

**Operating Systems Principles and
Programming [18ECSC202]**

Open Challenge

Report

**School of Computer Science and Engineering
2021-22**

Contents

Si.	Topics
No.	
1.	Course and Team Details
2.	Introduction
3.	Problem Statement
4.	Solution
5.	References
	Appendix

1. Course and Team Details

1.1 Course details

Course Name	Operating Systems Principles and Programming
Course Code	18ECSC202
Semester	IV
Division	B
Year	2021-22
Instructor	Shrinivas D Desai

1.2 Team Details

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4.	269	ShriNagahari N Savanur

2. Introduction

Linux environment has several open challenges that need contribution from the users. The contribution can be on several aspects of design, writing, organizing, code, testing, patch, bug fixing etc. [1]. The list of challenges can be found on several forums of the Linux pages [2]. There are many communities like Open Source Friday [3] which aggregate and manage open course projects providing a channel for contribution management. The task here for the students is that, in a team of 3 to 4, each team will identify an open challenge related to operating system or its application and contribute to it towards improvising functionality.

While modern operating systems have several challenges [4], the contribution can be on any of the aspects from design to testing.

3. Problem Statement

Creating user defined commands in linux.

4. Solution

Linux operating system allows users to create commands and execute them over the command line. To create a command in Linux, the first step is to create a bash script for the command. The second step is to make the command executable.

The .bashrc file is present in home folder. Which runs every time the terminal is opened. It specifies the options that must be set for the terminal.

In this bashrc file we can create aliases that can be used to create new commands or give new names to the existing commands.

The .bashrc file is edited to create the new aliases.

The syntax of adding the alias is as follows:

```
alias [name]=' [command 1]; [command 2]; [command 3]; ..... [command n]'
```

Linux already has thousands of commands that cover all the actions that can be performed on the operating system.

Some big commands with lots of arguments are complex and confusing. Creating aliases for them helps reduce the complexity and make the commands easier to use.

For example we have created custom commands for creating hex file from c code which is used in our microcontroller programming lab. The command is long which is made short using the alias. This can be very helpful and help run commands faster.

The alias we have chosen for chmod is as follows:

```
alias cmurwxgrwxorwx='chmod u=rwx,g=rwx,o=rwx'
```

cmurwxgrwxorwx can be broken down as cm short for chmod.

Followed by u – short for user, followed by the permissions for the user, in this case rwx, it can empty or only r,w or rw or rx.

Followed by g – short for guest, followed by the permissions for the guest user.

Followed by o – short for others, followed by the permissions for other users.

Screenshots:

```
sankalp@sankalp-ubuntu: ~/Desktop
sankalp@sankalp-ubuntu: ~/Desktop/m... x sankalp@sankalp-ubuntu: ~/Desktop x
sankalp@sankalp-ubuntu:~$ cd Desktop
sankalp@sankalp-ubuntu:~/Desktop$ ls -l
total 416
-rwxrwxr-x 1 sankalp sankalp 27904 May 23 10:00 a.out
drwxr-xr-x 3 sankalp sankalp 4096 May 24 16:48 backup
-rwxrwxrwx 1 sankalp sankalp 65 May 24 17:00 backup.sh
-rw-rw-r-- 1 sankalp sankalp 4247 May 26 10:43 i2c.h
drwxrwxrwx 3 sankalp sankalp 4096 May 26 14:41 keypad
-rw-rw-r-- 1 sankalp sankalp 44143 May 23 10:00 lex.yy.c
drwxrwxr-x 4 sankalp sankalp 4096 May 26 15:01 'mcp lab'
drwxrwxr-x 2 sankalp sankalp 4096 May 26 12:02 'mcp temp'
-rw-rw-r-- 1 sankalp sankalp 63 May 24 17:00 mount.sh
drwxrwxr-x 4 sankalp sankalp 4096 Apr 28 15:20 'ospp lab'
-rwxrwxrwx 1 sankalp sankalp 53320 May 26 12:35 'OSPP OPEN CHALLENGE.docx'
-rw-r--r-- 1 sankalp sankalp 130283 May 19 20:13 'OSPP OPEN CHALLENGE_NEW.docx'
-rwxr--r-- 1 sankalp sankalp 0 May 26 14:12 ospp.txt
drwxrwxr-x 3 sankalp sankalp 4096 Apr 25 10:22 'PoCD - Principles of Compiler
Design Lab-20220425T044548Z-001'
drwxrwxrwx 2 sankalp sankalp 4096 May 24 17:03 samba
-rw-rw-r-- 1 sankalp sankalp 107712 May 26 14:55 sci.png
-rw-rw-r-- 1 sankalp sankalp 134 May 23 10:00 test.l
```

```
sankalp@sankalp-ubuntu: ~/Desktop
sankalp@sankalp-ubuntu: ~/Desktop/m... x sankalp@sankalp-ubuntu: ~/Desktop x
sankalp@sankalp-ubuntu:~/Desktop$ cmurwgrworw ospp.txt
sankalp@sankalp-ubuntu:~/Desktop$ ls -l
total 416
-rwxrwxr-x 1 sankalp sankalp 27904 May 23 10:00 a.out
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drwxrwxrwx 2 sankalp sankalp 4096 May 24 17:03 samba
-rw-rw-r-- 1 sankalp sankalp 107712 May 26 14:55 sci.png
-rw-rw-r-- 1 sankalp sankalp 134 May 23 10:00 test.l
```

```
sankalp@sankalp-ubuntu: ~/Desktop
sankalp@sankalp-ubuntu: ~/Desktop/m... x sankalp@sankalp-ubuntu: ~/Desktop x
sankalp@sankalp-ubuntu:~/Desktop$ cmurwgrworw ospp.txt
sankalp@sankalp-ubuntu:~/Desktop$ ls -l
total 416
-rwxrwxr-x 1 sankalp sankalp 27904 May 23 10:00 a.out
drwxr-xr-x 3 sankalp sankalp 4096 May 24 16:48 backup
-rwxrwxrwx 1 sankalp sankalp 65 May 24 17:00 backup.sh
-rw-rw-r-- 1 sankalp sankalp 4247 May 26 10:43 i2c.h
drwxrwxrwx 3 sankalp sankalp 4096 May 26 14:41 keypad
-rw-rw-r-- 1 sankalp sankalp 44143 May 23 10:00 lex.yy.c
drwxrwxr-x 4 sankalp sankalp 4096 May 26 15:01 'mcp lab'
drwxrwxr-x 2 sankalp sankalp 4096 May 26 12:02 'mcp temp'
-rw-rw-r-- 1 sankalp sankalp 63 May 24 17:00 mount.sh
drwxrwxr-x 4 sankalp sankalp 4096 Apr 28 15:20 'ospp lab'
-rwxrwxrwx 1 sankalp sankalp 53320 May 26 12:35 'OSPP OPEN CHALLENGE.docx'
-rw-r--r-- 1 sankalp sankalp 130283 May 19 20:13 'OSPP OPEN CHALLENGE_NEW.docx'
-rw-rw-rw- 1 sankalp sankalp 0 May 26 14:12 ospp.txt
drwxrwxr-x 3 sankalp sankalp 4096 Apr 25 10:22 'PoCD - Principles of Compiler
Design Lab-20220425T044548Z-001'
drwxrwxrwx 2 sankalp sankalp 4096 May 24 17:03 samba
-rw-rw-r-- 1 sankalp sankalp 107712 May 26 14:55 sc1.png
-rw-rw-r-- 1 sankalp sankalp 134 May 23 10:00 test.l
```

```
sankalp@sankalp-ubuntu: ~/Desktop/mcp lab
sankalp@sankalp-ubuntu:~/Desktop/mcp lab$ mcp
input.c: In function 'main':
input.c:26:3: warning: implicit declaration of function 'display' [-Wimplicit-fu
nction-declaration]
    display(seg_code);
    ^
input.c: At top level:
input.c:31:6: warning: conflicting types for 'display'
    void display(char seg_code[])
    ^
input.c:26:3: note: previous implicit declaration of 'display' was here
    display(seg_code);
    ^
sankalp@sankalp-ubuntu:~/Desktop/mcp lab$ mcpburn
avrdude: error: could not find USB device with vid=0x16c0 pid=0x5dc vendor='www.
fischl.de' product='USBasp'

avrdude done. Thank you.
sankalp@sankalp-ubuntu:~/Desktop/mcp lab$
```

Code:

```
alias chmodrm='chmod u=,g=,o='
alias cmur='chmod u=r,g=,o='
alias cmurw='chmod u=rw,g=,o='
alias cmurwgr='chmod u=rw,g=r,o='
alias cmurwx='chmod u=rwx,g=,o='
alias cmurwxgr='chmod u=rwx,g=r,o='
alias cmurwxgrw='chmod u=rwx,g=rw,o='
alias cmurwxgrwx='chmod u=rwx,g=rwx,o='
alias cmurwxgrwxor='chmod u=rwx,g=rwx,o=r'
alias cmurwxgrwxorw='chmod u=rwx,g=rwx,o=rw'
alias cmurwxgrwxorwx='chmod u=rwx,g=rwx,o=rwx'
alias cmurgror='chmod u=r,g=r,o=r'
alias cmurwgror='chmod u=rw,g=r,o=r'
alias cmurwxgror='chmod u=rwx,g=r,o=r'
alias cmurgrwor='chmod u=r,g=rw,o=r'
alias cmurgrwxor='chmod u=r,g=rwx,o=r'
alias cmurgrorw='chmod u=r,g=r,o=rw'
alias cmurgrorwx='chmod u=r,g=r,o=rwx'
alias cmurwgrworw='chmod u=rw,g=rw,o=rw'
alias cmurwxgrworw='chmod u=rwx,g=rw,o=rw'
alias cmurwgrxworw='chmod u=rw,g=rwx,o=rw'
alias cmurwgrworwx='chmod u=rw,g=rw,o=rwx'
alias cmuxgxox='chmod u=x,g=x,o=x'
alias cmurxgxox='chmod u=rx,g=x,o=x'
alias cmuxgrxox='chmod u=x,g=rx,o=x'
alias cmuxgxorx='chmod u=x,g=x,o=rx'
alias cmuxgxowx='chmod u=x,g=x,o=wx'
alias cmuxgwxox='chmod u=x,g=wx,o=x'
alias cmuwxgwowx='chmod u=wx,g=w,o=wx'
alias cmuwxgxox='chmod u=wx,g=x,o=x'
alias cmuxgxorx='chmod u=x,g=x,o=rx'
alias cmuxgrxox='chmod u=x,g=rx,o=x'
alias cmurxgxox='chmod u=rx,g=x,o=x'
alias cmuxgxor='chmod u=x,g=x,o=r'
alias cmuwxgrox='chmod u=w,g=r,o=x'
alias cmuxgrwox='chmod u=x,g=rw,o=x'

alias mcpc='avr-gcc -g -Os -mmcu=atmega32 -c -o output.o input.c && avr-gcc -g -mmcu=atmega32 -o output.elf output.o && avr-objcopy -j .text -j .data -O ihex output.elf output.hex'
alias mcpburn='avrdude -c USBasp -p m32 -P /dev/ttyUSB0 -b 19200 -U flash:w:output.hex'
```

5. References

- [1] <https://www.geeksforgeeks.org/custom-commands-linux-terminal/>
- [2] Linux Forum page, <https://www.linux.org/forums/>, Last Accessed: 06 April 2022

Appendix

Completely new commands can be created from scratch. But this is time consuming and extremely complex. Linux already has enough commands to cover all the actions that need to be performed. So creating aliases is an easy and efficient way to create user defined commands.

~*~*~*~*~*~*~*