



Filesystem Writeup

04.27.2022

Group Eta (github: [oliviercm](https://github.com/CSC415-2022-Spring/csc415-filesystem-groupeta) <https://github.com/CSC415-2022-Spring/csc415-filesystem-groupeta>)

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Filesystem Description

Our filesystem is loosely based on the Linux filesystem.

Filesystem volumes are defined by a volume control block containing a hardcoded constant for filesystem volume identification (magic number), volume block size and count, and the locations of the root directory and free space map. The volume control block is always at the beginning of the volume.

Each volume has a free space map which is used to track which blocks of the volume are in use, which takes the form of a bitmap where bits and blocks are represented in a 1-to-1 fashion such that the first bit represents the usage state of the first block, the second bit represents the second block, etc. The free space map is always stored directly after the volume control block.

Volumes always have a root directory which cannot be deleted, which is always stored directly after the free space map on volume.

Directories and files are stored as structures called directory entries where each directory entry contains a name, size in bytes, block location on volume, whether the entry is a file/directory/uninitialized, and other metadata such as creation/last modification time. Directories and files can be stored in various locations in the volume. Directories are stored as groups of directory entries, and files are stored on volume with a directory entry pointing to its location on volume.

Our filesystem provides an interface with the following functions:

- Make directory
- Remove directory
- Open directory (get directory descriptor)
- Read directory (get contained file and directory information)
- Close directory
- Get current working directory
- Set current working directory
- Check path type (is file, is directory)
- Delete file
- Move file

An interface is also provided for file input/output:

- Open file

- Read file
- Write file
- Seek file
- Close file

Issues Encountered

The largest issue encountered was a lack of team participation. Members of the team were not able to participate due to lack of confidence, or other unknown reasons.

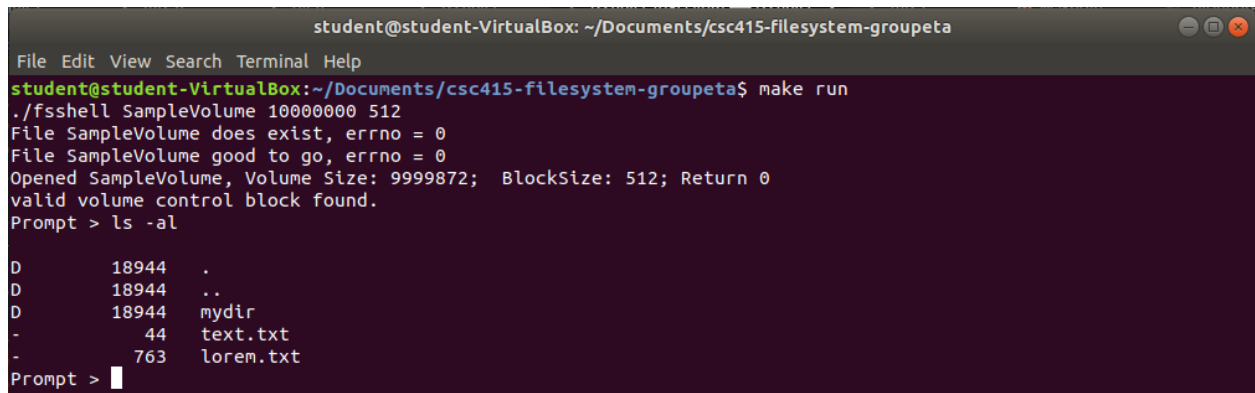
Driver Program Description

The driver program is unchanged from how it was provided except for two changes:

1. All commands were enabled (by changing macros from 0 to 1)
2. The "mv" command was implemented using the filesystem interface.

Screenshots

ls



```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > ls -al
D      18944  .
D      18944  ..
D      18944  mydir
-       44    text.txt
-       763   lorem.txt
Prompt > 
```

cp

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > ls

mydir
text.txt
lorem.txt
Prompt > cp text.txt copied.txt
opening file
got file descriptor 0
found file text.txt
returning file descriptor 0
opening file
got file descriptor 1
found file copied.txt
returning file descriptor 1
closing file at block 80
closing file at block 83
Prompt > ls

mydir
text.txt
lorem.txt
copied.txt
Prompt > █
```

mv

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > ls

mydir
text.txt
lorem.txt
Prompt > mv text.txt moved.txt
moving file...
Prompt > ls

mydir
moved.txt
lorem.txt
Prompt > █
```

md

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > ls

mydir
text.txt
lorem.txt
Prompt > md newdir
creating directory...

Name: .
Size: 18944
Block location: 84
Is directory: 1
Created at: 1651059425
Modified at: 1651059425
Accessed at: 1651059425

Name: ..
Size: 18944
Block location: 6
Is directory: 1
Created at: 1651056566
Modified at: 1651056566
Accessed at: 1651056566
Prompt > ls

mydir
text.txt
lorem.txt
newdir
Prompt > 
```

rm

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > ls

mydir
text.txt
lorem.txt
Prompt > rm text.txt
removing file...
Prompt > ls

mydir
lorem.txt
Prompt > 
```

cp2l

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > cp2l lorem.txt lorem.txt
opening file
got file descriptor 0
found file lorem.txt
returning file descriptor 0
closing file at block 81
Prompt > 
```

cp2fs

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > cp2fs text.txt text.txt
opening file
got file descriptor 0
found file text.txt
returning file descriptor 0
closing file at block 84
Prompt > 
```

cd, pwd

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
valid volume control block found.
Prompt > pwd
/
Prompt > cd mydir
Prompt > pwd
/mydir
Prompt > 
```

history, help

```
student@student-VirtualBox: ~/Documents/csc415-filesystem-groupeta
File Edit View Search Terminal Help
student@student-VirtualBox:~/Documents/csc415-filesystem-groupeta$ make run
./fsshell SampleVolume 10000000 512
File SampleVolume does exist, errno = 0
File SampleVolume good to go, errno = 0
Opened SampleVolume, Volume Size: 9999872; BlockSize: 512; Return 0
Valid volume control block found.
Prompt > ls -a
.
..
mydir
text.txt
lorem.txt
Prompt > cd mydir
Prompt > help
ls      Lists the file in a directory
cp      Copies a file - source [dest]
mv      Moves a file - source dest
md      Make a new directory
rm      Removes a file or directory
cp2l    Copies a file from the test file system to the linux file system
cp2fs   Copies a file from the Linux file system to the test file system
cd      Changes directory
pwd     Prints the working directory
history Prints out the history
help    Prints out help
Prompt > history
ls -a
cd mydir
help
history
Prompt > 
```