

## Linux Command

### **(1) ls ↵**

To list the file or content

- -a : To display all files.
- -l : To long listing details.
- -s : To print the allocated size of each file.
- -C : To list entries by columns (Upercase C).
- -c : To sort newly created file or directory.
- -larth : To display human readable file size.
- -r : To sort in reverse order (Increasing order).
- -alSrH : To sort the files by size.
- -alShR : To sort file with list subdirectories recursively
- -z : To see the file context.
- -i : To see the inode number.
- ls -lrt : to sort the file date wise

### **(2) cal ↵**

To display a calendar.

{cal day month year} Format

- 1 : Display 12 months cal of year 1
- -1 : To display a current month.
- -3 : to display previous , current , next month.
- -s : To display Sunday as the first day of the week.
- -m : To display Monday as the first day of the week.
- -j : To display Julian dates.
- -y : To display cal of current year.

### **(3) Date ↵**

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To display or set the system date and time.

- -r : To display the last modification time of file.

### **(4) mv**

To move (rename) files.

- |      | (Source)             | (Destination)      |                   |
|------|----------------------|--------------------|-------------------|
| ➤ mv | /home/abhijeet/file1 | /home/afridi/file1 | ↵                 |
| ➤ mv | file1,file2, . . . . | dir1               | ↵ (Multiple file) |

- -f : do not prompt before overwriting.
- -i : To prompt before overwrite.

### **(5) cp**

To copy files and directories.

- |         | (Source)         | (Destination) |
|---------|------------------|---------------|
| ➤ cp -R | /Abhifile1/files | /home/user/ ↵ |

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6) **touch <filename> ↵** : To create file (It will create zero byte file)

Ex. touch {file1,file2} ↵

touch dir1/file1 ↵ :- it create a file inside dir

touch File{1..10} ↵ : It create file1 to file10

7) **mkdir <directory name> ↵** : To create directories

-p : Make parent directories

mkdir -p dir1/1/2/3 ↵

mkdir {dir1,dir2};touch{file1,file} ↵ : To create directory as well as files

8) **rm <files> ↵ or rm -r <dir> ↵ :- To remove files and directories.**

-r :- To remove directories

-f :- Never prompt before remove

-d :- To remove empty directory

Ex. rm -rf \* ↵ :- to remove everything

rm -rf \*file ↵ :- To remove everything which have or end with file

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**9) rmdir <dir name> ↵ :- To remove empty directory**

-p :- to remove directory and its ancestors.

**10) echo “Any line of message” ↵ :- To display a line of text**

-n :- It print text /line rowwise

Echo \$SHELL :- To see the current SHELL

Echo \$? :- To check command successfully run or not. If return 0 then executed otherwise not

Echo \$DISPLAY :- To check how many display

## **11) Input Output Redirection**

‘>’ Output redirection

‘<’ Input Redirection

Echo “Msg” > file1 :- It redirect the message into file1.

Echo “msg2” >> file1 :- it redirect the message 2 into file1

‘>’ :- Redirect but overwrite

>> :- Redirect without overwrite

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2> :- redirect the standard error

&> :- Redirect the standard error and standard output

2>&1 :- redirect the standard error and standard output to the standard output

### **12) cat file1 file2 ↵ :- To concatenate files and print on the standard output**

cat file1 file2 ↵ : It will display file1 and file2 content together.

cat file1 ↵ : It will display only file1 content

-n : print line number

### **13) less <filename> ↵ : To display the file content in another output screen**

### **14) more <filename> ↵ : It display contain of a file part wise a screenful at a time.**

Space :- to next page or continue

q :- for exit

last reboot : To check the reboot history

### **15) tail <filename> ↵ : To print last 10 lines of files.**

-n : To print last n lines

tail -n 20 <filename> ↵

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-f : To output appended data as the file grows.

tail <filename> > /root/dest/file1 < : to redirect the filename data to file1

**16) tailf <filename> < : to print the last 10 lines of file and then wait for file to grow.**

**17) grep “pattern” <filename> < : To display lines that matching a pattern.**

\$ : Show line who end with the pattern ‘test\$’

# : Show line which contain #

^# : Show line who start with #

-i : Ignore case

-v : To display non-matching line.

**-e : To display string in the file**

grep -e <string1> -e <String2> -e <string3> <filename> < : It will find 3 string from the filename and give output

grep -v ‘^#’ /etc/ssh/sshd\_config < // It will display the pattern or line that do not start with #

grep ‘^#’ /etc/ssh/sshd\_config < // It will display the line that start with #

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**18) nano <filename> ↵ : To edit text file**

**19) emacs <filename> ↵ : To edit text file**

**20) vim <filename> ↵ : To edit text file “It is a text editor”**

:! = immediate

:q = quit

:w = write

:wq! = It will write the file the quit

Vim has 3 Mode

Command Mode

Insert mode

Escape mode

yy : Copy line

nyy : copy n line

dd : cut line

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ndd : cut n line  
p : Paste below (Lowercase P)  
P : paste above (Uppercase P)  
G : Go to bottom line  
nG : Go to n line  
cw : Erase the word from line  
cc : To erase or remove line  
:/word or :?word : search the word  
:%s/old-word/new-Word : Change first word  
: %s/old-word/new-word/g : change all word  
:!xs : It display contain in standard output  
:set nu : Display line number  
:set nonu : Remove line number

seq 100 > bigdata.txt ## To create 1 to 100 on bigdata.txt

**21) tar -cvf myarchive.tar files..... ↵ : To create and unpack tar file**

-c : To create a new tar file  
-v : Display details/changes in standard output  
-f : Represent the specific name of tar file  
-t : To list the contain of the archive file  
-z : To compress / decompress tar file in creation time.  
-x : To extract / unpack .tar file



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-d : To see the changes of the file

Ex : tar -cvzf mytar.tar.gz file1 file2 file3 ..... ↵

tar -zxvf <Mytar.gz> <Specific file name> ↵ : To extract any specific file from tar file.

**Note : It overwrite the updated file when we extract the archive file.**

**22) star -c -f=myarchive.tar filenames ↵ : To create tar file.**

-t : To list the contain of archive file.

-c : To create tar file

-f : Specific tar file name

-x : To extract the tar file

-z : To compress and decompress file without making .gz file

Ex: star -cvz -f=My.tar file1 file2 file3 ..... ↵

**23) su - <username> ↵ : To switch user**

Ex: su - abhijeet ↵ : abhijeet is the user name

‘-‘ represent all privillage of the user / or login with home directory

su - ↵ : To login as root user

**24) gzip <filename> ↵ : To compress a file**

-d : To decompress file

-l : It provide compression info

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25) `gunzip <filename>` ↵ : To decompress a file

## 26) Hard Links and Soft Links

### Creating Links Between Files

To create a hard link or soft link between files, use the following commands:

- **For a hard link:**

```
ln <source> <file link name or address>
```

- **For a soft link:** Use the `-s` flag:

```
ln -s <source> <file link name or address>
```

Example:

```
ln -s /1/2/3/filename <file link name or address>
```

### Hard Links:

1. A hard link is like giving an existing file a **second name**.
2. It refers to the **same file content** as the original file because it shares the same inode (file information on disk).
3. All hard links are **equal**, meaning there's no main file—each hard link is treated the same as the others.
4. Any **changes** made to one hard link will appear in all other hard links, as they all share the same data.
5. **Deleting** a hard link does **not** delete the file as long as at least one hard link still exists. The file is only removed when **all** hard links are deleted.
6. You **cannot** create hard links for directories and they usually cannot work across different filesystems.

### Steps to Find Files with the Same Inode Number and Hard Links:

1. **Get the inode number of the source file:**

```
ls -li <source>
```

- Note the inode number (it's the first column of the output).

2. **Search for all files with the same inode in the filesystem or a specific directory:**

```
find / -inum <inode_number>
```

- Replace `/` with a specific directory path if you want to narrow down the search.

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## Soft Links (Symbolic Links):

1. A soft link, or symbolic link, is like a **shortcut** to another file or directory.
2. It points to the **file name** or path, not the inode, meaning it acts as a reference to the original file.
3. Soft links can point to **both files and directories**.
4. If the original file is deleted, the soft link becomes a **broken link** and no longer points to a valid file.
5. Soft links can span across **different filesystems**, allowing for linking files in separate locations.
6. Soft links have their own **inode**, which is different from the inode of the original file.

## Inode Number:

The inode number holds the metadata (information) about a file or folder in a Linux filesystem, but it does not contain the actual content or the name of the file.

### It tracks important details like:

- **File Size:** The size of the file in bytes.
- **Permissions:** The read, write, and execute permissions for the owner, group, and others.
- **Owner and Group:** The user ID (UID) and group ID (GID) that own the file.
- **Timestamps:** Important dates related to the file, such as creation, modification, and last access times.
- **Location of Data on Disk:** Pointers to where the file's actual content is stored on the disk.

## 27) Changing File and Directory Permissions

To change the permissions of a file or directory, use the following command:

```
chmod <permission> <filename>
```

### Example:

```
chmod ugo+rwX <filename>
```

### Permission Breakdown:

- **u** = owner (user)
- **g** = group owner
- **o** = other users

### Permission Values:

- **read** = **r** = 4
- **write** = **w** = 2
- **execute** = **x** = 1

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## Special Permissions:

- **setuid** =  $u+s$  (4) — can be set for files only and is applicable for users;  $x$  is replaced by  $s$ .
- **setgid** =  $g+s$  (2) — can be set for directories only and is applicable for groups;  $x$  is replaced by  $s$ .
- **sticky bit** =  $o+t$  (1) — can be set for directories only and is applicable for others;  $x$  is replaced by  $t$ .

## Symbols:

- **+** : To add permission
- **-** : To remove permission
- **a** : All (user, group, and other)

## Recursive Options:

- **-R** : To change permission recursively (uppercase 'R').
- **-x** : To change execute permission only for directories recursively (uppercase 'X').

## Chattr Command:

To add or remove chattr permission, preventing even the root user from deleting a file:

```
chattr +i <filename>
chattr -i <filename>
```

## Check Chattr Status:

Use the following command to see if chattr is applied:

```
lsattr
```

## Additional Examples:

- **Give read, write, and execute permissions to all:**

```
chmod a+rwX file1
```

- **Set all permissions for all users:**

```
chmod 777 <filename>
```

- **Set all permissions for all users and setuid:**

```
chmod 4777 <filename>
```

- **Set all permissions for all users (setuid, setgid, and sticky bit):**

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```
chmod 7777 <filename>
```

- **Set read, write, and execute permissions for the user:**

```
chmod u+rwX <filename>
```

- **Remove read, write, and execute permissions for the user:**

```
chmod u-rwX <filename>
```

- **Set chattr:**

```
chmod +i <filename>
```

## 28) Changing File and Directory Owner and Group

To change the owner and group of a file or directory, use the following command:

```
chown ownername:groupname <filename>
```

### **Example:**

```
chown root:linuxgroup <File1>
```

### **Changing Only the Owner:**

To change only the owner while keeping the current group, use:

```
chown ownername <filename>
```

### **Example:**

```
chown root <File1>
```

### **Changing Only the Group:**

To change only the group while keeping the current owner, use:

```
chown :groupname <filename>
```

### **Example:**

```
chown :linuxgroup <File1>
```

### 29) Changing Default File and Directory Permissions

To change the default permissions for newly created files and directories, use the `umask` command:

```
umask <value>
```

#### Example:

```
umask 022
```

#### Default Permission Values:

- **File value:** 666
- **Directory value:** 777
- **Normal user umask:** 002
- **Root user umask:** 022

#### Permission Calculation:

- **File:**  $666 - 022 = 644$  (rw-r--r--)
- **Directory:**  $777 - 022 = 755$  (drwxr-xr-x)

#### Default Umask Value:

The default umask value is set in `/etc/bashrc`.

To apply the change after update the configuration file, use:

```
source /etc/bashrc
```

or

```
exec bash
```

### 30) `find /root/ -name <filename> ↵` : To search file in a directory

`-name` : to search with name

`-user` : To search with user name of file/dir.

`-uid` : Search using uid.

`-size` : search for size “n, -n = less then, +n more than”

`-mtime` : Search for modify date.

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-atime : Search for access time

-mmin : Modify minute (“-“ below, “+” above)(-20 below min, +20 above min)

Ex: **find /root/ -user abhi ↵** // it find a file/dir having user abhi.

**find / -uid 1002 ↵**

**find / -perm 644 ↵** // Find all file which have permission 644

**31) stat <filename> ↵ : To show the modification details of file.**

**32) id <username> ↵ : It show the id of the user.**

**Ex :** **id root ↵** // It will show user id, group id of root user.

**33) which <command name> ↵ : Show the full path of shell command.**

Ex: **which passwd ↵**

Output : /usr/bin/passwd

**34) whereis <commandname> ↵ : To locate the binary, source and the location of manual page of the file.**

-b : Search only for binary.

-m : search manual page file location.

-s : Search only for source.

**35) whatis <command name> ↵ : To display manual page description.**

**36) locate <filename> ↵ : To find file by name**

-i : Ignore case

/var/lib/mlocate/mlocatedb

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updatedb ↵ // To update the mlocate database

37) updatedb ↵ : To update database for locate / mlocate.

38 ) info <commandname> ↵ To display the command documents

-n : For next page

39) wc <filename> ↵ : To count line, word, character of text file.

-l : count new line.

-w : count word.

-c : count Character

40) shutdown ↵ : To power off the system

init 0

power off

shutdown -P now (Uppercase P)

shutdown -P +5

shutdown -P 00:00

shutdown -c

systemctl poweroff -i // Other user can shutdown the system using this system.

41) restart ↵ : To restart the system.

init 6

reboot

systemctl reboot

shutdown -r 00:00

shutdown -r now

shutdown -r +5

shutdown -c

42) gpasswd <option> <groupname> ↵ : to assign password to the group.

gpasswd <group name> // To assign password to group



## Linux Command

-a : add user to the group

gpasswd -a <username> <group name> // To add user to a group

-d : del user from tht group

-r : remove password from the group

gpasswd -r <gname> // remove the password from group

-R: restrict to access that group.

gpasswd -R <group name> // We cant not use that group

A: set the list of sdministrative users

-m: to set the list list of group mamber

gpasswd -d <username> <groupname> // To delete the user from the group

43) halt ↵ : To halt the system.

systemctl halt ↵

halt ↵

shutdown -h +5 ↵

44) useradd <username> ↵ : To add new user.

-M : without create home dir (Uppercase M).

-d : To specify particular home dir of user manually on creation time

-u : Top add user id on creation time

useradd -o -u 0 -g root <username> //Create duplicate root user ##use root as primary group

45) userdel <username> ↵ : To delete user

-f : forcefull

-r : remove home directory and mail spool

46) passwd <username> ↵ : To give password

-l : to lock the user(Lowercase l)

-u : to unlock the user(Lowercase u)

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47) `groupadd <groupname>` ↵ : To add new group

-g : group id

-r : system group

-R : root group

-n : Change group name

48) `groupdel <groupname>` ↵ : To remove group

-R : To delete group and apply changes to the root dir.

49) `w` ↵ : To show who is logged on and what they are doing

50) `who` ↵ : To show who is logged on.

-r : To show run level

-a : To see system boot time

-b : To see system last boot time.

`cat /etc/passwd | grep user1` // To see current login shell of particular user.

51) `usermod <option> <username>` : To modify user account

-c : Modify comment

-md : to modify user home directory

-L : To lock the user (Uppercase L)

-U : To unlock the user (Uppercase U)

-g : To add primary group

-G : To add secondary group

-u : To change uid

-l : To change user name.

-s : To change login shell

-aG : to append secondary group

## Linux Command

Ex : usermod -G <groupname> <username> //To add the secondary group  
usermod -u <uid> <username> // to change the uid of the username  
usermod -l <new user name> <old user name> // To rename the user name  
usermod -s </sbin/nologin or /bin/bash> <user name> // To change the user login shell  
usermod -G "" <username> //To remove all secondary remove  
usermod -aG <Secondary group name> <user name> // To append secondary group means more than one secondary group.  
usermod -o -u 0 <username> // Duplicate root user

ps -cf :- display process information with PPID  
ps -u <u.name> //to view the process of user  
Ex:-ps axo pid,comm,nice | grep httpd  
ps -G <g.name>/ //to view the process that is running by the group  
Ex:-ps -ef |grep init  
ps -ely cat // to view the nice value of the command  
ps -p <pid> // to view the process name  
pidof <p.name> //to view the process id

53. Kill : To terminate a process

- kill <process id> // To kill the process by pid  
(2373)
- kill %1 :- It terminate the job 1.  
<job no.>
- kill -9 pid // To kill process immediately
- kill -SIG STOP/19 %1 :- It stop job 1.
- kill -SIG CONT/18 %1 :- It continue job 1.

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Note : “kill” terminate the process based on PID where as “pkill” terminate the process based on name or other attributes.

- 1 -SING UP
- 9 -SIG KILL // Kill the process forcefully
- 15 -SIGTERM // Kill the process gracefully
- 18 -SIGCONT
- 19 -SIG STOP

55) ip : To show ip address and show / manipulate routing , device policy routing and tunnels.

- ip addr // It show ip address
- ip addr show ens37 // Show ip address of device ens37.
- ip -s link show ens 37 // show sending and receiving packets.
- ip a s eth0 // Show the pass of eth0

56) top : To display linux process and load average

- 20 :- High priority
- 19 :- Low priority

Shift +n or cat/proc/loadavg :- short it high to low of PID

1 :- To check the no of CPU

r :-To renice by PID

k :-To kill process by PID

-n 2 :- To refresh screen 2(n) times and comes into terminal number.

-d 3 :- It set the time for refresh display.

u :- To see the process owned by the user

shift + m or M = it sort the memory utilization top to bottom

shift +p or P = It sort cpu utilization top to bottom

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57) nice : To run/set a program with modified scheduling priority.

-20 :- Most Favouritable

-19 :- Least Favouritable

nice -n 0 <process name> // To set priority '0' to the process httpd  
httpd

## It cannot done if processs is running

kill -9 <process name> //To kill process

58) renice : To change the priority of running process.

Ex. renice -n 10 <pid> :- It change the priority of pid .

Priority

-n <Priority> \$(pgrep httpd) :- It change the priority of process

Ex. renice -n 10 \$(pgrap httpd)

59). time : To display the time taken to complete a process

Ex :- time nice -n 10 tar -cvf mytar.tar // It display the time to create tar file.

du -sh \* //estimate file space uses.

Note : du (command) for check file/directory size

60. df : To display the file system and disk space usages.

-T :- To view the particular file system type.

-h :- It show the disk space/in human readable

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1) du : To estimate file space usage

-a : To display all file sizes

-h : human readable

du -sh \*

2) dd : To create a file

dd if=/dev/zero of=/filename bs=1MB count=2048 // It will create 2GB empty file

61. chage : To change user password expiry information Or to change user password policy.

-l :- show user password information

i.e. chage -l <username>

-E :- To change account expire date

i.e. change -E 2015-06-05 <username> ## yy-mm-dd format

-1 :- To remove account expire

i.e. chage -E -1 <username>

-M :- To modify password expire date .

i.e. chage -M 90 <username> // (Uppercase M)

days format

-m :- minimum days ## Minimum days between password change

-d :- It expire everything

i.e. chage -d 0 <username>

-W :- To modify warning days // (Uppercase W)

-I :-set password inactive after expitiation to inactive

Note : date -d "+40 days" +%F ## To find specific date

vim /etc/passwd

<user name>:x:<uid>:<gid>:<comment>: <users home directory>:<logging cell>

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`vim /etc/shadow`

Username:password :last changed:min.day:max.days:Warn days : inactive days :expire days:reserved for future.

Inactive days: after few days of passwd expired, password will inactive then user have to contact admin team if user miss this one also then after that account will expire.

Note: Minimum days always should be 0.

Note:-/etc/login.defs // Default password policy configuration file

`passwd -x 1 <user name>` // It put never expiry of user

`passwd -S <uname>` // (to see the status of the password of that user. if root user is not assigned  
// the password then the password status is locked)

`passwd -d <uname>` // To delete the password from user.

`passwd <unmae>` // To set password of user

63) `fdisk` : To manipulate MBR based disk partition / It means create, delete and modify the partition.

`-l` : To list all details of disk

`fdisk -l /dev/sdb`

`fdisk /dev/sdb` : To create, delete and modify partition

Options :- `n` : new partition, `d` : delete partition, `t` : type of partition

Partition id :- `83` : Linux File System, `82` : Swap, `8e` : LVM, `fd` : Raid

Note : `fdisk` can create only 4 partition "3 Primary partition and 1 extended partition".

`gdisk` can create 128 partition

`fdisk` : 32Bit

`gdisk` : 64Bit

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64) `gdisk` : To interactive GUID partition table (GPT) manipulator.

## Support UEFI Device

8300 - Linux Filesystem

8200 - Swap Filesystem

8e00 - LVM Filesystem

65) `mkfs` : To build a linux filesystem // By default it will create ext2 file system

`-t` : Specify the type of file system to be build.

`-f` : Forcefully

`mkfs -t xfs <partition name>`

`mkfs.ext2/ext3/ext4/etc <device name>`

ex. `mkfs.ext2 -f /dev/sdb1` : It will change the file system type by formatting the partition with a particular file system type

`mkfs.ext4 -m <no.> <partition no.>` // To format a partition with a specific reserve % for superblock. By default it will take 5-10% superblock.

66) `blkid` : To print block device attributes or to see block id.

67) `mount` : To mount a file system

`-a` : To mount all

## For temporary mount

`mount <device name> <mount Point>`

e.g. `mount /dev/sdb1 /mnt/mymount`

## For permanent mount



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`vim /etc/fstab` //By make an entry in fstab file

`<device name> <mount point> <filesystem type> <mount options> <take a backup or not> <fsck value>`

e.g. `/dev/sdb1 /mnt/oracle xfs defaults 0 0 ##` After make entry run `mount -a` command or reboot

`mountpoint <Directory location>` //To check particular directory is mount point or not

`vim /etc/mtab` ##Is the file that keep record of all recent mount point

`mount` // Will show all mounted device

68) `umount` : To unmount the file system.

`-a` : To unmount all

`-f` : To unmount forcefully

`umount <mountpoint>` //To unmount a file

`umount /mnt/mymount`

69) `lsblk` : To list block device of disk / device in tree view.

70) `partprobe` : To update partition table information

`-s` : Show summary of device and their partition.

e.g. `partprobe -s /dev/sdb` ## only disk name not partition name

71) `pvcreate /dev/sdb1 /dev/sdc1` : To initialize physical volume(s) for use by LVM

72) `pvremove /dev/sdb1 /dev/sdc1` : To remove LVM label(s) from physical volume(s).

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`pvremove <device name>`

73) `pvdisplay` or `pvs` or `pvscan` : To display the physical volume.

`-m` : To display mapping of physical extents

74) `vgcreate <vgname> /dev/sdb1 /dev/sdc1` : To create a volume group

`vgcreate <vgname> /dev/sdb1 /dev/sdc1`

Note : Vg is the composite of logical volume and physical volume.

75) `vgdisplay` or `vgs` or `vgscan` : To display volume group

Note : To reduce Lvm partition formatted with XFS filesystem

- `xfsdump -f /location/name.dump <Mount Point>`
- Then unmount, then reduce, then formate with `mkfs`, then mount
- `xfsrestore -f /location/name.dump <mount point>`

76) `vgremove <vgname>` : To remove volume group

77) `lvcreate -n <lvname> -L <size> <vgname>` : To create a logical volume

`-n` : To give lv name

`-L` : To give size

e.g. `lvcreate -n lv1 -L 500M vgname1`

`lvcreate -l 200 -n <lvname> /dev/vg1`

## Linux Command

`lvcreate -n <Lv name> -l 100% FREE <Vg Location>`

78) `lvdisplay` or `lvs` or `lvscan` : To display information about a logical volume

79) `lvremove /dev/vg1/lv_vg1` : To remove logical volume

### LVM Snapshot

`lvcreate -s -n <Lvm_snapshot> -L <20M> <Lv Location>`

`umount <file system>`

`lvconvert --merge </lvm_location>`

`lvchange -ay <lvname>`

`mount -a`

80) `vgextend <vgname> <device name>` : To add physical volume to a volume group

e.g. `vgextend vg1 /dev/sdd3`

81) `vgreduce <vgname> <device name>` : To remove physical volume from a volume group

i.e. `vgreduce vg1 /dev/sdd3`

83) `lvextend -L <size> <Location of lv>` : To add or extend space to the logical volume.

i.e. `lvextend -L 5G /dev/vg/lv`

`lvextend -L +5G /dev/vg/lv`

`lvextend -l +50% FREE /dev/vg/lv`

84) `lvreduce` (for exit fire system)

## Linux Command

To reduce the size of logical volume

`Lvreduce -L -<size> <Lv name>`

`Lvreduce -L -1G /dev/vg1/lv1`

`Lvreduce -l 20/dev/vg1/Lv1//To remove using LEs`

`-r =resizefs`

`Lvreduce -l-500m-r <lv name> reduce ext file system`

85) `pvmove <location whose data is store>`

To move extents from one physical volume to another

`Pvmove <old pv>`

86) `xfs_growfs <mount point>`

To refresh/Expand on xfs file system

`Xfs_growfs <mount point>`

e.s. `xfs_growfs /mnt/my volume`

`xfs_repair /dev/vg1/lv1//to repair xfs file system`

87) `resize2fs <mount point>`

Ext2/ext3/ext4 file system resize

e.s. `resize2fs /mnt/my volume`

88) `tune2fs`

To change parameters of an ext2/ext3/ext4 file system.

`-l :-To set level name`

e.s. `tune2fs -l est4label /dev/sdc1`

`-l <device name> :- To verify label name`

89) `xfs_admin`

## Linux Command

To change parameter of an xfs file system

-l :- label name

Xfs\_admin -l <new label name> <partition name>

e.s. xfs\_admin -l label1 /dev/sdd1

To verify

-l <device name> :- label name of device

90) xfs\_repair <device name>

To repair an xfs file system

Xfs\_repair /dev/sdc1

1) vgcfgrestore : To restore volume group information

vgcfgrestore --list <Vg Name> //To see Vg backup list

vgcfgrestore -f <paste the backup file name> <vg name>

2) vgcfgbackup : To backup volume group configuration

vgcfgbackup <volume group> //To take a backup

3) vgchange : To change volume group attributes/parameter

-l : Logical volume number

vgchange -l <no> <vg name>

-P : Max physical volume number

vgchange -p <No.> <vg name>

-s : To set physical extents size / block size

vgchange -s <no.> <vgname>

## Linux Command

-a : Activate (n:no, y:yes)

vgchange -an <Volume groups> //Activate, No

vgchange -ay <Volume groups> //Activate, Yes

4) lvchange : To change the attributes/ parameter of logical volume(s)

-a : y|n

-p : for permission : rw|r

lvchange -Pr <lv name> //To put the logical volume read only mode

lvchange -Prw <lvname> // To put the logical volume read, write mode

5) vgrename : To rename volume group

vgrename <existing vg> <new Vg name>

6) lvrename : To rename logical volume

lvrename <existing lv> <new lvname>

7) cdrecord : To write the cd/dvd

Cdrecord /root/desktop/rhel.iso

8) eject : To eject removable media

## Linux Command

9) strings <command name> : to convert binary language into human readable language

string mkfs

91) fsck <device name or partition name>

To change consistency and repair a linux file system.

fsck /dev/sdb1

92 free :- To see the memory and swap space

To display amount of free and used memory in the system.

-m :- display mega byte (mb)

e.g. free -m

-g :-display GB

-h :- display in human readable.

93) mkswap <device or partition name>

To make a swap file system

e.g. mkswap /dev/battlestar/swap

94) swapon/off <swap device partition name>

To enable/disable swap space

-a :-all

i.e. swap on -a //on

## Linux Command

swap off -a //off

i.e. swap /dev/battlestar/swap

-s :-show summary of swap

Swap -s //To see the swap space information

95) getfacl <file/dir/name>

Get file access list (ACL)

i.e. getfacl file1

96) setfacl

To set access control lists (ACL)

- -m u:username:permission filename // To modify ACL

i.e. setfacl -m u:abhi:rw file1

- -b <filename> //remove all ACL permission

i.e. setfacl -b file1

- -x u:abhi file1//rename ACL permission of user.
- --remove-default <file/dirname> //To remove all default ACL permission.

i.e. setfacl --remove-default file1

- -d : for giving default ACL permission

-d -m u:abhi:rw dir1

- Setfacl: -x d:v:<username> dirname// To remove default permission

- Setfacl -m m::r file2//To update mask permission

- Setfacl -m m::- file //remove all mask permission of the file



## Linux Command

- Setfacl -x m:: filename // remove perm mask from file //mask perm. will be remove after remove all ACL permission

- Setfacl -R -m g:filename:rw ; u:abhi:rw dir1

- Getfacl filename | setfacl --set-file= - file2 // copy filename1 permission to file

We give default permission only to the dir

The acl mask defines the maximum effective permission for any entry in acl.

CP command does not perserve ACL rules mv command preserve ACL rules

m: max permission

using we assign to some particular user to access the file and directoroes.

97) nmcli : Command line tool for controlling network manager.

nmcli dev status // Show device network status

nmcli dev show // To show the device

nmcli con show // Show all connection

nmcli con add con-name "Mycon" autoconnect yes type ethernet ifname ens33 ipv4.method auto //

To add new connection

nmcli con up <con-name> // To up the connection

nmcli con down <con-name> // To down the connection

nmcli con del <con-name> // To delete the connection

nmcli con mod <con-name> // To modify the connection

e.g. nmcli con mod ens33 autoconnect yes // To update autoconnect as yes of ens33 connection

Note : /etc/sysconfig/network-scripts/ // device configuration file

## Network Teaming

1) teamdctl : Team demon control tool

## Linux Command

teamctl lateam0 state : It will show the status of team "lateam0"

### **##Process to create teaming**

```
nmcli con add con-name lateam0 type team ifname lateam0 config '{"runner": {"name": "activebackup" or "roundrobin" } }'
```

```
nmcli con mod lateam0 ipv4.address 192.168.0.10/24
```

```
nmcli con mod lateam0 ipv4.method manual
```

##Now add the port with lateam0

```
nmcli con add type team-slave con-name lateam0_port1 ifname ens33 master lateam0
```

```
nmcli con add type team-slave con-name lateam0_port2 ifname ens34 master lateam0
```

```
nmcli con up lateam0/lateam0_port1/ lateam0_port1
```

### **Some other things related o teaming**

Assign IP address to team0

```
nmcli con add con-name "name" type ethernet ifname ens33 autoconnect yes ipv4.address 192.168.1.15/24 ipv4.method manual gw4 <gateway id> ipv4.dns <dns Id> //Assign static ip
```

```
nmcli con mod dynamic ip ipv4.ignore-auto-dns yes
```

```
nmcli con mod dynamic ip ipv4.dns <DNS Server ip>
```

```
PEERDNS=no
```

+ add dns (we can have up to 3 nameserver configured)

- remove dns, without sign replace the current dns

98) nmtui : Text user interface for controlling network manager

99) nm-connection-editor : It show GUI for managing devices.

100) ss : To display listening port and establish connection. Or utility to investigate sockets.

-a : To display all sockets

-t : To display tcp sockets

-n : To display port number

-l : To display listening socket

## Linux Command

101) netstat : To print network connection, routing tables, interface statistics.

netstat -ntulp // To check listening port

-r : Display kernel routing tables

-n : Show numerical addresses

t = Tcp u = udp, n = port number, l = port is listening or not, p = process id

Network monitoring connection both for incoming & outgoing as well as view routing table interface statistics etc.

netstat -at : TCP port

netstat -l : Listing port

netstat -s : statistic

netstat -r : routing table

netstat -an | grep 22 : To find all process running on 22

netstat -ap | grep ssh : To find ssh running process

1) ip route : Routing table management

ip route list : list all route

ip route add 216.58.217.0/24 via 192.168.1.11 dev ens33 : To add ip route

## Linux Command

##static route

Vim /etc/sysconfig/static-route

any net 173.194.205.0 netmask 255.255.255.0 gw 162.242.253.1 dev eth0

2) nslookup : To query internet name servers interactively

nslookup google.com

3) nmap : To check the open port

nmap -p <port nm.> <ip> // To check particular port for particular ip is open or not

nmap <ip> // To see all open port of the ip

4) exportfs : To maintain table of exported NFS file system

-a : Export or unexport all dir

-v : List of exported dir

-r : Re-export all directories

i.e. exportfs -avr

5) dig : DNS lookup utility

dig -x <ip.address> // To query of ip address

dig <FQDN> // To query of domain

## Linux Command

101 ) traceroute : To print the route packets trace to network host

- traceroute <ip address>

102 ) ping : Send ICMP ECHO\_Request to network host.

-c 5 : Show 5 ping and quit

ping <ip address> : To ping ip address

Bash : Is the command language interpreter for GNU OS.

Shell : Is an interactive interface that allows user to execute command and utilities in linux os.

103) hostnamectl : To control the system hostname

hostnamectl set-hostname <host name> // To change or set hostname

hostnamectl status // To see hostname information

hostname // It display the hostname

hostname -i // To show ip

exec bash // To apply the changes without reboot

104) getent : To get entries from name service switch libraries.

105) timedatectl : To control the system time and date.

- list-time zones // To display time zone
- set-time zones 'Asia/kolkata' // To set the Kolkata time zone
- set-time 12:32:15 // Set the time
- timedatectl // It display current date and time
- set-ntp false/true // To enable and disable ntp

106 ) tzselect : To select a time zone

## Linux Command

107) at : To schedule task

- at now +10minutes // Schedule a task after 10 min

at > init 6

ctrl + D - Two time to excute above command ?? It will execute the command after 10 minutes

- at 12:00 am // Schedule the job for the given time

- atq // To list the pending job

- atrm <job No.> // to remove job

vim /etc/at.deny // Here we can restrict user to use at utility by enter username in the file

vim /etc/at.allow // Here we can allow the user to use at utility by default this file not created

-r : To delete the jobs

-l : To list the jobs

## Try below

at 5:20 pm

at > logger "The system current uptime is \$(uptime)"

ctrl+D (2times)

journalctl -xn

108) yumdownloader : to download rpm package

yumdownloader <packagename> //It will install the rpm package in local storage

yum localinstall <rpm package location> // Then we can use this step to install above downloaded pckage

109) yum : yellowdog updater modifier REDHAT package management tool

yum check-update // To check all package updates

yum info <package name> // To gether info of the package

yum install <package name> // To install package

## Linux Command

yum list installed // It show all install package

yum update <Packagename> // To update package

yum update -y //It update all

yum remove <packagename> // It remove the package

yum autoremove // To remove unnecessary package or dependency

yum clean all // to clean temporary, cache file.

Yum config-manager --disable/--enable <repos id> // To enable/disable repos

yum localinstall <package name> // To install downloaded package

yum update kernel //To update kernel

yum deplist <packagename> // To check dependency

yum install --downloadonly --downloader=downloads php

##How to roll back

yum history list all // check the history

yum history info <id> //Find the info id and check

yum history undo <id> // Then by entering previous id we can roll back to previous

**Note : Yum download the package along with dependency.**

110) rpm : Redhat package manager

rpm -ivh <package name>

-i <package name> // To install package

-e <package name> // To erase or remove package

-u <package name> // To upgrade package

-q <package name> // To query about package

-qa <package name> // All query

-ql <package name> // To show all file of the package

-R <package name> // To list package dependent **##NOT Sure**

## Linux Command

e.x.

```
rpm -i httpd  
rpmquery httpd
```

```
rpm -qa httpd  
rpm -e httpd  
rpm -qf <filename> // To check which package is responsible for the file  
rpm -qa kernel --last // To see kernel installation date time  
rpm -ivh --test <package name> // To check the package consistency
```

Note : rpm not able to download the dependency along with package

110) uname : To print system information

```
-a : Print all information  
-r : Print kernel version  
-m : System architecture current bit  
-o : O/S
```

112) firewall-cmd : Firewall command line client

```
- firewall-cmd --get-zones // It display all available zone  
- firewall-cmd --get-default-zone //To show default zones  
- firewall-cmd --list-all //To show default zone details  
- firewall-cmd --zone=home --add-source=192.168.1.0/24 // To add ip address to the source of the zone  
- firewall-cmd --reload or --complete-reload //To reload firewall configuration  
- firewall-config // To show GUI based configuration  
- firewall-cmd --zone=home --permanent --add-source=192.168.1.0/24 //To apply permanent we have to reload the configuration after apply  
- firewall-cmd --zone=public --add-port=80/tcp // To add for runtime after reboot it will not survive  
- firewall-cmd --panic-on // It looked everything on local console
```



## Linux Command

- firewall-cmd --query-panic // To see panic mode status or query
- firewall-cmd -state // To see firewall status

113) ssh : To access remote system using ssh

ssh <username@ip address>

ssh [root@192.168.1.12](#) // To access the system "root=username" & "192.168.1.12=Remote system address"

ssh [root@192.168.1.12](#) ls // It execute the ls command and exit

114) scp : To secure copy (Remote file copy program)

scp <source location> <destination location>

scp /root/file1 [root@192.168.1.12:~/](#) // It will copy "file1" to the remote address given file location

114.a) rsync : fast remote and local file copying tool

It use delta technique to transfer the file

-P : resume the transfer from interrupted point

If we want to copy a file that is reside, before the it 1<sup>st</sup> check or matches the both file size and creation/updation time of the file and then only copy the changes or new content.

rsync <source location> <destination location>

rsync <source file location> [root@192.168.1.12:~/](#) ## Upload

rsync [root@192.168.1.12:~/](#) <destination> ##Downloading

rsync file1 [root@192.168.1.11:/root/Documents](#)

-a = all (Copy the file with all permission except SELinux and ACL permission)

-aA = Synchronize ACL permission

-aAx = Synchronize ACL permission and selinux permission also

## Linux Command

115) sftp : To secure file transfer program

sftp [root@192.168.1.12](mailto:root@192.168.1.12)

then

sftp > ls : Display content

sftp > get <filename with location> : To download or copy file from remote location to local

sftp > put <Filename with location> : To upload or send file from local to remote location

bye : To exit

116) ssh-keygen : Authentication key generation.

-t : Key type "rsa algorithm or dsa algorithm"

ssh-keygen : By default It will create rsa type key

ssh-keygen -t dsa : It will create dsa key

/root/.ssh/ // Is the location of pub and private key

id\_rsa and id\_rsa.pub

Note : public key share with remote machine and compare with private key of local machine if all ok then we can take access

117) ssh-copy-id : To copy the key to authorize login on a remote machine

ssh-copy-id [root@192.168.1.11](mailto:root@192.168.1.11) // It copy the generated key by "ssh-keygen" to the remote IP address

// It will copy the public key "id\_rsa.pub" to the remote

## Linux Command

118) ssh-add : Add private key identifies to the authenticate agent.

## Process to use key based authentication

Step 1 : ssh-keygen or ssh-keygen -t dsa // It will create the key file "id\_rsa & id\_rsa.pub" in /username/.ssh/ directory.

Step 2 : ssh-copy-id [root@192.168.1.11](mailto:root@192.168.1.11) // It will copy the key "id\_rsa.pub" to the authorized\_key to the remote ip address.

Step 3 : ssh-agent bash

Step 4 : ssh-add // It will add the identity to the id\_rsa file

119) getenforce : To display current mode of SELinux

120) setenforce : To change the mode of SELinux

0 // Permissive mode // Disable mode but it will notify for unwanted access

1 //Enforcing mode ## Means enable

setenforce 0

setenforce 1

vim /etc/selinux/config

SELINUX=enforcing/disabled // It will apply the changes for permanent after that need to reboot

To completely disable the SELinux we need to make changes in configuration file as

"SELINUX=disabled " then reboot

Or we can use directly sed command

## Linux Command

`sed -i 's/enforcing/disabled'`

2) semanage : SELinux policy management tool

`semanage port -l // List all port`

`semanage port -l | grep 80`

`semanage port -a -t httpd_port_t -p tcp 8282 // To add port 8282 in Hpptd_port_t`

`semanage fcontext -l : To list all context`

`semanage fcontext -at httpd_sys_content_t "/mnt/check(/.*)?" // To change the context of a file or dir.`

`semanage fcontext -d "/mnt/file(/.*)?"`

`-d : To restore default file context.`

3) restorecon : Restore file default SELinux context.

`restorecon -R : Change selinux file context label recursively.`

`restorecon -V : Show changes.`

`e.x. restorecon -Rv /mnt/check`

3a) chcon : To change file context "SELinux security context"

`chcon -R -t samba_share_t /file location`

`-R : Recursive`

`-t : type`

4) getsebool : get selinux Boolean value

`-a : show all SELinux Booleans value`

`getsebool -a | grep nfs_export`

## Linux Command

5) setsebool : set SELinux Boolean value

```
setsebool -P nfs_export_all_ro=1
```

-P : To set Boolean value for permanent

1=enable 0=disable

121) sysctl : To configure kernel parameter at runtime

-a : Display all parameter value currently available

-w kernel.sysrq=32 :- change parameter value

```
sysctl -a | grep kernel
```

```
cat /proc/sys/kernel/sysrq
```

1) grub2-set-default <option> : To switch between the kernel

0 : Means newly updated

1: Means previous one

grub2-set-default 0/1 // To switch between the kernel reboot is require

package-cleanup --oldkernels --count=1 // Remove old kernel

```
vim /boot/grub/grub.conf // To load default kernel
```

122) elinks : elinks is a text mode www browser.

elinks <https://localhost>

## Linux Command

configuration file of httpd.

/etc/httpd/conf/httpd.conf

/var/www/html

123) systemctl : Control the systemd system and service manager

systemctl status <service name> // To check status

systemctl start/stop <service name> // to start and stop the service

systemctl enable/disable <service name> // To enable and disable the service

systemctl restart <service name> // To restart the service.

systemctl is-enabled / is-active httpd // to check httpd service is enable or not / active or not

systemctl list-unit-files // to display enable and disable service

systemctl isolate <target.name> // To change target for runtime

systemctl list-units --type=target // To display all available target

systemctl get-default // to show default target

systemctl set-default <target name> // to set the default target

systemctl list-dependencies <service name> // To list dependencies of particular services.

if we enable any service it will create a symlink between '/usr/lib/systemd/system/httpd.service' to '/etc/systemd/system/multi-user.target.wants/httpd.service'

124) mdadm : Multiple Disk and device administrator

It is used to manage and monitor software RAID devices.

## Linux Command

- mdadm -Cv /dev/md0 -n 2 /dev/sdb /dev/sdc -l 0 //To create raid 0 using /dev/sd[b-c] "Uppercase C".
- mdadm -E /dev/sdb1 /dev/sdb2 //Enquiry about the device
- mdadm -D /dev/md0 //Details about the raid device
- mdadm /dev/md0 -a /dev/sdb1 //To add disk
- mdadm --stop /dev/md0 //To stop the /dev/md0 raid device
- mdadm /dev/md0 -r /dev/sdb1 //To remove disk
- mdadm --assemble /dev/md0 /dev/sdb /dev/sdc //To restart the /dev/md0 raid device
- mdadm --zero-superblock /dev/sdb1 //To remove md superblock from the partition or any specific Raid.
- mdadm -S /dev/md0 //To stop Raid0

125) smbpasswd : Change users smb password

smbpasswd -a <username> //Add samba password to user

smbpasswd -u <uname> //change password

- d : Disable samba user
- e : Enable samba user
- x : Delete samba user password
- r : remove samba user password
- n : null password

126) cpio : Copy files to and from archives

- o : To take backup
- i : To restore the cpio backup
- v : verbose (Display the output)
- t : To list the cpio content

We use cpio to take backup as a archive.

\*.cpio is the extensions of cpio archive

e.x.

ls | cpio -o > /root/backup.cpio //To take backup

cpio i < /root/backup.cpio //It restore the backup at the current PWD

## Linux Command

`cpio t < /root/backup.cpio` // To list the content of the cpio archive

127) `modprobe` : Add and remove modules from the linux kernel

`modprobe <module name>` // To install and re-install module name

`modprobe -r <module name>` // To remove module

`modinfo <mod name>` // To see the specified module information

`lsmod` // To list the modules

extension .ko

128) `sar` : To check system activity report ---- We can check current and previous dated system activity report.

`sar 2 10` // system report for every 2 sec upto 10 times

`-b` : Report input output statistics

`sar -b 2 5`

`-s` : Report swap statistics

`sar -s -1` //To check swap information of previous date.

`sar -s 2 3` //To check swap information of current time

`-p` : Report cpu usages

`-q` : Load average

`-r` : Memory usages

`-d` : Disk static

`sar -q -f /var/log/sa/sa17` // To see the back dated log file of load average

configuration : `Vim /etc/sysconfig/sysstat`

`"HISTORY=28"`

log : `/var/log/sa/sa....`



## Linux Command

129 ) vmstat : It gives complete information about virtual memory like no of process, memory usage, paging memory, disk.

vmstat -d // To see the statistics of disk used.

vmstat -a // Active inactive process

- fields

procs : r : Running process

b : Busy Process

memory : swap : How much virtual memory used

free : How much memory is free

buff : How much temporary memory is using

cache : How much caching still using

swap : si : How much data transfer from RAM to SWAP

so : How much data transfer from SWAP to RAM

IO : bi : How much block input

bo : How much block output

130) sosreport : To store the system configuration and diagnostic report.

system : in : The number of interrupts per second.

cs : the number of context switches per second

cpu : us : The cpu time spent in user space. i.e. Normal process

sy : The cpu time spent in kernel space

id : CPU idle time

wa : CPU time spent waiting for I/O

131 ) iotop : To monitor the I/O statistic

- o : High consumption I/O

-p : PID

## Linux Command

-u : user

132) iostat : It reports cpu statistics and I/O statistics for device and partitions.

-c : Display CPU utilization report : iostat -c

-d : Display disk utilization report : iostat -d

-m : display disk utilization in MB format. : iostat -m

-p : Display static of disk in specified format : iostat -p or iostat -p <device or partition>

-N : Display Lvm static : iostat -N

-t : Display time stamp : iostat -t

-X : Display extended information of the disk : iostat -x

133) dmidecode : It gives hardware related information of the sys.

dmidecode -t memory // To see memory info

dmidecode -t bios // BIOS's info

dmidecode -t system // system information

dmidecode -t processor // Processor info

134 ) crontab -e // To edit the cron jobs

```
*/2 * * * * touch file {1..2}
```

root user it will create file every two minutes.

<minutes>	<hours>	<day of the month>	<month of the year>	<day of the week>
(0 - 59)	(0 - 23)	(1 - 31)	(1 - 12 or jan, feb, ...)	(0 - 6 or sun, mon, ...)

// five star representing this time respectively.

## Linux Command

- \* Is treated as a wild card. Meaning any possible value.
- \*/ 5 Is treated as every 5 minutes, hours, days or months. Replacing the 5 with any numerical value will change this option.
- 2, 4, 6 Treated as an OR, so if placed in the hours, this could mean at 2, 4 or 6 o'clock
- 9-17 Treats for any value between 9 and 17. So if placed in day of the month this would be days 9 through 17 or if put in hours, it would be between 9 AM and 5 PM.

```
crontab -r // To remove cron jobs
crontab -l // To list cron jobs
crontab -u <user name> -e or -r or -l
```

## How to reboot the system using crontab

```
crontab -e
43 12 * * * /sbin/shutdown/ -r // It will reboot the system every day at 12:43
```

```
vim /etc/crontab ## configuration file
```

135) dump : To take backup

- o : full backup
- (1-9) : Incremental backup
- dump -ouvf /opt/full.dump //To take backup
- dump -ouvf /destination
- restore -tf /destination : To list the backup contain
- restore -rf /destination ; To restore the file

- u : update
- v : verbose
- f : used to specify the dump or backup files
- t : list the contains
- r : to restore

-u : update the entries in /etc/dumpdates conf file.

```
restore -rf /opt/full.dump // to restores
```

Some Extra Commands

```
growpart /dev/sdb 2 // to apply the changes in the partition size.
lldpctl // To find the VLAN of the interface (yum install lldpd -y)
ifdown eth1 // to down the interface
ifup eth1 // To up the interface
```

## Linux Command

ifenslave -c bond0 p6p1 // To change the active interface.

smartctl // To check the hard disk health  
smartctl -i /dev/sdb // to check the info about the disk  
smartctl -H /dev/sdb // to check the disk health

pam\_tally2 -u <uname> // To check failed login  
pam\_tally2 -r <uname> // To reset user  
  
/etc/pam.d/password-auth // pam\_tally2 configuration files.

## SUDO

Visudo /etc/sudoers  
Go to 98 line

Username ALL=ALL NOPASSWD: ALL // It won't ask root password to user

:wq!

## Allows people in the group wheel to run all commands  
%wheel ALL=(ALL) ALL

## It means all the users that belong to the wheel group can execute all the commands like root

raju ALL=NOPASSWD:/usr/sbin/useradd, /usr/sbin/usermod  
abhijeet ALL=(ALL) NOPASSWD: ALL

## RAID

Raid stands for redundant array of independent or inexpensive disks, is a storage device that provides fault tolerance, load balancing using striping, mirroring and parity concepts.

There are two types of Raid available

1) Hardware Raid 2) Software Raid

## Linux Command

There are mainly five types of Raid which are generally used

### 1) Raid-0 (Striping)

- In Raid-0 data is divided into multiple blocks and each of those blocks is stored on different disk. So, minimum 2 disk is required and partition id is "fd".
- It provide high read/write speed, but there is no redundancy and fault tolerance because if one of the disk fails, the entire data is lost.
- We can use 100% disk space of the total disk space.

### 2) Raid-1 (Mirroring)

- In Raid-1 the same data is stored in two disk, as like take the backup of the data into another disks. Minimum 2 disks are required and partition id is "fd".
- Write speed is slow as compared to Raid-0.
- It provide fault tolerance and more redundancy.
- But we can use only 50% space of the total disk space.

### 3) Raid-5 (Striping with parity)

- It striped the data across the multiple disks and on one disks a parity checksum of all the block data is written.
- Minimum 3 disks is required to configure raid-5 and partition id is "fd".
- It provide high read speed but write speed is little bit slow because of parity checksum.
- If one of the disk fail we can recover the data from parity but if 2 disk fails, then we cannot recover the data. So, there is less fault tolerance.
- we can use approximately 70% space of the total disk space and remaining space is reserved for the parity.

### 4) Riad-6 -----(Striping with double parity)

- It striped the data across the multiple disks with dual parity.
- Minimum 4 disks are required and partition id is "fd" but we can use only 50% space of the total space because of dual parity.

## **Linux Command**

- It provide more load balancing and fault tolerance as compare to Raid-5.
- R/W speed is also fast.
- if two disks are fail on the same time, then we can also recover the data but if 3 disks are fails at the same time then we cannot recover the data.

### 5) Raid-10 ----- (Mirroring + Stripping)

- Raid-10 is the combination of Raid-1 & Raid-0, To provide data mirroring with data stripping to protect our data.
- It requires minimum of four disks.
- We can use only 50% space of total space.
- Read Write speed is very fast.
- It provides fault tolerance and load balancing.

If one disk failed then we can recover the data but if two disk failed then we cannot recover the data.

## **Network Teaming**

## Linux Command

1<sup>st</sup> we must have more than one NIC card for network teaming.

```
nmcli con add con-name team0 ifname team type team config '{"runner": {"name": "roundrobin" or "active backup" or "broadcasting"}}'
```

Add two NIC card

```
- nmcli con add con-name port1 ifname ens33 type team-slave master team
```

```
- nmcli con add con-name port2 ifname ens34 type team-slave master team
```

Add ip address

```
- nmcli con mod team ipv4.address <ip address/netmask> ipv4.method static
```

```
nmcli con up team
```

```
teamdctl team state
```

```
ping -I team0 <Ip address>
```

## **FTP (File Transfer Protocol)**

Ftp is used for transfer file between one host to another host in a network.

**Server :**

```
yum install vsftpd * -y
```

```
systemctl start vsftpd
```

```
firewall-cmd --permanent --add-service=ftp
```

```
firewall-cmd --complete-reload
```

```
vim /etc/vsftpd/vsftpd.conf
```

```
anonymous_enable = no
```

```
chroot_local_user = YES
```

```
allow_writeable_chroot = YES
```

```
writeable_enable = YES
```

```
anon_upload_enable = YES // Do not use for secure ftp
```

```
ftp_banner = "welcome to ftp"
```

```
max_clients=<no>
```

```
:wq!
```

## Linux Command

```
systemctl restart vsftpd
```

```
mkdir /etc/ftp/pub/files  
chcon -t public_content_t "file(/.*)?"  
setsebool -P ftpd_full_access=1
```

```
chmod 770 files
```

Client :

```
yum install -y ftp* lftp* filezilla(optional)  
ftp <ip> or <hostname>  
ftp > ls  
    > get <filename> // downloading  
    > put <file name> // uploading  
    > mget f1 f2 // Multiple file get  
    > buy
```

```
vim /etc/host.allow  
vim /etc/host.deny  
vim /etc/vsftpd/ftpusers  
  
vim /etc/vsftpd/user_list
```

What is DHCP :

Dynamic Host configuration protocol assigns ip address to hosts. DHCP operations fall into four phases : (1) Discovery (2) Offer (3) Request (4) acknowledgement.

How does DHCP client find dhcp server?

The dhcp client discovers a DHCP server by broadcasting a discovery message to the limited broadcasting address on the local subnet. And if a router is present and configured to behave as Bootp relay agent, the request is passed to their DHCP servers on different subnets.

We have to use static NIC card parameter to configure dhcp server. and also close the vmware local dhcp server for dynamic NAT.



## Linux Command

**Broadcasting** : In computer networking broadcasting refers to transmitting packet that will received by every device on the network.

**For ex.** : A radio station broadcasting a signal to many listeners, and digital t.v. subscriber receive signal that is broadcast by their T.V provider.

## **Firewall**

- It allow certain packet which we want from authorized source or genuine application and it blocks the packet or communication from the unknown sources, In that manner it try to protect our system from unauthorized access of our services and resources.

- The service which control firewall is knows as firewalld.
- Firewall is a set of script and daemon that manages our netfilter.

**Netfilter** : Netfilter (kernel) is a framework provided by the Linux kernel that allows various networking related operations to be implemented in the form of customized handlers.

**Zones** : Is a set of pre-define rule that establish the security borders of a network. Whatever interface of the server in that zone those rule are apply for that interface.

`/usr/lib/firewalld/services` : Is the firewall services configuration file.

**Rich Rule** : Allow the administrator to specify custom rule for the zone.

```
firewall-cmd --get-active-zones // To show active zones
firewall-cmd --zone=home --list-all // To know about the rule of the zone.
firewall-cmd --zone=home --change-interface ens37 // To change the zone
```

```
firewall-cmd --zone=home --add-source=ip.addr // It allow every traffic from the host
firewall-cmd --get-zone-of-interface=ens33 // It display the specified device zone.
```

**NAT (Network Address translation)** : Natting means that I am hiding my private id and if any request is going on to the network external sites it will be shown public id.

```
firewall-cmd --version // Check version of firewall
firewall-cmd --get-zoneof-interface=ens33 //To check the zone of interface
```

## Linux Command

**Masquerade** : Masquerading is assuming we have two network cards, moving traffic from one card to another card and in the process connecting two network. The other assumption is that we have an internal network with private ip address that we will change to an external address on the machine.

```
firewall-cmd --zone=<zone name> --add-masquerade //Add masquerade  
firewall-cmd --zone=<zone name> --query-masquerade // Check masquerade status on particular zone
```

Masquerade should be on before port forwarding

```
firewall-cmd --permanent --zone=public \ "press enter"  
--add-forward-port=port=22:proto=tcp:toport=24 //It redirect the incoming port 22 into the port 24
```

```
firewall-cmd --permanent --zone=public \ "press enter"  
--add-forward-port=port=22:proto=ssh:toaddr=<redirect ip addr> //It redirect the incoming port 22 into the port 24
```

## IP Addr + Port No. = Socket

Ip is an unique address which is provide for our machine.

port : port number is a unique id of a protocol in a computer network, all the protocol in a computer network are having a unique port number.

when our system is not connected with the internet still we have an ip which is 127.0.0.1, is nothing but our local host.

By using port host machine connect to the require protocol / services.

A port number is always associated with an IP address of a host and the protocol type of the communication. It completes the destination or origination network address of a message. specific port number are commonly reserved to identify specific services, so that an arriving packet can be easily forwarded to a running application.

## **Kerberos (KDC)**

**KDC** : A key distribution centre is responsible for providing keys to users in a network that shares sensitive or private data.

- Each time a connection is established between two computers in a network, they both request to KDC to generate a unique password which can be used by the and system users for verification.

- The KDC system should be dedicated machine. The machine needs to be secure if possible, it should not run any services other than the KDC.

## Linux Command

**Confluence (Inventory Management) :** Store the server's information like ipaddress, name, console ip.

**Jump Server :** It used in linux as a gateway to access other Linux machines on a private network.

**Server name Console Port Expansion name**

- 1) DELL : DRAC or iDRAC : Dell Remote Access Control Integrated remote Access Controllers.
- 2) HP : ILO : Integrated Light Out (BL460)
- 3) IBM : HMC : Hardware Management Port
- 4) CISCO : CIMC

**Why we need SSL Certificate or https**

- To encrypts the traffic between web server and user web browsers and enhance data security.

**SSL : Secure Socket Layer**

**CSR : Certificate Sign Request**

**CA : Certificate Authority**

**CRT : Certificate Extension Name ".crt"**

**key : Key of the certificate "/etc/pki/tls/private/<domain name>.key"**

**TLS : Transport Layer Security**

**Virtual Host :** Means using one Ip address to host, multiple websites or multiple websites hosting on same machine.

**Web Server :** The job of web server is accept request from client and send responses to those request.

web server get a URL, translate it to a file name (For static requests) & send that file back over the internet from local hdd, or is translate it to a programe name (For dynamic request). ex: Ticket booking website changing is always going on, to connect the database and send the ouyput back to the request client.

**In case webserver is not able to process requests or website is not available it will send error message.**

- It controlled by the httpd daemon.

- Main configuration file /etc/httpd/conf/httpd.conf http:80 https:443

## Quota

There are two types of quota : 1. Block Quota (Disk Quota) 2. Inode Quota (File Quota)

/dev/<disk name> // Create a partition

## Linux Command

mkfs.file system <device> // Give file system

vim /etc/fstab // For permanent mount

<Device name> <Mount Point> <FileSystem> defaults,usrquota/grpquota 0 0 // XFS doesn't support quota

mount -o remount,usrquota /mnt/quota/ // Remount

usrquota : for user

grpquota : for group

quotacheck -cu <mountPoint> // To create quota database for user

quotaon <mount point>

edquota -u <username>

repquota -a // To display report of the quota.

edquota -t // To change the grace period.

## **Boot Process**

There are 6 high level stages of a typical linux boot process.

BIOS : Basic I/O system executes MBR.

MBR : Master Boot record executes GRUB.

GRUB : Grand unified Bootloader Executes kernel.

Kernel : Kernel executes /sbin/init

init : Init executes run level programs

Run Level : Run level programs are executed from /etc/rc.d.rc\*.d/

1. BIOS : Stand for Basic Input/output system.

## Linux Command

- Performs some system integrity checks.
- Searches, loads, and executes the boot loader program.
- It looks for boot loader in hard drive, floppy, or cd-rom
- Once the boot loader program is detected and loaded into the memory, BIOS gives the control to it.
- So, in simple terms BIOS loads and executes the MBR boot loader.

### 2. MBR : Master Boot Record

- It is located in the 1<sup>st</sup> sector of the bootable disk. Typical /dev/had, or /dev/sda
- MBR is less than 512 bytes in size. This has three components
  - a. Primary boot loader info in 1<sup>st</sup> 446 bytes.
  - b. Partition table info in next 64 bytes.
  - c. MBR validation check in last 2 bytes.
- It contains information about GRUB.
- So in simple terms MBR loads and executes the GRUB boot loader.

### 3. GRUB : GRUB stands for grand unified bootloader.

- If we have multiple kernel images installed on our system, then we can choose which one to be executed.
- GRUB displays a splash screen, and waits for a few seconds, if we don't enter anything. If we don't enter anything it loads the default kernel image as specified in the grub configuration file.
- GRUB configuration file is /boot/grub2/grub.conf .
- So, in simple terms GRUB just loads and executes kernel and initrd images.

### 4. Kernel : Mounts the root file systems as specified in the "root=" in grub.conf

- Kernel executes the system program since the system is the 1<sup>st</sup> program to be executed by linux kernel, it has process id(PID) of 1. Do a "ps -ef | grep init" and check the PID.
- initrd stands for initrd Ram Disk. Initrd is used by kernel as a temporary root file system until kernel is booted and the root file system is mounted. It also contains necessary drivers compiled inside, which helps it to access the hard drive partitions, and other hardware.

### 5. systemd : Looks at the /etc/systemd/system/default.target file to decide the linux run level.

- following are the available run levels.
  - 0 : halt / Info/shutdown.
  - 1 : Single user mode
  - 2 : multi user without NFS.
  - 3 : Full multiuser mode.
  - 4 : Unused
  - 5 : GUI
  - 6 : reboot
- systemd identifies the default init level from /etc/inittab and uses that to load all appropriate programs.
- who -r : To check the default run level.

### 6. run level programs : When the linux system is booting up, we might see various services getting started. For example it might say starting to send mail..... ok. Those are the runlevel programs executed from the run level directory as defined by our run level.

## Linux Command

- depending on our default init level setting. the system will execute the programs from one of the following directories.

- Run level 0 - /etc/rc.d/rc0.d/
- Run level 1 - /etc/rc.d/rc1.d/
- Run level 2 - /etc/rc.d/rc2.d/
- Run level 3 - /etc/rc.d/rc3.d/
- .....
- Run level 6 - /etc/rc.d/rc6.d/

- There are also symbolic links available for these directory under /etc directory. So, /etc/rc0.d is linked to /etc/rc.d/rc0.d

- Under the /etc/rc.d/rc\*.d/ directories we would see programs that start with S and K.

- Programs starts with S are used during startup. S for startup.

- Programs starts with k are used during shutdown. K for kill

- There are numbers right next to S and K in the program names. Those are the sequence number in which the programs should be started to killed.

- For ex. S12 syslog is to start the syslog daemon, which has the sequence number of 12.

- S80 sendmail is to start the sendmail daemon, which has the sequence number of 80. So, syslog programs will be started before send mail.

### **Autofs**

```
yum install -y autofs
```

```
vim /etc/auto.master  
/root/mnt/samba /etc/auto.misc --timeoue=300
```

```
vim /etc/auto.misc  
user_mount -fstype=cifs,multiuser,sec=ntlmssp,cred=/config/smb.txt :/192.168.86.131/S_Share
```

### **Logrotate**

In IT log rotation is an automated process used in system administration in which log files are compressed, moved, renamed or deleted once they are too old or too big.

Conf File : /etc/logrotate.conf include /etc/logrotate.d

## Linux Command

```
vim /etc/logrotate.d/samba
```

```
/var/log/samba {  
    daily  
    create 0644 root root  
    maxsize 1M  
    rotate 2  
}
```

For forcefully rotate

```
logrotate -f /etc/logrotate.d/samba
```

## Custom log rotate file

```
vim custom  
/root/test/file {           // Here we specified the file location  
    daily/monthly/weakly    // This is the rotate duration  
    rotate 2                // 2 is the rotate number means how many file it makes  
    create                  // Create the file  
}
```

```
logrotate -f /root/test/desktop/custom // This is the custom file location
```

### Local Repo

Mount the CD or File.

```
mount /dev/sr0 /root/mnt/repo
```

```
cd /etc/yum.repos.d/ : move all repo file into another file
```

then, vim test.repo

```
[test.repo]  
name = centos local repo  
baseurl = file:///root/mnt/repo  
enabled=1/0  
gpgcheck=0/1  
:wq!
```

Then try,

```
yum remove httpd  
yum install httpd
```

## **Linux Command**

### **Reset/Change root password**

- 1) Reboot
- 2) Press 'e' to edit grub configuration in boot menu.
- 3) rd.break then ctrl+x to continue
- 4) mount -o remount,rw /sysroot // It gives read write permission to the file sysroot.
- 5) chroot /sysroot // Change root into sysroot
- 6) then type passwd // command
- 7) touch /.autorelabel // The file carry autoreload when we reboot.
- 8) exit
- 9) exit

### **How to scan a harddisk**

echo "--" > /sys/class/scsi\_host/host0 or host1 or host2/scan

## To scan new harddisk where hostname may be different into different system.

"--" indicates "-" = channel" "-" = scsi target id" "-" = lun"

### **## How to flash or clear Ram**

echo 1> /proc/sys/vm/drop\_caches //To clear page cache only

echo 2> /proc/sys/vm/drop\_caches // To clear dentries and inodes

echo 3> /proc/sys/vm/drop\_caches //To clear cache, dentries & inode ##This is not recommend to run



# Linux Command

## SELinux

Security Enhance Linux (SELinux) is a security that enhance security that allows users and administrator more control over which applications and users can access which resources such as file.

If httpd or apache is compromised then attacker could access of file and folder owned that have rw, permission for apache, that means anything in web serving traffic.

If the SELinux on then the risk is limited to the compromised directories, files, services.

1. Document Root : It is a location of file which are accessible by clients. By default all request taken from this directory `"/var/www/html"`.
2. ServerRoot : It simplify where is web server are install. `/etc/httpd`
3. CGI (Common Gateway Interface) : CGI is an interface between web client and web server.
4. Scripts Alias : The control which directory control script server `/var/www/cgi_bin`
5. TLS : Transport layer Security is a upper Layer protocol (ULP) that runs over TCP.
6. Http : Http/Https are used to transfer hyper text documents on the www or http is the protocol used to transfer data over the web.
7. Httpd : Is a software program that runs in the background of a web server and wait for incoming server requests. The daemon answers the request automatically.
8. DNS (Domain name system) : DNS is a larger database which resides on various computers that contains the names and ip address of various hosts/domain.
9. NFS : Network file system is a way of mounting linux directories over a network. The main use of NFS is to share out data on a central server to all the PCS In the network.
10. SELinux : Security enhanced linux is a set of security policies which are going to apply on the machine to improve the overall security of the machine.
11. Bin(Binary) : `/bin` contains the executable (i.e. ready to run) programs that must be available in order to attain minimal functionality for the purpose of booting (i.e. starting) and repairing a system.
12. Repository (repo) : Is a storage location or contain the configuration of repos (i.e. disk location / web location) of disk or web from which our system retrieves and install OS updates and applications. Each repository is a collection of software hosted on remote server and intended to be used for installing and updating software packages on linux.
13. SELinux Context : Is the mechanism used by SELinux to classify resources, such as files, on a SELinux-enabled system.

## **Linux Command**

14. Boolean : Is a conditional rule that allows run time modification of the security policy without having to load a new policy.
15. Port : A port is a logical entity which acts as a endpoints of communication to identify a given process or application.  
(It is a 16 bit number 0-65535)
16. gpgcheck : gpgcheck stands for signature verification from the central database. If signature verification is successful then we are sure about the security if we set the value of gpgcheck is ! then it ask for signature verification else it doesnot.
17. / - The root directory : Everything on our Linux system is located under the / directory, known as root directory.
18. /bin – Essential user binaries : The /bin directory contain the essential user binaries (Program) that must be present when the system is mounted in single-user mode.
19. /boot – static boot files ; The /boot directory contains the files needed to boot the system. like GRUB boot loader's files and our linux kernels are stored here.
20. /cdrom – Historical mount point for CD-Roms : It is temporary location for CD-Roms inserted in the system.
21. /dev – device file ; Linux expose devices as files, and the /dev dir contains number of specified files that represent device.
22. /etc - configuration file : the /etc directory contains configuration files, which can generally be edited by hand in a text editor.
23. /home - Home folders : The /home dir contains a home folder for each user.
24. /lib- Essential shared libraries : The / lib dir contains libraries needed by the essential binaries in the /bin and /sbin folder.
25. /lost+found - Recovery files
26. /media - Removable media
27. /mnt - Temporary mount point
28. /opt - Optional packages
29. /proc - kernel & process
30. /root - root home dir
31. /run - Application state files
32. /sbin - System administration Binaries

## Linux Command

- 33. /selinux - SELinux virtual file system
- 34. /srv - Service data
- 35. /tmp - Temporary files
- 36. /usr - Use binaries & Read-only data
- 37. /var - Variable data file
- 38. demon : Gives service to the process.
- 39. Kernel : Establish relationship between hardware and software.
- 40. dmidecode : desktop management interface table decoder "Retrives system hardware related information such as processor, RAM, BIOS details, Memory."
- 41. /root : It is root user home directory
- 42. /etc : It contains all system configuration files for linux.
- 43. /opt : This file system holds additional software installed on the system.
- 44. /bin : It contains command used by all users.
- 45. /sbin : It contains commands used by root user.
- 46. /var : contains data that frequently changes while the system is operational.
- 47. /proc : It contain process file.

server.hp.com  
<hostname> <Domain name>  
<Fully Qualified Domain Name>

### **Logical Volume management (LVM)**

LVM means the combination of 2 or more physical disk in order to make a big logical disk.

- S1. Create / Delete a hard disk.
- S2. Make partition using fdisk and gdisk in the partition time give the partition label linux LVM '8e00' in gdisk '8e' in fdisk.
- S3. Create Physical volumes  
## pvcreate /dev/sdb1 /dev/sdc1  
## pvdisplay ; To display physical group
- S4. Create Volume group  
## vgcreate <vg name> /dev/sdb1 /dev/sdc  
## vgdisplay : To display the volume group

## Linux Command

S5. Create logical volume

```
## lvcreate -n <lv name> -L <size> <vgname>
```

```
## lvdisplay : To display logical volume
```

S6. Then make file system of the LV.

```
## mkfs -t xfs <lv name>
```

S7. Then mount the device to any directory

```
## mount /dev/vg/lv /mnt/mymount
```

## For remove

1<sup>st</sup> unmount the file system, then lvremove then vgremove and then pvremove.

**## How many types of files.**

-- device file, symbolic file, regular file, network file, binary file, executable file.

## **Port Numbers**

1. 21 - FTP
2. 22 - SSH
3. 23 - TELNET
4. 25 - SMTP (Send mail)
5. 53 - Domain (DNS)
6. 80 - HTTP
7. 443 - HTTPS
8. 110 - POP3
9. 143 - IMAP
10. 631 - PRINTER
11. 2049 - NFS Server
12. 1028 - NFS Client
13. 3260 - ISCSI\_lqn
14. DHCP server - 67
15. DHCP Client – 68
16. Backup port no. - 13782
17. NTP – 123
  
18. 139 - Samba Port Number : To establish connection
19. 137 - Samba Port Number : To verify share name
20. 138 - Samba Port Number : To data transfer

## **Linux Command**

21. 445 - Samba Port Number : For Authentication