Introduction to Linux

Q1. Create a directory "exercise" inside your home directory and create a nested (dir1/dir2/dir3) directory structure inside "exercise" with a single command.
Ans. Single command to create directory "exercise" inside your home directory and create a nested dir1/dir2/dir3 is:

```
netik@TTNPL-netikkohli:~$ sudo mkdir -p /home/exercise/dir1/dir2/dir3
[sudo] password for netik:


netik@TTNPL-netikkohli:~$ ls /home/exercise/
dir1
netik@TTNPL-netikkohli:~$ ls -R /home/exercise/
/home/exercise/:
dir1

/home/exercise/dir1:
dir2

/home/exercise/dir1/dir2:
dir3

/home/exercise/dir1/dir2/dir3:
```

The above command will create a directory

Q2. Create two empty files inside dir2 directory: emptyFile1, emptyFile2 in single command
Ans. Touch command is used to create the empty files as follows:

```
netik@TTNPL-netikkohli:~$ sudo touch /home/exercise/dir1/dir2/dir3/emptyFile1 /home/exercise
/dir1/dir2/dir3/emptyFile2
netik@TTNPL-netikkohli:~$ ls /home/exercise/dir1/dir2/dir3/
emptyFile1  emptyFile2
netik@TTNPL-netikkohli:~$
```

.Q3)Create one file file1.txt containing text "hello world" and save it.
Ans. cat command can be used to create a file. Here is the command:

```
netik@TTNPL-netikkohli:~/Desktop$ cat >file1.txt
hello world
```

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. Commands are as follows:

```
netik@TTNPL-netikkohli:~$ sudo su
[sudo] password for netik:
root@TTNPL-netikkohli:/home/netik# find /etc -name passwd
/etc/pam.d/passwd
/etc/passwd
root@TTNPL-netikkohli:/home/netik# cp /etc/passwd passwd_copy
root@TTNPL-netikkohli:/home/netik# mv passwd_copy passwd_backup
root@TTNPL-netikkohli:/home/netik#
```

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

```
netik@TTNPL-netikkohli:~$ less 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
_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
netik:x:1000:1000:Netik KOhli,,,:/home/netik:/bin/bash
mfe:x:999:1001::/home/mfe:/sbin/nologin
kohli:x:1001:1002::/home/kohli:/bin/sh
test:x:1002:1003::/home/test:/bin/sh
bootcamp:x:1003:1003::/home/bootcamp:/bin/sh
sshd:x:129:65534::/run/sshd:/usr/sbin/nologin
~
(END)
```

```
netik@TTNPL-netikkohli:~$ 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/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
--More--(39%)
```

```
netik@TTNPL-netikkohli:~$ 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
```

```
netik@TTNPL-netikkohli:~$ strings 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
```

Difference:

1. less is used to open file in a scrollable way.
2. more is used for forward only view
3. cat command is used to simply show the content of the file.
4. strings is used for mainly for binary files

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

```
netik@TTNPL-netikkohli:~$ grep -c "/bin/false" passwd_backup
6
```

Q7)Get the first 5 lines of a file “password_backup” and Redirect the output of the above commands into file "output".
Ans. Command:

```
netik@TTNPL-netikkohli:~$ head -n 5 passwd_backup > output
```

We can use the cat command to see the stored 5 lines in output file:

```
netik@TTNPL-netikkohli:~$ cat output
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
netik@TTNPL-netikkohli:~$
```

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

```
netik@TTNPL-netikkohli:~$ sudo useradd test
netik@TTNPL-netikkohli:~$ sudo passwd test
New password:
Retype new password:
passwd: password updated successfully
netik@TTNPL-netikkohli:~$ id test
uid=1001(test) gid=1002(test) groups=1002(test)
```

Q9)Change the timestamp of emptyFile1,emptyFile2 which are exist in dir2
Ans.
We use touch command to change the timestamp of a file if it already exists in a directory.

```
netik@TTNPL-netikkohli:~$ cd /home/exercise/dir1/dir2/
netik@TTNPL-netikkohli:/home/exercise/dir1/dir2$ sudo touch emptyFile1 emptyFile2
```

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. a.

```
netik@TTNPL-netikkohli:~$ su test
Password:
$ nano /home/netik/output
```

```
[ Path '/home/netik' is not accessible ]...
^O Write Out   ^W Where Is   ^K Cut      ^T Execute   ^C Loca
^R Read File   ^\ Replace    ^U Paste    ^J Justify   ^/ Go T
```

```
netik@TTNPL-netikkohli:~$ ls -l /home/netik/output
-rw-r--rw- 1 test netik 189 Jan 22 19:38 /home/netik/output
netik@TTNPL-netikkohli:~$
netik@TTNPL-netikkohli:~$ sudo usermod -aG testgroup test
[sudo] password for netik:
usermod: group 'testgroup' does not exist
netik@TTNPL-netikkohli:~$ ls -l /home/netik/output
-rw-r--rw- 1 test netik 189 Jan 22 19:38 /home/netik/output
netik@TTNPL-netikkohli:~$ sudo groups netik
netik : netik adm cdrom sudo dip plugdev lpadmin lxd sambashare
netik@TTNPL-netikkohli:~$ id test
uid=1001(test) gid=1002(test) groups=1002(test)
netik@TTNPL-netikkohli:~$ ls -l /home/netik/output
-rw-r--rw- 1 test netik 189 Jan 22 19:38 /home/netik/output
netik@TTNPL-netikkohli:~$ sudo usermod -aG netik test
netik@TTNPL-netikkohli:~$ id test
uid=1001(test) gid=1002(test) groups=1002(test),1000(netik)
netik@TTNPL-netikkohli:~$ sudo chmod g+w /home/netik/
netik@TTNPL-netikkohli:~$ su test
Password:
$ nano /home/netik/output
```

```
$ exit
netik@TTNPL-netikkohli:~$ chmod g-w /home/netik/output
chmod: changing permissions of '/home/netik/output': Operation not permitted
netik@TTNPL-netikkohli:~$ sudo chmod g-w /home/netik/output
```

b.

```
netik@TTNPL-netikkohli:~$ sudo chmod o+w /home/netik/output
[sudo] password for netik:
netik@TTNPL-netikkohli:~$ su test
Password:
$ vim /home/netik/output
$ exit
```

C.

```
netik@TTNPL-netikkohli:~$ sudo chmod o-w /home/netik/output
netik@TTNPL-netikkohli:~$ sudo chown test /home/netik/output
netik@TTNPL-netikkohli:~$ su test
Password:
$ vim /home/netik/output
$ exit
netik@TTNPL-netikkohli:~$ sudo chown netik /home/netik/output
netik@TTNPL-netikkohli:~$
```

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

```
netik@TTNPL-netikkohli:/home/exercise/dir1/dir2$ alias netik="sudo touch /tmp/aliastesting"
netik@TTNPL-netikkohli:/home/exercise/dir1/dir2$ netik
[sudo] password for netik:
netik@TTNPL-netikkohli:/home/exercise/dir1/dir2$ ls /tmp
aliastesting
```

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

```
netik@TTNPL-netikkohli:~$ nano /home/test/.bashrc
```

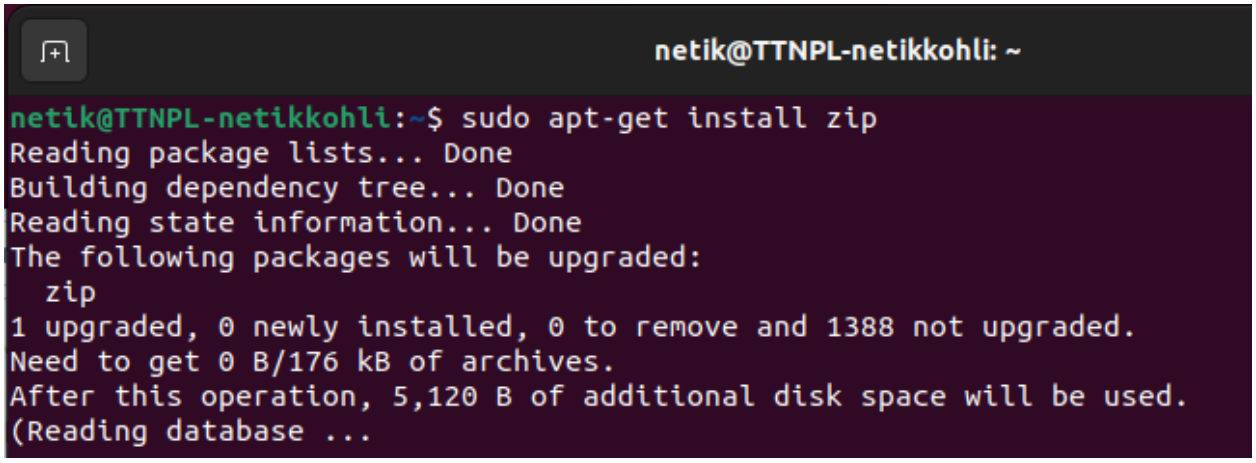
➔ Putting the following command in the in the bashrc file:

```
clear
echo "Welcome"
```

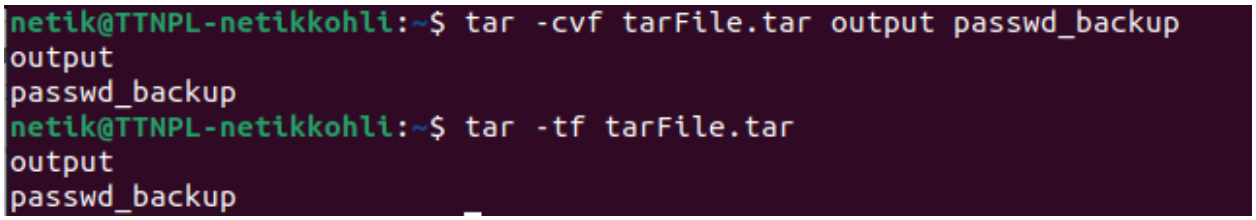
Ctrl + X and then press Y to save the file.

```
netik@TTNPL-netikkohli:~$ source /home/test/.bashrc
```

Q13)Install “zip” package.

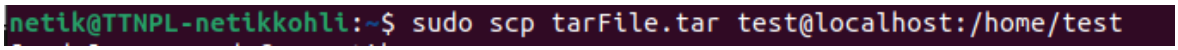


Q14)Compress "output" and "password_backup" files into a tar ball. List the files present inside the tar created.



Q15)scp this file to test user

Ans.The below command will scp the file tarFile.tar to the test user from netik user.



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

Ans. To unzip we use tar command followed by the flags:

-x : Extract a tar

-v: Verbose output or show progress while extracting files.

-f: Specify an archive or a tarball filename

```
netik@TTNPL-netikkohli:~$ tar -xvf tarFile.tar
output
passwd_backup
```

Q17)Download any image from web and move to desktop

```
netik@TTNPL-netikkohli:~$ wget "https://www.python.org/static/apple-touch-icon-144x144-precomposed.png"
--2025-01-22 22:56:53--  https://www.python.org/static/apple-touch-icon-144x144-precomposed.png
Resolving www.python.org (www.python.org)... 2a04:4e42:42::223, 199.232.20.223
Connecting to www.python.org (www.python.org)|2a04:4e42:42::223|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 7382 (7.2K) [image/png]
Saving to: ‘apple-touch-icon-144x144-precomposed.png’

apple-touch-icon-144x14 100%[============================>]   7.21K  --.-KB/s    in 0s


2025-01-22 22:56:53 (31.7 MB/s) - ‘apple-touch-icon-144x144-precomposed.png’ saved [7382/7382]
```

Q18)How to get help of commands usages.

Ans. There are two ways to get help of any command:

1. Using man command: syntax - man [command]

```
netik@TTNPL-netikkohli:~$ man ls
```

2. Using help command:

```
netik@TTNPL-netikkohli:~$ ls --help
Usage: ls [OPTION]... [FILE]...
List information about the FILEs (the current directory by default).
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.
  -a, --all                  do not ignore entries starting with .
  -A, --almost-all           do not list implied . and ..
      --author               with -l, print the author of each file
  -b, --escape               print C-style escapes for nongraphic characters
      --block-size=SIZE      with -l, scale sizes by SIZE when printing them;
                               e.g., '--block-size=M'; see SIZE format below
  -B, --ignore-backups       do not list implied entries ending with ~
  -c                         with -lt: sort by, and show, ctime (time of last
                               modification of file status information);
                               with -l: show ctime and sort by name;
                               otherwise: sort by ctime, newest first
  -C                         list entries by columns
      --color[=WHEN]         colorize the output; WHEN can be 'always' (default
                               if omitted), 'auto', or 'never'; more info below
  -d, --directory            list directories themselves, not their contents
  -D, --dired                generate output designed for Emacs' dired mode
  -f                         do not sort, enable -aU, disable -ls --color
  -F, --classify             append indicator (one of */=>@|) to entries
```

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

```
netik@TTNPL-netikkohli:~$ ln -s /etc/services /tmp/ports-info
netik@TTNPL-netikkohli:~$ cat /tmp/ports-info
# Network services, Internet style
#
# Updated from https://www.iana.org/assignments/service-names-port-numbers/service-names-port-
numbers.xhtml .
#
# New ports will be added on request if they have been officially assigned
# by IANA and used in the real-world or are needed by a debian package.
# If you need a huge list of used numbers please install the nmap package.

tcpmux          1/tcp                           # TCP port service multiplexer
echo            7/tcp
echo            7/udp
discard         9/tcp           sink null
discard         9/udp           sink null
```

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. The approach we can follow is:

1. Using of - which xyz
2. If it will not work then we can use - whereis xyz
   It will locate the binary source code

```
netik@TTNPL-netikkohli:~$ which xyz
netik@TTNPL-netikkohli:~$ whereis xyz
xyz:
```