

Assignment 1

1. Basic Unix/Linux commands

- **ls**

ls is a Linux shell command that lists directory contents of files and directories

ls -t: It sorts the file by modification time, showing the last edited file first. head -1 picks up this first file

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
ayush1.c Desktop Downloads Pictures rc.c Templates Videos
ayush.c Documents Music Public sanu.c test.txt yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **date**

date command is used to display the system date and time. date command is also used to set date and time of the system. By default, the date command displays the date in the time zone on which Unix/Linux operating system is configured. You must be the super-user (root) to change the date and time.

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ date
Wednesday 04 January 2023 02:31:55 PM IST
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **help**

help command just displays information about shell built-in commands.

options

- -d option: It is used when you just want to get an overview about any shell built-in command i.e it only gives short description.
- -m option: It displays usage in pseudo-manpage format.
- -s option: It just displays only a short usage synopsis for each topic matching.

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ help -d pwd
pwd - Print the name of the current working directory.
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ help pwd
pwd: pwd [-LP]
    Print the name of the current working directory.

Options:
  -L      print the value of $PWD if it names the current working
          directory
  -P      print the physical directory, without any symbolic links

By default, 'pwd' behaves as if '-L' were specified.

Exit Status:
Returns 0 unless an invalid option is given or the current directory
cannot be read.
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **Info**

info command reads documentation in the info format. It will give detailed information for a command when compared with the man page. The pages are made using the texinfo tools because of which it can link with other pages, create menus and easy navigation.

```

Next: dir invocation, Up: Directory listing

10.1 'ls': List directory contents
=====

The 'ls' program lists information about files (of any type, including
directories). Options and file arguments can be intermixed arbitrarily,
as usual.

    For non-option command-line arguments that are directories, by
    default 'ls' lists the contents of directories, not recursively, and
    omitting files with names beginning with '.'. For other non-option
    arguments, by default 'ls' lists just the file name. If no non-option
    argument is specified, 'ls' operates on the current directory, acting as
    if it had been invoked with a single argument of '.'.

    By default, the output is sorted alphabetically, according to the
    locale settings in effect.(1) If standard output is a terminal, the
    output is in columns (sorted vertically) and control characters are
    output as question marks; otherwise, the output is listed one per line
    and control characters are output as-is.

    Because 'ls' is such a fundamental program, it has accumulated many
    options over the years. They are described in the subsections below;
    within each section, options are listed alphabetically (ignoring case).
    The division of options into the subsections is not absolute, since some
    options affect more than one aspect of 'ls's operation.

Exit status:

    0 success
    1 minor problems (e.g., failure to access a file or directory not
      specified as a command line argument. This happens when listing a
      directory in which entries are actively being removed or renamed.)
    2 serious trouble (e.g., memory exhausted, invalid option, failure
      to access a file or directory specified as a command line argument
      or a directory loop)

Also see *note Common options::.

* Menu:

* Which files are listed::
* What information is listed::
* Sorting the output::
* Details about version sort::
* General output formatting::
* Formatting file timestamps::
* Formatting the file names::

----- Footnotes -----

(1) If you use a non-POSIX locale (e.g., by setting 'LC_ALL' to
-----Info: (coreutils)ls invocation, 57 lines --Top-----
Welcome to Info version 6.7. Type H for help, h for tutorial.

```

- **man**

man command in Linux is used to display the user manual of any command that we can run on the terminal. It provides a detailed view of the command which includes NAME, SYNOPSIS, DESCRIPTION, OPTIONS, EXIT STATUS, RETURN VALUES, ERRORS, FILES, VERSIONS, EXAMPLES, AUTHORS and SEE ALSO.

```

CAT(1)
NAME
    cat - concatenate files and print on the standard output

SYNOPSIS
    cat [OPTION]... [FILE]...

DESCRIPTION
    Concatenate FILE(s) to standard output.

    With no FILE, or when FILE is -, read standard input.

    -A, --show-all
        equivalent to -vET

    -b, --number-nonblank
        number nonempty output lines, overrides -n

    -e
        equivalent to -vE

    -E, --show-ends
        display $ at end of each line

    -n, --number
        number all output lines

    -s, --squeeze-blank
        suppress repeated empty output lines

    -t
        equivalent to -vT

    -T, --show-tabs
        display TAB characters as ^I

    -u
        (ignored)

    -v, --show-nonprinting
        use ^ and M- notation, except for LFD and TAB

    --help
        display this help and exit

    --version
        output version information and exit

EXAMPLES
    cat f - g
        Output f's contents, then standard input, then g's contents.

    cat
        Copy standard input to standard output.

AUTHOR
    Written by Torbjorn Granlund and Richard M. Stallman.

Manual page cat(1) line 1 (press h for help or q to quit)

```


- **who**

shows current user information

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ who
adminstrator :0      2023-01-04 14:10 (:0)
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **pwd**

pwd stands for **Print Working Directory**. It prints the path of the working directory, starting from the root.

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ pwd
/home/administrator
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **cat**

It reads data from the file and gives their content as output. It helps us to create, view, concatenate files

```
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ cat test.txt
Hy there.
It is a test file for cad command.
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **more**

more command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large (For example log files). The more command also allows the user do scroll up and down through the page.

+/**pattern**: This option is used to search the string inside your text document.

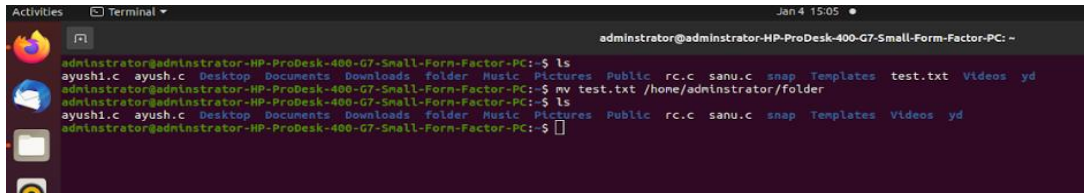
```
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ more +/vertices test.txt
...
Traverse all the adjacent and unmarked nodes and call the recursive function with the index of the adjacent node.
This will happen by handling a corner case.
The above code traverses only the vertices reachable from a given source vertex.
All the vertices may not be reachable from a given vertex, as in a Disconnected graph.
To do a complete DFS traversal of such graphs, run DFS from all unvisited nodes after a DFS.
The recursive function remains the same.
Follow the below steps to solve the problem:
Create a recursive function that takes the index of the node and a visited array.
Mark the current node as visited and print the node.
Traverse all the adjacent and unmarked nodes and call the recursive function with the index of the adjacent node.
Run a loop from 0 to the number of vertices and check if the node is unvisited in the previous DFS, then call the recursive function with the current node.

Depth First Traversal (or Search) for a graph is similar to Depth First Traversal of a tree.
The only catch here is, that, unlike trees, graphs may contain cycles (a node may be visited twice).
To avoid processing a node more than once, use a boolean visited array. A graph can have more than one DFS traversal.
Depth-first search is an algorithm for traversing or searching tree or graph data structures.
The algorithm starts at the root node (selecting some arbitrary node as the root node in the case of a graph) and explores as far as possible along each branch before backtracking.
So the basic idea is to start from the root or any arbitrary node and mark the node and move to the adjacent unmarked node and continue this loop until there is no unmarked adjacent node.
Then backtrack and check for other unmarked nodes and traverse them. Finally, print the nodes in the path.
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Mark the current node as visited and print the node.
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The above code traverses only the vertices reachable from a given source vertex.
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Run a loop from 0 to the number of vertices and check if the node is unvisited in the previous DFS, then call the recursive function with the current node.

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Then backtrack and check for other unmarked nodes and traverse them. Finally, print the nodes in the path.
Follow the below steps to solve the problem:
Create a recursive function that takes the index of the node and a visited array.
Mark the current node as visited and print the node.
```

- **mv**

mv is used to move one or more files or directories from one place to another in a file system



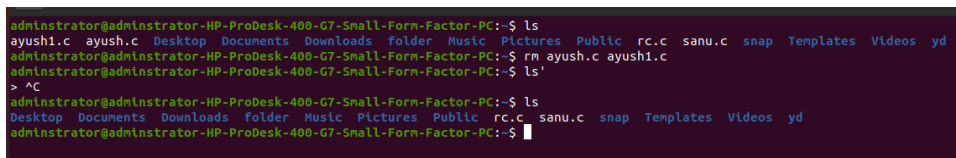
```

administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
ayush1.c  ayush.c  Desktop  Documents  Downloads  folder  Music  Pictures  Public  rc.c  sanu.c  snap  Templates  test.txt  Videos  yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ mv test.txt /home/administrator/folder
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
ayush1.c  ayush.c  Desktop  Documents  Downloads  folder  Music  Pictures  Public  rc.c  sanu.c  snap  Templates  Videos  yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ 

```

- **rm**

rm command is used to remove objects such as files, directories, symbolic links and so on from the file system



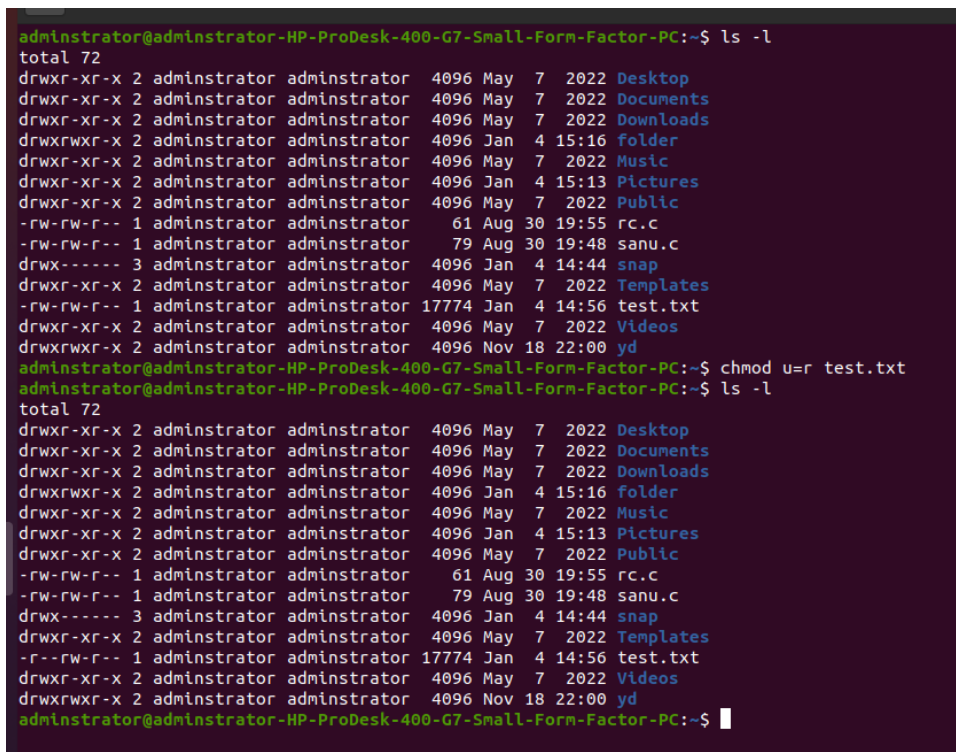
```

administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
ayush1.c  ayush.c  Desktop  Documents  Downloads  folder  Music  Pictures  Public  rc.c  sanu.c  snap  Templates  Videos  yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ rm ayush1.c
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
> AC
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
Desktop  Documents  Downloads  folder  Music  Pictures  Public  rc.c  sanu.c  snap  Templates  Videos  yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ 

```

- **chmod**

the chmod command is used to change the access mode of a file. The name is an abbreviation of change mode.



```

administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls -l
total 72
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Desktop
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Documents
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Downloads
drwxrwxr-x 2 administrator administrator 4096 Jan 4 15:16 folder
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Music
drwxr-xr-x 2 administrator administrator 4096 Jan 4 15:13 Pictures
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Public
-rw-rw-r-- 1 administrator administrator 61 Aug 30 19:55 rc.c
-rw-rw-r-- 1 administrator administrator 79 Aug 30 19:48 sanu.c
drwx----- 3 administrator administrator 4096 Jan 4 14:44 snap
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Templates
-rw-rw-r-- 1 administrator administrator 17774 Jan 4 14:56 test.txt
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Videos
drwxrwxr-x 2 administrator administrator 4096 Nov 18 22:00 yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ chmod u=r test.txt
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls -l
total 72
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Desktop
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Documents
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Downloads
drwxrwxr-x 2 administrator administrator 4096 Jan 4 15:16 folder
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Music
drwxr-xr-x 2 administrator administrator 4096 Jan 4 15:13 Pictures
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Public
-rw-rw-r-- 1 administrator administrator 61 Aug 30 19:55 rc.c
-rw-rw-r-- 1 administrator administrator 79 Aug 30 19:48 sanu.c
drwx----- 3 administrator administrator 4096 Jan 4 14:44 snap
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Templates
-r--rw-r-- 1 administrator administrator 17774 Jan 4 14:56 test.txt
drwxr-xr-x 2 administrator administrator 4096 May 7 2022 Videos
drwxrwxr-x 2 administrator administrator 4096 Nov 18 22:00 yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ 

```

- **whoami**

whoami command displays the username of the current user when this command is invoked.

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ whoami
administrator
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **wc**

wc (word count) command is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ cat test1.txt
Hyderabad
Itanagar
Dispur
Patna
Raipur
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ wc test1.txt
 5  5 39 test1.txt
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **grep**

grep (global search for regular expression and print out) filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression.

-c: This print only a count of the lines that match a pattern

-w: Match whole word

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ grep -c "algorithm" test.txt
2
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ grep -w "algorithm" test.txt
Depth-first search is an algorithm for traversing or searching tree or graph data structures.
The algorithm starts at the root node (selecting some arbitrary node as the root node in the case of a graph) and explores as far as possible along each branch before backtracking.
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **sort**

SORT command is used to sort a file, arranging the records in a particular order. By default, the sort command sorts file assuming the contents are ASCII. Using options in the sort command can also be used to sort numerically.

```
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ cat test1.txt
Hyderabad
Itanagar
Dispur
Patna
Raipur
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ sort test1.txt
Dispur
Hyderabad
Itanagar
Patna
Raipur
```

- **mkdir**

mkdir command in Linux allows the user to create directories (also referred to as folders in some operating systems). This command can create multiple directories at once as well as set the permissions for the directories. It is important to note that the user executing this command must have enough permissions to create a directory in the parent directory, or he/she may receive a 'permission denied' error.

```

administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ mkdir -v one two three
mkdir: created directory 'one'
mkdir: created directory 'two'
mkdir: created directory 'three'
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
Desktop Documents Downloads folder Music one Pictures Public rc.c sanu.c snap Templates test1.txt test.txt three two Videos yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ mkdir -m a=rwx four
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls -l
total 76
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Desktop
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Documents
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Downloads
drwxrwxr-x 2 administrator administrator 4096 Jan  4 15:16 folder
drwxrwxrwx 2 administrator administrator 4096 Jan  5 17:26 one
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Music
drwxrwxr-x 2 administrator administrator 4096 Jan  5 17:25 one
drwxr-xr-x 2 administrator administrator 4096 Jan  5 17:24 Pictures
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Public
-rw-rw-r-- 1 administrator administrator  61 Aug 30 19:55 rc.c
-rw-rw-r-- 1 administrator administrator  79 Aug 30 19:48 sanu.c
drwx----- 3 administrator administrator 4096 Jan  4 14:44 snap
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Templates
-rw-rw-r-- 1 administrator administrator  39 Jan  4 15:25 test1.txt
-rw-rw-r-- 1 administrator administrator 1974 Jan  4 15:31 test.txt
drwxrwxr-x 2 administrator administrator 4096 Jan  5 17:25 three
drwxrwxr-x 2 administrator administrator 4096 Jan  5 17:25 two
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Videos
drwxrwxr-x 2 administrator administrator 4096 Nov 18 22:00 yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ mkdir -m a=r five
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls -l
total 80
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Desktop
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Documents
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Downloads
dr--r--r-- 2 administrator administrator 4096 Jan  5 17:27 five
drwxrwxr-x 2 administrator administrator 4096 Jan  4 15:16 folder
drwxrwxrwx 2 administrator administrator 4096 Jan  5 17:26 one
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Music
drwxrwxr-x 2 administrator administrator 4096 Jan  5 17:25 one
drwxr-xr-x 2 administrator administrator 4096 Jan  5 17:24 Pictures
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Public
-rw-rw-r-- 1 administrator administrator  61 Aug 30 19:55 rc.c
-rw-rw-r-- 1 administrator administrator  79 Aug 30 19:48 sanu.c
drwx----- 3 administrator administrator 4096 Jan  4 14:44 snap
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Templates
-rw-rw-r-- 1 administrator administrator  39 Jan  4 15:25 test1.txt
-rw-rw-r-- 1 administrator administrator 1974 Jan  4 15:31 test.txt
drwxrwxr-x 2 administrator administrator 4096 Jan  5 17:25 three
drwxrwxr-x 2 administrator administrator 4096 Jan  5 17:25 two
drwxr-xr-x 2 administrator administrator 4096 May  7  2022 Videos
drwxrwxr-x 2 administrator administrator 4096 Nov 18 22:00 yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$

```

- **rmdir**

rmdir command is used to remove empty directories from the filesystem in Linux. The rmdir command removes each and every directory specified in the command line only if these directories are empty. So if the specified directory has some subdirectories or files in it then this cannot be removed by the rmdir command.

```

administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
Desktop Documents Downloads five folder one Music one Pictures Public rc.c sanu.c snap Templates test1.txt test.txt three two Videos yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ rmdir -p two
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
Desktop Documents Downloads five folder one Music one Pictures Public rc.c sanu.c snap Templates test1.txt test.txt three Videos yd
administrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$

```


- **cd**

cd command in linux known as change directory command. It is used to change current working directory.

```
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ ls
Desktop Documents Downloads five folder  Music one Pictures Public rc.c sanu.c snap Templates test1.txt test.txt three two Videos yd
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ cd two
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~/two$ cd /
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:/$
```

- **tail**

It is the complementary of head command. The tail command, as the name implies, print the last N amount of data of the given input. By default, it prints the last 10 lines of the specified files. If more than one file name is provided then data from each file is precedes by its file name.

```
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ cat test1.txt
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chhattisgarh
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Meghalaya
Mizoram
Nagaland
Odisha
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ tail test1.txt
Odisha
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ tail -4 test1.txt
Tripura
Uttar Pradesh
Uttarakhand
West Bengal
adminstrator@administrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```


- **cmp**

cmp command in Linux/UNIX is used to compare the two files byte by byte and helps you to find out whether the two files are identical or not.

```
admin@Ubuntu:~$ cat test1.txt
Hyderabad
Itanagar
Dispur
Patna
Raipur
admin@Ubuntu:~$ cat test2.txt
Hyderabad
Itanagar
Dispur
Patna
Raipur
admin@Ubuntu:~$ cmp test1.txt test2.txt
admin@Ubuntu:~$ cat test1.txt
Hyderabad
Itanagar
Dispur
Patna
Raipur
admin@Ubuntu:~$ cat test2.txt
Hyderabad
Itanagar
Dispur
Patna
Raipur
Surat
admin@Ubuntu:~$ cmp test1.txt test2.txt
cmp: EOF on test1.txt after byte 39, line 5
admin@Ubuntu:~$
```

- **clear**

clear is a standard Unix computer operating system command that is used to clear the terminal screen. This command first looks for a terminal type in the environment and after that, it figures out the terminfo database for how to clear the screen.

- **diff**

diff stands for difference. This command is used to display the differences in the files by comparing the files line by line. Unlike its fellow members, cmp and comm, it tells us which lines in one file have been to be changed to make the two files identical. The important thing to remember is that diff uses certain special symbols and instructions that are required to make two files identical. It tells you the instructions on how to change the first file to make it match the second file.

```
admin@Ubuntu:~$ cat test1.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ cat test2.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ diff test1.txt test2.txt
admin@Ubuntu:~$ cat test1.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ cat test2.txt
Gujarat
Uttar Pradesh
Kolkata
Jammu and Kashmir
admin@Ubuntu:~$ diff test1.txt test2.txt
4d3
< Bihar
admin@Ubuntu:~$ diff -u test1.txt test2.txt
--- test1.txt      2023-01-05 19:20:51.360327490 +0530
+++ test2.txt      2023-01-05 19:22:02.747255837 +0530
@@ -1,5 +1,4 @@
   Gujarat
   Uttar Pradesh
   Kolkata
-Bihar
   Jammu and Kashmir
```

- **cp**

cp stands for copy. This command is used to copy files or group of files or directory. It creates an exact image of a file on a disk with different file name. cp command requires at least two filenames in its arguments.

```
admin@Ubuntu:~$ cat test1.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ cp test1.txt testcopied.txt
admin@Ubuntu:~$ ls
Desktop Documents Downloads Music Pictures Public Templates testcopied.txt test1.txt test2.txt test.txt Videos
admin@Ubuntu:~$ cat testcopied.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ cp -i test1.txt testcopied.txt
cp: overwrite 'testcopied.txt'? y
admin@Ubuntu:~$ cp -b test1.txt testcopied.txt
admin@Ubuntu:~$ ls
Desktop Documents Downloads Music Pictures Public Templates testcopied.txt testcopied.txt- test1.txt test2.txt test.txt Videos
admin@Ubuntu:~$
```

- **df**

The df command (short for disk free), is used to display information related to file systems about total space and available space.

```
admin@Ubuntu:~$ ls
Desktop Music Templates test1.txt test.txt
Documents Pictures testcopied.txt test2.txt Videos
Downloads Public testcopied.txt~ testFolder
admin@Ubuntu:~$ df test1.txt
Filesystem      1K-blocks    Used Available Use% Mounted on
/dev/sda5      14856168 9150932   4928788  65% /
admin@Ubuntu:~$ df -h test1.txt
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda5       15G   8.8G  4.8G   65% /
admin@Ubuntu:~$ df -T test1.txt
Filesystem      Type 1K-blocks    Used Available Use% Mounted on
/dev/sda5      ext4 14856168 9151532   4928188  65% /
admin@Ubuntu:~$
```

- **du**

du command, short for disk usage, is used to estimate file space usage.

The du command can be used to track the files and directories which are consuming excessive amount of space on hard disk drive.

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

admin@Ubuntu:~$ du test.txt test1.txt
4      test.txt
4      test1.txt
admin@Ubuntu:~$
```

- **uname**

The command `uname` displays the information about the system.

```
admin@Ubuntu:~$ uname -a
Linux Ubuntu 5.15.0-56-generic #62~20.04.1-Ubuntu SMP Tue Nov 22 21:24:20 UTC 20
22 x86_64 x86_64 x86_64 GNU/Linux
admin@Ubuntu:~$ uname -s
Linux
admin@Ubuntu:~$ uname -n
Ubuntu
admin@Ubuntu:~$ uname -r
5.15.0-56-generic
admin@Ubuntu:~$ uname -v
#62~20.04.1-Ubuntu SMP Tue Nov 22 21:24:20 UTC 2022
admin@Ubuntu:~$ uname -m
x86_64
admin@Ubuntu:~$ uname -p
x86_64
admin@Ubuntu:~$ uname -i
x86_64
admin@Ubuntu:~$ uname -o
GNU/Linux
admin@Ubuntu:~$
```

- **apt-get**

`apt-get` is a command-line tool which helps in handling packages in Linux. Its main task is to retrieve the information and packages from the authenticated sources for installation, upgrade and removal of packages along with their dependencies. Here APT stands for the Advanced Packaging Tool.

update: This command is used to synchronize the package index files from their sources again. You need to perform an update before you upgrade or `dist-upgrade`.

`apt-get update`

upgrade: This command is used to install the latest versions of the packages currently installed on the user's system from the sources enumerated in `/etc/apt/sources.list`. The installed packages which have new packages available are retrieved and installed. You need to perform an update before the upgrade, so that `apt-get` knows that new versions of packages are available.

`apt-get upgrade`

- **find**

The find command in UNIX is a command line utility for walking a file hierarchy. It can be used to find files and directories and perform subsequent operations on them. It supports searching by file, folder, name, creation date, modification date, owner and permissions. By using the '-exec' other UNIX commands can be executed on files or folders found.

```
admin@Ubuntu:~$ ls
Desktop    Downloads  Pictures   temp       test1.txt  Videos
Documents  Music      Public     Templates  test.txt

admin@Ubuntu:~$ find ./temp -name tempTXT.txt
./temp/subtemp2/tempTXT.txt
admin@Ubuntu:~$ find ./temp -name *.txt
find: paths must precede expression: `test.txt'
find: possible unquoted pattern after predicate `-name'?
admin@Ubuntu:~$ find ./temp -name tempTXT.txt -exec rm -i {} \;
rm: remove regular file './temp/subtemp2/tempTXT.txt'? y
admin@Ubuntu:~$ ls
Desktop    Downloads  Pictures   temp       test1.txt  Videos
Documents  Music      Public     Templates  test.txt

admin@Ubuntu:~$ find ./temp -empty
./temp/subtemp1
./temp/subtemp3
./temp/subtemp2
admin@Ubuntu:~$
```

- **wget**

Wget is the non-interactive network downloader which is used to download files from the server even when the user has not logged on to the system and it can work in the background without hindering the current process.

1. To simply download a webpage:
wget <http://example.com/sample.php>
2. To download the file in background
wget -b http://www.example.com/samplepage.php

- **top**

top command is used to show the Linux processes. It provides a dynamic real-time view of the running system. Usually, this command shows the summary information of the system and the list of processes or threads which are currently managed by the Linux Kernel. As soon as you will run this command it will open an interactive command mode where the top half portion will contain the statistics of processes and resource usage. And Lower half contains a list of the currently running processes. Pressing q will simply exit the command mode.

```
Tasks: 280 total,  4 running, 276 sleeping,  0 stopped,  0 zombie
%Cpu(s): 88.8 us, 11.2 sy,  0.0 ni,  0.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  3924.3 total,   296.8 free,  2550.5 used,  1077.0 buff/cache
MiB Swap:   687.5 total,   685.0 free,    2.5 used.  1062.4 avail Mem
PID to renice [default pid = 3305]
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
3305	admin	20	0	3835.3m	520.2m	214.2m	S	27.6	13.3	6:18.03	/usr/li+
6373	admin	20	0	2379.0m	124.2m	100.0m	R	14.9	3.2	0:03.38	/usr/li+
2775	admin	20	0	3634.3m	358.2m	128.8m	R	14.2	9.1	4:01.23	/usr/bi+
3656	admin	20	0	6806.8m	310.2m	101.1m	R	14.2	7.9	1:14.05	/usr/li+
6004	admin	20	0	2574.1m	275.4m	114.2m	S	11.2	7.0	0:14.05	/usr/li+
6051	admin	20	0	2476.6m	185.1m	97.2m	S	4.5	4.7	0:08.66	/usr/li+
2562	admin	20	0	288.9m	104.3m	60.7m	S	3.7	2.7	1:02.37	/usr/li+
6440	admin	20	0	2336.8m	84.3m	72.0m	S	2.2	2.1	0:00.18	/usr/li+
6249	admin	20	0	2369.2m	104.7m	78.8m	S	1.5	2.7	0:01.38	/usr/li+
25	root	20	0	0.0m	0.0m	0.0m	S	0.7	0.0	0:00.30	[kcompa+
890	root	20	0	355.7m	0.8m	0.7m	S	0.7	0.0	0:00.67	/usr/bi+
2473	admin	9	-11	2481.0m	20.1m	15.1m	S	0.7	0.5	0:05.65	/usr/bi+
3591	admin	20	0	2394.3m	118.5m	93.8m	S	0.7	3.0	0:05.47	/usr/li+
6164	admin	20	0	2345.5m	89.6m	76.7m	S	0.7	2.3	0:00.80	/usr/li+
6232	admin	20	0	2343.2m	88.6m	75.7m	S	0.7	2.3	0:00.49	/usr/li+
6415	admin	20	0	804.0m	50.1m	37.8m	S	0.7	1.3	0:00.97	/usr/li+
6434	admin	20	0	20.2m	3.8m	3.0m	R	0.7	0.1	0:00.10	top
1	root	20	0	164.3m	11.0m	7.9m	S	0.0	0.3	0:01.77	/sbin/i+

- **mpstat**

mpstat is a command that is used to report processor related statistics. It accurately displays the statistics of the CPU usage of the system. It displays information about CPU utilization and performance. It initializes the first processor with CPU 0, the second one with CPU 1, and so on.

```
Tasks: 280 total,  4 running, 276 sleeping,  0 stopped,  0 zombie
%Cpu(s): 88.8 us, 11.2 sy,  0.0 ni,  0.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  3924.3 total,   296.8 free,  2550.5 used,  1077.0 buff/cache
MiB Swap:   687.5 total,   685.0 free,    2.5 used.  1062.4 avail Mem
PID to renice [default pid = 3305]
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
3305	admin	20	0	3835.3m	520.2m	214.2m	S	27.6	13.3	6:18.03	/usr/li+
6373	admin	20	0	2379.0m	124.2m	100.0m	R	14.9	3.2	0:03.38	/usr/li+
2775	admin	20	0	3634.3m	358.2m	128.8m	R	14.2	9.1	4:01.23	/usr/bi+
3656	admin	20	0	6806.8m	310.2m	101.1m	R	14.2	7.9	1:14.05	/usr/li+
6004	admin	20	0	2574.1m	275.4m	114.2m	S	11.2	7.0	0:14.05	/usr/li+
6051	admin	20	0	2476.6m	185.1m	97.2m	S	4.5	4.7	0:08.66	/usr/li+
2562	admin	20	0	288.9m	104.3m	60.7m	S	3.7	2.7	1:02.37	/usr/li+
6440	admin	20	0	2336.8m	84.3m	72.0m	S	2.2	2.1	0:00.18	/usr/li+
6249	admin	20	0	2369.2m	104.7m	78.8m	S	1.5	2.7	0:01.38	/usr/li+
25	root	20	0	0.0m	0.0m	0.0m	S	0.7	0.0	0:00.30	[kcompa+
890	root	20	0	355.7m	0.8m	0.7m	S	0.7	0.0	0:00.67	/usr/bi+
2473	admin	9	-11	2481.0m	20.1m	15.1m	S	0.7	0.5	0:05.65	/usr/bi+
3591	admin	20	0	2394.3m	118.5m	93.8m	S	0.7	3.0	0:05.47	/usr/li+

- **netstat**

Netstat command displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships etc.

```
admin@Ubuntu:~$ netstat -a | more
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:domain        0.0.0.0:*               LISTEN
tcp        0      0 localhost:ipp           0.0.0.0:*               LISTEN
tcp        0      0 Ubuntu:56368            ec2-50-17-70-129.:https ESTABLISHED
tcp        0      0 Ubuntu:48718            172.64.154.237:https   ESTABLISHED
tcp        0      0 Ubuntu:56560            bom07s28-in-f2.1e:https ESTABLISHED
tcp        0      0 Ubuntu:56482            bom05s12-in-f2.1e:https ESTABLISHED
tcp        0      0 Ubuntu:59710            103.231.98.193:https   ESTABLISHED
tcp        0      0 Ubuntu:58900            whatsapp-cdn-shv-:https ESTABLISHED
tcp        0      0 Ubuntu:50290            bom12s06-in-f2.1e:https ESTABLISHED
tcp        0      0 Ubuntu:35760            ec2-35-76-247-58.:https ESTABLISHED
tcp        0      0 Ubuntu:54980            map3.hwcdn.net:https    ESTABLISHED
tcp        0      0 Ubuntu:47090            ec2-34-198-143-91:https ESTABLISHED
tcp        0      0 Ubuntu:47920            bom07s20-in-f2.1e:https ESTABLISHED
tcp        0      0 Ubuntu:52278            bom12s18-in-f2.1e:https ESTABLISHED
tcp        0      0 Ubuntu:37278            ec2-50-17-70-129.:https ESTABLISHED
tcp        0      0 Ubuntu:49274            ec2-13-215-14-109:https ESTABLISHED
tcp        0      0 Ubuntu:40490            218.64.98.34.bc.g:https ESTABLISHED
tcp        0      0 Ubuntu:43676            server-108-159-63:https ESTABLISHED
tcp6       0      0 ip6-localhost:ipp      [::]:*                  LISTEN
udp        0      0 0.0.0.0:49661          0.0.0.0:*
udp        0      0 0.0.0.0:631            0.0.0.0:*
--More--
```

- **chown**

Different users in the operating system have ownership and permission to ensure that the files are secure and put restrictions on who can modify the contents of the files.

```
admin@Ubuntu:~$ ls -l
total 44
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Desktop
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Documents
drwxr-xr-x 2 admin admin 4096 Jan  5 20:39 Downloads
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Music
drwxr-xr-x 2 admin admin 4096 Jan  5 21:04 Pictures
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Public
drwxrwxr-x 5 admin admin 4096 Jan  5 20:46 temp
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Templates
-rw-rw-r-- 1 admin admin   39 Jan  5 20:38 test1.txt
-rw-rw-r-- 1 admin admin 1974 Jan  5 20:38 test.txt
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Videos
admin@Ubuntu:~$ sudo chown kalp test.txt
admin@Ubuntu:~$ ls -l
total 44
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Desktop
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Documents
drwxr-xr-x 2 admin admin 4096 Jan  5 20:39 Downloads
drwxr-xr-x 2 admin admin 4096 Jan  5 21:04 Pictures
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Public
drwxrwxr-x 5 admin admin 4096 Jan  5 20:46 temp
drwxr-xr-x 2 admin admin 4096 Jan  5 20:34 Templates
-rw-rw-r-- 1 admin admin   39 Jan  5 20:38 test1.txt
-rw-rw-r-- 1 kalp admin 1974 Jan  5 20:38 test.txt
```

2. Linux commands related with process

- **ps**

ps command is used to list the currently running processes and their PIDs along with some other information depends on different options. It reads the process information from the virtual files in /proc file-system. /proc contains virtual files, this is the reason it's referred as a virtual file system.

```
admin@Ubuntu:~$ ps
  PID TTY          TIME CMD
  6548 pts/0        00:00:00 bash
  9802 pts/0        00:00:00 ps
admin@Ubuntu:~$ ps -r
  PID TTY      STAT   TIME COMMAND
  9803 pts/0    R+      0:00   ps -r
```

- **kill**

kill command in Linux (located in /bin/kill), is a built-in command which is used to terminate processes manually. kill command sends a signal to a process which terminates the process. If the user doesn't specify any signal which is to be sent along with kill command, then default TERM signal is sent that terminates the process.

```
3305 ?          00:11:54 firefox
3364 ?          00:00:00 Socket Process
3377 ?          00:00:00 xdg-desktop-por
3381 ?          00:00:00 xdg-document-po
3390 ?          00:00:01 xdg-desktop-por
3562 ?          00:00:02 WebExtensions
3591 ?          00:00:09 Privileged Cont
3656 ?          00:01:37 Isolated Web Co
3732 ?          00:00:00 update-notifier
4017 ?          00:00:00 RDD Process
4024 ?          00:00:00 Utility Process
4561 ?          00:00:00 sd_dummy
4564 ?          00:00:00 sd_espeak-ng
4570 ?          00:00:00 speech-dispatch
4631 ?          00:00:00 gvfsd-network
4646 ?          00:00:00 gvfsd-dnssd
6138 ?          00:00:00 kworker/u2:0-events_unbound
6528 ?          00:00:05 nautilus
6541 ?          00:00:16 gnome-terminal-
6548 pts/0        00:00:00 bash
8187 ?          00:00:00 kworker/0:1-events
9743 ?          00:00:24 Isolated Web Co
9750 ?          00:00:00 Isolated Web Co
9856 ?          00:00:00 kworker/0:0-events
9903 ?          00:00:00 Isolated Web Co
9923 ?          00:00:10 Isolated Web Co
9950 ?          00:00:00 Isolated Web Co
9952 ?          00:00:00 Web Content
9984 ?          00:00:00 Web Content
10008 ?         00:00:00 Web Content
10082 ?          00:00:01 gedit
10097 pts/1        00:00:00 bash
10127 pts/0        00:00:00 sudo
10128 pts/0        00:00:00 apt-get
10131 pts/0        00:00:01 http
10132 pts/0        00:00:01 http
10135 pts/0        00:00:00 gpgv
10266 pts/0        00:00:02 store
10359 ?          00:00:00 kworker/u2:1-ext4-rsv-conversion
10377 pts/1        00:00:00 ps
admin@Ubuntu:~$ kill 3305
admin@Ubuntu:~$
```