

Linux Commands

- Create user with name Techie and provide sudo access to user.

```
root@Ubuntu:/home/vboxuser# useradd Techie
root@Ubuntu:/home/vboxuser# passwd Techie
New password:
Ubuntu% sudo apt install git
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
git is already the newest version (1:2.43.0-1ubuntu7.3).
The following package was automatically installed and is no longer required:
  libllvm19
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 11 not upgraded.
Ubuntu% id
uid=1002(Techie) gid=1002(Techie) groups=1002(Techie)
```

- Navigate to the home directory.

```
vboxuser@Ubuntu:/$ cd ~
vboxuser@Ubuntu:~$ ls
Desktop Documents Downloads Klop Music Pictures Public snap Templates Videos
```

- Create a new directory.
- List the contents of a directory.

```
vboxuser@Ubuntu:~$ ls
Desktop Documents Downloads Music Pictures Public snap Templates Videos
vboxuser@Ubuntu:~$ mkdir Klop
vboxuser@Ubuntu:~$ ls
Desktop Downloads Music Public Templates
Documents Klop Pictures snap Videos
```

- Change the current directory.
- Create a new empty file
- View the contents of a file.

```
vboxuser@Ubuntu:~$ cd Klop/
vboxuser@Ubuntu:~/Klop$ ls
GOT
vboxuser@Ubuntu:~/Klop$ vi Look
vboxuser@Ubuntu:~/Klop$ vi Look
vboxuser@Ubuntu:~/Klop$ ls
GOT Look
vboxuser@Ubuntu:~/Klop$ cat Look
World is here
sure?
yep
```

- Copy a file to another location.

Linux Commands

- Move a file to another location.

```
vboxuser@Ubuntu:~$ cd Klop/
vboxuser@Ubuntu:~/Klop$ cp -r Look /home/vboxuser/Downloads
vboxuser@Ubuntu:~/Klop$ ls
GOT  Look
vboxuser@Ubuntu:~/Klop$ cd ..
vboxuser@Ubuntu:~$ cd Downloads/
vboxuser@Ubuntu:~/Downloads$ ls
hello-world-pixel-3840x2160-15168.png  Look  wc1782992-berserk-2017-wallpaper.jpg
vboxuser@Ubuntu:~/Downloads$ mv Look /home/vboxuser/
vboxuser@Ubuntu:~/Downloads$ cd ..
vboxuser@Ubuntu:~$ ls
Desktop  Documents  Downloads  Klop  Look  Music  Pictures  Public  snap  Templates  Videos
```

- Rename a file.
- Delete a file.

```
vboxuser@Ubuntu:~$ mv Look Night
vboxuser@Ubuntu:~$ ls
Desktop  Documents  Downloads  Klop  Music  Night  Pictures  Public  snap  Templates  Videos
vboxuser@Ubuntu:~$ cat Night
World is here
sure?
yep
vboxuser@Ubuntu:~$ rm Night
vboxuser@Ubuntu:~$ ls
Desktop  Documents  Downloads  Klop  Music  Pictures  Public  snap  Templates  Videos
```

- Grant or revoke permissions on a file or directory.

```
vboxuser@Ubuntu:~/Klop$ ll
total 16
drwxrwxr-x  2 vboxuser Jack    4096 Dec 10 09:43 ./
drwxr-x--- 18 vboxuser vboxuser 4096 Dec 10 09:49 ../
-rw-rw-r--  1 vboxuser vboxuser   38 Dec  9 11:12 GOT
-rw-rw-r--  1 vboxuser vboxuser   24 Dec 10 09:43 Look
vboxuser@Ubuntu:~/Klop$ chmod 777 GOT
vboxuser@Ubuntu:~/Klop$ ll
total 16
drwxrwxr-x  2 vboxuser Jack    4096 Dec 10 09:43 ./
drwxr-x--- 18 vboxuser vboxuser 4096 Dec 10 09:49 ../
-rwxrwxrwx  1 vboxuser vboxuser   38 Dec  9 11:12 GOT*
-rw-rw-r--  1 vboxuser vboxuser   24 Dec 10 09:43 Look
vboxuser@Ubuntu:~/Klop$ chmod 621 GOT
vboxuser@Ubuntu:~/Klop$ ll
total 16
drwxrwxr-x  2 vboxuser Jack    4096 Dec 10 09:43 ./
drwxr-x--- 18 vboxuser vboxuser 4096 Dec 10 09:49 ../
-rw--w---x  1 vboxuser vboxuser   38 Dec  9 11:12 GOT*
-rw-rw-r--  1 vboxuser vboxuser   24 Dec 10 09:43 Look
```

Linux Commands

- View the current date and time.
- Check the system uptime.

```
vboxuser@Ubuntu:~$ date
Wed Dec 10 09:53:52 AM UTC 2025
vboxuser@Ubuntu:~$ uptime
 09:55:07 up  5:13,  1 user,  load average: 0.00, 0.00, 0.00
```

- View the running processes.

```
vboxuser@Ubuntu:~$ ps -ef
UID          PID    PPID  C STIME TTY          TIME CMD
root           1      0  0  04:41 ?        00:00:02 /sbin/init splash
root           2      0  0  04:41 ?        00:00:00 [kthreadd]
root           3      2  0  04:41 ?        00:00:00 [pool_workqueue_release]
root           4      2  0  04:41 ?        00:00:00 [kworker/R-rcu_gp]
root           5      2  0  04:41 ?        00:00:00 [kworker/R-sysrq_wq]
```

- Kill a running process.

```
vboxuser@Ubuntu:~$ pkill -9 apache2
vboxuser@Ubuntu:~$ systemctl status apache2
○ apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset:
   Active: inactive (dead) since Thu 2025-12-11 05:09:38 UTC; 43min ago
   Duration: 41min 29.186s
   Docs: https://httpd.apache.org/docs/2.4/
   Process: 1179 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SU
   Process: 3244 ExecStop=/usr/sbin/apachectl graceful-stop (code=exited, stat
```

- Install a package using the package manager (e.g., apt or yum).

```
vboxuser@Ubuntu:~$ sudo apt install cmatrix
[sudo] password for vboxuser:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  libllvm19
Use 'sudo apt autoremove' to remove it.
Suggested packages:
  cmatrix-xfont
The following NEW packages will be installed:
  cmatrix
0 upgraded, 1 newly installed, 0 to remove and 11 not upgraded.
Need to get 33.7 kB of archives.
After this operation, 75.0 kB of additional disk space will be used.
```

Linux Commands

- Update the system packages.

```
vboxuser@Ubuntu:~$ sudo apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://in.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:3 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1,646 kB]
Get:6 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [21.6 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]
Get:8 http://in.archive.ubuntu.com/ubuntu noble-updates/main amd64 Components [175 kB]
Get:9 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [71.4 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Components [212 B]
Get:11 http://in.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [1,501 kB]
Get:12 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [212 B]
Get:13 http://in.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Components [377 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Components [940 B]
Get:15 http://in.archive.ubuntu.com/ubuntu noble-backports/main amd64 Components [7,124 B]
Get:16 http://in.archive.ubuntu.com/ubuntu noble-backports/restricted amd64 Components [212 B]
Get:17 http://in.archive.ubuntu.com/ubuntu noble-backports/universe amd64 Components [11.6 kB]
```

- Create a symbolic link.

```
vboxuser@Ubuntu:~$ ln -s /home/vboxuser/Klop/GOT got_link
vboxuser@Ubuntu:~$ ls
Desktop  Documents  Downloads  got_link  Klop  Music  Pictures  Public  snap  Templates  Videos
vboxuser@Ubuntu:~$ cat got_link
Power is Power
Winter is Coming
Lions
```

- Search for files using the find command.

```
vboxuser@Ubuntu:~/Klop$ sudo find / -name GOT
[sudo] password for vboxuser:
find: '/run/user/1000/gvfs': Permission denied
find: '/run/user/1000/doc': Permission denied
find: '/proc/8192/task/8192/net': Invalid argument
find: '/proc/8192/net': Invalid argument
/home/vboxuser/Klop/GOT
```

- Compress and decompress files using tar.

```
vboxuser@Ubuntu:~/Downloads$ ls
Fun.tar  hello-world-pixel-3840x2160-15168.png  wc1782992-berserk-2017-wallpaper.jpg
vboxuser@Ubuntu:~/Downloads$ tar -xf Fun.tar
vboxuser@Ubuntu:~/Downloads$ ls
Fun.tar  hello-world-pixel-3840x2160-15168.png  Klop  wc1782992-berserk-2017-wallpaper.jpg
```

Linux Commands

- Monitor system resources with top or htop.

```

top - 10:26:12 up 5:45, 1 user, load average: 0.00, 0.01, 0.00
Tasks: 241 total, 1 running, 239 sleeping, 0 stopped, 1 zombie
%Cpu(s): 0.8 us, 0.2 sy, 0.0 ni, 99.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 11961.8 total, 8701.1 free, 1202.1 used, 2408.3 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used. 10759.8 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
 1968 vboxuser  20   0 5022400 394004 150276 S   3.3   3.2   8:18.89 gnome-shell
 6023 vboxuser  20   0 562444   59428 45112 S   0.7   0.5   0:16.53 gnome-terminal-
    18 root      20   0      0      0      0 I   0.3   0.0   0:03.04 rcu_preempt
 458 systemd+ 20   0  17560   7660  6748 S   0.3   0.1   0:03.10 systemd-oomd
11631 root      20   0      0      0      0 I   0.3   0.0   0:03.28 kworker/u18:3-events_unbound
    1 root      20   0  23376  14476  9532 S   0.0   0.1   0:02.85 systemd
    2 root      20   0      0      0      0 S   0.0   0.0   0:00.00 kthreadd
    3 root      20   0      0      0      0 S   0.0   0.0   0:00.00 pool workqueue release

```

- Create and manage user groups.

```
vboxuser@Ubuntu:~$ groups
vboxuser sudo
vboxuser@Ubuntu:~$ sudo groupadd Wolves
vboxuser@Ubuntu:~$ groups
vboxuser sudo
vboxuser@Ubuntu:~$ sudo usermod -aG Wolves Jack
```

- Set up SSH password less authentication.

```

Viqaas@LAPTOP-VG025G9U MINGW64 ~/Downloads
$ ssh ec2-user@44.221.43.88

      #_
    ~\  #####          Amazon Linux 2023
    ~\  #####\
    ~\  #####|
    ~\  \###|
    ~\  \#/  ____  https://aws.amazon.com/linux/amazon-linux-2023
    ~\  V~'  '->
    ~~~~~
    ~.  _  _/
    ~\  _/  _/
    ~\m/'  _/

```

Last login: Thu Dec 11 07:22:42 2025 from 103.203.172.230
[ec2-user@ip-172-31-65-118 ~]\$

- Monitor log files using tail or grep.

```
vboxuser@Ubuntu:~$ sudo tail -f /var/log/syslog
[sudo] password for vboxuser:
2025-12-11T05:46:23.469490+00:00 Ubuntu gnome-shell[2143]: Window manager warnin
g: Overwriting existing binding of keysym 37 with keysym 37 (keycode 10).
2025-12-11T05:46:23.469545+00:00 Ubuntu gnome-shell[2143]: Window manager warnin
g: Overwriting existing binding of keysym 35 with keysym 35 (keycode e).
2025-12-11T05:46:23.475903+00:00 Ubuntu gnome-shell[2143]: DING: DBus interface
for Switcheroo control (net.hadess.SwitcherooControl) is now available.
2025-12-11T05:46:23.501657+00:00 Ubuntu gnome-shell[2143]: DING: DBus interface
for Gvfs daemon (org.gtk.vfs.Metadata) is now available.
2025-12-11T05:46:23.503451+00:00 Ubuntu gnome-shell[2143]: DING: DBus interface
```

Linux Commands

- Set up a web server (e.g., Apache or Nginx).

```
vboxuser@Ubuntu:~$ systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset:
   Active: active (running) since Wed 2025-12-10 11:20:23 UTC; 4s ago
     Docs: https://httpd.apache.org/docs/2.4/
   Process: 6790 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/
 Main PID: 6796 (apache2)
    Tasks: 55 (limit: 14256)
   Memory: 5.4M (peak: 6.0M)
      CPU: 22ms
```

- Configure and secure a MySQL Database.

```
vboxuser@Ubuntu:~$ systemctl status mysql
● mysql.service - MySQL Community Server
   Loaded: loaded (/usr/lib/systemd/system/mysql.service; enabled; preset: en>
   Active: active (running) since Wed 2025-12-10 11:23:56 UTC; 10s ago
   Process: 8899 ExecStartPre=/usr/share/mysql/mysql-systemd-start pre (code=e>
 Main PID: 8908 (mysqld)
    Status: "Server is operational"
```

- Set up an Application Server (e.g: Apache Tomcat)
- Create a service file for Apache Tomcat. (Should execute by using systemctl command)

```
vboxuser@Ubuntu:/tmp$ systemctl status tomcat
● tomcat.service - Apache Tomcat Application Server
   Loaded: loaded (/etc/systemd/system/tomcat.service; enabled; preset: enabl
   Active: active (running) since Thu 2025-12-11 07:52:01 UTC; 3min 16s ago
   Process: 6919 ExecStart=/opt/tomcat/bin/startup.sh (code=exited, status=0/S
 Main PID: 6926 (java)
    Tasks: 38 (limit: 14256)
   Memory: 112.4M (peak: 170.1M)
      CPU: 6.311s
   CGroup: /system.slice/tomcat.service
```

- Print specific columns from a delimited file.

```
vboxuser@Ubuntu:~/Klop$ cat Look
age,height,country,city
12,50,India,Hy
vboxuser@Ubuntu:~/Klop$ awk -F ',' '{print $2, $4}' Look
height city
50 Hy
```


Linux Commands

- Filter and print lines based on a specific pattern or condition.

```
vboxuser@Ubuntu:~/Klop$ grep IT Look
Bob,32,IT,55000
David,35,IT,60000
vboxuser@Ubuntu:~/Klop$ awk -F ',' '$4 < 50000' Look
Alice,25,HR,40000
Charlie,29,Finance,48000
Eve,22,HR,35000
vboxuser@Ubuntu:~/Klop$ cat Look
name,age,department,salary
Alice,25,HR,40000
Bob,32,IT,55000
Charlie,29,Finance,48000
David,35,IT,60000
Eve,22,HR,35000
```

- Calculate and print the average, sum, or other statistics of a column.

```
vboxuser@Ubuntu:~/Klop$ awk -F ',' 'NR>1 {sum = sum + $4} END {print sum}' Look
238000
vboxuser@Ubuntu:~/Klop$ awk -F ',' 'NR>1 {sum = sum + $4; count++} END {print sum/count}' Look
47600
vboxuser@Ubuntu:~/Klop$ awk -F ',' 'NR>1 {print $1, $4 - $2}' Look
Alice 39975
Bob 54968
Charlie 47971
David 59965
Eve 34978
```

- Perform string manipulation, such as extracting substrings or changing cases.

```
vboxuser@Ubuntu:~/Klop$ echo "Hello World"
Hello World
vboxuser@Ubuntu:~/Klop$ echo "Hello World" | tr 'a-z' 'A-Z'
HELLO WORLD
vboxuser@Ubuntu:~/Klop$ echo "Hello World" | tr ' ' ','
Hello,World
vboxuser@Ubuntu:~/Klop$ echo "Winter is coming" | cut -c4-7
ter
vboxuser@Ubuntu:~/Klop$ echo "Winter is coming" | awk '{print toupper ($0)}'
WINTER IS COMING
```

Linux Commands

- Count the occurrences of a specific pattern in a file.

```
vboxuser@Ubuntu:~/Klop$ cat Look
name,age,department,salary
Alice,25,HR,40000
Bob,32,IT,55000
Charlie,29,Finance,48000
David,35,IT,60000
Eve,22,HR,35000
vboxuser@Ubuntu:~/Klop$ grep -c IT Look
2
vboxuser@Ubuntu:~/Klop$ grep -o IT Look | wc -l
2
```

- Sort lines based on a specific field or column.

```
vboxuser@Ubuntu:~/Klop$ cat Look
name,age,department,salary
Alice,25,HR,40000
Bob,32,IT,55000
Charlie,29,Finance,48000
David,35,IT,60000
Eve,22,HR,35000
vboxuser@Ubuntu:~/Klop$ ( head -n 1 Look; tail -n +2 Look | sort -t',' -k4,4n )
name,age,department,salary
Eve,22,HR,35000
Alice,25,HR,40000
Charlie,29,Finance,48000
Bob,32,IT,55000
David,35,IT,60000
```

- Merge multiple files based on a common field or column.

```
vboxuser@Ubuntu:~/Klop$ cat employees.txt
1 Alice 10
2 Bob 20
3 Charlie 30
4 David 40
vboxuser@Ubuntu:~/Klop$ cat departments.csv
10,HR
20,IT
30,Finance
40,Marketing
vboxuser@Ubuntu:~/Klop$ awk 'NR==FNR { split($0,a,","); dept[a[1]]=a[2]; next } { print $0, dept[$3] }' departments.csv employees.txt
1 Alice 10 HR
2 Bob 20 IT
3 Charlie 30 Finance
4 David 40 Marketing
```

- Substitute text in a file using search and replace.

```
vboxuser@Ubuntu:~/Klop$ echo "i love apples and oranges">> fruitx.txt
vboxuser@Ubuntu:~/Klop$ ls
departments.csv employees.txt fruitx.txt GOT Look test test.zip
vboxuser@Ubuntu:~/Klop$ mv fruitx.txt fruits.txt
vboxuser@Ubuntu:~/Klop$ sed -i 's/apples/mangoes/g' fruits.txt
vboxuser@Ubuntu:~/Klop$ cat fruits.txt
i love mangoes and oranges
```


Linux Commands

- Delete specific lines based on a pattern or line number.

```
vboxuser@Ubuntu:~/Klop$ cat >sample.txt <<EOF
> line one
> error found
> line three
> another error here
> line five
> EOF
vboxuser@Ubuntu:~/Klop$ cat sample.txt
line one
error found
line three
another error here
line five

vboxuser@Ubuntu:~/Klop$ cat sample.txt
line one
error found
line three
another error here
line five
vboxuser@Ubuntu:~/Klop$ sed -i '/error/d' sample.txt
vboxuser@Ubuntu:~/Klop$ cat sample.txt
line one
line three
line five
vboxuser@Ubuntu:~/Klop$ sed -i '/three/!d' sample.txt
vboxuser@Ubuntu:~/Klop$ cat sample.txt
line three
```

- Append or insert text before or after a specific pattern or line.

```
vboxuser@Ubuntu:~/Klop$ cat file.txt
fruits : apples
fruits : oranges
fruits : mangoes
fruits : melons
vboxuser@Ubuntu:~/Klop$ sed -i '/mangoes/i strawberries' file.txt
vboxuser@Ubuntu:~/Klop$ cat file.txt
fruits : apples
fruits : oranges
strawberries
fruits : mangoes
fruits : melons
vboxuser@Ubuntu:~/Klop$ sed -i '/strawberries/a lemons' file.txt
vboxuser@Ubuntu:~/Klop$ cat file.txt
fruits : apples
fruits : oranges
strawberries
lemons
fruits : mangoes
fruits : melons
```

Linux Commands

- Print only specific lines from a file.

```
vboxuser@Ubuntu:~/Klop$ cat file.txt
fruits : apples
fruits : oranges
strawberries
lemons
fruits : mangoes
fruits : melons
vboxuser@Ubuntu:~/Klop$ sed -n '3p' file.txt
strawberries
vboxuser@Ubuntu:~/Klop$ sed -n '3,6p' file.txt
strawberries
lemons
fruits : mangoes
fruits : melons
vboxuser@Ubuntu:~/Klop$ sed -n '3p;6p' file.txt
strawberries
fruits : melons
```

- Copy file from linux to windows machine.

```
Viqaas@LAPTOP-VG025G9U MINGW64 ~/Desktop
$ scp ec2-user@44.221.43.88:/tmp/abc.pdf C:/Users/Viqaas/Desktop/
abc.pdf 100% 164KB 113.4KB/s 00:01
```

- 5 use cases for AWK and 5 use cases for sed.
- `awk -F',' 'NR>1 {sum = sum + $n} END {print sum}' filename` – for adding content in a file
- `ps -ef | awk '{print $2}'` - gives pid column in processes,
- `awk -F',' 'NR>1 {sum = sum + $4; count++} END {print sum/count}' filename` - an example for taking a average in a file.
- `awk -F',' 'NR>1 {print $1, $4 - $2}' filename` - an example for subtracting (NR>1 means to ignore the first line, use it if the file contains header)
- `sed -i '/keyword/d' filename` - to delete lines with the specific keyword.
- `sed -i '/keyword/!d' filename` - to delete every line except the ones with the specific keyword.
- `sed -n '3p' filename` - to print the third line.
- `sed -n '2,4p' filename` - to print 2-4 line.
- `sed -n '/keyword/p' filename` - print lines that match a pattern.

Linux Commands

```
vboxuser@Ubuntu:~/Klop$ cat file.txt
fruits : apples
fruits : oranges
strawberries
lemons
fruits : mangoes
fruits : melons
vboxuser@Ubuntu:~/Klop$ sed -n '3p' file.txt
strawberries
vboxuser@Ubuntu:~/Klop$ sed -n '3,6p' file.txt
strawberries
lemons
fruits : mangoes
fruits : melons
vboxuser@Ubuntu:~/Klop$ sed -n '3p;6p' file.txt
strawberries
fruits : melons
```

```
vboxuser@Ubuntu:~/Klop$ cat sample.txt
line one
error found
line three
another error here
line five
vboxuser@Ubuntu:~/Klop$ sed -i '/error/d' sample.txt
vboxuser@Ubuntu:~/Klop$ cat sample.txt
line one
line three
line five
vboxuser@Ubuntu:~/Klop$ sed -i '/three/!d' sample.txt
vboxuser@Ubuntu:~/Klop$ cat sample.txt
line three
```

```
vboxuser@Ubuntu:~/Klop$ grep IT Look
Bob,32,IT,55000
David,35,IT,60000
vboxuser@Ubuntu:~/Klop$ awk -F ',' '$4 < 50000' Look
Alice,25,HR,40000
Charlie,29,Finance,48000
Eve,22,HR,35000
vboxuser@Ubuntu:~/Klop$ cat Look
name,age,department,salary
Alice,25,HR,40000
Bob,32,IT,55000
Charlie,29,Finance,48000
David,35,IT,60000
Eve,22,HR,35000
```