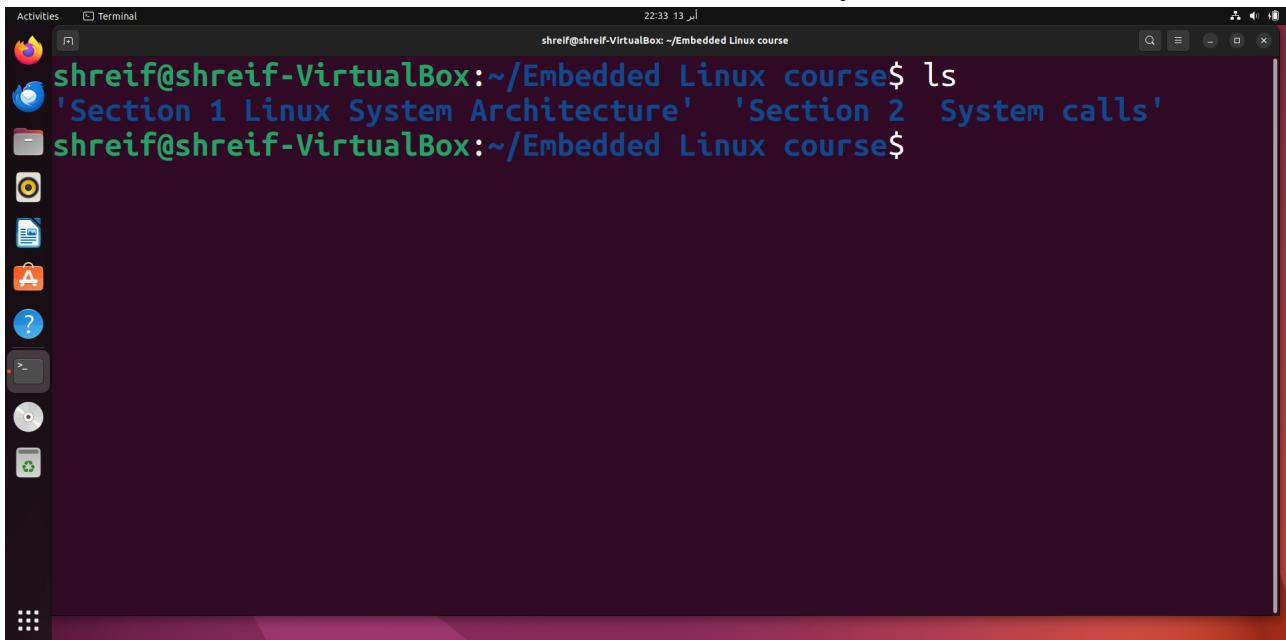


commands-fs

Exercise 1: Basic Navigation

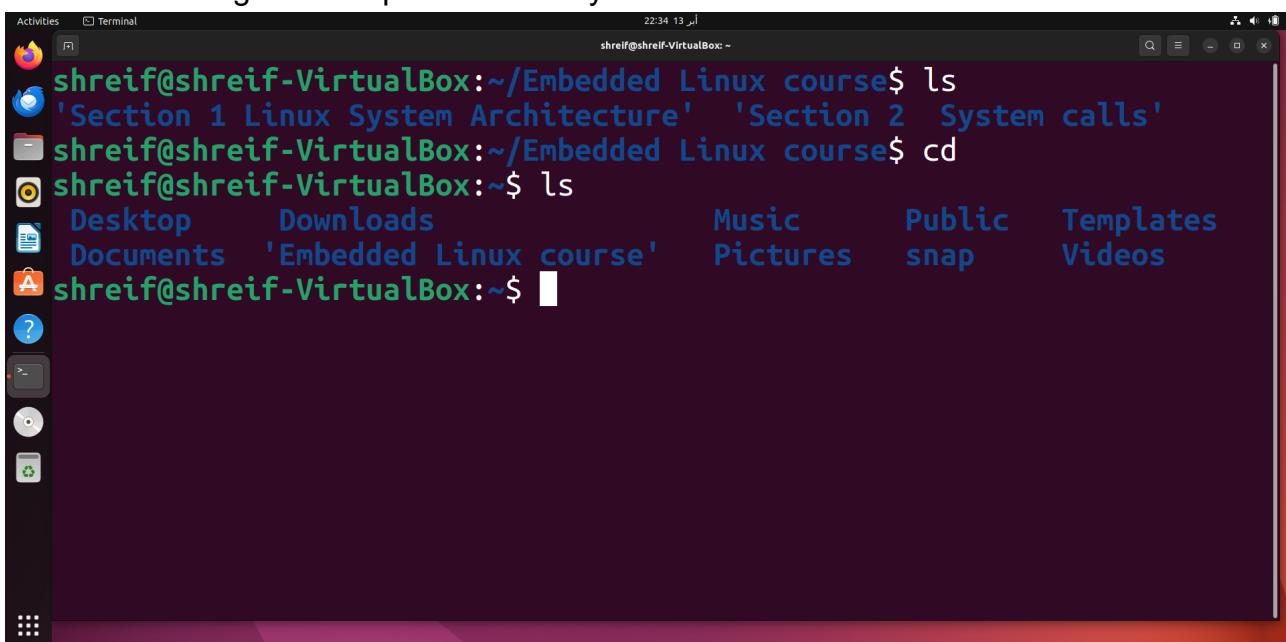
- **Use ls to list all files and directories in the current directory.



A screenshot of a Linux desktop environment. On the left is a dock with icons for Home, Dash, Activities, Terminal, and others. In the center is a terminal window titled 'shreif@shreif-VirtualBox: ~/Embedded Linux course'. The terminal shows the command 'ls' being run, listing two subdirectories: 'Section 1 Linux System Architecture' and 'Section 2 System calls'. The timestamp at the top right of the terminal is 22:33 13 Jul.

```
shreif@shreif-VirtualBox:~/Embedded Linux course$ ls
'Section 1 Linux System Architecture' 'Section 2 System calls'
shreif@shreif-VirtualBox:~/Embedded Linux course$
```

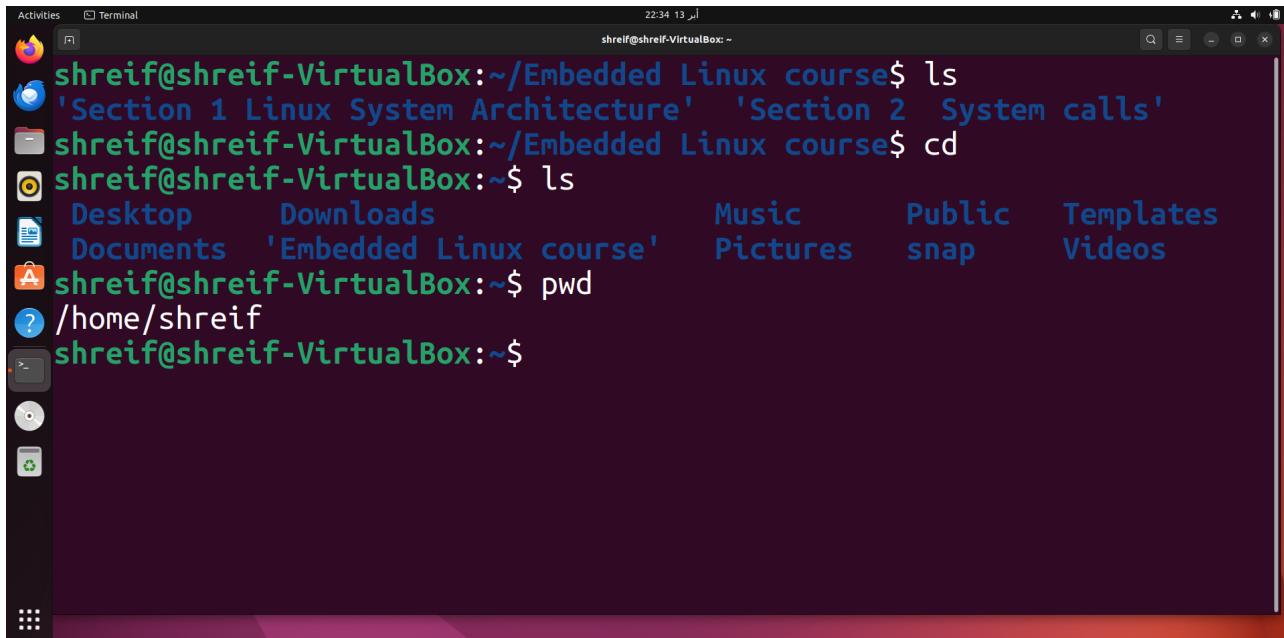
- **Use cd to navigate to a specific directory.



A screenshot of a Linux desktop environment, similar to the previous one. The terminal window shows the user navigating to the home directory ('~') and then listing the contents. The command 'cd' is used to change the directory, and 'ls' is used to list the contents of the home directory. The timestamp at the top right of the terminal is 22:34 13 Jul.

```
shreif@shreif-VirtualBox:~/Embedded Linux course$ ls
'Section 1 Linux System Architecture' 'Section 2 System calls'
shreif@shreif-VirtualBox:~/Embedded Linux course$ cd
shreif@shreif-VirtualBox:~$ ls
Desktop      Downloads      Music      Public      Templates
Documents   'Embedded Linux course' Pictures    snap       Videos
shreif@shreif-VirtualBox:~$
```

- **Use `pwd` to print the current working directory.

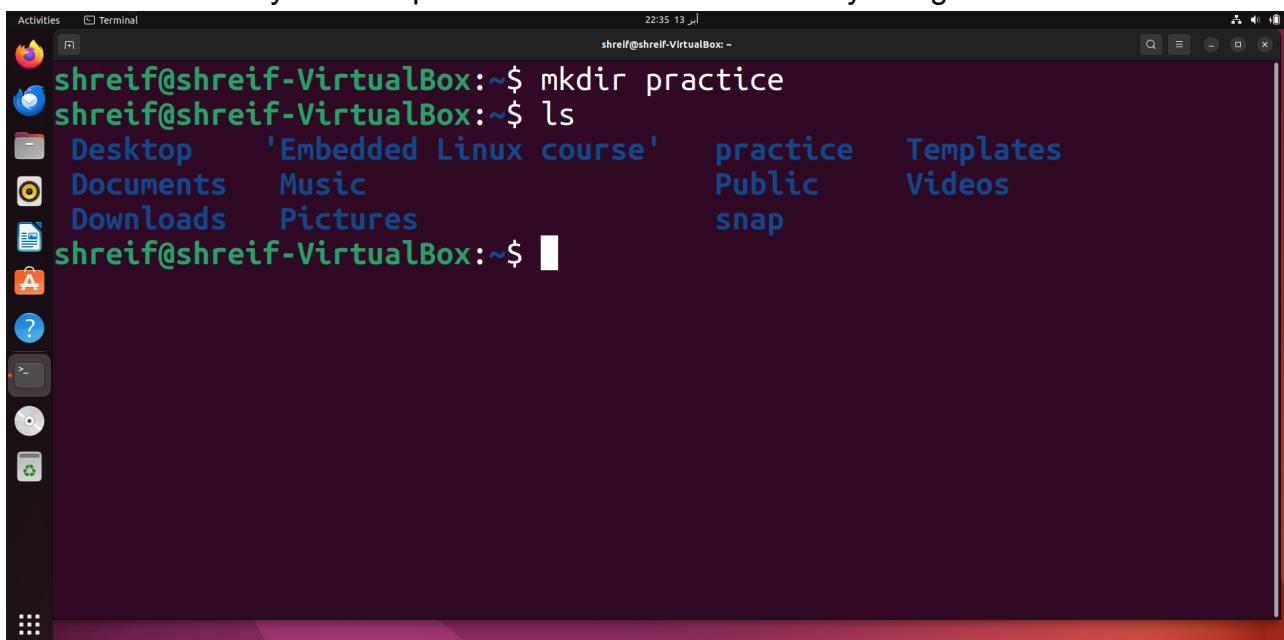
A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for Dash, Home, Applications, and others. In the center is a terminal window titled "Terminal". The terminal shows the following session:

```
shreif@shreif-VirtualBox:~/Embedded Linux course$ ls
'section 1 Linux System Architecture' 'Section 2 System calls'
shreif@shreif-VirtualBox:~/Embedded Linux course$ cd
shreif@shreif-VirtualBox:~$ ls
Desktop      Downloads      Music      Public      Templates
Documents    'Embedded Linux course' Pictures  snap       Videos
shreif@shreif-VirtualBox:~$ pwd
/home/shreif
shreif@shreif-VirtualBox:~$
```

The terminal window has a dark background with light-colored text. The title bar shows the session name and the current working directory.

Exercise 2: File and Directory Operations

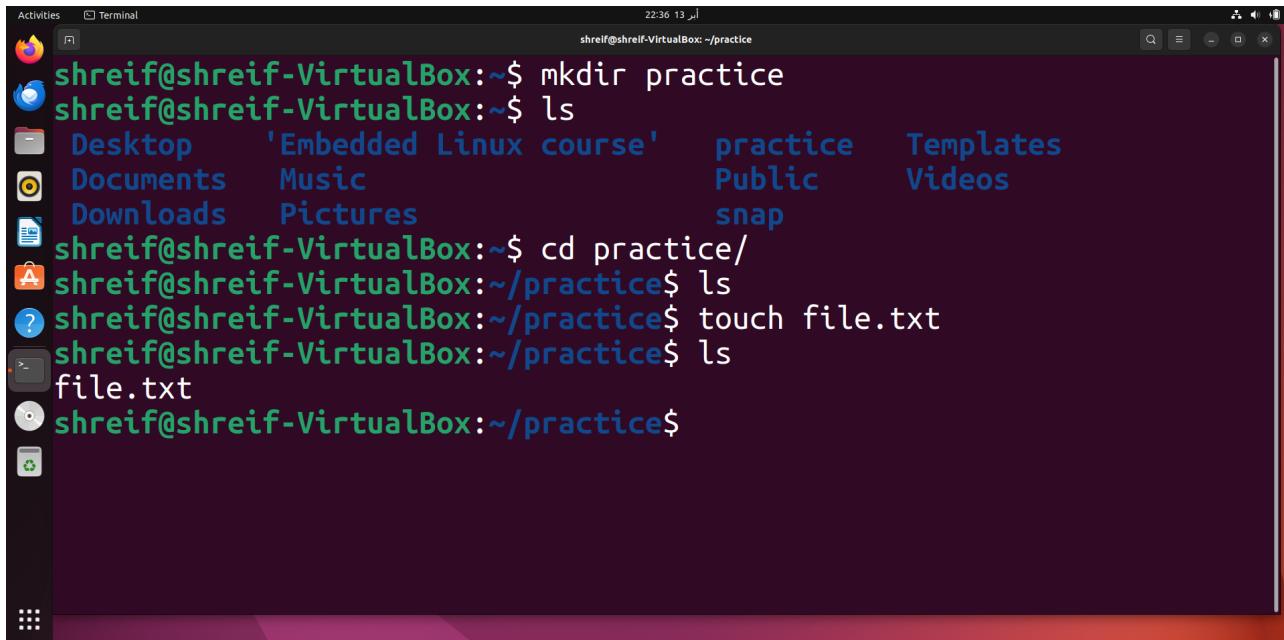
- **Create a directory named "practice" in the current directory using `mkdir`.

A screenshot of an Ubuntu desktop environment, identical to the one above. The terminal window shows the following session:

```
shreif@shreif-VirtualBox:~$ mkdir practice
shreif@shreif-VirtualBox:~$ ls
Desktop      'Embedded Linux course'  practice  Templates
Documents    Music                  Public    Videos
Downloads    Pictures               snap
shreif@shreif-VirtualBox:~$
```

The terminal window has a dark background with light-colored text. The title bar shows the session name and the current working directory.

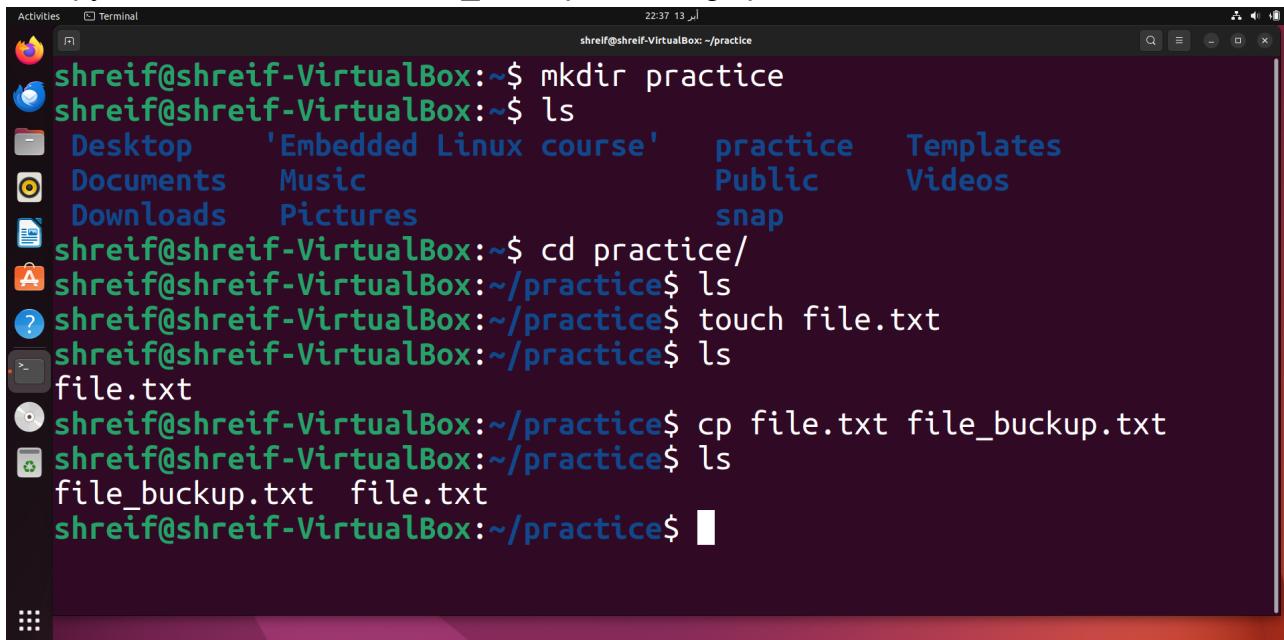
- **Create an empty file named "file.txt" within the "practice" directory using touch.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window titled "Terminal". The terminal window has a dark background and contains the following text:

```
shreif@shreif-VirtualBox:~$ mkdir practice
shreif@shreif-VirtualBox:~$ ls
Desktop  'Embedded Linux course'  practice  Templates
Documents  Music  Public  Videos
Downloads  Pictures  snap
shreif@shreif-VirtualBox:~$ cd practice/
shreif@shreif-VirtualBox:~/practice$ ls
shreif@shreif-VirtualBox:~/practice$ touch file.txt
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$
```

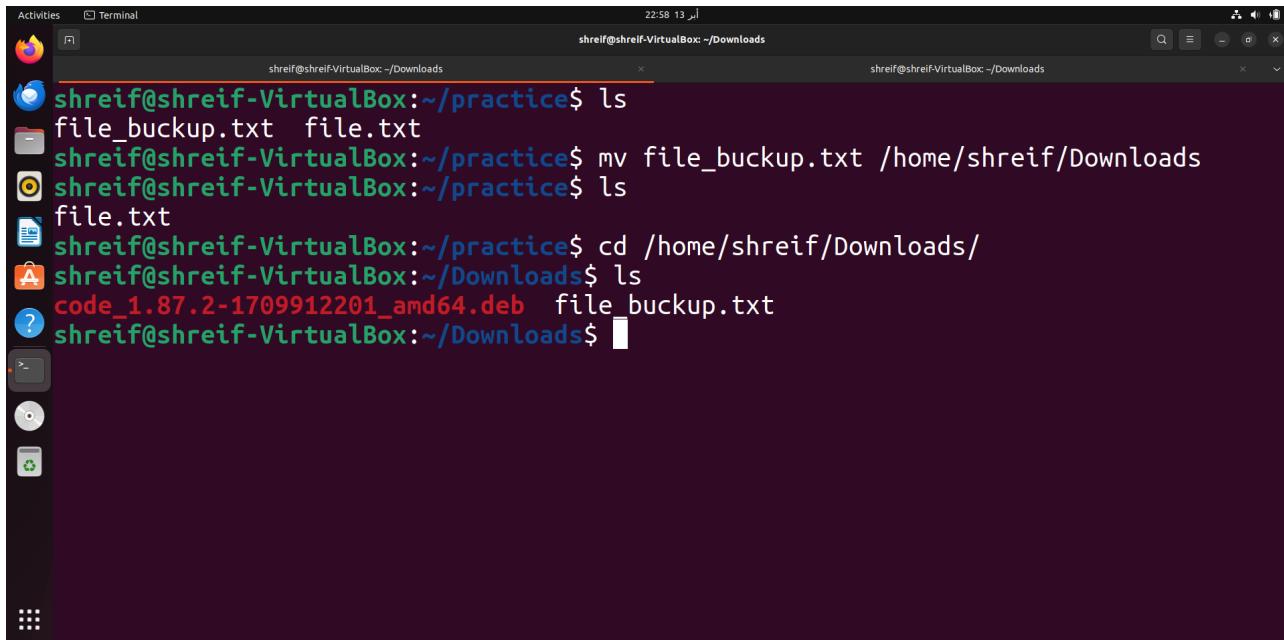
- **Copy "file.txt" to a new file "file_backup.txt" using cp.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window titled "Terminal". The terminal window has a dark background and contains the following text:

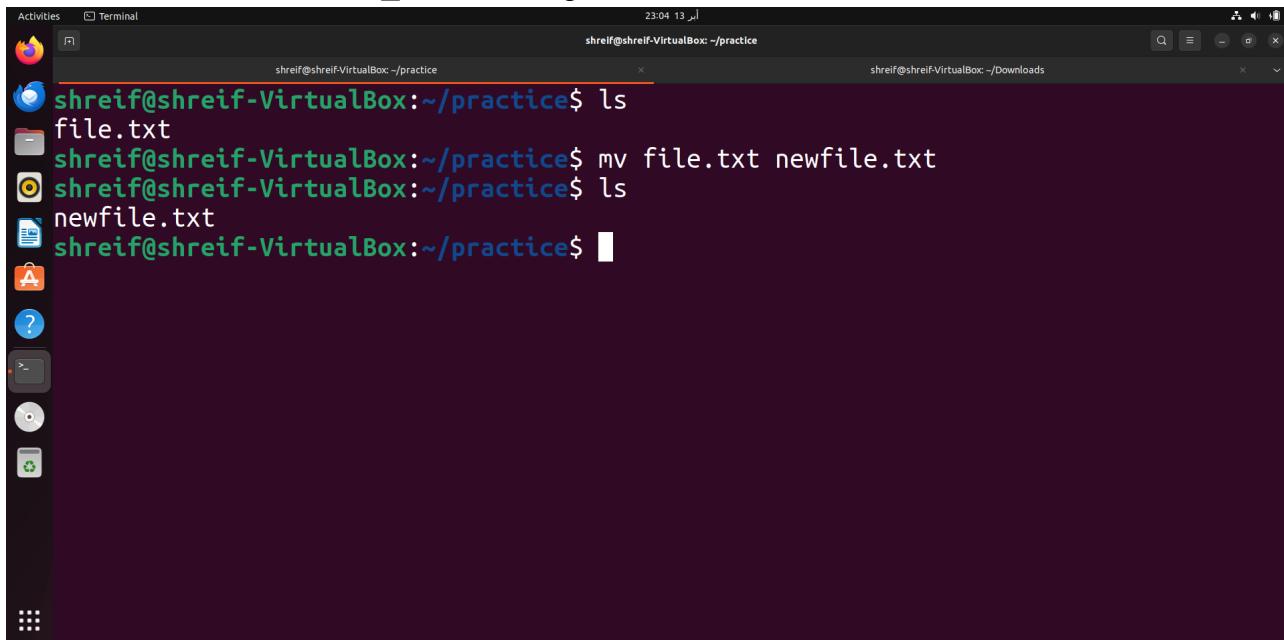
```
shreif@shreif-VirtualBox:~$ mkdir practice
shreif@shreif-VirtualBox:~$ ls
Desktop  'Embedded Linux course'  practice  Templates
Documents  Music  Public  Videos
Downloads  Pictures  snap
shreif@shreif-VirtualBox:~$ cd practice/
shreif@shreif-VirtualBox:~/practice$ ls
shreif@shreif-VirtualBox:~/practice$ touch file.txt
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$ cp file.txt file_buckup.txt
shreif@shreif-VirtualBox:~/practice$ ls
file_buckup.txt  file.txt
shreif@shreif-VirtualBox:~/practice$
```

- **Move "file_backup.txt" to another directory using mv.



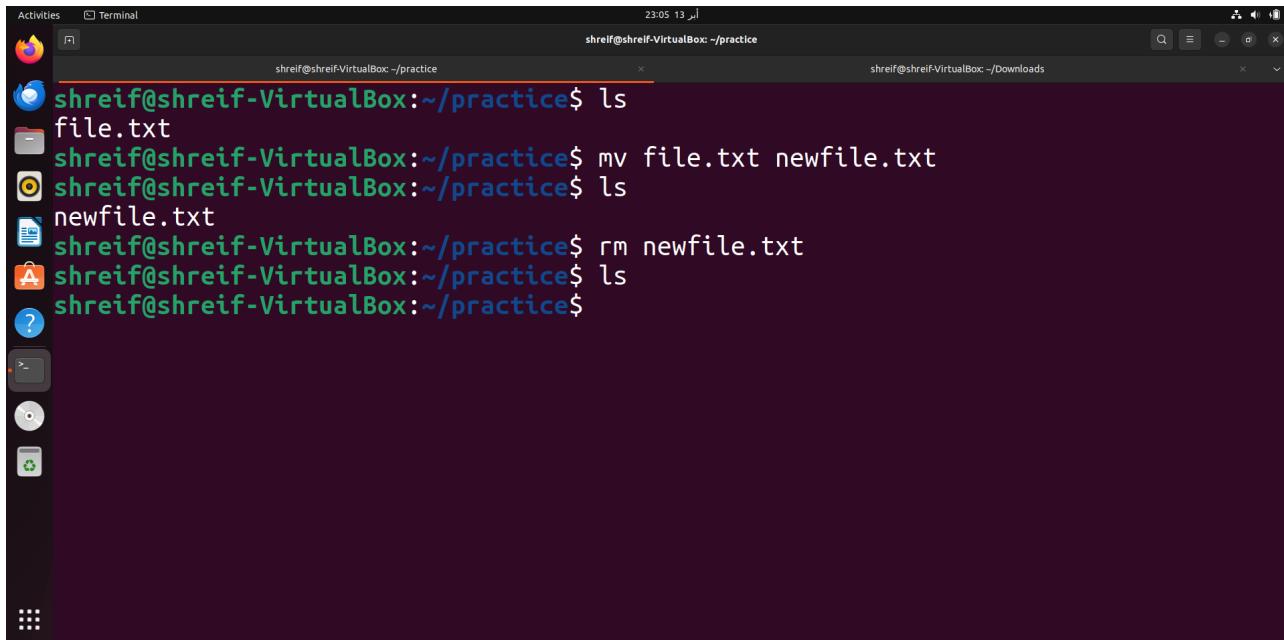
```
shreif@shreif-VirtualBox:~/practice$ ls
file_buckup.txt  file.txt
shreif@shreif-VirtualBox:~/practice$ mv file_buckup.txt /home/shreif/Downloads
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$ cd /home/shreif/Downloads/
shreif@shreif-VirtualBox:~/Downloads$ ls
code_1.87.2-1709912201_amd64.deb  file_buckup.txt
shreif@shreif-VirtualBox:~/Downloads$
```

- **Rename "file.txt" to "new_file.txt" using mv.



```
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$ mv file.txt newfile.txt
shreif@shreif-VirtualBox:~/practice$ ls
newfile.txt
shreif@shreif-VirtualBox:~/practice$
```

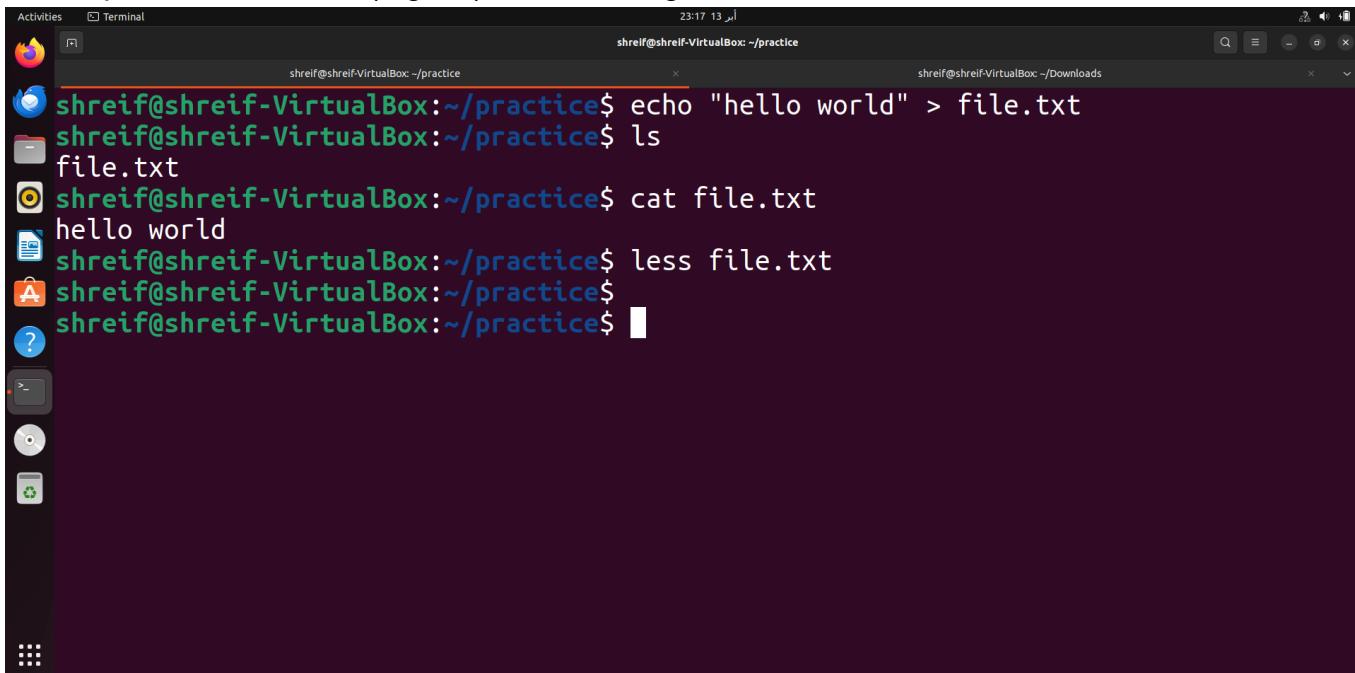
- **Delete the "new_file.txt" using rm.



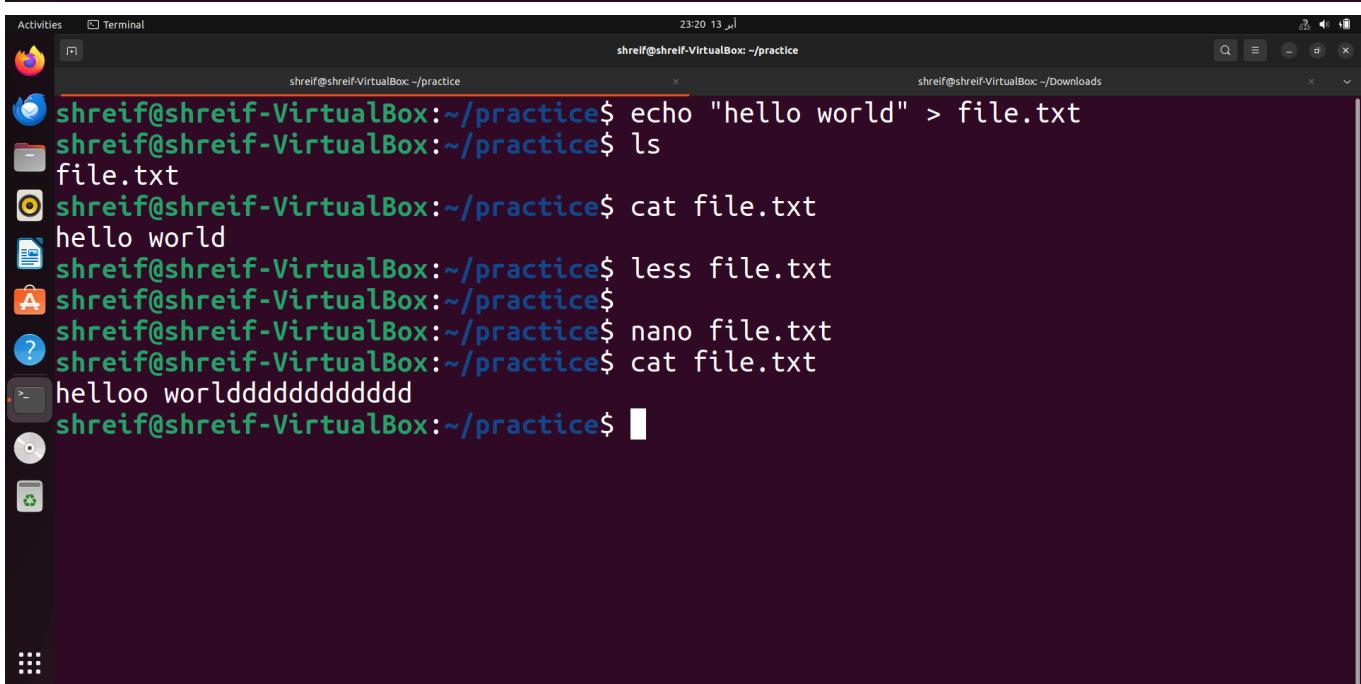
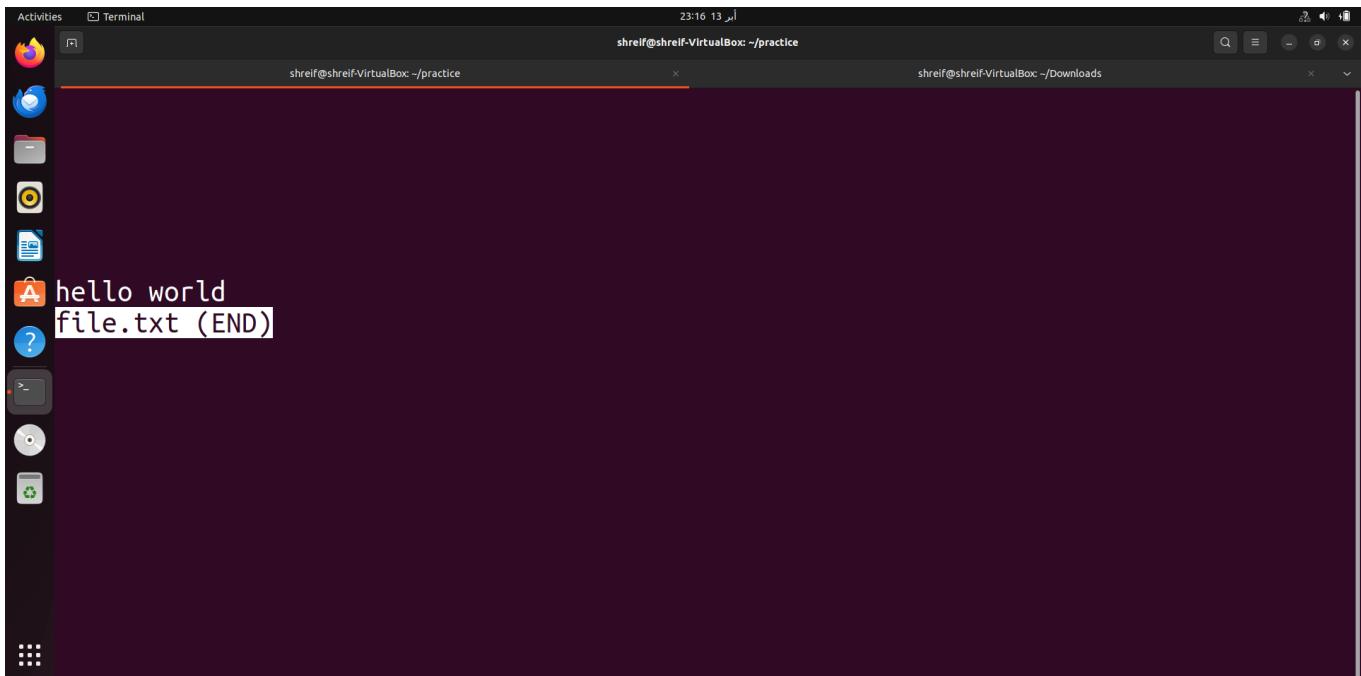
```
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$ mv file.txt newfile.txt
shreif@shreif-VirtualBox:~/practice$ ls
newfile.txt
shreif@shreif-VirtualBox:~/practice$ rm newfile.txt
shreif@shreif-VirtualBox:~/practice$ ls
shreif@shreif-VirtualBox:~/practice$
```

Exercise 3: File Viewing and Editing

**Create a text file using echo or a text editor like nano. View the contents of the file using cat. View the contents of the file using less. Edit the file using nano or another text editor. Redirect the output of a command (e.g., ls) to a file using >.



```
shreif@shreif-VirtualBox:~/practice$ echo "hello world" > file.txt
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$ cat file.txt
hello world
shreif@shreif-VirtualBox:~/practice$ less file.txt
shreif@shreif-VirtualBox:~/practice$
```



```
shreif@shreif-VirtualBox:~/practice$ echo "hello world" > file.txt
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$ cat file.txt
hello world
shreif@shreif-VirtualBox:~/practice$ less file.txt
shreif@shreif-VirtualBox:~/practice$ nano file.txt
shreif@shreif-VirtualBox:~/practice$ cat file.txt
heollo world
shreif@shreif-VirtualBox:~/practice$ ls > file.txt
shreif@shreif-VirtualBox:~/practice$ cat file.txt
file.txt
shreif@shreif-VirtualBox:~/practice$
```

Exercise 4: File Permissions

**Create a file and set specific permissions using chmod. Check the permissions of the file using ls -l. Change the owner and group of the file using chown. Verify the changes using ls -l.

A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for Dash, Home, Applications, and Help. Two terminal windows are open in the top panel. The left terminal window shows a user named 'shreif' at 'shreif-VirtualBox' in the directory '/practice'. The user runs 'ls -l' which shows a file named 'file.txt' with permissions '-rw-rw-r--'. The user then runs 'cat file.txt' and sees the text 'hi i am shreif'. The user changes the file's permissions with 'chmod u+rwx file.txt' and then runs 'ls -l' again, where 'file.txt' now has permissions '-rwxrw-r--'. The right terminal window also shows the same user and directory, with a similar sequence of commands and output.

```
shreif@shreif-VirtualBox:~/practice$ ls -l
total 4
-rw-rw-r-- 1 shreif shreif 15 Apr 14 16:20 file.txt
shreif@shreif-VirtualBox:~/practice$ cat file.txt
hi i am shreif
shreif@shreif-VirtualBox:~/practice$ chmod u+rwx file.txt
shreif@shreif-VirtualBox:~/practice$ ls -l
total 4
-rwxrw-r-- 1 shreif shreif 15 Apr 14 16:20 file.txt
shreif@shreif-VirtualBox:~/practice$
```

A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for Dash, Home, Applications, and Help. Two terminal windows are open in the top panel. The left terminal window shows a user named 'shreif' at 'shreif-VirtualBox' in the directory '/practice'. The user runs 'ls -l' which shows a file named 'file.txt' with permissions '-rwxrw-r--'. The user then runs 'chown shreif file.txt' but receives an error message: 'chown: changing ownership of 'file.txt': Operation not permitted'. The user then runs 'sudo chown shreif file.txt' and successfully changes the ownership. The right terminal window also shows the same user and directory, with a similar sequence of commands and output.

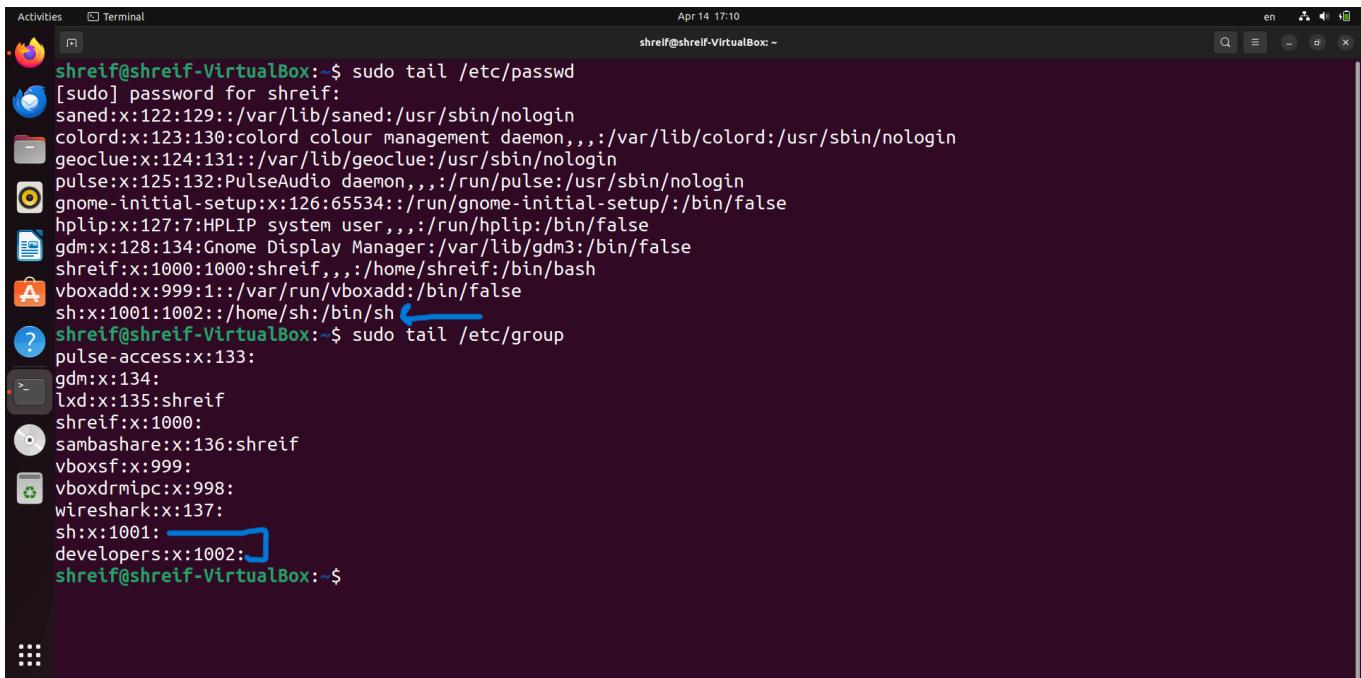
```
shreif@shreif-VirtualBox:~/practice$ ls -l
total 4
-rwxrw-r-- 1 root shreif 15 Apr 14 16:20 file.txt
shreif@shreif-VirtualBox:~/practice$ chown shreif file.txt
chown: changing ownership of 'file.txt': Operation not permitted
shreif@shreif-VirtualBox:~/practice$ sudo chown shreif file.txt
shreif@shreif-VirtualBox:~/practice$ ls
file.txt
shreif@shreif-VirtualBox:~/practice$ ls -l
total 4
-rwxrw-r-- 1 shreif shreif 15 Apr 14 16:20 file.txt
shreif@shreif-VirtualBox:~/practice$
```

Exercise 5: User and Group Management

**Create a new user using useradd. Set a password for the new user using passwd. Create a new group using groupadd. Add the user to the newly created group using usermod.

```
Activities Terminal Apr 14 16:42 shreif@shreif-VirtualBox:~/practice  
shreif@shreif-VirtualBox:~/practice$ sudo useradd sh  
shreif@shreif-VirtualBox:~/practice$ passwd sh  
passwd: You may not view or modify password information for sh.  
shreif@shreif-VirtualBox:~/practice$ sudo passwd sh  
New password:  
A BAD PASSWORD: The password is shorter than 8 characters  
Retype new password:  
Sorry, passwords do not match.  
New password:  
Retype new password:  
passwd: password updated successfully  
shreif@shreif-VirtualBox:~/practice$ sudo groupadd shreifmo  
shreif@shreif-VirtualBox:~/practice$ sudo usermod --append --groups  
    shreifmo sh  
usermod: group 'shreifmo' does not exist  
shreif@shreif-VirtualBox:~/practice$
```

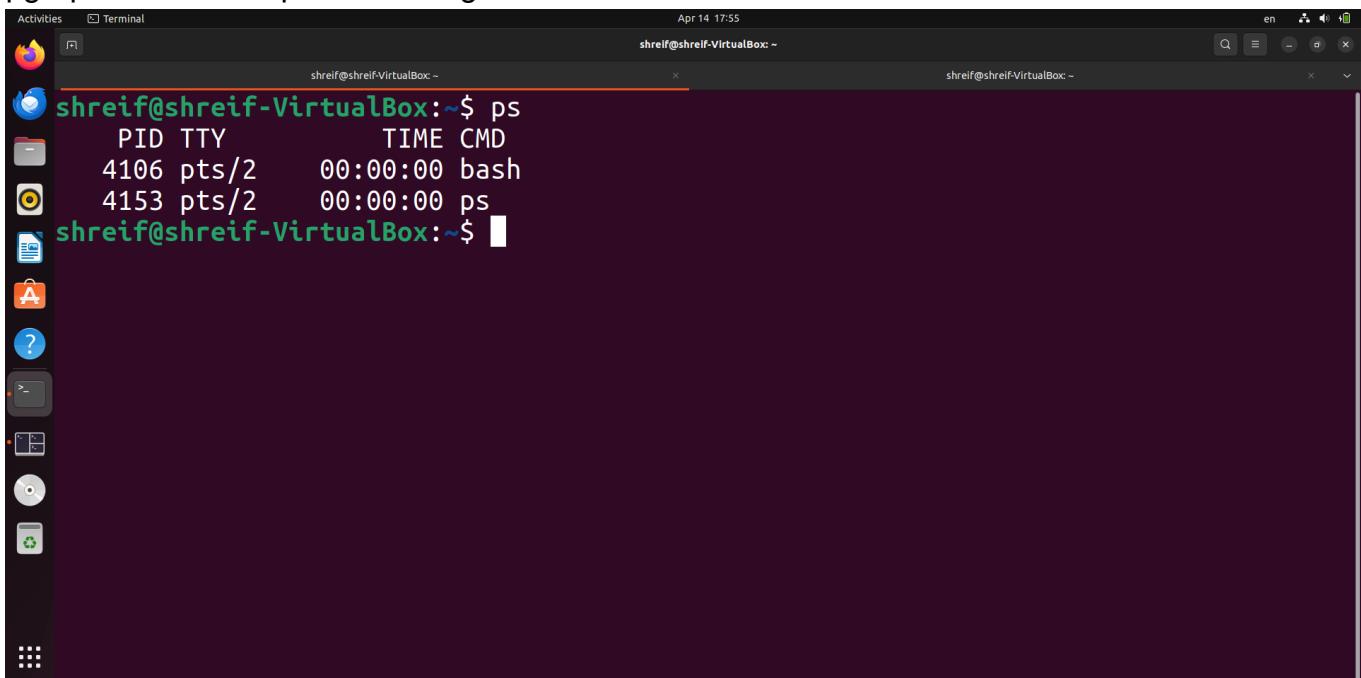
```
Activities Terminal Apr 14 17:02 shreif@shreif-VirtualBox:~/practice  
shreif@shreif-VirtualBox:~/practice$ sudo groupadd developers  
shreif@shreif-VirtualBox:~/practice$ sudo tail /etc/group  
pulse-access:x:133:  
gdm:x:134:  
lxd:x:135:shreif  
A shreif:x:1000:  
sambashare:x:136:shreif  
vboxsf:x:999:  
vboxdrvmpc:x:998:  
wireshark:x:137:  
sh:x:1001:  
developers:x:1002:  
shreif@shreif-VirtualBox:~/practice$ usermod -g developers sh  
usermod: Permission denied.  
usermod: cannot lock /etc/passwd; try again later.  
shreif@shreif-VirtualBox:~/practice$ sudo usermod -g developers sh
```



```
shreif@shreif-VirtualBox:~$ sudo tail /etc/passwd
[sudo] password for shreif:
saned:x:122:129::/var/lib/saned:/usr/sbin/nologin
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:124:131::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:126:65534::/run/gnome-initial-setup/:/bin/false
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false
shreif:x:1000:1000:shreif,,,:/home/shreif:/bin/bash
vboxadd:x:999:1::/var/run/vboxadd:/bin/false
sh:x:1001:1002::/home/sh:/bin/sh
shreif@shreif-VirtualBox:~$ sudo tail /etc/group
pulse-access:x:133:
gdm:x:134:
lxd:x:135:shreif
shreif:x:1000:
sambashare:x:136:shreif
vboxsf:x:999:
vboxdrmpc:x:998:
wireshark:x:137:
sh:x:1001: [REDACTED]
developers:x:1002:
shreif@shreif-VirtualBox:~$
```

Exercise 6: Process Management

**List all processes using ps. List processes in real-time using top. Find a specific process using pgrep. Terminate a process using kill.



```
shreif@shreif-VirtualBox:~$ ps
 PID TTY      TIME CMD
 4106 pts/2    00:00:00 bash
 4153 pts/2    00:00:00 ps
shreif@shreif-VirtualBox:~$
```

```

Activities Terminal Apr 14 17:57
shreif@shreif-VirtualBox:~ top - 17:57:19 up 34 min, 1 user, load average: 0.19, 0.25, 0.36
Tasks: 196 total, 1 running, 195 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.3 us, 0.2 sy, 0.0 ni, 99.5 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3907.2 total, 1621.5 free, 894.8 used, 1390.9 buff/cache
MiB Swap: 2680.0 total, 2680.0 free, 0.0 used. 2728.7 avail Mem

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
2773 shreif 20 0 4368108 461392 154972 S 0.7 11.5 2:27.96 gnome-shell
3093 shreif 20 0 207456 64528 49860 S 0.3 1.6 0:00.58 Xwayland
4212 shreif 20 0 21876 3968 3200 R 0.3 0.1 0:00.06 top
1 root 20 0 166704 11620 8164 S 0.0 0.3 0:01.86 systemd
2 root 20 0 0 0 0 S 0.0 0.0 0:00.00 kthreadd
3 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu_gp
4 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu_par_gp
5 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 slab_flushwq
6 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 netns
8 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/0:0H-kblockd
11 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 mm_percpu_wq
12 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rcu_tasks_kthread
13 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rcu_tasks_rude_kthread
14 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rcu_tasks_trace_kthread
15 root 20 0 0 0 0 S 0.0 0.0 0:00.11 ksoftirqd/0
16 root 20 0 0 0 0 I 0.0 0.0 0:01.02 rCU_prempt
17 root rt 0 0 0 0 S 0.0 0.0 0:00.01 migration/0
18 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_inject/0
19 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/0
20 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/1
21 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_inject/1

```

```

Activities Tilix Apr 14 18:01
Tilix: shreif@shreif-VirtualBox:~ top - 18:01:46 up 38 min, 1 user, load average: 0.12, 0.17, 0.20
Tasks: 195 total, 1 running, 194 sleeping, 0 stopped, 0 zombie
%Cpu(s): 2.3 us, 0.8 sy, 0.0 ni, 97.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3907.2 total, 1621.0 free, 895.0 used, 1391.2 buff/cache
MiB Swap: 2680.0 total, 2680.0 free, 0.0 used. 2728.4 avail Mem

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
2773 shreif 20 0 4368132 461392 154972 S 3.7 11.5 2:49.96 gnome-shell
4012 shreif 20 0 940432 86256 61864 S 0.7 2.2 0:09.12 tilix
3285 shreif 20 0 227524 3200 2816 S 0.3 0.1 0:02.35 VBoxclient
4243 shreif 20 0 21872 3968 3200 R 0.3 0.1 0:00.06 top
1 root 20 0 166704 11620 8164 S 0.0 0.3 0:01.86 systemd
2 root 20 0 0 0 0 S 0.0 0.0 0:00.00 kthreadd
3 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu_gp
4 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu_par_gp
5 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 slab_flushwq
6 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 netns
8 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/0:0H-kblockd
11 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 mm_percpu_wq
12 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rCU_tasks_kthread
13 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rCU_tasks_rude_kthread
14 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rCU_tasks_trace_kthread
15 root 20 0 0 0 0 S 0.0 0.0 0:00.11 ksoftirqd/0
16 root 20 0 0 0 0 I 0.0 0.0 0:01.11 rCU_prempt
17 root rt 0 0 0 0 S 0.0 0.0 0:00.01 migration/0
18 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_inject/0
19 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/0
20 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/1
21 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_inject/1
22 root rt 0 0 0 0 S 0.0 0.0 0:00.00 migration/1
23 root 20 0 0 0 0 S 0.0 0.0 0:00.00 ksoftirqd/1
24 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/1:0H-events_highpri
26 root 20 0 0 0 0 S 0.0 0.0 0:00.01 kworker/1:0H-events_lowpri
27 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 net_fq_wq
29 root 20 0 0 0 0 S 0.0 0.0 0:00.00 kaudiod
30 root 20 0 0 0 0 S 0.0 0.0 0:00.00 khungtaskd
31 root 20 0 0 0 0 S 0.0 0.0 0:00.00 oom_reaper
32 root 20 0 0 0 0 I 0.0 0.0 0:00.01 kworker/4:2-events_power_eff+
33 root 0 -20 0 0 0 I 0.0 0.0 0:00.01 writeback
34 root 20 0 0 0 0 S 0.0 0.0 0:00.07 kcompactd0
35 root 25 5 0 0 0 S 0.0 0.0 0:00.00 ksm
36 root 39 19 0 0 0 S 0.0 0.0 0:00.00 khugepaged
37 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kintegridd
38 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kblockd
39 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 blkcg_punt_bio
40 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 tpm_dev_wq

```

```

1:shreif@shreif-VirtualBox:~$ pgrep top
3225
3228
3325
3347
4243
shreif@shreif-VirtualBox:~$ kill 4243
bash: kill: (4243) - No such process
shreif@shreif-VirtualBox:~$ kill 4243
shreif@shreif-VirtualBox:~$
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	XMEM	TIME+	COMMAND
2773	shreif	20	0	4368136	461392	154972	S	5.0	11.5	2:51.58	gnome-shell
518	systrend+	20	0	14836	6784	6016	S	0.3	0.2	0:02.34	systrend-ondm
2746	root	20	0	0	0	0	I	0.3	0.0	0:00.39	kworker/1:2-events
4012	shreif	20	0	940432	86256	61864	S	0.3	2.2	0:09.29	tilix
4243	shreif	20	0	21872	3968	3200	R	0.3	0.1	0:00.10	top
1	root	20	0	166704	11628	8164	S	0.0	0.3	0:01.88	systrend
2	root	20	0	0	0	0	I	0.0	0.0	0:00.00	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_bh_kthre
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par_gp
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	slub_flushwq
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/0:0-H-kblockd
11	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_percpu_wq
12	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_kthread
13	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_rude_kthread
14	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_trace_kthread
15	root	20	0	0	0	0	S	0.5	0.0	0:00.10	ksoftirqd/0
16	root	20	0	0	0	0	S	0.0	0.0	0:00.00	ksoftirqd/1
17	root	rt	0	0	0	0	S	0.0	0.0	0:00.01	migration/0
18	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/0
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0
20	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/1
21	root	-51	0	0	0	0	S	0.0	0.0	0:00.30	idle_inject/1
22	root	rt	0	0	0	0	S	0.0	0.0	0:00.10	migration/1
23	root	20	0	0	0	0	S	0.0	0.0	0:00.10	ksoftirqd/1
25	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/10:H-events_highpri
26	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs
27	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	ksched_wq
29	root	20	0	0	0	0	S	0.0	0.0	0:00.00	ksuidkd
30	root	20	0	0	0	0	S	0.0	0.0	0:00.00	khungtaskd
31	root	20	0	0	0	0	S	0.0	0.0	0:00.00	con_reaper
32	root	20	0	0	0	0	I	0.0	0.0	0:00.57	kworker/4:2-events_power_eff+
33	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	writeback
34	root	20	0	0	0	0	S	0.0	0.0	0:00.07	kcompactd0
35	root	25	5	0	0	0	S	0.0	0.0	0:00.00	ksmd
36	root	39	19	0	0	0	S	0.0	0.0	0:00.00	khugepaged
37	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kinintegrity
38	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kblockd
39	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	blkcg_punt_bio

Exercise 7: File Searching

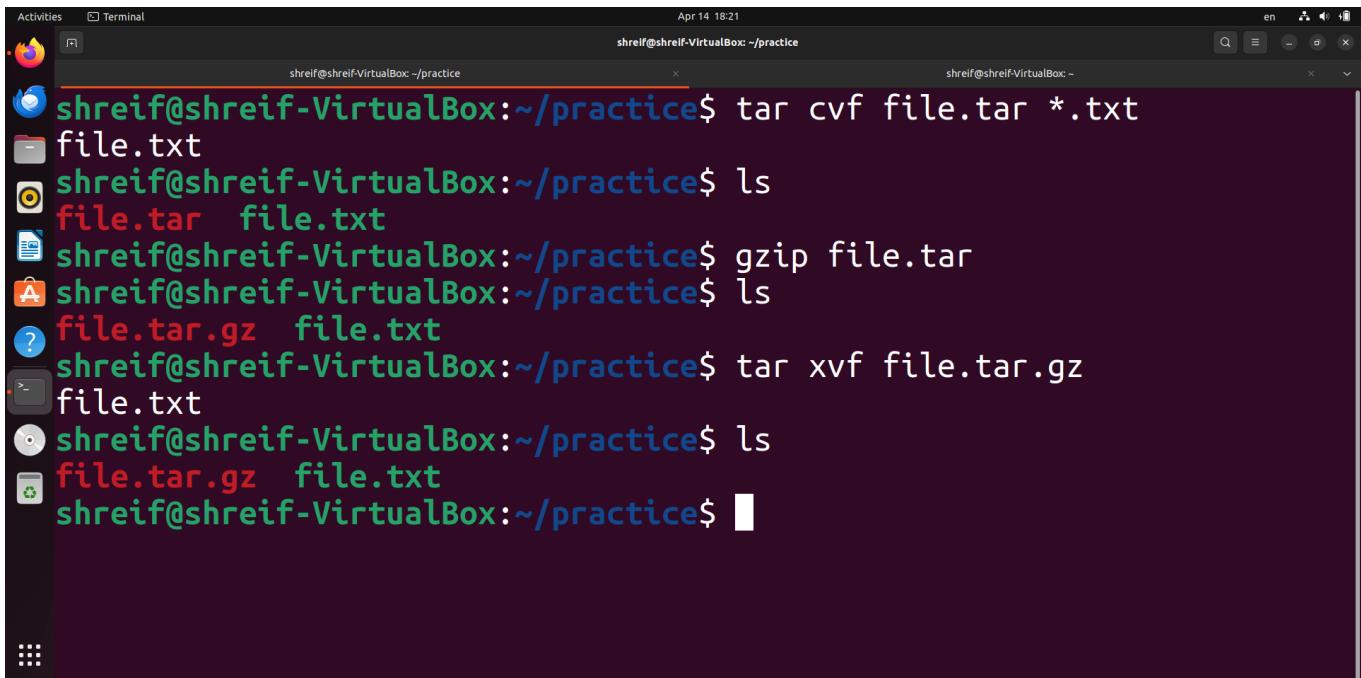
**Use find to search for a specific file or directory. Use grep to search for a specific string in a file.

```

Activities Terminal
shreif@shreif-VirtualBox:~$ find -name 'file.txt'
./practice/file.txt
shreif@shreif-VirtualBox:~$ grep "shreif" ./practice/file.txt
hi i am shreif
shreif@shreif-VirtualBox:~$ grep "name" ./practice/file.txt
shreif@shreif-VirtualBox:~$ grep "hi" ./practice/file.txt
hi i am shreif
shreif@shreif-VirtualBox:~$
```

Exercise 8: Archiving and Compression

**Create a tar archive of a directory using tar. Compress the tar archive using gzip. Extract the tar archive using tar.

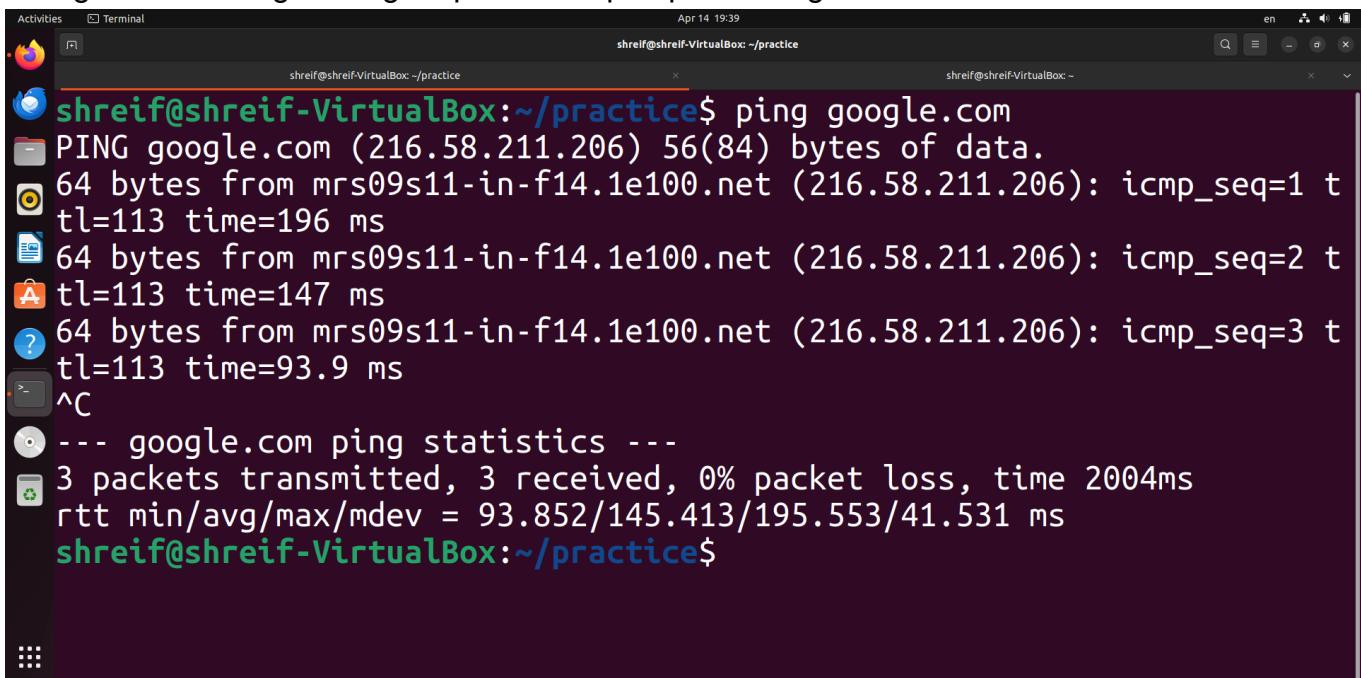


A screenshot of a Linux desktop environment showing a terminal window. The terminal window has two tabs: "shreif@shreif-VirtualBox:~/practice" and "shreif@shreif-VirtualBox:~". The user is demonstrating file compression and extraction. They first tar a file, then gzip it, and finally extract it back to its original state.

```
shreif@shreif-VirtualBox:~/practice$ tar cvf file.tar *.txt
file.txt
shreif@shreif-VirtualBox:~/practice$ ls
file.tar file.txt
shreif@shreif-VirtualBox:~/practice$ gzip file.tar
shreif@shreif-VirtualBox:~/practice$ ls
file.tar.gz file.txt
shreif@shreif-VirtualBox:~/practice$ tar xvf file.tar.gz
file.txt
shreif@shreif-VirtualBox:~/practice$ ls
file.tar.gz file.txt
shreif@shreif-VirtualBox:~/practice$
```

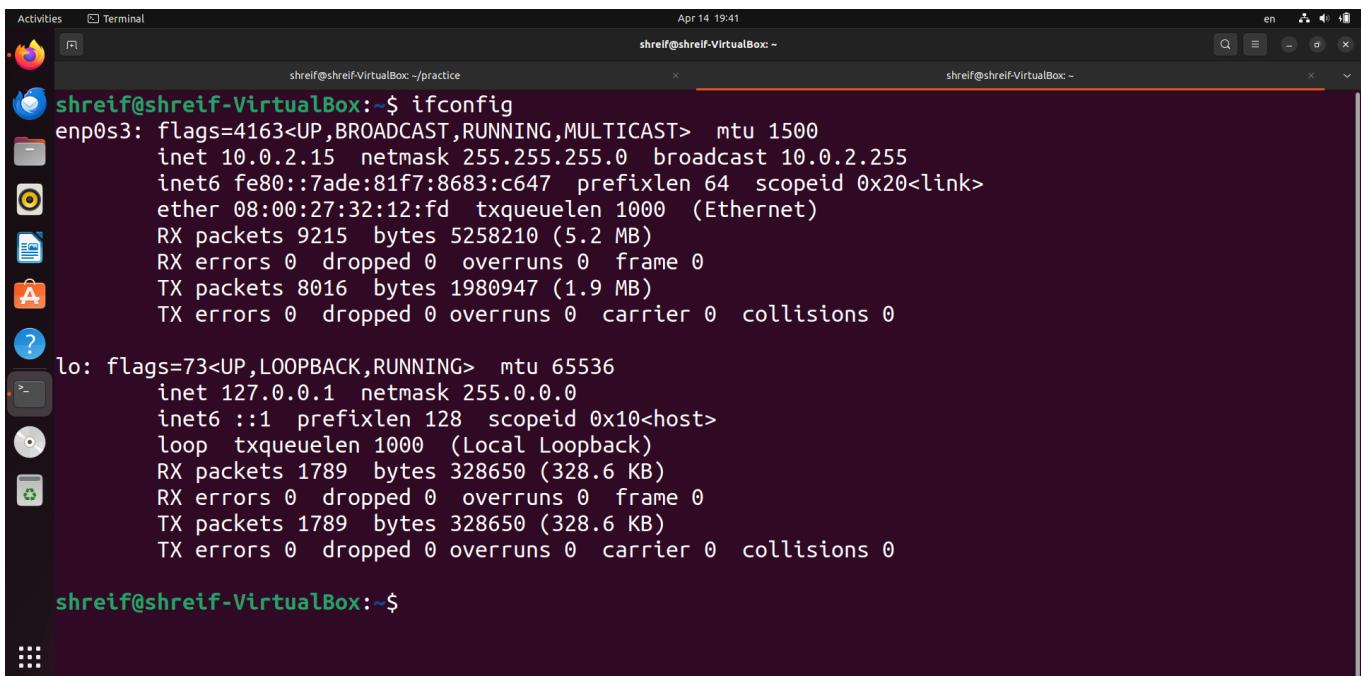
Exercise 9: Networking

**Ping a website or IP address using ping. Check your network interfaces and their configurations using ifconfig or ip. List all open ports using netstat.



A screenshot of a Linux desktop environment showing a terminal window. The terminal window has two tabs: "shreif@shreif-VirtualBox:~/practice" and "shreif@shreif-VirtualBox:~". The user is demonstrating the ping command to check connectivity to Google's website.

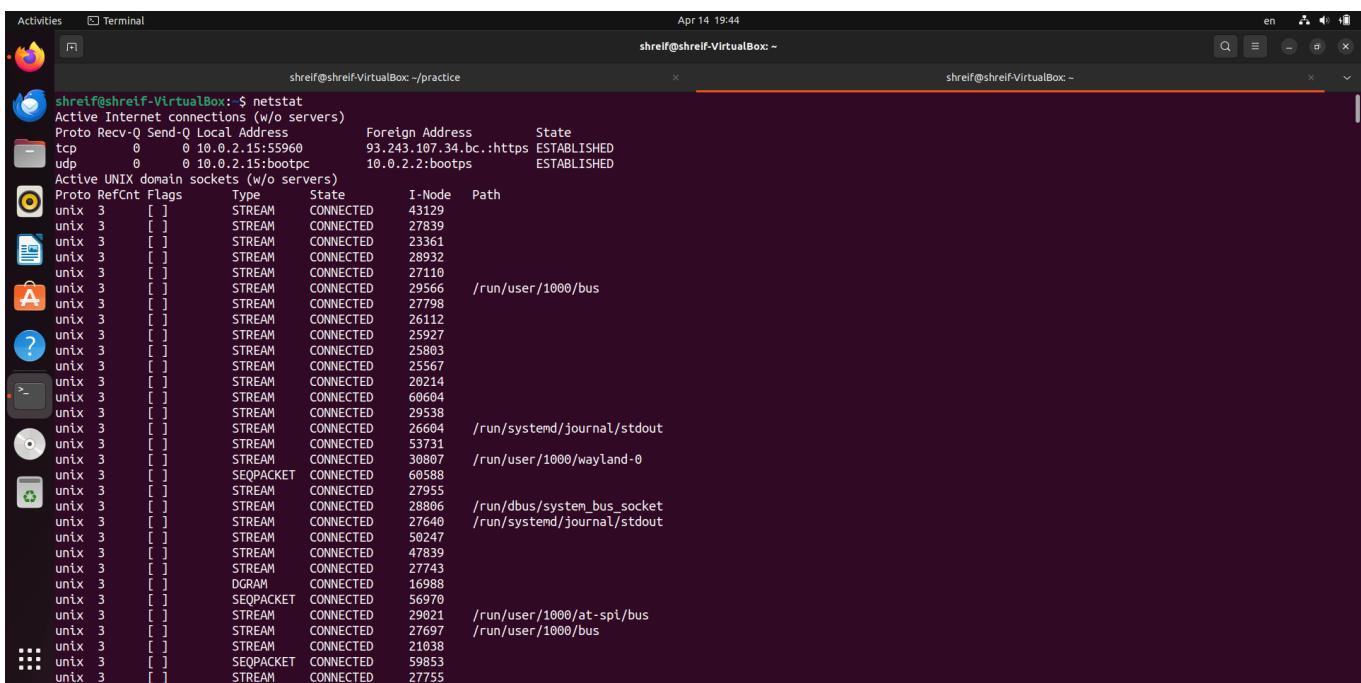
```
shreif@shreif-VirtualBox:~/practice$ ping google.com
PING google.com (216.58.211.206) 56(84) bytes of data.
64 bytes from mrs09s11-in-f14.1e100.net (216.58.211.206): icmp_seq=1 ttl=113 time=196 ms
64 bytes from mrs09s11-in-f14.1e100.net (216.58.211.206): icmp_seq=2 ttl=113 time=147 ms
64 bytes from mrs09s11-in-f14.1e100.net (216.58.211.206): icmp_seq=3 ttl=113 time=93.9 ms
^C
--- google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 93.852/145.413/195.553/41.531 ms
shreif@shreif-VirtualBox:~/practice$
```



```
shreif@shreif-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::7ade:81f7:8683:c647 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:32:12:fd txqueuelen 1000 (Ethernet)
            RX packets 9215 bytes 5258210 (5.2 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 8016 bytes 1980947 (1.9 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 1789 bytes 328650 (328.6 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1789 bytes 328650 (328.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

shreif@shreif-VirtualBox:~$
```



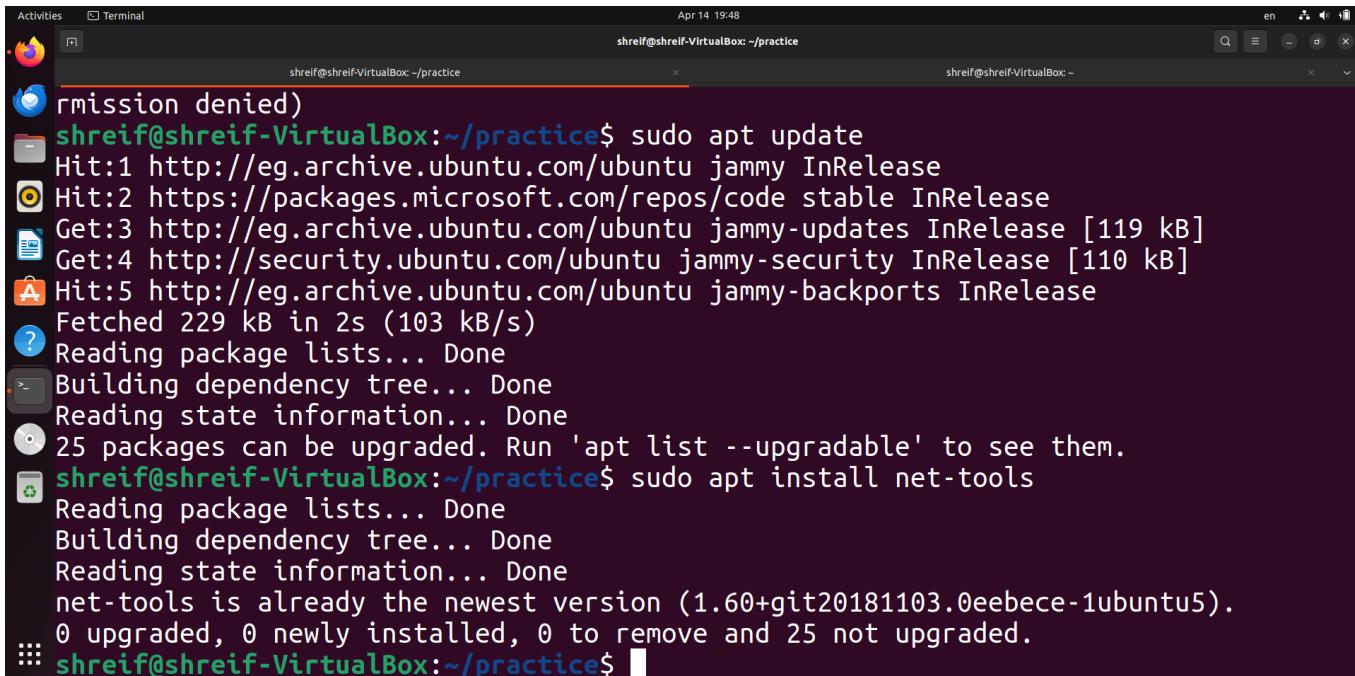
```
shreif@shreif-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 10.0.2.15:55960          93.243.107.34.bc.https ESTABLISHED
udp      0      0 10.0.2.15:bootpc         10.0.2.2:bootps       ESTABLISHED

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type    State      I-Node Path
unix    3      [ ]     STREAM  CONNECTED  43129
unix    3      [ ]     STREAM  CONNECTED  27839
unix    3      [ ]     STREAM  CONNECTED  23361
unix    3      [ ]     STREAM  CONNECTED  28932
unix    3      [ ]     STREAM  CONNECTED  27110
unix    3      [ ]     STREAM  CONNECTED  29566 /run/user/1000/bus
unix    3      [ ]     STREAM  CONNECTED  27798
unix    3      [ ]     STREAM  CONNECTED  26112
unix    3      [ ]     STREAM  CONNECTED  25927
unix    3      [ ]     STREAM  CONNECTED  25803
unix    3      [ ]     STREAM  CONNECTED  25567
unix    3      [ ]     STREAM  CONNECTED  20214
unix    3      [ ]     STREAM  CONNECTED  60604
unix    3      [ ]     STREAM  CONNECTED  29538
unix    3      [ ]     STREAM  CONNECTED  26604 /run/systemd/journal/stdout
unix    3      [ ]     STREAM  CONNECTED  53731
unix    3      [ ]     STREAM  CONNECTED  30807 /run/user/1000/wayland-0
unix    3      [ ]     SEQPACKET  CONNECTED  69588
unix    3      [ ]     STREAM  CONNECTED  27955
unix    3      [ ]     STREAM  CONNECTED  28806 /run/dbus/system_bus_socket
unix    3      [ ]     STREAM  CONNECTED  27640 /run/systemd/journal/stdout
unix    3      [ ]     STREAM  CONNECTED  50247
unix    3      [ ]     STREAM  CONNECTED  47839
unix    3      [ ]     STREAM  CONNECTED  27743
unix    3      [ ]     DGRAM   CONNECTED  16988
unix    3      [ ]     SEQPACKET  CONNECTED  56970
unix    3      [ ]     STREAM  CONNECTED  29021 /run/user/1000/at-spi/bus
unix    3      [ ]     STREAM  CONNECTED  27697 /run/user/1000/bus
unix    3      [ ]     SEQPACKET  CONNECTED  59853
unix    3      [ ]     STREAM  CONNECTED  27755
```

Exercise 10: Package Management

**Update the package list using the package manager (e.g., apt update). Install a package using the package manager (e.g., apt install). Remove a package using the package manager

(e.g., apt remove).

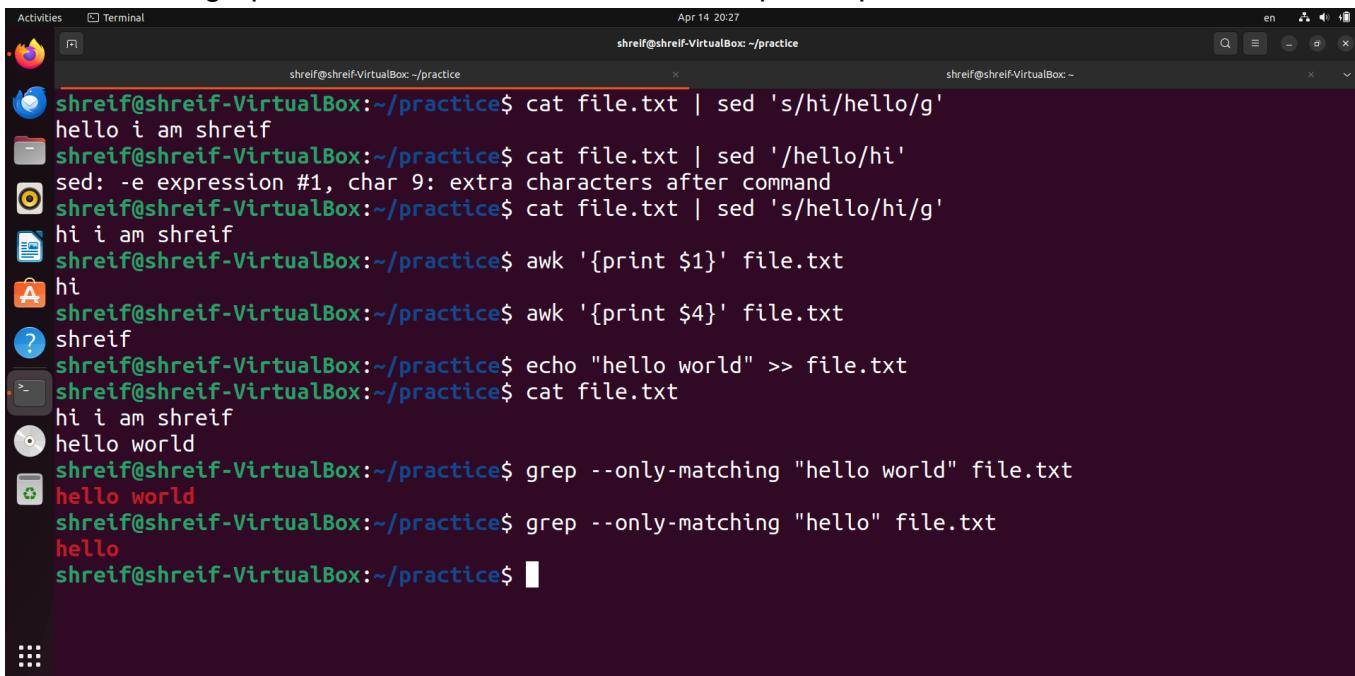


A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark background and light-colored text. It displays a series of commands and their outputs related to package management. The user runs 'sudo apt update' which shows hits from various repositories. Then, they run 'sudo apt install net-tools', which indicates that net-tools is already at its newest version. The terminal ends with a prompt '\$'.

```
rmission denied)
shreif@shreif-VirtualBox:~/practice$ sudo apt update
Hit:1 http://eg.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 https://packages.microsoft.com/repos/code stable InRelease
Get:3 http://eg.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:4 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Hit:5 http://eg.archive.ubuntu.com/ubuntu jammy-backports InRelease
Fetched 229 kB in 2s (103 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
25 packages can be upgraded. Run 'apt list --upgradable' to see them.
shreif@shreif-VirtualBox:~/practice$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
net-tools is already the newest version (1.60+git20181103.0eebece-1ubuntu5).
0 upgraded, 0 newly installed, 0 to remove and 25 not upgraded.
shreif@shreif-VirtualBox:~/practice$
```

Exercise 12: Text Processing

**Use sed to replace a specific word in a text file. Use awk to extract specific columns from a CSV file. Use grep to find lines in a file that match a specific pattern.



A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark background and light-colored text. It demonstrates several text processing commands. The user creates a file 'file.txt' containing 'hello i am shreif'. They then use sed to replace 'hi' with 'hello'. This leads to an error message about extra characters after the command. They then use sed again with a different command to replace 'hello' with 'hi'. They use awk to print the first column of the file. They add a new line 'hello world' to the file and then use awk to print the fourth column. Finally, they use grep to search for 'hello world' and 'hello' in the file, showing the results.

```
Activities Terminal Apr 14 20:27
shreif@shreif-VirtualBox:~/practice$ cat file.txt | sed 's/hi/hello/g'
hello i am shreif
shreif@shreif-VirtualBox:~/practice$ cat file.txt | sed '/hello/hi'
sed: -e expression #1, char 9: extra characters after command
shreif@shreif-VirtualBox:~/practice$ cat file.txt | sed 's/Hello/Hi/g'
hi i am shreif
shreif@shreif-VirtualBox:~/practice$ awk '{print $1}' file.txt
hi
shreif@shreif-VirtualBox:~/practice$ awk '{print $4}' file.txt
shreif
shreif@shreif-VirtualBox:~/practice$ echo "hello world" >> file.txt
shreif@shreif-VirtualBox:~/practice$ cat file.txt
hi i am shreif
hello world
shreif@shreif-VirtualBox:~/practice$ grep --only-matching "hello world" file.txt
hello world
shreif@shreif-VirtualBox:~/practice$ grep --only-matching "hello" file.txt
hello
shreif@shreif-VirtualBox:~/practice$
```