Assignment 1 – File System Management

1) List out 5 files in your system which consuming most of the disk space

Sol) find / -type f -exec du -h {} + 2>/dev/null | sort -rh | head -n 5

+ is used for grouping the files for the du command for efficiency instead of du executing one file at a time

sort and head won't process the output from each individual **du** invocation as intended.

2 for error messages , > for redirecting the files to a location

/dev/null a special file for discarding

```
ubuntu@ip-172-31-12-145:~$ find / -type f -exec du -h {} + 2>/dev/null | sort -rh | head -n 5
118M    /usr/lib/llvm-18/lib/libLLVM.so.1
74M     /var/lib/snapd/snaps/core22_1663.snap
70M     /var/lib/apt/lists/ap-south-1.ec2.archive.ubuntu.com_ubuntu_dists_noble_universe_binary-amd64_Packages
62M     /usr/lib/llvm-18/lib/libclang-cpp.so.18.1
56M     /var/lib/snapd/snaps/core18_2846.snap
ubuntu@ip-172-31-12-145:~$
```

2) Create one common folder in such a way that anyone can create files inside that independently and should not be able to delete other users files from that common folder.
Sol) sudo mkdir /common

    Sudo chmod 1777 /common

```
ubuntu@ip-172-31-12-145:~$ sudo mkdir /common
ubuntu@ip-172-31-12-145:~$ sudo chmod 1777 /common
ubuntu@ip-172-31-12-145:~$ ls -l /
total 136
drwxr-xr-x  3 root    root    4096 Nov 14 12:18 abc
drwxr-xr-x  5 root    root    4096 Nov  7 11:04 backup
lrwxrwxrwx  1 root    root       7 Apr 22  2024 bin -> usr/bin
drwxr-xr-x  2 root    root    4096 Feb 26  2024 bin.usr-is-merged
drwxr-xr-x  5 root    root    4096 Nov  7 06:53 boot
drwxrwxrwt  2 root    root    4096 Nov 13 10:27 checkfile
drwxrwxrwt  2 root    root    4096 Nov 17 08:33 common
-rwxr-x---  1 root    root       0 Nov 12 12:59 confidential
```

 t at the last of permissions indicates sticky bit permission is applied, tells that the users cannot delete the files they don't own

```
ubuntu@ip-172-31-12-145:~$ su - user1
Password:
$ touch /common/file1.txt
$ exit
ubuntu@ip-172-31-12-145:~$ su - user2
Password:
su: Authentication failure
ubuntu@ip-172-31-12-145:~$ su - user2
Password:
$ rm /common/file1.txt
rm: remove write-protected regular empty file '/common/file1.txt'? yes
rm: cannot remove '/common/file1.txt': Operation not permitted
$ touch /common/file2.txt
$
```

3) Create user name "shubham" and add that user in the group "adm"
a) Create folder /data , change owner and group as "root:adm

```
ubuntu@ip-172-31-12-145:~$ sudo useradd -m shubham
ubuntu@ip-172-31-12-145:~$ sudo groupadd adm
ubuntu@ip-172-31-12-145:~$ sudo cat /etc/passwd | grep shubham
shubham:x:1016:1025::/home/shubham:/bin/sh
ubuntu@ip-172-31-12-145:~$ sudo usermod -aG adm shubham
ubuntu@ip-172-31-12-145:~$ groups shubham
shubham : shubham adm
ubuntu@ip-172-31-12-145:~$ sudo mkdir /data
ubuntu@ip-172-31-12-145:~$ sudo chown root:adm /data
ubuntu@ip-172-31-12-145:~$ ls -ld /data
drwxr-xr-x 2 root adm 4096 Nov 17 09:13 /data
ubuntu@ip-172-31-12-145:~$
```

b) Change /data permission such a way that user can able to write data in this folder
and ownership of files or folder which you creates in this folder should be same as parent
folder i.e /data folder permission (root:adm)

```
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ubuntu@ip-172-31-12-145:~$ sudo cat /etc/passwd | grep shubham
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ubuntu@ip-172-31-12-145:~$ groups shubham
shubham : shubham adm
ubuntu@ip-172-31-12-145:~$ sudo mkdir /data
ubuntu@ip-172-31-12-145:~$ sudo chown root:adm /data
ubuntu@ip-172-31-12-145:~$ ls -ld /data
drwxr-xr-x 2 root adm 4096 Nov 17 09:13 /data
ubuntu@ip-172-31-12-145:~$ sudo chmod 2775 /data
ubuntu@ip-172-31-12-145:~$ ls -ld /data
drwxrwsr-x 2 root adm 4096 Nov 17 09:13 /data
ubuntu@ip-172-31-12-145:~$ sudo passwd shubham
New password:
Retype new password:
passwd: password updated successfully
ubuntu@ip-172-31-12-145:~$ su - shubham
Password:
$ cd /data
$ touch file.txt
$ mkdir newfile
$ ls -l newfile
total 0
$ ls -ld newfile
drwxrwsr-x 2 shubham adm 4096 Nov 17 09:19 newfile
$ exit
ubuntu@ip-172-31-12-145:~$
```

We enabled setgid permission in /data so that folders created inside /data will inherit the
permissions of parent folder i.e. /data,
We can verify this as shubham part of adm group made a folder(newfile) in /data and the
permissions of that folder are same as /data   i.e drwxrwsr-x