University of Texas at Dallas--Computer Science Department

CS 5348 Operating Systems Concepts Fall 2021

Project 2-Part 1

V6 file system is highly restrictive. A modification has been done: Block size is 1024 Bytes, i-node size is 64 Bytes and i-node's structure and directory entry struc have been modified as well and given below:

```
typedef struct {
  int isize;
  int fsize;
  int nfree;
  unsigned int free[251];
  char flock;
  char ilock;
  char fmod;
  unsigned int time;
} superblock_type; // Block size is 1024 Bytes; only 1023 Bytes are used

superblock_type superBlock;

// i-node Structure

typedef struct {
unsigned short flags;
unsigned short nlinks;
unsigned int uid;
unsigned int gid;
unsigned int size0;
unsigned int size1;
unsigned int addr[9];
unsigned int actime;
unsigned int modtime;
} inode_type; //64 Bytes in size


typedef struct {
  unsigned int inode;
  char filename[28];
} dir_type;//32 Bytes long
```

Flags field has a small change: bits 1, b, c are as before. Bits d and e are to represent if the file is small/medium/long/super long file (00 = small file, 01=medium, 10=long and 11 = super long file). Bit f is for set uid on execution and bit g is for set gid on execution. Other bits remain the same.

If file is small addr[9] has 9 direct block addresses. If file is medium, addr[9] has addresses of 9 single indirect blocks. If file is large, each element of addr[] is address of a double indirect block. If file is super long, each element of addr[] is address of a triple indirect block.

You need to develop a program called mod-v6.c (or mod-v6.cc) that implements the following three commands in C/C++:

1. openfs file_name

   In this case, file_name is the name of the file in the native unix machine (where you are running your program) that represents the disk drive.

2. initfs n1 n2
   where n1 is the file system size in number of blocks and n2 is the number of blocks devoted to the i-nodes. In this case, set all data blocks free (except for one data block for storing the contents of i-node number 1, representing the root, which has the two entries . and .. All i-nodes except i-node number 1 are (unallocated) set to free. Make sure that all free blocks are accessible from free[] array of the super block. One of the data blocks contains the root directory's contents (two entries . and ..)
3. q
   Quit the program

Some useful Unix system calls: lseek(), read(), write(), open()

This project must be done in C/C++ only.

Due date: Nov 10, 2021 11:55 pm.