

Linux

Operating system

1. Operating system acts as a intermediate_distance between hardware and user.
2. Operating system manages hardware in the system.
3. And also acts as interpreter

Types of operating system

- Desktop machine:-

It has only used for general purpose like presentation, video games, etc...

- Server machine:-

Whenever multiple user works on the website at same time. it doesn't affect the user performance because of the system to be created like this called as server machine.

Development of operating system

- Single user single tasking---eg ms-doc
- Single user multitasking
- Multiple user multitasking

What is hypervisor

It is a software that creates space and runs virtual machine like (VMS) etc

We use two operating system at a same time with the help of hypervisor ...

Windows

1. It is proprietary based
(Means licening is required)
2. It is paid
3. It is less secure

Because it gives (read, write, execute)

4. It is a closed source.
(We cant change source code)
4. It's a heavy hardware
(To install OS in the hardware you need to give more space)
6. It's a user friendly GUI
7. It is a non-portable
8. It is a 80% on desktop

Linux

- 1.It is a community based
(means licening is not required)
- 2.It is free of cost
- 3.Is is more secure
(it gives only read,write permission)
- 4.It is open source
- 5.Light weight software
- 6.It is portable
- 7.It is less user-friendly
- 8.It is 90% on desktop

What is interpreter

It is used to translate/converts high level language to low level language called as interpreter.

What is compiler

It is used to translate/converts high level language to low level language called as interpreter.

What is linux

Linux is **an open source operating system (OS)**. An operating system is the software that directly manages a system's hardware and resources, like CPU, memory, and storage.

The OS sits between applications and hardware and makes the connections between all of your software and the physical resources that do the work.

History

- In 1983, american software engineer **Richard Stallman** started project “GNU project” (means GNU is not unix).
- And in 1985, FSF started (free software foundation).
- In 1991 started programme like debugger,shell,editor.
- But GNU is hard to develop then in 1991 Linus torwards develop kernel.

GNU/LINUX----IINUX Os

Operating systems are...

- **Multics**

Multics, also known as Multiplexed Information and Computing Service, was a time-sharing operating system developed by MIT, General Electric, and Bell Labs, first released in 1964. Notable developers who worked on Multics include Ken Thompson and Dennis Ritchie.

- **UNIX**

It is a multiuser, multitasking operating system (OS) designed for flexibility and adaptability. Originally developed in the 1970s, Unix was one of the first OSes to be written in the C programming language.

- **BSD**

Berkeley Software Distribution (BSD) is a group of related open source Unix-like operating systems (OS) with origins in early versions of Research Unix at Bell Labs. FreeBSD is the most popular member. BSD is configured for internet hosting, web hosting, and hosting many servers on one system.

- **Posix**

It is a "Portable Operating System Interface for uni-X", POSIX is a set of standards codified by the IEEE and issued by ANSI and ISO.

- **Minix**

MINIX 3 is a free, open-source, operating system designed to be highly reliable, flexible, and secure. It is based on a tiny microkernel running in kernel mode with the rest of the operating system running as a number of isolated, protected, processes in user mode.

Architecture of OS

- Hardware
- Kernel
- Shell
- Application
- User

OS ----depends on kernel and shell

Kernel ----it is core part of OS

Shell ---it gives input from user

Linux distributions

- Redhat
- Centos
- Mentos
- Fedora
- ubuntu

Root user:-

- It is a super user.
- Home directory of root user is (/root).
- All permission given to a root user

[root@localhost~]#-----prompt

Localhost ----- hostname

Root -----super user

-----to login with root

/ -----root directory

~ -----home directory

\$ -----to login with local

Local user:-

- It is a local user
- Home directory is (/home/username)
- We can create different localuser in linux

Important sites to resolve error

- Stack overflow
- Stack exchange
- Serverfault.com

To switch user

- Home directory—root directory
Su – root
- Root directory----home directory
Su – (username)

File system hierarchy

- **/home**—Home directory for home user
- **/root** ---Root directory for root user
- **/boot** ---Contain bootable files for linux
- **/etc** ----All configuration files
- **/usr** ----By default software are installed in
This directory
- **/bin** ----Contains command user by all
User including root user
- **/sbin**----Contains command use by only
Root user
- **/opt** -----Optional application software
Package
- **/dev** -----Any other device attached to

System files printers, tty, etc

- **Lib**----To store architecture information
- **/temp**--Temporary files by user, system
- **/srv**-----to store service information
- **/var**-----logs, mails, webpages, etc
- **/mnt**----mount point harddisk
- **/media**--mnt point reader, floppy disk
- **/proc**----process information
- **/sys**-----system related information
- **/run**-----runtime information

Commands

- hostname-----to check hostname
- hostname -i---to check machine address
- Ifconfig -----to check IP address
- which-----to check path
- whoami-----to check who am i
- echo-----to check shell
- grep-----to find out words
- sort-----to arrange words
- clear-----to clear screen

- echo “\$SHELL”----to check shell
- lscpu-----to check cpu information
- lsusb-----to check usb information
- lspci-----peripheral component
interconnect
- free-----to check memory
- free -h -----to check memory in human
readable format
- man-----to see manual page
- info-----to see information page
- date-----to check date
- date +%a----to see weekdays
- date +%b----to see month
- date +%c-----to see date and time
- date +%T-----to see time in sec
- date +%t-----to see time
- date -s -----to change date
- cal-----to check calender
- cal -y -----to see year calender
- cal -j -----to see in julian form
- history-----to see history of command

- `tty` -----terminal type show
- `who`-----to show whos teminal we use and
how many teminals we used
- `w`-----load average
- `uname`-----to see kernel details
- `uname -a`-----to see kernel version
- `uname -r`-----to see kernel version
- `shutdown`-----to shutdown
- `shutdown -c`----to cancel shutdown
- `shutdown now`---to shutdown Immediate
- `sudo halt` -----to turf off terminal
- `sudo reboot` -----to reboot the terminal
- `dmidecode`-----to check hardware infor.
to check motherboard.
to check bios informat.
- `wc` -----to check words lines characte
- `diff` -----to see diff between two files
- `df` -----to display diskspace
- `alias`-----to create custom shortcuts
- `pipe`-----gives output from first
and input from second
- `tee`-----show content on terminal as

well as save on file

- tab -----to fill terminal
- ctrl+z -----to stop command forcefully
- ctrl+c -----to stop any command

❖ **How to change hostname permanently**

hostnamectl set-hostname (name)

❖ **How to change hostname temporarily**

hostname (name)

❖ **How to copy file**

cp file /home/mayur/

cp -r file dir1 /home/mayur/

❖ **How to move file**

mv file1 /home/mayur/new1

❖ **how to rename file**

mv file1 myfiles

Format of change directory

Absolute path

- `cd /home/`
- `cd /root/`
- `cd /boot/`

Relative path

- `./linux/`
- `./boot/`

How to check files

- `ls` ----to check list
- `ls -l` ---to check list with information
- `ls -a` ----to check hide files
- `ls -al` -----to check all files include hidden
- `ls -ltr` -----to check files newly created
- `ls -ld` ----to check directory
- `ll` -----to check all files
- `pwd` ----print working directory
- `cd` -----change directory

Command line mode / insert mode

(vim /etc/passwd)

- G-----curser from top to bottom
 - gg -----curser from bottom to top
 - yy -----copy line where curser is placed
 - nyy ---copy number of lines
 - P -----paste line where curser is placed
 - p -----paste line below curser is placed
 - dd-----to delete line where cursor is placed
 - ndd -----to delete number of lines
 - dw -----delete word
 - u -----to undo the word
 - O -----to create line above the cursor
 - o -----to create line below the cursor
 - I -----to beginning of the line
 - A -----end of the line
 - i -----to enter into insert mode
-
- w -----to save
 - q -----to exit
 - wq ----to save and quit
 - wq! ----to save and quit
 - q! -----forcefully quit

- set nu -----give numbers to a lines
- set nonu -----remove number
- /words -----to highlight words
- Nohl -----to removes highlight
- V -----to enter into visual mode

Read operation

- 1.Cat -----to view file from bottom to top
- 2.Less -----to view file from top to bottom
- 3.More -----to view file from top to bottom
- 4.Head -----to view first top 10 lines
- 5.Head -n -----to view numbers of lines
From top
- 6.Tail -----to view last 10 lines
- 7.Tail -n -----to view numbers of lines
bottom

/etc/passwd

It stores all the information about users

mayur:X:1000:1000:hello:/home/mayur:/bin/bash

mayur-----username

X -----hash form/ encrypted format passwd

1000 -----user ID

1000 -----group ID

Hello-----GECOS

/home/mayur-----home directory

/bin/bash -----our login shell

Changes in /etc/passwd file

1) To add user with a particular UID

Useradd -u 1000 user1

2) To add user with a particular GID

Useradd -g 1000 user2

3) To add personal information GECOS

Useradd -c "hello" user3

4) to add home directory of user

useradd -d /mayur user4

5) to add login shell of user

```
useradd -s /sbin/nologin user5
```

/etc/shadow

It stores all the information about the passwords in hashed format /encrypted format

Mayur:abcdefgh:18009:0:120:7:14:18759

mayur----- -username

abcdefgh----- -hash format password

18009-----last time passwd change

0 -----minimum password age

120-----maximum password age

7 -----warning period

14-----inactivity period

18759-----expiration date

1.to change last time passwd

- `echo $(($(date +%s)/86400))`
18816
- `date -s "10 july 2022"`
- `passwd mayur`
- `echo $(($(date +%s)/86400))`
18817

2.to change mininum passwd days

- chage -l mayur
minimum no of days between passwd change:0
- chage -m 2 mayur
- chage -l mayur
minimum no of days between passwd change:2
- su – mayur
- passwd
you must wait longer to change your passwd

3.to change maximum passwd days

- chage -l mayur
maximum no of days between password change:99999
- chage -M 2 mayur
- chage -l mayur
maximum no of days between password change:2
- su – linux
- su – mayur
- warning:-your passwd will expire in 2 days

3.to change warning period

- chage -W 10 mayur

4.to change inactivity days

- chage -I 20 mayur

5.to change expiration date(account expire)

- chage -E “13 oct 2022” mayur

/etc/group

Tech:X:1021:user1,user2

Tech-----groupname

X -----passwd hash format

1021-----groupID

User1,user2----list of members in group

1.to add group

groupadd tech

2.to add group with GID

groupadd -g 1021 tech

3.add no of users in a group

`gpasswd -M user1,user2 tech-----add multiple`

➤ **to add one user in a group**

`gpasswd -a user1 tech`

➤ **to add multiple user in a group**

`gpasswd -M user1,user2 tech`

➤ **to delete user in a group**

`gpasswd -d user1 tech`

➤ **to remove passwd of a user/group**

`gpasswd -r tech`

➤ **to admin a user**

`gpasswd -A user1 tech`

➤ **to remove admin user**

`gpasswd -A '' tech`

➤ **to add user with usermod**

`usermod -G tech user1`

`usermod -aG tech user1`

/etc/gshadow

It stores all information about group in a hashed format/encrypted format

Tech:X:new:user1,user2

Tech-----groupname

X -----passwd hash format

New-----group administrator

User1,user2----list of members in group

1.to add group

groupadd tech

2.to admin a user

gpasswd -A new tech

3.add no of users in a group

gpasswd -M user1,user2 tech-----add multiple

How to remove skeleton files and add also

- `cd /home/mayur`
`rm -rf .bashrc .bash_logout .bash_profile`
- `su – mayur`
`[-bash_4.2]$`
- `cd /etc/skel`
`cp .bashrc .bash_logout .bash_profile`
`/home/mayur`
- `ls -al /home/mayur`
- Logout
- `su – mayur`
`[mayur@localhost~]$`

Skeleton files are

`[.bashrc .bash_logout .bash_profile]`

Usermod/user modify command

- **To modify login shell of existing user**

`usermod -s /sbin/nologin user1`

- **To lock the user**

`usermod -L mayur`

- **to unlock the user**

`usermod -U user`

- **to change userID of existing user**

`usermod -u 1000 user1`

- **to change groupID of existing user**

`usermod -g 1000 user1`

- **to change groupID of existing group**

`usermod -g 1000 tech`

- **to modify name of existing group**

`groupmod -n tech techy`

How to delete users and groups

- **For user**

`rm -rf user1`

`userdel -r user1`

- **for group**

`rm -rf tech`

`groupdel -f tech`

- **how to hide /etc/shadow**

`pwunconv`

- **how to unhide /etc/shadow**

`pwconv`

- **how to hide /etc/gshadow**

`grpunconv`

- **how to unhide /etc/gshadow**

`grpconv`

linux file system security

drwxrwxrwx 3 root root 8118 jul 1 8:31 file1

d-----directory

rwx-----owner

rwx-----group

rwx-----other

3-----link count

Root-----owner

Root-----group

8118 -----file size in byte

Jul 1 8:31-----time and date

File1-----file name

1.file type

1.Normal file-----(-)

2.Directory----- (d)

3.Link file----- (l)

4.Block device file----- (b)

5.Socket file----- (s)

6.Character device file--- (c)

7.Pipe file----- (p)

2.Link count

File -----1

Directory-----2

Parent directory-----3

Hard-link

- To create a backup file use hard-link
- Its file type is normal file
- Link count increases by 1
- Inode number is same (ls -i)
- Cannot create hard-link of directory

Soft-link

- To create a shortcut file use soft-link
- Its file type is link file
- Link count does not increases
- Inode number is different (ls -i)
- Can create directory as well as file

Metadata

The data that provide information about other data but not the content of data

3.Ownership

- **To change group**

chgrp root new

- **to change owner**

Chown root new

- **Change both owner and group**

Chown root:root new

4.Permissions

Owner-----rwx

Group-----rwx

Other -----rwx

r-----read-----4

w-----write-----2

x-----execute-----1

In binary form

rwX	-----111
r-X	-----101
rw-	-----110
r- -	-----100
-w-	-----010
--X	-----001

Binary

In octal form

000	$0*2^2+0*2^1+0*2^0$
001	$0*2^2+0*2^1+1*2^0$
010	$0*2^2+1*2^1+0*2^0$
111	$1*2^2+1*2^1+1*2^0$

5.Default permission

For root

File-----644---{rw- r—r--}

Directory—755—{rwx r-x r-x}

For local-user

File-----664-----{rw- rw- r--}

Directory-----775-----{rwx rwx r-x}

Read-----ls (long listing)

Write-----create,delete

Execute-----change directory

6.Full permission

File-----666-----{rw- rw- rw-}

Directory-----777-----{rwx rwx rwx}

7.umask

umask gives making value of particular default user/permission.

Root---022-----→default umask

Local—002-----→default umask

- **For root user /umask**

Umask=full permission-default permission

=666-644-----file

=022

=777-755-----directory

=022

- **For local-user/umask**

Umask=full permission-default permission

=666-664-----file

=002

=777-775-----directory

=002

- **To change umask temporary**

Umask (change value)

- **To change umask permanently**

Vim /etc/profile-----permanent

Source /etc/profile-----update bash

8.To change permission

u-----user

g-----group

o-----other

(+) -----to add permission

(-) -----to remove permission

(=) -----to replace permission

1st method

1) `chmod u+x user1`

`rwX --- ---`

2) `chmod u=x user1`

`--X --- ---`

3) `Chmod ugo=rwx user1`

`rwx rwx rwx`

2nd method

1) `chmod 777 user1`

`rwx rwx rwx`

2) `chmod 536 user1`

`r-X -wX rw-`

special permissions

1.suid (super user identification permission):-

it is defined as giving permission to a user to run a file with the permission of file owner.

All users gets access of executable files.

How to apply SUID

Chmod u+s “command”

How to remove SUID

Chmod u-s “command”

Applying SUID,,,

- Chmod u+s /sbin/dmidecode
- ls -l /sbin/dmidecode
 rwS r-X r-X

2.Sgid (super user group permission):-

This permission can inherit the group property

Group of parent directory inherit with the child directory and files.

- **How to apply Sgid**

Chmod g+s “directory/file name”

- **How to remove Sgid**

Chmod g-s “directory/file name”

1st step:-create a group

groupadd cloudblitz

passwd cloudblitz

2nd step:-add member in a group

gpasswd -M user1,user2 cloudblitz

3rd step:-to check the group

`tail /etc/group`

4th step:-to create directory

- `mkdir /project`
- `ls -ld /project`

`rwX r-X r-X -----`default permission

5th step:-to remove permissions

`chmod 770 /project`

6th step:-to add group cloudblitZ in /project

- `Chgrp cloudblitZ /project`
- `ls -l /project`

`rwX rwX rwX 2 root cloudblitZ`

7th step:-to add sgid for access the Cloudblitz

- Chmod g+s /project
 - ls -ld /project
- drwx rws --- root cloudblitz

8th step:-to create file in /project

- su – user1
 - cd /project
 - touch sample
 - ls -l
- rw- rw- r-- user1 cloudblitz new

9th step:-also create file in /project

- su -user2
- cd /project
- touch sample2
- ls -l

3. Sticky bit permission:-

It is basically used for control all other users to resist the delete or modify operation.

Only owners and root user have to access to delete or rename a file.

How to apply sticky bit permission

- `chmod o+t "directory name"`

How to remove sticky bit

- `chmod o-t "directory name"`

applying sticky bit permission

- `chmod o+t /project`
- `ls -ld /project`
`drwx rwx -T root cloudblit`

T-----execution permission removed

t-----there is a execution permission

4.Acl permission (access Control list)

It is special type of permission which is act on a directory and add a extra permission to a directory.

Also denies all other users to use these directory/file called ass acl

How to apply acl for a user

```
setfacl -m u:(username):rwx /test
```

How to apply acl for a group

```
setfacl -m g:(groupname):rwx /test
```

How to remove acl

```
setfacl -x u:(username):--- /test
```

```
setfacl -x g:(groupname):--- /test
```

How to remove all acl

```
setfacl -b /test
```

How to check acl

getfacl /test

• applying acl...

1st step:-create a user

useradd user1

passwd user1

2nd step:-create a directory

mkdir /test

3rd step:-check the directory

ls -ld /test

drwx r-x r-x ----default permission

4th step:-apply acl for user1

setfacl -m u:user1:rwX /test

5th step:-to check acl

getfacl /test

user:user1:rwX

user :rwX

group:r-x

6th step:-create a file in /test

```
su – user1  
cd /test  
touch sample1  
ls  
sample
```

To denies all others users permission...

1st step:-to denies other user

```
Setfacl -m u:user2:--- /test
```

2nd step:-to see user2 access or not

```
su – user2  
cd /test  
ls  
Permission denied:cannot see any  
Directory
```

Removing the acl of users from directory

```
Setfacl -x u:user1:rwx /test
```


Removing all acl from directory

setfacl -b /test

- **apply acl on group**

1st step:-create a directory

groupadd tech

passwd tech

2nd step:-apply on group

setfacl -m g:tech:rwX /test

3rd step:-to check acl

getfacl /test

user:rwX

group:tech:rwX

other:r-x

To remove acl on group

setfacl -x g:tech:rwX /test

4.sudo (super user do)

permission

it allows you to temporarily elevate your current user account to a root user/previlage.

means we can use root command as a local user

configuration files

- 1.vim /etc/sudoers
- 2.visudo

1st technique:-to do permission with password

1st step:-vim /etc/sudoers

- To search /root in the file and add Username below that with specific Path
- **Linux** **ALL=(ALL)** **/sbin/dmidecode**
- wq!

To check permission of /etc/sudoers

`ls -ltr /etc/sudoers`

`r-- --- --- /etc/sudoers`

2nd step:-

- `su -linux`
- `sudo dmidecode`
- Warning generated
(do not use sudo command) only for root
- Type the password
- And run the command in linux user

3rd step:-

- `su – user1`
- `sudo dmidecode`
- user1 is not in sudoers file .this incident will be recorded

4th step:-

- If another user access the sudo file
- these is an error and send a mail to the root user
- to access the sudo file

5th step:-

- You have a mail in `/var/spool/mail/root/`

6th step:-

- Mail generated in /var/spool/mail/root/
- Vim /var/spool/mail/root/

7th step:-To check direct mail

- Mail

2nd technique:-to do permission without password

1st step:-vim /etc/sudoers

2nd step:-

- Type a path below (same thing without Password)
- **Linux ALL=(ALL) /sbin/dmidecode**
- wq!

3rd step:-then go to the linux user

- Su -linux
- Sudo dmidecode
- File will be accessible

3rd technique:-to do permission with wheel group

1st step:-to add user into wheel group

- `gpasswd -a linux wheel`

2nd step:-

- `su – linux`
- `sudo dmidecode`, `sudo shutdown`,
- all commands get access by only linux user

4th technique:-permission with wheel group (add command into wheel)

1st step:-vim /etc/sudoers

2nd step:-

- Type a path below (wheel group)
- Edit below wheel (all)
- All-----/sbin/dmidecode

3rd step:-

- `Su -linux`
- `Sudo dmidecode`
- Access the permission

Filter and search utility

Filter:-it is a program that take plain text as standard output,transform it into a meaningful format and then return as a standard output.

Example:-

1.To show no of that line

```
grep -n root /etc/passwd
```

2.To show how many lines

```
grep -c root /etc/passwd
```

3.For extended words

```
grep -E root /etc/passwd
```

4.To show either capital or small

```
grep -i root /etc/passwd
```

5.To find out words only

```
grep root /etc/passwd
```

search:-to search a particular file/directory

1.locate:-

can find a file in database system

updatedb:-

can update file in database system

2.find:-

To find out file and related information

Examples:-

- Find / -name mayur
- Find / -user mayur -type d
/home/mayur

If we have to copy all related data of a user

Find / -user mayur -exec cp-rvf '{}' /backup\:

But the owenership be change to (root/root)

If we have not change the ownership

Find / -user mayur -exec cp-aprvf '{}' /backup\:

Archiving

Tar:-it can be used to create,compressed archives files and also maintain and modify them

Examples:-

- `tar -cvf /mnt/etc.tar /etc-----`to create
- `ls /mnt-----`to see file
etc.tar
- `du -sh /mnt/etc.tar-----`to check size
38mb
- `tar -xvf /mnt/etc.tar -C /mnt-----`to extract
- `ls /mnt-----`to check
etc etc.tar
- `du -sh /mnt/etc-----`to check size
43mb

There are three methods to compress

- 1.gzip (z) -----gz
- 2.bzip2 (j)-----bz2
- 3.xzip (J)-----xz

1st method :-gzip (z)

- Tar -czvf /test/etc.tar.gz /etc-----**compress**
- ls /test
etc.tar.gz
- du -sh /test/etc.tar.gz-----**to check size**
12mb
- Tar -xzvf /test/etc.tar.gz -C /test-----**extract**
- ls /test
etc etc.tar.gz
- du -sh /test/etc
43mb

2nd method:-bzip2 (j)

- Tar -cjvf /test/etc.tar.bz2 /etc-----**compress**
- ls /test
etc.tar.bz2
- du -sh /test/etc.tar.bz2-----**to check size**
11mb
- Tar -xjvf /test/etc.tar.bz2 -C /test-----**extract**
- Ls /test
etc etc.tar.bz2
- du -sh /test/etc
43mb

3rd method:-xzip (J)

- Tar -cJvf /test/etc.tar.xz /etc-----**compress**
 - Ls /test
etc.tar.xz
 - du -sh /test/etc.tar.xz-----**to check size**
8mb
 - Tar -xJvf /test/etc.tar.xz -C /test-----**extract**
 - ls /test
etc etc.tar.Jz
 - du -sh /test/etc
43mb
-

Scheduling

There are three tool for scheduling

1. At----- (non periodic task)
2. Cron----- (periodic task)
3. Anacron----- (desktop task)

At command:-

It is linux-command line utility used to schedule a job for later execution

Steps:-

- At “07:23” -----take particular time
>touch /task1 -----giving task
>mkdir /dir1 -----giving task
- Ctrl+D -----for save and quit
- Atq -----to check task
- ls / -----to check files
Task1

Cron command:-

It is a linux command line utility used to schedule a job to run in the background automatically.

Criteria:-

- 1.Minute
- 2.Hour
- 3.Day of month
- 4.Month (1-12)
- 5.Day of week (0-6) (Sunday 7)

Steps:-

- Crontab -e -----command
* * * * * /bin/touch file1---create
- wq! -----save and quit
- systemctl restart crond----- to update
- crontab -l -----to running task
- ls / -----to see files
file1

tasks:-

- 1.10 sept 20:45
 - 2.At 7.00am on Monday to Friday
 - 3.Perform task only on Saturday
 - 4.Every minute
 - 5.Every 5 minute
 - 6.Every 180 minute
 - 7.Every 90 minute
 - 8.For every 4th Saturday
 - 9.Every 2nd Saturday
 - 10.Every hours
 - 11.For 10min and every 2 hour
-

Package management

Redhat family

- 1.Low value tool-----rpm
- 2.High value tool-----yum

Debian family

- 1.Low value tool-----dpkg
- 2.High value tool-----apt

Package downloader

- 1.wget
- 2.curl -O

To check package

- 1.rpm -q (package name)

To check all packages

- 2.rpm -qa
- 3.yum list installed

To check information of package

- 4.rpm -qi (package name)

To check information of downloaded package

5.rpm -qip

How to download package

1.wget (package name)

2.yumdownloader (package name)

How to install package

1.rpm -ivh (package name)

where i-----(to install)

v-----(verbos)

h-----(hashing)

2.yum install (package name)

How to reinstall packages

Yum reinstall (package name)

How to update package

Yum update (package name)

How to upgrade package

Yum upgrade (package name)

How to unistall packages

1. rpm -evh (package name)
2. Yum remove (package name)
3. Yum autoremove (package name)

How to check provide package

Yum provides (command name)

How to check (search) package

Yum search (package)

Dependencies:-

One package depend on the other package

1. Rpm-----it does not download dependencies
2. Yum-----it download dependencies

How to recover unistall command

Suppose head command unistall and we have to recover these command

1. yum provides head

Coreutils-----package of head command

2. yum reinstall coreutils
3. the package has been reinstalled
4. then run the command
5. head anaconda

How to create repository

1.create a directory

mkdir /local

2.then change directory /local

cd /local

3.the download the package

yumdownloader tree

yumdownloader httpd

4.ls

httpd 2.4.6.97 el7 x86.64rpm

tree 1.6.0.10 el7 x86.64rpm

5.to create repository of local

`createrepo /local`

6.to create configuration file

`vim /etc/yum.repos.d/local.repo`

1.[abc 123]

2.name=local_repo

3.baseurl=file:///local

4.enabled=1

5.gpgcheck=0

7.then save and quit the file

`wq!`

8.Then yum clean all

9.Yum repolist all

10.yum install httpd

How to diasabled repository

`Vim /etc/yum.repos.d/local.repo`

1.[abc 123]

2.Name=local_repo

3.Baseurl=file:///local

4.Enabled=0

5.Gpgcheck=0

2.Then save and quit the file

wq!

3.Yum install httpd

The package install form update not from

[abc 123]

Networking:-

It is a interconnected computing device that can exchange data and share resources

OSI model (open system interconnection)

It is a seven layer that computer system use to communicate over a network

Sender side

- 1.Application layer
- 2.Presentation layer
- 3.Session layer
- 4.Transport layer
- 5.Network layer
- 6.Data-link layer

receiver side

- 7.Application layer
- 6.Presentation layer
- 5.Session layer
- 4.Transport layer
- 3.Network layer
- 2.Data-link layer

7.Physical layer

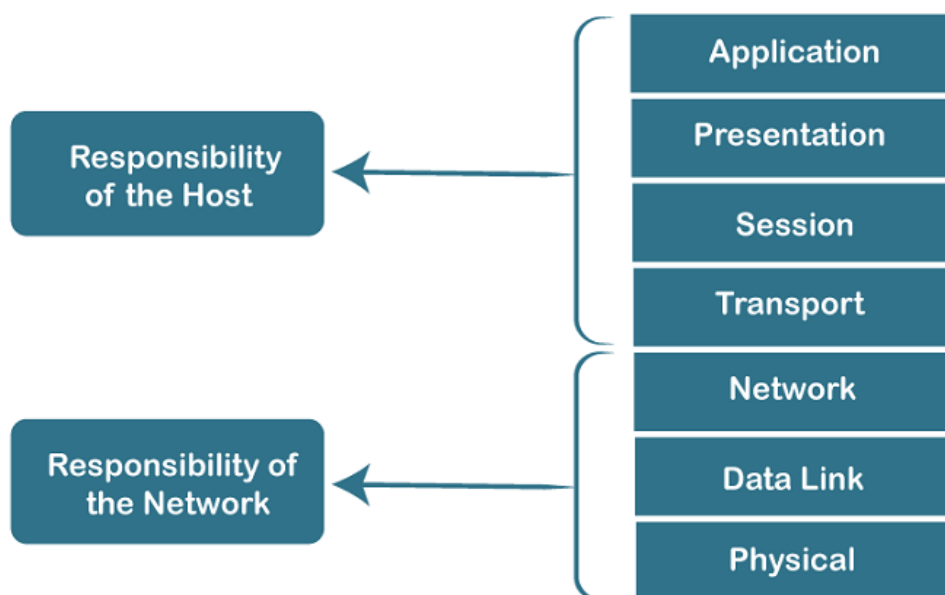
1.Physical layer

1st -----three layers are software layers

4th -----is heart layer

Next ---three layers are hardware layers

Characteristics of OSI Model



“All people seems to need data processing”

This is a shortcut sentence to learn seven layers

1.Application layer -----end user layer(ssh)

2.Presentation layer -----syntax layer(ssh,ftp)

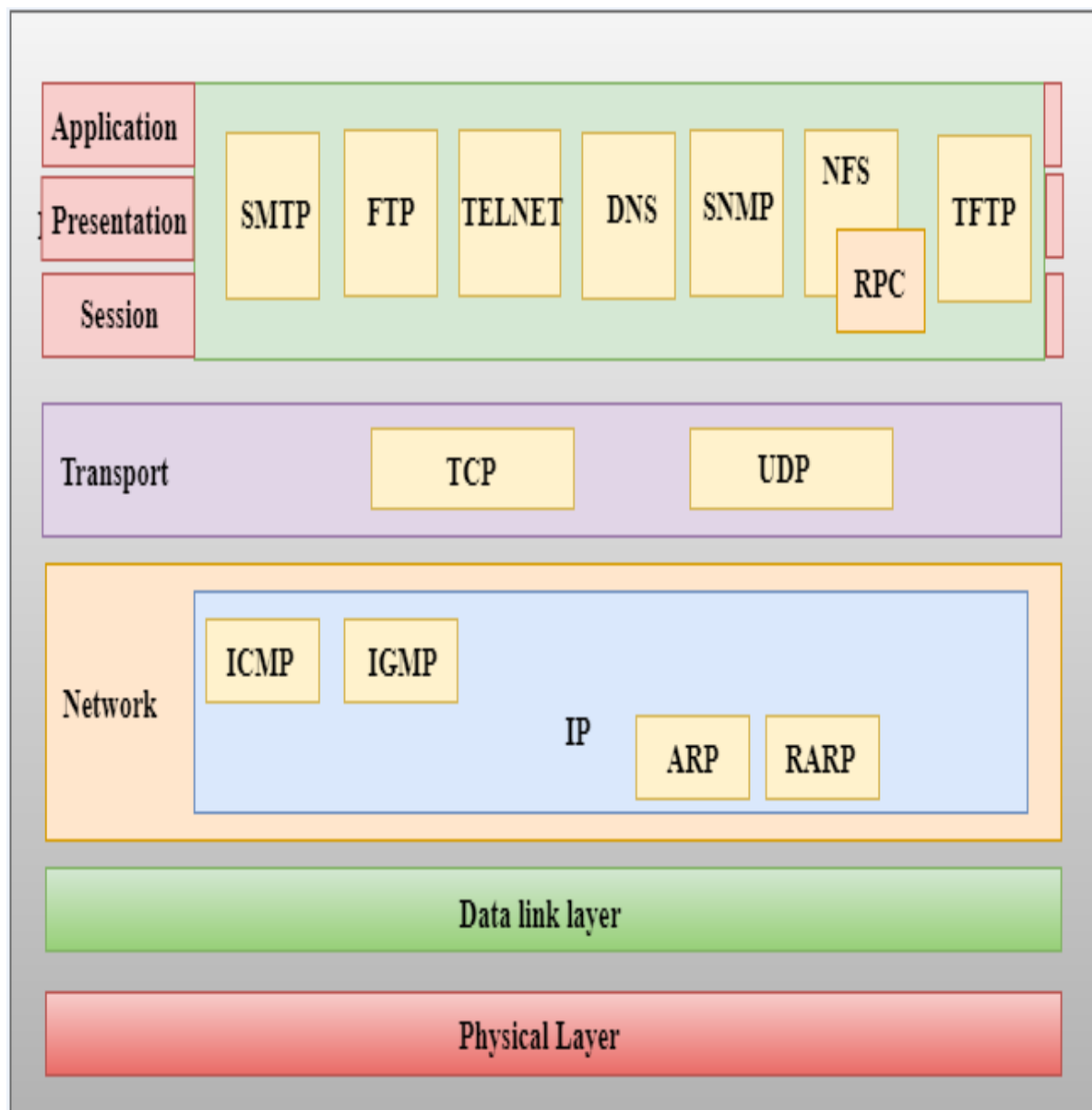
- | | |
|-------------------|---------------------------|
| 3.Session layer | -----maintain connection |
| 4.Transport layer | -----end to end connectin |
| 5.Network layer | -----packets ip/igmp/icmp |
| 6.Data-link layer | -----frames switch/ppp |
| 7.Physical layer | -----physical structure |

TCP and IP model

(Tcp—transmission control protocol)

It is a standard that defines how to establish and maintain a network conversation by which

application can exchange data.



IP (internet protocol)

It is responsible for delivering packets from the source host to destination host by looking at the IP address in packets header

UDP (user datagram protocol)

It is connectionless protocol and used for real-time applications such as video games, video calls, etc.

Example:-video games, video calls

Mac address

- MAC address is the physical address, which uniquely identifies each device on a given network. To make communication between two networked devices, we need two addresses: IP address and MAC address. It is assigned to the NIC (Network Interface card) of each device that can be connected to the internet.
- It stands for Media Access Control, and also known as Physical address, hardware address, or BIA (Burned In Address).
- It is globally unique; it means two devices cannot have the same MAC address. It is represented in a hexadecimal format on each device, such as 00:0a:95:9d:67:16.
- It works on the data link layer of the OSI model.

Why we need mac address

every mac address is assigned to the **NIC** of a hardware device that helps to identify a device over a network.

Computer network types:-

1.lan

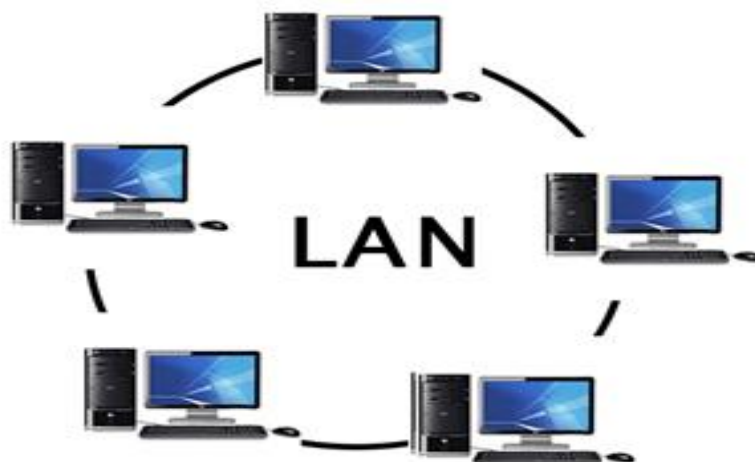
2.wan

3.man

3.pan

1.LAN (Local Area Network)

- Local Area Network is a group of computers connected to each other in a small area such as building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.
- Local Area Network provides higher security.



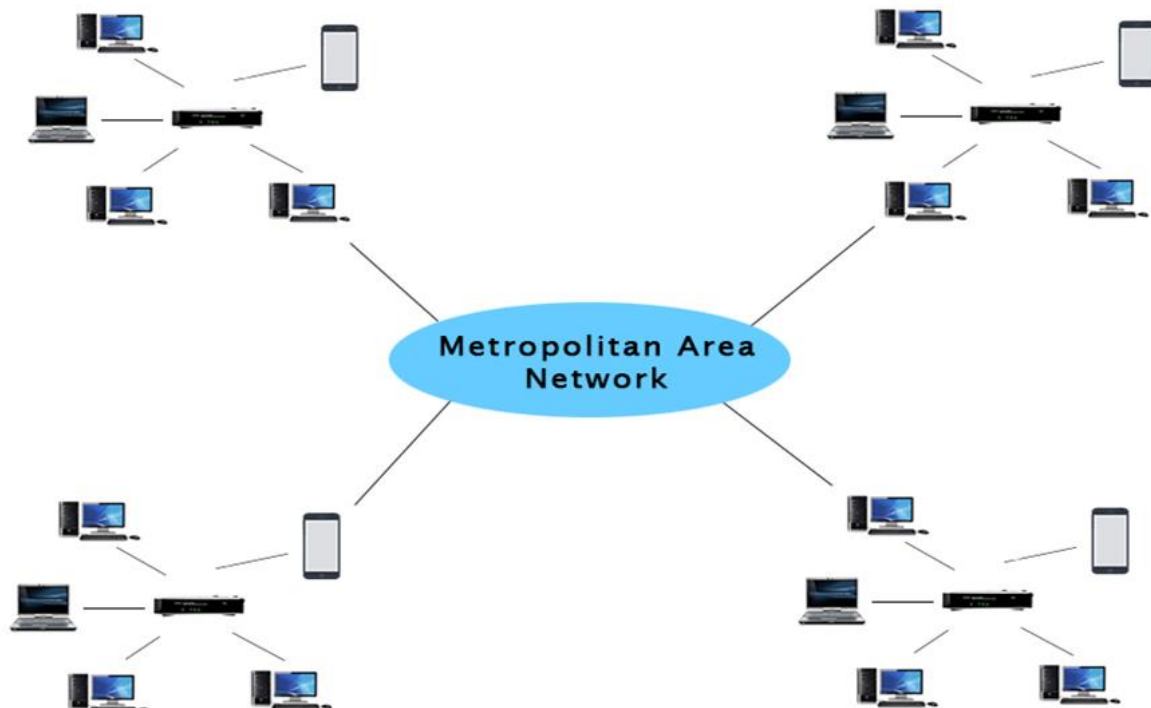
2.PAN (Personal Area Network)

- Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.
- Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.
- **Thomas Zimmerman** was the first research scientist to bring the idea of the Personal Area Network.
- Personal Area Network covers an area of **30 feet**.
- Personal computer devices that are used to develop the personal area network are the laptop, mobile phones, media player and play stations.



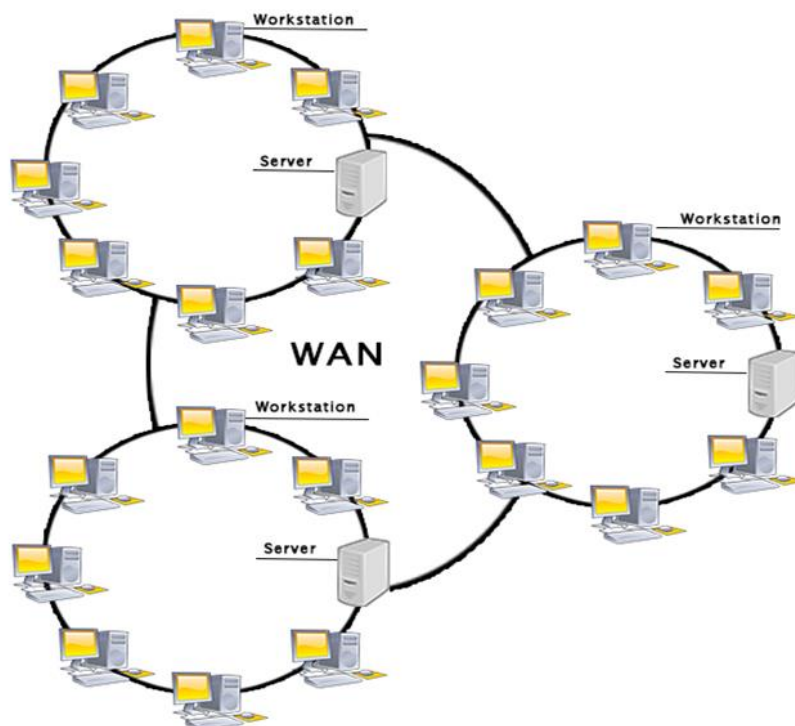
3.MAN (Metropolitan Area Network)

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than Local Area Network(LAN).



4.WAN (Wide Area Network)

- A Wide Area Network is a network that extends over a large geographical area such as states or countries.
- A Wide Area Network is quite bigger network than the LAN.
- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fibre optic cable or satellite links.
- The internet is one of the biggest WAN in the world.
- A Wide Area Network is widely used in the field of Business, government, and education.



Ip address:-

Physical card-----mac address-----48 bit

Ip4-----version 4-----ipv6----version 6

Ipv4-----32 bit

Ipv6-----128 bit

8 bit---8 bit---8 bit---8 bit

Classes:-

0-----126---(n/8)-----N H H H = $256*256*256$

128----191---(N/16)---N N H H = $256*256$

192----223---(N/24)----N N N H =256

224----239-----for special task and multitasking

240----255-----reaserches

127-----Is the system IP or loopback IP

Class A –subnet mask-----N H H H /8

Total no of host = 2^n

= 2^{24}

=167777216 host

Subnet mask =255 0 0 0

Class B –subnet mask-----N N H H /16

Total no of host =2ⁿ

=2¹⁶

=65,536

Subnet mask =255 255 0 0

Class C –subnet mask -----N N N H /24

Total no of host =2ⁿ

=2⁸

=256 host

Subnet mask =255 255 255 0

Networking to connect IP:-

- 1)GUI-----graphical user interface
- 2)TUI-----terminal user interface
- 3)CLI-----command line interface

How to give netmask , host and network

1.192.168.0.44/19

11111111/11111111/1110000/00000000

1.Netmask-----255 255 ($2^7+2^6+2^5$) 0

-----255 255 224 0

2.Network----- $2^3=8$

3.Host ----- $2^{12}-2=4096$

2.172.25.0.5/17

11111111/11111111/10000000/00000000

1.Netmask----255 255 (2^7)

----255 255 128 0

2.Network---- $2^1=2$

3.Host----- $2^{15}-2=3,27,666$

3.10.0.0/26

11111111/11111111/11111111/11000000

Netmask-----255 255 255 (2^7+2^6)

1.Netmask -----255 255 255 192

2.Network----- $2^2=4$

3.Host----- $2^6-2=62$

4.112.25.0/17

11111111/11111111/10000000/00000000

1.Netmask-----255 255 (2^7)

-----255 255 128 0

2.Network----- $2^1=1$

3.Host----- $2^{15}-2=32,766$

Private IP range:-

Class A -----10.0.0.0-----10.255.255.255

Class B-----172.16.0.0----172.31.255.255

Class C-----192.168.0.0---192.168.255.255

Public IP

1.internet service decide

IP

2.global access charge

3.globally unique

4.routable on internet

private IP

1.system admin

Decides IP

2.free of cost charge

3.locally unique

4.no routable on internet

Add adapter / assign IP with GUI

1.we have to add adapter

Setting—network—adapter2---internet

network---ok

2.start machine

3.ifconfig

4.enp0s8----assign IP for enp0s8

5.go to applications

6.system tools---setting

7.click on adapter enp0s8

8.click on IPV4

9.IPV4-----choose manual

10. address ----192.168.0.4

Netmask—255 255 255 0

Getway-----192.1680.1

11.then apply

12.ifconfig

13.ping 192.168.0.4

Add adapter / assign IP with nmtui

1.we have to add adapter

Setting—network—adapter3---

Internet network---ok

2.start machine

3.ifconfig

4.enp0s9----assign IP for enp0s9

5.type nmtui

6.edit a connection

7.ethernet---add—ethernet

9.profile name----first

Device name----enp0s9

10.IPV4 confi----automatic to manual show

11.address---192.168.0.6/24

Getway---192.168.0.1

12.okk

13.to activate diactivate connection go to the
nmtui again

14.activate connection

15.click on first

16.ping 192.168.0.6

Add adapter / assign IP with CLI

1.we have to add adapter

Setting—network—adapter3---internt
network---ok

2.start machine

3.ifconfig

4.enp0s10----assign IP for enp0s10

5.on the terminal

6.nmcli connection add con-name demo ifname
enp0s10 type ethernet ipv4.addresses
“172.25.0.4/24” gw4

“172.25.0.1”

7.nmcli connection show

8.to activate or diactivate the connection

9.ifup enp0s10-----for activate

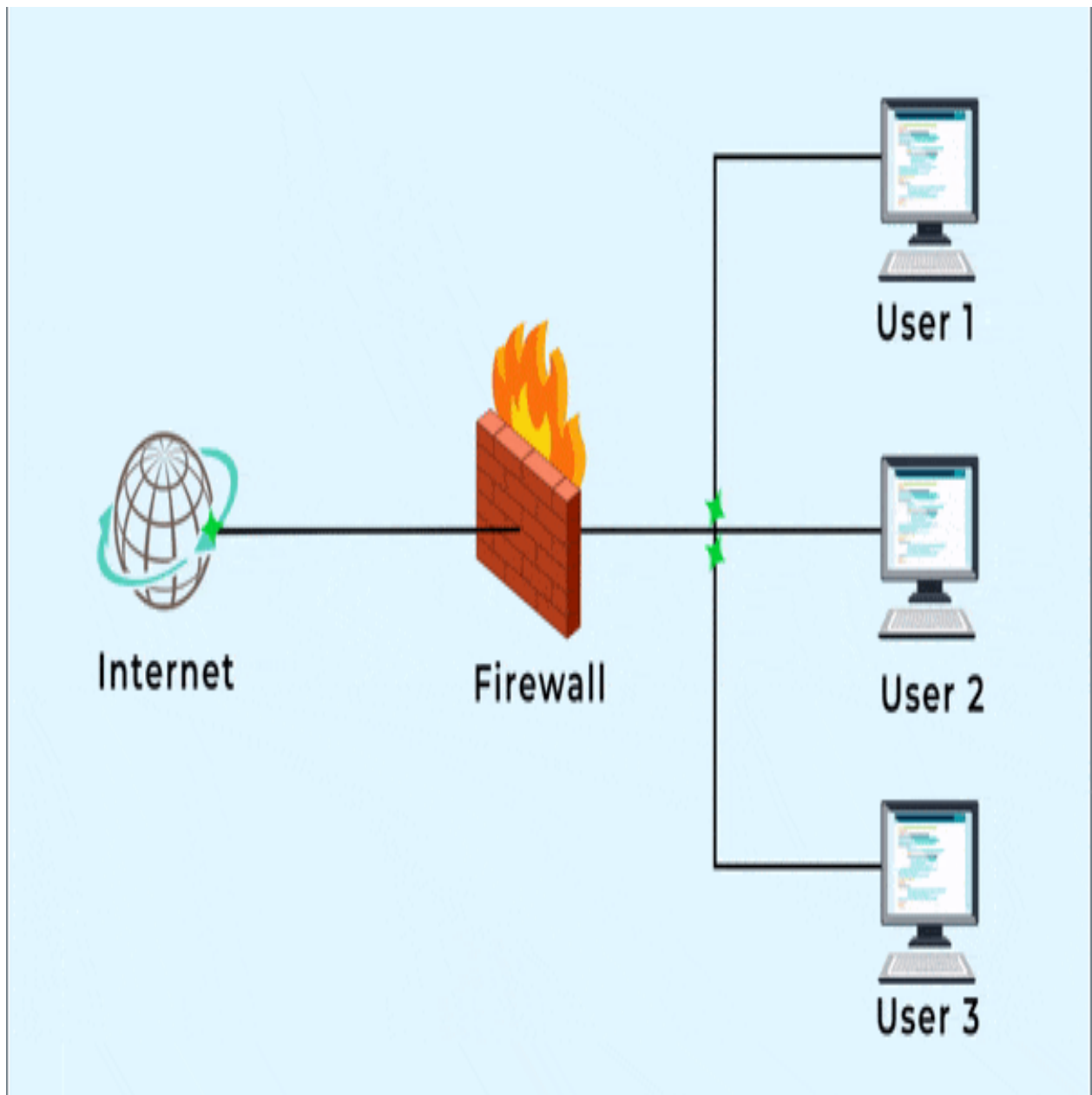
10.ifdown enp0s10---for diactivate

11.ping 172.25.0.4

Firewall

A Firewall is a network security device that monitors and filters incoming and outgoing network traffic based on an organization's previously established security policies. At its most basic, a firewall is essentially the barrier that sits between a private internal network and the public Internet.

(It is a additional security layer to maintained inbound traffic.)



Systemctl status firewalld

Systemctl start firewalld

Systemctl enable firewalld

If your internet doesn't work,try to change DNS...

Configuration file...

Vim /etc/resolv.conf

Nameserver 8.8.8.8

wq!

Ping 8.8.8.8-----it works

Simple way to host webpage

In server machine (172.25.0.4)

1.you have to install httpd

Yum install httpd

2.then configure /create a webpage

Vim /var/www/html/index.html

<h1>

Hello world

</h1>

Wq!-----to save and quit

3.to start services

systemctl start httpd

4.also if you have to enable the service

systemctl enable httpd

5.add http service

- Firewall-cmd --add-service=http

Or

- Firewall-cmd --add-service=http --

Permanent

- Firewall-cmd –reload

6.to check the services

Firewall-cmd --list-all

7.To check the webpage

Curl localhost

Hello world

8.also check in firefox

<http://localhost>

Hello world

In client machine (172.25.0.6)

9. ping 172.25.0.4

10.curl 172.25.0.4

Hello world

11.also check in firefox

<http://172.25.0.4>

Port forwarding

In computer networking, port forwarding or port mapping is an application of network address translation that redirects a communication request from one address and port number combination to another while the packets are traversing a network gateway, such as a router or firewall.

Port forwarding is to reduce the chances of hacking also enhance the security that's why we use port forwarding

Suppose we have to change the port

1.configuration file

```
Vim /etc/httpd/conf/httpd.conf
```

2.Then change listen

```
Listen80-----listen8080
```

3.then restart the httpd

```
systemctl restart httpd
```

4.In client machine

Curl 172.25.0.4

Does not access because we have to change ---the port 80 to 8080

5.In server machine

6.add 8080 Port in firewall

firewall-cmd --add-port=8080/tcp

7.to check the services /port

firewall-cmd --list-all

8.then in client machine

Curl 172.25.0.4:8080

Hello world

9.also check in firefox

<http://172.25.0.4:8080>

Hello world

10.To change port without knowing Anyones...

Firewall-cmd --add-forward-
port=port=80:proto=tcp:toport=8080

11.To check services/port

Firewall-cmd --list-all

12.go to client machine

Curl 172.15.0.4

Hello world

13.also check in firefox

<http://172.25.0.4>

IP address and masquerade

Masquerade NAT allows you to translate multiple IP addresses to another single IP address. You can use masquerade NAT to hide one or more IP addresses on your internal network behind an IP address that you want to make public.

In centos1 machine (172.25.0.4)

1.You have to install httpd

Yum install httpd

2.then configure /create a webpage

Vim /var/www/html/index.html

```
<h1>
```

```
Hello world
```

```
</h1>
```

```
Wq!
```

3.to start services

systemctl start httpd

5.add http service

Firewall-cmd --add-service=http

6.add masquerade

firewall-cmd --add-masquerade

7.then IP forward

Firewall-cmd --add-forward-port=port=80:proto=tcp:toaddr=172.25.0.6

Then centos 2 machine (172.25.0.6)

1.You have to install httpd

Yum install httpd

2.then configure /create a webpage

Vim /var/www/html/index.html

<h1>

This is new page

</h1>

Wq!

3.to start the services

`systemctl start httpd`

5.add http service

`Firewall-cmd --add-service=http`

6.add masquerade

`firewall-cmd --add-masquerade`

then in centos 3 machine (172.25.0.8)

1.ping the machines first

Ping 172.25.0.4

Ping 172.25.0.6

2.curl 172.25.0.4

This is a new page

But if we remove the IP forwarding

`Firewall-cmd --remove-forward-port=port=80:proto=tcp:toaddr=172.25.0.6`

In centos 3 machine

Curl 172.25.0.4

Hello world

SSH shell (secure shell) :-22/tcp

It is a network communication protocol that enables two computers to communicate

Or

It is a cryptographic network protocol or operating network service securely over unsecure network

Configuration file:- sshd_config

There are two ways to get remove access

- 1.passwd authentication
- 2.key-based authentication

1.password authentication

1.In centos machine

ssh root @172.25.0.4

get passwd of root

2.make directory

mkdir dir1

3.In server machine

ls

dir1

4.To stop config. Press control+D

2.key-based authentication

Two keys generated....

- Id_rsa-----private key
- Id_rsa.pub-----public key

Who wants to access----private key

Who give an access-----public key

In server machine (with creating user)

1.to create user

useradd admin

passwd admin

2.su – admin

3.ssh-keygen

Creating directory:-/home/admin/.ssh

4.ls -al

.ssh

5.cd .ssh/

6.ls

Id _rsa id_rsa.pub

7.to redirect public key in authorized_keys

cat id_rsa.pub >authorized_keys

8.give permission of read and write

Chmod 600 authorized_keys

9.ls -l

rw- --- --- admin admin authorized_keys

10.To copy private key in client machine

scp id_rsa root@172.25.0.6:/mnt

11.In client machine

ls /mnt

12.cd /mnt

ssh -i id_rsa admin@172.25.0.4

13.create directory

```
mkdir dir1
```

14.check in server machine

```
su – admin
```

```
ls
```

```
dir1
```

In server machine (with root user)

1.ssh-keygen

Creating directory:-/root/.ssh/

2.ls -al

.ssh/

3.cd .ssh/

4.ls

id_rsa id_rsa.pub

5.to redirect public key in authorized_keys

```
cat id_rsa.pub >authorized_keys
```

6.give permission of read and write

```
chmod 600 authorized_keys
```

5.ls -l

```
rw- --- --- admin admin authorized_keys
```

6.To copy private key in client machine

```
scp id_rsa root@172.25.0.6:/mnt
```

7.In client machine

8. ls /mnt

9.cd /mnt

```
ssh -i id_rsa root@172.25.0.4
```

10.create directory

```
mkdir dir1
```

11.check in server machine

```
ls
```

```
Dir1
```

To change port:-

In server machine

- 1.vim /etc/ssh/sshd_config
- 2.Change port 22-----2020
- 3.semanage port -a -t ssh_port_t -p tcp
2020

5.To stop passwd authentication

- 6.vim /etc/ssh/sshd_config
- 7.edit (yes-----No) in line no 65
Passwd authentication=no
- 8.systemctl restart sshd
- 9.firewall-cmd --add-port=2020/tcp

In client machine

- 1.ssh -i id_rsa [root@172.25.0.4](#) -p 2020
connection access

But if we remove the port from server

2.firewall-cmd --remove-port=2020/tcp

In client machine

3.ssh -i id_rsa [root@172.25.0.4](#) -p 2020

Connection denied

Port forwarding in SSH:-

In server machine

1,Firewall-cmd --add-forward-port=port=22:proto=tcp:toport=2020

In client machine

2.ssh -i id_rsa [root@172.25.0.4](#)

connection access

Process management

It is defined as running executable programme.

whenever the executable programme in running state called as process.

There are two types of process

1.shell jobs

The job which we can create

2.daemon process

The process which is running in background

Daemon -----(crond,sshd,etc)

States of processes

1.running process---R (foreground proc)

2.stopped process—T

3.sleep process-----S (interruptable)

4.sleep process-----S (uninterruptable)

5.zombie process---Z

The process which killed but still

Shows it is present

To check process id

1.ps -aux

2.ps -elf

3.Top

There two types of jobs to run process

1.background process-----bg

2.foreground process----- fg

Example:-

For background

1.sleep 456& -----to create job

Sleep 454&

2.jobs -----to check jobs

[1] stopped sleep 456

[2] stopped sleep 454

3.bg 1-----stopped to running

bg 2

5.jobs

[1] running sleep 456

[2] running sleep 454

For foreground

1.fg 1 ----- running to stopped

2.fg 2

3.jobs-----to check jobs

[1] stopped sleep 456

[2] stopped sleep 454

How to kill jobs

1. kill -9 (PID)
2. pkill (process name)
3. TOP

Renice value

To set the priority of process.

It ranges from -20-----19

1. renice -n 10 -p (PID)

Tree

It shows all the directories and files in a structural format /hierarchy format

Ps-tree

It show all the process and related process about that process

Log management

It is record of recent activities or recent events or notification

ls /var/log -----to check logs

ls /var/log-----to check crons

ls /var/log/httpd-----to check httpd logs

ls /var/log/yum.log---to check yum logs

To see logs

1.rsyslog-----it saves all the logs

2.journalctl-----it saves log from boot

3.systemctl -----to check latest logs

1.rsyslog-----user above RHEL 7

2.Syslog -----user below RHEL 7

3.message----total journalctl logs are here

RSYSLOG

it is a daemon service in which all systemlogs are stored / all remote logs

JOURNALCTL

it does not save the logs but it can show all the logs from boot process

There are 8 types of logs with priority

- 1.emergancy log------(0)
- 2.alert log------(1)
- 3.critical log------(2)
- 4.error log----- (3)
- 5.warning log------(4)
- 6.notice log------(5)
- 7.information log------(6)

8.debug log------(7)

How to create a log

1.logger “mayur”

How to check

1.journalctl -r

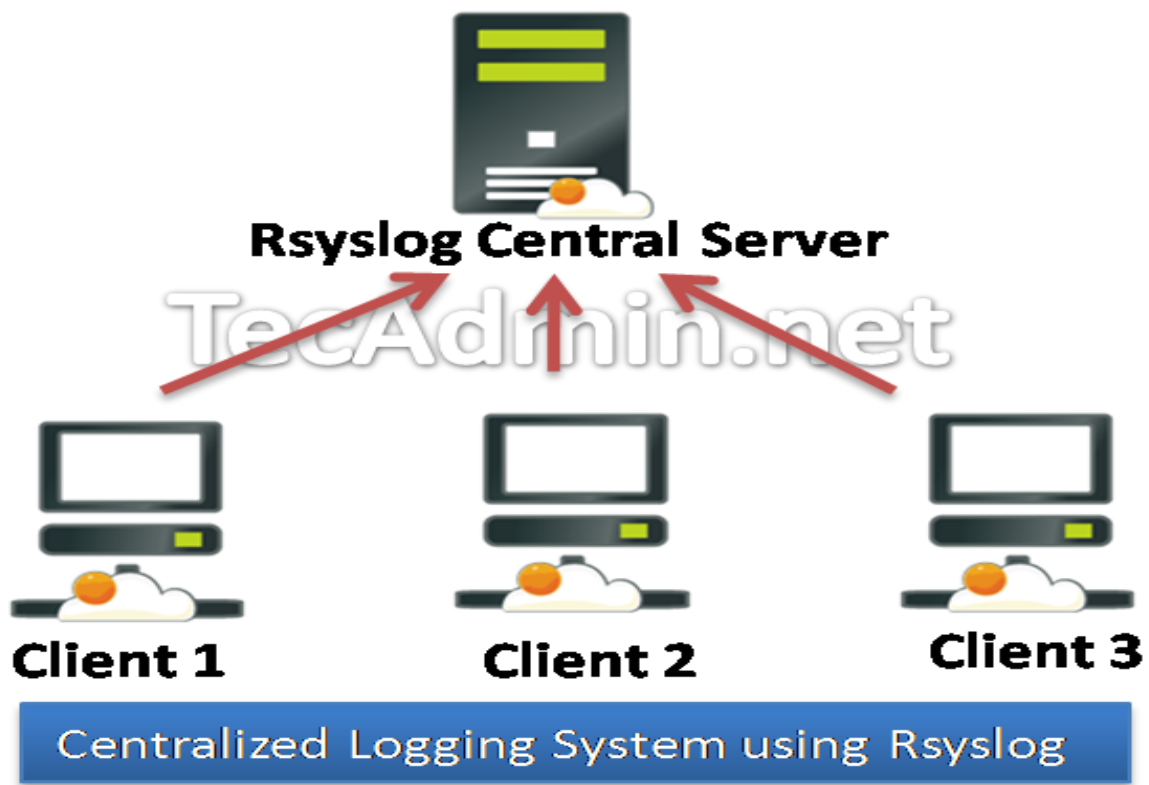
“ mayur”

Centralised log server:-

It is a process of collecting all your logs from networks infrastructure and application into a single location for storage and analysis

Configuration file is :-

Vim /etc/rsyslog.conf



Steps:-

In server machine

1.vim /etc/rsyslog.conf

- Uncomment line no 19 and 20 and edit 21
- \$template
templAuth,"/var/log/%HOSTNAME%/ %PROGRAMNAME%.log"
- *.* ?templAuth
- Wq!

2.systemctl restart rsyslog

3.firewall-cmd --add-port=514/tcp

In client machine

1.vim /etc/rsyslog.conf

- Add line below line number 90
- *.* @ @172.25.0.4:514
- Wq!

2.systemctl restart rsyslog

3.create a log

Logger “hello”

4.journalctl -r

“hello”

In server machine

1.ls /var/log/clone/

Root.log systemctl.log cron.log

2.vim /var/log/clone/root.log

Log rotation :-

It is a automated process used in system administration in which log files are compressed,moved,renamed or deleted once they are too old or too big.New incoming log data is directed into a new fresh file.

We can rotate monthly,weekly,daily, depending upon their size

```
1.vim /etc/logrotate.d/sample.txt
```

```
/root/sample/*.log {
```

```
Weekly
```

```
missingok
```

```
rotate4
```

```
compress
```

```
copytruncate
```

```
}
```

```
Wq!
```

2.mkdir /root/sample

3.ls /root

4.cd /root/sample

5.vim test.log

“this is a log rotation”

6.ls /etc/logrotate.d/sample.txt

7.logrotate -f /etc/logrotate.conf

8.ls /root/sample/

Test.log 20218823.gz

9.gunzip test.log 20218823.gz

10.ls

Test.log 20218823

11.vim test.log 20218823

Partition

Volatile memory:-

It is a temporary memory which is data stored in a memory for a specific time...

Eg..RAM

Non-volatile memory:-

It is a permanent memory which is data stored in a disk for a permanent way called as non-volatile memory...

Eg..ROM

Why we create partiion

- 1.partition can make backing up easier
- 2.separating user data from system data
- 3.allows use of different filesystem to be
Installed for different kinds of files.

Sata

the data stored in serial format called as sata.

Pata

the data stored in paragraph format called as pata

Filesystem

Proper configuration of storing metadata.it uses metadata to store and retrieve files.

To add disk

- 1.go to setting
- 2.storage----select sata----choose hard disk
- 3.create new
- 4.select virtual hard disk (VHD)
- 5.dyanamically allocated
- 6.then storage-----attached VHD
- 7.create partion of 8gb

Create partition of sdb

1. Fdisk /dev/sdb

Press n for create-----n

Select default (P)-----enter

Partion no (P)-----1

First sector (default)-----enter

Last sector-----+2G

Press n for create-----n

Select default (P)-----enter

Partion no (P)-----2

First sector (default)-----enter

Last sector-----+2G

Presss w for save

2. Lsblk-----to check partition

3.give them filesystem

```
mkfs.ext4 /dev/sdb1 /dev/sdb2
```

4.blkid-----to check filesystem

```
/dev/sdb1          type="ext4"
```

```
/dev/sdb2          type="ext4"
```

5.then mounting

- Temporary mounting

```
Mount /dev/sdb1 ./dev/sdb2 /mnt
```

6.df -Th-----to check mount

```
/dev/sdb1    ext4    2.0G  1.8G  /mnt
```

```
/dev/sdb2    ext4    2.0G  1.8G  /mnt
```

7.umount /mnt-----to umount

- Permanent mounting

1. Vim /etc/fstab

```
/dev/sdb1 /mnt ext4 defaults 0 0  
/dev/sdb2 /mnt ext4 defaults 0 0
```

2. lsblk-----to check partition

3. df -Th -----to check mount

Logical volume

Extend, merge, reduced etc....

There are three types of logical volume

1. physical volume

2. volume group

3. logical volume

To create physical volume

1.create physical volume of sdb1 & sdb2

`pvcreate /dev/sdb1 /dev/sdb2`

physical volume successfully created

2.pvs-----to check physical volume

3.pvdisplay -----to check physical volume

To create volume group

1.vgcreate vg /dev/sdb1 /dev/sdb2

2.vgs-----to check volume group

`Vg 2 0 3.99G`

3.vgdisplay----to check volume group

To create logical volume

1.lvcreate -L +2G -n lv vg

2.lvs-----to check logical volume

`lv vg 2.0G`

give them filesystem

1. `mkfs.ext4 /dev/vg/lv`
2. `blkid`-----to check filesystem

To mount

`Mount /dev/vg/lv /mnt`

Ls /mnt -----to check files

Lsblk -----to check partition

umount /mnt -----to unmount

To extend LVM

To extend volume group

1.Create one more new partion

Fdisk /dev/sdb

Press n for create-----n

Select default (P)-----enter

Partion no (P)-----3

First sector (default)-----enter

Last sector-----+1G

To change file type

Press t for type-----t

Partion number (3)----3

Hex code -----8e

Press w for save

2.partprobe -----to update

3.then create physical volume of sdb3

```
pvcreate /dev/sdb3
```

4.then extend the physical volume

```
vgextend vg /dev/sdb3
```

5.vgs-----to check volume group

```
Vg      lv      4.99G
```

To extend logical volume

```
1.lvextend -L +500M /dev/vg/lv
```

```
2.mount /dev/vg/lv /mnt
```

```
3.df -Th-----to check mount
```

```
/dev/mapper/vg-lv    ext4    2.0G
```

We give additional 500M but they show only 2gb .so we can resize the partition table.

4.e2fsck -f /dev/vg/lv

5.resize2fs /dev/vg/lv-----for ext4

• xfs_growfs-----for xfs

6.mount /dev/vg/lv /mnt

7.df -Th-----to check mount

/dev/mapper/vg-lv ext4 2.5G

8.umount /mnt

To reduce LVM

1. `e2fsck -f /dev/vg/lv`
2. `resize2fs /dev/vg/lv 2G`
3. `lvreduce -L -500M /dev/vg/lv`
4. `lsblk`-----to check partition
5. `mount /dev/vg/lv /mnt`
6. `df -Th`-----to check mount
7. `umount /mnt`

To reduce volume group

1. `vgreduce vg /dev/sdb3`
 2. `vgs`-----to check vgs
 3. `lsblk`-----to check partition
-

To rename LVM

- 1.lvrename /dev/vg/lv kk
- 2.lsblk-----to check partition

To rename volume group

- 1.vgrename vg mm
- 2.lsblk-----to check partition

To delete partition

- 1.lvremove /dev/vg/lv
- 2.vgremove vg
- 3.pvremove /dev/sdb1 /dev/sdb2
- 4.fdisk /dev/sdb

Press d for delete

Then press w for save

Format of partition

1.create a partion

2.pvcreate

3.vgcreate

4.lvcreate

5.file system (ext4,xfst)

6.mount (/mnt)

7.umount (/mnt)

Swap memory

When amount of physical ram is full.

If system needs more memory resources and the ram is full ,the inactive the pages in the memory move to swap space.

To check to swap memory

Free -h

Memory	990M	397M	209M	9.6M
Swap	1.7G	0B	2.0G	

Note

Ram \leq 2GB -----swap=2 * ram size

Ram \geq 2GB -----swap=2 + ram size

To create a partion

1.Fdisk /dev/sdb

Press n for create-----n

Select default (P)-----enter

Partion no (P)-----4

First sector (default)-----enter

Last sector-----+2G

Partition type

Press t for change lvm-----t

Hex code-----82

Default -----enter

Press w for save

2.partprobe-----to update table

3.lsblk-----to check partition

4.give them filesystem

mkswap /dev/sdb4

5.blkid-----to check filesystem

Dev/mapper/centos/swap	swap
------------------------	------

6.free -h-----to check swap memory

Swap	1.7G	0B	2.0G
------	------	----	------

7.swapon /dev/sdb4

8.free -h

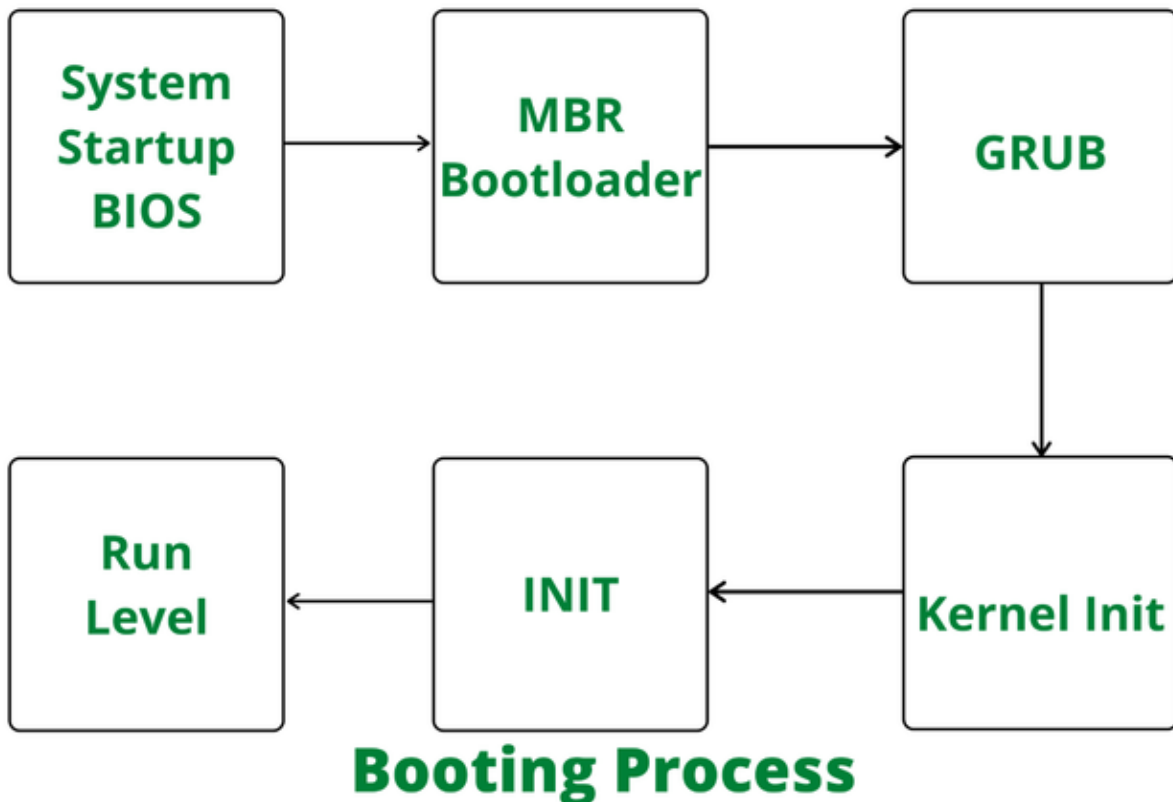
Swap	3.7G	0B	2.0G
------	------	----	------

9.swapoff /dev/sdb4

10.free -h

Swap	1.7G	0B	2.0G
------	------	----	------

Boot process



Run-levels:-

- 1.init1----halt the system
- 2.init2----single user mode
- 3.init3----multi user mode
- 4.init4----for future purpose
- 5.init5----multi user----networking all ser-
-vices we can used

How to set default user mode

1.systemctl get-default

Graphical interface

2.systemctl set-default multi-user mode

3.systemctl get-default

multi user mode

Extended web server

Single server , modules are different

Method:-

1.mkdir /var/www/html/mobile

2.vim /var/www/html/mobile/index.html

<h1>

“This is a mobile webpage”

</h1>

3.systemctl restart httpd

4.curl localhost

“Hello world”

5.curl localhost/mobile/

“This is a mobile webpage”

ftp (file transfer protocol)

it is a file transfer protocol in which the two computers can communicate with each other in a network and shared files within a network.

Port no 20 and 21:-

Port 20 -----transfer data via data channel

Port 21-----to establish connection between
Two computers

- Vsftpd-----very secure file transfer protocol
Daemon

It is used as one of the most common means of copying file between computers over the internet.

In server machine(172.25.0.4)

- 1.yum install vsftpd
- 2.systemctl start vsftpd
- 3.create files in /var/ftp
Touch /var/ftp/file{ 1..10}

3.fpt localhost

Name(localhost)---ftp

Password-----enter

4.ftp >ls -----to check files

File1 file3 file5 file4 file6 file7 file8 file9

File10 file2

5.ftp >? -----(?) to check which command

We used

6.ftp >! -----(!) to see external terminal

7.firewall-cmd --add-service=ftp

In client machine(172.25.0.6)

1.yum install ftp

2.fpt 172.25.0.4

Name(localhost)---ftp

Password----enter

4.ftp >ls -----to check files

File1 file3 file5 file4 file6 file7 file8 file9

File10 file2

1.How to upload file from anonymous user

1.vim /etc/vsftpd/vsftpd.conf

Uncomment---anon upload enable =yes

2.mkdir /var/ftp/shared

3.chmod 777 /var/ftp/shared

4.check getenforce

5.getsebool -a | grep ftp

6.setsebool ftpd_anon_write on
setsebool ftpd_full_access on

7.getsebool -a | grep ftp

8.systemctl restart vsftpd

9.create a file

man date >new

10.ftp localhost

Name(localhost)---ftp

Password-----enter

11.ftp >ls

File1 file3 file5 file4 file6 file7 file8 file9

File10 file2 shared

12.ftp >cd shared

13.ftp >put new

14.ftp >ls

rw- --- --- 13098 dec 4 new

2.How to download these uploaded file

1.vim /etc/vsftpd/vsftpd.conf

Write at last----anon_umask=022

2.systemctl restart vsftpd

3.create a new file

man cal >new1

4.ftp localhost

Name(localhost)---ftp

Password-----enter

5.ftp >ls

File1 file3 file5 file4 file6 file7 file8 file9

File10 file2 shared

6.ftp >cd shared

7.ftp >put new1

8.ftp >ls

New1,new

3.How to delete uploaded file

1.vim /etc/vsftpd/vsftpd.conf

Write at last---anon_other_write_enable=yes

2.systemctl restart vsftpd

3.ftp localhost

Name(localhost)---ftp

Password-----enter

4.ftp >ls

File1 file3 file5 file4 file6 file7 file8 file9

File10 file2 shared

5.ftp >cd shared

6.ftp >ls

New ,new1

7.ftp >delete new

8.ftp >delete new1

4. only local user can login

1. vim /etc/vsftpd/vsftpd.conf
Anonymous_enable----no
Local_enable-----yes
 2. systemctl restart vsftpd
 3. ftp localhost
Name(localhost)-----mayur
Passwd -----mayur
 4. ftp >
-

5. only particular user can login

1. vim /etc/vsftpd/user_list
Add line at end-----linux
2. vim /etc/vsftpd/vsftpd.conf
Add line at last----userlist_deny=no
3. systemctl restart vsftpd
4. ftp localhost
Name(localhost)----linux
Passwd -----mayur
5. ftp > ls

Storage

There are three types of storage

- 1.DAS---direct attached storage
(PENDRIVE,etc)
- 2.NAS---network attached storage
(SAMBA,NFS)
- 3.SAN---storage area network
(ISCSI,RAID)

NFS---(network file system)

Network file system allows a system to share directories and files with others over a network.

It is a mechanism for storing files on a network.

Package name----nfs-utils,rpc-bind,mountd

Port number-----2049

Configuration-----/etc/sysconfig/nfs

Service user-----nfsnobody

In server machine(172.25.0.4)

- 1.yum install nfs-utils
- 2.create a directory
Mkdir /shared2
Touch /shared2/file{ 1..10}
- 3.give permission of shared2 to nfsnobody
Setfacl -m u:nfsnobody:rwX /shared2
- 4.vim /etc/exports
/shared2 172.25.0.0/24(rw,sync)
- 5.exportfs -ar
- 6.systemctl start nfs
- 7.firewall-cmd --add-service=nfs
- 8.firewall-cmd --add-service=mountd
- 9.firewall-cmd --add-service=rpc-bind

Note:-

Rpc -bind -----use to transfer real data

Mountd-----to store information in

Network to store metadata

In client machine(172.25.0.6)

1.showmount -e 172.25.0.4

2.vim /etc/fstab

```
172.25.0.4:/shared2    /media    nfs
                        Defaults    0    0
```

Wq!-----to save and quit

3.mount -a

4.df -Th

```
172.25.0.4:/shared2    /media
```

5.ls /media

6.touch /media/file11

Note:-

1.it does not support cross platform

2.integrate with authentication services

Kerberos

3.it has three services running

(nfs , mountd , rpc-bind)

Samba server

It is A Samba file server enables file sharing across different operating systems over a network.

Is it also a cross platform means sharing of files windows also

- Smb-----authentication and data transfer
- Nmb-----network,interface netbios system

Smb----port no---445/tcp

Nmb----port no---139/tcp

File access in permissive mode

In server machine(172.25.0.4)

- 1.yum install samba
- 2.mkdir /access
- 3.useradd new
- 4.passwd new
- 5.vim /etc/samba/smb.conf

[access_dir]

Path=/access

Comment=this is a directory

Writable=yes

Browseable=yes
Public=yes
Write list=new
Read list=new
Valid users=new

Wq! -----save and quit

- 6.setfacl -m u:new:rwX /access
- 7.smbpasswd -a new
- 8.yum install samba-client
- 9.systemctl start smb nmb
- 10.smbclient -U new //localhost/access_dir
- 11.smb:\>
- 12.firewall-cmd --add-service=samba

In client machine(172.25.0.6)

- 1.yum install samba
- 2.systemctl start smb nmb
- 3.smbclient -U new //172.25.0.4/access_dir
- 4.smb:\>

Files access in enforcing mode

In server machine(172.25.0.4)

- 1.setenforce enforcing
- 2.semanage fcontext -a -t samba_share_t
"/access(/.*)"
- 3.restorecon -vFR /access
- 4.smbclient -U new //localhost/access_dir
- 5.smb:\>

In client machine(172.25.0.6)

- 1.Smbclient -U new //172.25.0.4/access_dir
- 2.yum install cifs-utils
- 3.vim /etc/fstab
- 4.//172.25.0.4/access_dir /mnt cifs defaults,
Username=new 0 0
Wq! -----save and quit
- 5.then mount
Mount -a
Passwd—mayur
- 6.df -Th
//172.25.0.4/access_dir cifs 28G /mnt

Connect system with windows

Linux-----→Windows

In windows

1.go to the network status-----change adapter

Option ----virtual box adapter only-----

192.168.56.1-----ip address

2.in centos machine

add adapter-----host only adapter

3.start the machine

4.ifconfig

192.168.56.101

5.ping in centos

192.168.56.1

6.ping in windows CMD

192.168.56.101

7.add service in firewall

Firewall-cmd --add-service=samba

8.go to this pc

Select----Map network drive

\\192.168.56.101\access_dir

Choose ---different credentials connect

9.username----new

Passwd-----mayur

Then connect the linux with windows and you can easily share files from linux to windows and windows to linux with the help of samba

Mariadb (mysql)

Database:-

it is a collection of data but in a organised form called as database.

There are two types of databases

- 1.sql-----structured query language
- 2.nosql-----non structured query language

1.sql (structured query language)

It helps in generating queries.

Static content---predefine schema-----
-----Vertically scalable.

2.nosql (non structured query language)

Dynamic content---it is horizontally

Scalable-----it has no structured schema

In server machine

- 1.yum install mariadb-server
- 2.systemctl start mariadb

3.configuration file

Vim /etc/my.cnf

4.set mariadb passwd

Mysql_secure_installation

5.mysql -u root -h localhost -pmayur

6.show databases;

7.create database student_data;

8.use student_data;

9.create table student_info (name
varchar(10),roll_no int,status varchar(10));

10.describe student_info;

11.show tables;

12.insert into student_info values
(‘user1’.100,’fail’);

13.insert into student_info values
(‘user2’.101,’pass’);

14.insert into student_info values
(‘user3’.102,’fail’);

15.insert into student_info values
(‘user4’.103,’pass’);

16.select * from student_info;
17.select name from student_info where
 Status='fail';
18.select name,roll_no from student_info
 Where status='pass'
19.delete from student_info where name
 ='user1'
20.drop table student_info;

How to give backup

Mysqldump -u root -h localhost -pmayur
student_data >abc.bkp

To recover database

Mysql -u root -h localhost -pmayur
student_data <abc.bkp

20.firewall-cmd --add-service=mysql

21.create user to login in client machine

22.mysql -u root -h localhost -pmayur
Create user user1 identified by 'mayur';
Grant all privilege on *.* to user1;
Flush privileges;

In client machine

1.yum install mariadb
2.systemctl start mariadb
3.mysql -u user1 -h localhost -pmayur

1.to separate schema

Mysqldump -u root -h localhost -pmayur
student_data --no-data>abc1.bkp

2.to separate data

Mysqldump -u root -h localhost -pmayur
student_data --no-create-info>abc2.bkp
