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

```
adminstrator@adminstrator-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
adminstrator@adminstrator-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.

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

- **help**

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

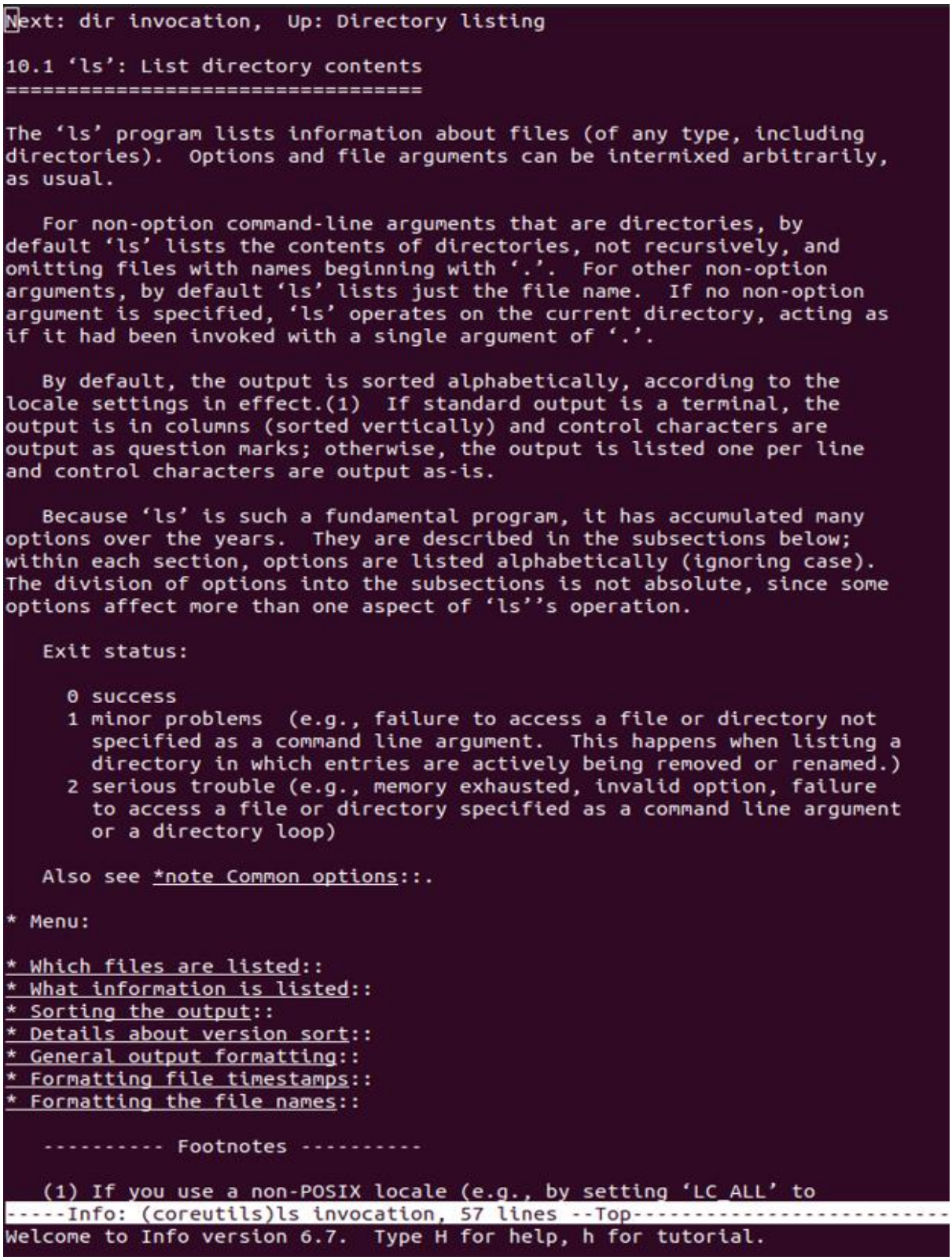
  options

  - -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.

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



- **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.

- **who**
  shows current user information

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

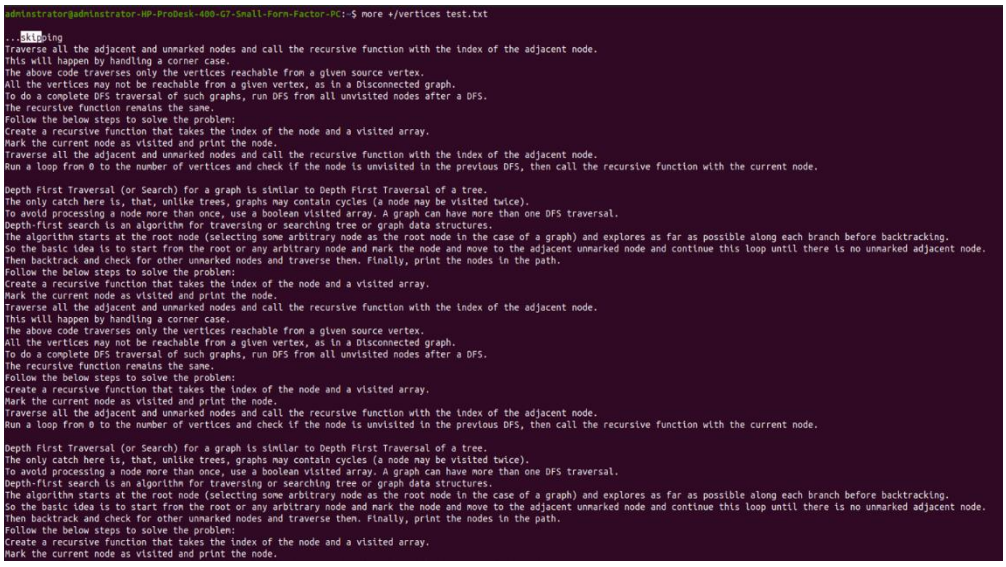
- **pwd**
  pwd stands for **P**rint **W**orking **D**irectory. It prints the path of the working directory, starting from the root.

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

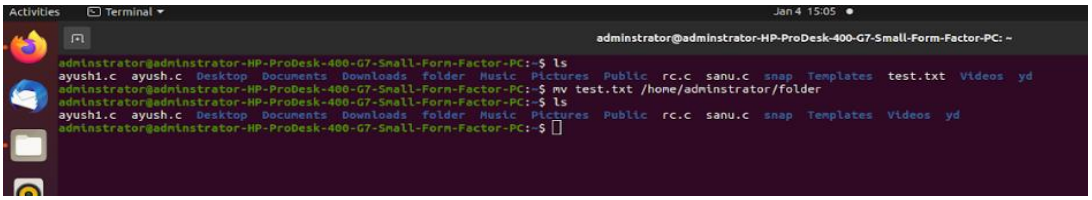
```
adminstrator@adminstrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$ cat test.txt
Hy there.
It is a test file for cad command.
adminstrator@adminstrator-HP-ProDesk-400-G7-Small-Form-Factor-PC:~$
```

- **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.



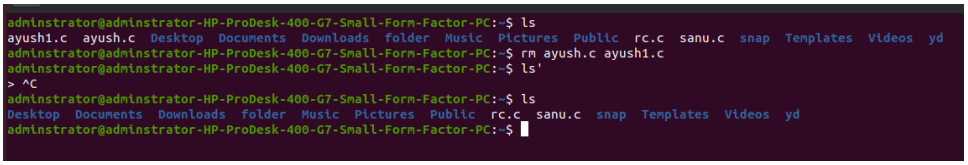
- **mv**

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



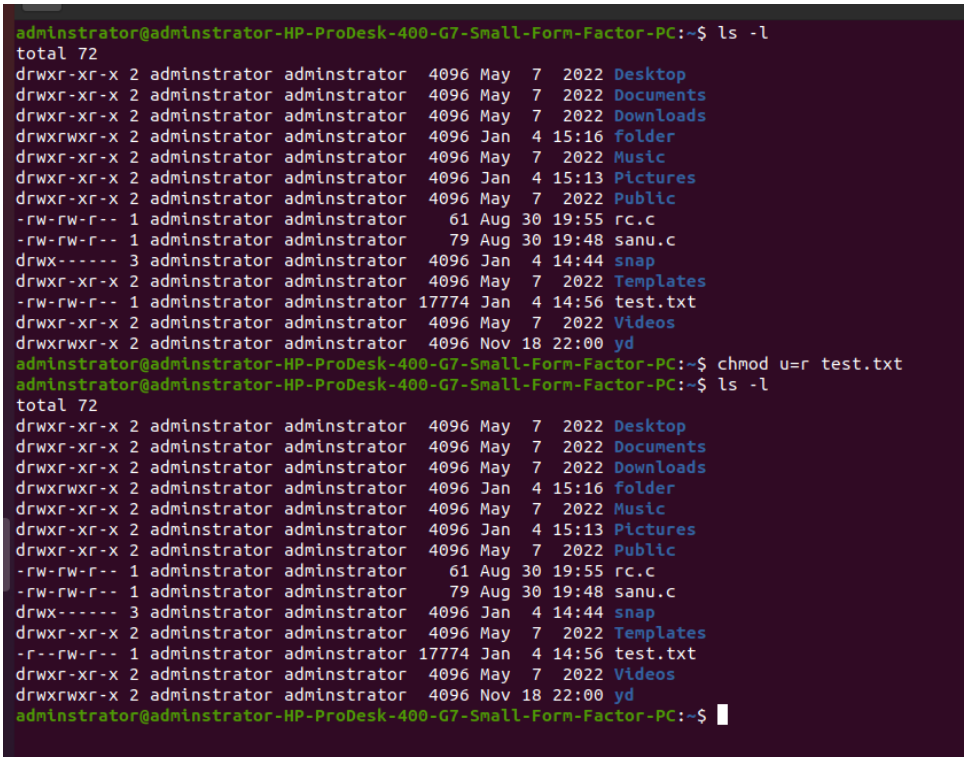
- **rm**

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



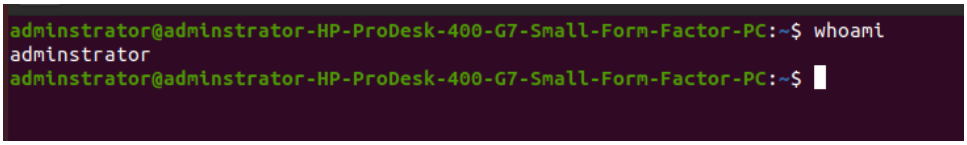
- **chmod**

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



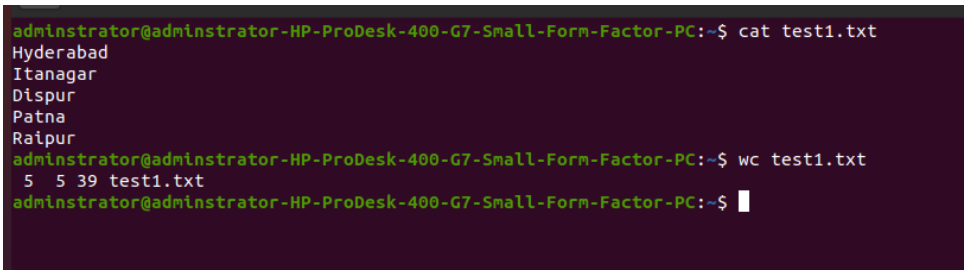
- **whoami**

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



- **wc**

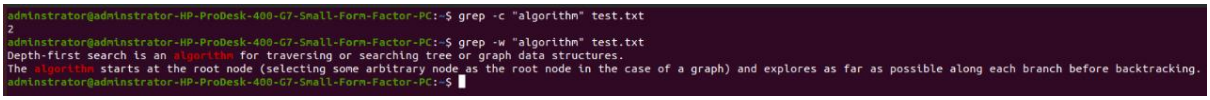
  wc (word count) command is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.



- **grep**

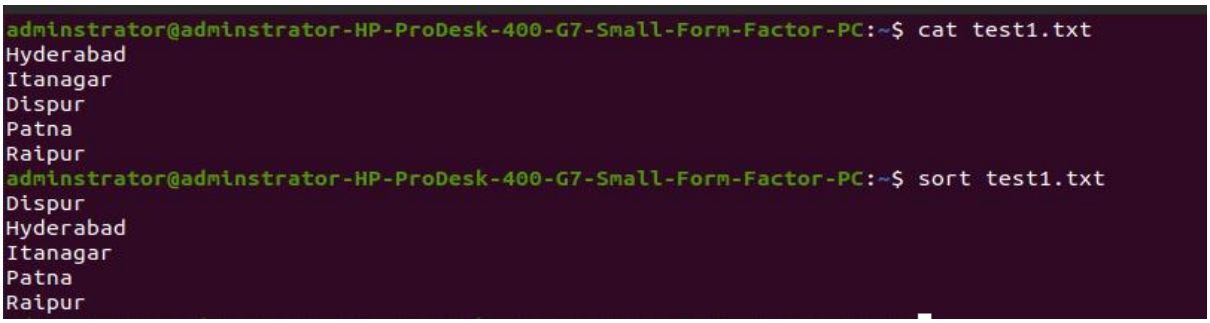
  grep (global search for regular expression and print out) filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression.

  -c: This print only a count of the lines that match a pattern
  -w: Match whole word



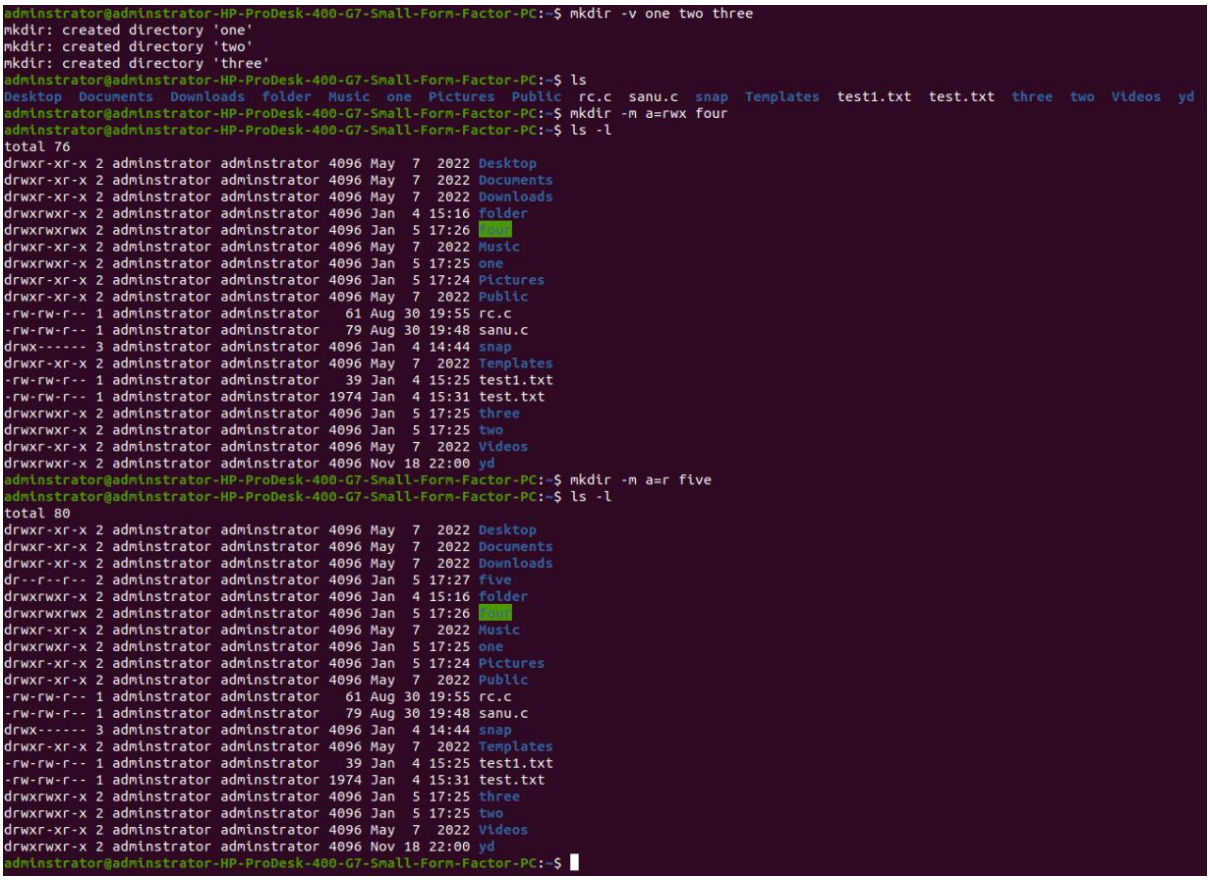
- **sort**

  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.



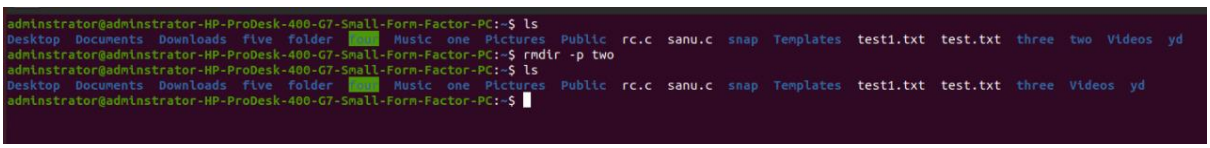
- **mkdir**

  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.



- **rmdir**

  rmdir command is used 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 directories or files in it then this cannot be removed by rmdir command.

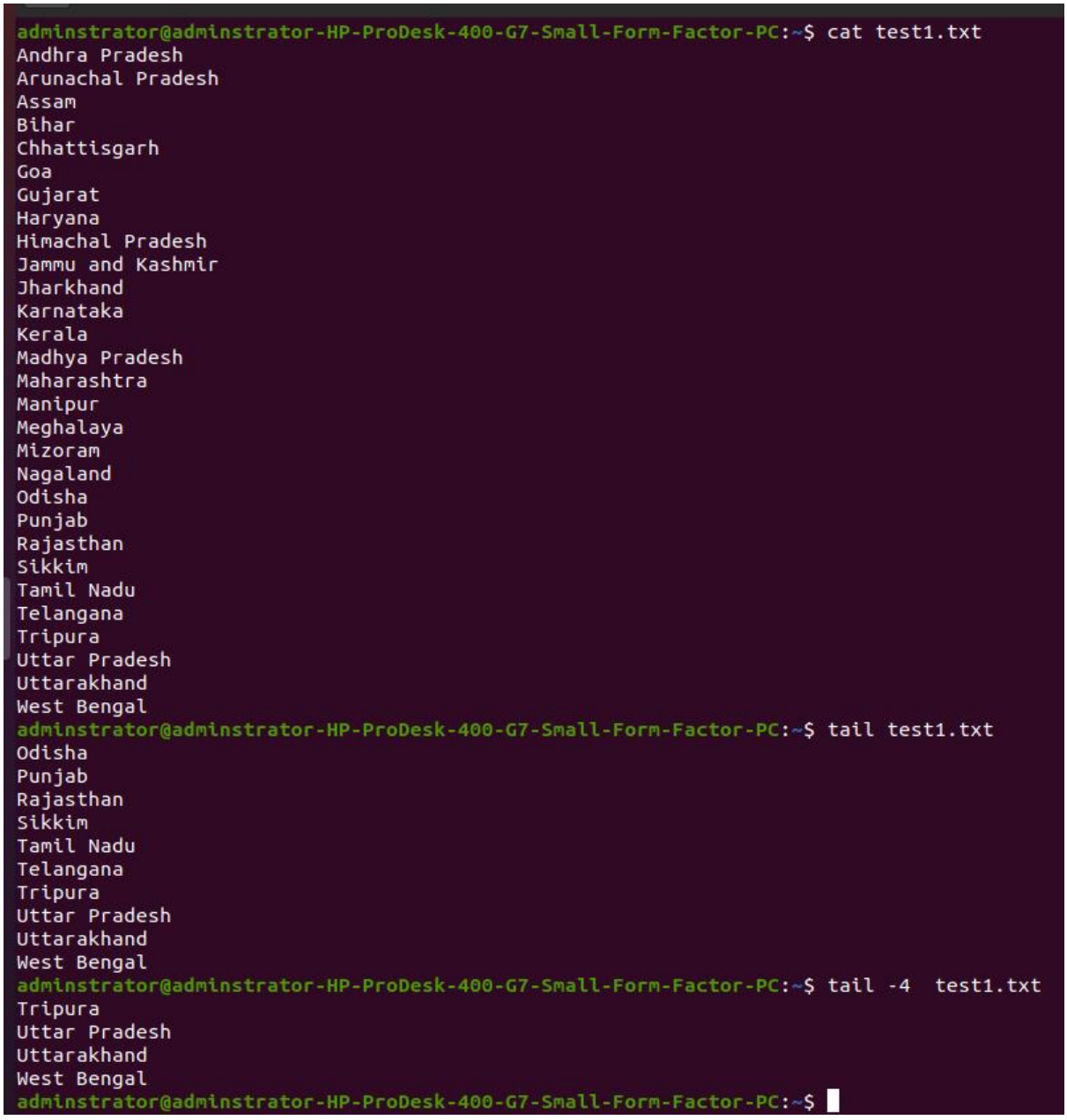


- **cd**

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

- **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.



- **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.

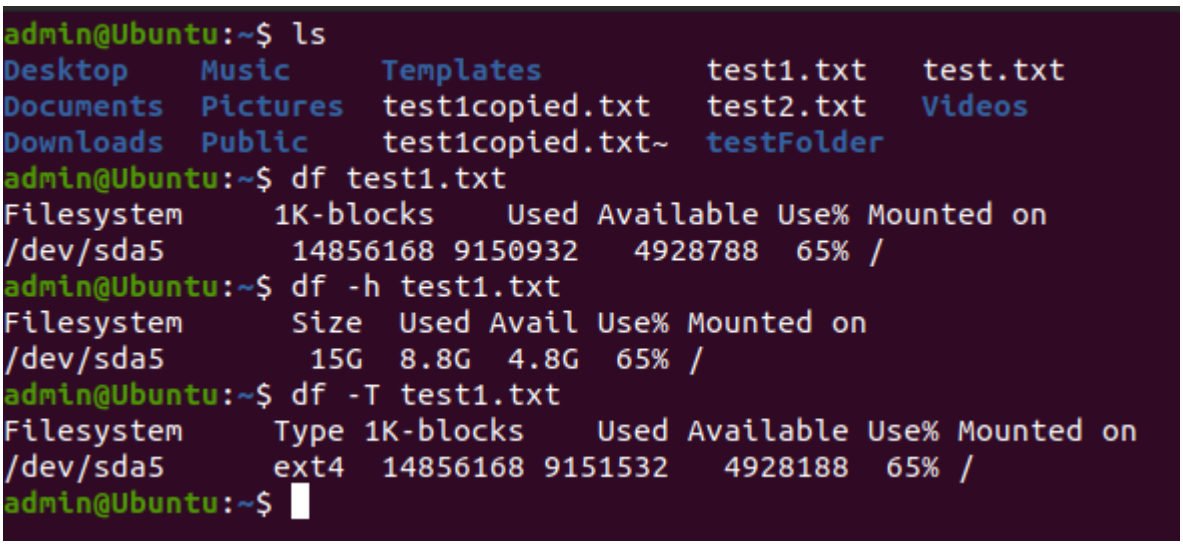
```
admin@Ubuntu:~$ cat test1.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ cat test2.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ diff test1.txt test2.txt
admin@Ubuntu:~$ cat test1.txt
Gujarat
Uttar Pradesh
Kolkata
Bihar
Jammu and Kashmir
admin@Ubuntu:~$ 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.

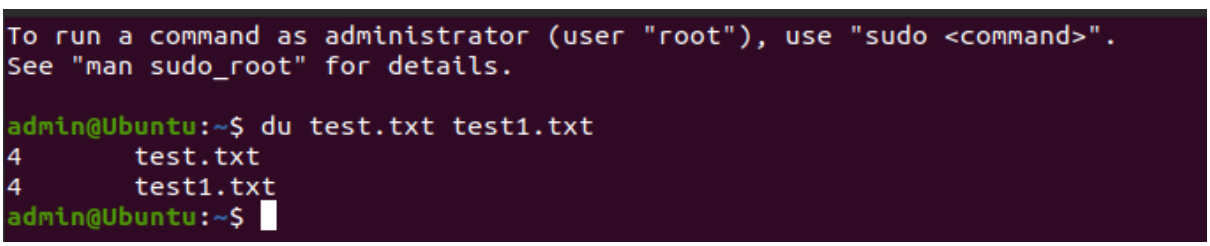
- **df**

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



- **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.



- **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.

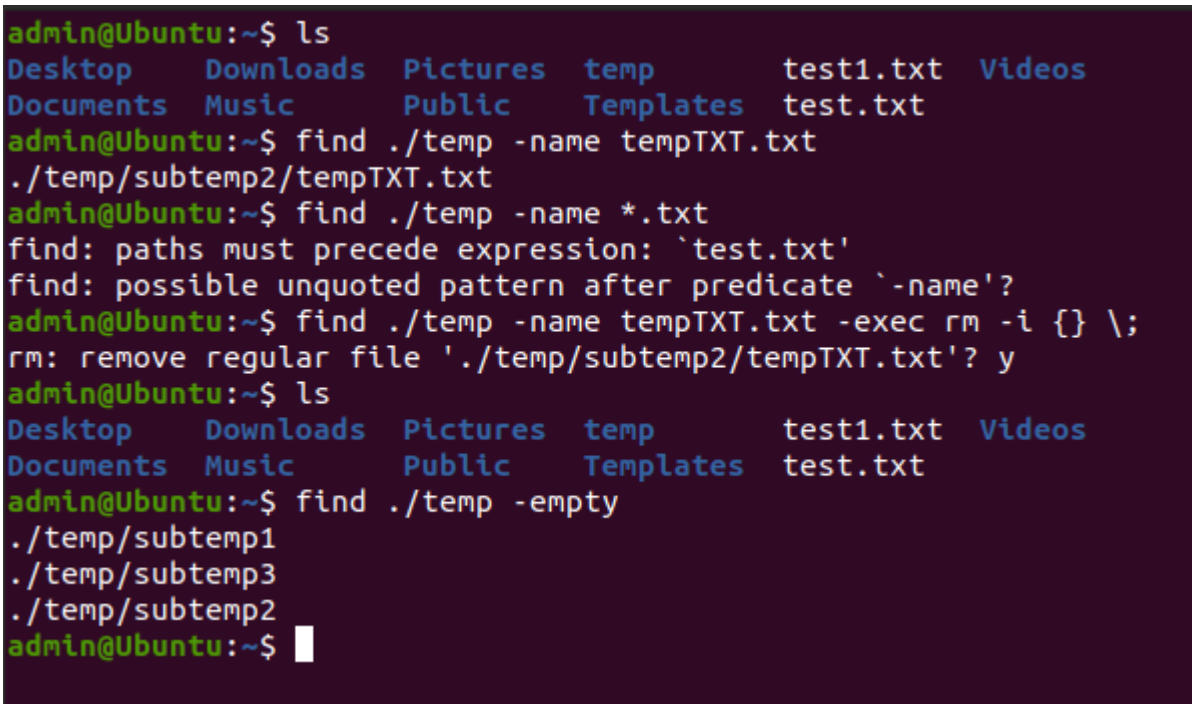
  apt-get update

  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.



- **wget**

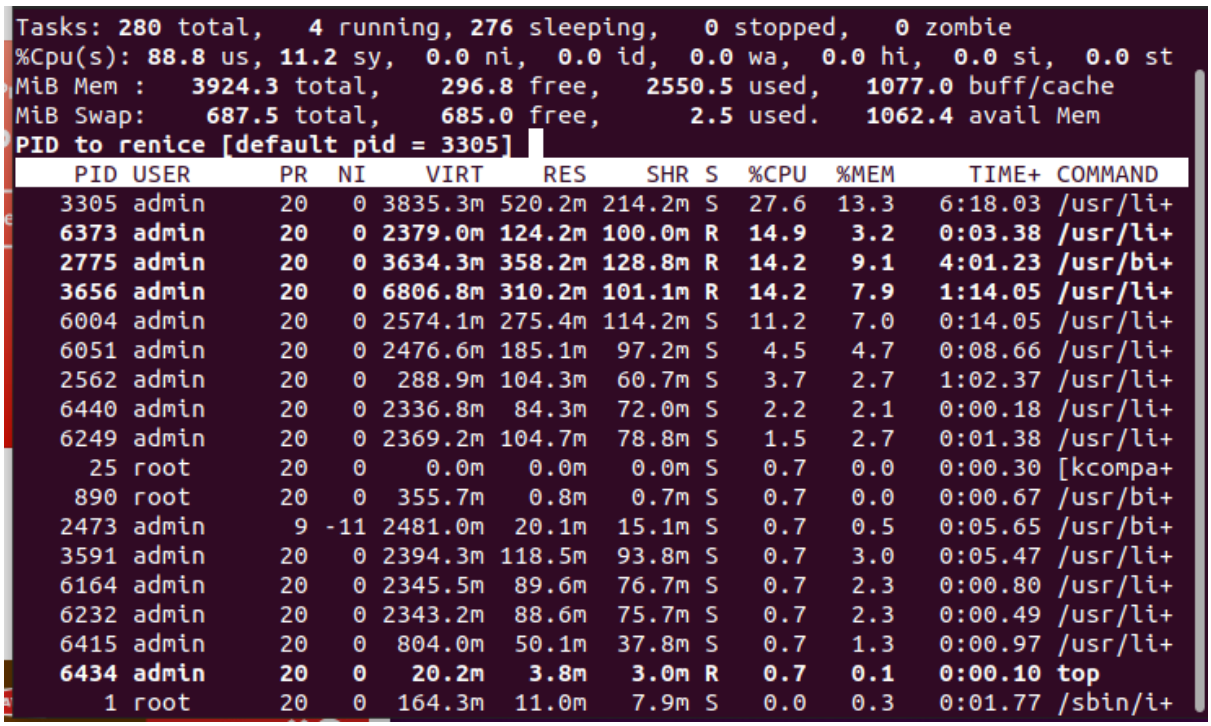
  Wget is the non-interactive network downloader which is used to download files from the server even when the user has not logged on to the system and it can work in the background without hindering the current process.

  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

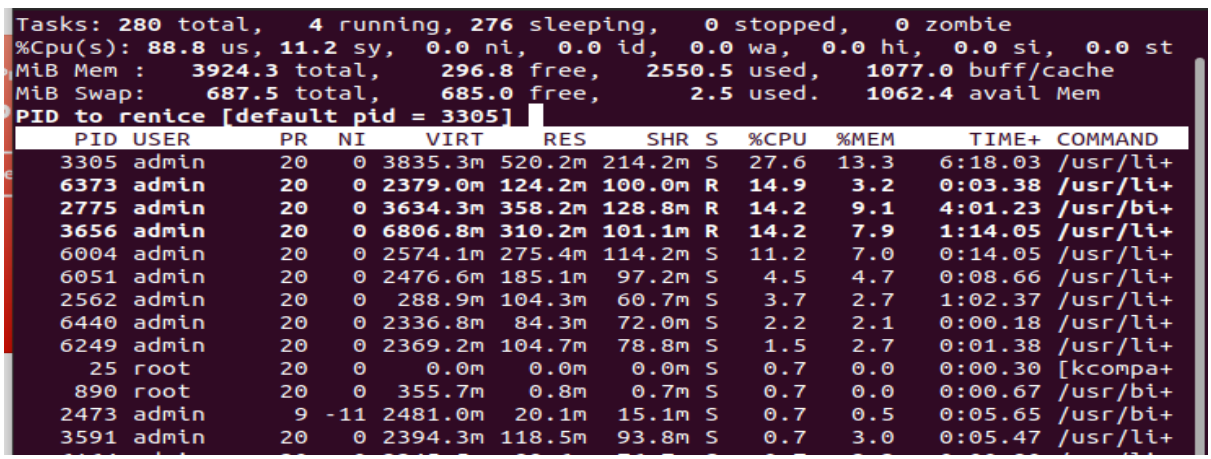
- **top**

  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.



- **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.



- **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 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 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:~$
```