NAME: _____ (FIRST NAME FIRST) **SCORE**: ____

COSC 6360 FINAL EXAMINATION MAY13, 2009

THIS EXAM IS **CLOSED BOOK**. YOU CAN HAVE TWO PAGES OF NOTES. UH EXPELS CHEATERS.
PLEASE ANSWER **EACH PART** OF EACH QUESTION

1. How does LBFS define and recognize chunks? (10 points)

See paper.

2. How do Zyzzyva clients participate in Byzantine agreements? (10 points)

See paper.

3. Which purpose does the CRUSH function of the Ceph distributed file system serve? (5 points) How does it simplify the design of the Crush metadata cluster? (5 points)

This paper is not anymore on the reading list.

4. According to the authors of Swift, which rules should a secure system enforce to guarantee the security of its information? (2×5 points)

5. What is a ***lease***? (5 points) Explain how replacing callback by leases would improve the AFS file system. (5 points) Would the proposed change have the same effect on the Coda file system? (5 points)

A lease is a contract between the server and the clients of a distributed file system giving to these clients exclusive read/write or shared read access to one or more files for a specific time interval (the duration of the lease). If one or more other clients want to access the data in a way that is incompatible with a current lease, the server will contact all leaseholders or wait until the lease expire before granting new leases. Replacing callbacks by leases in AFS would eliminate the inconsistencies caused by lost callbacks and would implement true close-to-open consistency. Replacing callbacks by leases in CODA would prevent clients to operate in clients could not operate anymore in disconnected mode because they would be unable to obtain leases or renew them for the files they want to access.

6. How does NFS implement the following UNIX code fragment:

```
fd = open("/tmp/Re009778", O_RDWR | O_CREAT, 0600)
// create a temporary file with permission rw-------
unlink("/tmp/Re009778");
… // keep accessing the file;
close(fd); // delete the file
```

(3×5 points)

NFS will create the file if it does not exist already, rename it and delete the renamed file at close time.

T: ____

7. Which actions does FARSITE take when the owner of a file grants or revokes access to a given file? (2×5 points) How is the effect of a revoke different of that of the same revoke on a conventional UNIX system? (5 points) What could FARSITE do to eliminate that difference? (5 points)

When the owner of a file grants access to the file to another user, FARSITE encrypts a copy of the file key with the public key of the new user. When that access is revoked, FARSITE deletes that copy. This means that the user whose has lost the right to access the file could still be able to read it if he/she has kept a copy of the file key on his/her own workstation. Implementing the semantics of a UNIX access right revocation would require encrypting the file with a new key.

8. The designers of the Blue File System claim that their system uses a ***dynamic storage hierarchy***. What do they mean? (5 points) What is the main advantage of this approach? (5points) (***Hint:*** *there are two good answers to this part of the question.*)

See paper.