ECE329 HW #3

Augment your UNIX shell with the following commands:

- *mv file1 file2*
  renames a file.
- *cp file1 file2*
  duplicates a file. If the first character of *file1* or *file2* is *#*, then the filename describes an actual file on the hard disk using either a relative or absolute path. Example: *cp #a.txt b.txt* copies an actual file named *a.txt* on the Windows hard disk to a file in the simulated file system named *b.txt*.
- *more file*
  prints the contents of a file.

Your file system should consist, in order, of

- a 512 kB unused boot block
- a super block that specifies the number of i-nodes in the list (i.e., the maximum number of files that the file system can handle)
- an i-node list (i.e., an array of i-nodes, one per file). Each i-node should contain a valid bit, the file name, owner, permissions, last modified date, and size, along with an indicator of the location of the actual file data. If the valid bit is 0, then the other fields are ignored.
- file data

For simplicity, the data for each file may be contiguous. To access the contents of a file, your software should provide the following interface, where `sfs` means "simulated file system":

```
// Opens a file for reading (mode='r') or writing (mode='w') and
// returns a file descriptor.  Returns -1 upon error.
int sfsOpen(const char* filename, char mode);

// Reads a number of bytes from an open file into a buffer,
//    returning the number of bytes successfully read.
// Returns -1 upon error.
int sfsRead(char* buffer, int nbytes, int file_descriptor);

// Writes a number of bytes from a buffer into an open file,
//    returning the number of bytes successfully written.
// Returns -1 upon error.
int sfsWrite(const char* buffer, int nbytes, int file_descriptr);
```

Hint: The following library routines may be helpful: fopen, fclose, fwrite, fread, ftell, fseek, and rewind (all in stdio.h)

Separately, answer the following problems in Chapter 2 of the Tanenbaum textbook: 18, 20, 21, 23, 27, and 32 (erratum: *put_forks* is in Figure 2-33).