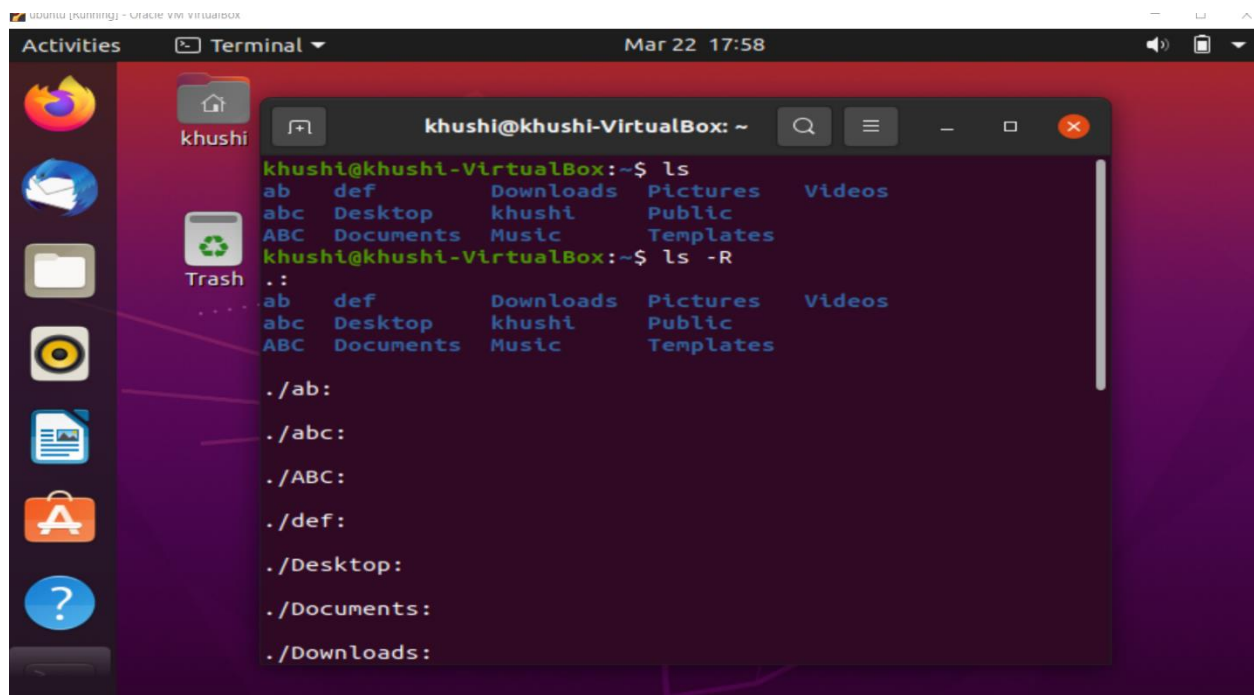


## Experiment 2

*Implement the basic and user status commands like: su, sudo, man, help, history, who, whoami, id, uname, uptime, free, tty, cal, date, hostname, reboot, clear, bc.*

Linux commands are case sensitive hence you need to be careful about what you are keying in. Open the terminal by pressing the **Ctrl + Alt + T**

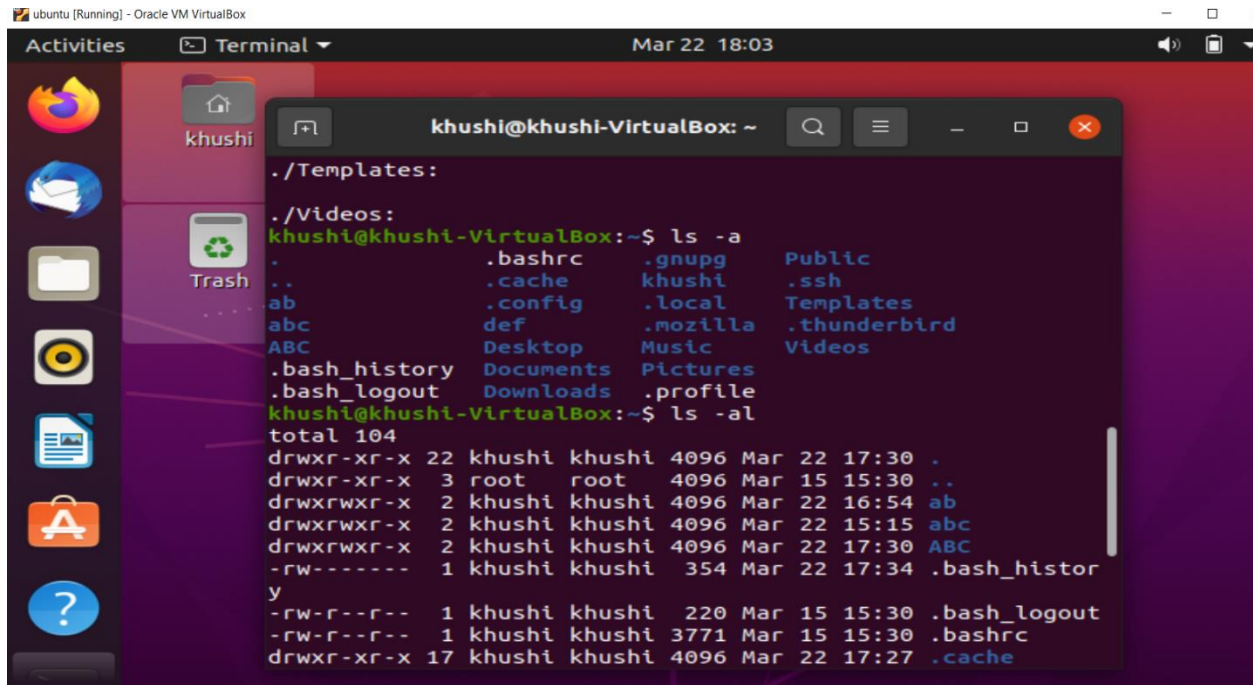
1. **ls:** In Linux, the ls command is used to list out files and directories.
  - ls -R will list all the files in the sub-directories as well
  - ls -a will show the hidden files
  - ls -al will list the files and directories with detailed information like the permissions, size, owner, etc



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "khushi@khushi-VirtualBox: ~". The terminal output is as follows:

```
khushi@khushi-VirtualBox:~$ ls
ab  def  Downloads  Pictures  Videos
abc Desktop khushi     Public
ABC Documents Music      Templates
khushi@khushi-VirtualBox:~$ ls -R
.:
ab  def  Downloads  Pictures  Videos
abc Desktop khushi     Public
ABC Documents Music      Templates

./ab:
./abc:
./ABC:
./def:
./Desktop:
./Documents:
./Downloads:
```



The screenshot shows a terminal window titled 'khushi@khushi-VirtualBox: ~' with a search icon, menu icon, and window controls. The terminal displays the following commands and output:

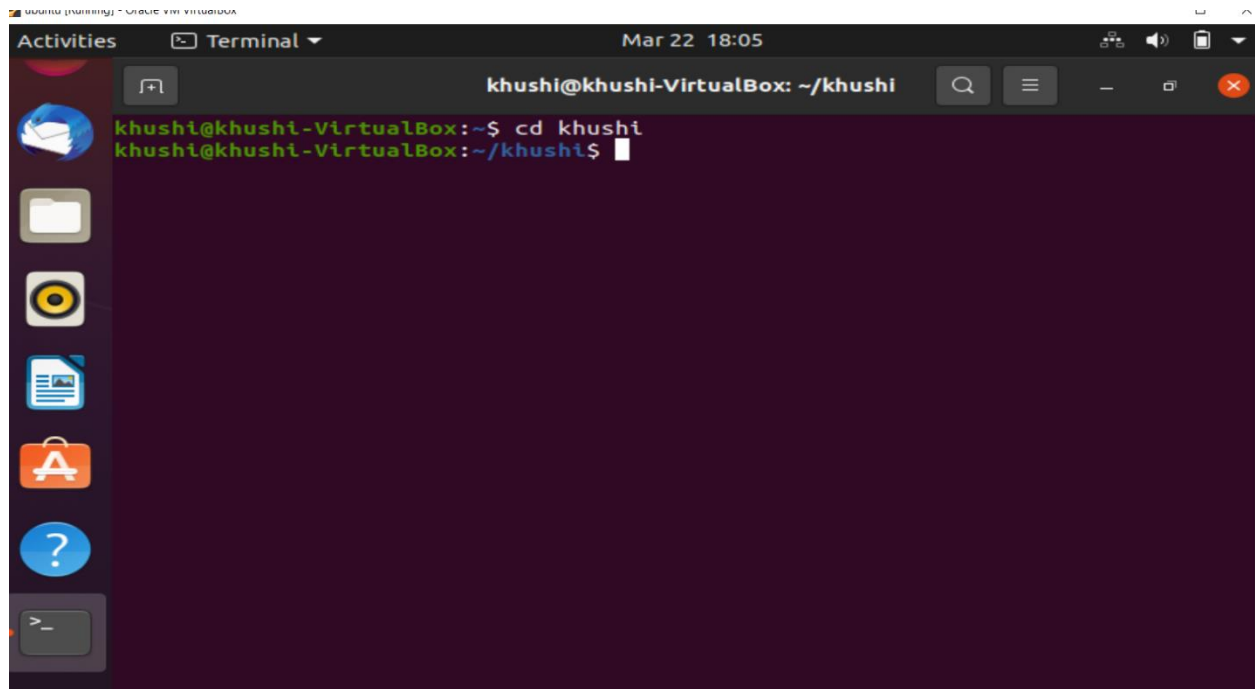
```
./Templates:
./Videos:
khushi@khushi-VirtualBox:~$ ls -a
.          .bashrc      .gnupg      Public
..         .cache       khushi      .ssh
ab         .config      .local      Templates
abc        def          .mozilla    .thunderbird
ABC        Desktop     Music       Videos
.bash_history Documents Pictures
.bash_logout Downloads .profile
khushi@khushi-VirtualBox:~$ ls -al
total 104
drwxr-xr-x 22 khushi khushi 4096 Mar 22 17:30 .
drwxr-xr-x  3 root  root  4096 Mar 15 15:30 ..
drwxrwxr-x  2 khushi khushi 4096 Mar 22 16:54 ab
drwxrwxr-x  2 khushi khushi 4096 Mar 22 15:15 abc
drwxrwxr-x  2 khushi khushi 4096 Mar 22 17:30 ABC
-rw-r----- 1 khushi khushi  354 Mar 22 17:34 .bash_history
-rw-r--r--  1 khushi khushi  220 Mar 15 15:30 .bash_logout
-rw-r--r--  1 khushi khushi 3771 Mar 15 15:30 .bashrc
drwxr-xr-x 17 khushi khushi 4096 Mar 22 17:27 .cache
```

## 2. **cd:** change director

To navigate through the Linux files and directories, use the `cd` command. It requires either the full path or the name of the directory, depending on the current working directory that you're in.

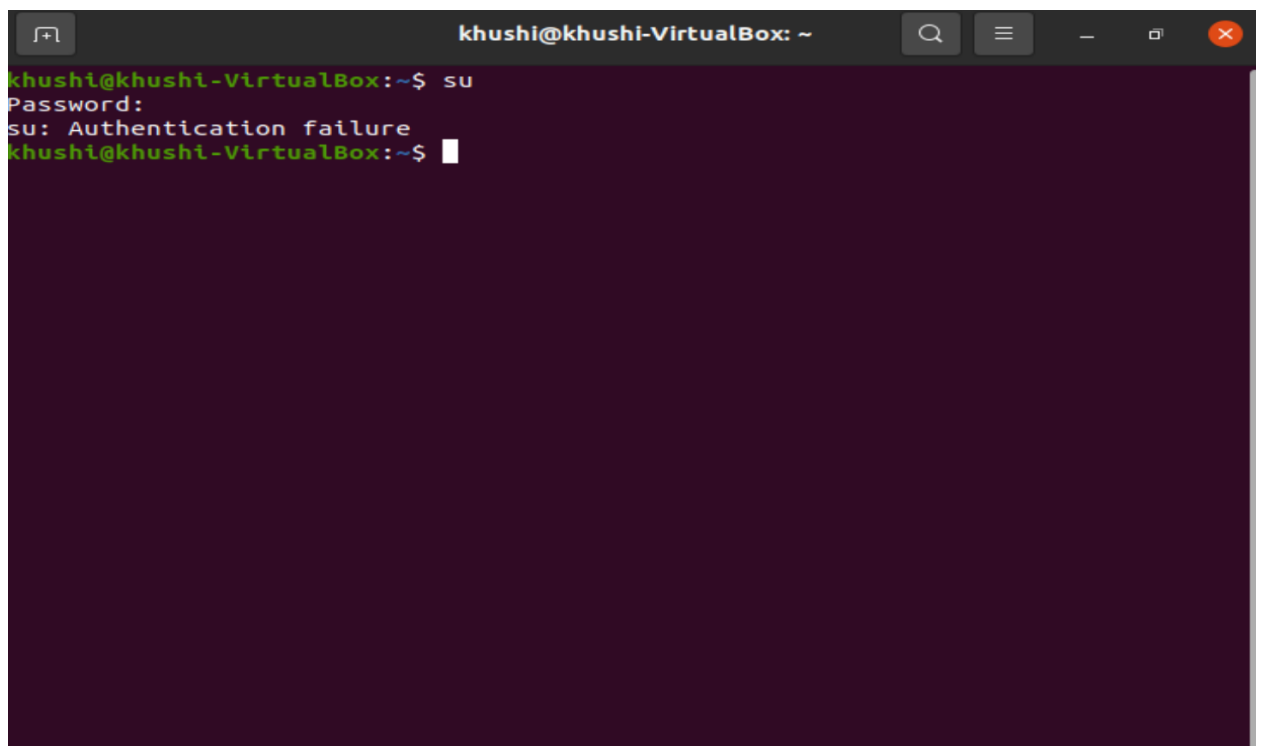
Let's say you're in `/home/username/Documents` and you want to go to `Photos`, a subdirectory of `Documents`. To do so, simply type the following command: `cd Photos`

- `cd ..` (with two dots) to move one directory up
- `cd` to go straight to the home folder
- `cd-` (with a hyphen) to move to your previous directory

A terminal window titled 'khushi@khushi-VirtualBox: ~/khushi' with a search icon, menu icon, and window controls. The terminal shows the user navigating to the 'khushi' directory. The prompt is 'khushi@khushi-VirtualBox:~\$' and the command 'cd khushi' is entered. The output is 'khushi@khushi-VirtualBox:~/khushi\$' with a cursor.

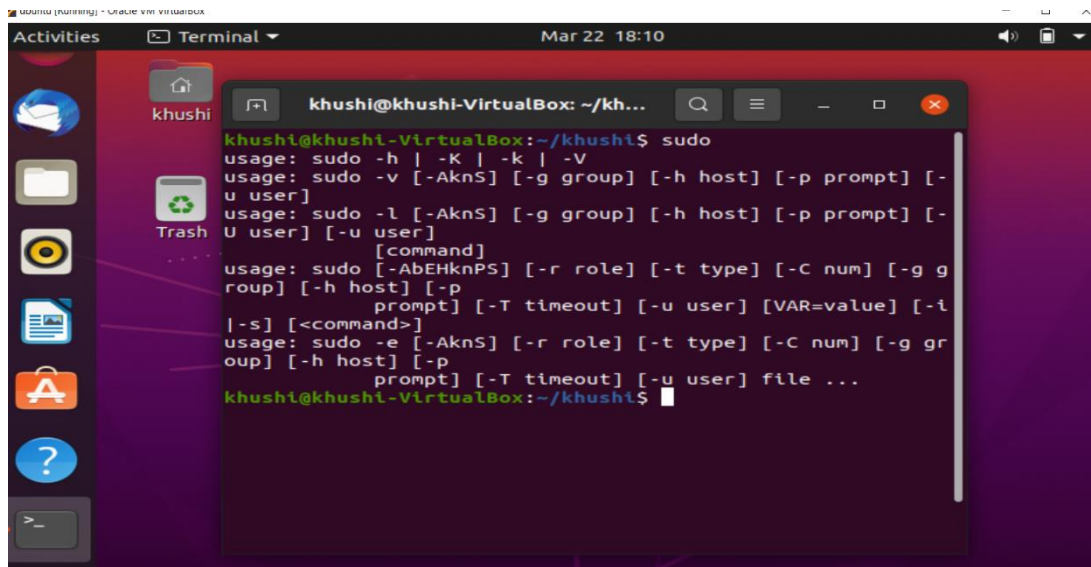
```
khushi@khushi-VirtualBox:~$ cd khushi
khushi@khushi-VirtualBox:~/khushi$
```

3. **su:** The Unix command su, which stands for 'substitute user' is defined as The su command lets you switch the current user to any other user

A terminal window titled 'khushi@khushi-VirtualBox: ~' with a search icon, menu icon, and window controls. The terminal shows the user attempting to switch users with the 'su' command. The prompt is 'khushi@khushi-VirtualBox:~\$' and the command 'su' is entered. The output is 'Password:' followed by 'su: Authentication failure' and the prompt 'khushi@khushi-VirtualBox:~\$' with a cursor.

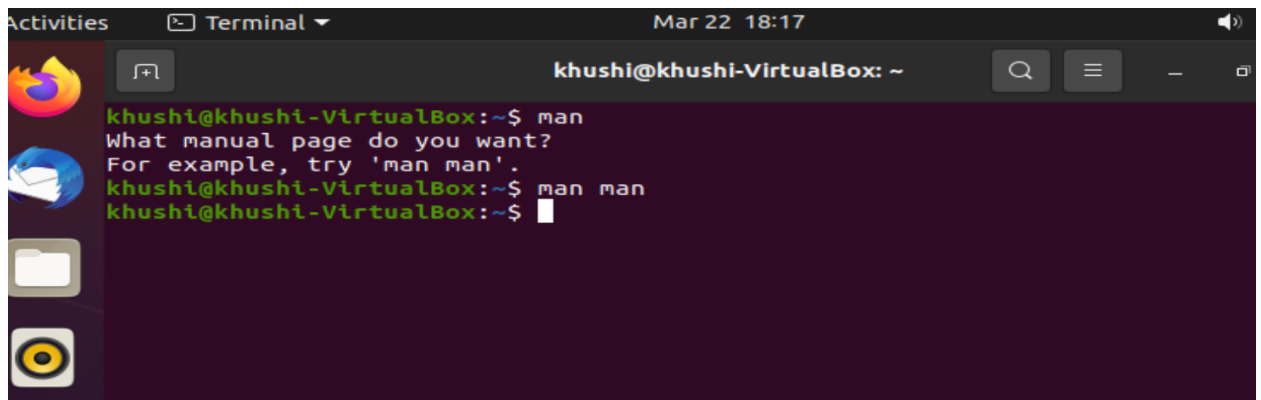
```
khushi@khushi-VirtualBox:~$ su
Password:
su: Authentication failure
khushi@khushi-VirtualBox:~$
```

4. **sudo:** Short for “SuperUser Do”, this command enables you to perform tasks that require administrative or root permissions.



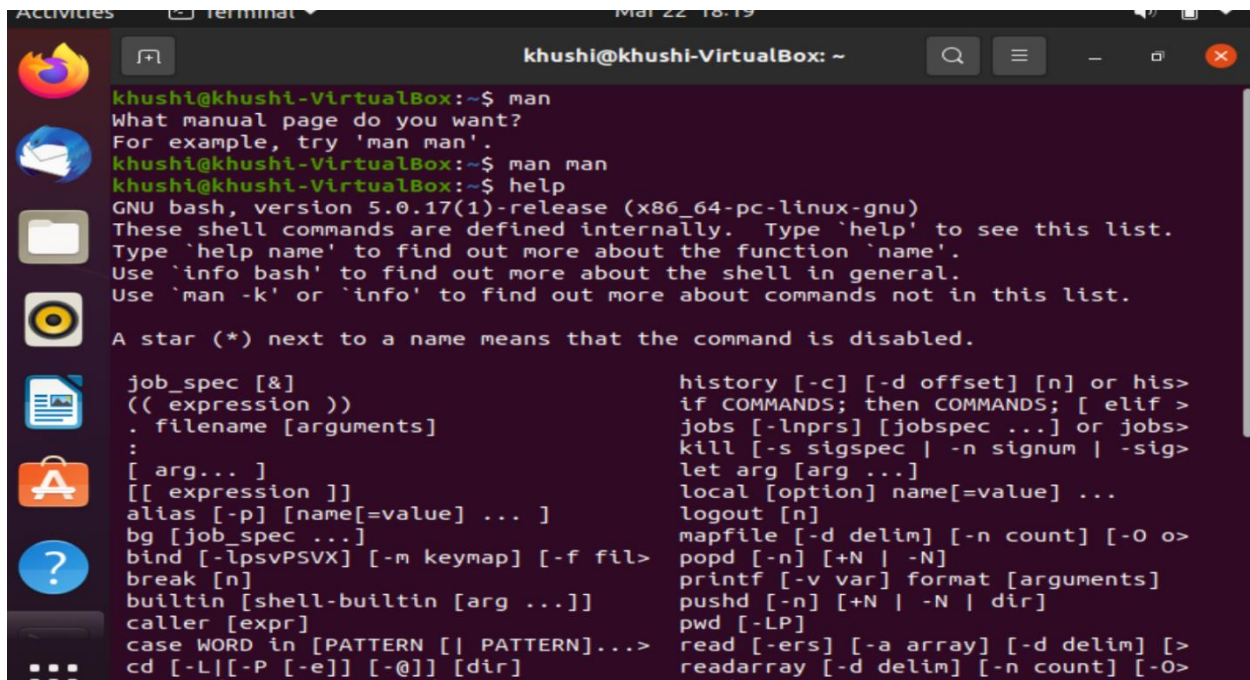
A screenshot of a Linux terminal window titled "Terminal" with the date and time "Mar 22 18:10". The terminal shows the command `sudo` being entered at the prompt `khushi@khushi-VirtualBox: ~/kh...`. The output displays the usage of `sudo` with various options and flags, including `-h`, `-K`, `-k`, `-V`, `-v`, `-AknS`, `-g group`, `-h host`, `-p prompt`, `-u user`, `-l`, `-AbEHknPS`, `-r role`, `-t type`, `-C num`, `-g group`, `-h host`, `-p prompt`, `-T timeout`, `-u user`, `VAR=value`, `-i`, `-s`, `-e`, and `-f`. The prompt returns to `khushi@khushi-VirtualBox: ~/khushi$`.

5. **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



A screenshot of a Linux terminal window titled "Terminal" with the date and time "Mar 22 18:17". The terminal shows the command `man` being entered at the prompt `khushi@khushi-VirtualBox: ~`. The output displays the prompt "What manual page do you want?" and "For example, try 'man man'". The prompt returns to `khushi@khushi-VirtualBox: ~$`.

6. **help:** If you are new to LINUX operating system and having trouble dealing with the command-line utilities provided by LINUX then you really need to know first of all about the **help command** which as its name says help you to learn about any built-in command.
- `-d` output short description for each topic
  - `-m` display usage in pseudo-manpage format
  - `-s` output only a short usage synopsis for each topic matching



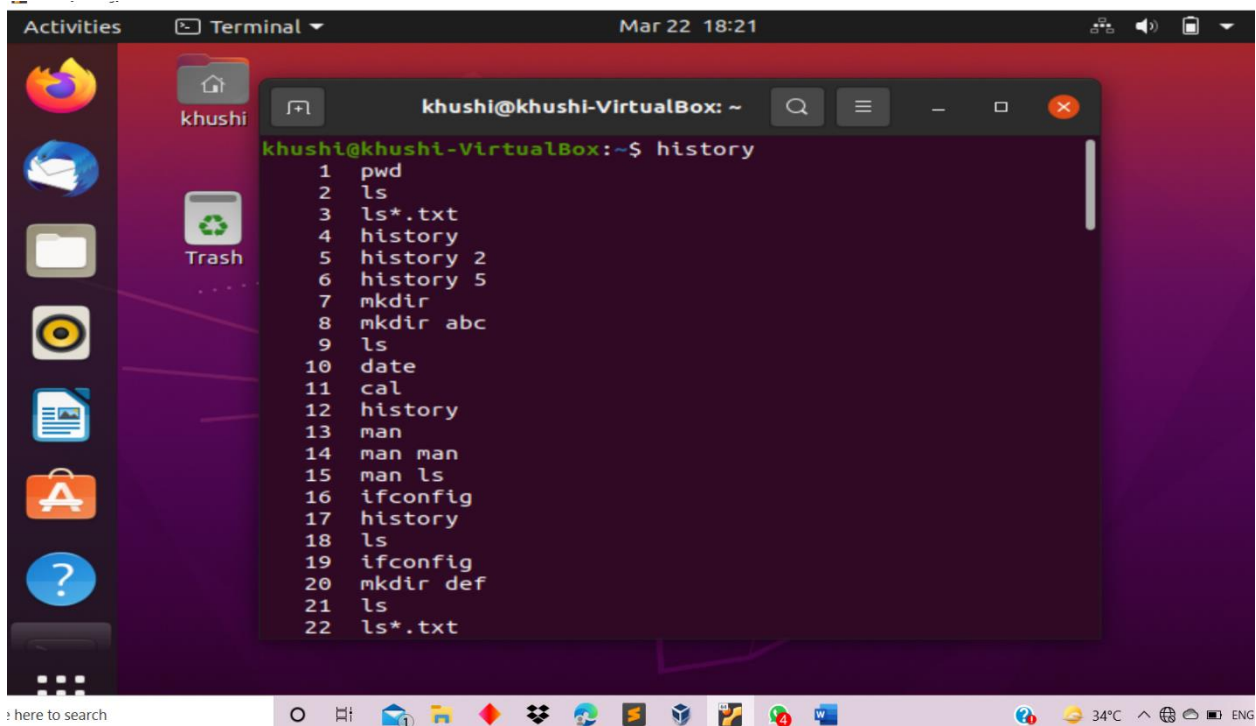
A terminal window titled 'khushi@khushi-VirtualBox: ~' showing the output of the 'man' and 'help' commands. The 'man' command prompts for a manual page, and the 'help' command displays a list of GNU bash built-in commands and their usage. The list includes commands like 'job\_spec', 'alias', 'bg', 'bind', 'break', 'builtin', 'caller', 'case', 'cd', 'history', 'if', 'jobs', 'kill', 'let', 'local', 'logout', 'mapfile', 'popd', 'printf', 'pushd', 'pwd', 'read', and 'readarray'.

```
khushi@khushi-VirtualBox:~$ man
What manual page do you want?
For example, try 'man man'.
khushi@khushi-VirtualBox:~$ man man
khushi@khushi-VirtualBox:~$ 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 file]
break [n]
builtin [shell-builtin [arg ...]]
caller [expr]
case WORD in [PATTERN [| PATTERN]...>
cd [-L|[-P [-e]] [-@]] [dir]
history [-c] [-d offset] [n] or his>
if COMMANDS; then COMMANDS; [ elif >
jobs [-lnprs] [jobspec ...] or jobs>
kill [-s sigspec | -n signum | -sig>
let arg [arg ...]
local [option] name[=value] ...
logout [n]
mapfile [-d delim] [-n count] [-O o>
popd [-n] [+N | -N]
printf [-v var] format [arguments]
pushd [-n] [+N | -N | dir]
pwd [-LP]
read [-ers] [-a array] [-d delim] [>
readarray [-d delim] [-n count] [-O>
```

7. **history**: command is used to view the previously executed command.
- \$ history 5: To show the limited number of commands (5) that executed previously



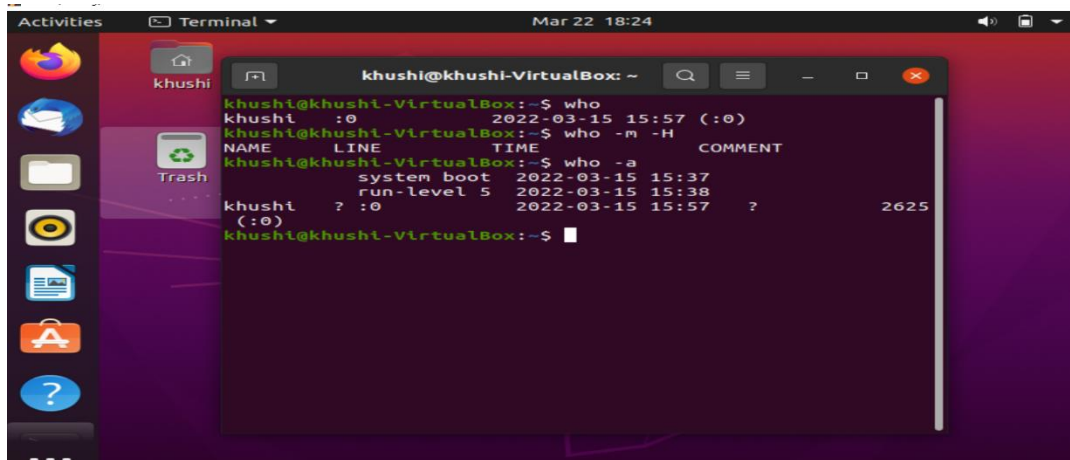
A terminal window titled 'khushi@khushi-VirtualBox: ~' showing the output of the 'history' command. The output is a numbered list of 22 commands that were previously executed in the shell.

```
khushi@khushi-VirtualBox:~$ history
1  pwd
2  ls
3  ls*.txt
4  history
5  history 2
6  history 5
7  mkdir
8  mkdir abc
9  ls
10 date
11 cal
12 history
13 man
14 man man
15 man ls
16 ifconfig
17 history
18 ls
19 ifconfig
20 mkdir def
21 ls
22 ls*.txt
```

8. **who**: The Linux "who" command lets you display the users currently logged in to your UNIX or Linux operating system. Whenever a user needs to know about how many users

are using or are logged-in into a particular Linux-based operating system, he/she can use the "who" command to get that information.

- `who -m -H` : Command to display the hostname and user associated with the input/output devices like a keyboard
- `who -a`: this command's help, one sees all the details of every user logged in to the current system



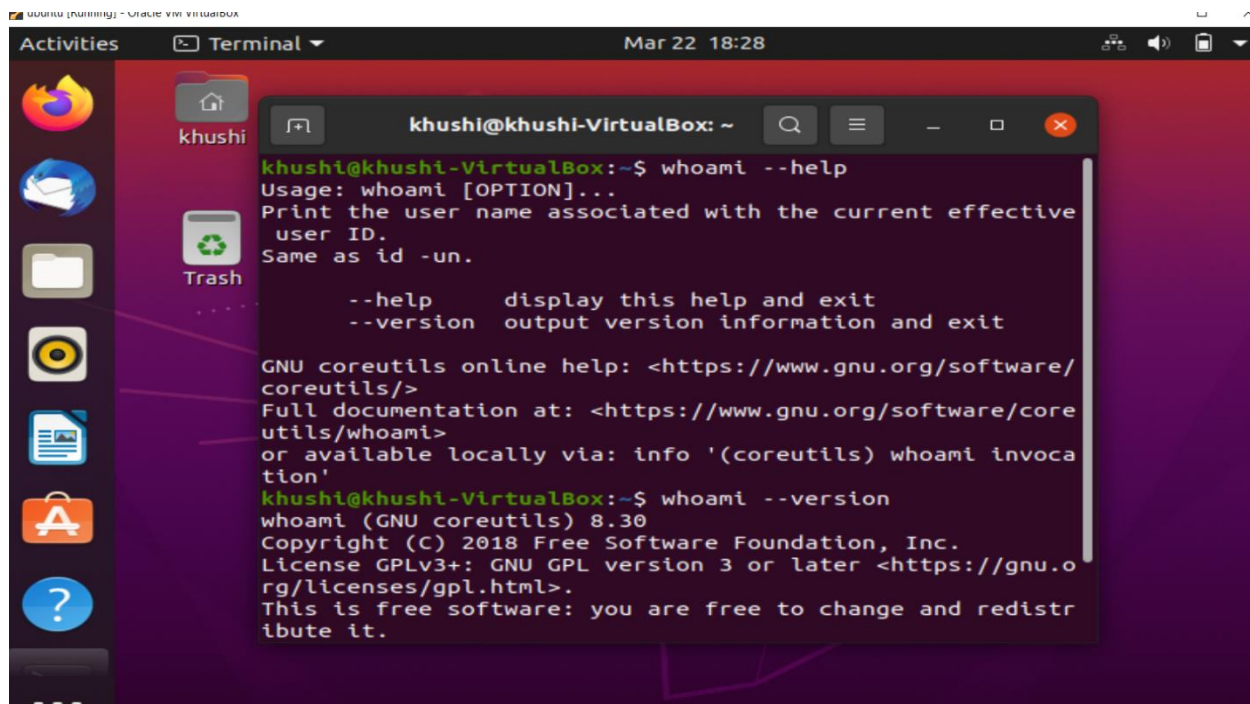
The screenshot shows a terminal window titled "khushi@khushi-VirtualBox: ~" with a search icon, menu icon, and window controls. The terminal output is as follows:

```
khushi@khushi-VirtualBox:~$ who
khushi  :0      2022-03-15 15:57 (:0)
khushi@khushi-VirtualBox:~$ who -m -H
NAME     LINE     TIME          COMMENT
khushi@khushi-VirtualBox:~$ who -a
system boot 2022-03-15 15:37
run-level 5 2022-03-15 15:38
khushi  ? :0      2022-03-15 15:57 ?          2625
(:0)
```

9. **whoami**: It is basically the concatenation of the strings “**who**,”**am**,”**i**” as **whoami**. It displays the username of the current user when this command is invoked. It is similar as running **the id** command with the options **-un**.

- `whoami -help`: It gives the help message and exit.
- `whoami -version`: It gives the version information and exit.



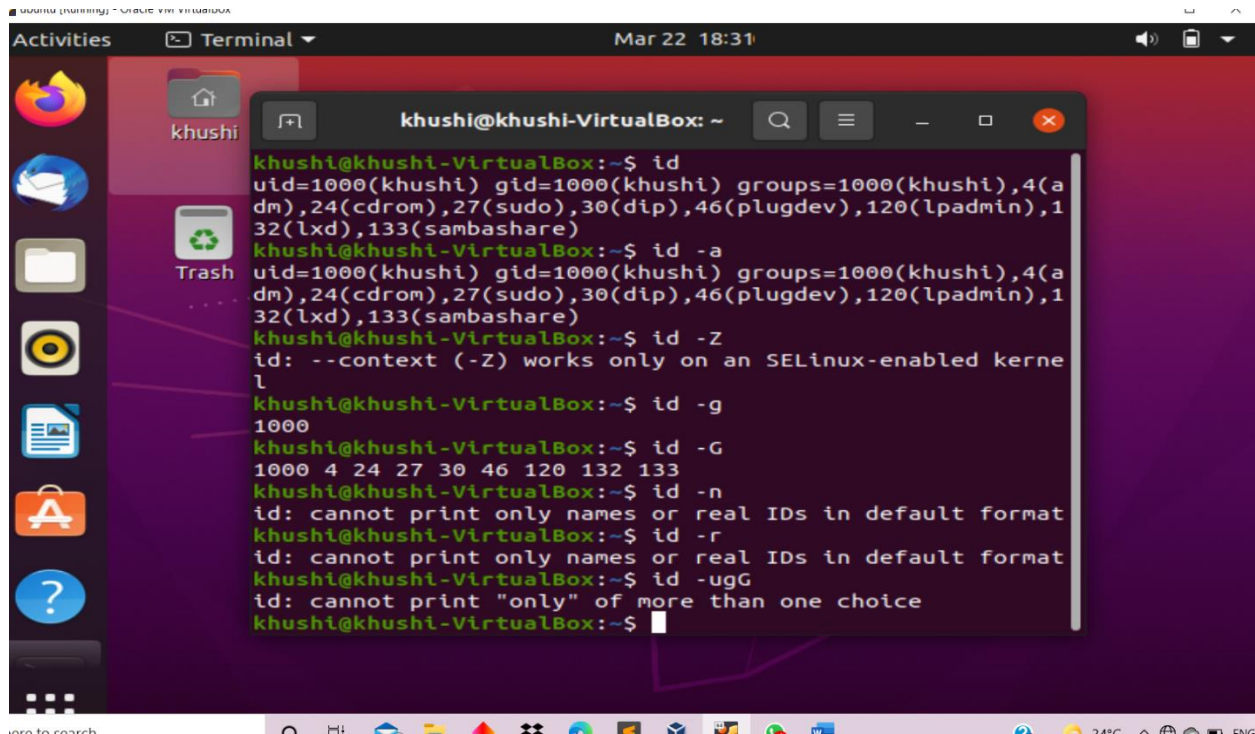


```
khushi@khushi-VirtualBox: ~  
khushi@khushi-VirtualBox:~$ whoami --help  
Usage: whoami [OPTION]...  
Print the user name associated with the current effective  
user ID.  
Same as id -un.  
  
    --help      display this help and exit  
    --version   output version information and exit  
  
GNU coreutils online help: <https://www.gnu.org/software/coreutils/>  
Full documentation at: <https://www.gnu.org/software/coreutils/whoami>  
or available locally via: info '(coreutils) whoami invocation'  
khushi@khushi-VirtualBox:~$ whoami --version  
whoami (GNU coreutils) 8.30  
Copyright (C) 2018 Free Software Foundation, Inc.  
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.  
This is free software: you are free to change and redistribute it.
```

10. **id**: is used to print the genuine and effective user ID and group ID.

The supported options by the id command are as following:

- -a: It is used to ignore the compatibility with other versions.
- -Z, --context: It is used to print only the security context of the process.
- -g, --group: It is used to print only the effective GID.
- -G, --groups: It is used to print all group IDs.
- -n, --name: It is used to print a name instead of a number.
- -r, --real: It is used to print the real ID instead of the effective ID, with -ugG
- -u, --user: It is used to print only the effective UID.
- -z, --zero: It is used to delimit entries with NULL characters, except the whitespace;
- --help: It is used to display the help documentation and exit.

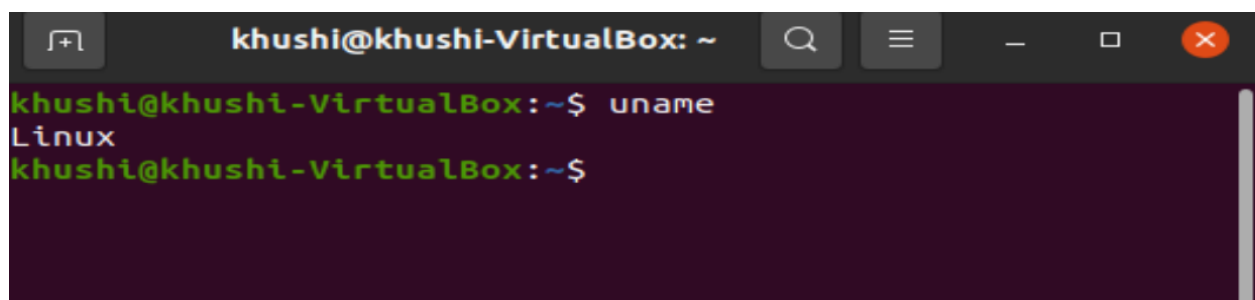


```
khushi@khushi-VirtualBox: ~  
khushi@khushi-VirtualBox:~$ id  
uid=1000(khushi) gid=1000(khushi) groups=1000(khushi),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),132(lxd),133(sambashare)  
khushi@khushi-VirtualBox:~$ id -a  
uid=1000(khushi) gid=1000(khushi) groups=1000(khushi),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),132(lxd),133(sambashare)  
khushi@khushi-VirtualBox:~$ id -Z  
id: --context (-Z) works only on an SELinux-enabled kernel  
khushi@khushi-VirtualBox:~$ id -g  
1000  
khushi@khushi-VirtualBox:~$ id -G  
1000 4 24 27 30 46 120 132 133  
khushi@khushi-VirtualBox:~$ id -n  
id: cannot print only names or real IDs in default format  
khushi@khushi-VirtualBox:~$ id -r  
id: cannot print only names or real IDs in default format  
khushi@khushi-VirtualBox:~$ id -ugG  
id: cannot print "only" of more than one choice  
khushi@khushi-VirtualBox:~$
```

11. **uname:** displays the information about the system.

uname [OPTION] .....Syntax

- -a option: It prints all the system information in the following order: Kernel name, network node hostname, kernel release date, kernel version, machine hardware name, hardware platform, operating system
- -s option: It prints the kernel name.
- -n option: It prints the hostname of the network node (current computer).



```
khushi@khushi-VirtualBox: ~  
khushi@khushi-VirtualBox:~$ uname  
Linux  
khushi@khushi-VirtualBox:~$
```

12. **uptime:** It is used to find out how long the system is active (running). This command returns set of values that involve, the current time, and the amount of time system is in running state, number of users currently logged into, and the load time for the past 1, 5 and 15 minutes respectively.

Syntax: uptime [-options]

Options:

- -p, --pretty show uptime in pretty format



- -h, --help display this help and exit
- -s, --since system up since
- -V, --version output version information and exit

The screenshot shows a terminal window titled 'khushi@khushi-VirtualBox: ~' with the following content:

```
khushi@khushi-VirtualBox:~$ uptime
18:40:10 up 4:15, 1 user, load average: 0.01, 0.05, 0.02
khushi@khushi-VirtualBox:~$ uptime -p
up 4 hours, 15 minutes
khushi@khushi-VirtualBox:~$ uptime -h

Usage:
uptime [options]

Options:
-p, --pretty    show uptime in pretty format
-h, --help      display this help and exit
-s, --since     system up since
-V, --version   output version information and exit

For more details see uptime(1).
khushi@khushi-VirtualBox:~$ uptime -s
2022-03-22 14:24:33
khushi@khushi-VirtualBox:~$ uptime -V
uptime from procps-ng 3.3.16
khushi@khushi-VirtualBox:~$
```

13. **free:** displays the total amount of free space available along with the amount of memory used and swap memory in the system, and also the buffers used by the kernel.

Syntax: \$free [OPTION]

- -b, --bytes : It displays the memory in bytes.
- -k, --kilo : It displays the amount of memory in kilobytes(default).
- -m, --mega : It displays the amount of memory in megabytes.
- -g, --giga : It displays the amount of memory in gigabytes.
- -t, --tera : It displays the amount of memory in terabytes.
- -h, --human : It shows all output columns automatically scaled to shortest three digit unit and display the units also of print out. The units used are B(bytes), K(kilos), M(megas), G(gigas), and T(teras).
- -c, --count : It displays the output c number of times and this option actually works with -s option.
- -l, --lohi : It shows the detailed low and high memory statistics
- -o, --old : This option disables the display of the buffer adjusted line.

- `-s, --seconds` : This option allows you to display the output continuously after `s` seconds delay. In actual, the `usleep` system call is used for microsecond resolution delay times.
- `-t, --total` : It adds an additional line in the output showing the column totals.
  - `-help` : It displays a help message and exit.
- `-V, --version` : It displays version info and exit.

```
khushi@khushi-VirtualBox:~$ free
              total        used        free      shared  buff/cache
Mem:      2025480      731460      291628         7028      1002392
Swap:      945416       27048      918368
khushi@khushi-VirtualBox:~$ free -b
              total        used        free      shared  buff/cache
Mem: 2074091520  748683264  298893312      7192576  1026514944
Swap: 968105984  27697152   940408832
khushi@khushi-VirtualBox:~$ free -k
              total        used        free      shared  buff/cache
Mem:      2025480      731128      291888         7024      1002464
Swap:      945416       27048      918368
khushi@khushi-VirtualBox:~$ free -m
free-m: command not found
khushi@khushi-VirtualBox:~$
```

```
khushi@khushi-VirtualBox:~$ free -g
              total        used        free      shared  buff/cache
Mem:           0             1             0             0             0
Swap:           0             0             0
khushi@khushi-VirtualBox:~$ free -h
              total        used        free      shared  buff/cache
Mem:      1.9Gi      713Mi      285Mi         6.0Mi      979Mi
Swap:      923Mi       26Mi      896Mi
khushi@khushi-VirtualBox:~$ free -c
free: option requires an argument -- 'c'

Usage:
  free [options]

Options:
  -b, --bytes          show output in bytes
  --kilo                show output in kilobytes
  --mega               show output in megabytes
```

14. **tty**: displays information related to terminal. The `tty` command of terminal basically prints the file name of the terminal connected to standard input. `tty` is short of *teletype*.

Syntax: `tty [OPTION]`

- `-s, --silent, --quiet` : Prints nothing, only returns an exit status.

- --help : It will display the help message and exit.
- --version : Prints the version information and exits

```

khushi@khushi-VirtualBox: ~
khushi@khushi-VirtualBox:~$ tty
/dev/pts/0
khushi@khushi-VirtualBox:~$ tty -s
khushi@khushi-VirtualBox:~$ tty --help
Usage: tty [OPTION]...
Print the file name of the terminal connected to standard input.

    -s, --silent, --quiet    print nothing, only return an exit status
    --help                  display this help and exit
    --version                output version information and exit

GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
Full documentation at: <https://www.gnu.org/software/coreutils/tty>
or available locally via: info '(coreutils) tty invocation'
khushi@khushi-VirtualBox:~$ tty --version
tty (GNU coreutils) 8.30
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Written by David MacKenzie.
khushi@khushi-VirtualBox:~$ █

```

## 15. **cal**: a quick view of the calendar in the Linux terminal

Syntax: cal [ [ month ] year]

- cal : Shows current month calendar on the terminal with the current date highlighted.
- cal -y : Shows the calendar of the complete current year with the current date highlighted.
- cal 08 2000 : Shows calendar of selected month and year.
- cal 2018 : Shows the whole calendar of the year.
- cal 2018 | more : But year may not be visible in the same screen use more with cal use spacebar to scroll down.
- cal -3 : Shows calendar of previous, current and next month

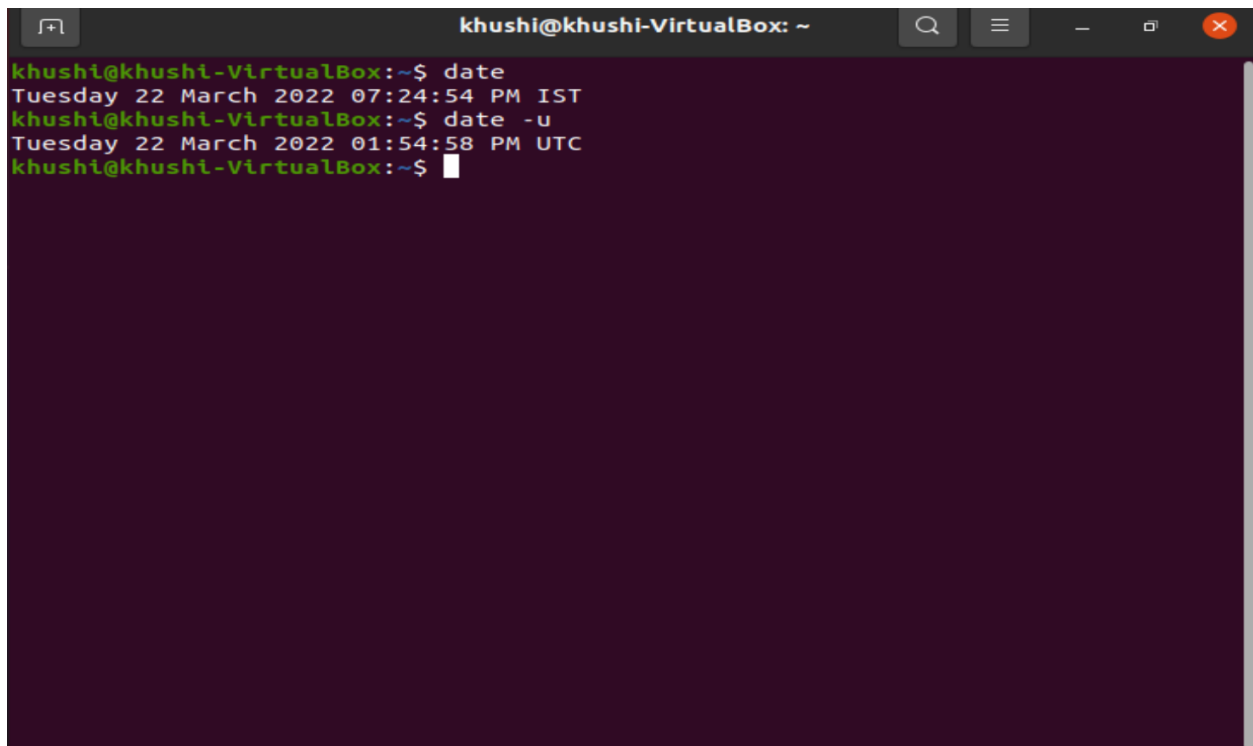
```
khushi@khushi-VirtualBox: ~  
khushi@khushi-VirtualBox:~$ cal  
March 2022  
Su Mo Tu We Th Fr Sa  
        1  2  3  4  5  
 6  7  8  9 10 11 12  
13 14 15 16 17 18 19  
20 21 22 23 24 25 26  
27 28 29 30 31  
  
khushi@khushi-VirtualBox:~$ cal -y  
2022  
January February March  
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa  
        1          1  2  3  4  5          1  2  3  4  5  
 2  3  4  5  6  7  8  6  7  8  9 10 11 12  6  7  8  9 10 11 12  
 9 10 11 12 13 14 15 13 14 15 16 17 18 19 13 14 15 16 17 18 19  
16 17 18 19 20 21 22 20 21 22 23 24 25 26 20 21 22 23 24 25 26  
23 24 25 26 27 28 29 27 28          27 28 29 30 31  
30 31  
  
April May June  
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa  
        1  2          1  2  3  4  5  6  7          1  2  3  4  
 3  4  5  6  7  8  9  8  9 10 11 12 13 14  5  6  7  8  9 10 11  
10 11 12 13 14 15 16 15 16 17 18 19 20 21 12 13 14 15 16 17 18  
17 18 19 20 21 22 23 22 23 24 25 26 27 28 19 20 21 22 23 24 25  
24 25 26 27 28 29 30 29 30 31          26 27 28 29 30
```

```
khushi@khushi-VirtualBox: ~  
khushi@khushi-VirtualBox:~$ cal -3  
February 2022 March 2022 April 2022  
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa  
        1  2  3  4  5          1  2  3  4  5          1  2  
 6  7  8  9 10 11 12  6  7  8  9 10 11 12  3  4  5  6  7  8  9  
13 14 15 16 17 18 19 13 14 15 16 17 18 19 10 11 12 13 14 15 16  
20 21 22 23 24 25 26 20 21 22 23 24 25 26 17 18 19 20 21 22 23  
27 28          27 28 29 30 31          24 25 26 27 28 29 30  
  
khushi@khushi-VirtualBox:~$ cal 2022  
2022  
January February March  
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa  
        1          1  2  3  4  5          1  2  3  4  5  
 2  3  4  5  6  7  8  6  7  8  9 10 11 12  6  7  8  9 10 11 12  
 9 10 11 12 13 14 15 13 14 15 16 17 18 19 13 14 15 16 17 18 19  
16 17 18 19 20 21 22 20 21 22 23 24 25 26 20 21 22 23 24 25 26  
23 24 25 26 27 28 29 27 28          27 28 29 30 31  
30 31  
  
April May June  
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa  
        1  2          1  2  3  4  5  6  7          1  2  3  4  
 3  4  5  6  7  8  9  8  9 10 11 12 13 14  5  6  7  8  9 10 11  
10 11 12 13 14 15 16 15 16 17 18 19 20 21 12 13 14 15 16 17 18  
17 18 19 20 21 22 23 22 23 24 25 26 27 28 19 20 21 22 23 24 25  
24 25 26 27 28 29 30 29 30 31          26 27 28 29 30
```

16. **date:** display the system date and time. date command is also used to set date and time of the system.



- **date (no option)** : With no options, the date command displays the current date and time, including the abbreviated day name, abbreviated month name, day of the month, the time separated by colons, the time zone name, and the year.
- **-u Option**: Displays the time in GMT(Greenwich Mean Time)/UTC(Coordinated Universal Time )time zone.
- **-date or -d Option**: Displays the given date string in the format of date. But this will not affect the system's actual date and time value. Rather it uses the date and time given in the form of string.
  - `$date --date="2/02/2010"`

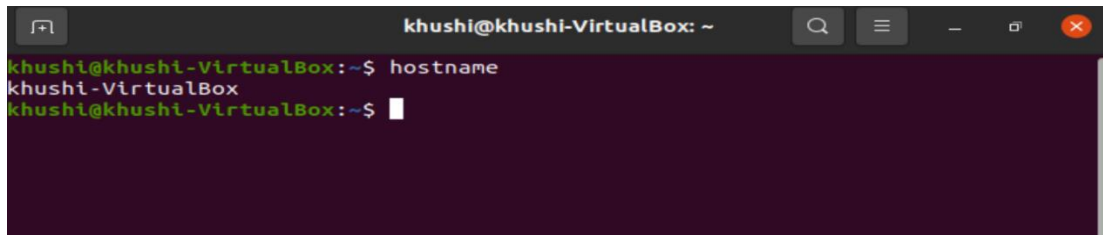
A terminal window titled 'khushi@khushi-VirtualBox: ~' with standard window controls. The terminal shows the execution of the 'date' command twice. The first command 'date' returns 'Tuesday 22 March 2022 07:24:54 PM IST'. The second command 'date -u' returns 'Tuesday 22 March 2022 01:54:58 PM UTC'. The prompt '\$' is visible at the end of each line.

```
khushi@khushi-VirtualBox:~$ date
Tuesday 22 March 2022 07:24:54 PM IST
khushi@khushi-VirtualBox:~$ date -u
Tuesday 22 March 2022 01:54:58 PM UTC
khushi@khushi-VirtualBox:~$
```

17. **hostname:** is used to obtain the DNS(Domain Name System) name and set the system's hostname or NIS(Network Information System) domain name. A hostname is a name which is given to a computer and it attached to the network. Its main purpose is to uniquely identify over a network.

Syntax: `hostname -[option] [file]`



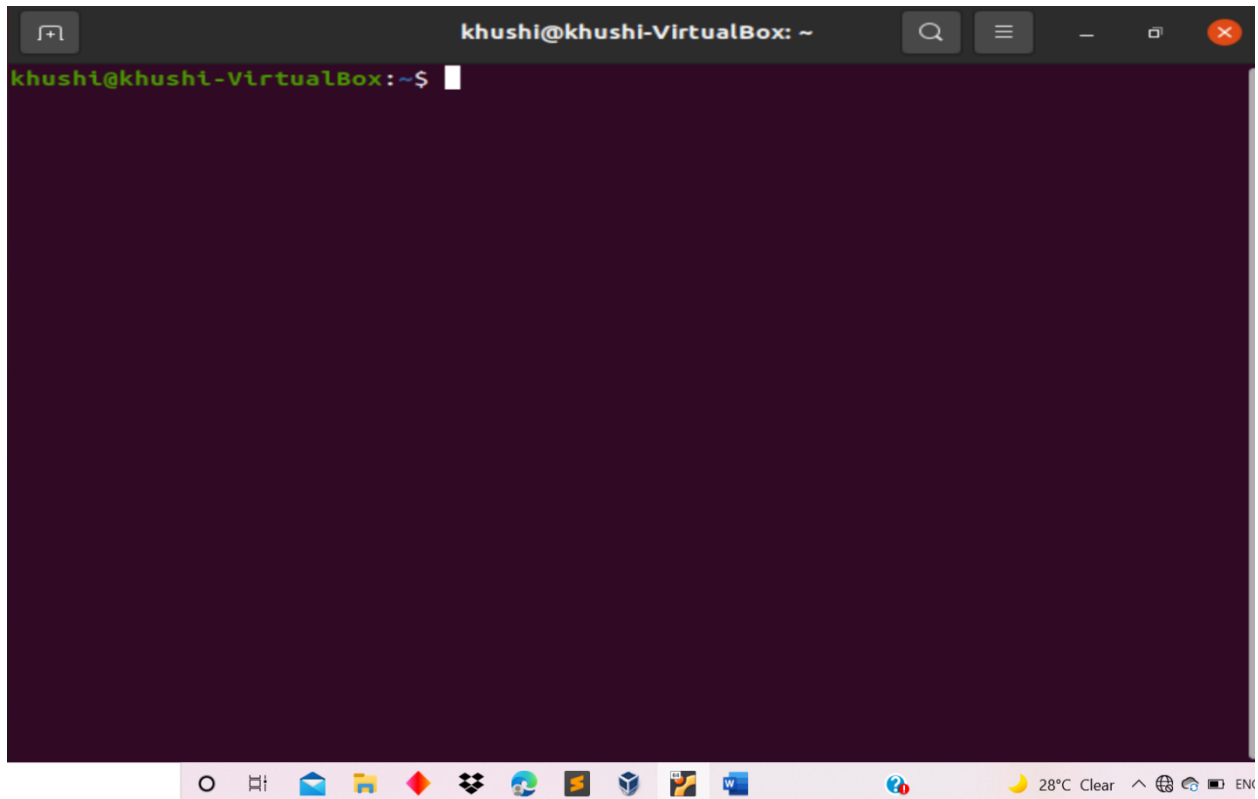


```
khushi@khushi-VirtualBox: ~  
khushi@khushi-VirtualBox:~$ hostname  
khushi-VirtualBox  
khushi@khushi-VirtualBox:~$
```

18. **reboot:** is used restart or reboot the system.

19. **clear:** is a standard Unix computer operating system command that is used to clear the terminal screen.

Syntax: \$clear



```
khushi@khushi-VirtualBox:~$
```

20. **bc:** is used for command line calculator. It is similar to basic calculator by using which we can do basic mathematical calculations.

- Example1 : \$ echo "12+5" | bc
- Example 2 : \$ echo "10^2" | bc
- Example3: \$ echo "var=10;var" | bc

```
khushi@khushi-VirtualBox: ~  
khushi@khushi-VirtualBox:~$ bc  
bc 1.07.1  
Copyright 1991-1994, 1997, 1998, 2000, 2004, 2006, 2008, 2012-2017 Free Software  
Foundation, Inc.  
This is free software with ABSOLUTELY NO WARRANTY.  
For details type `warranty'.  
█
```