Ex No: 1a)

Date: 25-1-25

INSTALLATION AND CONFIGURATION OF LINUX

Aim:

To install and configure Linux operating system in a Virtual Machine.

Installation/Configuration Steps:

1. Install the required packages for virtualization
dnf install xen virt-manager qemu libvirt

2. Configure xend to start up on boot
systemctl enable virt-manager.service

3. Reboot the machine
Reboot

4. Create Virtual machine by first running virt-manager
virt-manager &

5. Click on File and then click to connect to localhost

6. In the base menu, right click on the localhost(QEMU) to create a new VM 7. Select

Linux ISO image

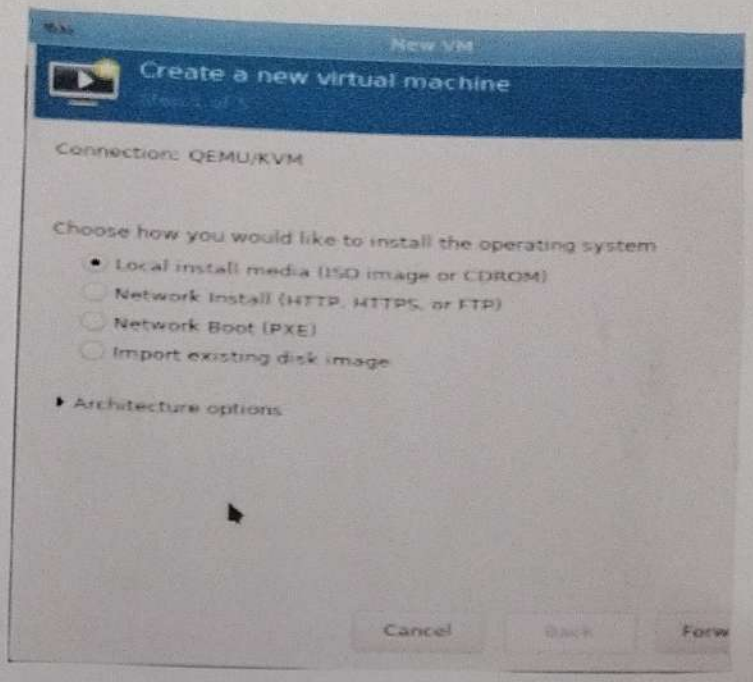
8. Choose puppy-linux.iso then kernel version

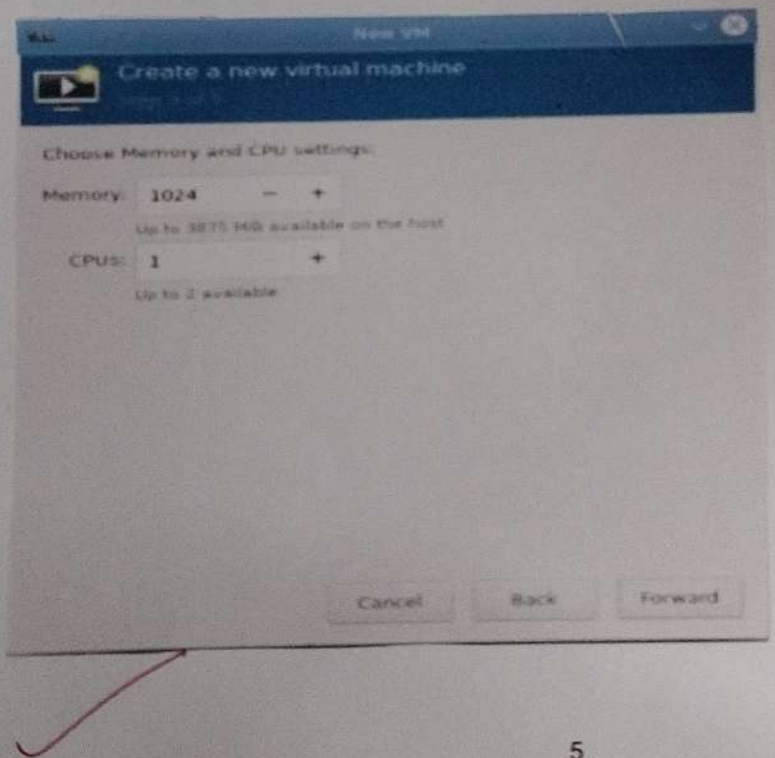
9. Select CPU and RAM limits

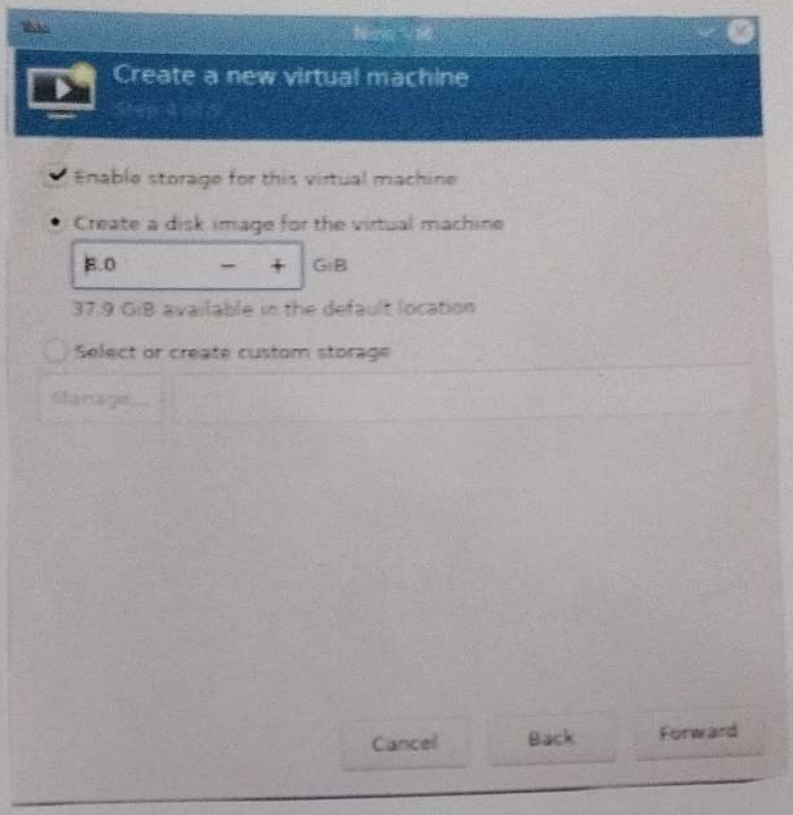
10.Create default disk image to 8 GB

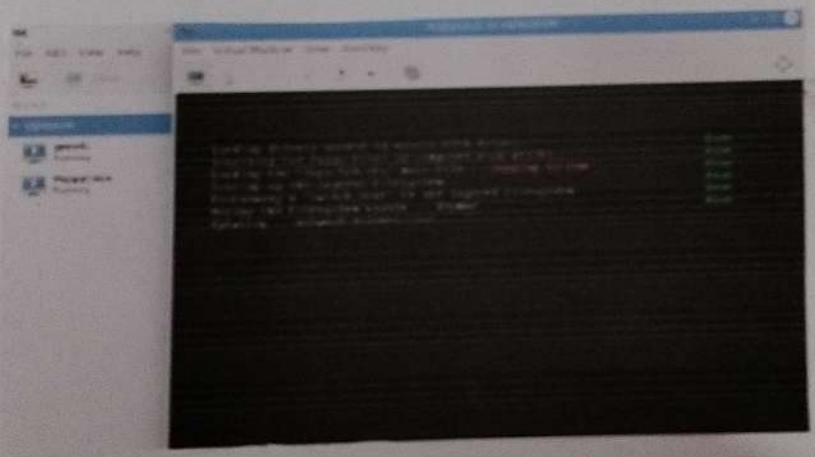
11.Click finish for creating the new VM with PuppyLinux

Output:









Result :

The process to install Linux completed Successfully

$date

Thu Jan 23 08:18:39 IST 2025

$date +%m

01

$date +%h

Jan

$date +%y

25

$date +%d

23

$date +%H

08

$date +%M

19

$date +%S

49

$echo "Hello world"

Hello world

$cal

January 2025

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

$cal Jan 2012

January 2012

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

$bc

bc 1.06.95

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This is free software, with Absolutely No warranty

For details type 'warranty'

Ex No: 1b)

Date: 31/1/25

BASIC LINUX COMMANDS

1.1 GENERAL PURPOSE COMMANDS

1. The 'date' command:

The date command displays the current date with day of week, month, day, time (24 hours clock) and the year.

SYNTAX: $ date

The date command can also be used with following format.

Format	Purpose	Example
+ %m	To display only month	$ date + %m
+ %h	To display month name	$ date + %h
+ %d	To display day of month	$ date + %d
+ %y	To display last two digits of the year	$ date + %y
+ %H	To display Hours	$ date + %H
+ %M	To display Minutes	$ date + %M
+ %S	To display Seconds	$ date + %S

2. The echo'command:

The echo command is used to print the message on the screen.

SYNTAX: $ echo

EXAMPLE: $ echo "God is Great"

3. The 'cal' command:

The cal command displays the specified month or year calendar.

SYNTAX: $ cal [month] [year]

EXAMPLE: $ cal Jan 2012

4. The 'bc' command:

```
3+2
 5
3*2
 6
3/2
 1
3-2
 1
$who
root    pts/0        2025-01-23  8:14 (:0)
cse368  pts/1        2025-01-23  8:23 (172.16.9.18)
cse386  pts/2        2025-01-23  8:16 (172.16.9.27)
cse359  pts/3        2025-01-23  8:16 (172.16.9.12)
cse358  pts/4        2025-01-23  8:17 (172.16.9.11)
  :       :              :           :
cse360  pts/36       2025-01-23  8:37 (172.16.9.13)

$who am i
cse368  pts/1        2025-01-23  8:23 (172.16.9.18)

$id
uid=1369(cse368) gid=1369(cse368) groups=1369(cse368) context=
                                        unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023

$tty
/dev/pts/1

$ps
  PID  TTY      TIME     CMD
2654  pts/1    00:00:00 bash
2905  pts/1    00:00:00 ps

$uname
Linux
$uname -n
localhost.localdomain
$uname -m
i686
$uname -r
4.11.8-300.fc26.i686+PAE
$pwd
/home/cse368
```

Unix offers an online calculator and can be invoked by the command bc.

SYNTAX: $ bc

EXAMPLE: bc –l

16/4

5/2

5. The 'who' command

The who command is used to display the data about all the users who are currently logged into the system.

SYNTAX: $ who

6. The 'who am i' command

The who am i command displays data about login details of the user.

SYNTAX: $ who am i

7. The 'id' command

The id command displays the numerical value corresponding to your login.

SYNTAX: $ id

8. The 'tty' command

The tty (teletype) command is used to know the terminal name that we are using.

SYNTAX: $ tty

9. The 'clear' command

The clear command is used to clear the screen of your terminal.

SYNTAX: $ clear

10. The 'man' command

The man command gives you complete access to the Unix commands.

SYNTAX: $ man [command]

11. The 'ps' command

The ps command is used to the process currently alive in the machine with the 'ps' (process status) command, which displays information about process that are alive when you run the command. 'ps;' produces a snapshot of machine activity.

SYNTAX: $ ps

EXAMPLE: $ ps

$ ps –e

$ps -aux

```
$mkdir uma
$cd uma
[cse36s@localhost ~]$ mkdir uma
[cse36s@localhost ~]$ cd uma
[cse36s@localhost uma]$ vi add.c

$cc add.c
$./a.out
30 [cse36s@localhost uma]$

$vi display.txt
$cat display.txt
hello i am uma
$vi display.dat
$cat display.dat
hi, I am working on OS.
$file display.txt
display.txt: ASCII text
$mv display.txt display1.txt
$cat display1.txt
hello i am uma
$cat display.txt
cat: display.txt: No such file or directory
$wc display1.txt
 1  5 18 display.txt
$rm display.dat
$cat display.dat
cat: display.dat: No such file or directory
$cp display1.txt display.txt
$cat display1.txt
hello i am uma.
$cat display.text
hello i am uma.
$ls
add  add.c  a.out  display1.txt  display.txt  sample
```

12. The 'uname' command

The uname command is used to display relevant details about the operating system on the standard output.

-m -> Displays the machine id (i.e., name of the system hardware)

-n -> Displays the name of the network node. (host name)

-r -> Displays the release number of the operating system.

-s -> Displays the name of the operating system (i.e.. system name)

-v -> Displays the version of the operating system.

-a -> Displays the details of all the above five options.

SYNTAX: $ uname [option]

EXAMPLE: $ uname -a

1.2 DIRECTORY COMMANDS

1. The 'pwd' command:

The pwd (print working directory) command displays the current working directory.

SYNTAX: $ pwd

2. The 'mkdir' command:

The mkdir is used to create an empty directory in a disk.

SYNTAX: $ mkdir dirname

EXAMPLE: $ mkdir receee

3. The 'rmdir' command:

The rmdir is used to remove a directory from the disk. Before removing a directory, the directory must be empty (no files and directories).

SYNTAX: $ rmdir dirname

EXAMPLE: $ rmdir receee

4. The 'cd' command:

The cd command is used to move from one directory to another.

SYNTAX: $ cd dirname

EXAMPLE: $ cd receee

5. The 'ls' command:

```
$ touch display.py
$ nano display.py
$ python3 display.py
hello i am Uma.
$ who;date
student pts/0    2025-01-25. 13:32(:0)
student pts/1    2025-01-25 13:32(:0)
Sat Jan 25 13:33:42 IST 2025
$ who2 &date
student pts/0  2025-01-25  13:32 (:0)
student pts/1  2025-01-25  13:32 (:0)
Sat Jan 25 13:33:44 IST 2025
$ who|| date
student pts/0  2025-01-25  13:32 (:0)
student pts/1  2025-01-25  13:32(:0)
$ vi add.txt
$ head add.txt
a
b
c
d
e
f
g
h
i
j
$ tail add.txt
k
l
m
n
o
p
q
r
s
t
```

The ls command displays the list of files in the current working directory.

SYNTAX: $ ls

EXAMPLE: $ ls

$ ls –l

$ ls –a

1.3 FILE HANDLING COMMANDS

1. The 'cat' command:

The cat command is used to create a file.

SYNTAX: $ cat > filename

EXAMPLE: $ cat > rec

2. The 'Display contents of a file' command:

The cat command is also used to view the contents of a specified file.

SYNTAX: $ cat filename

3. The 'cp' command:

The cp command is used to copy the contents of one file to another and copies the file from one place to another.

SYNTAX: $ cp oldfile newfile

EXAMPLE: $ cp cse ece

4. The 'rm' command:

The rm command is used to remove or erase an existing file

SYNTAX: $ rm filename

EXAMPLE: $ rm rec

$ rm –f rec

Use option –fr to delete recursively the contents of the directory and its subdirectories.

5. The 'mv' command:

The mv command is used to move a file from one place to another. It removes a specified file from its original location and places it in specified location.

SYNTAX: $ mv oldfile newfile

EXAMPLE: $ mv cse eee

6. The 'file' command:

The file command is used to determine the type of file.

SYNTAX: $ file filename

EXAMPLE: $ file receee

$head -5 add.txt

a
b
c
d
e

$ vi display.txt

$ sort display.txt

a
a
b
b
b
c
d
d
d

$ sort -r display.txt

d
d
d
c
b
b
b
a
a

$ sort -c display.txt

sort: add.txt:2: disorder: a

$ sort -m display.txt

a
b
c
d
a
b
b
d
d

7. The 'wc' command:

The wc command is used to count the number of words, lines and characters in a file.

SYNTAX: $ wc filename

EXAMPLE: $ wc receee

8. The 'Directing output to a file' command:

The ls command lists the files on the terminal (screen). Using the redirection operator '>' we can send the output to file instead of showing it on the screen.

SYNTAX: $ ls > filename

EXAMPLE: $ ls > cseeee

9. The 'pipes' command:

The Unix allows us to connect two commands together using these pipes. A pipe (|) is an mechanism by which the output of one command can be channeled into the input of another command.

SYNTAX: $ command1 | command2

EXAMPLE: $ who | wc -l

10. The 'tee' command:

While using pipes, we have not seen any output from a command that gets piped into another command. To save the output, which is produced in the middle of a pipe, the tee command is very useful.

SYNTAX: $ command | tee filename

EXAMPLE: $ who | tee sample | wc -l

11. The 'Metacharacters of unix' command:

Metacharacters are special characters that are at higher and abstract level compared to most of other characters in Unix. The shell understands and interprets these metacharacters in a special way.

* - Specifies number of characters

?- Specifies a single character

[ ]- used to match a whole set of file names at a command line.

! – Used to Specify Not

EXAMPLE:

$ ls r** - Displays all the files whose name begins with 'r'

$ ls ?kkk - Displays the files which are having 'kkk', from the second characters irrespective of the first character.

$ ls [a-m] – Lists the files whose names begins alphabets from 'a' to 'm'

$ ls [!a-m] – Lists all files other than files whose names begins alphabets from 'a' to 'm' 12.

```
$ sort -u odd.txt
a
b
c
d
$ cat > student.txt
uma cse
Ram ece
Arun cse
^C
$ grep 'cse' student.txt
uma cse
arun cse
$ nl student.txt
1 uma cse
2 ram ece
3 arun cse
$ cut -c 1 student.txt
u
r
a
$ free
              total        used        free      shared  buff/cache   available
Mem:        1994436      483316      623200       60960      887920     1360620
Swap:       2125820           0     2125820
$ vmstat
procs -----------memory---------- ---swap-- -----io---- -system-- ------cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
 0  0      0 621508  50776 838228    0    0   163    31  209  692  1  1 97  0  0
$ df
Filesystem     1K-blocks     Used Available Use% Mounted on
devtmpfs          986232        0    986232   0% /dev
tmpfs             997216        0    997216   0% /dev/shm
tmpfs             997216      196    996020   1% /run
tmpfs             997216        0    997216   0% /sys/fs/cgroup
/dev/mapper/fedora-root 51343840 5029064 43576952  11% /
```

The 'File permissions' command:

File permission is the way of controlling the accessibility of file for each of three users namely Users, Groups and Others.

There are three types of file permissions are available, they are

r-read
w-write
x-execute

The permissions for each file can be divided into three parts of three bits each.

First three bits	Owner of the file
Next three bits	Group to which owner of the file belongs
Last three bits	Others

EXAMPLE: $ ls college

-rwxr-xr-- 1 Lak std 1525 jan10 12:10 college

Where,

-rwx The file is readable, writable and executable by the owner of the file.

Lak Specifies Owner of the file.

r-x Indicates the absence of the write permission by the Group owner of the file. Std Is the Group Owner of the file.

r-- Indicates read permissions for others.

13. The 'chmod' command:

The chmod command is used to set the read, write and execute permissions for all categories of users for file.

SYNTAX: $ chmod category operation permission file

Category	Operation	permission
u-users	+ assign	r-read
g-group	-Remove	w-write
o-others	= assign absolutely	x-execute
a-all		

$ping

Usage: ping [-aAbBdDfhLnOqrRUvV64] [-c count] [-i interval] [-I interface]
[-m mark] [-M pmtudisc_option] [-l preload] [-p pattern] [-Q tos]
[-s packetsize] [-S sndbuf] [-t ttl] [-T timestamp-option]
[-w deadline] [-W timeout] [hop1 ...] destination

$ping 172.16.4.1

PING 172.16.4.1 (172.16.4.1) 56(84) bytes of data.
64 bytes from 172.16.4.1: icmp_seq=1 ttl=64 time=0.162 ms
64 bytes from 17216.4.1: icmp_seq=2 ttl=64 time=0.103 ms
^C

$ ifconfig

enp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 172.16.9.18 netmask 255.255.252.0 broadcast 172.16.11.255
inet6 fe80::6b16:b6b2:f50e:ac1d prefixlen 64 scopeid 0x20<link>
ether 00:27:0e:13:f4:33 txqueuelen 1000 (Ethernet)
RX packets 170648 bytes 127702969 (121.7 MiB)
RX errors 0 dropped 64 overruns 0 frame 0
TX packets 11488 bytes 643742 (628.6 KiB)
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 packet 0 bytes 0 (0.0B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0B)
TX errors 0 dropped 0 overruns 0 carrier 0

$top

top - 14:58:57 up 1:27, 2 users, load average: 0.02, 0.01, 0.00
Tasks: 155 total, 2 running, 153 sleeping, 0 stopped, 0 zombie
%Cpu(s): 1.0 us, 0.2 sy, 0.0 ni, 98.7 id, 0.0 wa, 0.0 hi, 0.2 si, 0.0 st
KiB Mem: 1994436 total, 616664 free, 484088 used, 893684 buff/cache
KiB Swap: 2125820 total, 2125820 free, 0 used. 1359816 avail Mem

EXAMPLE:

$ chmod u –wx college

Removes write & execute permission for users for 'college' file.

$ chmod u +rw, g+rw college

Assigns read & write permission for users and groups for 'college' file.

$ chmod g=wx college

Assigns absolute permission for groups of all read, write and execute permissions for 'college' file.

14. The 'Octal Notations' command:

The file permissions can be changed using octal notations also. The octal notations for file permission are

Read permission	4
Write permission	2

EXAMPLE:

$ chmod 761 college

Execute permission	1

Assigns all permission to the owner, read and write permissions to the group and only executable permission to the others for 'college' file.

1.4 GROUPING COMMANDS

1. The 'semicolon' command:

The semicolon(;) command is used to separate multiple commands at the command line.

SYNTAX: $ command1;command2;command3……;commandn

EXAMPLE: $ who;date

2. The '&&' operator:

The '&&' operator signifies the logical AND operation in between two or more valid Unix commands.It means that only if the first command is successfully executed, then the next command will executed.

SYNTAX: $ command1 && command && command3……&&commandn

EXAMPLE: $ who && date

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1586	student	20	0	174116	56064	47780	S	1.3	2.8	0:15.24	Konsole
683	avahi	20	0	9836	7096	3596	S	0.7	0.4	2:45.24	avahi-daemon
1739	student	20	0	16904	4296	3728	R	0.3	0.2	0:003	top

3. The '||' operator:

The '||' operator signifies the logical OR operation in between two or more valid Unix commands.It means, that only if the first command will happen to be un successfully,it will continue to execute next commands.

SYNTAX: $ command1 || command || command3.....||commandn

EXAMPLE: $ who || date

1.5 FILTERS

1. The head filter

It displays the first ten lines of a file.

SYNTAX: $ head filename

EXAMPLE: $ head college Display the top ten lines.

$ head -5 college Display the top five lines.

2. The tail filter

It displays ten lines of a file from the end of the file.

SYNTAX: $ tail filename

EXAMPLE: $ tail college Display the last ten lines.

$tail -5 college Display the last five lines.

3. The more filter:

The pg command shows the file page by page.

SYNTAX: $ ls –l | more

4. The 'grep' command:

This command is used to search for a particular pattern from a file or from the standard input and display those lines on the standard output. "Grep" stands for "global search for regular expression."

SYNTAX: $ grep [pattern] [file_name]

EXAMPLE: $ cat> student

Arun cse

Ram ece

Kani cse

$ grep "cse" student

Arun cse

Kani cse

5. The 'sort' command:

The sort command is used to sort the contents of a file. The sort command reports only to the

screen, the actual file remains unchanged.

SYNTAX: $ sort filename

EXAMPLE: $ sort college

OPTIONS:

Command	Purpose
Sort –r college	Sorts and displays the file contents in reverse order
Sort –c college	Check if the file is sorted
Sort –n college	Sorts numerically
Sort –m college	Sorts numerically in reverse order
Sort –u college	Remove duplicate records
Sort –l college	Skip the column with +1 (one) option.Sorts according to second column

6. The 'nl' command:

The nl filter adds lines numbers to a file and it displays the file and not provides access to edit but simply displays the contents on the screen.

SYNTAX: $ nl filename

EXAMPLE: $ nl college

7. The 'cut' command:

We can select specified fields from a line of text using cut command.

SYNTAX: $ cut -c filename

EXAMPLE: $ cut -c college

OPTION:

-c – Option cut on the specified character position from each line.

1.5 OTHER ESSENTIAL COMMANDS

1. **free**

Display amount of free and used physical and swapped memory system.

synopsis- free [options]

example

[root@localhost ~]# free -t

total used free shared buff/cache available Mem: 4044380 605464 2045080

148820 1393836 3226708 Swap: 2621436 0 2621436

Total: 6665816 605464 4666516

2. **top**

It provides a dynamic real-time view of processes in the system.

synopsis- top [options]

example

[root@localhost ~]# top

top - 08:07:28 up 24 min, 2 users, load average: 0.01, 0.06, 0.23

Tasks: 211 total, 1 running, 210 sleeping, 0 stopped, 0 zombie

%Cpu(s): 0.8 us, 0.3 sy, 0.0 ni, 98.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st

KiB Mem : 4044380 total, 2052960 free, 600452 used, 1390968 buff/cache KiB Swap:

2621436 total, 2621436 free, 0 used. 3234820 avail Mem PID USER PR NI VIRT RES

SHR S %CPU %MEM TIME+ COMMAND

1105 root 20 0 175008 75700 51264 S 1.7 1.9 0:20.46 Xorg 2529 root 20 0 80444

32640 24796 S 1.0 0.8 0:02.47 gnome-term 3. **ps**

It reports the snapshot of current processes

synopsis- ps [options]

example

[root@localhost ~]# ps -e

PID TTY TIME CMD

1 ? 00:00:03 systemd

2 ? 00:00:00 kthreadd

3 ? 00:00:00 ksoftirqd/0

4. vmstat

It reports virtual memory statistics

synopsis- vmstat [options]

example

[root@localhost ~]# vmstat

procs ----------memory---------- ---swap-- -----io---- -system-- ------cpu---

-- r b swpd free buff cache si so bi bo in cs us sy id wa st 0 0 0 1879368

1604 1487116 0 0 64 7 72 140 1 0 97 1 0

5. **df**

It displays the amount of disk space available in file-system.

Synopsis- df [options]

example

[root@localhost ~]# df

Filesystem 1K-blocks Used Available Use% Mounted on

devtmpfs 2010800 0 2010800 0% /dev tmpfs 2022188 148 2022040 1% /dev/shm
tmpfs 2022188 1404 2020784 1% /run /dev/sda6 487652 168276 289680 37% /boot

6. ping

It is used verify that a device can communicate with another on network. PING stands for Packet Internet Groper.

synopsis- ping [options]

[root@localhost ~]# ping 172.16.4.1

PING 172.16.4.1 (172.16.4.1) 56(84) bytes of data.
64 bytes from 172.16.4.1: icmp_seq=1 ttl=64 time=0.328 ms
64 bytes from 172.16.4.1: icmp_seq=2 ttl=64 time=0.228 ms

64 bytes from 172.16.4.1: icmp_seq=3 ttl=64 time=0.264 ms
64 bytes from 172.16.4.1: icmp_seq=4 ttl=64 time=0.312 ms
^C
--- 172.16.4.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3000ms
rtt min/avg/max/mdev = 0.228/0.283/0.328/0.039 ms

7. ifconfig

It is used configure network interface.

synopsis- ifconfig [options]

example

[root@localhost ~]# ifconfig

enp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu
1500 inet 172.16.6.102 netmask 255.255.252.0 broadcast 172.16.7.255 inet6
fe80::4a0f:cfff:fe6d:6057 prefixlen 64 scopeid 0x20<link>
ether 48:0f:cf:6d:60:57 txqueuelen 1000 (Ethernet)

RX packets 23216 bytes 2483338 (2.3 MiB)
RX errors 0 dropped 5 overruns 0 frame 0
TX packets 1077 bytes 107740 (105.2 KiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0 **8.**

traceroute

It tracks the route the packet takes to reach the destination.

synopsis- traceroute [options]

example

[root@localhost ~]# traceroute www.rajalakshmi.org
traceroute to www.rajalakshmi.org (220.227.30.51), 30 hops max, 60 byte
packets 1 gateway (172.16.4.1) 0.299 ms 0.297 ms 0.327 ms
2 220.225.219.38 (220.225.219.38) 6.185 ms 6.203 ms 6.189 ms

Result:

Basic Linux Commands, Directory commands, File Handling commands, Grouping commands, and other essential commands have been executed successfully