CSC3320 System Level Programming
Lab Assignment 3 (Post-Lab)

Due at 11:59 pm on Friday Feb. 5th, 2021

Instructor : Fil Rondel

Purpose: Learn how to set permissions for the files and directories. Practices on editing a file via the vi editor.

Note: Please follow the instructions below step by step, and then write a report by answering the questions and upload the report (named as Lab3_FirstNameLastName.pdf or Lab3_FirstNameLastName.doc) to Google Classroom, under the rubric Lab 3 Out-of-lab Assignment.

Please add the lab assignment NUMBER and your NAME at the top of your file

sheet.

Part 1: VI Editing - Small file

Open your terminal and connect to snowball server. Change your directory to your home directory (cd ~), and then create a new directory named as "Lab3" (mkdir Lab3). After that, go to directory Lab3 (cd Lab3) and please download the file "Try.c" (content shown in table below) by the following command (internet access required):

```
cp /home/frondel1/Public/Try.c Try.c
```

Be sure it succeeds using "ls" to see the file name "Try.c" listed.

```
//Try.c

#include <stdio.h>
#include <stdlib.h> /* For exit() function */
int main(int argc, char *argv[]) {


FILE *fptr;
fptr=fopen("program.txt","a+");
if(fptr==NULL){
printf("Error!");
exit(1);
}

fprintf(fptr,"program is written");
printf("program is written in program.txt");
fclose(fptr);
return 0;

}
```

Try the following steps by issuing some commands in your vi editor 1) Open "Try.c" with vi editor

$vi Try.c

2) Move cursor to the beginning of “Error!”

use UP DOWN LEFT RIGHT arrow to control cursor

3) Insert “xxx”.

i

type “xxx” (hit x three times)

4) Append a blank line after the current line.

Hit Esc to command mode

o (lowercase o)

5) Delete “xxx”.

Hit Esc to command mode.

Move cursor to the beginning of "xxx", press x three times or press 3s to delete "xxx"

6) Copy the first 2 lines, move cursor to the beginning of file, and then paste it after current line

:1,2y

:0

p

7) Delete the first 2 lines

:1,2d

8) Save it

:w

9) Replace all "fptr" with "FPTR"

:1,$s/fptr/FPTR/g

10) Save and exit.

:wq

Part 2: VI Editing - Large file

1) Go into your Lab3 directory.
$cd ~/Lab3

2) Copy "RealEstate.csv" from the instructor's public directory to your Lab3 directory again.
$cp /home/frondel1/Public/RealEstate.csv .

Please write the commands you will issue to complete the following tasks and answer corresponding questions step by step in your report.

3) Use vi to open “RealEstate.csv”.

vi RealEstate.csv

4) Move the cursor to the last line (without knowing the number of the

last line).

Esc + G

5) Display line number.

1. Press the Esc key to switch to command mode.
2. Type :set number and press Enter

6) Search for the transaction for the estate located at "111 EAST"

/111 EAST

Which line is this string located? (Please just write down the line

number)

Line Number: 896

Delete this line.

dd

7) Move the cursor to the line 50.

:50

8) Substitute all comma "," with colon ":" from line 50 to line 54.

:50,54s/,/:/g

9) Copy line 50 to line 54 to the end of file.

:50,54y

:$

p

10)Remove line 50 to line 54.

:50,54d

11) Describe how to enter the text mode and insert a new line "Recorded in year 2008" between line 1 and line 2.

- Press Esc to enter 'command mode'
- :0
- Press o (Now you made a blank line between the original line 1 and 2, also you are in insert mode now)
- Now type in “Recorded in year 2008”

- Then hit Esc

12) Switch back to command mode.

Press Esc

13) Save the file and quit vi.

:wq

Part 3: Permissions for files

Follow the instructions step by step and finish the questions as required.

1) Go into your Lab3 directory.

$cd ~/Lab3

2) Check the file permissions for file "Try.c" in your own Lab3 directory. $ls -l Try.c

3) You may see similar output as below, in which rw-rw-r-- of the first field is the file permission string for "Try.c".

```
[frondel1@gsuad.gsu.edu@snowball Lab3]$ ls -l Try.c
-rw-rw-r--. 1 frondel1@gsuad.gsu.edu frondel1@gsuad.gsu.edu 379 Jan 28 11:57  Try.c
```

- The leftmost 3 characters rw- tells us that the user (owner of the file) can only read and write the file.
- The middle 3 characters rw- tells us the other users in the same group as the owner can only read and write the file.
- The last 3 characters r-- tells us the other users in the other groups different from owner can only read the file.

Note: once you copy a file from other directory or download a file from other resources, you are the owner of the new copied or downloaded file.

4) Remove the read permission for the owner (yourself).

$chmod u-r Try.c

5) Check the file permissions for file "Try.c" again.

$ ls -l Try.c

6) You may see similar output as below, in which -w-rw-r-- of the first field is the file permission string for "Try.c".

```
[frondel1@gsuad.gsu.edu@snowball Lab3]$ ls -l Try.c
--w-rw-r--. 1 frondel1@gsuad.gsu.edu frondel1@gsuad.gsu.edu 379 Jan 28 11:58  Try.c
```

So -w- in the leftmost 3 characters tells us that the user (owner of the file) only has the permission to write something into the file.

7) Try the vi editor again to modify the file.

$vi Try.c

8) However, you may find the following message displayed at the bottom of the screen which means you do not have the right to read "Try.c".

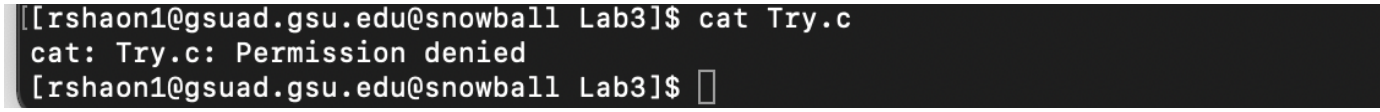
9) Quit vi editor.

:q

10) Try reading "Try.c" again using cat.

$cat Try.c

Attach a screenshot of the output.



11) Use chmod with an octal number to let all the users only have read permission for "Try.c".

$chmod 444 Try.c

Note: The permission string to be set should be r--r--r--. Convert each group of three characters into decimal to form an octal number, which should be 444.

12) Check the file permissions for file "Try.c" again. And explain the meaning of each character in the file permission string.

ls -l

Well r--r--r-- means that it gives permission for the owner (first r leftmost) to read the file, the group (the middle r) can read the file, and others (the rightmost r) can read the file. So basically everyone has permission to read this file right now.

13) Try the vi editor again to modify the file. Then remove one line by pressing dd $vi Try.c

Move your cursor to some line and press dd

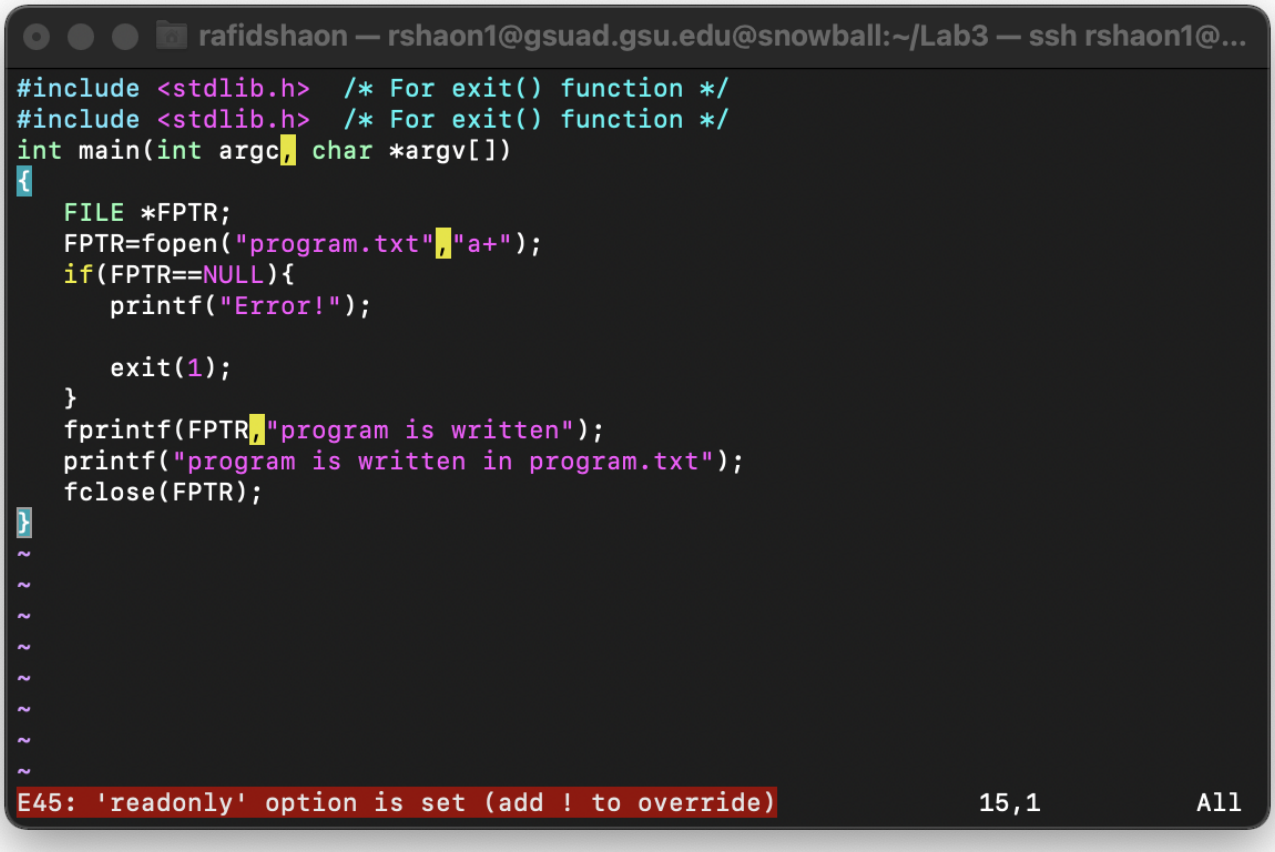
14) Try to save the file in the vi editor.

:w

15) Can you find some error message at the bottom of the screen? If yes, what is it and how to quit the vi editor without saving the modification.
Write an answer in your answer sheet.

Yes!

Since the user can only read from the file, writing to it is prohibited. So when one attempts to write the file, the following error will show.



To quit without saving, the command is **:q!**

16) Use chmod to add write the permission to all the users for "Try.c". Write an answer in your answer sheet.

To add write permission to all users, the command is **chmod ugo+w Try.c** . Here u represents user, g represents users in the same group and o represents other users in other groups. +w add write permission to all three channels.

17) Check the file permissions for file "Try.c" again. And explain the meaning of each character in the file permission string.
Write an answer in your answer sheet.

ls -l

The file permission is: **rw-rw-rw-**

It states that,

Leftmost three characters: The user (owner) has read and write permission.

Middle three characters: All users in the same group as owner of the file have read and write permission.

Rightmost three characters: All other users in other groups have read and write permission.

Part 4: Permissions for directories

The permissions also work for the directories. However, the permissions for the directories may have different behaviors.
Let us learn the permissions for directories by only changing different permissions to the owner of the file.

1) Go to your home directory and then check the permissions for directory Lab3. $cd ~
$ls -ld ~/Lab3
Note: -d option will let you check the detailed information for the directory instead of its contents.

2) You may see a similar output as below, in which the rwxrwxr-x of the first field is the permission string for directory Lab3.

drwxrwxr-x. 4 frondel1@gsuad.gsu.edu frondel1@gsuad.gsu.edu 4096 Jan 28 11:58 /home/frondel1/Lab3

3) Use chmod with an octal number to forbid all permissions to all users. $chmod 000 ~/Lab3

4) Check the permissions for directory Lab3. You may see similar output as below. The permission string is changed to ---------.

d---------. 4 frondel1@gsuad.gsu.edu frondel1@gsuad.gsu.edu 4096 Jan 28 11:59 /home/frondel1/Lab3

5) Finish the following tasks and fill out the blanks in the row for owner's permission "---" in the table below. If the task or command can be executed successfully, mark Y in the table, otherwise, mark N in the table. Please mark N/A if the task or command is not executed.

A. Check the contents in directory Lab3.
$ls ~/Lab3

B. Create a directory named as "test" in Lab3.
$mkdir ~/Lab3/test

C. Create a file named as "test.txt" in Lab3.
$cat>~/Lab3/test.txt
A test
^D

D. If (B) succeeds, remove the created directory "test" of Lab3.

$rm -r ~/Lab3/test

E. If (C) succeeds, copy "test.txt" from your Lab3 into your home directory.

$cp ~/Lab3/test.txt .

F. Go into directory Lab3.

$cd ~/Lab3

The blanks in row "---" have been filled out in the table. Please compare it to your answers.

6) Fill out the blanks in other rows by repeating 3) to 5) when the owner is assigned different permissions as in the first column of the table. However, when setting the permissions, we still need to forbid all the permissions to all other users. So the last two bits in the octal number should always be kept as 00.

For example, since the owner's permission is --x at next row, we should first set the file permission by issuing the command chmod 100 ~/Lab3. And then fill out the blanks in the row for

permissions --x by repeating 5).

Owner's permissions	ls A. Read contents	mkdir B. Create sub-directory	cat > C. Create file	rm D. Remove contents	cp E. Copy contents from	cd F. Enter into directory
---	N	N	N	N/A	N/A	N
--x	N	N	N	N/A	N/A	Y
-w-	N	N	N	N/A	N/A	N
-wx	N	Y	Y	Y	Y	Y
r--	Y	N	N	N/A	N/A	N
r-x	Y	N	Y	N/A	Y	Y
rw-	Y	N	N	N/A	N/A	N
rwx	Y	Y	Y	Y	Y	Y

Note: Since you need to try at least 56 commands, to save time, you can press up arrow or down arrow to repeat previous or next command.