

**DECEMBER 9, 2005**

This exam is **closed book**. You can have **two pages** of notes. UH expels cheaters.

1. Which of the following statements are *true* or *false* (2 points) and *why*? (3 points)
- a) A journaling file system keeps a log that records all write operations until they are committed to disk.  
TRUE, this log is also called the journal.
  - b) The FFS file system stores its *i- node map* into contiguous blocks.  
FALSE, FFS has no use for an i-node amp as its i-nodes occupy fixed locations..
  - c) Coda uses *stateless servers*.  
FALSE, they maintain callbacks..
  - d) Sun NFS servers trust their *clients*.  
TRUE, they assume that clients can authenticate users.
  - e) BSD-LFS assumes that the disk controller will *never reorder* write requests.  
FALSE, Sprite-LFS does that.
  - f) If two replicas of a Coda file have the *same LSID* then they must be *identical*.  
TRUE, the LSID uniquely identifies a file version.

2. You have been selected to decide between RAID-1 and RAID-5 organizations for a research group department and are told that the proposed RAID-5 system will consist of five disk drives forming a single stripe.
- a) How many disk drives would be needed to build a RAID-1 system having the same capacity as that RAID-5 system? (5 easy points)

Answer:   8   drives

- b) How many I/O operations would be needed to update a single block in either system assuming that we do not have in memory the old value of the block (4x5 easy points)  
With the RAID-1 system, it would take  0  reads and  2  writes  
With the RAID-5 system, it would take  2  reads and  2  writes
- c) Somebody joining the discussion points out that more than 70 percent of the disk workload consist of sequential accesses to huge video files that occupy 80 percent of the total disk space. How would this observation affect your *final recommendation*? (2x5 points).

**It would induce me to recommend a RAID- 5  organization because**

- i) It would require much less disk space than a RAID-1 organization.
- ii) It would implement large reads and large writes in an efficient fashion.

3. Consider a hypothetical file system storing each i-node in a *separate block* while still storing multiple directory entries in the same block. How would that change affect an implementation of *soft updates* for that file system? (10 points)

It would eliminate circular dependencies.

4. What is the main problem with the Sun NFS *lookup* call? (5 points) What does NSF do to alleviate this problem? (5 points)

a) **The main problem with the NSF lookup call is that most open systems call will require several lookup calls.**

b) **To alleviate this problem NSF lets clients cache the replies to their recent lookup requests.**

5. What is the main advantage of Coda *callbacks*? (5 points) What does a Coda server do when one of its callbacks get lost? (5 points) What does the client do to detect this situation? (5 points)

Coda callbacks reduce the number of cache validation requests the Coda server must reply to since clients that have a callback on a specific file assume that their cached copy of the file is valid.

When one of its callbacks has been lost, the server acts as if the callback had reached the client that was counting on it.

To detect this situation, clients call their server every *tau* minutes to check whether it received all callbacks it should have received