

# OS Qual Fall '03

September 9, 2003

1. Explain the operation of a “system call.” For example, when a program calls the `read(2)` system call, what code is it really invoking, and what does this code do?
2. Many file systems use the bitmap as the data structure (whether in-memory or on-disk) for tracking free and allocated disk blocks. Why? That is, what advantages does the bitmap provide that other data structures for storage allocation don't provide?
3. (a) Explain the operation of the UNIX password encryption algorithm.  
(b) What is the purpose of the “salt” in this algorithm?
4. In a file system based on inodes, how many disk references are needed to list the contents of the directory `/home/djd/bin` if `djd` is a symbolic link to `/u/faculty/cs/djd`? Assume that there are no other symlinks, and that the superblock and the inode for the root—but nothing else—have already been read and cached. Justify your answer and state any assumptions you make.