

GTU Department of Computer Engineering
CSE 312 – Spring 2024
Homework 2 Report

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1. Part1 and Part2 Report

- SuperBlock Structure

```
// superblock that contain
typedef struct {
    int block_size;
    int number_of_blocks;
    int root_dir_pos;
    int fat_pos;
    int data_pos;
} SuperBlock;
```

• Directory Table and Entries:

Stored in the root_dir array, each entry represented by a DirectoryEntry structure containing fields like filename, extension, file_size, etc.

```
typedef struct {
    uint8_t filename[MAX_FILENAME];
    uint8_t extension[MAX_EXTENSION];
    uint8_t file_size[FILE_SIZE_BYTES];
    uint8_t password[MAX_PASSWORD];
    uint8_t first_block_number[FIRST_BLOCK_NUMBER];
    uint8_t last_modified_date[LAST_MODIFIED_DATE];
    uint8_t last_modified_time[LAST_MODIFIED_TIME];
    uint8_t creation_date[CREATION_DATE];
    uint8_t creation_time[CREATION_TIME];
    uint8_t file_attributes[FILE_ATTRIBUTES];
    uint8_t file_type[FILE_TYPE];
} DirectoryEntry;
```

• Free Blocks Management:

Managed using the fat array where 0x000 indicates a free block and 0xFFFF marks the end of a file.

• Arbitrary Length File Names:

Currently supports the 8.3 filename format; can extend to longer names using multiple directory entries.

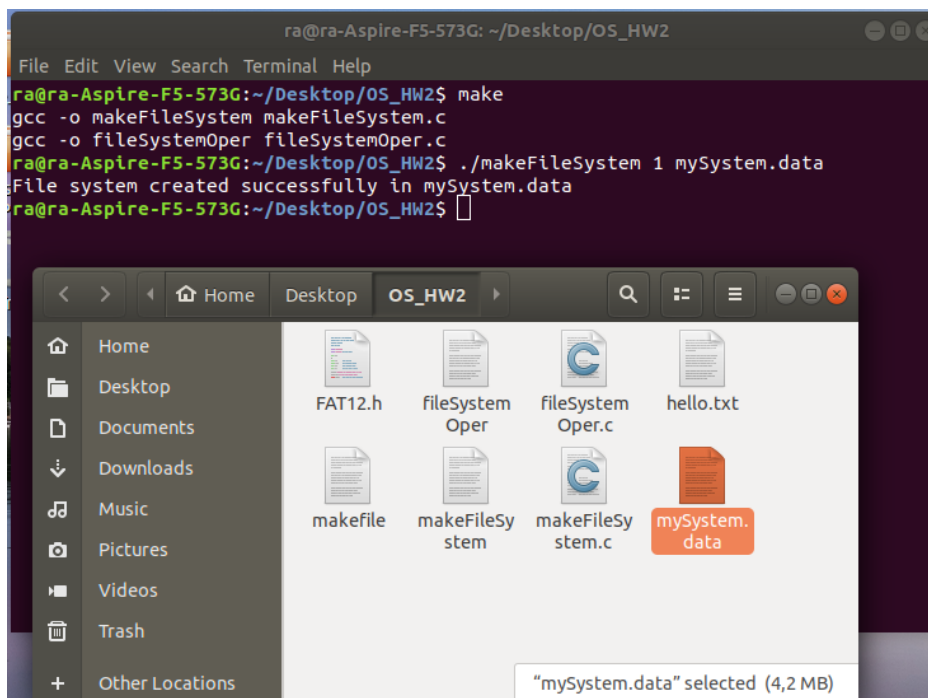
- **Permissions Handling:**

Managed via the file_attributes byte in DirectoryEntry, with bits representing read-only, write, and other permissions.

- **Password Protection:**

Implemented using the password field in DirectoryEntry to control access based on a 5-character password.

We can create mySystem.data file like this:



Where the second argument is the block size. We can see if we provide 1 as block size, the file size is 4.2mb.

2. Part 3 Report and Running Results

2.1 Dir command

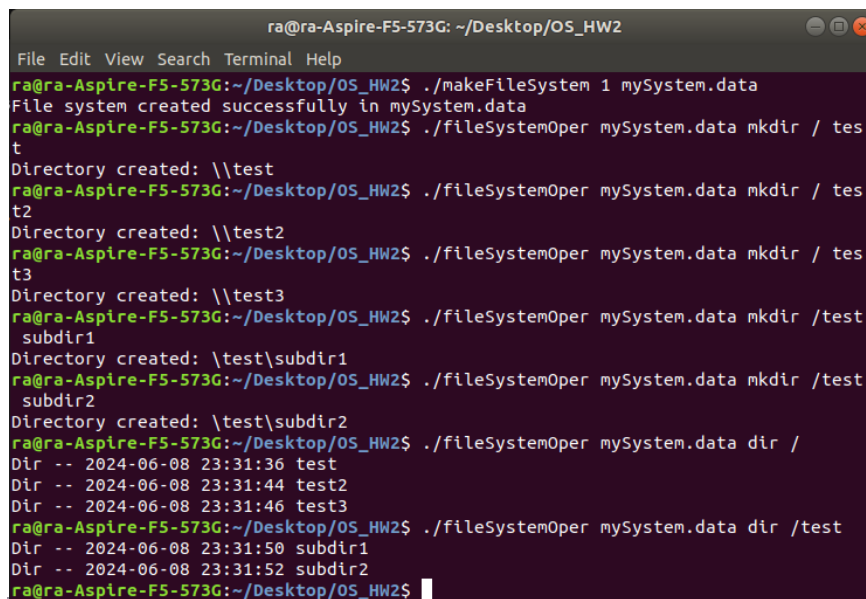
```
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data dir /
Dir -- 2024-06-08 23:11:16 test
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$
```

Lists the contents of the directory. A simple folder was created for the sake of example in this output.

Relevant function in my code:

```
void list_directory(FileSystem *fs, const char *path)
```

2.2.1 mkdir command



```
ra@ra-Aspire-F5-573G: ~/Desktop/OS_HW2
File Edit View Search Terminal Help
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./makeFileSystem 1 mySystem.data
File system created successfully in mySystem.data
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data mkdir / tes
t
Directory created: \\test
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data mkdir / tes
t2
Directory created: \\test2
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data mkdir / tes
t3
Directory created: \\test3
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data mkdir /test
subdir1
Directory created: \\test\\subdir1
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data mkdir /test
subdir2
Directory created: \\test\\subdir2
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data dir /
Dir -- 2024-06-08 23:31:36 test
Dir -- 2024-06-08 23:31:44 test2
Dir -- 2024-06-08 23:31:46 test3
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data dir /test
Dir -- 2024-06-08 23:31:50 subdir1
Dir -- 2024-06-08 23:31:52 subdir2
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$
```

As we see, my mkdir command works properly. It can create directories under root dir. It can also create subdirectories.

Relevant function in my code:

```
void create_directory(FileSystem *fs, const char *path, const char *dirname)
```

2.2.2 rmdir command

```
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data dir /
Dir -- 2024-06-08 23:31:36 test
Dir -- 2024-06-08 23:31:44 test2
Dir -- 2024-06-08 23:31:46 test3
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data dir /test
Dir -- 2024-06-08 23:31:50 subdir1
Dir -- 2024-06-08 23:31:52 subdir2
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data rmdir / test2
Directory removed: \test2
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data rmdir / test3
Directory removed: \test3
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data dir /
Dir -- 2024-06-08 23:31:36 test
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$
```

Rmdir command successfully removes the specified directory.

Relevant function in my code:

```
void remove_directory(FileSystem *fs, const char *path, const char *dirname)
```

2.3 dumpe2fs command

```
ra@ra-Aspire-F5-573G:~/Desktop/OS_HW2$ ./fileSystemOper mySystem.data dumpe2fs
File System Information:
Block Count: 8192
Block Size: 1024 bytes
Occupied Blocks: 5
Free Blocks: 8187
Number of Files: 0
Number of Directories: 1

Occupied Blocks Information:
Block 0: test.
```

This command lists block count, free blocks, number of files and directories, and block size.

Relevant function in my code:

```
void dump_file_system_info(FileSystem *fs)
```