Linux administrator

* Linux designed a UNIX like kernel on 386 Intel machine and gave this open-source foundation (OSF).

Linux Distributions:

* Red hat

Suse Introduction and Installation of Linux:

Kernel is the core of the OS

Operating system is RHEL-7 (Red hat enterprise Linux )

Red hat is a distribution of Linux, know we are learning about RHEL-7 version

Function of kernel:

User(root)

e.g. # mkdir Bablu

Hardware

SHELL(/bin/bash)

\*Shell It converts human readable language into binary language.

\* Shell It converts binary language into human readable language.

LINUX KERNEL

vmlinuz

\*It verify the purpose of command or task

\* It verify the command provided correct or incorrect.

\* It allocate the RAM memory to the program.

\* It schedule process ID for each working program.

\* Hardware It check all hardware input and output devices. E.g : printer, disks.

History of Linux:

* In 1990, Linus Torvalds, a graduate student form University of Helsinky
* Puppy Linux
* Ubuntu
* Debian
* Turbolinux
* Linux mandrake
* Slackware linux
* Fedora
* Centos

They are two types of versions; they are free edition and commercial edition.

Features of Linux:

* Open source:
* Free software along with the source code and documentation.
* Multitasking:
* Capable of running multiple application and process at the same time.
* Multi-user:
* Allows multiple users to login and use the resource at the same time.
* Portability:
* Can be installed on all hardware architecture.
* Scalability:
* Same operating can be used on a desktop to a super computer.
* Reliability:
* Large servers have been successfully being running without a single second of down time.
* Security:
* Inbuilt firewall (iptables) and SELinux.

Recommended partitions size:

/boot – 200MB

/ - 8000MB

/usr - 10000MB

/var - 10000MB

/home - 2000MB

Swap – twice the ram size (recommended)

File System Hierarchy:

/ (slash):-

* This directory is called as the root directory.
* It is at the top of the file system structure.
* All other directory are place under it.

/ Root:-

* This is the default home directory of the root.
* In Linux/ Unix the administrator is called as root.

/ home:-

* It contains the home directories of all users (similar to documents and settings folder in windows).
* When any user logs in the current directory by default is the users home directory.

/boot:-

* It contains the kernel which is the core of the operating system.
* It contains file related for the booting the OS such as the boot loader.
* Bootable files (Initrd and initramfs)
* Bootloader (Lilo, Grub, Grub2)
* Kernel: vmlinuz and vmlinz – rescue
* Vmlinuz = to operate an OS
* Vmlinuz – recuse = to troubleshoot an OS

/sbin:-

* Sbin stands for system binary.
* It contains essential system command which can only be used by the superuser(root).
* Example:- fdisk, dump, etc…

/bin:-

* Bin stand for binery.
* It contains essential command which are used by all user.
* Example:- ping, cat, chmod etc…

/usr:-

* Usr stands for Unix system resources.
* It contains the programs and applications which are available for users (similar to program files in windows).

/var:-

* Var stands for variable
* It contains variable information, such as logs and print queues.

/dev:-

* Dev stands for device.
* It contains information about all hardware devices.

/opt:-

* Opt stands for optional
* It generally contains the third party software’s.
* Example: open office, Kaspersky antivirus etc..

/media:-

* It is the default mount point for removable storage media such as cdrom/ dvd and pen drives, ect..

**Commands for Linux:**

To check present working directory

* # pwd

1. To check files and directory

Eg; **# ls**

1. To check normal and hidden objects

Eg**: # ls -a**

1. To check object properties

Eg: **# ls -l**

1. To check objects Inode

Eg: **# ls -i**

1. To open the user directory

**# su – <user name>**

Eg: su – bablu

1. To check the last reboot system

* # who -b

1. To check file system

* # fsck

1. To change the text file length of the lines

* # fmt <file name>

To add a file by using (cat) command

1. **# cat > <files>**

Eg: # cat > admin

This is a file of Linux Ctrl+d (to save data)

1. To check file data

**# cat <filename>**

Eg: # cat adimin

1. To append filename

**# cat >> < failname>**

Eg: # cat >> admin

1. To read new added data

eg**; # cat admin**

1. To add multiple files by using ‘touch’ command

**# touch file1 file2 file3 file4**

Eg; # ls (to list new files)

**To create single folder**

1. To add new directory folder

Eg**: # mkdir < folder name>**

# ls (to list)

1. To add data into director add new file.

# cd <dir name>

Eg**: cat > linux**

This is a file ( press enter) Ctrl + d ( to save )

1. To add multiple directory

**# mkdir <dir name> <dir name> <dir name>**

Eg: # mkdir madhu bala Preethi

# ls (to list)

1. To add parent directory

**# mkdir -p <dir1>/<dir2>/<dir3>**

Eg: # mkdir -p /<file name>/f1/f2/f3/f4/f5/f6

1. To fine sub directory along with parent directory

**# ls -R / <file name>| less** (screen wise)

q (for quit)

1. To go to last working directory

Eg: **# cd –**

1. To remove only file

Eg;**# rm <file>**

1. To remove an empty directory

Eg**: # rmdir <dir (folder)name>**

1. To remove directory forcefully

Eg**: # rm -rf /file name**

**0**

**To copy and past data between file to file**

1. To copy the files to one file to another file

**# cp <sorce file> <destination file>**

Eg: # cp file1 file2

Result: # cat file2 (to find new data)

1. To copy data without overwriting

**# cat <source file> >> < destination file>**

Eg: # cat file2 >> file3

# cat file (to find new data)

1. To copy and paste single folder

**# cp -rvp <source directory> <destination diectory>**

Eg: # cp -rvp Document Destop

# ls desktop

1. To copy and paste multiple directory’s

Eg: **# cp -rvp music document /mnt**

# ls /mnt (to list)

1. To copy and paste multiple with common name

Eg**: # cp -rvp file\* /mnt**

# ls /mnt (to list)

1. To copy and paste complete data

Eg**: # cp -rvp /root/\* /media**

To cut and paste the data

1. To cut and past

**# mv <source directory> <existing directory>**

Eg: # mv document /media

# ls /media (to find)

1. To rename an object

**# mv <souce> <new name>**

Eg: # mv music movies

# ls (to list)

To view the manual page of command

**# man <command**>

To view the command history

**# history**

**To check the date and time**

1. To check the date and time

**# date**

1. To change the date and time

**# date -s “date month date hours min seconds”**

1. To see the calendar

**# cal | less (or) # cal | more**

1. To view the content of the file screen wise

**# less <filename>**

1. To view the top lines of a file

**# head <filename>** ( top ten lines)

**#head -5 <filename>** (top five lines)

1. To view the bottom lines of a file

**# tail <filename>** (bottom ten lines)

**# tail -3<filename>** (bottom 3 lines)

1. To fine the location of file or directory

**# find / -iname<file/dir name>**

1. To count the word, line and characters of file

**# wc install.log**

VI - Editor

Editors:

Editors are used for adding, modification and or deleting text

The different editors used

* Windows: Notepad
* DOS : edit
* Linux/unix
* CLI based : ex , ed , vi and vim, etc..
* GUI based : emacs, gedit, nedit, nano, notepad, kwrite and pico, etc…
* VI editor is a screen-oriented text editor written by Bill joy in 1976.
* This is the most commonly used editor for editing files in Linux.
* This editor works on basis of default three modes.
* Command mode
* Insert mode
* Ex mode(Extended command mode)

**Command mode:** This mode is mainly used to copy, delete, find, paste, and undo, re-do.

**Ex mode (Extended command mode):**

This mode can be used to save the changes, to quit from editor, to replace name, to check line numbers, to remove line numbers.

**Insert mode:**

This mode is used to insert new data in the file and also to modify existing data of a file.

**Steps to create a file using editor:**

* Create a file using cat command eg: **cat > file name**
* Open the file with VI eg**: vi <file name>**
* Press( **I )**to go insert mode to doing changes.
* After doing changes press **( Esc )** key to go command mode.
* To save changes go to extended mode using **( shift+ : )** and at bottom right**( wq )**for save and quit.
* To make more changes by using the task like copy past delete set number find name and replace name us the following options.

**To go insert mode from command mode:**

* i - Insert the text at the current cursor position
* l - Insert the text in beginning of a line
* a - Adds the text after the current cursor position
* A - Adds the text at the end of a line.
* o -Insert the text one line below current cursor position.
* O -Insert the text one line above current cursor position.

**Extended mode:**

* :q -quit without saving
* :q! -quit forcefully without saving
* :w -Write (save)
* :wq -save and quit
* :wq! -save and quit forcefully
* :se nu -Sets line numbers
* :se nonu -Removes line numbers
* :84 -The cursor goes to lines 84
* 1,$s/old name/new name -Replace the word name

**Command Mode:**

* dd - Deletes a line
* ndd - Deletes ‘n’ lines
* yy - copies a line
* nyy - copies ‘n’ lines
* p - put (pastes the deleted or copied text)
* u - undo (you can undo 1000 times)
* ctrl+r - Redo
* G - Moves the cursor to the line of the file
* /<word to find> - finds a word (press n for next)
* To shut down an OS

# init 0

* To restart an OS

# init 6

* To work on cli made in all six consoles

# init 3

* To work on cli mode and also on gui mode

# init 5

In run level 5 there are six consoles, one will be work on gui mode and five will be work on cli mode.

Ctrl+alt+f1 = first console which work on gui mode

Ctrl+alt+f2 to ctrl+alt+f6 = second to six consoles work on cli mode

* To find working console

# tty

* To find working runlevel

# runlevel

**User Admin**

**Users:**

* In computing a user is a person who uses a computer’s objects, resources or internet service.
* A user will have a user account that identifies the user by a username. The username can be recognized even with the uid.
* To log on to a system, a user is required to authenticate himself with a password for the purpose of accounting, security, logging, and resource management.

**Users Database files:**

* /etc/passwd
* /etc/shadow

**System users:**

* The user which created default by an operating system are called system users the function of this users to mange all the system servers such shutdown, restart and an application servers such as ftp, web server, mail server etc..
* This user can be identified with the help of UID starts from 0 to 999
* I Linux and Unix operating systems root user is know as super user which come default with 0 UID and it is an example of system users
* Normal users the users which created manually by super user are called normal users the function of normal users to share the resources and object data with the help of limited permission.
* The normal users can be used like a domain users and like a local user

**User properties:**

* The information of each user created is stored in a separate line in the file vi **/ect/passwd**
* Each record has seven field separated by a : as given:-
* **Eg: ravi1 : x : 1000 : 1000 : prog : /home/ravi: /bin/bash**

**User password properties:**

* This file contains the encrypted user password
* Password are encrypted using SHA 512 default which can even be change vi **/etc/shadow**

**Password encryption tools in Linux:**

* DES: 64 bits (Data encryption standard)
* MDS: 128 bits (Message digest version 5)
* SHA: 512bits (Secure Hash Alogorithm)

1. **To add a user:**

**# useradd <user>**

Eg: # useradd tom

1. To set password on user

**# passwd <user>**

Eg: # passwd tom

1. To check password encryption tool

**# passwd -s <user>**

Eg: # passwd -s tom

1. To check user properties

**# tail /etc/passwd** (to check last 10 user properties)

**# head /etc/passwd** (to check top 10 user properties)

**# grep user /etc/passwd** (to check single user properties)

1. To login user on new GUI console

**# gdmflexserver**

Tom

123 (password)

# mkdir data{1..100} (to add new data)

Note: to check data, move to admin console using ctrl+alt+f1 and check user data in user home directory i.e…

**# ls /home/user**

1. To lock an user account

**# usermod -L <username>**

# usermod -L tom

# grep tom /etc/shadow (exclamation mark (!)) is a sign of locking user)

1. To unlock user account

**# usermod -U <username>**

# usermod -U tom

# grep tom /etc/shadow (! Sign will be remove)

1. To delete the user in home

* # sudo userdel --remove <username>

User mode and Group admin

**Group permissions:**

* Group is a collection of user to whom the same permissions are to be applied.
* There are two types of group
* Primary
* Secondary
* Linux uses a user private group (UPG) scheme
* When a user is created a group with the same name as the group name is also created.
* This becomes the primary group for that user
* A user can have only one primary group.
* The main use of primary group is to apply Disk Quotas.
* The group which created manually by root user to add an existing users is called secondary group.
* The information of each group is created is stored in a separate line in the file **grep** **/etc/group**
* Each recode has four fields separated by : as given:-
* Eg: **sales : x : 1000 : sachin,kumar**
* In the above :-
* **( sales** ) is called as group name
* **( x : )** is called as mask password
* **(1000)** is called as GID
* **(Kumar)** is called as secondary members

**Group password properties:-**

* This file contains the encrypted group password
* Password are encrypted using MD5 ( Message Digest version 5)

Algorithm **grep** **/etc/gshadow**

* **Sales : hjkadfhs8 : admin : sachin,kumar**
* In the above:-
* **Sales** is called as group name
* **hjkadfhs8** is called as Encrypted password
* **admin** is called as list of administrative members
* **kumar** is called as list of members

Basic File Permission

**Permission:**

* In computing, a permission are use to create secure environment in the network to secure the data an against from unauthorized users.
* In Linux platform permission are secured by the default mechanism called Umask.
* Permission are mainly use in sharing data environment which can be implement in Linux by using same servers like Nfs and Samba.

**Umask:**

* In Linux and Unix operating system the value of objects and permission can be secured by Umask.
* The Umask value by default root user is 0022 and for normal users is 0002.
* The first digit in the both the user level of Umask will be use for advance file permission and remining three basic file permission.
* The purpose of basic file permission to configure and remove permission such as read, wright and execute.
* The purpose of advance file permission to secure data against deleting after proving the full permission are file are folders.
* ACL(accuse control list) this is one of the permission policy in Linux which is mainly used to configure different permission on different users and groups.
* The ACl permission can be configure using the command call **setfacl**

**To check umask:**

* # umask

**To change umask temporally.**

* # umask <value>

**To change umask permanent.**

* # vi /etc/bashrc

Properties of files and Directory:

* Unix / Linux files have 8 attributes that can be seen with **ls -ld** command
* **# ls -ld** reports.
* **Note:** Only the owner or the root can change the permission.

**Absolute mode:**

* This mode is use to configure permission on files and folders using the three numeric in which:-
* First digit use for owner level.
* Second digit use for group owner.
* Third digit use for others.

**Symbolic mode:**

* This mode is to configure permission on objects using alfa characters accordingly the access modes and access levels

1. Create a new file

* **# cat > project**

This is a file of root user

Ctrl+d (to save)

1. Add new user

* **# useradd <user name>**

1. Give write permission on other level

* **# chmod <permission\_mode> <file/folder>**
* Eg: #chmod 646 project (Absolute mode)

(OR)

# chmod o+w project (symbols mode)

# ls -ld project (to check new permission)

1. Give fill access along with sticky bit on admin directory.

* **# chmod 1777 /root**
* ls -ld /root

1. To find result, try to access file as normal

* su -username
* $ cd /root
* $ cat filename (user can read)
* Cat >> filename (user can write)

1. Try to delete project file

* **$ rm -rf project**

**Umask 0022 =0= advanced , 022=basic and ACL’S**

**File permission:**

4+2:6 4 0 0 :4 4 0 0 :4 644

\_ r w \_ r \_ \_ r \_ \_

File owner root group root other and all normal users

|  |  |  |
| --- | --- | --- |
| Access level | Access mode | permission |
| Owner = u    Group = g  Other = o | Read = r = 4  Write = w = 2 | 6 6 6  6 4 4  0 2 2 |

|  |
| --- |
| **Permission** |

|  |  |
| --- | --- |
| Absolute mode  4 3 1 | Symbolic mode  r w x |

**Directory permission:**

4+2+1:7 4+0+1:5 4+0+1:5

d r w r r \_ x r \_ x

Dir owner group other and all user nornal

|  |  |  |
| --- | --- | --- |
| accesslevels | Access mode | Permission |
| Owner = u  Group = g  Other = o | Read = r = 4  Write = w = 2  Execute = x =1 | 7 7 7  7 5 5  0 2 2 |

**Symbolic mode:**

-rw-,r--,r—

Other =0, group=g, owner=u

Read=r, write=w and execute=x

#chmod g+w filename

#chmod 0+w filename

# chmod u-rm filename

# chmod u+rwx, g+rwx, o+rwx filename

# chmod ugo=rwx filename

# chmod <permission\_mode> <file/folder>

**Absolute mode:**

644

Read=4, write=2 and execute=1

# chmod 646 filename

# chmod 664 filename

# chmod 044 filename

# chmod 000 filename

# chmod 777 filename

# chmod 666 filename

Access control list (ACL) chown and chgrp and partitons and swap

**To change owner of object:**

1. Create a new user of the file

* # useradd <username>
* # chown <user> <file/folder>
* # chown <uername> <file name>
* # ls -ld <user name> (check new owner)
* # su - <username>
* # cd /root (user can enter into admin directory)
* # cat <user name> (user can read)
* # cat >> <user name>(user can write)

**To change group owner of object:**

1. Add a new group

* # groupadd <group name>
* # useradd s1
* # useradd s2
* # gpasswd -M s1,s2 <group name>
* # chgrp <group\_name> <file/directory>
* # chgrp <group name> <file name>
* # chmod g+w <file name>
* # ls -ld project (to check new group)
* # su – s1
* # cat <group name> (group user can read)
* # cat >> <group name> (group user can write)

**To change the group:**

* This command is used to change new group and existing group **# newgrp**

**To set ACL’S permission on user level:**

* # setfacl -m u:<username>:<permissions> <file/directory>

**To set ACL’S permissions on group level:**

* # setfacl -m g:<groupname>:<permission> <file/dierctory>
* # getfacl <file/folder> (to check Acl permissions)
* # ls -ld <file\_name>

Note: check ACl result, try to access file by login as a acl users and member.

**Partitions list:**

1. Check the partitions list

# fdisk -l

1. Enter into fdisk mode

# fdisk /dev/sda

Press ‘n’ to add new partition

Press enter to skip sectors option

+100M(partition size)

P( to print new changes)

W (to save new changes)

1. To activate new partition

# partprobe /dev/sda

1. To format partition

# mkfs.ext4 /dev/sad10

1. To mount partition or directory to access it.

# mkdir /disk10 (add new directory)

# mount <partition no.> <dir name>

# mount /dev/sad10 /disk10

# mount | grep /disk10 (to check mounting details)

# mkdir /disk10/data{1..100}

# df -hT (to check size)

1. To make permanent mount

# vim /etc/fstab

/dev/sda10 /disk10 ext4 defaults 0 0

:wq

# mount -a (to update new changes of fstab file)

**To create swap partition**

1. Find the ram size

# free -m

1. Create a partition double to ram size

# fdisk /dev/sda

n (to add new partition)

press enter to skip sector

+4gb (partition size)

t (to change toggle id)

p (to check new partition number)

12 (partition no.)

82 (swap toggle id)

W (save and quit)

# partprobe /dev/sad

1. Format the partition with swap

# mkswap /dev/sad12

1. Turn on swap service

# swapon /dev/sad12

1. Find the new swap size

# free -m

1. Mount permanent across reboot

# vi /etc/fstab

/dev/sad12 swap swap default 0 0

: wq

# mount -a (to update fstab file)

Disk Quotas and Logical Volume manger (LVM)

* Quotas are used to restrict the amount oh hard disk space occupied by a user or a group.
* Group level quota can only be applied to primary group.
* Quota can be applied on quota enabled partitions.
* User repeatedly exceed their quotas or consistently reach their soft limits, a system administrator has a few choices to make depending on what type of user they are and how much disk space impacts their work. The administrator can either help the user determine how to use less disk space or increase the user’s disk quota.

Quotas can be applied in two ways:

* Based on the number of the Inodes (number of files).
* Based on the number of blocks (volume of hard disk space).
* To apply blocks quota block size of partition is needed.
* To find block size of partition

**# blockdev –getbsz <partition no.>**

**Quotas limits:**

**There are two quotas limits:**

* **Soft –** soft quota limit will only warn the user that they have reached their quota limits.
* **Hard –** hard quota limit not allow the user to create any more files or directories once the quota limit has been reached.

**To configure inode quota:**

1. Add a new partition

# fdisk /disk/sda

# partprobe /dev/sda

# mkfs.ext4 /dev/sda14

# mount -o <usrbablu> <grbablu> /dev/sad14/mnt

# mount | grep /mnt (to check quota mount point)

1. Create quota DB on partition

# bablucheck -cug /mnt

# babluon /mnt

1. Apple full permission on bablu partition

# chmod 1777 /mnt

1. Apply limit on user

# useradd bablu

# edquota -u bablu

Inodes soft hard limit

0 10 12

:wq

# su – bablu

# cd /mnt

# mkdir /mnt/data{1..13}

# ls

**Steps to apple quotas:**

* Create a new partition.
* Format the partition.
* Create an directory.
* Mount the partition on the directory with quotas enabled.
* Give full permissions to the partition.
* Create the quota database file.
* Turn on the quota.
* Assign the quota limit to the user or group.

**Appling quotas on a partition:**

**To mount the partition with quota enable:**

* # mount -o usrusername,grpusername <partition name> <mount point>

**Generate the quota database file:**

* # quotacheck -cugv <mount point>

**Options:**

* -c create new database
* -g group
* -u user
* -v verbose

Logical volume manager (LVM)

**To configure LVM:**

1. Add new partitions eg:100mb

# fdisk /dev/sda

n (to add new disk)

press enter key to skip sector or cylinders option

+100mb (partition size)

W (to save)

1. To activate new partitions

# partprobe /dev/sda

1. Create physical volume

# pvcreate /dev/sda11

# pvdisplay

1. Add valume group

# vgcreate <vgname> <pv1>

# vgcreate bablu /dev/sda11

# vgdisplay

1. Add logical valume’s

# lvcreate -L <size> <vgname> -n <lvname>

# lvcreate -L +100m bablu -n linux

# lvdisplay

1. Format lv

# mkfs.ext4 /dev/bablu/linux

1. mount LV on directory

# mount /dev/bablu/linux /mnt

# mount (to check mount point)

1. add data into LV directory

# cp -rv /usr/\* /mnt

# df -h

1. to extend LV size

# lvsize -L +100M -n /dev/bablu/linux

# resize2fs /dev/bablu/linux

# df -h

1. to extend vgsize

# fdisk /dev/sda (add a new disk)

# partprobe /dev/sda

# pvcreate /dev/sda12

# vgextend /dev/bablu /dev/sda12

# vgdisplay

1. to remove LVM’s

# umount /mnt

# lvremove /dev/bablu/linux

# vgremove /dev/bablu

# pvremove /dev/sda11/dev/sda12

**Redundant array of independent Disks (RAID)**

**RADI:**

* RAID is a technology that employs the simultaneous use of two or more partitions on the same or different hard disk drives to achieve greater levels of performance and reliability.
* An advantage of RAID to prevent data loss.
* It is a fault tolerance mechanism in which the data is not lost even if one of the disk fails.
* It is a parity mechanism in which the data backup is maintain in RAID array.

**To configure RAID level file :**

1. add some partitions eg(4): with equal size 100mb

# fdisk -l

# fdisk /dev/sda

# partprobe/dev/sda

1. create metadisk by adding requirement partition

# mdadm -C /dev/md0 -n3 /dev/sda{17..19} -l5

# mdadm -D /dev/md0 |less (to see the raid level)

1. format metadisk and mount

# mkfs.ext4 /dev/md0

# mount /dev/md0 /media

# mount (to check mount)

# mount /media/data{1..100}

# ls /media

1. to check raid, current and add new disk

# mdadam -f /dev/md0 /dev/sda17 (to corrupt the hard disk )

# mdadam -r /dev/md0 /dev/sda17 (to remove corrupted hard disk)

# mdadam -a /dev/md0 /dev/sda20 (to add new hard disk)

# ls /madia

# mdadm -D /dev/md0 | less

1. to stop Raid

# umount/media

# mdadm -S /dev/md0

# mdadm -D /dev/md0

1. to start Raid

# mdadm -A /dev/md0 /dev/sda{18..20}

Packege Management RPM and YUM

**Package management:**

* A collection of programs is called package are application. the purpose of package to configure the servers and also to access the resources.
* In LINUX operating redhat, fedora and centos etc.. RPM (Redhat package manager) and YUM (yellow dog updated) are the default tools to install upgrade quires and to uninstall the packages but there are some different between both this tools. such as

**RPM :**

* This was the default tool since from RHEL 1 to RHEL 4 in redhat operating systems
* In RPM server configuration repositories are not required to create.
* There is no configuration file for RPM.

**YUM :**

* This tool added from RHEL 5 version on words, in RHEL 5, 6, 7 both tool are available.
* This tool cannot install package with dependences
* This tool can install package with all dependences
* In server configuration repositories are required to create
* There is configuration file for YUM that is **# /etc/yum.repos.d/CentOS-Base.repo**

**Dependence:**

* A package which depends on other package is called dependence package eg: samba is package dependence to samba-swat, samba-lib, samba-domainjion.

**Repositories:**

* This is nothing but a database which required on all RPM packages
* The repositories can be create using the command called **# createrepo**

And the file name called **repomd.xml**

**Installation method of packages:**

* **Standalone method**: Installing the packages using the devise such as DVD, hard disk and pen drive.
* **Network method**: Installing the packages from remote server using the services NFS(network file system) and FTP (file transfer protocol).

**RPM label pattern**:

Bind-9.3.3-7.el7.i386.rpm.

|  |  |  |  |
| --- | --- | --- | --- |
| Package name | Package version | Package architecture | Package extension |

* X86\_64 =64bit packages
* I386 or i686 = 32 bit packages
* noarch =32 and 64 bit packages

**To install application by using RPM with DVD**

1. insert the dvd and mount it on dir

# mount /dev/sr0 /media

# rom -q zip

1. if application is installed, remove it

# rpm -e zip –nodeps

# rpm -q zip (check package)

1. To install application, enter into DVD mount point

# cd /media/packages

# rpm -ivm zip\*

# rpm –q zip (check installed package)

**To install application by using RPM and nfs**

1. Mount to rpm server on applications dir

# mount ip of server eg: 192.168.0.250:/var/ftp/pub/centos8 /mnt

# cd /mnt/packages

# rpm -ivh zip\* --force

# rpm -q zip (to check installed applictaion)

1. To check application more properties

# rpm -qc zip (to check configuration file)

# rpm -qd zip (to check documentation)

# rpm -qi zip (to check information)

**To install application by using YUM command with ftp**

1. Update the yum file

# vi /etc/yum.repos.d/centos-base.repo

Remove all paragraphs in this file, except 1st paragraph, in 1st paragraph remove mirror line and edit 3rd line as a follows.

baseurl=ftp://192.168.0.250/pub/centos8

baseurl=file:///media

:wq

1. To check result

# yum list samba\* -y

# yum install samba\* -y

NFS (Network file system)

* A network file system is any computer file system that supports sharing of files over a computer network.
* It is a centralized file storage system.
* The client cannot differentiate whether the file is stored locally or remotely.
* The NFS environment contains the following components:
* **NFS server:**
* A system that contains the file resources to be shared with other system over the network.
* **NFS client:**
* A system that mounts the file resources shared over the network and presents the file resources as if they were local.

**NFS server system:**

1. Check and install package

# yum install nfs-utils\* -y

1. Add a new dir to share data

# mkdir /bablushare

# touch /bablushare/data{1..100}

1. Give full permission along with sticky bit

# chmod 1777 /bablu

1. Provide share dir in nfs configuration file

# vi /etc/exports

/bablushare\* (rw,sync)

:wq (to save and quit)

1. Restart the nfs service

# systemctl restart nfs

Client system to share data:

1. Check share dir data

# showmount -e ip adders (nfs server ip)

1. Mount to nfs sever share dir to share data

# mount ip adders /bablushare /mnt

1. Check mount point

# mount | grep /mnt

1. Share data

# ls /mnt

1. Write new data in share mount point

# mkdir /mnt/client{1..10}

Note: to check client written data, move to server and check in share dir

1. To check an existing IP address

# ifconfig

1. To configure new IP address

# nmtui

1. To active new IP address

# systemctl restart network

1. To configure new hostname (computer name)

# hostnamectl set-hostname nfs.bablu.com

1. To change terminal properties

# bash

Dynamic Host configuration protocol (DHCP server)

* It assigns IP addresses automatically to the clients.
* it provides centralized IP address management.
* It prevents IP address conflicts.
* DHCP reduce the complexity and amount of administrative work by assigning other TCP/IP configuration along with the IP address.

**Static vs Dynamic:**

|  |  |
| --- | --- |
| **Static IP assigning** | **Dynamic IP assigning** |
| * Ip addresses are entered manually * Chances of misconfiguration. * Communication and network problem can result. * Frequent computer moves increase administrative effort. | * IP address are assigned automatically * Correct configuration. * Common network problem are eliminated. * Client configuration is updated automatically. |

**DHCP Reservation:**

* Assigning IP address dynamically has some disadvantage, every time the lease period expires the client system may not get the same IP address.
* The above problem can be solved can solved by doing a DHCP reservation.
* In DHCP reservation the mac-address of the client system is bound to an IP address.
* **Installation packages**

# dhcp\*

* **Port numbers**
* 67 Bootp / DHCP client
* 86 Bootp / DHCP server
* **Configuration file**
* /etc/dgcp/dhcpd.conf
* **Daemon /server**
* Dhcpd

**IN DHCP Server:**

**Steps to configure system server:**

* Configure static IP Address
* Restart the network service
* Check and install the packages
* Copy sample file into dhcp file
* Provide IP range in dhcp file
* Restart the service

1. Configure static IP Address

# nmtui

1. Restart the network service

# systemctl restart network

1. Check new configured IP address

# ifconfig

1. Check and install the packages

# yum install dhcp\* -y

1. Copy sample file into dhcp file

# cd /usr/share/doc/dhcp-4.2.5

# cp dhcpd.conf.example /etc/dhcp/shcpd.cpnf

1. Provide IP range in dhcp file

# vi /etc/dhcp/dhcpd.conf

In 47th line provide subnet and netmask

: wq

1. Restart the service

# systemctl restart dhcpd

# systemctl enable dhcpd

**In client system:**

# use nmtui or system commands to enable dhcp

# dhclient -v (to see DORA process)

# systemctl restart network (to activate IP in rhcl-7)

# server network restart (to activate IP in rhcl-6)

# ifconfig (to check new dynamic IP)

**DHCP RESERVATION CONFIGURATION**

**IN DHCP SERVER SYSTEM**

1. Copy mac and IP address from log file

# vi /var/lib/dhcp/dhcpd.leases

Copy client mac and IP address

:wq

1. Paste mac and IP in dhcp file

# vi /etc/dhcp/dhcp.conf

75:host linuxclient {

76:hardware ethernet 00:0c:29:8b:6d:c7;

77:fixed-address 192168.0.14;

}

:wq

# syatemctl restart dhcpd

**IN CLIENT SYSTEM TO GET NEW IP**

# syatemctl restart network

# ifconfig (to check new IP address)

FTP server YUM server and NFS server

**File transfer Protocol (FTP):**

* File transfer protocol is one of the oldest members of the TCP/IP protocol stack and still in common use.
* As the name suggest, it is optimized for transferring files.
* FTP server is used to exchange files between computers over network.
* FTP server can be use as a centralized server to maintain all clients data in single system.
* There is some default application in Linux to configure FTP protocal.
* vsFTPd - very secure FTP daemon
* WU-FTP – Washington university’s (st.Louis)
* Proftpd – Professional FTP daemon

**FTP requirements:**

* Installation packages
* Vsftpd\*
* Configuration file
* /etc/vsftpd/vsftpd.conf
* Port number
* 20 data transfer
* 21 Control connection
* Server / Daemon
* Vsftpd

**FTP user Policies:**

* Anonymous (public user)
* Domain user policy (private user policy)

**FTP mode:**

* **Passive mode**
* Connection will be created using 21 port.
* Data will be transfer using Random ports.
* **Active mode**
* Connection will be create using 21 port.
* Data will be transfer using 20 port.
* To monitor working services, port number and IP address
* # iptraf-ng
* To check all services along with port numbers
* # vi /etc/services
* To check working port number and services of destination system
* # nmap <destination IP address>

**Configure FTP server for downloading the file**

**IN FTP SERVER SYSTEM:**

1. Change Hostname of the server

* # hostnamectl set-hostname server.zoomgroup.com
* # bash (to change shell environment)

1. Check and install packages

* # rpm -q vsftpd
* # yum install vsftpd\* -y (to install the ftp package)

1. Create some file in ftp dir

* # cd /var/ftp/pub
* # touch admin{1..25}

1. Restart the service

* # systemctl restart vsftpd

(or)

* # systemctl enable vsftpd

**IN FTP CLIENT TO DOWNLODE**

1. Install the FTP command package

* # yum install ftp\* -y

1. Connect to ftp server

* # ftp <server\_IP>
* Username ftp
* Password <enter>
* ftp>ls (to list)
* ftp>cd pub (enter into ftp dir)
* ftp>ls (to list)
* ftp> prompt (to disable confimation)
* ftp> mget admin\* (to download all files)
* ftp> bye (to exit)
* # ls /root
* ftp> ! (temp.. logout)

**CONFIGURE FTP SERVER FOR UPLOADING FILES IN FTP SERVER SYSTEM**

1. apply full permission on pub dir along with sticky bit

* # chmod 1777 /var/ftp/pub

1. Enable uploading in ftp file

* # vi /etc/vsftpd/vsftpd.conf
* Remove # form 29th line to enable uploading
* :wq
* Restart the service
* # systemctl restart vsftpd

**IN FTP CLIENT SYSTEM**

* Touch client{1..20}
* # ftp <ftpserver\_ ip>
* Username ftp
* Password enter
* ftp> ls (to list)
* ftp> cd pub (enter into pub dir)
* ftp> prompt (to disable configuration)
* ftp> mput client\* (to upload files)
* ftp> bye (to exit)

Note: to check uploaded files, move to server and check

Eg: # ls /var/ftp/pub

**TO DIABLE ANONYMOUS USERS**

* # vi /etc/vsftpd/vsftpd.conf
* Change from yes into no in 12th line.
* :wq
* # systemctl restart vasftpd

Domain name system (DNS) and Mail server

DNS: It is a type of mechanism which provide resolution by resolving the client request from friendly name into an IP address and an IP address into friendly name

* An advantage of DNS: it maintains centralized data base of all network systems an also it provides easy access to server using the friendly name.

**Data base file of DNS:**

* Forward lockup zone: the function of this data base file to resolve friendly name into an IP address.
* Reverse lockup zone: the function this data base file to resolve an IP address into friendly name

Records:

* CNAME record
* Canonical name (alias)
* Maps an alias name to a hostname.
* PTR record
* Pointer
* Maps an IP address to a hostname.
* MX record
* Mail exchange.
* Maps a domain name to a mail server.
* SOA record
* Start of authority.
* It is the first record in any zone file.
* NS record
* Name server
* Identifies the DNS server for each zone.
* A record
* Address
* Maps a hostname to an IP address.

DNS requirements:

* Package
* bind
* Port number
* 53 DNS
* Configuration files
* /etc/named.conf
* /etc/named,rfc1912.zones
* Database directory
* /var/named
* Server/Daemon
* named

**DNS SERVER:**

**Steps to create DNS configuration server:**

* check and change hostname
* To resolve name in local system
* Check and install s/w
* Edit 1st dns file
* Create zones files
* Edit zones file
* Provide self-system IP in resolve file
* Edit 2nd dns file

1. check and change hostname

* # hostnamectl set-hostname dns.filename.com
* # bash (to update new hostname)

1. To resolve name in local system

* # vi /etc/hosts

1. Check and install s/w

* # yum install bind\* -y

1. Edit 1st dns file

* # vi /etc/named.rfc1912.zones
* Edit 19-23 lines filename.for (flz) and 31-35 filename.rev (rlz)
* As follows
* Zone “filename.com” In {
* Type master;
* File “filename.for”;
* Allow-update {none;};
* };
* Zone “0.168.192.in-addr.arpa”IN {
* Type master;
* File “filename.rev”;
* Allow-update {none;};
* };
* :wq

1. Create zones files

* # cd /var/named
* # cd -p named.localhost filename.for
* # cd -p named.loopback filename.rev

1. Edit zones file

* # vi filename.for
* SOA @ dns.filename.com.
* NS dns.filename.com.
* dns A IP address
* :wq
* # vi linux.rev
* SOA @ dns.filename.com.
* NS dns.filename.com.
* 253 PTR dns.filename.com
* :wq

1. Provide self-system IP in resolve file

* # vi /etc/resolv.conf
* nameserver IP address
* :wq

1. Edit 2nd dns file

* # vi /etc/named.conf
* In 11th line self system IP
* In 17th line client’s system IP
* :wq

# systemctl restart named

**TO CHECK IN DNS CLINET SYATEM**

1. Provide dns server IP address

* # vi /etc/resolve.conf
* Namedserver IP address
* :wq

1. To check result, try to dig flz and rlz files

* # dig dns.filename.com (to check fiz)
* # dig -x IP address (to check rlz)

Note: Answer 1 is a sing of correct dns

Answer 0 is a sign of incorrect dns

Network file system (NFS)

**NFS requirements:**

* **Installation packages**
* nfs\*
* rpcbind\*
* **Port numbers**
* 2049 nfs
* 111 rpcbind
* **Configuration file**
* /etc/exports
* **Service**
* nfs
* rpcbind
* **Daemon**
* nfsd
* mountd
* statd
* lockd

**NFS SERVER SYSTEM:**

**Steps to configure NFS file share:**

* Check and install package
* And a new directory to share data
* Give full permission along with sticky bit
* Provide share directory in NFS configuration file

1. check and install package

* # yum install nfs-utils\* -y

1. And a new directory to share data

* # mkdir /<file name>
* # touch /<file name> /data(1..100)

1. Give full permission along with sticky bit

* # chmod 1777 /<file name>

1. Provide share directory in NFS configuration file

* # vi /etc/exports
* /<file name\*>(rw,sync)
* :wq (save and quit)

1. Restart the NFS service

* # systemctl restart nfs

**CLIENT SYSTEM TO SHARE DATA**

**Steps configure client system to share data:**

* Provide share directory in NFS configuration file
* Mount to nfs server share directory to share data
* Check mount point
* Share data
* write new data in share mount point

1. Check share directory data

* # showmount -e <IP address> (nfs server IP)

1. Mount to nfs server share directory to share data

* # mount <IP address><:/filename>/mnt

1. Check mount point

* # mount | grep /mnt

1. Share data

* ls /mnt

1. write new data in share mount point

* # mkdir /mnt/client{1..10}
* # ls /mnt

Note: To check client written data, move to server and check inshare directory

Mail server (Postfix)

Mail sever:

* It is a type of mechanism which is use to exchange information across the different public users the mechanism can be work on mail components and mail protocol.
* Mail components:
* MUA (Mail user agent):
* This function this component using from and to address
* In Linux operating systems squirrelmail is a third-party application in Linux to configure MUA in mail server system to provide composing feature to all client system.
* evaluation this is a mail client application which use in Linux system to compose the mail.
* MTA (Mail transfer agent):
* This component transfer the mail an across different user and daemon
* In Linux operating system fallowing are the application to configure MTA in Linux.

Unix / Linux Based Mail server:

* Sendmail
* Postfix
* Qmail
* Smail
* Exim
* Zimbra
* MDA (Mail deliver agent):
* This component the mail end to end in box of user
* In Linux operating system procmail is a default application to configure MDA

Postfix requirements:

* Packages
* Postfix\*.rpm
* Port number
* 25 simple mail transfer protocol (SMTP)
* 110 post office protocol v3 (POP3)
* 143 interim mail access protocol (IMAP)
* Configuration file:
* /etc/postfix/mail.cf
* Service / Daemon
* Postfix
* SquirrelMail
* Squirrelmail\*.rpm
* Dovecot-\*.rpm
* Curl\*
* Php-5\*
* Perl-5\*
* Httpd\*
* Mod\_ssl\*
* Hunspell-en\*
* Tmpwatch\*

1. IN MAIL SERVER (POSTFIX)

* # yum install pstfix dovecot\* https\* hunspell-en\* php-\* tmpwatch\* - -skip-broken -y

1. Edit postfix file

* # vi /etc/postfix/main.cf
* Remove # from 75th line and write (Domain name) mail.bablu.com
* Remove # from 83rd line and write (domain name) bablu.com
* :wq
* ) Download and install the squirrellmail application
* Firefox &
* <ftp://192.168.0.250>
* # cd /root/Downloads
* # rpm -ivh squirrelmail\* --force

1. Edit dovecot 1st file

* # vi /etc/dovecot/conf.d/10-auth.conf
* Remove # from 10th line and change from yes into no
* Remove # from 100th line and write plain login
* :wq

1. Edit dovecot 2nd file

* # vi /etc/dovecot/conf.d/10-mail.conf
* Remove # from 25th line and complete mail dir eg: /var/spool/mail
* 119: mail\_access\_group = mail (remove # from beginning of line and mail at last)
* :wq

1. Copy squirrel dir data into http default dir

* Cp -rv /usr/share/squrrelmail/\* /var/www/html

1. Restart the services

* # service postfix restart
* # service dovecot restart
* # service httpd restart

1. Add some users

* # useradd bablu
* # useradd Preethi
* Passwd tom
* Passwd tom

1. Open web browser and compose the mails

* # firefox
* # <http://mail.bablu.com>

YUM CONFIGURATION:

1. Install fto s/w from od dvd

* Mount /dev/sr0 /media
* Cd /media/packages
* Rpm -ivh vsftpd\* --force

1. Add a new dir in ftp dir

* # mkdir -p /var/ftp/pub/centos7

1. Copy dvd data into ftp dir

* # cp -rvp /media/\* /var/ftp/pub/centos7

1. Edit yum file

* # vi /etc/yum.repos.d/CentOS-Base.repo
* Note: remove all paragraphs except 1st, in 1st paragraph, remove mirror line and edit only baseurl line as follows.
* Baseurl=ftp://<self system ip/pub/centos7

1. Activate the ftp service temporary

* # systemctl restart vsftpd

1. Activate the ftp service permanent

* # systemctl enable vsftpd

1. Disable all firewalls

* # systemctl disable firewalld
* # systemctl disable iptables
* # vi /etc/selinum/config
* SElinux=disabled
* :wq
* # reboot (to update selinux firewall)

1. To find result try to install any application eg: firefox

* # yum install firefox\* -y