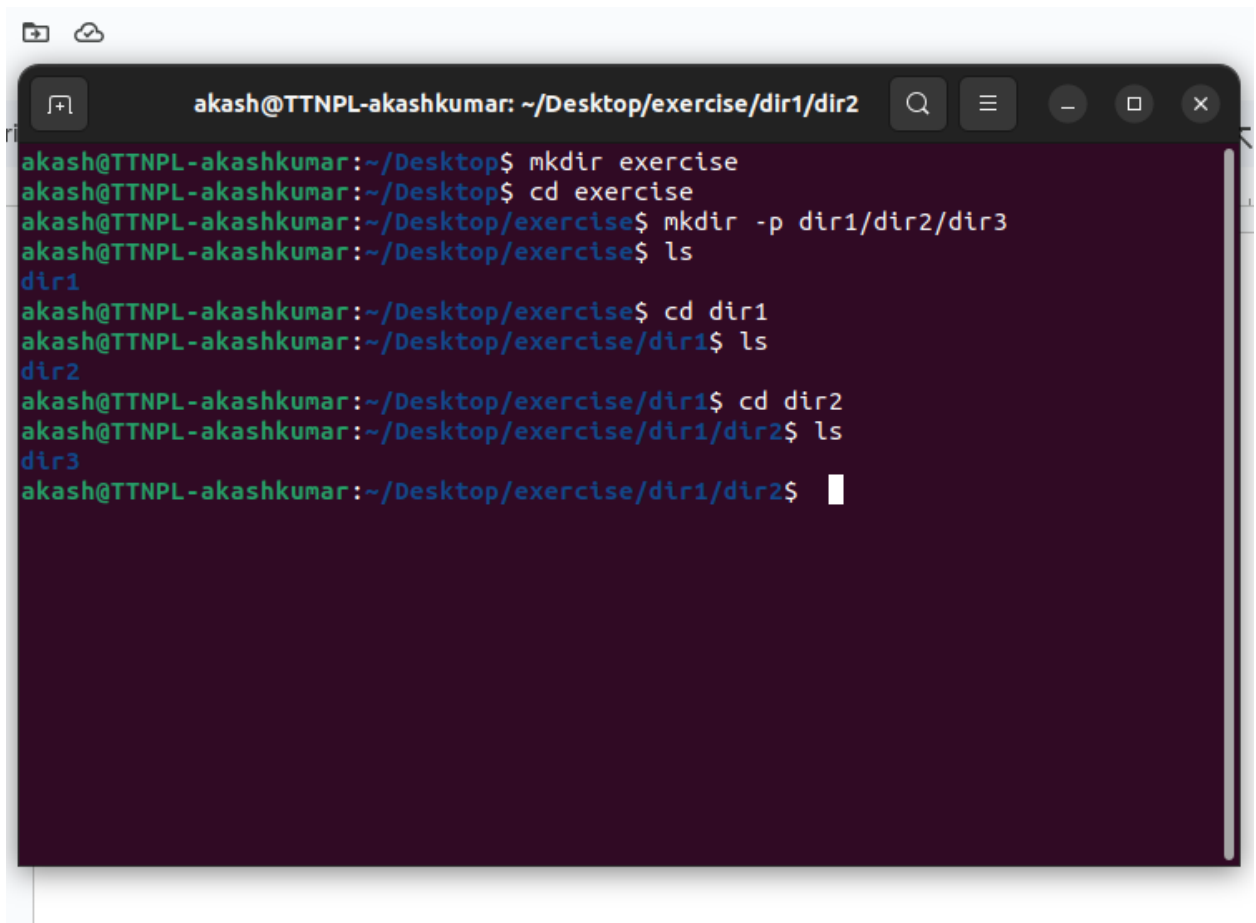# Assignment - Introduction to Linux

Q1. Create a directory "exercise" inside your home directory and create a nested (dir1/dir2/dir3) directory structure inside "excerise" with a single command.

Ans -

<u>Following are the commands used</u> -
1.   mkdir
2.   cd
3.   mkdir -p

So, i used mkdir to create the main directory "exercise". Then changed directory to exercise and created the rest nested queries using mkdir -p.

Q2. Create two empty files inside dir2 directory: emptyFile1, emptyFile2 in single command.

Ans -

Following are the steps:-
- Move to dir2.
- Use command "touch" followed by filenames.

Q3. Create one file file1.txt containing text "hello world" and save it.

Ans -

```
akash@TTNPL-akashkumar:~/Desktop$ cd dir1
bash: cd: dir1: No such file or directory
akash@TTNPL-akashkumar:~/Desktop$ cd exercise/
akash@TTNPL-akashkumar:~/Desktop/exercise$ cd dir1
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ touch file1.txt
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ echo "hello world">file1.txt
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ cat < file1.txt
hello world
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ ▮
```
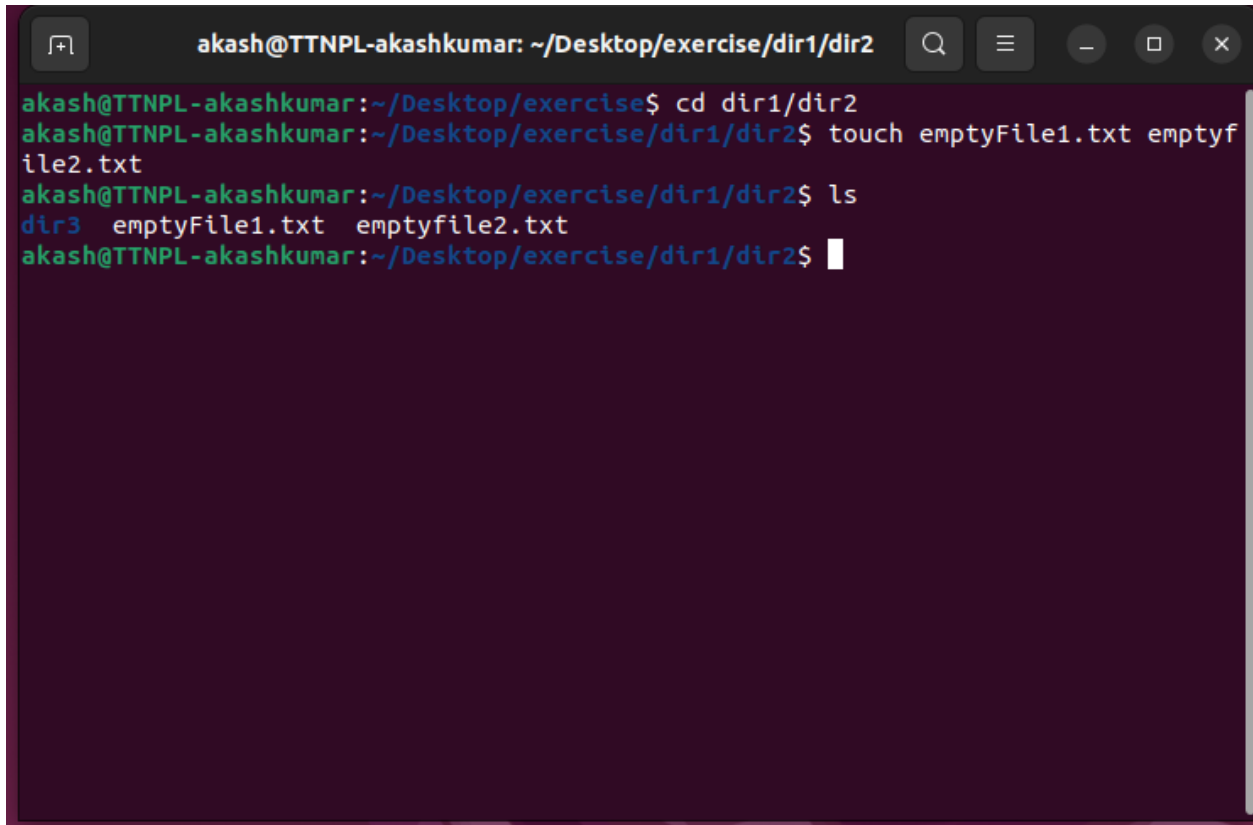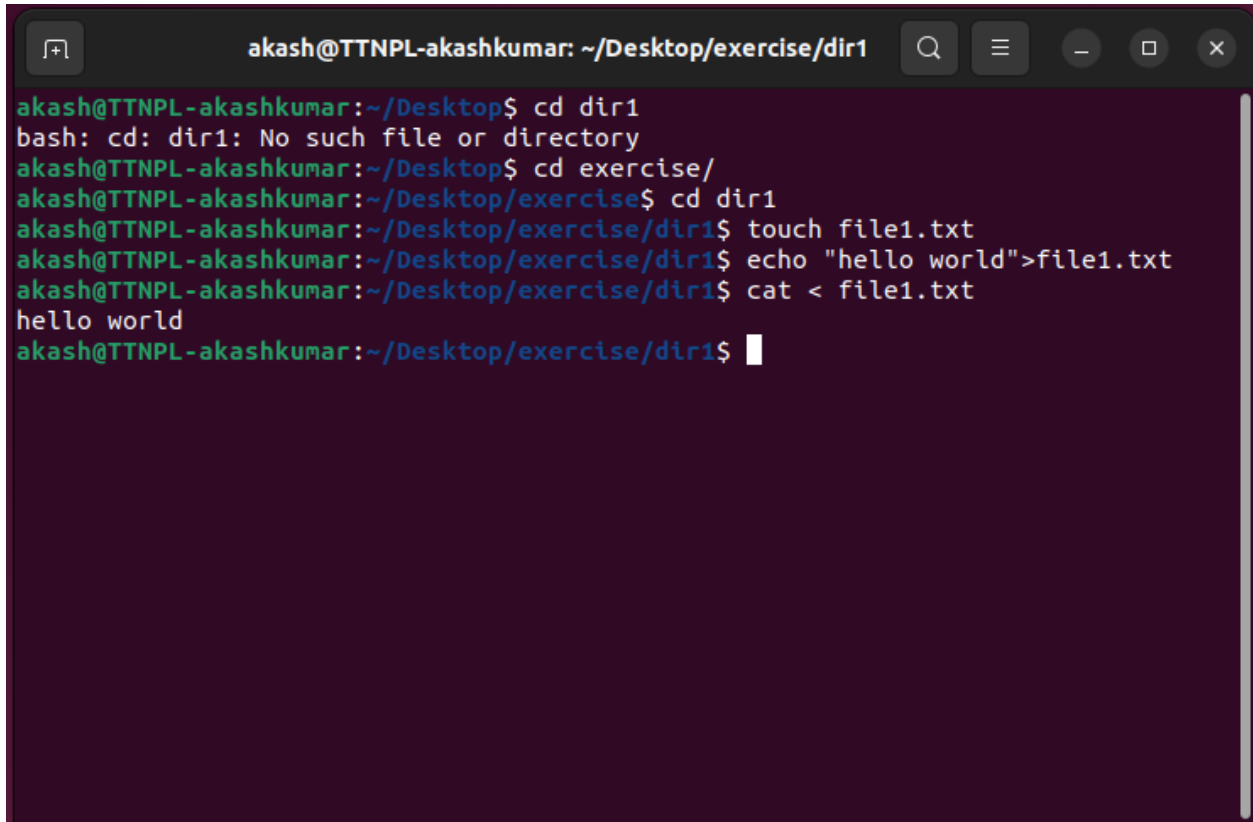
Following are the commands used -

- Create a file using touch command
- Use echo command to write the required text "hello world" and overwrite the file
- Use cat < filename> to get the contents of the file

Q4. Find a "passwd" file using find command inside /etc. copy this files as passwd_copy and then rename this file as passwd_backup.

Ans -

```
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ sudo find /etc -name "passwd"
[sudo] password for akash:
/etc/passwd
/etc/pam.d/passwd
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ cp /etc/passwd passwd_copy
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ ls
dir2  file1.txt  passwd_copy
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ mv passwd_copy passwd_backup
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ ls
dir2  file1.txt  passwd_backup
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$
```

Following are the steps used -

- Find the file using command -
  Sudo find /etc -name "passwd"
- Use cp command to copy file into new file passwd_copy
- Now we can rename file using mv(as mv moves the content to new file and removes existing file)

Q5. Try reading passwd_backup file in multiple tools: less,more,cat,strings etc and find the difference in their usage.

Ans -

Using cat:-

```
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ cat passwd_backup
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:102:105::/nonexistent:/usr/sbin/nologin
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
syslog:x:104:111::/home/syslog:/usr/sbin/nologin
```

Using more:-


```
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ more  passwd_backup
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologi
n
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/n
ologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:102:105::/nonexistent:/usr/sbin/nologin
--More--(36%)
```

Using less:-

```
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:102:105::/nonexistent:/usr/sbin/nologin
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
syslog:x:104:111::/home/syslog:/usr/sbin/nologin
_apt:x:105:65534::/nonexistent:/usr/sbin/nologin
tss:x:106:113:TPM software stack,,,:/var/lib/tpm:/bin/false
uuidd:x:107:116::/run/uuidd:/usr/sbin/nologin
systemd-oom:x:108:117:systemd Userspace OOM Killer,,,:/run/systemd:/usr/sbin/nologin
tcpdump:x:109:118::/nonexistent:/usr/sbin/nologin
avahi-autoipd:x:110:119:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:111:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,,:/:/usr/sbin/nologin
avahi:x:114:121:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
cups-pk-helper:x:115:122:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
rtkit:x:116:123:RealtimeKit,,,:/proc:/usr/sbin/nologin
whoopsie:x:117:124::/nonexistent:/bin/false
sssd:x:118:125:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin
speech-dispatcher:x:119:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
fwupd-refresh:x:120:126:fwupd-refresh user,,,:/run/systemd:/usr/sbin/nologin
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
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
akash:x:1000:1000:Akash Kumar,,,:/home/akash:/bin/bash
mfe:x:999:1001::/home/mfe:/bin/nologin
sshd:x:129:65534::/run/sshd:/usr/sbin/nologin
(END)
```

Using string:-

Command	Output Style	Navigation	Best For	Key Features	Limitations
cat	Full dump	None	Small text files	Simple, fast	No scroll, floods

					terminal on large files
`more`	Paged (forward only)	Space, Enter, q	Medium text files	Basic paging	Can't scroll backward
`less`	Interactive pager	PgUp PgDn / q	Any size text files	Scroll both ways, search	Slightly more advanced
`strings`	Filtered readable	None	Binary or mixed files	Shows only printable characters	Ignores formatting, no scroll

Q6. Find out the number of line in password_backup containing "/bin/false".

Ans -

- Use grep -c to count the number of lines in passwd_backup to get number of lines with required text

Q7. Get the first 5 lines of a file "password_backup" and Redirect the output of the above commands into file "output".

Ans -

```
akash@TTNPL-akashkumar:~ $ cd Desktop/
akash@TTNPL-akashkumar:Desktop $ cd exercise/
akash@TTNPL-akashkumar:exercise $ cd dir1/
akash@TTNPL-akashkumar:dir1 $ ls
dir2   file1.txt   passwd_backup
akash@TTNPL-akashkumar:dir1 $ head -n 5 password_backup > output
head: cannot open 'password_backup' for reading: No such file or directory
akash@TTNPL-akashkumar:dir1 $ head -n 5 passwd_backup > output
akash@TTNPL-akashkumar:dir1 $
```

- Use head -n filename > newfile
- n = number of lines from top

Q8. Create a "test" user,create its password and find out its uid and gid.

Ans -

```
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ sudo useradd test
[sudo] password for akash:
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ sudo passwd test
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: password updated successfully
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$ id test
uid=1001(test) gid=1002(test) groups=1002(test)
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1$
```
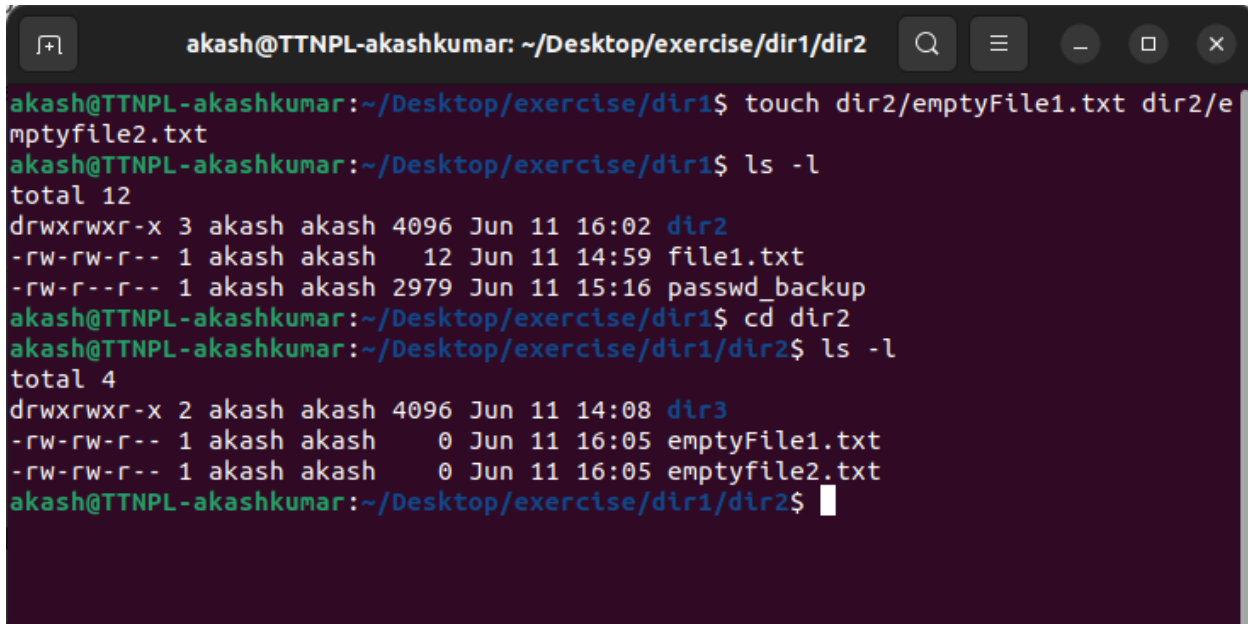
Following are the steps used -
- Use command useradd to create new user
- Now set password for user for using passwd command
- Now to view uid and gid write -
     id username

Q9. Change the timestamp of emptyFile1,emptyFile2 which are exist in dir2

Ans -

Following are the steps used -

- Use touch command to update the timestamp
- We can use ls -l to check the time stamp

Q10. Login as test user and edit the "output" file created above. Since the permission wont allow you to save the changes. Configure such that test user can edit it. a) Add group owner of the "output" file as the secondary group of testuser and check/change the "output" file permission if it is editable by group. Once done revert the changes b) Make the file editable to the world so that test user can access it. Revert the changes after verification c) Change the ownership to edit the file.

Ans -

Following are the steps used -
- First login user of test using su - command
- Check permission through: ls -l output
- Add group owner of output file: -sudo usermod -aG akash test

- Now, check or change output file using: chmod 664 output
- Revert the changes : - sudo passwd -d test akash
- To make it editable : chmod 666 output
- Chmod 664 output
- For changing ownership
- Sudo chown test output
- Sudo chown akash output

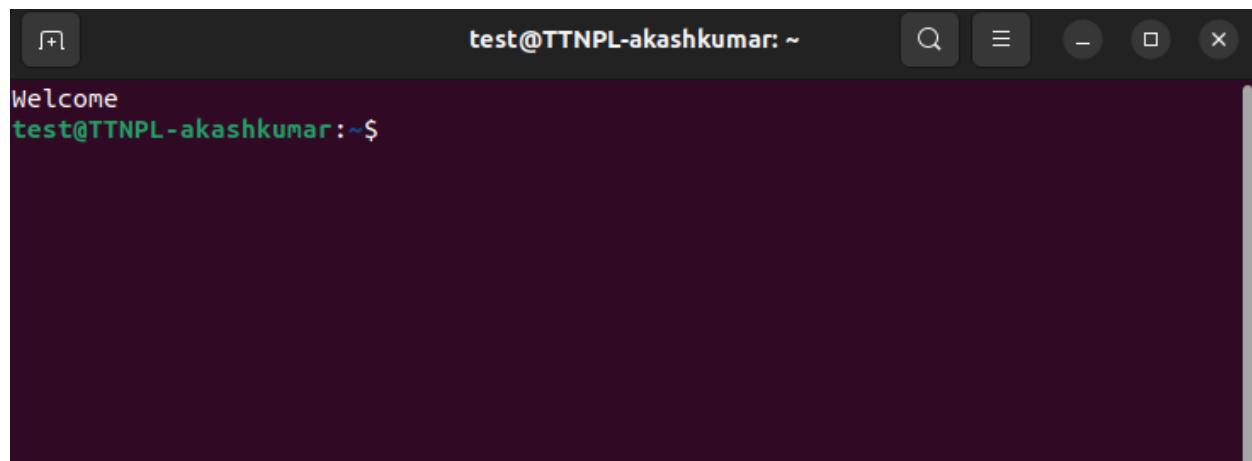## Q11. Create alias with your name so that it creates a file as "/tmp/aliastesting".

Ans -

```
akash@TTNPL-akashkumar:Desktop $ cd exercise/
akash@TTNPL-akashkumar:exercise $ cd dir1/
akash@TTNPL-akashkumar:dir1 $ alias akash='touch /tmp/aliastesting'
akash@TTNPL-akashkumar:dir1 $ akash
akash@TTNPL-akashkumar:dir1 $ ls -l /tmp/aliastesting
-rw-rw-r-- 1 akash akash 0 Jun 12 16:35 /tmp/aliastesting
akash@TTNPL-akashkumar:dir1 $
```

Following are the steps used -

- Create alias as alias yourname='command'

Q12. Edit ~/.bashrc file such that when you change to "test" user it should clear the screen and print "Welcome".

Ans -

```
test@TTNPL-akashkumar: ~

Welcome
test@TTNPL-akashkumar:~$
```

Following are the steps used -

- Use vim ~/.bashrc
- Add lines as-
  1)clear
  2)echo "welcome"
- Now press esc and type :wq to exit vim
- Now do source ~/.bashrc
- Required output is displayed

Q13. Install "zip" package.

Ans -

```
test@TTNPL-akashkumar:~$ su - akash
Password:
akash@TTNPL-akashkumar:~ $ vim ~/.bashrc
akash@TTNPL-akashkumar:~ $ sudo apt install zip
[sudo] password for akash:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
zip is already the newest version (3.0-12build2).
zip set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 29 not upgraded.
akash@TTNPL-akashkumar:~ $
```

- Use command sudo apt install zip

Q14. Compress "output" and "password_backup" files into a tar ball. List the files present inside the tar created.

Ans -

```
test@TTNPL-akashkumar: ~

akash@TTNPL-akashkumar:dir1 $ tar -cvf backup_files.tar output passwd_backup
output
passwd_backup
akash@TTNPL-akashkumar:dir1 $ tar -tf backup_files.tar
output
passwd_backup
akash@TTNPL-akashkumar:dir1 $
```

- Tar combines multiple files into one single file without compressing them by default.
- -c: Create a new tarball.
- -v: Verbose output (shows files being added).
- -f filename.tar : The name of the tarball to create.

- Then add filename1 filename2
- So command becomes
  tar -cvf filename.tar file1 file2

Q15. scp this file to test user

Ans -

```
Unit ssh-service.service could not be found.
akash@TTNPL-akashkumar:~ $ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
     Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: e>
     Active: active (running) since Thu 2025-06-12 13:17:39 IST; 4h 9min ago
       Docs: man:sshd(8)
             man:sshd_config(5)
    Process: 785 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 835 (sshd)
      Tasks: 1 (limit: 18738)
     Memory: 3.3M
        CPU: 21ms
     CGroup: /system.slice/ssh.service
             └─835 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jun 12 13:17:39 TTNPL-akashkumar sshd[835]: Server listening on 0.0.0.0 port 22.
Jun 12 13:17:39 TTNPL-akashkumar sshd[835]: Server listening on :: port 22.
Jun 12 13:17:39 TTNPL-akashkumar systemd[1]: Starting OpenBSD Secure Shell serv>
Jun 12 13:17:39 TTNPL-akashkumar systemd[1]: Started OpenBSD Secure Shell serve>
akash@TTNPL-akashkumar:~ $ cd Desktop/
akash@TTNPL-akashkumar:Desktop $ cd exercise/
akash@TTNPL-akashkumar:exercise $ cd dir1/
akash@TTNPL-akashkumar:dir1 $ ls
backup_files.tar  dir2  file1.txt  output  passwd_backup
akash@TTNPL-akashkumar:dir1 $ pwd
/home/akash/Desktop/exercise/dir1
akash@TTNPL-akashkumar:dir1 $ scp backup_files.tar test@localhost:/home/test
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ED25519 key fingerprint is SHA256:innKDpgDLWm7lzxa/Bt4CvHCC6mYcGKr0BUMkdCXN04.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ED25519) to the list of known hosts.
test@localhost's password:
backup_files.tar                            100%   10KB  64.5MB/s   00:00
akash@TTNPL-akashkumar:dir1 $ 
```
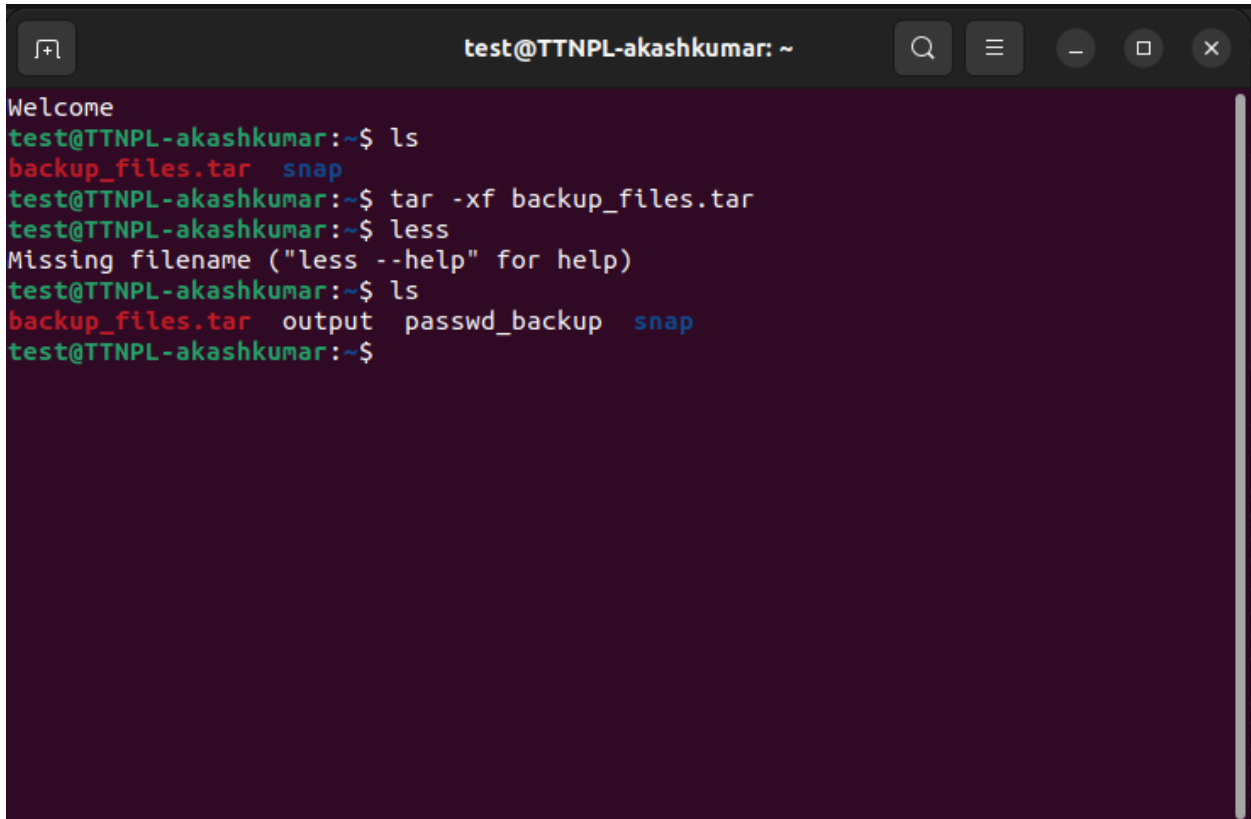
Following are the steps used -
- Use command
  Scp filename.tar username@localhost:/path
- File has been moved

Q16. Unzip this tar file by logging into the remote server

Ans -

<u>Following are the steps used</u> -

- Use command
    ssh test@localhost
- Now check if file exist using ls
- To unzip use
    tar -xf backup_files.tar
- Results are displayed in the screenshot

Q17. Download any image from web and move to desktop

Ans -

Step 1 - Downloading image from web using wget command

Step 2 - Moving to desktop

Q18. How to get help of commands usages.

Ans -

Using man-

```
MKDIR(1)                        User Commands                        MKDIR(1)

NAME
       mkdir - make directories

SYNOPSIS
       mkdir [OPTION]... DIRECTORY...

DESCRIPTION
       Create the DIRECTORY(ies), if they do not already exist.

       Mandatory  arguments  to  long  options are mandatory for short options
       too.

       -m, --mode=MODE
              set file mode (as in chmod), not a=rwx - umask

       -p, --parents
              no error if existing, make parent directories as needed

       -v, --verbose
              print a message for each created directory

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

Using help-

```
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1/dir2$ man mkdir
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1/dir2$ mkdir --help
Usage: mkdir [OPTION]... DIRECTORY...
Create the DIRECTORY(ies), if they do not already exist.

Mandatory arguments to long options are mandatory for short options too.
  -m, --mode=MODE    set file mode (as in chmod), not a=rwx - umask
  -p, --parents      no error if existing, make parent directories as needed
  -v, --verbose      print a message for each created directory
  -Z                 set SELinux security context of each created directory
                     to the default type
      --context[=CTX]  like -Z, or if CTX is specified then set the SELinux
                     or SMACK security context to CTX
      --help     display this help and exit
      --version  output version information and exit

GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
Full documentation <https://www.gnu.org/software/coreutils/mkdir>
or available locally via: info '(coreutils) mkdir invocation'
akash@TTNPL-akashkumar:~/Desktop/exercise/dir1/dir2$ █
```
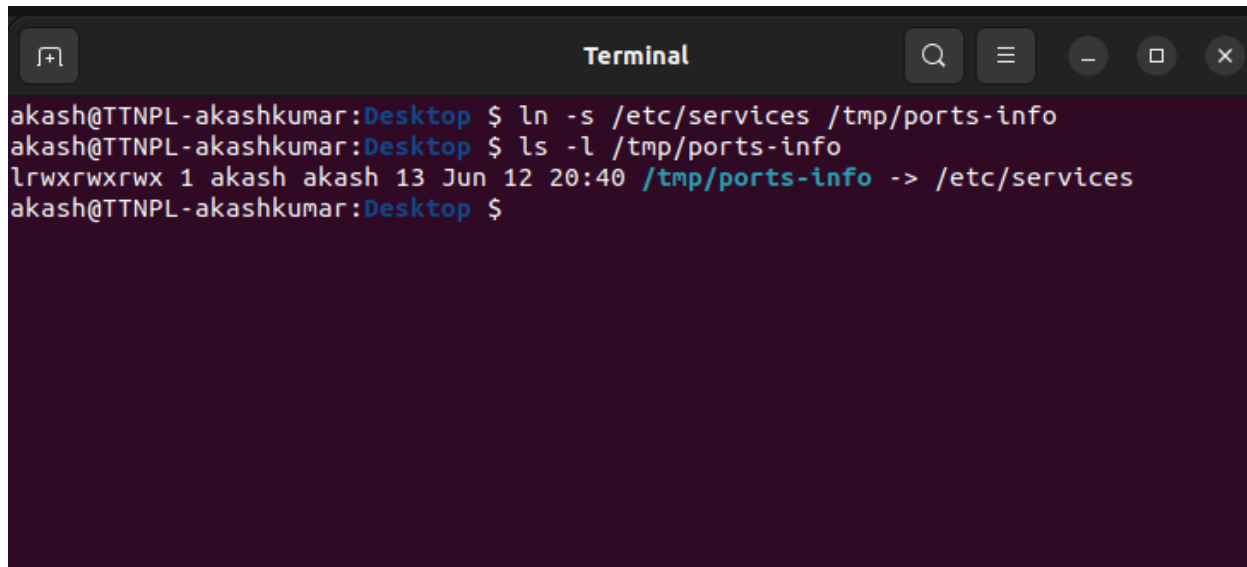
Using whatis -

Command	Description
man <command>	Shows the detailed manual page
<command> --help	Displays a quick summary of command options
Whatis <command>	Gives a one-line description of the command

Q19.Create a symlink of /etc/services into /tmp/ports-info

Ans -

- ln - the command to create links.

- -s - tells ln to create a soft link instead of a hard link.

- /etc/services: the original file (source).

- /tmp/ports-info: the name and location of the new symlink (destination).

Q20. You are appointed as a Software/DevOps Engineer in ABC media services. On your first day you need to troubleshoot a problem. There is a command "xyz" somewhere installed in that linux system. But as a new joinee you do not have any idea about where is that Installed. How can you check that?

Ans -
Whereis -

- locates the binary, source, and man page files for a command.
- Broader than `which`.

- Doesn't rely strictly on path it searches standard system directories.

- Often used for locating documentation or source files in addition to the binary.

Which -
- locates the executable file associated with a given command by searching the directories listed in the user's path
- it only works for executables.

- It shows the first match in the path.