

# U18C0018

## Shubham Shekhaliya

### OS

## Assignment-1

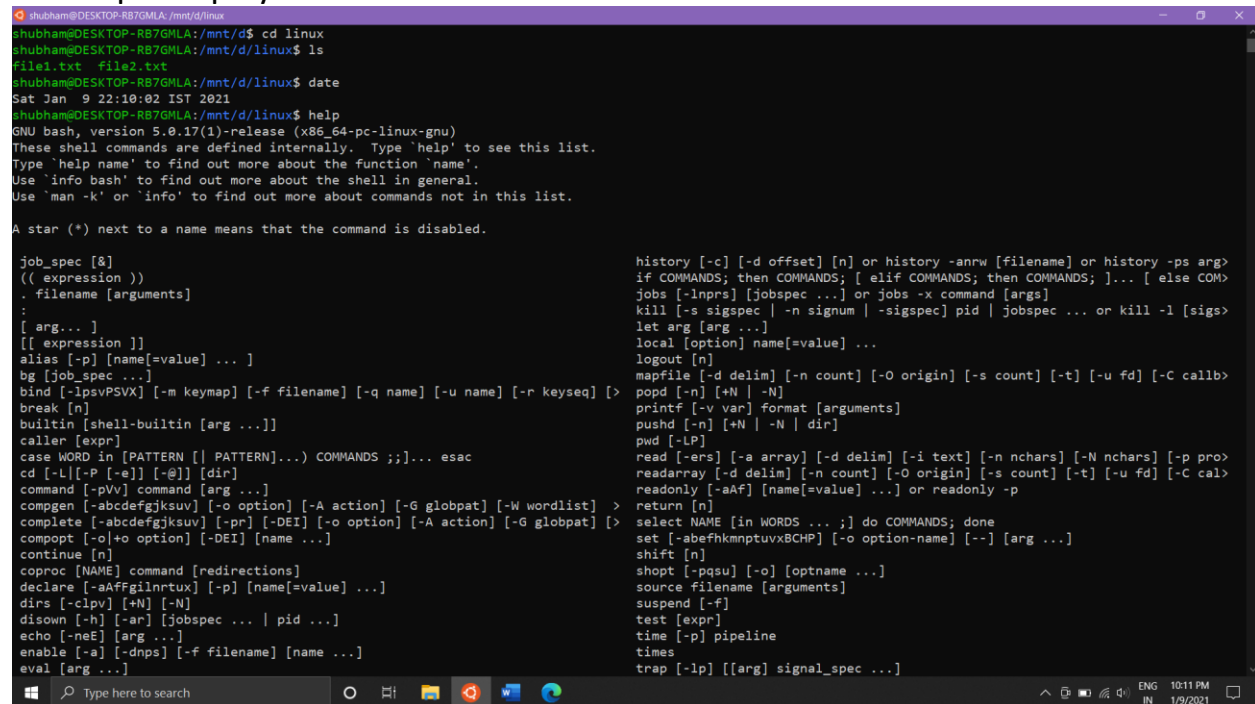
Execute all commands on Linux terminal and note down the functionality of each.

(1) Basic Unix/Linux commands: ls, date, help, info, man, who, pwd, cat, more, mv, rm, chmod, logout, wc, grep, sort, mkdir, rmdir, cd, tail, cmp, diff, cp, clear, df, du, uname, apt-get, find, wget, top, mpstat, netstat, sar

1-> ls – List all files of current directory

2-> date – print or set the system date and time

3-> help - Display information about builtin commands



```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ cd linux
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ ls
file1.txt  file2.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ date
Sat Jan  9 22:10:02 IST 2021
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ help
GNU bash, version 5.0.17(1)-release (x86_64-pc-linux-gnu)
These shell commands are defined internally.  Type 'help' to see this list.
Type 'help name' to find out more about the function 'name'.
Use 'info bash' to find out more about the shell in general.
Use 'man -k' or 'info' to find out more about commands not in this list.

A star (*) next to a name means that the command is disabled.

job_spec [&]
(( expression ))
. filename [arguments]
:
[ arg... ]
[[ expression ]]
alias [-p] [name=value] ...
bg [job_spec ...]
bind [-lpsvPSVX] [-m keymap] [-f filename] [-q name] [-u name] [-r keyseq] >
break [n]
builtin [shell-builtin [arg ...]]
caller [expr]
case WORD in [PATTERN [| PATTERN]...] COMMANDS ;;)... esac
cd [-L][-P [-e]] [-@] [dir]
command [-pVv] command [arg ...]
compgen [-abcdefgjkuv] [-o option] [-A action] [-G globpat] [-W wordlist] >
complete [-abcdefgjkuv] [-pr] [-DEI] [-o option] [-A action] [-G globpat] >
compopt [-o+o option] [-DEI] [name ...]
continue [n]
coproc [NAME] command [redirections]
declare [-aAfFgIlNrtux] [-p] [name=value] ...
dirs [-clpv] [+N] [-N]
disown [-h] [-ar] [jobspec ... | pid ...]
echo [-neE] [arg ...]
enable [-a] [-dnps] [-f filename] [name ...]
eval [arg ...]

history [-c] [-d offset] [n] or history -anrw [filename] or history -ps arg>
if COMMANDS; then COMMANDS; [ elif COMMANDS; then COMMANDS; ]... [ else COM>
jobs [-lnprs] [jobspec ...] or jobs -x command [args]
kill [-s sigspec | -n signal | -sigspec] pid | jobspec ... or kill -l [sig>
let arg [arg ...]
local [option] name[=value] ...
logout [n]
mapfile [-d delim] [-n count] [-O origin] [-s count] [-t] [-u fd] [-C callb>
popd [-n] [+N | -N]
printf [-v var] format [arguments]
pushd [-n] [+N | -N | dir]
pwd [-LP]
read [-ers] [-a array] [-d delim] [-i text] [-n nchars] [-N nchars] [-p pro>
readarray [-d delim] [-n count] [-O origin] [-s count] [-t] [-u fd] [-C cal>
readonly [-aAf] [name=value] ... or readonly -p
return [n]
select NAME [in WORDS ... ;] do COMMANDS; done
set [-abefhkmnptuvxBCHP] [-o option-name] [--] [arg ...]
shift [n]
shopt [-pqsu] [-o] [optname ...]
source filename [arguments]
suspend [-f]
test [expr]
time [-p] pipeline
times
trap [-lp] [[arg] signal_spec ...]
```

## 4-> info- read Info documents

```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux
File: dir,      Node: Top,      This is the top of the INFO tree.

This is the Info main menu (aka directory node).
A few useful Info commands:

'g' quits;
'H' lists all Info commands;
'h' starts the Info tutorial;
'mTexinfo RET' visits the Texinfo manual, etc.

* Menu:

Basics
* Common options: (coreutils)Common options.
* Coreutils: (coreutils).      Core GNU (file, text, shell) utilities.
* Date input formats: (coreutils)Date input formats.
* Ed: (ed).                    The GNU line editor
* File permissions: (coreutils)File permissions.
                                Access modes.
* Finding files: (find).       Operating on files matching certain criteria.

Compression
* Gzip: (gzip).               General (de)compression of files (lzw).

Editors
* nano: (nano).              Small and friendly text editor.

General Commands
* Screen: (screen).          Full-screen window manager.

GNU organization
* Maintaining Findutils: (find-maint).
                                Maintaining GNU findutils

GNU Utilities
* dirmngr-client: (gnupg).     X.509 CRL and OCSP client.
* dirmngr: (gnupg).           X.509 CRL and OCSP server.
* gpg-agent: (gnupg).         The secret key daemon.
-----Info: (dir)Top, 180 lines --Top-----
Welcome to Info version 6.7.  Type H for help, h for tutorial.
```

## 5-> man – an interface to the on-line reference manuals

```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux
MAN(1)                                Manual pager utils                                MAN(1)

NAME
    man - an interface to the system reference manuals

SYNOPSIS
    man [man options] [[section] page ...] ...
    man -k [apropos options] regexp ...
    man -K [man options] [section] term ...
    man -f [whatis options] page ...
    man -l [man options] file ...
    man -w|-W [man options] page ...

DESCRIPTION
    man is the system's manual pager.  Each page argument given to man is normally the name of a program, utility or function.  The manual page associated with each of these arguments is then found and displayed.  A section, if provided, will direct man to look only in that section of the manual.  The default action is to search in all of the available sections following a pre-defined order (see DEFAULTS), and to show only the first page found, even if page exists in several sections.

    The table below shows the section numbers of the manual followed by the types of pages they contain.

    1 Executable programs or shell commands
    2 System calls (functions provided by the kernel)
    3 Library calls (functions within program libraries)
    4 Special files (usually found in /dev)
    5 File formats and conventions, e.g. /etc/passwd
    6 Games
    7 Miscellaneous (including macro packages and conventions), e.g. man(7), groff(7)
    8 System administration commands (usually only for root)
    9 Kernel routines [Non standard]

    A manual page consists of several sections.

    Conventional section names include NAME, SYNOPSIS, CONFIGURATION, DESCRIPTION, OPTIONS, EXIT STATUS, RETURN VALUE, ERRORS, ENVIRONMENT, FILES, VERSIONS, CONFORMING TO, NOTES, BUGS, EXAMPLE, AUTHORS, and SEE ALSO.

    The following conventions apply to the SYNOPSIS section and can be used as a guide in other sections.

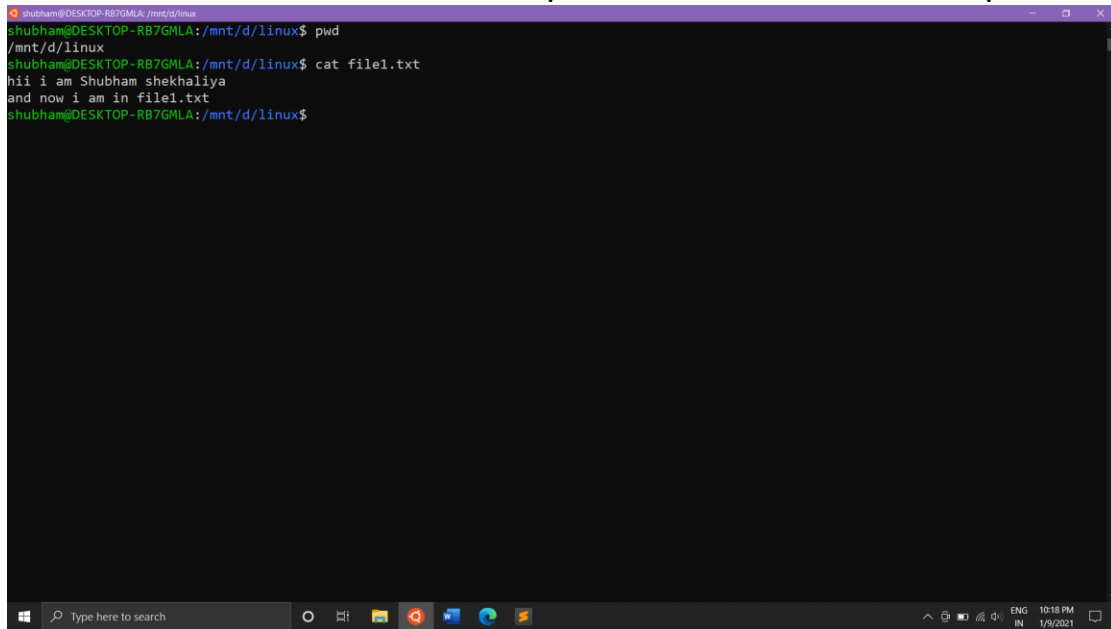
    bold text      type exactly as shown.

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

6-> who – show who is logged in

7-> pwd – print name of current/working directory

8-> cat – concatenate files and print on the standard output

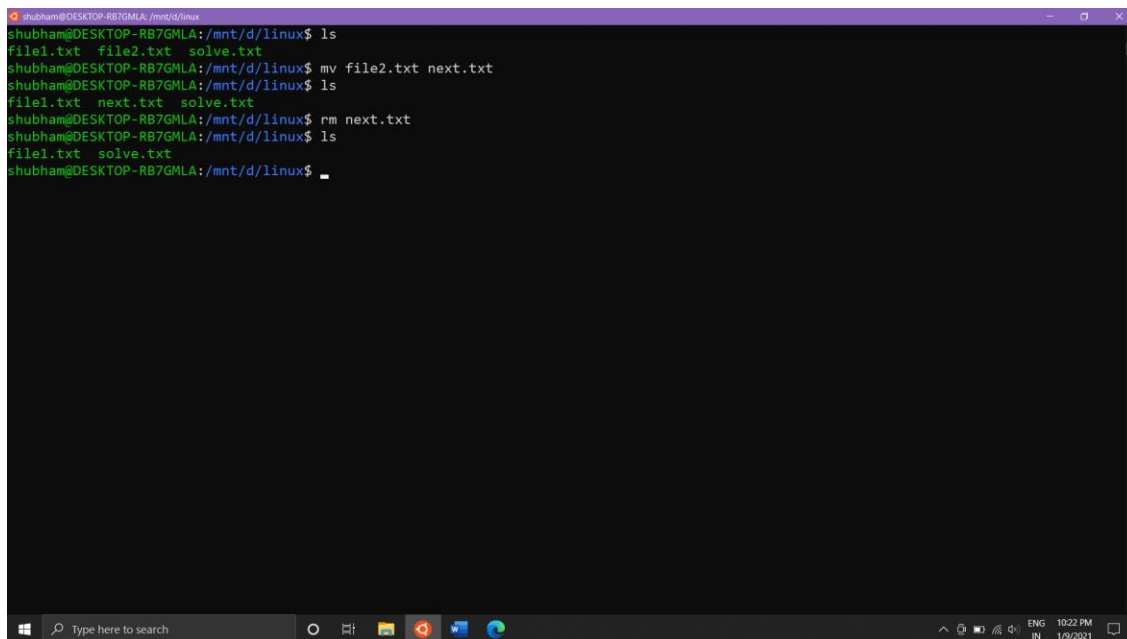
A terminal window titled 'shubham@DESKTOP-RB7GMLA: /mnt/d/linux' showing the execution of 'pwd' and 'cat file1.txt'. The output of 'pwd' is '/mnt/d/linux'. The output of 'cat file1.txt' is 'hii i am Shubham shekhaliya' followed by 'and now i am in file1.txt' on a new line.

```
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ pwd
/mnt/d/linux
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ cat file1.txt
hii i am Shubham shekhaliya
and now i am in file1.txt
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$
```

9-> more – Open a file for interactive reading, allowing scrolling and search(in forward direction only).

10->mv – move or rename files and directories

11-> rm – remove files and directories

A terminal window titled 'shubham@DESKTOP-RB7GMLA: /mnt/d/linux' showing a sequence of commands: 'ls', 'mv file2.txt next.txt', 'ls', 'rm next.txt', and 'ls'. The output of the first 'ls' is 'file1.txt file2.txt solve.txt'. After the 'mv' command, the output of the second 'ls' is 'file1.txt next.txt solve.txt'. After the 'rm' command, the output of the third 'ls' is 'file1.txt solve.txt'.

```
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ ls
file1.txt file2.txt solve.txt
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ mv file2.txt next.txt
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ ls
file1.txt next.txt solve.txt
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ rm next.txt
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ ls
file1.txt solve.txt
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ _
```

12-> chmod - Change the access permissions of a file or directory.

Eg. Give the [u]ser rights to [r]ead and [w]rite to a file/directory: chmod u+rw {{file\_or\_directory}}

13-> Whoami - Print the username associated with the current effective user ID.

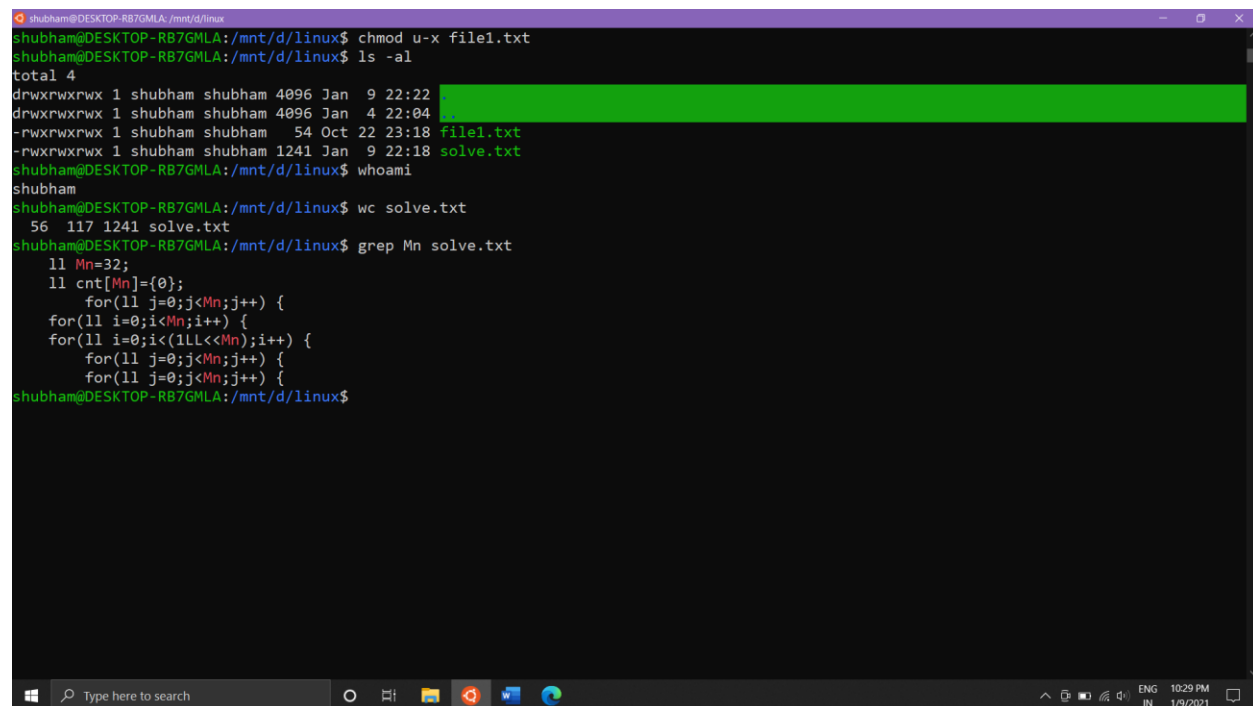
14-> Logout - logout command allows you to programmatically logout from your session. causes the session manager to take the requested action immediately.

\$ logout

- User gets logged out

15-> wc – count lines, words or bytes

16-> Grep - Matches patterns in input text. Supports simple patterns and regular expressions.



```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ chmod u-x file1.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ ls -al
total 4
drwxrwxrwx 1 shubham shubham 4096 Jan  9 22:22 .
drwxrwxrwx 1 shubham shubham 4096 Jan  4 22:04 ..
-rwxrwxrwx 1 shubham shubham  54 Oct 22 23:18 file1.txt
-rwxrwxrwx 1 shubham shubham 1241 Jan  9 22:18 solve.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ whoami
shubham
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ wc solve.txt
 56 117 1241 solve.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ grep Mn solve.txt
 11 Mn=32;
 11 cnt[Mn]={0};
    for(11 j=0;j<Mn;j++) {
  for(11 i=0;i<Mn;i++) {
    for(11 i=0;i<(111<<Mn);i++) {
      for(11 j=0;j<Mn;j++) {
        for(11 j=0;j<Mn;j++) {
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$
```

```
hshubham@DESKTOP-BB70MJA: ~/motd/linux$  
for(ll i=0;i<(ll<<9);i++) {  
    for(ll j=0;j<9;j++) {  
        for(ll k=0;k<9;k++) {  
  
hshubham@DESKTOP-BB70MJA:/mnt/d/linux$ sort solve.txt  
  
        cnt[j]++;  
        pt++;  
        val+= cnt[j] * (ll<<9);  
        continue;  
        if(((ll<<9)>j))  
            if(((ll<<9)>k))  
                if((x&k)(ll<<9))  
                    mx=val;  
                    res=x;  
                    cout<<" ln"; return ;  
                    for(ll j=0;j<9;j++) {  
                        for(ll k=0;k<9;k++) {  
                            for(ll l=0;l<9;l++) {  
                                if(pt!=k)  
                                    if(val>mx) {  
                                        ll pt=0;  
                                        ll val=0;  
                                        ll x; cin>>x;  
                                        solve();  
                                        tp+=cnt[i];  
                                    }  
                                }  
                                }  
                                }  
                                } else if(val==mx) {  
cerr << "time : " << 1000 * ((double) clock()) / (double) CLOCKS_PER_SEC << "ms\n";  
cin.tie(NULL);  
cin>>n;k;  
cin>>t;  
// DON'T FORGET IT. ^^^  
cout<<res<<endl;  
for(ll i=0;i<(ll<<9);i++) {  
    for(ll j=0;j<9;j++) {  
        for(ll k=0;k<9;k++) {  
            for(long int tt=1;tt<=t;tt++){  
                if(tp==0) {  
ios_base::sync_with_stdio(false);  
ll mn=32;  
ll cnt[mn]=0;  
ll mx=-LLONG_MIN,res=0;  
ll n,k;  
ll tp=0;  
long int t=1;  
return 0;
```

19-> Rmdir - delete empty directory

20-> Cd - change directory

22-> Cmp - Compare two files.

```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ mkdir temp
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ ls
file1.txt  solve.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ rmdir temp
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ ls
file1.txt  solve.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ cd ..
shubham@DESKTOP-RB7GMLA:/mnt/d$ cd linux
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ tail -n 10 solve.txt
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    long int t=1;
    cin>t;           // DON'T FORGET IT. ^^^
    for(long int tt=1;tt<=t;tt++){
        solve();
    }
    cerr << "Time : " << 1000 * ((double) clock()) / ((double) CLOCKS_PER_SEC << "ms\n";
    return 0;
}shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ cmp file1.txt solve.txt
file1.txt solve.txt differ: byte 1, line 1
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$
```

## 23-> Diff - Compare files and directories.

```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ diff file1.txt solve.txt
file1.txt solve.txt differ: byte 1, line 1
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ diff file1.txt solve.txt
1,2c1,57
< hii i am Shubham shekhaliya
< and now i am in file1.txt
---
> #include <bits/stdc++.h>
> using namespace std;
>
> void solve() {
>     ll n,k;
>     cin>>n>>k;
>     ll Mn=32;
>     ll cnt[Mn]={0};
>     for(ll i=0;i<n;i++) {
>         ll x; cin>>x;
>         for(ll j=0;j<Mn;j++) {
>             if((x&(1LL<<j)))
>                 cnt[j]++;
>         }
>     }
>     ll tp=0;
>     for(ll i=0;i<Mn;i++) {
>         tp+=cnt[i];
>     }
>     if(tp==0) {
>         cout<<"-1\n"; return ;
>     }
>     ll mx=LLONG_MIN,res=0;
>     for(ll i=0;i<(1LL<<Mn);i++) {
>         ll pt=0;
>         for(ll j=0;j<Mn;j++) {
>             if((i&(1LL<<j)))
>                 pt++;
>         }
>         if(pt!=k)
>             continue;
>         ll val=0;
```

## 24-> Cp - Copy files and directories.

```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux/temp$ mkdir temp
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ ls
file1.txt  solve.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ cp file1.txt temp
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ cd temp
shubham@DESKTOP-RB7GMLA:/mnt/d/linux/temp$ cat file1.txt
hii i am Shubham shekhaliya
and now i am in file1.txt
shubham@DESKTOP-RB7GMLA:/mnt/d/linux/temp$
```

25-> Clear - clear screen of terminal

26-> Du - Disk usage: estimate and summarize file and directory space usage.

Disk usage of file MIT in KB and MB is shown above.

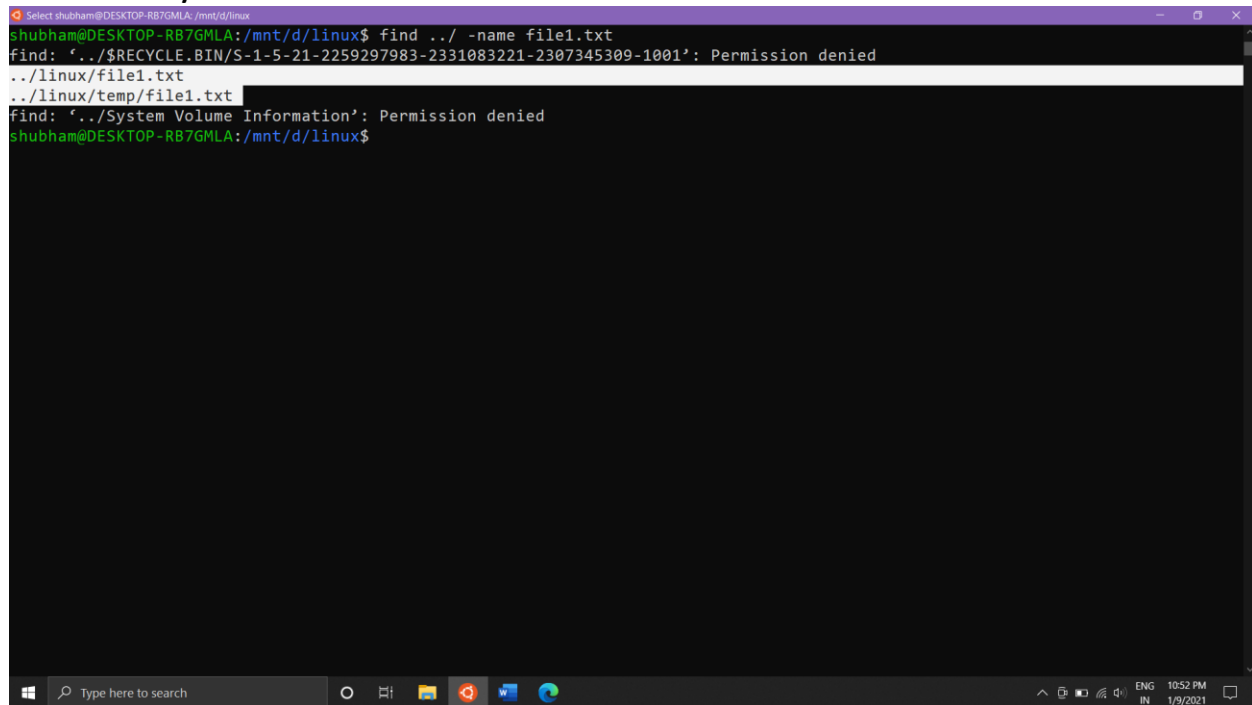
27-> Df - Gives an overview of the file system disk space usage

28-> Uname - Print details about the current machine and the operating system running on it.

29-> Apt-get - Debian and Ubuntu package management utility. Search for packages using apt-cache.

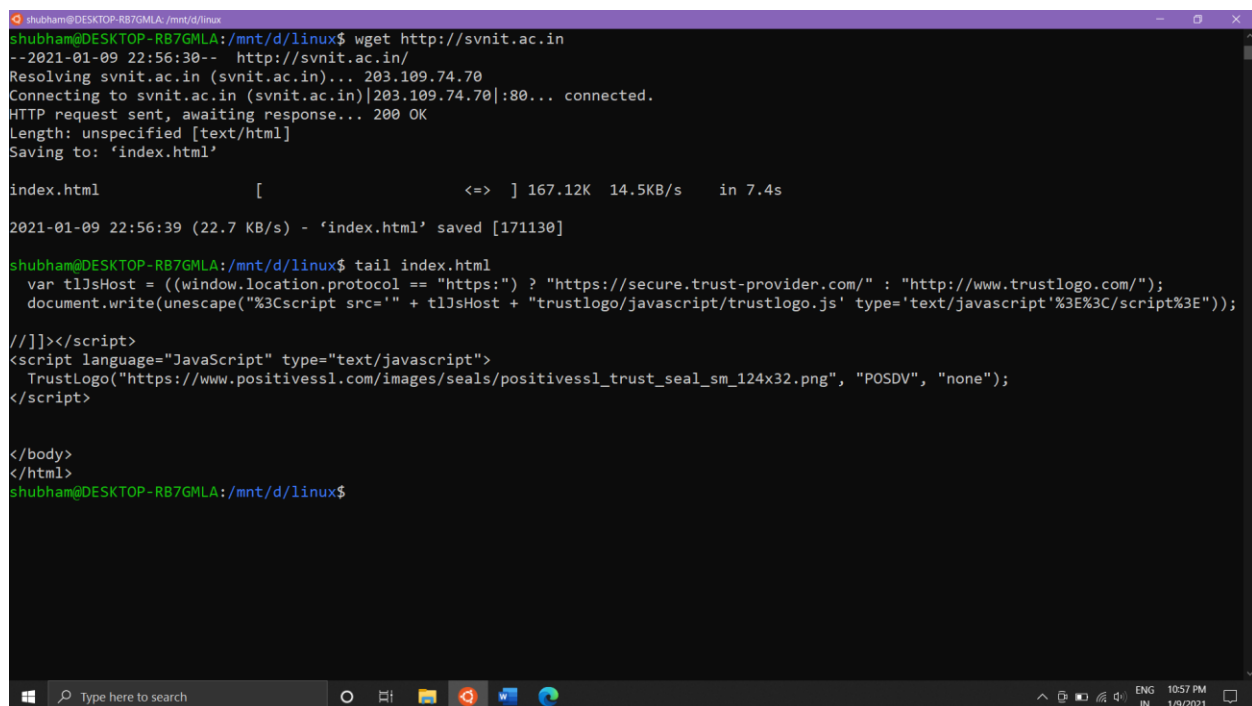
```
shubham@DESKTOP-RB7GMLA:/mnt/d
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ cd ..
shubham@DESKTOP-RB7GMLA:/mnt/d$ du -m linux
0      linux/temp
1      linux
shubham@DESKTOP-RB7GMLA:/mnt/d$ du -k linux
0      linux/temp
4      linux
shubham@DESKTOP-RB7GMLA:/mnt/d$ df
Filesystem      1K-blocks      Used Available Use% Mounted on
rootfs          746951292    72973408 673977884   10% /
none            746951292    72973408 673977884   10% /dev
none            746951292    72973408 673977884   10% /run
none            746951292    72973408 673977884   10% /run/lock
none            746951292    72973408 673977884   10% /run/shm
none            746951292    72973408 673977884   10% /run/user
tmpfs           746951292    72973408 673977884   10% /sys/fs/cgroup
C:\             746951292    72973408 673977884   10% /mnt/c
D:\             315467772    1219628  314248144    1% /mnt/d
E:\             315466748    5255912  310210836    2% /mnt/e
F:\             559787004    116778940 443008064   21% /mnt/f
shubham@DESKTOP-RB7GMLA:/mnt/d$ uname -srv
Linux 4.4.0-19041-Microsoft #488-Microsoft Mon Sep 01 13:43:00 PST 2020
shubham@DESKTOP-RB7GMLA:/mnt/d$ sudo apt-get autoremove
[sudo] password for shubham:
Reading package lists... Done
Building dependency tree
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 75 not upgraded.
shubham@DESKTOP-RB7GMLA:/mnt/d$
```

30-> Find - Find files or directories under the given directory tree, recursively



```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ find ../ -name file1.txt
find: './$RECYCLE.BIN/S-1-5-21-2259297983-2331083221-2307345309-1001': Permission denied
../linux/file1.txt
../linux/temp/file1.txt
find: './System Volume Information': Permission denied
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$
```

31-> wget – Download files from the web. Supports HTTP, HTTPS and FTP



```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ wget http://svnit.ac.in
--2021-01-09 22:56:30-- http://svnit.ac.in/
Resolving svnit.ac.in (svnit.ac.in)... 203.109.74.70
Connecting to svnit.ac.in (svnit.ac.in)|203.109.74.70|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/html]
Saving to: 'index.html'

index.html          [          ] 167.12K  14.5KB/s   in 7.4s

2021-01-09 22:56:39 (22.7 KB/s) - 'index.html' saved [171130]

shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ tail index.html
var t1JsHost = ((window.location.protocol == "https:") ? "https://secure.trust-provider.com/" : "http://www.trustlogo.com/");
document.write(unescape("%3Cscript src='" + t1JsHost + "trustlogo/javascript/trustlogo.js' type='text/javascript'%3E%3C/script%3E"));

//]]></script>
<script language="JavaScript" type="text/javascript">
TrustLogo("https://www.positivessl.com/images/seals/positivessl_trust_seal_sm_124x32.png", "POSDV", "none");
</script>

</body>
</html>
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$
```



32-> top- display dynamic real time information about running processes

```
shubham@DESKTOP-RB7GMLA /mnt/d/linux
top - 22:57:57 up 57 min, 0 users, load average: 0.52, 0.58, 0.59
Tasks:  4 total,   1 running,   3 sleeping,   0 stopped,   0 zombie
%Cpu(s):  1.7 us,   2.6 sy,   0.0 ni,  95.7 id,   0.0 wa,   0.0 hi,   0.0 si,   0.0 st
MiB Mem :  8889.6 total,   3530.2 free,   4335.5 used,   224.0 buff/cache
MiB Swap: 24576.0 total,  24183.0 free,   393.0 used,  3623.5 avail Mem

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM    TIME+  COMMAND
    1 root        20   0   8936   316   272  S   0.0   0.0   0:00.18 init
     9 root        20   0   8936   224   176  S   0.0   0.0   0:00.01 init
    10 shubham     20   0  18080  3640  3544  S   0.0   0.0   0:01.03 bash
    163 shubham    20   0  18912  2076  1452  R   0.0   0.0   0:00.01 top
```

33-> mpstat – report CPU statistics

34-> netstat – display network related information such as open connections, open socket ports, etc.

35-> sar – monitor performance of various linux subsystems Displays performance every 3 seconds.

```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ mpstat
Linux 4.4.0-19041-Microsoft (DESKTOP-RB7GMLA) 01/09/21 _x86_64_ (8 CPU)

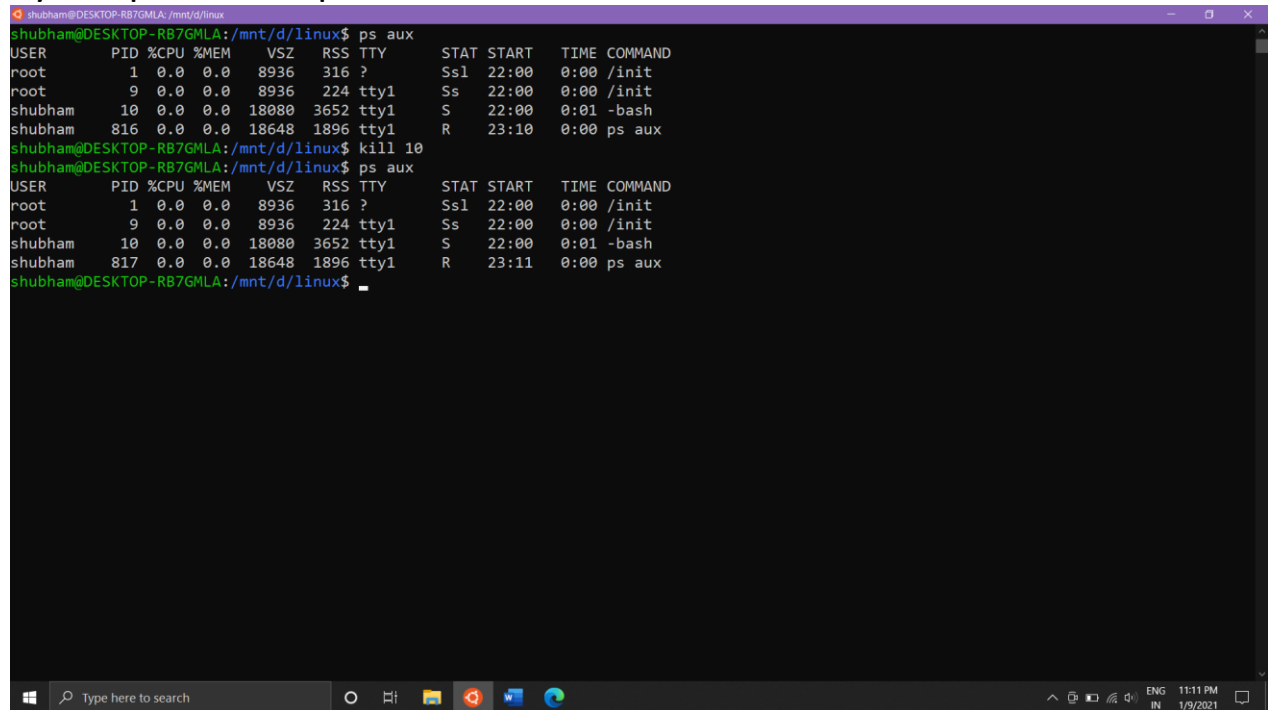
23:05:19   CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal   %guest   %gnice   %idle
23:05:19   all     6.58    0.00    9.30    0.00    0.42    0.00    0.00    0.00    0.00   83.70
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State           I-Node    Path
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ sar -b 3
Linux 4.4.0-19041-Microsoft (DESKTOP-RB7GMLA) 01/09/21 _x86_64_ (8 CPU)

23:05:29      tps      rtps      wtps      dtps  bread/s  bwrtn/s  bdsdcd/s
23:05:32    0.00    0.00    0.00    0.00    0.00    0.00    0.00
23:05:35    0.00    0.00    0.00    0.00    0.00    0.00    0.00
23:05:38    0.00    0.00    0.00    0.00    0.00    0.00    0.00
23:05:41    0.00    0.00    0.00    0.00    0.00    0.00    0.00
23:05:44    0.00    0.00    0.00    0.00    0.00    0.00    0.00
```

## (2) Linux commands related with process:

1-> Ps - Information about running processes. Eg. ps aux lists all processes.

2-> Kill - Sends a signal to a process, usually related to stopping the process. All signals except for SIGKILL and SIGSTOP can be intercepted by the process to perform a clean exit.



```
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ ps aux
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.0  0.0   8936   316 ?        Ss1  22:00   0:00 /init
root         9  0.0  0.0   8936   224 tty1      Ss   22:00   0:00 /init
shubham    10  0.0  0.0  18080  3652 tty1      S    22:00   0:01 -bash
shubham    816  0.0  0.0  18648  1896 tty1      R    23:10   0:00 ps aux
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ kill 10
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$ ps aux
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.0  0.0   8936   316 ?        Ss1  22:00   0:00 /init
root         9  0.0  0.0   8936   224 tty1      Ss   22:00   0:00 /init
shubham    10  0.0  0.0  18080  3652 tty1      S    22:00   0:01 -bash
shubham    817  0.0  0.0  18648  1896 tty1      R    23:11   0:00 ps aux
shubham@DESKTOP-RB7GMLA:/mnt/d/linux$
```

3-> Background processes with & -> moves the process to background  
Eg. Sleep command is moved to background using & and then using fg we bring it to foreground and we get a delay of 5 seconds.

```
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ sleep 10s &  
[4] 846  
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$ fg  
sleep 10s  
[3]-  Done                sleep 10s  
shubham@DESKTOP-RB7GMLA: /mnt/d/linux$
```