

Linux Environment Lab 1

Table of Contents

| | |
|---|----|
| Objective | 3 |
| Prerequisites | 3 |
| Problem Statement | 3 |
| Fundamental concepts | 3 |
| Summary | 3 |
| Template for each step | 5 |
| Step-1: Explore the content of each directory inside root directory | 5 |
| Step-2: Execute Directory & File related commands | 6 |
| References | 15 |

1. Objective

Understanding the Linux Architecture, File System, Commands etc.

2. Prerequisites

| Prerequisites | Version |
|------------------|--------------------|
| Operating System | Linux (Any flavor) |

3. Problem Statement

To understand the Linux File System, Explore the content of each directory present in the root directory. Understand different Linux commands and execute the same.

4. Summary

| Steps | Description |
|--------|---|
| Step 1 | Explore the content of each directory inside root directory |
| Step2 | Execute Directory and File related commands |
| Step3 | Output |
| Step4 | Analyzing the Output with Program |

5. Fundamental Concept

A Linux file system is a structured collection of files on a disk drive or a partition. A partition is a segment of memory and contains some specific data. Linux file system is generally a built-in layer of a Linux operating system used to handle the data management of the storage. It helps to arrange the file on the disk storage. It manages the file name, file size, creation date, and much more information about a file.

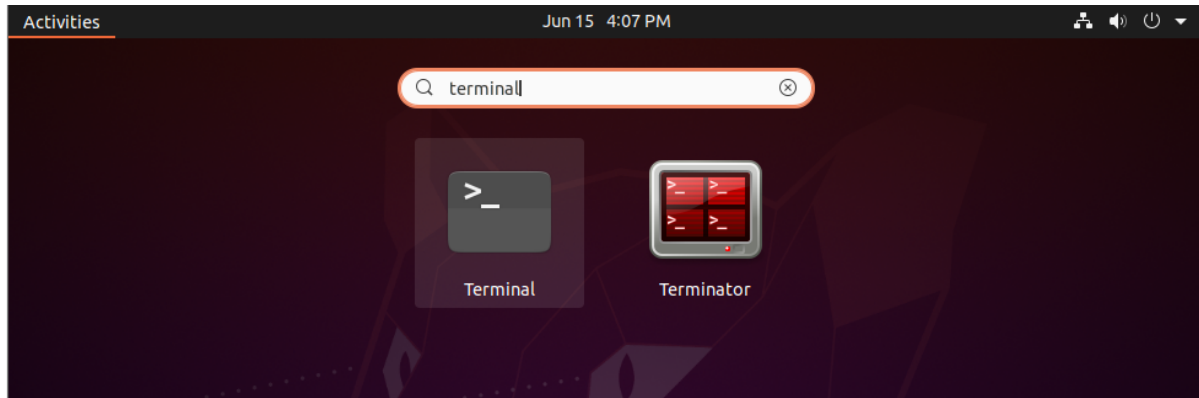
Directory and File related Linux Commands:

| Command | Description |
|--------------|--|
| pwd | It prints the path of the working directory, starting from the root |
| ls | Lists directory contents of files and directories |
| cd | It is used to change current working directory |
| mkdir | Allows the user to create directories. This command can create multiple directories at once |
| rmdir | Used to remove empty directories from the filesystem in Linux |
| cp | Used to copy files or group of files or directory |
| mv | Used to move one or more files or directories from one place to another in file system like UNIX |
| touch | Used to create, change and modify timestamps of a file |
| less | Used to read contents of text file one page(one screen) per time |
| more | Used to view the text files in the command prompt, displaying one screen at a time in case the file is large |
| cat | Reads data from file and gives their content as output. It helps us to create, view, concatenate files |
| head | Prints the top N number of data of the given input |
| tail | Prints the last N number of data of the given input |

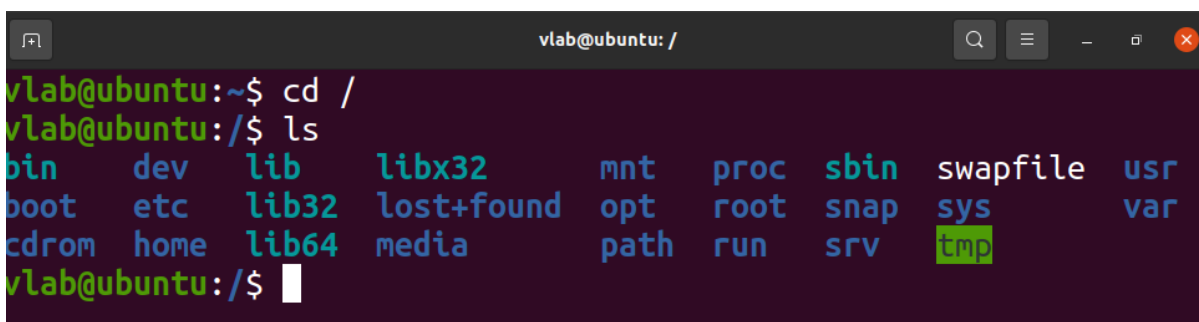
6. Template for each step

1. Step-1: Explore the content of each directory inside root directory

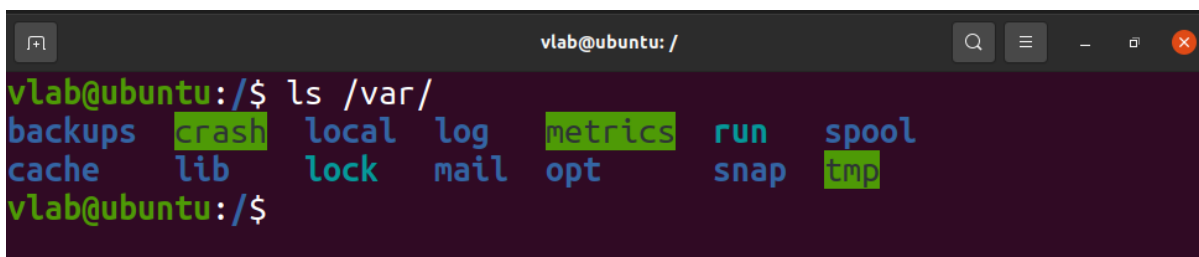
- Open the Terminal by clicking on Activities and type terminal or use keyboard shortcut **Ctrl + Alt + T**



- Go to the root directory by executing command **cd /** and then list the contents of root directory using **ls** commands



- Now, go inside each directory using command **cd** and list the content of that directory using command **ls** or execute the command **ls** followed by directory name from the root directory



2. Step-2: Execute Directory and File related commands

1. pwd: Print Working Directory

Execute the command **pwd**. This will print the current working directory

```

vlab@ubuntu: ~$ pwd
/home/vlab
vlab@ubuntu: ~$
  
```

2. ls: List Directory Contents

Execute the command **ls**. This will print the content of the current working directory on the terminal

```

vlab@ubuntu: /$ ls
bin      etc      lib64    mnt      root    srv      usr
boot    home    libx32   opt      run     swapfile var
cdrom   lib     lost+found path    sbin    sys
dev     lib32   media    proc    snap    tmp
vlab@ubuntu: /$
  
```

3. cd: Change Directory

Change the directory to **Desktop** using command **cd**

```

vlab@ubuntu: ~$ cd Desktop/
vlab@ubuntu: ~/Desktop$
  
```

4. mkdir: Create Directory

Create a new directory **newDir** using command **mkdir** and using **ls** command you can check the newly created directory

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ mkdir newDir
vlab@ubuntu:~/Desktop$ ls
newDir
vlab@ubuntu:~/Desktop$
  
```

5. rmdir: Remove Directory

Remove the directory **newDir** using command **rmdir** and using **ls** command you can check the directory has been deleted or not.

- **Note:** Directory deleted using **rmdir** gets deleted permanently. They can't be recovered.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ ls
newDir
vlab@ubuntu:~/Desktop$ rmdir newDir
vlab@ubuntu:~/Desktop$ ls
vlab@ubuntu:~/Desktop$
  
```

6. cp: Copy

First create a new file with command **touch** and a directory using command **mkdir** and confirm using **ls** command

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ touch hello.txt
vlab@ubuntu:~/Desktop$ mkdir foo
vlab@ubuntu:~/Desktop$ ls
foo  hello.txt
vlab@ubuntu:~/Desktop$
  
```

- Now using **cp** command copy the **hello.txt** file to **foo** directory and then check the contents of **foo** directory using **ls** command.
- You can also copy the directory using **cp**.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ cp hello.txt foo/
vlab@ubuntu:~/Desktop$ ls foo/
hello.txt
vlab@ubuntu:~/Desktop$
  
```

7. mv: Move

First create a new directory using command **mkdir** and confirm using **ls** command.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ mkdir newDir
vlab@ubuntu:~/Desktop$ ls
foo  hello.txt  newDir
vlab@ubuntu:~/Desktop$
  
```

Now, move the file **hello.txt** inside newly created directory and then check the content of current directory and newly created directory using **ls** command


```
vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ mv hello.txt newDir/
vlab@ubuntu:~/Desktop$ ls
foo  newDir
vlab@ubuntu:~/Desktop$ ls newDir/
hello.txt
vlab@ubuntu:~/Desktop$
```

8. less: Allows you to view the contents of a file and navigate through file

First we will create a new file which has large content in it, for that execute below command:

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ man mkdir >> temp.txt
vlab@ubuntu:~/Desktop$
  
```

Now we will read the content of the file **temp.txt** using command **less**. This command will only show the one page at a time on the screen. If you can press **Enter key** it will show next line on the screen. And, if you press page down key, it will show the next page on the screen. Similarly, page up key will take you one page back.

```

vlab@ubuntu: ~/Desktop
MKDIR(1)                                User Commands
                                         MKDIR(1)

NAME
    mkdir - make directories

SYNOPSIS
    mkdir [OPTION]... DIRECTORY...

DESCRIPTION
    Create the DIRECTORY(ies), if they do not already exist.

    Mandatory arguments to long options are mandatory for short options too.

    -m, --mode=MODE
        set file mode (as in chmod), not a=rwx - umask

:
  
```

9. more: Open a given file for interactive reading

Now, we will use the **more** command to read the content of **temp.txt**. You can scroll through the contents of the file by pressing **ENTER** or **SPACE BAR** keys.

Note: The main difference between **more** and **less** is that **less** command is faster because it does not load the entire file at once and allows navigation through file using page up/down keys.

```
vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ more temp.txt
MKDIR(1)                                User Commands
                                MKDIR(1)

NAME
    mkdir - make directories

SYNOPSIS
    mkdir [OPTION]... DIRECTORY...

DESCRIPTION
    Create the DIRECTORY(ies), if they do not already exist.

    Mandatory arguments to long options are mandatory for short
    options too.

    -m, --mode=MODE
        set file mode (as in chmod), not a=rwx - umask

    -p, --parents
        no error if existing, make parent directories as
needed

    -v, --verbose
--More-- (30%)
```

10. cat: Concatenate

Now, we will use the **cat** command to display the content of **temp.txt** on the screen.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ cat temp.txt
MKDIR(1)                                User Commands
                                     mkdir - make directories
NAME
    mkdir - make directories
SYNOPSIS
    mkdir [OPTION]... DIRECTORY...
DESCRIPTION
    Create the DIRECTORY(ies), if they do not already exist.

    Mandatory arguments to long options are mandatory for short options too.

    -m, --mode=MODE
        set file mode (as in chmod), not a=rwx - umask
    -p, --parents
        no error if existing, make parent directories as needed
    -v, --verbose
        print a message for each created directory
vlab@ubuntu:~/Desktop$
  
```

Now, we will use **cat** command to copy the content of **temp.txt** file to another text file. So, first we will create an empty text file using **touch** command and then copy the content of **temp.txt** to newly created file.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ touch newFile.txt
vlab@ubuntu:~/Desktop$ ls
foo newDir newFile.txt temp.txt
vlab@ubuntu:~/Desktop$ cat temp.txt >> newFile.txt
vlab@ubuntu:~/Desktop$
  
```

Now, print the content of **newFile.txt** using **cat** command and you can see that the content of **temp.txt** has got copied to **newFile.txt** using cat command

```

vlab@ubuntu:~/Desktop$ cat newFile.txt
MKDIR(1)                                User Commands
                                     MKDIR(1)

NAME
    mkdir - make directories

SYNOPSIS
    mkdir [OPTION]... DIRECTORY...

DESCRIPTION
    Create the DIRECTORY(ies), if they do not already exist.

    Mandatory arguments to long options are mandatory for short options too.

    -m, --mode=MODE
        set file mode (as in chmod), not a=rwx - umask

    -p, --parents
        no error if existing, make parent directories as needed

    -v, --verbose
        print a message for each created directory
vlab@ubuntu:~/Desktop$
  
```

11. head: Print the top N number of data of the given input

We can use a **head** command to display the content of **temp.txt** on the screen. By default it will print first 10 lines on the screen.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ head temp.txt
MKDIR(1)          User Commands          MKDIR(1)

NAME
    mkdir - make directories

SYNOPSIS
    mkdir [OPTION]... DIRECTORY...

DESCRIPTION
    Create the DIRECTORY(ies), if they do not already ex-
vlab@ubuntu:~/Desktop$
  
```

You can specify the no of lines to be printed on the screen by using **-n** followed by no of lines.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ head -n15 temp.txt
MKDIR(1)          User Commands          MKDIR(1)

NAME
    mkdir - make directories

SYNOPSIS
    mkdir [OPTION]... DIRECTORY...

DESCRIPTION
    Create the DIRECTORY(ies), if they do not already ex-
    ist.

    Mandatory arguments to long options are mandatory for
    short options too.
vlab@ubuntu:~/Desktop$
  
```

12. tail: Print the last N number of data of the given input

We can use a tail command to display the content of **temp.txt** from the end of the file. By default it will print last 10 lines on the screen.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ tail temp.txt

SEE ALSO
    mkdir(2)

Full documentation at: <https://www.gnu.org/software/coreutils/mkdir>
or available locally via: info '(coreutils) mkdir invocation'

GNU coreutils 8.30      September 2019      MKDIR(1)
vlab@ubuntu:~/Desktop$
  
```

We can specify the no of lines to print using option **-n**.

```

vlab@ubuntu: ~/Desktop
vlab@ubuntu:~/Desktop$ tail -n15 temp.txt
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<https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and re-
distribute it. There is NO WARRANTY, to the extent
permitted by law.

SEE ALSO
    mkdir(2)

Full documentation at: <https://www.gnu.org/software/coreutils/mkdir>
or available locally via: info '(coreutils) mkdir invocation'

GNU coreutils 8.30      September 2019      MKDIR(1)
vlab@ubuntu:~/Desktop$
  
```

7. References

- https://en.wikipedia.org/wiki/File_system
- https://en.wikipedia.org/wiki/Filesystem_Hierarchy_Standard