

**CMSI 387**  
**OPERATING SYSTEMS**  
Spring 2007

## Assignment 0419

This assignment is meant to get your hands nice and dirty with a specific Linux file system.

### Not for Submission

Read Chapters 10 and 11 in SGG.

### For Submission

This assignment requires that you perform operations that are normally reserved for a superuser. So you'll need to do this on a Linux machine over which you have *su* permissions — either a machine of your own, or a machine in the Keck lab that has been approved/designated for this purpose.

If you choose the latter, you can boot that machine directly from an Ubuntu Edgy Live CD (the Keck lab has one, or you can make one yourself) and do this work within that session.

Perform the following tasks, then submit the final annotated hex dump on hardcopy:

1. Find out how to create and mount an *ext2* or *ext3* disk image file in Linux.
2. Create the smallest possible disk image file on which a fully-functional *ext2* or *ext3* file system can be installed.
3. Install an *ext2* or *ext3* file system on that disk image file.
4. Mount the file system (this is where you need those superuser permissions).
5. Create the following items within that mounted file system:
  - a. A non-empty text file at the top-level directory of the file system
  - b. A directory at the top-level directory of the file system
  - c. A second non-empty text file inside that subdirectory (give it different content so you can differentiate the two files)
  - d. A symbolic link inside that subdirectory to the text file in the top-level directory
  - e. A hard link from the top-level directory to the text file in the subdirectory
6. Unmount the file system, then use *hexdump -C* to display the raw bytes and characters on the disk image file.
7. Print out the hex dump, and annotate it to identify these items:
  - a. The disk image's superblock
  - b. The directory entries for the files, links, and directories that you created
  - c. Where applicable, the inodes for the items that you created
  - d. Where applicable, the data blocks occupied by these items