

Gebze Technical University
Department of Computer Engineering
CSE 312
Operating Systems Summer
2024

HW2
Due Date: Aug 31st 2024
No late submissions
File Systems

In this project, you will design and implement a simplified CDROM file system in C or C++ as described in Section 4.5.3 of your textbook.

Part 1

Design a file system that uses CDROM structure to keep your files. Your file system will use the directory structure defined in figure 4-35 of the textbook. No extended entries, CD#, interleave, etc. fields will be used. Your file attributes will include size, date and time, location of the file. Write a design report that specifies the following

- Define your directory structure and directory entries;
- Define your superblock that contains crucial information about the file system such as the block size, root directory position, block positions, etc.

Your report should include the function names of your source code that handles the file system operations listed in the table of Part 3.

Part 2

Write a C/C++ program that creates an empty file system as a (16 MB max) Linux file. This file will include all the information about your file system including the super block, data blocks, directories, data, etc. The sample run of the program will be like

```
makeFileSystem 4 mySystem.dat /ysa/start
```

where 4 is the block size of the file system in KB. **mySystem.dat** is the Linux file that contains all the file system. **mySystem.dat** is the root of the Linux directory all of which you will copy to the CDROM file system. Note that CDROMs are write once mediums, once you write them there is no way to modify the file system. So, all the writing has to be done in this step. When you work on the file system, the file **mySystem.dat** contains all the information for the file system.

Part 3

You will write a program that performs file system operation on the file system. The program will work like following

```
fileSystemOper mySystem.dat operation parameters
```

where **fileSystemOper** is your program, **mySystem.dat** is the file system data file that you have created in Part 2. You will keep accessing the same **mySystem.dat** file for all your operations. Allowable operations and parameters for these operations are given below in the following table. Note than none of the operations are modification or remove operation.

Operation	Parameters	Explanation	Example
dir	Path	Lists the contents of	<code>fileSystemOper mySystem.dat dir ""</code>

		the directory shown by path on the screen.	lists the contents of the root directory. The output will be similar to dir command of DOS
dumpe2fs	None	Gives information about the file system.	<pre>fileSystemOper mySystem.dat dumpe2fs</pre> <p>works like simplified and modified Linux dumpe2fs command. It will list block count, number of files and directories, and block size. <u>Different from regular dumpe2fs, this command lists all the occupied blocks and the file names for each of them.</u></p>
read	Path and file name	Reads data from the file	<pre>fileSystemOper mySystem.dat read "\ysa\file" linuxFile</pre> <p>Reads the file named file under <code>"/usr/ysa"</code> in your file system, then writes this data to the Linux file. This again works very similar to Linux copy command.</p>

Here is a sequence file system operation commands that you can use to test your file system. Suppose you have a file named linuxFile.data in your Linux current directory.

```
makeFileSystem 4 mySystem.data /ysa/start; you may change 4 to a reasonable value
fileSystemOper mySystem.dat dir "/"
fileSystemOper mySystem.dat dumpe2fs
fileSystemOper mySystem.dat read "/usr/file2" linuxFile2.data
```

Notes

1. Always be careful about the errors, such as bad block sizes, bad file names, non-existent files or directories, etc.
2. Run experiments that uses up all of your data blocks.
3. Try to get fragmentation and show your fragmented file system using the `dumpe2fs` command.
4. Do not use any code from any other source even a single line!

General Homework Guidelines

1. No cheating, No copying, No peaking to other people homework
2. Follow the instructions very carefully.
3. Submit required files only. Do not share your whole file system with us.
4. If you fail to implement one of the requirements, leave it be. Do not send an empty file
5. Respect the file names! Our HW grading is case-sensitive.
6. Failing to comply any of the warnings above will result in getting a **0** for your current homework.

Homework Instructions

1. Download and Install Vmware Player from Official site.
2. Download and install our virtual machine from HW2