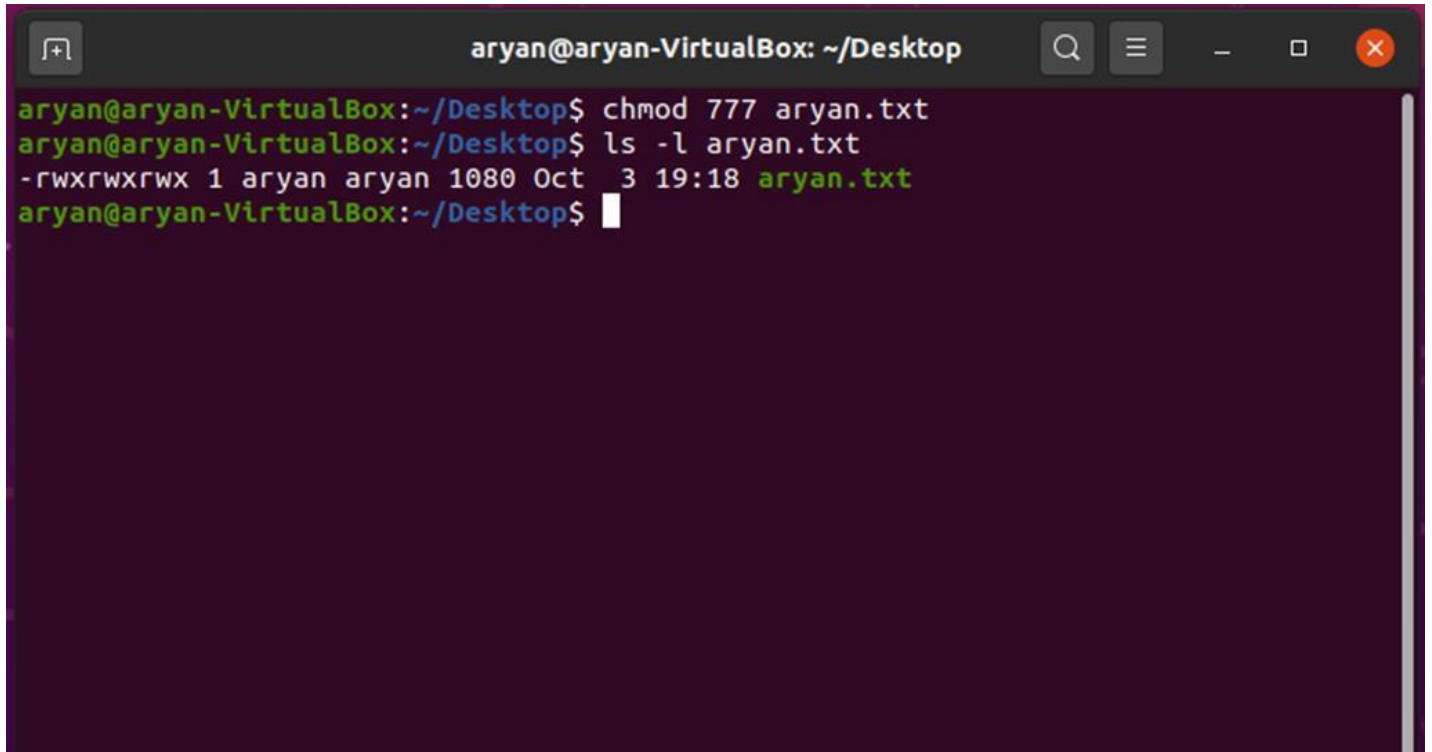


Q1. (a) Run the following commands and write/show output

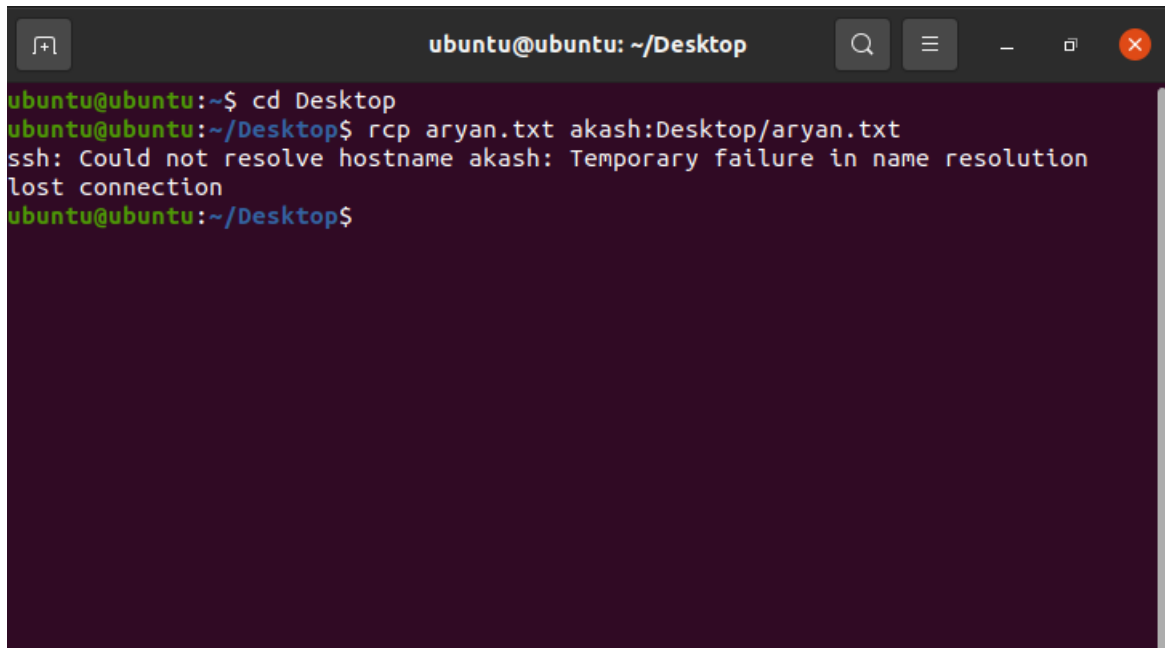
- chmod

A terminal window titled 'aryan@aryan-VirtualBox: ~/Desktop' with standard window controls. The terminal shows the execution of 'chmod 777 aryan.txt' followed by 'ls -l aryan.txt', which outputs the file's permissions as '-rwxrwxrwx 1 aryan aryan 1080 Oct 3 19:18 aryan.txt'.

```
aryan@aryan-VirtualBox: ~/Desktop
aryan@aryan-VirtualBox:~/Desktop$ chmod 777 aryan.txt
aryan@aryan-VirtualBox:~/Desktop$ ls -l aryan.txt
-rwxrwxrwx 1 aryan aryan 1080 Oct 3 19:18 aryan.txt
aryan@aryan-VirtualBox:~/Desktop$
```

- **rcp**

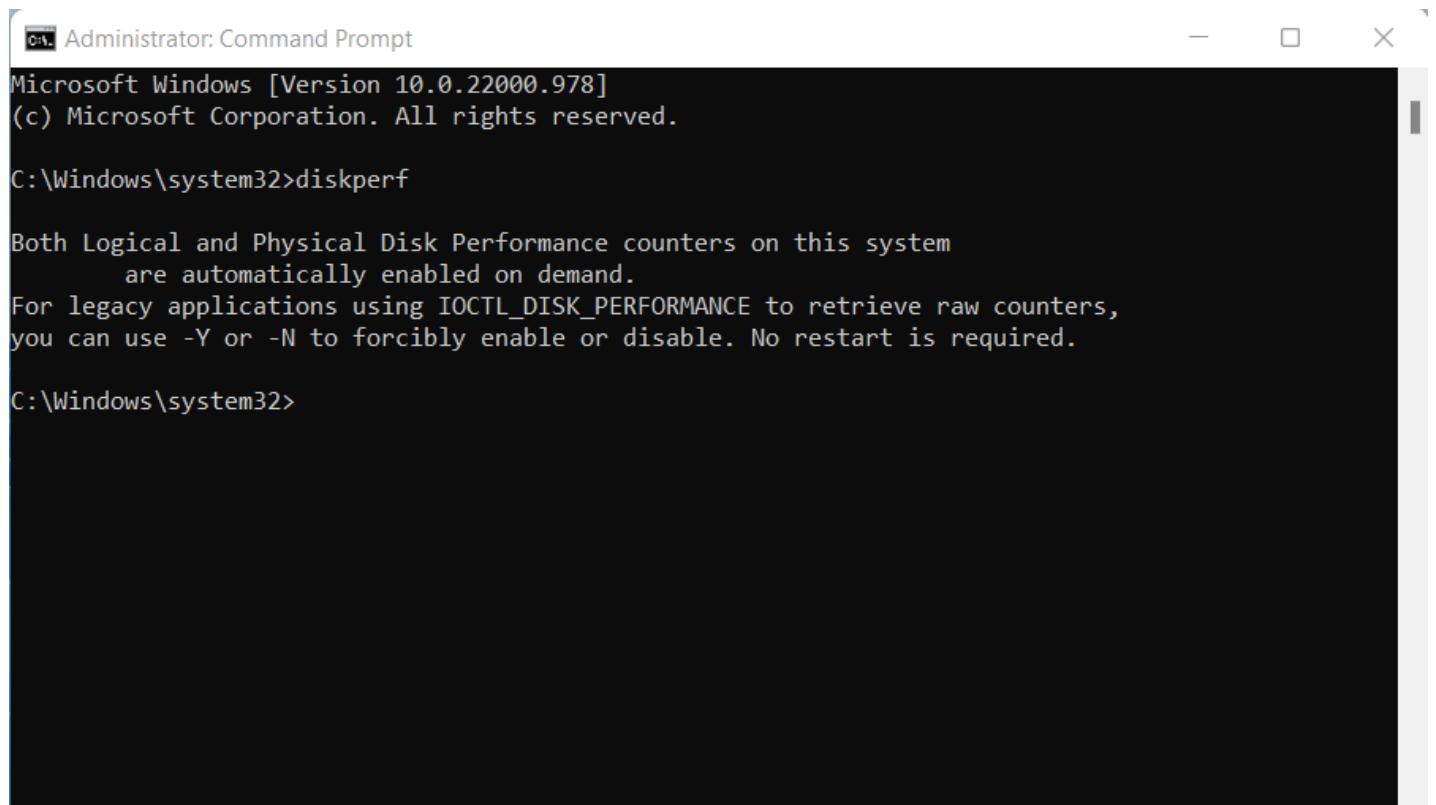
The rcp command copies files or directories between a local and a remote system or between two remote systems.

A terminal window titled 'ubuntu@ubuntu: ~/Desktop' with search, menu, and window control icons. The terminal shows the following commands and output:

```
ubuntu@ubuntu:~$ cd Desktop
ubuntu@ubuntu:~/Desktop$ rcp aryan.txt akash:Desktop/aryan.txt
ssh: Could not resolve hostname akash: Temporary failure in name resolution
lost connection
ubuntu@ubuntu:~/Desktop$
```

This command copies the file aryan.txt from the local path /Desktop to the remote system named akash, placing it in the directory desktop.

- **diskperf**

A Windows Command Prompt window titled 'Administrator: Command Prompt' with standard window controls. The terminal shows the following commands and output:

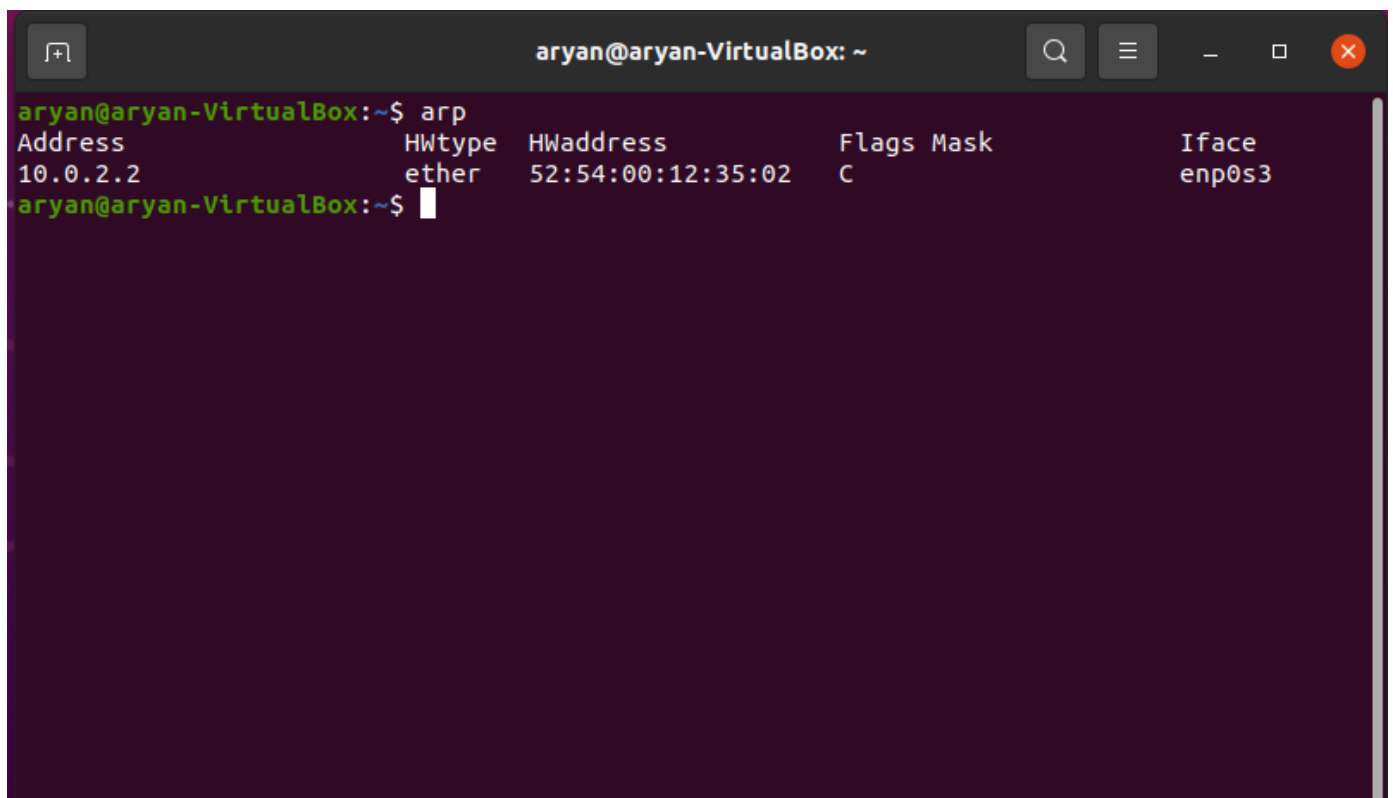
```
Microsoft Windows [Version 10.0.22000.978]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\system32>diskperf

Both Logical and Physical Disk Performance counters on this system
are automatically enabled on demand.
For legacy applications using IOCTL_DISK_PERFORMANCE to retrieve raw counters,
you can use -Y or -N to forcibly enable or disable. No restart is required.

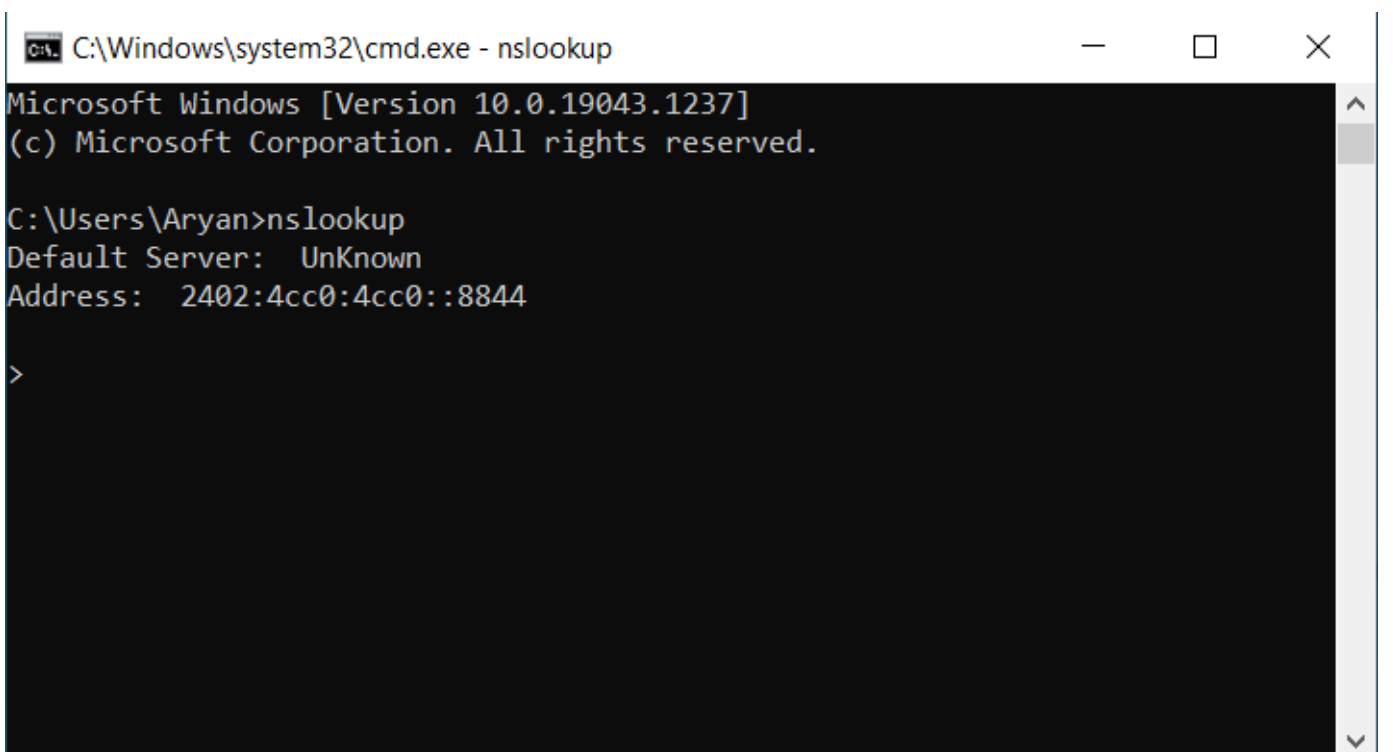
C:\Windows\system32>
```

- arp



```
aryan@aryan-VirtualBox: ~  
aryan@aryan-VirtualBox:~$ arp  
Address          HWtype  HWaddress      Flags Mask    Iface  
10.0.2.2         ether   52:54:00:12:35:02  C           enp0s3  
aryan@aryan-VirtualBox:~$
```

- nslookup



```
C:\Windows\system32\cmd.exe - nslookup  
Microsoft Windows [Version 10.0.19043.1237]  
(c) Microsoft Corporation. All rights reserved.  
  
C:\Users\Aryan>nslookup  
Default Server:  UnKnown  
Address:  2402:4cc0:4cc0::8844  
  
>
```

(b) Explore the following directories and write its contents:

(i) /bin

It contains binary or executable programs

(ii) /usr/bin

User related Files. It contains most of the executable files.

(iii) /sbin

It contains commands for Super User, for System Administration.

(iv) /tmp

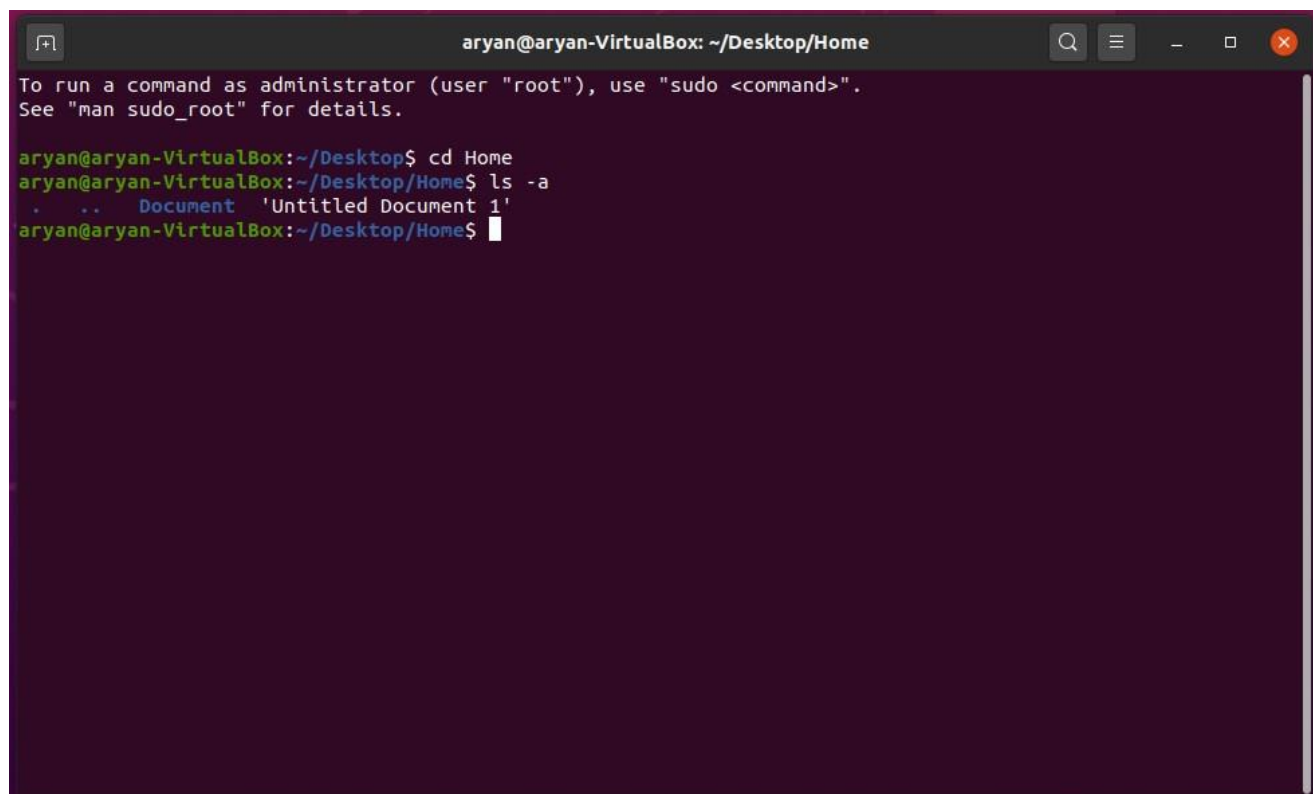
Temporary space, typically cleared on reboot.

(v) /boot

It contains all the boot-related information files and folders such as conf, grub, etc.

(c) Answer the following questions:

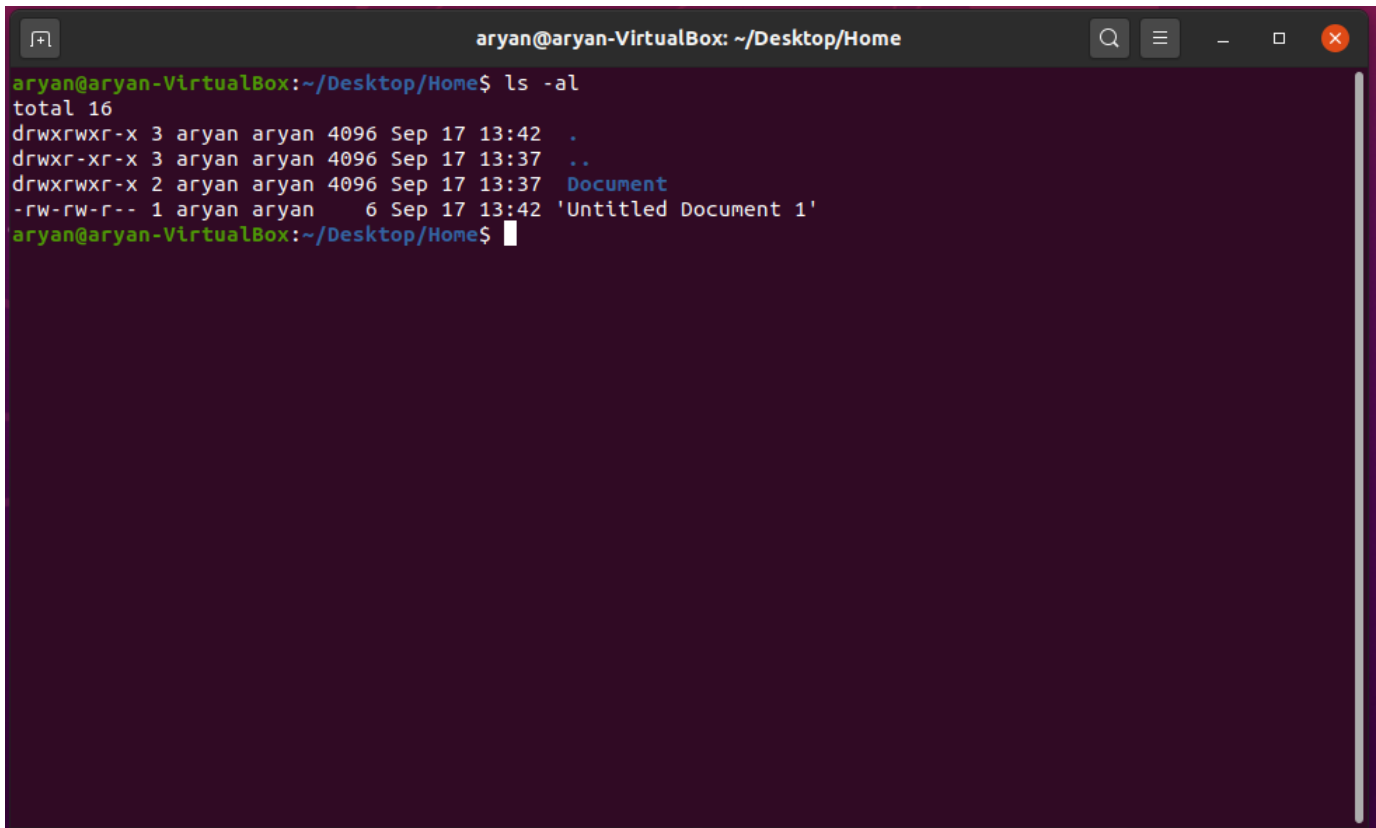
- List all the files within a directory including hidden files

A terminal window titled 'aryan@aryan-VirtualBox: ~/Desktop/Home'. The window shows the following text: 'To run a command as administrator (user "root"), use "sudo <command>". See "man sudo_root" for details.' followed by the command 'aryan@aryan-VirtualBox:~/Desktop\$ cd Home' and the output 'aryan@aryan-VirtualBox:~/Desktop/Home\$ ls -a' which lists '. .. Document 'Untitled Document 1''. The prompt 'aryan@aryan-VirtualBox:~/Desktop/Home\$' is shown again at the end of the output.

```
aryan@aryan-VirtualBox: ~/Desktop/Home
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

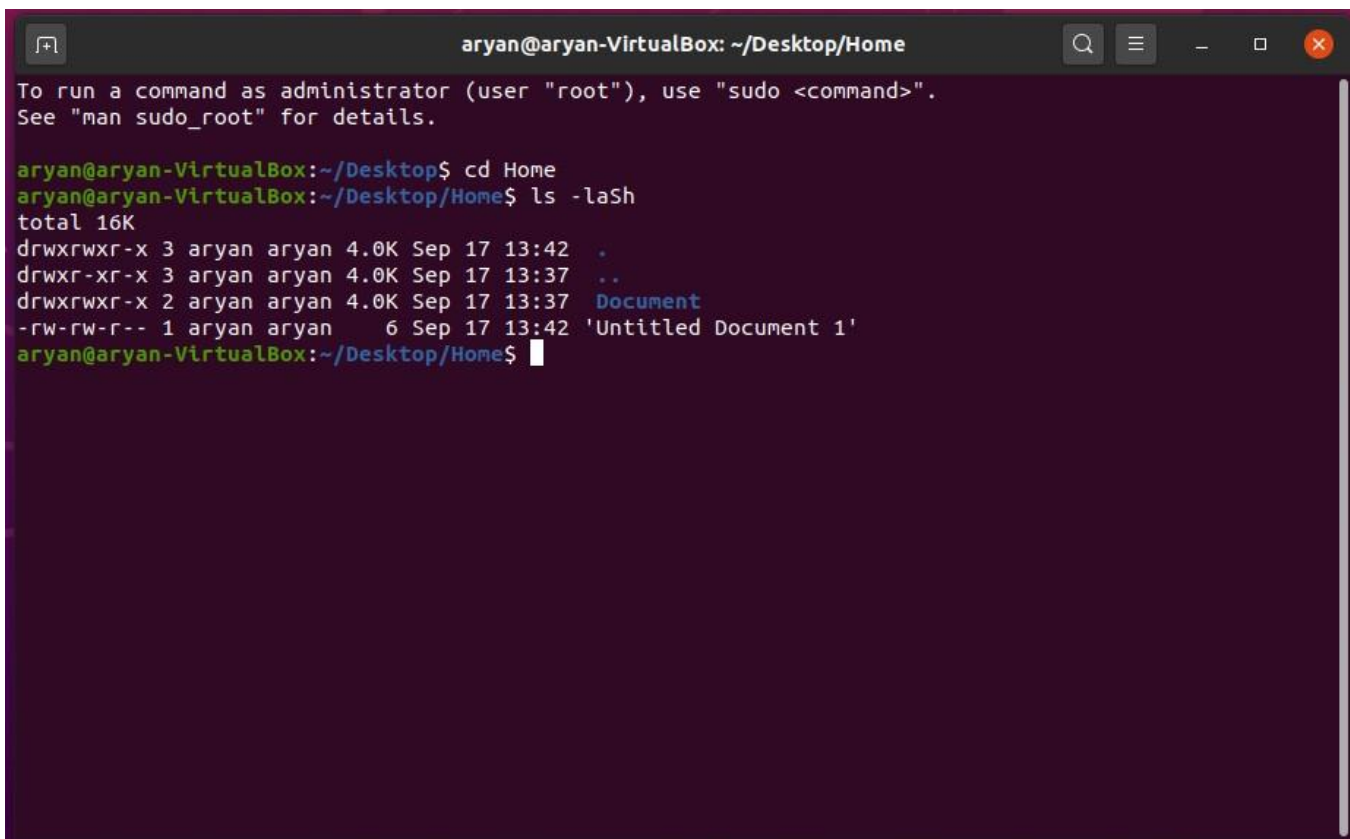
aryan@aryan-VirtualBox:~/Desktop$ cd Home
aryan@aryan-VirtualBox:~/Desktop/Home$ ls -a
.  ..  Document  'Untitled Document 1'
aryan@aryan-VirtualBox:~/Desktop/Home$
```

- Which command is used to show files or directory, size, modified date and time, file permission etc.



```
aryan@aryan-VirtualBox: ~/Desktop/Home
aryan@aryan-VirtualBox:~/Desktop/Home$ ls -al
total 16
drwxrwxr-x 3 aryan aryan 4096 Sep 17 13:42 .
drwxr-xr-x 3 aryan aryan 4096 Sep 17 13:37 ..
drwxrwxr-x 2 aryan aryan 4096 Sep 17 13:37 Document
-rw-rw-r-- 1 aryan aryan 6 Sep 17 13:42 'Untitled Document 1'
aryan@aryan-VirtualBox:~/Desktop/Home$
```

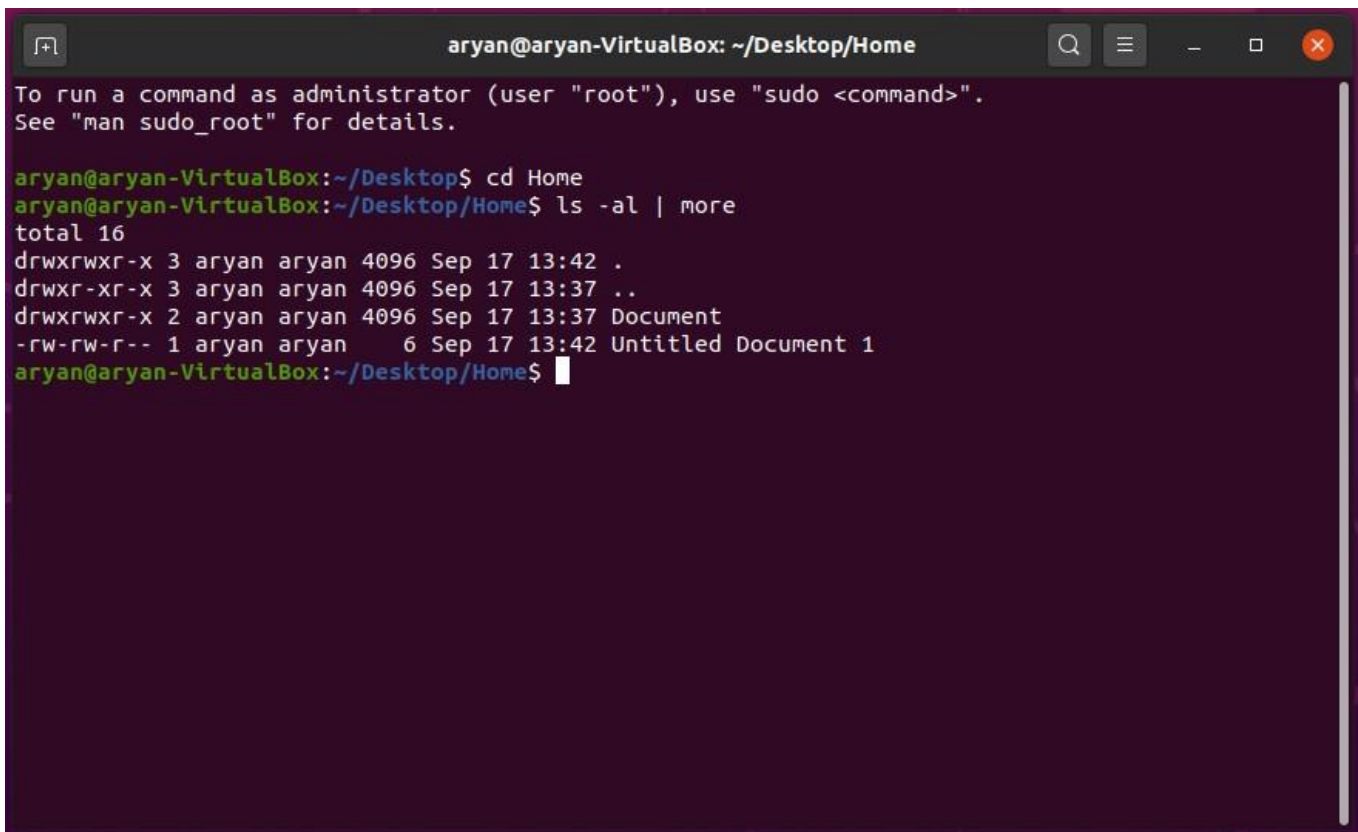
- Sort file or directory by file size



```
aryan@aryan-VirtualBox: ~/Desktop/Home
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

aryan@aryan-VirtualBox:~/Desktop$ cd Home
aryan@aryan-VirtualBox:~/Desktop/Home$ ls -laSh
total 16K
drwxrwxr-x 3 aryan aryan 4.0K Sep 17 13:42 .
drwxr-xr-x 3 aryan aryan 4.0K Sep 17 13:37 ..
drwxrwxr-x 2 aryan aryan 4.0K Sep 17 13:37 Document
-rw-rw-r-- 1 aryan aryan 6 Sep 17 13:42 'Untitled Document 1'
aryan@aryan-VirtualBox:~/Desktop/Home$
```

- What is the output of: `ls -al | more`?



```
aryan@aryan-VirtualBox: ~/Desktop/Home
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

aryan@aryan-VirtualBox:~/Desktop$ cd Home
aryan@aryan-VirtualBox:~/Desktop/Home$ ls -al | more
total 16
drwxrwxr-x 3 aryan aryan 4096 Sep 17 13:42 .
drwxr-xr-x 3 aryan aryan 4096 Sep 17 13:37 ..
drwxrwxr-x 2 aryan aryan 4096 Sep 17 13:37 Document
-rw-rw-r-- 1 aryan aryan 6 Sep 17 13:42 Untitled Document 1
aryan@aryan-VirtualBox:~/Desktop/Home$
```

- How to kill a process?

Ans: Step 1: View Running Linux Processes

The top command is the easiest way to get a complete overview of the processes currently being run.

To view a list of all currently running processes, use the command:

Step 2: Locate the Process to Kill

Before you can kill a process, you need to find it. There are multiple ways you can search for a process in Linux. Processes can either be located by a process name (or a partial process name) or a process ID (also known as a “pid”).

Locate a Process with ps Command

The ps command displays similar information to top, though it will not be in the form of an interface. Instead, the ps command provides a complete listing of running processes, formatted based on the tags you add.

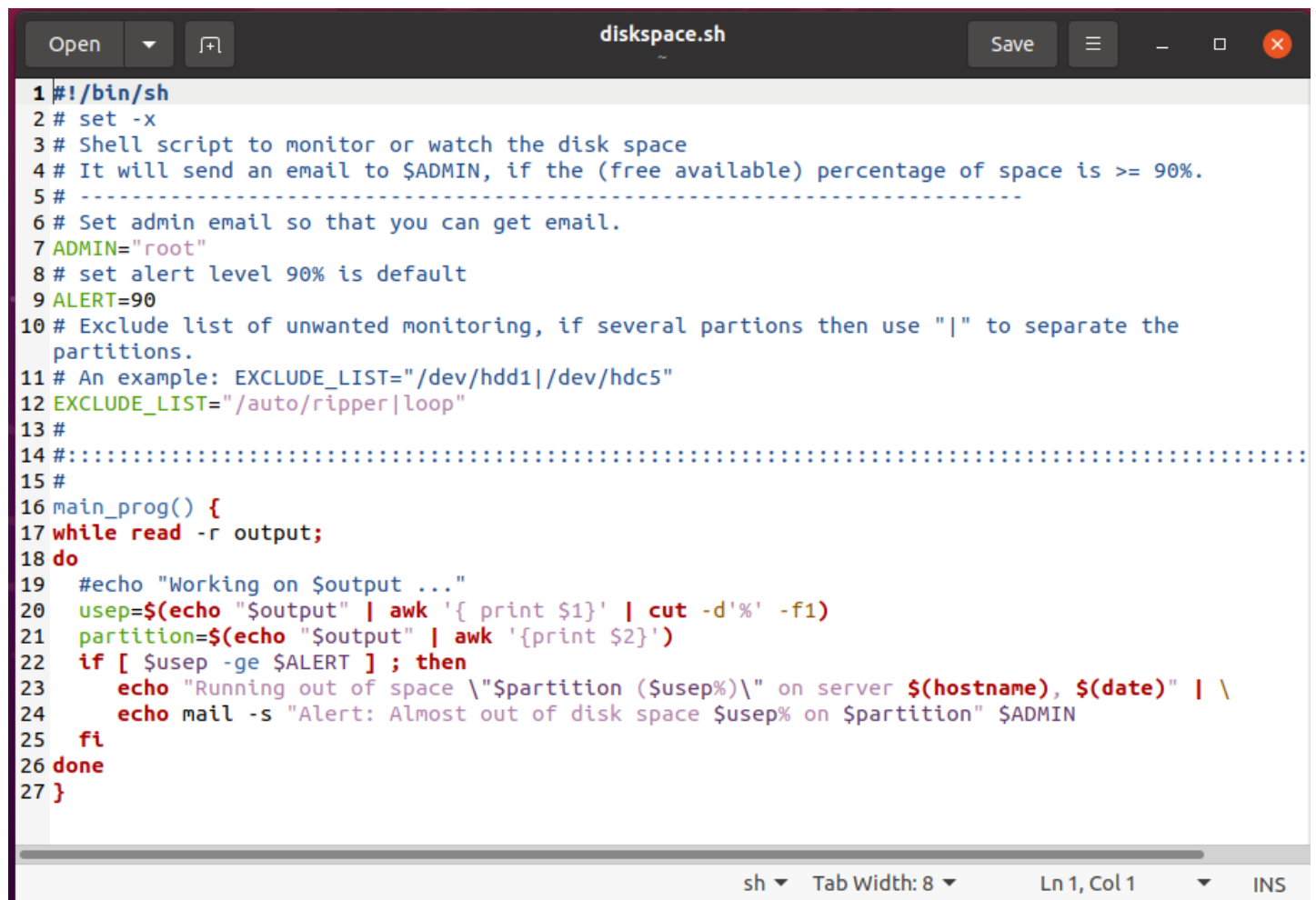
Step 3: Use Kill Command Options to Terminate a Process

killall Command

The killall command is used to kill processes by name. By default, it will send a SIGTERM signal. The killall command can kill multiple processes with a single command.

Q2. (a) Write a shell script to check a proper utilization of disk space and send an email to the user currently logged in.

Ans:



```
1#!/bin/sh
2# set -x
3# Shell script to monitor or watch the disk space
4# It will send an email to $ADMIN, if the (free available) percentage of space is >= 90%.
5# -----
6# Set admin email so that you can get email.
7ADMIN="root"
8# set alert level 90% is default
9ALERT=90
10# Exclude list of unwanted monitoring, if several partions then use "|" to separate the
   partitions.
11# An example: EXCLUDE_LIST="/dev/hdd1|/dev/hdc5"
12EXCLUDE_LIST="/auto/ripper|loop"
13#
14# ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
15#
16main_prog() {
17while read -r output;
18do
19    #echo "Working on $output ..."
20    usep=$(echo "$output" | awk '{ print $1}' | cut -d'%' -f1)
21    partition=$(echo "$output" | awk '{print $2}')
22    if [ $usep -ge $ALERT ] ; then
23        echo "Running out of space \"$partition ($usep)\" on server $(hostname), $(date)" | \
24        echo mail -s "Alert: Almost out of disk space $usep% on $partition" $ADMIN
25    fi
26done
27}
```

(b) (i) write a shell script that prompts the user for a name of a file or directory and reports what type of this file is : regular file, a directory, or another type of file.

Ans:



```
1 #!/bin/bash
2
3 echo "Enter the file path"
4 read FILE
5
6 if [ -f "$FILE" ]
7 then
8     echo "$FILE is a regular file"
9
10 elif [ -d "$FILE" ]
11 then
12     echo "$FILE is a directory"
13
14 else
15     echo "FILE is another type of file"
16
17 fi
18
19 ls -l $FILE
20
21
```

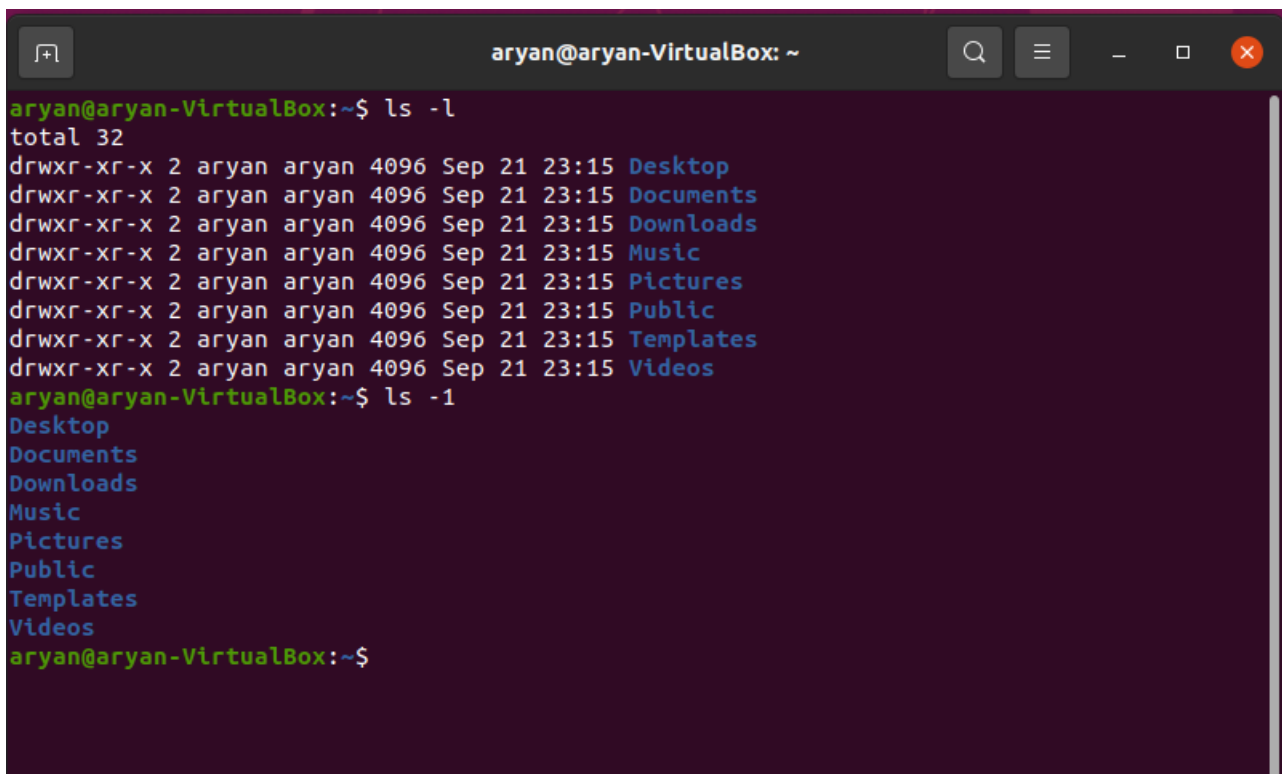
The screenshot shows a terminal window with a dark theme. The title bar indicates the file is 'checkfile.sh' located at '~/Desktop'. The script content is as follows:

```
1 #!/bin/bash
2
3 echo "Enter the file path"
4 read FILE
5
6 if [ -f "$FILE" ]
7 then
8     echo "$FILE is a regular file"
9
10 elif [ -d "$FILE" ]
11 then
12     echo "$FILE is a directory"
13
14 else
15     echo "FILE is another type of file"
16
17 fi
18
19 ls -l $FILE
20
21
```

The status bar at the bottom shows 'sh', 'Tab Width: 8', 'Ln 21, Col 1', and 'INS'.

(ii) Execute an ls command against the file or directory with any two options you are aware of.

Ans:



```
aryan@aryan-VirtualBox: ~$ ls -l
total 32
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Desktop
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Documents
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Downloads
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Music
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Pictures
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Public
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Templates
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Videos
aryan@aryan-VirtualBox: ~$ ls -l
Desktop
Documents
Downloads
Music
Pictures
Public
Templates
Videos
aryan@aryan-VirtualBox: ~$
```

The screenshot shows a terminal window with the title 'aryan@aryan-VirtualBox: ~'. The user has executed the 'ls -l' command, which displays the following output:

```
total 32
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Desktop
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Documents
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Downloads
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Music
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Pictures
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Public
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Templates
drwxr-xr-x 2 aryan aryan 4096 Sep 21 23:15 Videos
```

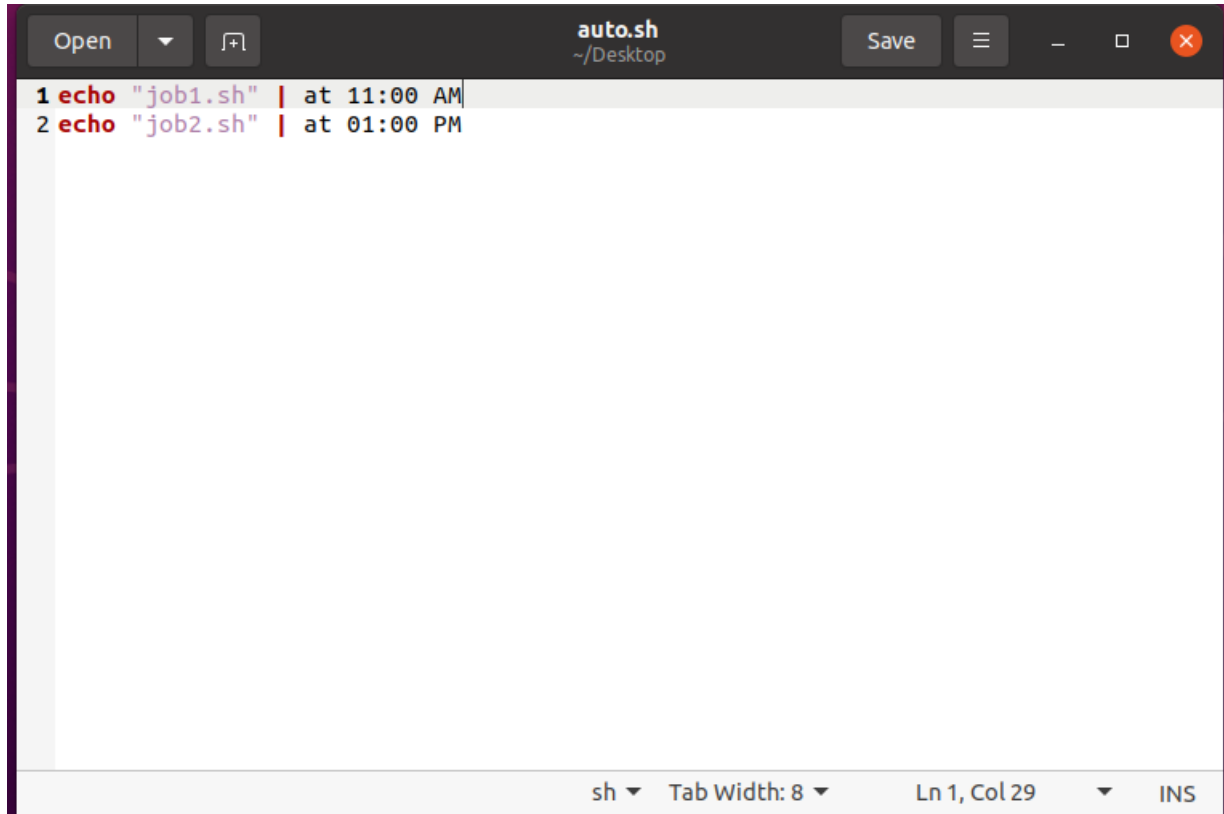
The user then executes 'ls -l' again, which displays the following output:

```
Desktop
Documents
Downloads
Music
Pictures
Public
Templates
Videos
```

The prompt 'aryan@aryan-VirtualBox: ~\$' is shown at the bottom.

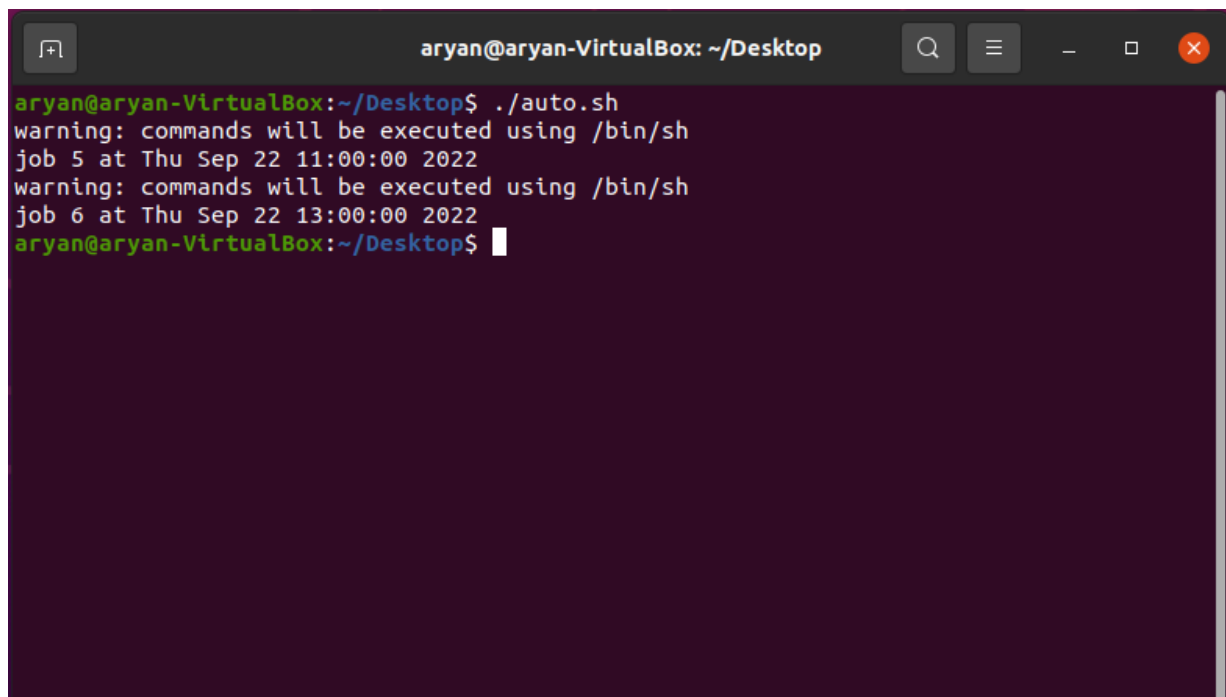
Q3. Perform the following tasks:

(a) Set the execution time of two jobs so that it can run automatically tomorrow one at 11:00 a.m. and another at 1:00 p.m. After this setting, how can you change the time of execution of the job?



The screenshot shows a text editor window titled 'auto.sh' with the file path '~/Desktop'. The editor contains two lines of code: '1 echo "job1.sh" | at 11:00 AM' and '2 echo "job2.sh" | at 01:00 PM'. The status bar at the bottom indicates 'sh', 'Tab Width: 8', 'Ln 1, Col 29', and 'INS'.

```
1 echo "job1.sh" | at 11:00 AM
2 echo "job2.sh" | at 01:00 PM
```



The screenshot shows a terminal window titled 'aryan@aryan-VirtualBox: ~/Desktop'. The user has executed the command './auto.sh'. The output shows two jobs being scheduled: 'job 5 at Thu Sep 22 11:00:00 2022' and 'job 6 at Thu Sep 22 13:00:00 2022'. Both jobs are scheduled to be executed using '/bin/sh'. The prompt 'aryan@aryan-VirtualBox:~/Desktop\$' is visible at the bottom.

```
aryan@aryan-VirtualBox:~/Desktop$ ./auto.sh
warning: commands will be executed using /bin/sh
job 5 at Thu Sep 22 11:00:00 2022
warning: commands will be executed using /bin/sh
job 6 at Thu Sep 22 13:00:00 2022
aryan@aryan-VirtualBox:~/Desktop$
```

(b) Add different user's and groups. Also configure their permissions.

Ans: To create a new User, please follow these steps:

1. Log into your server through Terminal Services or Remote Desktop Connection.
2. Open Computer Management using either method below:
 - Right-click on the My Computer Icon and select Manage.
 - Click Start, Programs, Administrative Tools, and Computer Management.
3. Expand Local Users and Groups.
4. Click on Users. In the right window you will see a list of the current users on the server.
5. Right-click Users and select New User.
6. Enter the following information:
 - User Name (required): all usernames must be unique.
 - Full Name (optional): the full name of the user
 - Description (optional): a description of the user
 - Password (required): we strongly recommend you use at least 6 characters and mixture of uppercase letters, lowercase letters and numbers for your passwords. For example, ft5yH7.
 - Confirm Password (required): this entry must be identical to the Password field.
7. Set the options that suit your needs:
 - **User must change password at next login:** if checked, the user must change their password the next time they login. We recommend you uncheck this so that you have full control over the password.
 - **User cannot change password:** if the first option is unchecked you will be able to set this option. We recommend you check this option so that only the administrator of the machine can modify the users password.
 - **Password never expires:** controls if the password will expire 30 days. Once the password expires you will need to reset it manually.
 - **Account is disabled:** when checked, the User will no longer be valid.
8. Click Create to add the new user.

To add a user to the Administrators group, please follow these steps:

1. Right-click the username and select Properties.
2. Select the Members Of Tab. You will see a list of groups the User is assigned to.
3. Click Add.

4. Type in the name of the group, Administrators.
5. Click OK. You will now see the Administrators group in the list.
6. Click OK.

To set permissions on Windows 2000:

1. Select Start > Settings > Control Panel to open the Control Panel.
2. In the Control Panel, open Administrative Tools.
3. In Administrative Tools, open Local Security Policy.
4. Expand the tree for Local Policies, and then select User Rights Assignment.
5. Select and right-click the required user right to display a pop-up menu. From the pop-up menu, select Security. The following is an example of the window that is opened for the Act as part of the operating system user right.

To add permissions:

- Click Add. The Select Users or Groups window appears.
In the Select Users or Groups window, type the user ID (that requires this permission) in the form:
- domain\userid

6. Click OK.

When you are finished adding permissions, restart the machine so that the updates will take effect.

(c) Share any folder available in your directory. Also configure its share permissions for different users.

Ans: Shared Folder with Access Control

Once you create the user account on your computer, create a shared folder. Add the created account to the shared folder as a user who is permitted to access that folder. Set access permissions so that the user can that folder as well.

1. Set a shared folder.

- Create a new shared folder in any drive.
- Right-click the created folder.
- Select [Sharing] to open the [<Folder name> Properties] dialog box.
- Select [Share this folder].

2. Set the network-level access permission

- In the [Sharing] sheet, click the [Permissions] button to open the [Permissions for <Folder Name>].
- Click [Add...] to open the [Select Users or Groups] dialog box.
- Type [Computer Name]\[User Name] in [Enter the object names to select].
- Click [Check Names]. Make sure that the correct object name is typed.
- Click [OK] to close the [Select Users or Groups] dialog box.
- In the [Permissions for <Folder name>], under [Group or user names], select the user whom you want to grant permission. Select the [Full Control] box under [Allow].
- Click [OK] to close the [Permissions for <Folder Name>] dialog box.
- If the [Security] tab is displayed in the [<Folder name> Properties], proceed to Step 3 to set the local-level access permission. If not, proceed to Step 4.

3. Set the local-level access permission.

If the drive to which the shared folder is set is formatted in NTFS, you need to set the local-level as well as the network-level access permissions.

- In the [<Folder name> Properties], click the [Security] tab.
- Click [Add...] to open the [Select Users or Groups] dialog box.
- Type [Computer Name]\[User Name] in [Enter the object names to select]
- Click [Check Names]. Make sure that the correct object name is typed.
- Click [OK] to close the [Select Users or Groups] dialog box.
- In the [Security] sheet, under [Name], select the user whom you want to grant permission. Select the [Full Control] box under [Allow].

4. Click [OK] to close the [<Folder name> Properties] dialog box.

(d) Configure the DHCP Server Service.

Ans: Configuring DHCP server:

After you install a DHCP server, go to Start | Programs | Administrative Tools | DHCP to open the Windows 2000 console for managing the DHCP service.

When setting up a DHCP server, the first thing you have to do is define a scope. A scope is a list of valid IP addresses you want the DHCP server to be able to assign to clients. When a machine requests TCP/IP information from the DHCP server, the information is provided from the scope you created.

To define a scope using the Create Scope Wizard:

1. From the Action menu, select New Scope to launch the Create Scope Wizard, and then click Next.
2. Type a name and description of your scope and click Next.
3. Enter the start and end IP addresses of your scope. Remember to also assign the appropriate subnet mask as well. Click Next.
4. This window is where you specify all of your static IP addresses to exclude from your scope. Add any exclusions and click Next.
5. Enter the amount of time the lease is active and click Next.
6. The next screen asks you whether you want to configure your DHCP options now or later. For this article, we will select Yes, I Want To Configure These Options Now and click Next.
7. Enter your domain name and add the IP addresses for your DNS servers as shown in.
8. Enter the addresses of any WINS servers you configured on your network for resolving NetBIOS names into IP addresses.
9. Choose Yes or No to indicate whether to activate your scope. There is still more work to be done, so we will choose No.
10. Click Finish.

Adding reservations

In addition to specifying exclusions, you can add reservations to your DHCP server. By adding a reservation, you ensure that a machine always receives the same IP address from the DHCP server.

To add a reservation:

1. From the DHCP console, click the + sign next to the scope you created.
2. Click Reservations and select Action | New Reservation.
3. Enter a friendly name for the reservation and the IP address you want to assign to the computer or device.

4. Enter the MAC address of the computer or device. (For Windows NT/2000 machines, you can find the MAC address by running ipconfig/all from the command prompt of the machine.)
5. Enter a description and then choose the following reservation type: DHCP, BOOTP (going across a router), or both. Click Add.

Authorizing the DHCP server and activating scopes

Remember that after you install and configure your DHCP server, you will need to authorize your scope before it can be activated. Authorizing your DHCP server allows you to prevent hackers from configuring rogue DHCP servers.

To authorize your DHCP server:

1. From the DHCP console, click on the DHCP icon.
2. From the Action menu, select Manage Authorized Servers.
3. Click Authorize and enter the name or IP address for your server.
4. Now you're ready to activate your DHCP server and bring it online. Click the scope you created and choose Activate from the Action menu.

(e) Monitor the IP Routing status.

```
Administrator: Command Prompt

=====
Interface List
=====
 8...54 e1 ad 50 a5 73 .....Realtek PCIe GBE Family Controller
18...0a 00 27 00 00 12 .....VirtualBox Host-Only Ethernet Adapter
12...fa 28 19 c7 ce 5b .....Microsoft Wi-Fi Direct Virtual Adapter
 4...0a 28 19 c7 ce 5b .....Microsoft Wi-Fi Direct Virtual Adapter #2
16...f8 28 19 c7 ce 5b .....Qualcomm Atheros QCA9377 Wireless Network Adapter
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
=====
Network Destination        Netmask          Gateway          Interface        Metric
0.0.0.0                    0.0.0.0          192.168.1.1      192.168.1.7      35
127.0.0.0                  255.0.0.0        On-link          127.0.0.1        331
127.0.0.1                  255.255.255.255  On-link          127.0.0.1        331
127.255.255.255            255.255.255.255  On-link          127.0.0.1        331
192.168.1.0                 255.255.255.0    On-link          192.168.1.7      291
192.168.1.7                 255.255.255.255  On-link          192.168.1.7      291
192.168.1.255              255.255.255.255  On-link          192.168.1.7      291
192.168.56.0               255.255.255.0    On-link          192.168.56.1     281
192.168.56.1               255.255.255.255  On-link          192.168.56.1     281
192.168.56.255             255.255.255.255  On-link          192.168.56.1     281
224.0.0.0                  240.0.0.0        On-link          127.0.0.1        331
224.0.0.0                  240.0.0.0        On-link          192.168.56.1     281
224.0.0.0                  240.0.0.0        On-link          192.168.1.7      291
255.255.255.255            255.255.255.255  On-link          127.0.0.1        331
255.255.255.255            255.255.255.255  On-link          192.168.56.1     281
255.255.255.255            255.255.255.255  On-link          192.168.1.7      291
=====
Persistent Routes:
None

IPv6 Route Table
=====
Active Routes:
=====
If Metric Network Destination      Gateway
16      291 ::/0                  fe80::1
1       331 ::1/128              On-link
16      291 2402:4cc0:2307:de::/64 On-link
16      291 2402:4cc0:2307:de:3881:aed1:28c0:2b73/128
                                           On-link
16      291 2402:4cc0:2307:de:715e:8550:fadf:9ac8/128
                                           On-link
```