

ZOOM
TECHNOLOGIES



Lab Manual

LINUX

System Administration

RHCE Mapped Course

Lab Manual

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Introduction

This lab manual has been designed as a supplement to the Linux Server Administration course offered by Zoom Technologies.

We have taken care to ensure that this serves as a comprehensive reference manual for the Linux administrator. The exercises have been arranged in order of increasing complexity, starting from the installation of the Linux OS right up to web server administration and covering everything else in between.

It has been written in a simple and easy style, with plenty of screenshots wherever required and the syntax clearly given before each command. As with our other lab manuals, we have used the same structure for these exercises, with each exercise divided into five sections:

1. Objective
2. Topology
3. Prerequisites
4. Configuration
5. Verification / Result

We hope that this will serve as a useful guide to the Linux professional, not only during the course but in actual implementation at the workplace. We have tried to ensure that no errors or mistakes creep in, but suggestions and feedback to improve this manual are always welcome.

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LAB 1: INSTALLATION OF LINUX OPERATING SYSTEM

OBJECTIVE:

To install Linux Operating System.

PRE-REQUISITE:

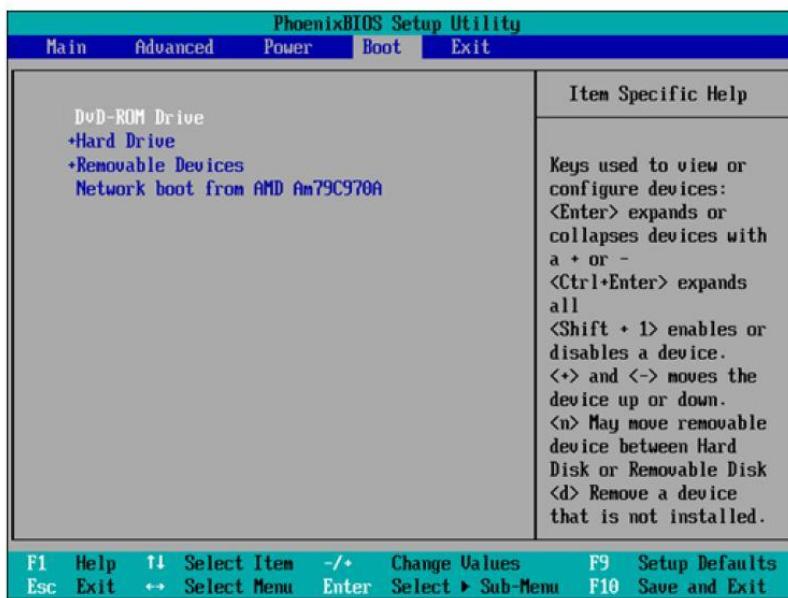
A user should have a system along with OS DVD.

TOPOLOGY:

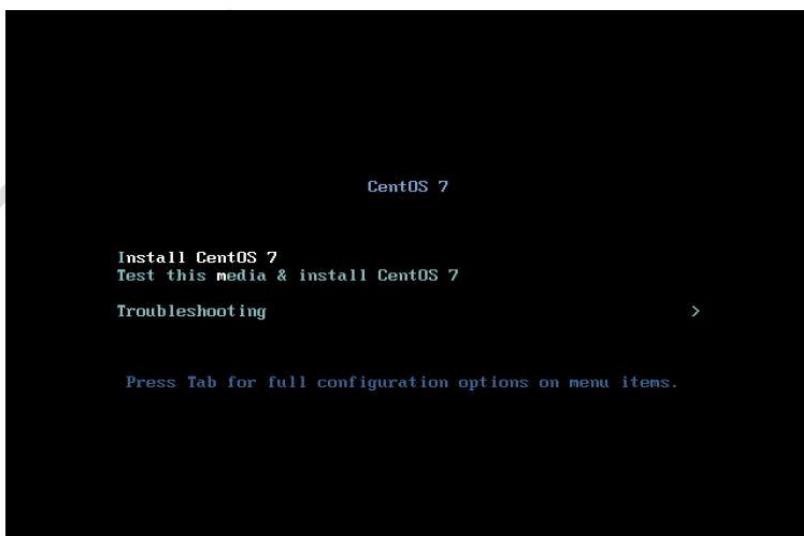


Steps to Install Linux

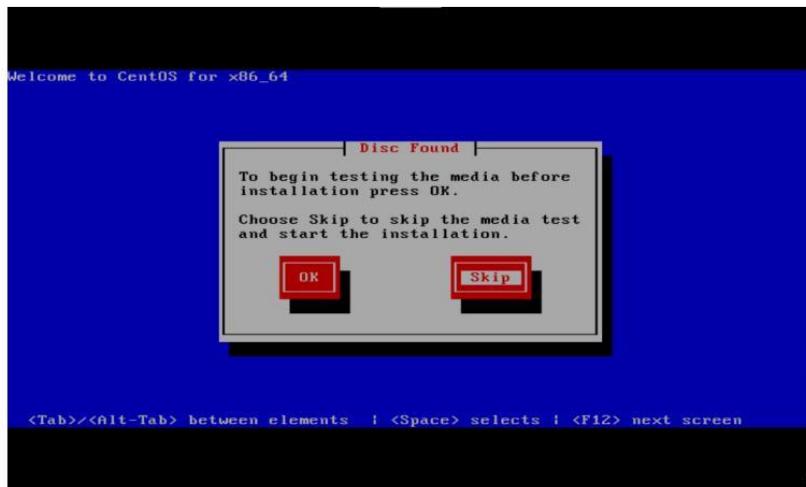
1. Restart the System and go to BIOS.
2. Set the First Boot Device as **DVD ROM**.



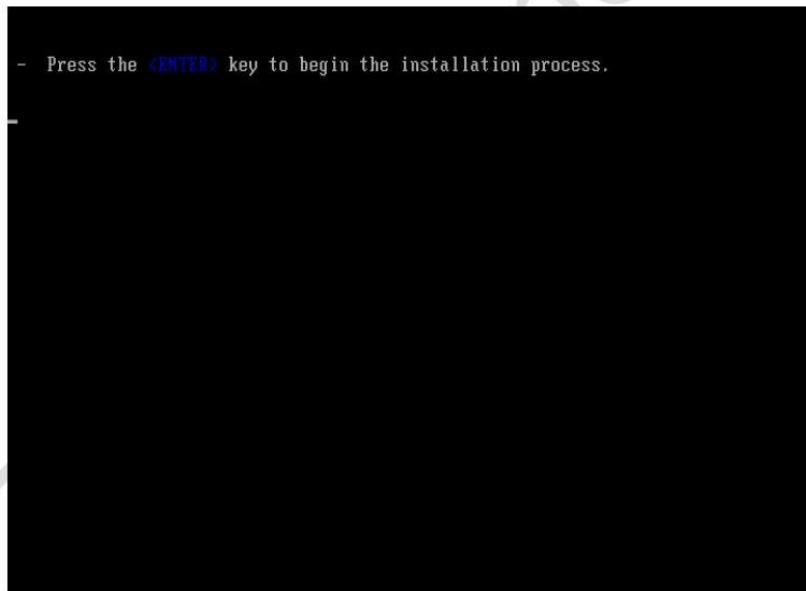
3. Save the settings by Pressing **F10** and click YES.
4. Insert **LINUX DVD** and **Restart** the system.
5. Select **Install CentOS 7** option to install new Operating System



6. Select **skip** to avoid media test



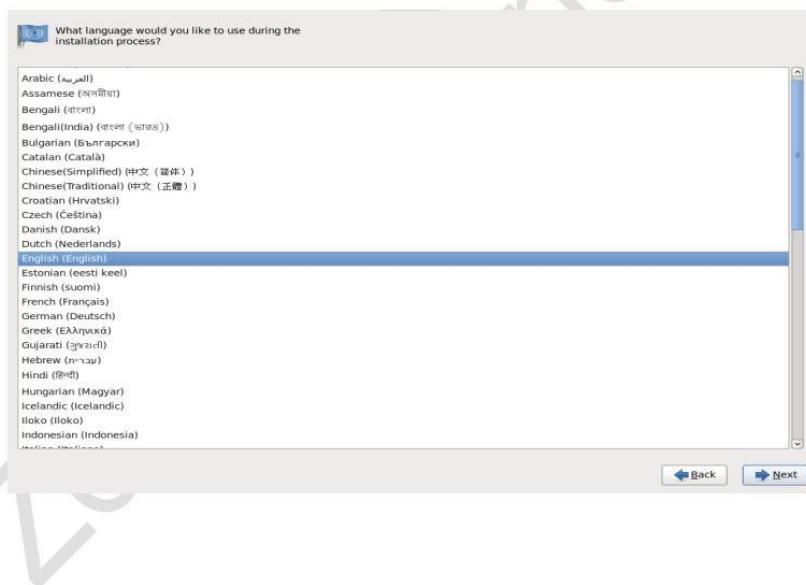
7. Press **ENTER** to proceed with installation



8 . Verify installation language e.g.: **English** and click **next**



9 . Make sure it is the right installation language e.g. **English** and click **next**



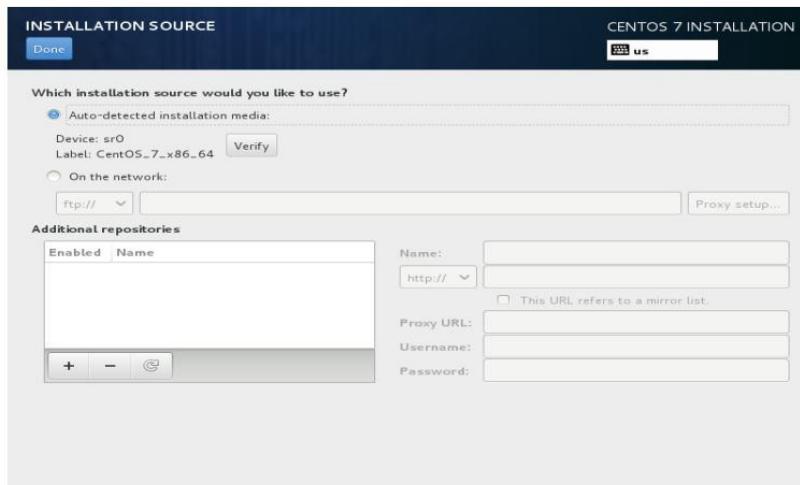
10. Window of installation summary



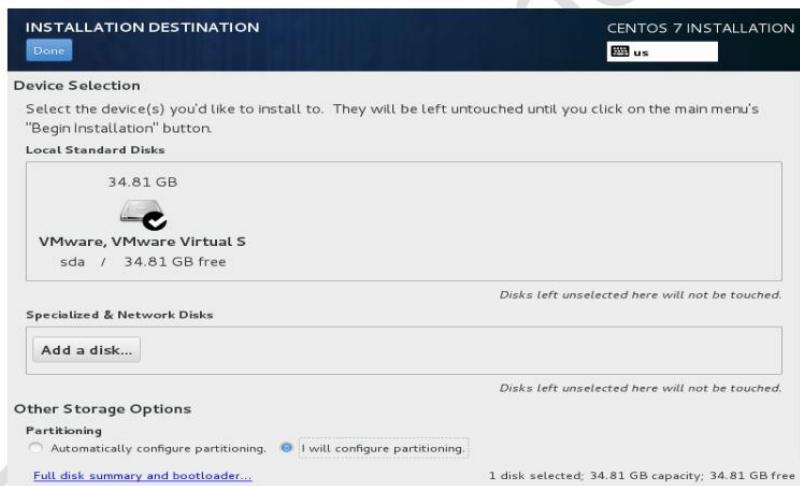
11. Select time zone e.g. **Asia/Kolkata** and click next



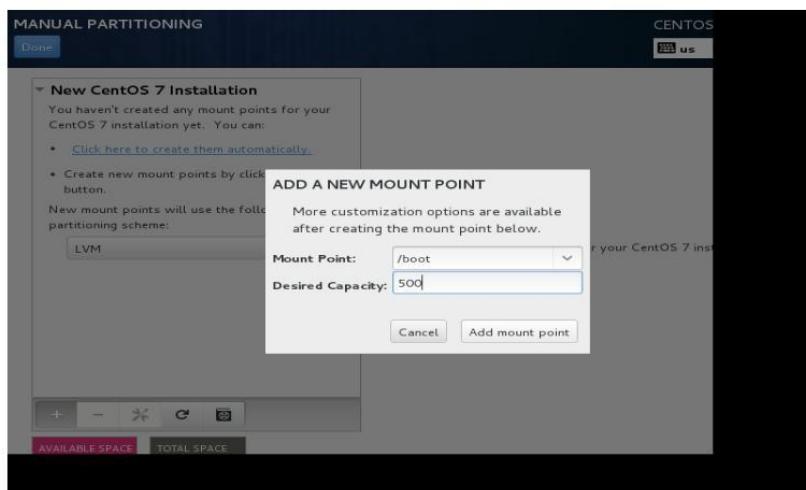
12. Provide installation source and click next



13. Select Hard disk-->"I will configure partitioning" and click next

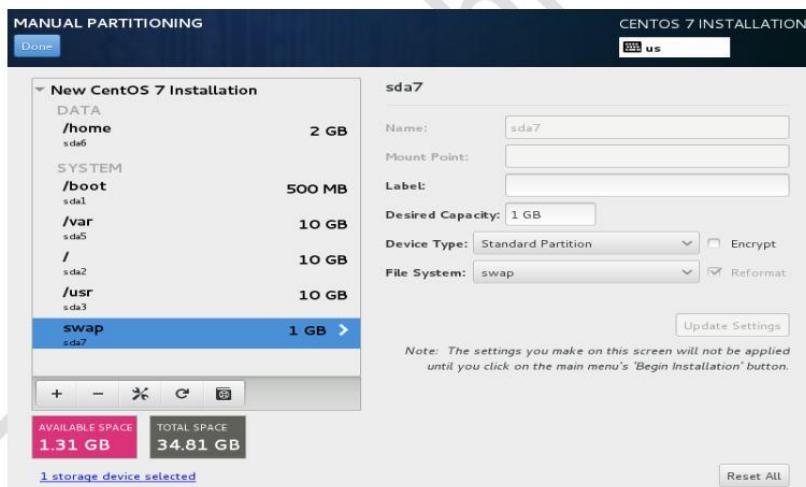


14. Provide size, **mount point** and click next

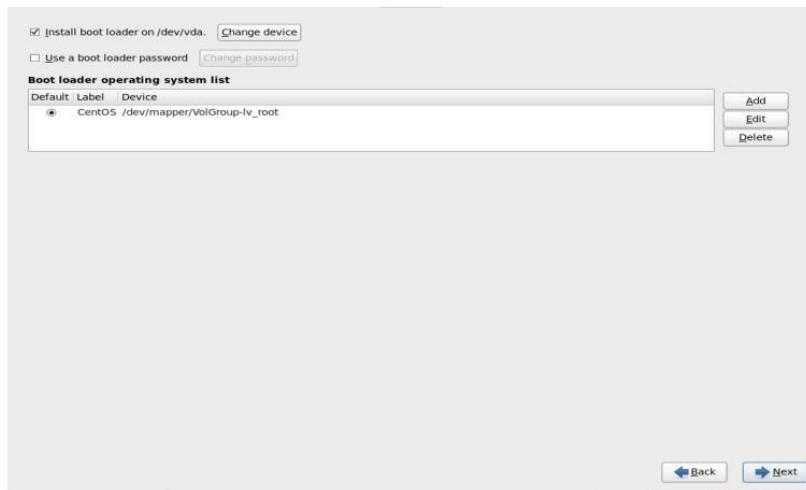


Note: Follow the same procedure for all the other partitions required.

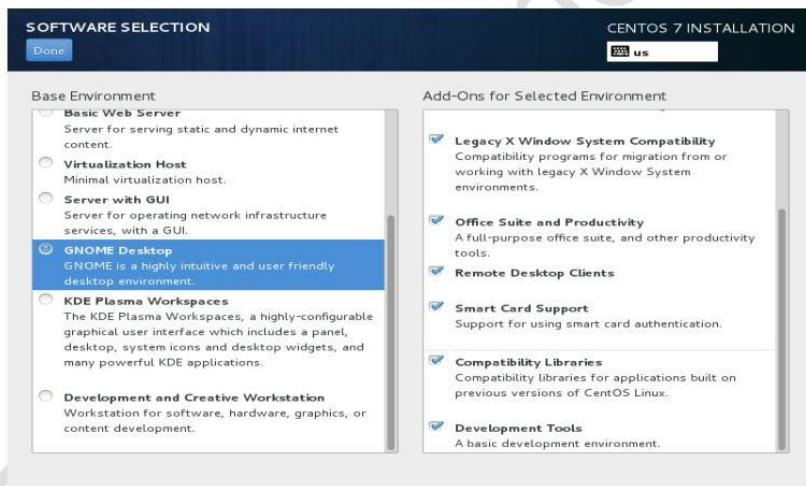
15. After creating all **partitions**, the result is:



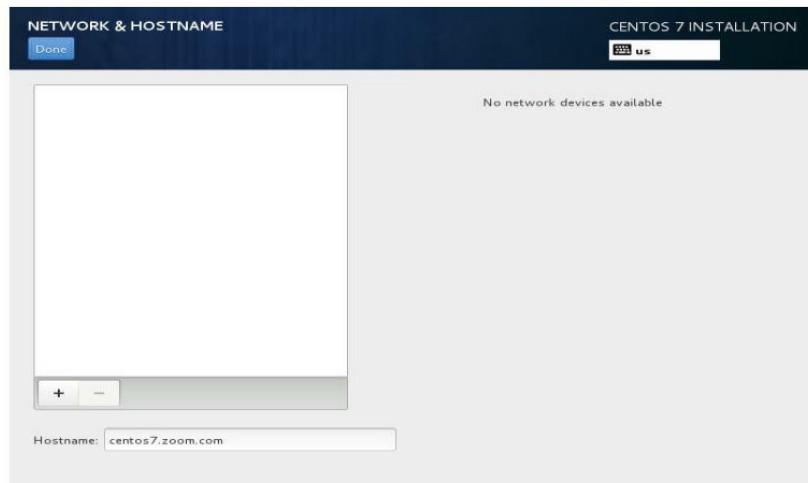
16. Click next to install **bootloader**



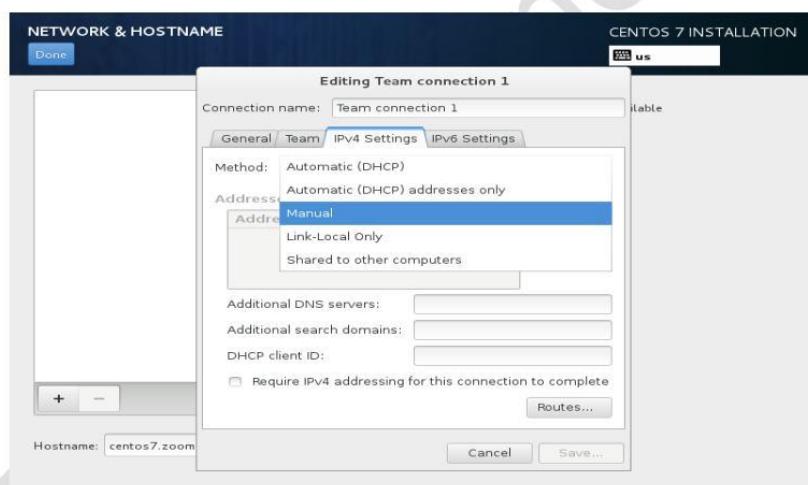
17. Select **GNOME Desktop** and choose applications to install.



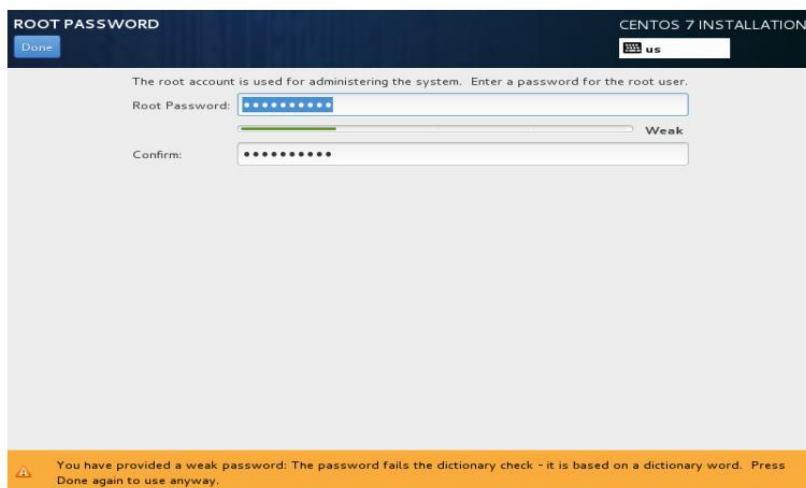
18. Configure Hostname



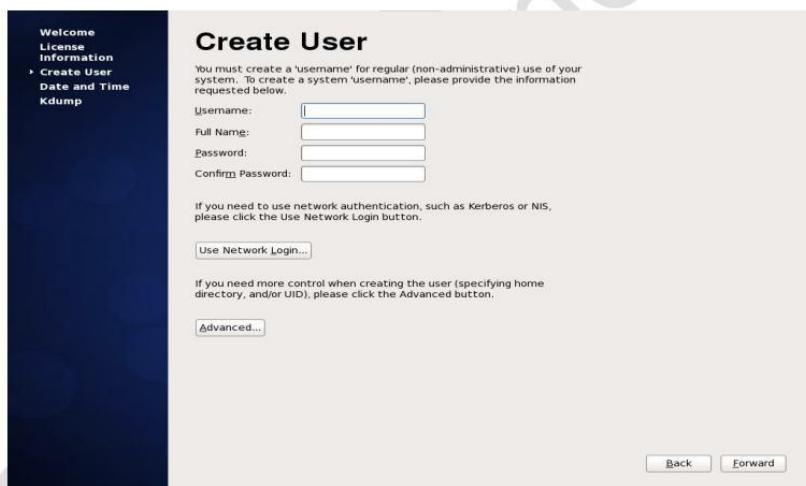
19. Provide an IP-Address



20. Provide a **root password** and click **forward**



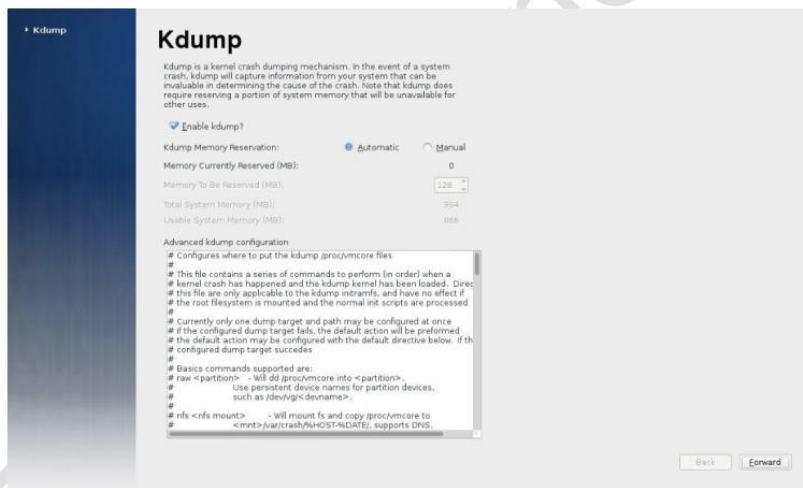
21. Create a non-root user and click **forward**



22. The Installation process will take place



23. Select forward and finish

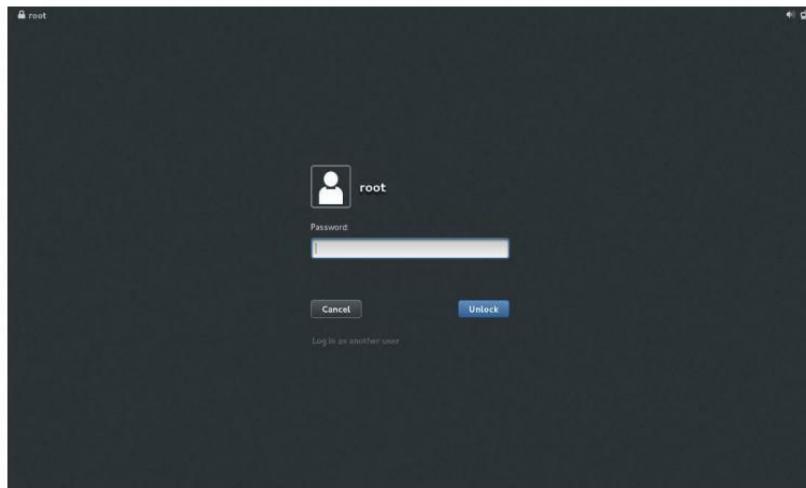


24. Select **Not listed** option

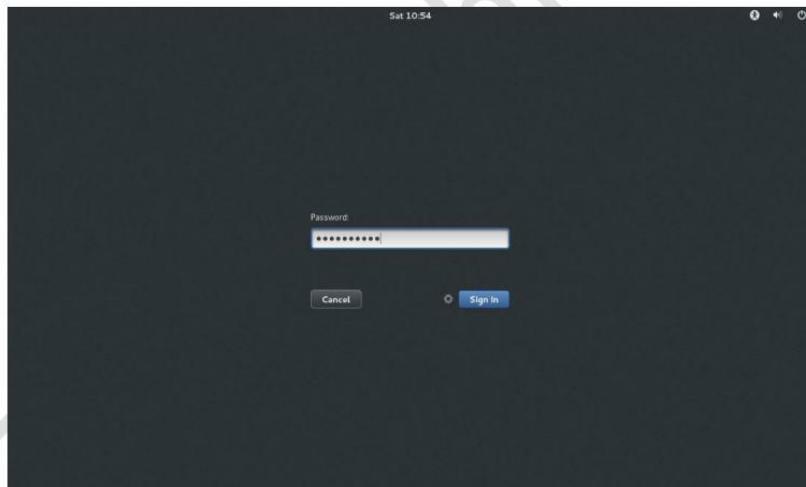


Verification

- Provide username e.g. **root**



- Provide **password** e.g. zoom_123



LAB 2: BASIC COMMANDS -I

OBJECTIVE:

To operate the Linux Operating System using basic commands

PRE-REQUISITE:

Make sure you have a machine with Linux OS.

TOPOLOGY:



1. To check the present working directory

Syntax:

```
[root localhost ~]# pwd
```

```
[root localhost ~]# pwd
```

Result:

```
/root
```

2. To see the list of files and directories(the current directory by default)

Syntax:

```
[root@localhost ~]# ls <option>
```

```
[root@localhost ~]# ls
```

Result:

```
anaconda-ks.cfg Desktop Documents Downloads initial-setup-ks.cfg Music Pictures Public  
Templates Videos
```

3. To see the long list (properties) of files and directories

```
[root@localhost ~]# ls -l
```

Result:

```
total 76
```

```
-rw----- 1 root root 1805 Aug 18 06:31 anaconda-ks.cfg  
-rw----- 1 root root 8605696 Aug 30 22:56 core.5864  
drwxr-xr-x. 2 root root 4096 Aug 21 14:16 Desktop  
drwxr-xr-x. 2 root root 4096 Aug 21 14:16 Documents  
drwxr-xr-x. 2 root root 4096 Aug 21 14:29 Downloads  
-rw-r--r--. 1 root root 1856 Aug 20 09:31 initial-setup-ks.cfg  
drwxr-xr-x. 2 root root 4096 Aug 21 14:16 Music  
drwxr-xr-x. 2 root root 4096 Aug 21 14:29 Pictures  
drwxr-xr-x. 2 root root 4096 Aug 21 14:16 Public  
drwxr-xr-x. 2 root root 4096 Aug 21 14:16 Templates  
drwxr-xr-x. 2 root root 4096 Aug 21 14:16 Videos
```

OR

```
[root@localhost ~]# ll
```

Result:

```
total 7624
-rw----- 1 root root 1805 Aug 18 06:31 anaconda-ks.cfg
-rw----- 1 root root 8605696 Aug 30 22:56 core.5864
drwxr-xr-x 2 root root 4096 Aug 21 14:16 Desktop
drwxr-xr-x 2 root root 4096 Aug 21 14:16 Documents
drwxr-xr-x 2 root root 4096 Aug 21 14:29 Downloads
-rw-r--r-- 1 root root 1856 Aug 20 09:31 initial-setup-ks.cfg
drwxr-xr-x 2 root root 4096 Aug 21 14:16 Music
drwxr-xr-x 2 root root 4096 Aug 21 14:29 Pictures
drwxr-xr-x 2 root root 4096 Aug 21 14:16 Public
drwxr-xr-x 2 root root 4096 Aug 21 14:16 Templates
drwxr-xr-x 2 root root 4096 Aug 21 14:16 Videos
```

4. To see the list of files/folders including hidden also.

```
[root@localhost ~]# ls -a
```

Result:

```
. .bash_history .bashrc core.5864 Desktop .esd_auth .local Pictures .tcshrc
.. .bash_logout .cache .cshrc Documents .ICEauthority .mozilla Public
anaconda-ks.cfg .bash_profile .config .dbus Downloads initial-setup-ks.cfg Music Videos
Templates
```

5. To see a file starting from letter D*

```
[root@localhost ~]# ls D*
```

Result:

```
Desktop Downloads Documents
```

6. To see a file or folder whose length is of 6 characters, where ? is used to match any single character

```
[root@localhost ~]# ls -d ??????
```

Result:

```
Public Videos
```

7. To create a text file by using cat command

Syntax:

```
[root@localhost ~]# cat > <filename>
```

```
[root@localhost ~]# cat > file1
```

hi how are you, how is your Linux sessions

ctrl+d (to save)

8. To see an existing file contents

Syntax:

```
[root@localhost ~]# cat <filename>
```

```
[root@localhost ~]# cat file1
```

Result

hi how are you, how is your Linux sessions

9. To append an existing file

Syntax:

```
[root@localhost ~]# cat >> <filename>
```

```
[root@localhost ~]# cat >> file1
```

They are good

Ctrl+d (to save)

Verification:

```
[root@localhost ~]# cat file1
```

hi how are you, how is your Linux sessions

They are good

10. To create files by using touch command

Syntax:

```
[root@localhost ~]# touch <file_1> <file_2> ..... <file_n>
```

```
[root@localhost ~]# touch CCIE CCNP CCNA "Advanced Linux"
```

Verification:

```
[root@localhost ~]# ls
```

```
Advanced Linux anaconda-ks.cfg CCIE CCNP CCNA Desktop Downloads Documents initial-  
setup-ks.cfg Templates Music Public Pictures Videos
```

11. Creating a single directory

Syntax:

```
[root@localhost ~]# mkdir <directory name>
```

```
[root@localhost ~]# mkdir zoomgroup
```

Verification:

```
[root@localhost ~]# ls
```

```
Advanced Linux anaconda-ks.cfg CCIE CCNP CCNA Desktop Downloads Documents initial-  
setup-ks.cfg Templates Music Public Pictures Videos zoomgroup
```

12. Creating multiple directories

Syntax:

```
[root@localhost ~]# mkdir <dir_1> <dir_2> ... <dir_n>
```

```
[root@localhost ~]# mkdir linux mcse "Ethical Hacking"
```

Verification:

```
[root@localhost ~]# ls
```

```
Advanced Linux anaconda-ks.cfg CCIE CCNP CCNA Desktop Downloads Documents  
Ethical Hacking initial-setup-ks.cfg linux Templates mcse Music Public Pictures Videos  
zoomgroup
```

13. To create nested directory along with child directories

Syntax:

```
[root@localhost ~]# mkdir -p <dir1>/<dir2>/<dir3>/<dir4>/<dir5>/<dir6>
```

-p (parent directory)

```
[root@localhost ~]# mkdir -p linuxtech/clusters/san/ldap/nagios/samba
```

14. To see the tree structure

```
[root@localhost ~]# ls -R linuxtech
```

Result:

```
linuxtech:  
clusters
```

```
linuxtech/clusters:  
san
```

```
linuxtech/clusters/san:  
ldap
```

```
linuxtech/clusters/san/ldap:  
nagios
```

```
linuxtech/clusters/san/ldap/nagios:  
samba
```

```
linuxtech/clusters/san/ldap/nagios/samba:
```

15. To change a directory (Navigation between Directories)

Syntax:

```
[root@localhost ~]# cd <dir_1>/<dir_2>...../<dir_n>
```

```
[root@localhost ~]# cd linuxtech/clusters/san/ldap/nagios/samba
```

Verification:

```
[root@localhost samba]# pwd  
/root/linuxtech/clusters/san/ldap/nagios/samba
```

16. To move 1 step back

```
[root@localhost samba]# cd ..
```

Verification:

```
[root@localhost nagios]# pwd
```

```
/root/linuxtech/clusters/san/ldap/nagios
```

17. To move 2 steps back

```
[root@localhost nagios]# cd ../../..
```

Verification:

```
[root@localhost san]# pwd
```

```
/root/linuxtech/clusters/san
```

18. To go directly to user home directory

```
[root@localhost san]# cd
```

Verification:

```
[root@localhost ~]# pwd
```

```
/root
```

19. To go to last working directory

```
[root@localhost ~]# cd -
```

Result:

/root/linuxtech/clusters/san

Verification:

```
[root@localhost san]# pwd
```

```
/root/linuxtech/clusters/san
```

20. To remove files

Syntax:

```
[root@localhost ~]# rm <filename>
```

```
[root@localhost san]# cd
```

```
[root@localhost ~]# rm "Advanced Linux"
```

```
rm: remove regular empty file `Advanced Linux'? y
```

Verification

```
[root@localhost ~]# ls
```

```
anaconda-ks.cfg CCIE CCNP CCNA Desktop Downloads Documents  
Ethical Hacking initial-setup-ks.cfg linuxtech linux Templates mcse Music Public Pictures  
Videos zoomgroup
```

Note:

Deleted **Advanced Linux** file cannot be displayed.

21. To remove an empty directory

Syntax:

```
[root@localhost ~]# rmdir <directory name>
```

```
[root@localhost ~]# rmdir linux
```

Verification :

```
[root@localhost ~]# ls
```

```
anaconda-ks.cfg CCIE CCNP CCNA Desktop Downloads Documents  
Ethical Hacking initial-setup-ks.cfg linuxtech Templates mcse Music Public Pictures Videos  
zoomgroup
```

Note:

Deleted **linux** directory cannot be displayed

22. To remove a directory along with all sub directories and files forcefully

Syntax:

```
[root@localhost ~]# rm -rf <dir_name>
```

```
[root@localhost ~]# rm -rf linuxtech
```

Verification:

```
[root@localhost ~]# ls
```

```
anaconda-ks.cfg CCIE CCNP CCNA Desktop Downloads Documents  
Ethical Hacking initial-setup-ks.cfg Templates mcse Music Public Pictures Videos zoomgroup
```

Note:

Deleted linuxtech directory cannot be displayed

LAB 3: BASIC COMMANDS II

OBJECTIVE:

To operate the Linux Operating System using basic commands like copy, paste, move, etc.

PRE-REQUISITE:

Linux machine with VI editor

TOPOLOGY:



1. To copy file data from one file to another

Syntax:

```
[root@localhost ~]# cp <source_file> <destination_file>
```

```
[root@localhost ~]# cp anaconda-ks.cfg file1
```

2. To verify that the data has been copied

```
[root@localhost ~]# cat file1
```

Result:

```
# System authorization information  
auth --enableshadow --passalgo=sha512
```

```
# Use CDROM installation media cdrom  
# Run the Setup Agent on first boot  
firstboot --enable  
ignoredisk --only-use=sda  
# Keyboard layouts  
keyboard --vckeymap=us --xlayouts='us'  
# System language  
lang en_US.UTF-8
```

3. To copy folders

Syntax:

```
[root@localhost ~]# cp <options> <source_dir> <destination_dir>
```

-r (recursive)

-v (verbose)

-p (permissions)

```
[root@localhost ~]# cp -rvp mcse Desktop
```

Result:

'mcse' -> 'Desktop/mcse'

Verification:

```
[root@localhost ~]# ls Desktop  
mcse
```

4. To rename directories and files

Syntax:

```
[root@localhost ~]# mv <source_name> <new_name>
```

```
[root@localhost ~]# mv zoomgroup zoomtech
```

Verification

```
[root@localhost ~]# ls
```

```
anaconda-ks.cfg CCIE CCNP CCNA Desktop Downloads Documents
```

```
Ethical Hacking initial-setup-ks.cfg Templates mcse Music Public Pictures Videos zoomtech
```

5. To move directories and files

Syntax:

```
[root@localhost ~]# mv <source_file/folder> <destination_dir>
```

```
[root@localhost ~]# mv /root/CCNA /opt
```

Verification

```
[root@localhost ~]# ls /opt
```

```
CCNA
```

6. To filter the single word from a file

Syntax:

```
[root@localhost ~]# grep <string> <file_name>
```

```
[root@localhost ~]# grep root /etc/passwd
```

Verification

```
/etc/passwd:root:x:0:0:root:/root:/bin/bash
```

7. To see the type of file

```
[root@localhost ~]# file *
```

Verification

NameType

Desktop	Directory
anaconda.cfg	ASCII text
file1	ASCII text

CCIE Empty

8. To view and change the date and time

Syntax:

```
[root@localhost ~]# date -s " Day/mm/dd/hh:mm:ss/year"  
-s ( string )
```

```
[root@localhost ~]# date
```

Result:

```
fri Aug 14 10:10:10 ist 2015
```

```
[root@localhost ~]# date -s "sat Aug 15 10:20:10 ist 2015"
```

Verification:

```
Day/mm/dd/hh:mm:ss/year  
sat Aug 15 10:20:10 ist 2015
```

9. To view the calendar for complete year in screen order

```
[root@localhost ~]# cal 2015 | less  
## OR ##
```

```
[root@localhost ~]# cal 2015 | more
```

Note: use **q** option to quit from screen order mode

10. To get help on a particular command with man

Syntax:

```
[root@localhost ~]# man <command_name>
```

```
[root@localhost ~]# man mkdir
```

Note: use **q** option to quit from man page

11. To find the location of an object

Syntax:

```
[root@localhost ~]# find <source_dir> <options> <searching_file/folder>  
-iname case insensitive
```

```
[root@localhost ~]# find / -iname anaconda-ks.cfg
```

Result:

```
/root/anaconda-ks.cfg
```

12. To count words, lines and characters of file

Syntax:

```
[root@localhost ~]# wc <filename>
```

```
[root@localhost ~]# wc anaconda-ks.cfg
```

Result:

```
66 154 1805 anaconda-ks.cfg
```

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LAB 4: VISUAL INTERFACE (VI EDITOR)

OBJECTIVE:

To create, edit and modify text files with VI editor

PRE-REQUISITE:

Linux machine with VI editor

TOPOLOGY:



1. Modify the file by using vi command

Syntax:

[root@localhost~]# vi <filename>

[root@localhost~]# vi zoomfile

2. Commands to go from command mode to insert mode

- i - inserts the text at current cursor position
- I - inserts the text at beginning of line
- a - appends the text after current cursor
- A - appends the text at end of line
- o - inserts a line below current cursor
- O - inserts a line above current cursor
- r - replace a single char at current cursor

3. Commands in execute mode

- :q - quit without saving
- :q! - quit forcefully without saving
- :w - save
- :wq - save and quit
- :wq! - save and quit forcefully
- :x - save and quit
- :sh - Provides temporary shell
- :se nu - Setting line numbers
- :se nonu - Removing line numbers
- :84 - Press enter goes to line

4. To find and replace words

1,\$s/<findword>/<replaceword>/gc
:1,\$s/world/universe/gc
1-- To start the search at from 1st line
\$ -> End of File
s -> substitute
g -> global
c -> confirmation

5. Commands in command mode

- dd - Deletes a line
- 2dd - Deletes 2 lines
- yy - Copy a line
- 2yy - Copies 2 lines
- p - put (deleted or copied text)
- u - Undo (can undo 1000 times)
- Ctrl+r - Redo
- G - Moves cursor to last line of file
- 5G - Moves cursor to 5th line of file
- Shift+ZZ - save and quit
- /<find word> - locate word

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LAB 5: USER ADMINISTRATION

OBJECTIVE:

To create a new user, modify and delete user accounts

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Adding a new user

Syntax:

```
[root@localhost~]# useradd <username>
```

```
[root@localhost~]# useradd Tom
```

2. To filter single user properties

```
[root@localhost~]# grep Tom /etc/passwd
```

Result:

```
Tom:x:1000:1000:/home/Tom:/bin/bash
```

3. To check last 10 lines of /etc/passwd

```
[root@localhost ~]# tail /etc/passwd
```

Result:

```
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin  
radvd:x:75:75:radvd user:/sbin/nologin  
chrony:x:994:993::/var/lib/chrony:/sbin/nologin  
pulse:x:171:171:PulseAudio System Daemon:/var/run/pulse:/sbin/nologin  
gdm:x:42:42::/var/lib/gdm:/sbin/nologin  
gnome-initial-setup:x:993:991::/run/gnome-initial-setup:/sbin/nologin  
postfix:x:89:89::/var/spool/postfix:/sbin/nologin  
sshd:x:74:74:Privilege-separated SSH:/var/empty/sshd:/sbin/nologin  
tcpdump:x:72:72::/sbin/nologin  
Tom:x:1000:1000:/home/Tom:/bin/bash
```

4. To check top 10 lines of user's file

```
[root@localhost ~]# head /etc/passwd
```

Result:

```
root:x:0:0:root:/root:/bin/bash  
bin:x:1:1:bin:/bin:/sbin/nologin  
daemon:x:2:2:daemon:/sbin:/sbin/nologin  
adm:x:3:4:adm:/var/adm:/sbin/nologin  
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin  
sync:x:5:0:sync:/sbin:/bin/sync  
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown  
halt:x:7:0:halt:/sbin:/sbin/halt  
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin  
operator:x:11:0:operator:/root:/sbin/nologin
```

5. To assign password on Tom user

Syntax:

```
[root@localhost ~]# passwd <username>
```

```
[root@localhost ~]# passwd Tom
```

Changing password for user Tom.

New password:

BAD PASSWORD: The password is shorter than 8 characters

Retype new password:

passwd: all authentication tokens updated successfully.

6. To check password properties of Tom user

```
[root@localhost ~]# grep Tom /etc/shadow
```

Result:

```
Tom:$6$IWiNPPn9$uBA.bikWM0G7Z/VI.J0AZoY0zWO7yph.3WzItdX2.urlqEch1xTlOPpWvpEQ5
```

```
RZrm7rVm.1tB6rxhdPy/AWcN1:16677:0:99999:7:::
```

Verification:

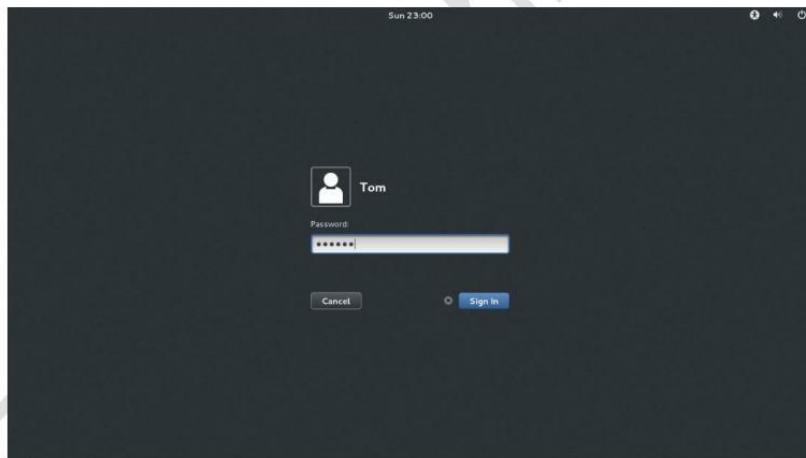
Open another gui console to login with new user

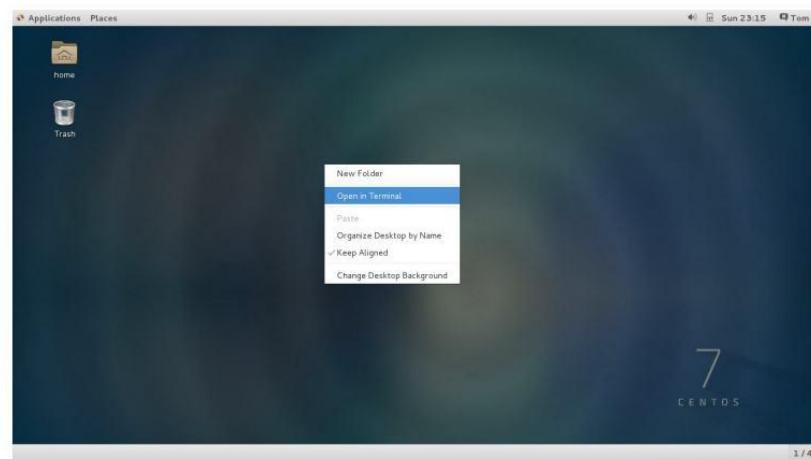
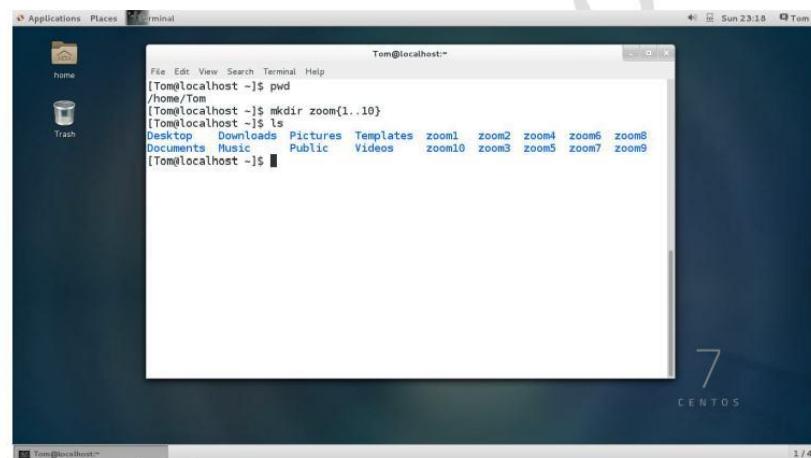
```
[root@localhost ~]# gdmflexiserver
```

Select **Tom** username



Providing **Tom** password



Opening a terminal in **Tom** consoleAdding data as a **Tom** user

Note: To check Tom user data move to root user console by using **ctrl+alt+f1** and check in his home directory.

Verification:

```
[root@localhost ~]# ls /home/Tom
Desktop  Downloads Pictures Templates zoom1  zoom2 zoom4 zoom6 zoom8
Documents Music   Public  Videos   zoom10 zoom3 zoom5 zoom7 zoom9
```

Modifying an existing user's properties

Syntax:

```
[root@localhost~]# usermod <option> <arguments> <username>
-u 2001 (changing user id)
-c "Manager of sales dept" (changing new comment)
-d /salesdept (changing new directory)
-s /bin/csh (changing an user shell)
-l /bin/csh (changing an user login name)
-L /bin/csh (To lock a user account)
-U /bin/csh (To unlock a user account)
```

1. Changing uid of an existing user

Syntax:

```
[root@localhost~]# usermod -u <uid> <username>
[root@localhost~]# usermod -u 2001 Tom
```

Verification:

```
[root@localhost~]# grep Tom /etc/passwd
Tom: x: 2001:1000: /home/Tom:/bin/bash
```

```
[root@localhost~]# su - Tom
[Tom@localhost~]$ id
uid=2001(Tom) gid=1001(Tom) groups=1001(Tom)
context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
[Tom@localhost~]$ exit
logout
```

2. Changing comment of an existing user

Syntax:

```
[root@localhost~]# usermod -c <comment> <username>
[root@localhost~]# usermod -c "Manager of sales dept" Tom
```

Verification:

```
[root@localhost~]# grep Tom /etc/passwd
```

Tom:x:2001:1000:Manager of sales dept:/home/tom:/bin/bash

3. Changing user home directory

Adding new directory according username in an existing directory

```
[root@localhost~]# mkdir -p /salesdept/Tom
```

Syntax:

```
[root@localhost~]# usermod -d <directory> <username>
```

```
[root@localhost~]# usermod -d /salesdept/Tom Tom
```

Copying bash files from default directory into user home directory

```
[root@localhost~]# cp -rvp /etc/skel/. /salesdept/Tom
```

Verification:

```
[root@localhost~]# grep Tom /etc/passwd
```

Tom:x:2001:1000:"Manager of Sales Dept":/salesdept/Tom:/bin/bash

```
[root@localhost~]# su - Tom
```

```
[Tom@localhost~]$ pwd
```

/salesdept/Tom

```
[Tom@localhost~]$ exit
```

logout

4. Change an existing user shell

Syntax:

```
[root@localhost~]# usermod -s <new shell> <username>
```

```
[root@localhost~]# usermod -s /bin/ksh Tom
```

Verification:

```
[root@localhost~]# grep Tom /etc/passwd
```

Tom:x:2001:1000:"Manager of Sales Dept":/Salesdept/Tom:/bin/ksh

```
[root@localhost~]# su - Tom  
$ echo $SHELL  
/bin/ksh  
$ exit  
logout
```

5. To change an existing user's login name

Syntax:

```
[root@localhost ~]# usermod -l <new name> <old name>
```

```
[root@localhost ~]# usermod -l John Tom
```

Verification:

```
[root@localhost ~]# grep John /etc/passwd
```

```
John:x:2001:1000:Manager of sales dept:/salesdept/Tom:/bin/ksh
```

Note: User home directory will not be changed, only username will change

```
[root@localhost ~]# gdmflexiserver
```

Result:

User is logging with new name



6. To Lock the Account

Syntax:

```
[root@localhost ~]# usermod -L <username>
```

```
[root@localhost ~]# usermod -L John
```

Verification:

```
[root@localhost ~]# grep John /etc/shadow
```

```
John:!$6$xyIJN65M$iK6FLYNX01DcBfmnc9Ea23MljYdggkdpwMH7qcA3m4ZrP0dgKm1hDqr8Zh  
Y6gkmNy3scVrqazV2DjVvh.JZFL/:16677:0:99999:7:::
```

Note: (!) Exclamation mark is a sign of Locked user

```
[root@localhost ~]# gdmflexiserver
```

Result:

Username John not displayed because that account has been locked



7. To Unlock the Account

Syntax:

```
[root@localhost ~]# usermod -U <username>
```

```
[root@localhost ~]# usermod -U John
```

Verification:

```
[root@localhost ~]# grep John /etc/shadow
```

```
John:$6$xyIJN65M$iK6FLYNX01DcBfmnc9Ea23MljYdggkdpwMH7qcA3m4ZrP0dgKm1hDqr8Zh  
Y6gkmNy3scVrqazV2DjVvh.JZFL/:16677:0:99999:7:::
```

Note: (!)Exclamation mark will be removed once the user account is unlocked.

```
[root@localhost ~]# gdmflexiserver
```

Result:

Username John is displayed and by using that name user John can login



To add new user with all new properties

Syntax:

```
[root@localhost~]# useradd -u <uid> -c <comment> -d <newdir> -s <newshell> <username>
```

```
[root@localhost~]# useradd -u 2002 -c "Admin" -d /salesdept/Ali -s /bin/csh Ali
```

Verification:

```
[root@localhost~]# grep Ali /etc/passwd
```

```
Ali:x:2002:1003:Admin:/salesdept/Ali:/bin/csh
```

8. To delete user John without deleting his home directory

Syntax:

```
[root@localhost ~]# userdel <username>
```

```
[root@localhost ~]# userdel John
```

Verification:

```
[root@localhost ~]# ls /home
```

Note: User directory will not be deleted

```
[root@localhost ~]# grep John /etc/passwd
```

Result:

No user properties are shown

9. To delete user along with his home directory

Syntax:

```
[root@localhost ~]# userdel -r <username>
```

```
[root@localhost ~]# userdel -r Ali
```

Verification:

```
[root@localhost ~]# ls /home
```

Note: User directory will also be deleted

```
[root@localhost ~]# grep Ali /etc/passwd
```

Result:

No user properties are shown

LAB 6: GROUP ADMINISTRATION

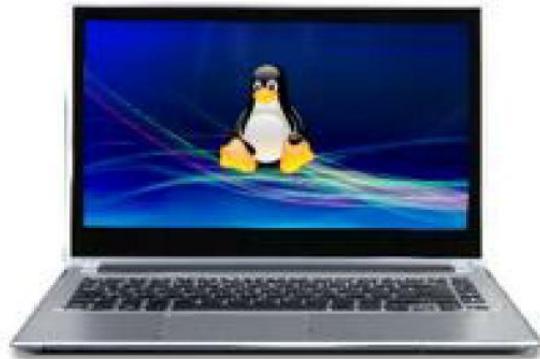
OBJECTIVE:

To create a new group and modify an existing group's properties

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. To add new group

Syntax:

```
[root@localhost ~]# groupadd <groupname>
```

```
[root@localhost ~]# groupadd zoomtech
```

Verification:

```
[root@localhost ~]# grep zoomtech /etc/group
```

```
zoomtech:x:1000:
```

2. To assign password to a group

Syntax:

```
[root@localhost ~]# gpasswd <groupname>
```

```
[root@localhost ~]# gpasswd zoomtech
```

Changing the password for group zoomtech

New Password:

Re-enter new password:

Verification:

```
[root@localhost ~]# grep zoomtech /etc/gshadow
```

```
zoomtech:$6$KoqFT/.FlI$TKrAHtcPHa7iEv0c/YG7AvBeELtngSRZWWzxx00Dc/rOK1Nyi5wfekM
```

```
wqd10HNz5.NDCAlty6wghkCC2Id6J70::
```

3. Changing the name of an existing group (from zoomtech to zoomgroup)

Syntax:

```
[root@localhost ~]# groupmod -n <new_name> <old_name>
```

```
[root@localhost ~]# groupmod -n zoomgroup zoomtech
```

Verification:

```
[root@localhost ~]# grep zoomgroup /etc/group
```

```
zoomgroup:x:1000:
```

4. To add single user in a group

Note: Before you add user into group create a user

```
[root@localhost ~]# useradd jack
```

Syntax:

```
[root@localhost ~]# gpasswd -a <username> <groupname>
```

```
[root@localhost ~]# gpasswd -a jack zoomgroup
```

Adding user **Jack** to group **zoomgroup**

Verification:

```
[root@localhost ~]# grep zoomgroup /etc/group
```

```
zoomgroup:x:1000:jack
```

5. To add multiple users in a group

Note: Before you add user into group create some users

```
[root@localhost ~]# useradd wiliam
```

```
[root@localhost ~]# useradd sam
```

Syntax:

```
[root@localhost ~]# gpasswd -M <user1>,<user2>,<user3> <group_name>
```

```
[root@localhost ~]# gpasswd -M jack,sam,wiliam zoomgroup
```

Verification:

```
[root@localhost ~]# grep zoomgroup /etc/group
```

```
zoomgroup:x:1000:jack,sam,wiliam
```

6. To add user in a group as a Secondary member

Note: Before you add user into group create a user

```
[root@localhost ~]# useradd ravi
```

Syntax:

```
[root@localhost ~]# usermod -G <groupname> <username>
```

```
[root@localhost ~]# usermod -G zoomgroup ravi
```

Verification:

```
[root@localhost ~]# grep zoomgroup /etc/group
```

```
zoomgroup:x:1000:jack,sam,wiliam,ravi
```

7. To add user in a group as a primary member

Note: Before you add user into group create a user

```
[root@localhost ~]# useradd Ali
```

Syntax:

```
[root@localhost ~]# usermod -g <groupname> <username>
```

```
[root@localhost ~]# usermod -g zoomgroup Ali
```

Verification:

```
[root@localhost ~]# su - Ali
```

```
[Ali@localhost ~]$ id
```

```
uid=1004(Ali) gid=1000 (zoomgroup) groups=1000(zoomgroup)
```

```
context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
```

8. Removing user wiliam from zoomgroup

Syntax:

```
[root@localhost ~]# gpasswd -d <user_name> <group_name>
```

```
[root@localhost ~]# gpasswd -d wiliam zoomgroup
```

Verification:

```
[root@localhost ~]# grep zoomgroup /etc/group
```

```
zoomgroup:x:1000:jack,sam,ravi
```

9. Deleting a group

Syntax:

```
[root@localhost ~]# groupdel <group_name>
```

```
[root@localhost ~]# groupdel zoomgroup
```

Note: If group contains any primary member, it cannot be deleted unless the gid of that member is changed.

Verification:

```
[root@localhost ~]# grep zoomgroup /etc/group
```

No group details will be displayed.

LAB 7: PERMISSIONS

OBJECTIVE:

To assign permissions for files and directories

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Adding a new directory(folder)

```
[root@localhost ~]# mkdir /myfolder
```

```
[root@localhost ~]# cd /myfolder/
```

2. Adding new file in directory

```
[root@localhost myfolder]# touch test_file
```

3. To check working username

```
[root@localhost myfolder]# whoami
```

Result:

root

4. To check an existing file/dir default permissions

```
[root@localhost myfolder]# ls -ld test_file
```

```
-rw-r--r-- 1 root root 0 sep 1 00:06 test_file
```

5. Set write permissions to the group level only by using Symbolic Mode

Syntax:

```
[root@localhost myfolder]# chmod <permission_mode> <file/dir_name>
```

```
[root@localhost myfolder]# chmod g+w test_file
```

Verification:

```
[root@localhost myfolder]# ls -ld test_file
```

```
-rw-rw-r-- 1 root root 0 Sep 1 00:06 test_file
```

6. Remove read permissions for others only by using symbolic mode

```
[root@localhost myfolder]# chmod o-r test_file
```

Verification:

```
[root@localhost myfolder]# ls -ld test_file
```

```
-rw-rw---- 1 root root 0 Sep 1 00:06 test_file
```

7. Assign read, write and execute permissions to others only by using symbolic mode

```
[root@localhost myfolder]# chmod o=rwx test_file
```

Verification:

```
[root@localhost myfolder]# ls -ld test_file
```

```
.,-rw-rw-rwx 1 root root 0 Sep 1 00:06 test_file
```

8. Assign execute permissions to owner, group and others by using symbolic mode

```
[root@localhost myfolder]# chmod +x test_file
```

Verification:

```
[root@localhost myfolder]# ls -ld test_file
```

```
-rwxrwxrwx 1 root root 0 Jul 13 00:06 test_file
```

9. Remove write and execute permissions from group and others also.

```
[root@localhost myfolder]# chmod g-wx,o-wx test_file
```

Verification:

```
[root@localhost myfolder]# ls -ld test_file
```

```
-rw-r-r- 1 root root 0 Sep 1 00:06 test_file
```

10. Assign write permissions to others by using Absolute Mode(Numeric Mode)

Syntax:

```
[root@localhost myfolder]# chmod <permission_mode><file/dir>
```

```
[root@localhost myfolder]# chmod 646 test_file
```

Verification:

```
[root@localhost myfolder]# ls -ld test_file
```

```
-rw-r--rw- 1 root root 0 sep 1 00:06 test_file
```

11. Assign full permissions to owner, group and others on admin directory using Absolute Mode

```
[root@localhost ~]# chmod 777 /root
```

```
##### OR #####
```

12. Assign full permissions to owner, group and others on admin directory using Symbolic Mode

```
[root@localhost ~]# chmod u+rwx,g+rwx,o+rwx /root
```

13. To find result, add a normal user and try to access file as a normal user

```
[root@localhost myfolder]# useradd zoomuser
```

```
[root@localhost myfolder]# su - zoomuser
```

```
[zoomuser@localhost ~]$ cd /root/myfolder
```

Verification:

```
[zoomuser@localhost myfolder]$ cat >> test_file
```

This is a zoom user file

Ctrl+d (to save data)

```
[zoomuser@localhost myfolder]$ cat test_file
```

This is a zoom user file

Verification:

```
[root@localhost ~]# ls -ld /root
```

```
drwxrwxrwx 2 root root 4096 Sep 1 02:22 /root
```

Note: user can read and write in file because file is having read and write permissions on other level

LAB 8: ACCESS CONTROL LIST

OBJECTIVE:

To assign permissions for files/folders belonging to different users and groups using Access Control Lists.

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Create some users

```
[root@localhost ~]# useradd tom  
[root@localhost ~]# useradd jack  
[root@localhost ~]# useradd john  
[root@localhost ~]# useradd ali  
[root@localhost ~]# useradd ravi  
[root@localhost ~]# useradd ram
```

2. To find the properties of the newly created users (6 users):

```
[root@localhost ~]# tail -6 /etc/passwd  
tom:x:1000:1000::/home/tom:/bin/bash  
jack:x:1001:1001::/home/jack:/bin/bash  
john:x:1002:1002::/home/john:/bin/bash  
ali:x:1003:1003::/home/ali:/bin/bash  
ravi:x:1004:1004::/home/ravi:/bin/bash  
ram:x:1005:1005::/home/ram:/bin/bash
```

3. Create a new group

```
[root@localhost ~]# groupadd salesgrp
```

4. To add users into group

```
[root@localhost ~]# gpasswd -M ali,ravi,ram salesgrp
```

Verification:

```
[root@localhost ~]# grep salesgrp /etc/group  
salesgrp:x:1006:ali,ravi,ram
```

5. Create a file by using 'cat' command

```
[root@localhost ~]# cat > zoom
```

This file is added by root user

Ctrl+d (to save data)

6. To apply ACL permissions for file/folder for individual users

Syntax:

```
[root@localhost ]# setfacl -m u:<username>:<permissions> <file/folder>
```

-m (modify)

```
[root@localhost ~]# setfacl -m u:tom:rw zoom
```

```
[root@localhost ~]# setfacl -m u:jack:r zoom
```

```
[root@localhost ~]# setfacl -m u:john:0 zoom
```

7. To apply ACL permissions for file/folder for groups

Syntax:

```
[root@localhost ]# setfacl -m g:<groupname>:<permissions> <file/folder>
```

```
[root@localhost ~]# setfacl -m g:salesgrp:rw zoom
```

8. To check the list of ACL permissions of files/folders

Syntax:

```
[root@localhost ~]# getfacl <filename>
```

Verification:

```
[root@localhost ~]# getfacl zoom
```

file: zoom

owner: root

group: root

user::rw-

user:tom:rw-

user:jack:r--

user:john:---

group::r--

group:salesgrp:rw-

mask::rw-

other::r--

9. To exclude user Tom from ACL list

Syntax:

```
[root@localhost ~]# setfacl -x u:<username> <filename>
```

```
[root@localhost ~]# setfacl -x u:tom zoom
```

Verification

```
[root@localhost ~]# getfacl zoom
```

```
# file: zoom
# owner: root
# group: root
user::rw-
user:jack:r--
user:john:---
group::r--
group:salesgrp:rw-
mask::rw-
other::r--
```

10. Check the output by logging in as a user jack

```
[root@localhost ~]# su - jack
```

```
[jack@localhost ~]$ cd /root (to enter into root user dir)
```

```
[jack@localhost~]$ cat zoom
```

Result:

This file is added by root user

```
[jack@localhost ~]$ cat >> zoom
```

Result:

-bash: zoom: Permission denied

Because jack has only read permissions

Note: Similarly login as different users and group members to test the Access List.

LAB 9: CHANGE OWNERSHIP OF FILES AND DIRECTORIES

OBJECTIVE:

To change owners of files/folders .

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Create a new user

```
[root@localhost ~]# useradd sam
```

2. To give ownership of a file to another user

Syntax:

```
[root@localhost ~]# chown <username> <file/folder>
```

```
[root@localhost ~]# chown sam zoom
```

Verification

```
[root@localhost ~]# ls -ld zoom
```

```
-rw-r--r-- 1 sam root 32 Aug 31 09:46 zoom
```

3. Check the result by logging in as user sam

```
[root@localhost~] su – sam
```

```
[sam@localhost ~]$ cd /root (to enter into root user dir)
```

```
[sam@localhost~]$ cat zoom
```

Result:

This file is added by root user

```
[sam@localhost ~]$ cat >> zoom (try to read)
```

Sam is a good boy

ctrl+d (to save)

```
[sam@localhost~]$ cat zoom (try to read)
```

Result:

This file is added by root user

Sam is a good boy

LAB 10 : CHANGE GROUP OWNER OF FILES AND DIRECTORIES

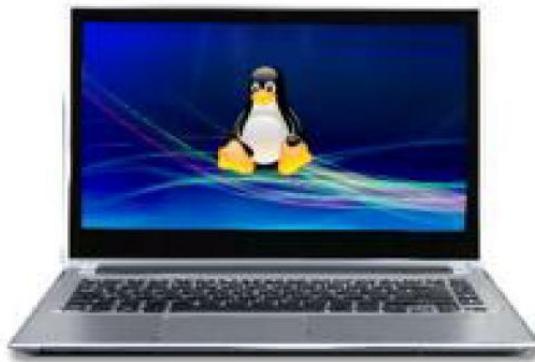
OBJECTIVE:

To change the group owner of a file/folder.

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Create a group

```
[root@localhost ~]# groupadd techgrp
```

2. Create some users

```
[root@localhost ~]# useradd kumar
```

```
[root@localhost ~]# useradd vali
```

3. Add users in a group

```
[root@localhost ~]# gpasswd -M kumar, vali techgroup
```

Verification:

```
[root@localhost ~]# grep techgroup /etc/group
```

```
Techgrp:x:1000:kumar, vali
```

4. To change group owner of a file

Syntax:

```
[root@localhost ~]# chgrp <group_name> <file/folder>
```

```
[root@localhost ~]# chgrp techgrp zoom
```

5. To give write permissions to group owner on file

```
[root@localhost ~]# chmod g+w zoom
```

Verification:

```
[root@localhost ~]# ls -ld zoom
```

```
-rw-rw-r-- 1 sam techgrp 32 Aug 31 09:46 zoom
```

6. Check the result by logging in as a techgrp user

```
[root@localhost ~]# su - vali
```

```
[vali@localhost ~]$ cd /root (to enter into root user dir)
```

```
[vali@localhost ~]$ cat zoom
```

Result:

This file is added by root user

Sam is a good boy

```
[vali@localhost~]$ cat >> zoom
```

Vali is a good boy

Ctrl+d (to save)

```
[vali@localhost~]$ cat zoom
```

This file is added by root user

Sam is a good boy

Vali is a good boy

Zoom Technologies

LAB 11: PARTITIONS

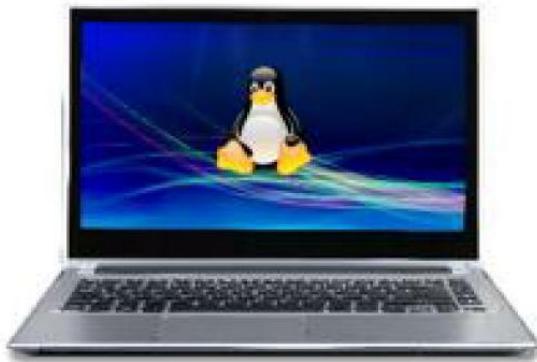
OBJECTIVE:

To create a new partition on the hard disk

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Check the existing partitions on the hard disk**Syntax:**

```
[root@client1 ~]# fdisk <option>
```

```
[root@client1 ~]# fdisk -l
```

Result:

```
Disk /dev/sda: 41.9 GB, 41875931136 bytes, 81788928 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk label type: dos  
Disk identifier: 0x00040059
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	21506047	10240000	83	Linux
/dev/sda3		21506048	37890047	8192000	83	Linux
/dev/sda4		37890048	81788927	21949440	5	Extended
/dev/sda5		37894144	54278143	8192000	83	Linux
/dev/sda6		54280192	58376191	2048000	83	Linux
/dev/sda7		58378240	62474239	2048000	82	Linux swap / Solaris

2. Enter the hard disk by using fdisk command

```
[root@client1 ~]# fdisk /dev/sda
```

Command (m for help): m

- d delete a partition
- m print this menu
- n add a new partition
- p print the partition table
- q quit without saving changes
- w write table to disk and exit

Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them.

Be careful before using the write command.

Command (m for help): n

First cylinder (1098-2434, default 1098): Press enter (key to skip cylinders option)

Using default value 1098

Last cylinder or +size or +sizeM or +sizeK (1098-2434, default 2434): +100M (partition size)

Command (m for help): **p** (to print new changes)
Disk /dev/sda: 41.9 GB, 41875931136 bytes, 81788928 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x00040059

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	21506047	10240000	83	Linux
/dev/sda3		21506048	37890047	8192000	83	Linux
/dev/sda4		37890048	81788927	21949440	5	Extended
/dev/sda5		37894144	54278143	8192000	83	Linux
/dev/sda6		54280192	58376191	2048000	83	Linux
/dev/sda7		58378240	62474239	2048000	82	Linux swap / Solaris
/dev/sda8		37892096	37894143	1024	83	Linux

Partition table entries are not in disk order

Command (m for help): **w** (to save and quit)

The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy.
The kernel still uses the old table. The new table will be used at
the next reboot or after you run partprobe(8) or kpartx(8)
Syncing disks.

3. Update new partition changes to kernel

Syntax:

```
[root@client1 ~]# partprobe <disk_name>  
[root@client1 ~]# partprobe /dev/sda
```

Verification:

No error message means updated successfully

[root@client1 ~]# fdisk -l

```
Disk /dev/sda: 41.9 GB, 41875931136 bytes, 81788928 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x00040059
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	21506047	10240000	83	Linux
/dev/sda3		21506048	37890047	8192000	83	Linux
/dev/sda4		37890048	81788927	21949440	5	Extended
/dev/sda5		37894144	54278143	8192000	83	Linux
/dev/sda6		54280192	58376191	2048000	83	Linux
/dev/sda7		58378240	62474239	2048000	82	Linux swap / Solaris
/dev/sda8		37892096	37894143	102400	83	Linux

4. Make file system i.e... (format the partition)

Syntax:

[root@client1 ~]# mkfs.ext4 <partition no>

[root@client1 ~]# mkfs.ext4 /dev/sda1

Result:

mke2fs 1.42.9 (28-Dec-2013)

```
Filesystem too small for a journal
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
Stride=0 blocks, Stripe width=0 blocks
128 inodes, 1024 blocks
51 blocks (4.98%) reserved for the super user
First data block=1
Maximum filesystem blocks=1048576
1 block group
8192 blocks per group, 8192 fragments per group
128 inodes per group
```

Allocating group tables: done

Writing inode tables: done
Writing superblocks and filesystem accounting information: done

OR

[root@client1 ~]# mkfs.vfat /dev/sda8

Result:

mkfs.fat 3.0.20 (12 Jun 2013)

5. To check file system type of partition

[root@client1 ~]# blkid /dev/sda8

Result:

/dev/sda8: UUID="08b85639-6ce3-4d4c-8d55-19c24ab0756a" TYPE="ext4"

6. Create a folder and mount the partition to use

[root@client1 ~]# mkdir /mnt/linux

Syntax:

[root@client1 ~]# mount <partition_no.> <directory>

[root@client1 ~]# mount /dev/sda8 /mnt/linux

7. Check the mounted partition

[root@client1 ~]# mount | grep /mnt/linux

/dev/sda8 on /mnt/linux type ext4 (rw,relatime,seclabel)

8 . Write the data on the partition

```
[root@client1 ~]# cd /mnt/linux
```

```
[root@client1 linux]#
```

```
[root@client1 linux]# touch myfile myfil1 myfile2
```

```
[root@client1 linux]# mkdir dsnr secbad bhills ameerpet
```

```
[root@client1 linux]# ls
```

```
ameerpet bhills dsnr lost+found myfile myfile1 myfile2 secbad
```

Zoom Technologies

LAB 12: SWAP PARTITION (VIRTUAL MEMORY)

OBJECTIVE:

To create a swap partition for faster performance .

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Check the RAM size

```
[root@client1 ~]# free -m
```

Result:

	total	used	free	shared	buffers	cached
Mem:	979	918	61	1	0	55
-/+ buffers/cache:	862	117				
Swap:	1999	1173	826			

2. Create a new partition twice the size of RAM

```
[root@client1 ~]# fdisk /dev/sda
```

Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them.

Be careful before using the write command.

Command (m for help): n (to add new partition)

First cylinder (1098-2434, default 1098): **Press enter key to skip cylinders size**

Using default value 1098

Last cylinder or +size or +sizeM or +sizeK (1098-2434, default 2434): **+2GB (partition size)**

Command (m for help): t (to change the partition ID)

Partition number (1-9, default 9): **9**

Hex code (type L to list all codes): **82 (assigning swap code value)**

Changed type of partition 'Linux' to 'Linux swap / Solaris'

Command (m for help): w (to save new changes)

The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy.

The kernel still uses the old table. The new table will be used at

the next reboot or after you run partprobe(8) or kpartx(8)

Syncing disks.

3. Update new partition changes to kernel

Syntax:

```
[root@client1 ~]# partprobe <device_name>
```

```
[root@client1 ~]# partprobe /dev/sda
```

Verification:

No error message means updated successfully

```
[root@client1 ~]# fdisk -l
```

Disk /dev/sda: 41.9 GB, 41875931136 bytes, 81788928 sectors

Units = sectors of 1 * 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 512 bytes

I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk label type: dos

Disk identifier: 0x00040059

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	21506047	10240000	83	Linux
/dev/sda3		21506048	37890047	8192000	83	Linux
/dev/sda4		37890048	81788927	21949440	5	Extended
/dev/sda5		37894144	54278143	8192000	83	Linux
/dev/sda6		54280192	58376191	2048000	83	Linux
/dev/sda7		58378240	62474239	2048000	82	Linux swap / Solaris
/dev/sda8		37892096	37894143	102400	83	Linux
/dev/sda9		62683136	66588671	1952768	82	Linux swap / Solaris

4 . Format the partition by using swap filesystem

Syntax:

```
[root@client1 ~]# mkswap <partition_no.>
```

```
[root@client1 ~]# mkswap /dev/sda9
```

Result:

Setting up swapspace version 1, size = 1952764 KiB

no label, UUID=0b6c9b8f-b4a9-45bf-bf90-14a076cd334e

5. Turn on the swap partition

Syntax:

```
[root@client1 ~]# swapon <partition_no.>
```

```
[root@client1 ~]# swapon /dev/sda9
```

6. To see the swap partition status

```
[root@client1 ~]# swapon -s
```

Result:

Filename	Type	Size	Used	Priority
/dev/sda7	partition	2047996	1225984	-1
/dev/sda9	partition	1952764	0	-2

7. Check the newly added swap partition size

Verification

```
[root@client1 ~]# free -m
```

total	used	free	shared	buffers	cached
Mem:	979	909	70	1	0
-/+ buffers/cache:	868	111			
Swap:	3906	1197	2709		

8. To Turn Off the swap partition

```
[root@client1 ~]# swapoff /dev/sda9
```

Result:

```
[root@client1 ~]# swapon -s
```

Filename	Type	Size	Used	Priority
/dev/sda7	partition	2047996	1225984	-1

Note:/dev/sda9 swap partition is not displayed

LAB 13: DISK LABEL

OBJECTIVE:

To Label a Disk

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. To Assign label name on partition

Syntax:

```
[root@client1 ~]# e2label <partition_no.> <label_name>
[root@client1 ~]# e2label /dev/sda8 /songs
```

2. To check label name of partition

Syntax:

```
[root@client1 ~]# e2label <partition_no.>
[root@client1 ~]# e2label /dev/sda8
```

Result:

```
/songs
```

3. Mounting the partition with label name

Syntax

```
[root@client1 ~]# mount LABEL=<label_name> <directory_name>
[root@client1 ~]# mount LABEL=/songs /myfolder
```

4. Check mount point with label

```
[root@client1 ~]# mount -l | grep /songs
```

Result:

```
/dev/sda8 on /myfolder type ext4 (rw,relatime,data=ordered)[/songs]
```

5. Permanently mounting the partition with label name

```
[root@client1 ~]# vi /etc/fstab
```

```
LABEL=/songs    /myfolder    ext4    defaults    0 0
```

wq:

6. To see the utilization of disk space

```
[root@client1 ~]# df -hT
```

Result:

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda3	ext4	7.6G	111M	7.1G	2%	/
devtmpfs	devtmpfs	482M	0	482M	0%	/dev
tmpfs	tmpfs	490M	14M	477M	3%	/run
/dev/sda5	ext4	7.6G	3.7G	3.6G	52%	/usr
/dev/sda1	ext4	477M	77M	371M	18%	/boot
/dev/sda2	ext4	9.5G	130M	8.9G	2%	/var
/dev/sda6	ext4	1.9G	6.1M	1.8G	1%	/home
/dev/sr0	iso9660	6.6G	6.6G	0	100%	/run/media/root/CentOS 7 x86_64
/dev/sda8	ext4	93M	1.6M	85M	2%	/mnt/linux

7. To see the block size.**Syntax:**

```
[root@client1 ~]# blockdev --getbsz <partition_no.>
```

```
[root@client1 ~]# blockdev --getbsz /dev/sda9
```

Result:

4096

LAB 14 : DISK QUOTAS

OBJECTIVE:

To allocate disk space to users and groups

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1 . Create the required partition for disk quotas

```
[root@localhost ~]# fdisk -l
```

Result:

```
Disk /dev/sda: 41.9 GB, 41875931136 bytes, 81788928 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk label type: dos  
Disk identifier: 0x00040059
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	21506047	10240000	83	Linux
/dev/sda3		21506048	37890047	8192000	83	Linux
/dev/sda4		37890048	81788927	21949440	5	Extended
/dev/sda5		37894144	54278143	8192000	83	Linux
/dev/sda6		54280192	58376191	2048000	83	Linux
/dev/sda7		58378240	62474239	2048000	82	Linux swap / Solaris
/dev/sda8		37892096	37894143	102400	83	Linux
/dev/sda9		62683136	66588671	1952768	82	Linux swap / Solaris

2. Add the new partition

```
[root@localhost ~]# fdisk /dev/sda
```

```
Welcome to fdisk (util-linux 2.23.2).  
Changes will remain in memory only, until you decide to write them.  
Be careful before using the write command.
```

Command (m for help): n

```
First cylinder (2315-4865, default 2315):  
Using default value 2315  
Last cylinder or +size or +sizeM or +sizeK (2315-4865, default 4865): +100M  
The partition table has been altered!
```

```
Calling ioctl() to re-read partition table.
```

```
WARNING: Re-reading the partition table failed with error 16: Device or resource busy.  
The kernel still uses the old table. The new table will be used at  
the next reboot or after you run partprobe(8) or kpartx(8)
```

Command (m for help): **w (to save and quit)**

The partition table has been altered!

Syncing disks.

3. Update the new changes to kernel

[root@localhost ~]# partprobe /dev/sda

Verification:

No error message means updated successfully

4. View the newly added partition

[root@localhost ~]# partprobe /dev/sda

Verification:

```
/dev/sda1  *  2048  1026047  512000  83 Linux
/dev/sda2    1026048  21506047  10240000  83 Linux
/dev/sda3   21506048  37890047  8192000  83 Linux
/dev/sda4   37890048  81788927  21949440  5 Extended
/dev/sda5   37894144  54278143  8192000  83 Linux
/dev/sda6   54280192  58376191  2048000  83 Linux
/dev/sda7   58378240  62474239  2048000  82 Linux swap / Solaris
/dev/sda8   37892096  37894143  102400  83 Linux
/dev/sda9   62476288  66381823  1952768  82 Linux swap / Solaris
/dev/sda10  66383872  66588671  102400  83 Linux
```

5. Format the partition by using filesystem

[root@localhost ~]# mkfs.ext4 /dev/sda10

6. Create a new directory to mount the quota partition

[root@localhost ~]# mkdir /salesdept

7. Mount the partition with user and group quota parameters.

Syntax:

[root@localhost ~]# mount -o <usrquota,grpquota> <partition_no> <directory_name>

```
[root@localhost ~]# mount -o usrquota,grpquota /dev/sda10 /salesdept
```

8. Check only the mount point of quota partition

```
[root@localhost ~]# mount | grep /salesdept
```

Result:

```
/dev/sda10 on /salesdept type ext4  
(rw,relatime,seclabel,quota,usrquota,grpquota,data=ordered)
```

9. Give full permissions on quota partition

```
[root@localhost ~]# chmod 777 /salesdept/
```

```
[root@localhost ~]# ls -ld /salesdept
```

Result:

```
drwxrwxrwx. 3 root root 1024 Sep 1 11:54 /salesdept
```

10. Create the Quota Database on partition

Syntax:

```
[root@localhost ~]# quotacheck <options> <mount_point>
```

```
-c (create)
```

```
-u (user level)
```

```
-g (group level)
```

```
-v (verbose)
```

```
[root@localhost ~]# quotacheck -cugv /salesdept
```

subtracted.

```
quotacheck: Checked 2 directories and 0 files
```

```
quotacheck: Old file not found.
```

```
quotacheck: Old file not found.
```

Verification:

```
[root@localhost ~]# ls /salesdept
```

```
aquota.group aquota.user lost+found
```

11. Check the quota Status

Syntax:

```
[root@localhost ~]# quotaon -p <mount_point>
```

Verification:

```
[root@localhost ~]# quotaon -p /salesdept  
group quota on /salesdept (/dev/sda10) is off  
user quota on /salesdept (/dev/sda10) is off
```

12. Enable the quota on partition

Syntax:

```
[root@localhost ~]# quotaon <mount_point>
```

```
[root@localhost ~]# quotaon /salesdept
```

Verification:

```
[root@localhost ~]# quotaon -p /salesdept  
group quota on /salesdept (/dev/sda10) is on  
user quota on /salesdept (/dev/sda10) is on
```

13. Create users and groups

```
[root@localhost ~]# useradd tom
```

```
[root@localhost ~]# groupadd salesgrp
```

```
[root@localhost ~]# groupadd fingrp
```

14. Add users as a primary member in groups

```
[root@localhost ~]# useradd -g salesgrp sai
```

```
[root@localhost ~]# useradd -g salesgrp ram
```

15. Apply quota on a user tom

Syntax:

```
[root@localhost ~]# edquota -u <username>
```

```
[root@localhost ~]# edquota -u tom
```

Result:

Disk quotas for user tom (uid 1000):

Filesystem	blocks	soft	hard	inodes	soft	hard
/dev/sda10	0	0	0	0	3	5

:wq(save and quit)

16. To check result ,login as user tom

```
[root@localhost ~]# su - tom
```

```
[tom@localhost ~]$ cd /salesdept/
```

```
[tom@localhost salesdept]$ ll
```

Result of quota files:

```
-rw----- 1 root root 6144 Sep 1 12:05 aquota.group  
-rw----- 1 root root 6144 Sep 1 12:05 aquota.user  
drwx----- 2 root root 12288 Sep 1 11:54 lost+found
```

```
[tom@localhost salesdept]$ touch file1
```

```
[tom@localhost salesdept]$ touch file2
```

```
[tom@localhost salesdept]$ touch file3
```

```
[tom@localhost salesdept]$ touch file4
```

Result:

sda10: warning, user file quota exceeded.

```
[tom@localhost salesdept]$ touch file5
```

```
[tom@localhost salesdept]$ touch file6
```

Result:

sda10: write failed, user file limit reached.

mkdir: cannot create directory `file6': Disk quota exceeded

17. Apply quota on a group salesgrp which has sai and ram as primary members

Syntax:

```
[root@localhost ~]# edquota -g <group_name>
```

```
[root@localhost ~]# edquota -g salesgrp
```

Result:

Disk quotas for group salesgrp (gid 1002):

Filesystem	blocks	soft	hard	inodes	soft	hard
/dev/sda10	0	0	0	5	3	5

```
:wq!(save and quit)
```

18. To check result, try to add data as the group member sai

```
[root@localhost salesdept]# su - sai
```

```
[sai@localhost salesdept]$ cd /salesdept (enter into disk quota dir)
```

```
[sai@localhost salesdept]$ touch file1 file2 file3
```

```
[sai@localhost salesdept]$ exit (to logout user)
```

```
exit
```

```
[root@localhost salesdept]# su - ram
```

```
[ram@localhost salesdept]$ cd /salesdept
```

```
[ram@localhost salesdept]$ touch file4
```

```
sda10: warning, group file quota exceeded.
```

```
[ram@localhost salesdept]$ touch file5
```

```
[ram@localhost salesdept]$ touch file6
```

Result:

```
sda10: write failed, group file limit reached.
```

```
touch: cannot touch `file6': Disk quota exceeded
```

```
[ram@localhost salesdept]$ ll
```

```
total 36
```

```
-rw----- 1 root root    7168 Sep 1 01:52 aquota.group
-rw----- 1 root root    7168 Sep 1 01:53 aquota.user
drwx----- 2 root root   16384 Sep 1 01:38 lost+found
-rw-r--r-- 1 ram salesgrp  0 Sep 1 01:53 file5
-rw-r--r-- 1 ram salesgrp  0 Sep 1 01:53 file4
-rw-r--r-- 1 sai salesgrp  0 Sep 1 01:53 file1
-rw-r--r-- 1 sai salesgrp  0 Sep 1 01:53 file2
-rw-r--r-- 1 sai salesgrp  0 Sep 1 01:53 file3
```

```
[ram@localhost salesdept]$
```

Note: Quotas are not applicable on secondary group members

LAB 15: LOGICAL VOLUME MANAGER (LVM)

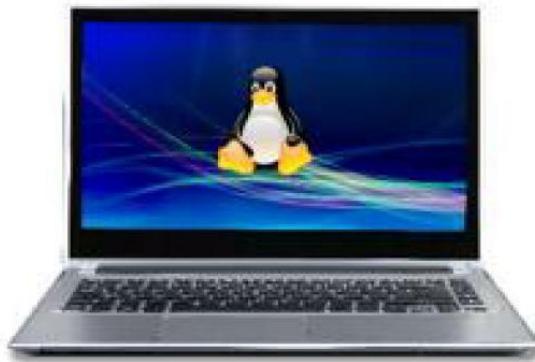
OBJECTIVE:

To resize block storage i.e logical volumes on harddisk, partitions, or SAN storage.

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1 . View hard disk details and list of partitions**Syntax:**

```
[root@localhost ~]# fdisk -l
```

```
Disk /dev/sda: 32.2 GB, 32212254720 bytes, 62914560 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk label type: dos  
Disk identifier: 0x000b85b7
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	616447	307200	83	Linux
/dev/sda2		616448	14952447	7168000	83	Linux
/dev/sda3		14952448	27240447	6144000	83	Linux
/dev/sda4		27240448	62914559	17837056	5	Extended
/dev/sda5		27244544	39532543	6144000	83	Linux
/dev/sda6		39534592	41582591	1024000	83	Linux
/dev/sda7		41584640	43632639	1024000	82	Linux swap / Solaris
/dev/sda8		27242496	27244543	102400	83	Linux
/dev/sda9		43634688	44249087	307200	83	Linux

2. Create partition of required size ,for eg : Two partitions of 300 MB each**Syntax:**

```
[root@localhost ~]# fdisk <device_name>
```

```
[root@localhost ~]# fdisk /dev/sda
```

Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them.

Be careful before using the write command.

Command (m for help): n

All primary partitions are in use

Adding logical partition 10

First sector (44251136-62914559, default 44251136):

Using default value 44251136

Last sector, +sectors or +size{K,M,G} (44251136-62914559, default 62914559): **+300M**

Partition 10 of type Linux and of size 300 MiB is set

Command (m for help): **n**

All primary partitions are in use

Adding logical partition 11

First sector (44867584-62914559, default 44867584):

Using default value 44867584

Last sector, +sectors or +size{K,M,G} (44867584-62914559, default 62914559): **+300M**

Partition 11 of type Linux and of size 300 MiB is set

Command (m for help): **w**

The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy.

The kernel still uses the old table. The new table will be used at

the next reboot or after you run partprobe(8) or kpartx(8)

Syncing disks.

3. Update newly created partitions to kernel without restarting.

Syntax:

[root@localhost~]# partprobe <disk_name>

[root@localhost~]# partprobe /dev/sda

Verification:

No error message means updated successfully

4. Now confirm the list of newly created partitions

[root@localhost ~]# fdisk -l

Verification:

```
Disk /dev/sda: 32.2 GB, 32212254720 bytes, 62914560 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk label type: dos  
Disk identifier: 0x000b85b7
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	616447	307200	83	Linux
/dev/sda2		616448	14952447	7168000	83	Linux
/dev/sda3		14952448	27240447	6144000	83	Linux
/dev/sda4		27240448	62914559	17837056	5	Extended
/dev/sda5		27244544	39532543	6144000	83	Linux
/dev/sda6		39534592	41582591	1024000	83	Linux
/dev/sda7		41584640	43632639	1024000	82	Linux swap / Solaris
/dev/sda8		27242496	27244543	1024	83	Linux
/dev/sda9		43634688	44249087	307200	83	Linux
/dev/sda10		44251136	44865535	307200	83	Linux
/dev/sda11		44867584	45481983	307200	83	Linux

5. Create Physical Volumes**Syntax:**

```
[root@localhost ~]# pvcreate <partition_number>  
[root@localhost ~]# pvcreate /dev/sda10 /dev/sda11
```

Result:

```
Physical volume "/dev/sda10" successfully created  
Physical volume "/dev/sda11" successfully created
```

6. View the list of Physical Volumes**Syntax:**

```
[root@localhost ~]# pvdisplay <pv_name>
```

```
[root@localhost ~]# pvdisplay
```

Result:

```
"/dev/sda10" is a new physical volume of "300.00 MiB"
--- NEW Physical volume ---
PV Name      /dev/sda10
VG Name
PV Size      300.00 MiB
Allocatable   NO
PE Size       0
Total PE     0
Free PE      0
Allocated PE  0
PV UUID      5UVcYc-D2OD-3YyC-5KRm-zfNX-cOAY-SCcyeK
```

```
"/dev/sda11" is a new physical volume of "300.00 MiB"
```

```
--- NEW Physical volume ---
PV Name      /dev/sda11
VG Name
PV Size      300.00 MiB
Allocatable   NO
PE Size       0
Total PE     0
Free PE      0
Allocated PE  0
PV UUID      jVx5Gd-MA9a-Opwv-DeDO-LYHD-sLet-aeAMke
```

7. Create Volume Group

Syntax:

```
[root@localhost ~]# vgcreate <volume_group_name><physical_volume_name>
```

```
[root@localhost ~]# vgcreate zoomgroup /dev/sda10 /dev/sda11
```

Result:

```
Volume group "zoomgroup" successfully created
```

8. Display Volume Group Information.

Syntax:

```
[root@localhost ~]# vgdisplay
```

```
[root@localhost ~]#vgdisplay
```

Verification

```
--- Volume group ---
VG Name          zoomgroup
System ID
Format          lvm2
Metadata Areas   2
Metadata Sequence No 1
VG Access        read/write
VG Status         resizable
MAX LV           0
Cur LV            0
Open LV           0
Max PV            0
Cur PV            2
Act PV            2
VG Size          592.00 MiB
PE Size          4.00 MiB
Total PE         148
Alloc PE / Size  0 / 0
Free PE / Size   148 / 592.00 MiB
VG UUID          UjE4o2-pTnn-27cA-Mo8n-017W-zvQg-zLm2xATo create logical Volume
```

9. Create logical Volumes in Volume Group**Syntax:**

```
[root@localhost ~]# lvcreate <volume_group_name> -L <+size_of_logical_volume> -n
<logical_volume_name>
-L logical volume
-n name of logical volume
```

```
[root@localhost ~]# lvcreate zoomgroup -L +300M -n lv1
```

Result:

Logical volume "lv1" created

10. View Logical Volume details.**Syntax:**

```
[root@localhost ~]# lvdisplay
```

```
[root@localhost ~]# lvdisplay
```

Verification:

```
--- Logical volume ---
LV Path      /dev/zoomgroup/lv1
LV Name      lv1
VG Name      zoomgroup
LV UUID      dPTAZW-BWck-Ysb0-feSU-XUYF-EYn7-PA9GQf
LV Write Access   read/write
LV Creation host, time localhost.localdomain, 2015-08-31 13:36:39 +0530
LV Status      available
# open         0
LV Size        300.00 MiB
Current LE     75
Segments       2
Allocation     inherit
Read ahead sectors  auto
- currently set to  8192
Block device   253:0
```

11. Make filesystem (i.e format) for the Logical Volume

```
[root@localhost ~]# mkfs.ext4 /dev/zoomgroup/lv1
```

```
mke2fs 1.42.9 (28-Dec-2013)
```

```
Filesystem label=
```

```
OS type: Linux
```

```
Block size=1024 (log=0)
```

```
Fragment size=1024 (log=0)
```

```
Stride=0 blocks, Stripe width=0 blocks
```

```
76912 inodes, 307200 blocks
```

```
15360 blocks (5.00%) reserved for the super user
```

```
First data block=1
```

```
Maximum filesystem blocks=33947648
```

```
38 block groups
```

```
8192 blocks per group, 8192 fragments per group
```

```
2024 inodes per group
```

```
Superblock backups stored on blocks:
```

```
    8193, 24577, 40961, 57345, 73729, 204801, 221185
```

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

12. Create a folder and mount the Logical Volume

```
[root@localhost ~]# mkdir /mylvm  
[root@localhost ~]# mount /dev/zoomgroup/lv1 /mylvm
```

13. To check LVM mounted partition

```
[root@localhost ~]# mount | grep /mylvm
```

Verification:

/dev/mapper/zoomgroup-lv1 on /mylvm type ext4 (rw,relatime,data=ordered)

14. To resize the Logical Volume

Syntax :

```
[root@localhost ~]# lvresize -L <+size_of_logical_volume> -n <logical_volume_name>  
[root@localhost ~]# lvresize -L +100M -n /dev/zoomgroup/lv1
```

Result:

Extending logical volume lv1 to 400.00 MB
Logical volume lv1 successfully resized

15. To check newly created logical volume size had increased.

```
[root@localhost ~]# lvdisplay
```

Verification:

```
--- Logical volume ---  
LV Path      /dev/zoomgroup/lv1  
LV Name      lv1  
VG Name      zoomgroup  
LV UUID      dPTAZW-BWck-Ysb0-feSU-XUYF-EYn7-PA9GQf  
LV Write Access   read/write  
LV Creation host, time localhost.localdomain, 2015-08-31 13:36:39 +0530  
LV Status     available  
# open        1
```

```
LV Size      400.00 MiB
Current LE    100
Segments      2
Allocation    inherit
Read ahead sectors  auto
- currently set to  8192
Block device  253:0 [root@localhost ~]# cd /mylvm
```

```
[root@localhost mylvm]# ls
lost+found
```

16. Now check partition size

```
[root@localhost ~]# df -h
```

Result:

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda3	5.7G	68M	5.3G	2%	/
devtmpfs	1.5G	0	1.5G	0%	/dev
tmpfs	1.5G	80K	1.5G	1%	/dev/shm
tmpfs	1.5G	9.0M	1.5G	1%	/run
tmpfs	1.5G	0	1.5G	0%	/sys/fs/cgroup
/dev/sda5	5.7G	3.6G	1.9G	66%	/usr
/dev/sda6	969M	8.5M	894M	1%	/home
/dev/sda1	283M	77M	188M	29%	/boot
/dev/sda2	6.7G	4.1G	2.2G	65%	/var
/dev/mapper/zoomgroup-lv1	283M	2.1M	262M	1%	/mylvm

17. We still find the same partition size, so update the kernel. Resize the logical volume at OS level to update kernel.

Syntax:

```
[root@localhost ~]# resize2fs <logical_volume_name>
[root@localhost ~]# resize2fs /dev/zoomgroup/lv1
```

Result:

```
resize2fs 1.42.9 (28-Dec-2013)
Filesystem at /dev/zoomgroup/lv1 is mounted on /mylvm; on-line resizing required
old_desc_blocks = 3, new_desc_blocks = 4
The filesystem on /dev/zoomgroup/lv1 is now 409600 blocks long.
```

```
[root@localhost ~]# df -h
```

Result:

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda3	5.7G	68M	5.3G	2%	/
devtmpfs	1.5G	0	1.5G	0%	/dev
tmpfs	1.5G	80K	1.5G	1%	/dev/shm
tmpfs	1.5G	9.0M	1.5G	1%	/run
tmpfs	1.5G	0	1.5G	0%	/sys/fs/cgroup
/dev/sda5	5.7G	3.6G	1.9G	66%	/usr
/dev/sda6	969M	8.5M	894M	1%	/home
/dev/sda1	283M	77M	188M	29%	/boot
/dev/sda2	6.7G	4.1G	2.2G	65%	/var
/dev/mapper/zoomgroup-lv1	380M	2.3M	355M	1%	/mylvm

Note: Mounted partition size had increase and updated.

18. Now create some files and folders on logical volume

```
[root@localhost mylvm]# touch file1 file2 file3
```

```
[root@localhost mylvm]# mkdir hyd sec
```

Verification:

```
[root@localhost mylvm]# ls  
file1 file2 file3 hyd lost+found sec
```

19. To extend the volume group, create a new partition and add to volume group.

```
[root@localhost ~]# fdisk /dev/sda
```

Command (m for help): **n**

All primary partitions are in use

Adding logical partition 12

First sector (45484032-62914559, default 45484032):

Using default value 45484032

Last sector, +sectors or +size{K,M,G} (45484032-62914559, default 62914559): **+300M**

Partition 12 of type Linux and of size 300 MiB is set

Command (m for help): **w**

The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy.
The kernel still uses the old table. The new table will be used at
the next reboot or after you run partprobe(8) or kpartx(8)
Syncing disks.

20. Now update kernel

```
[root@localhost ~]# partprobe /dev/sda
```

21. To view the list of partitions

```
[root@localhost ~]# fdisk -l
```

```
Disk /dev/sda: 32.2 GB, 32212254720 bytes, 62914560 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk label type: dos  
Disk identifier: 0x000b85b7
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	616447	307200	83	Linux
/dev/sda2		616448	14952447	7168000	83	Linux
/dev/sda3		14952448	27240447	6144000	83	Linux
/dev/sda4		27240448	62914559	17837056	5	Extended
/dev/sda5		27244544	39532543	6144000	83	Linux
/dev/sda6		39534592	41582591	1024000	83	Linux
/dev/sda7		41584640	43632639	1024000	82	Linux swap / Solaris
/dev/sda8		27242496	27244543	1024	83	Linux
/dev/sda9		43634688	44249087	307200	83	Linux
/dev/sda10		44251136	44865535	307200	83	Linux
/dev/sda11		44867584	45481983	307200	83	Linux
/dev/sda12		45484032	46098431	307200	83	Linux

Partition table entries are :not in disk order

```
Disk /dev/mapper/zoomgroup-lv1: 419 MB, 419430400 bytes, 819200 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

```
[root@localhost ~]# pvcreate /dev/sda12
```

Result:

Physical volume "/dev/sda12" successfully created

22. To extend the volume group.

Syntax :

```
[root@localhost ~]# vgextend <volume_group_name> <physical_volume_name>
```

```
[root@localhost ~]# vgextend zoomgroup /dev/sda12
```

Result:

Volume group "zoomgroup" successfully extended

Verification:

```
[root@localhost ~]# vgdisplay
--- Volume group ---
VG Name      zoomgroup
System ID
Format       lvm2
Metadata Areas 3
Metadata Sequence No 4
VG Access    read/write
VG Status    resizable
MAX LV      0
Cur LV      1
Open LV      1
Max PV      0
Cur PV      3
Act PV      3
VG Size     888.00 MiB
PE Size     4.00 MiB
Total PE    222
Alloc PE / Size 100 / 400.00 MiB
Free PE / Size 122 / 488.00 MiB
VG UUID     UjE4o2-pTnn-27cA-Mo8n-017W-zvQg-zLm2xA
```

Note: Volume group size had increased.

23. To remove logical Volume

Note: First unmount the logical volume then remove it. While unmounting you should not be in mounted folder.

```
root@localhost ~]# cd  
[root@localhost ~]# umount /mylvm
```

Verification of removing logical volumes, volume group and physical volumes

```
[root@localhost ~]# lvremove /dev/zoomgroup/lv1  
Do you really want to remove active logical volume "lv1"? [y/n]: y  
Logical volume "lv1" successfully removed
```

```
[root@localhost ~]# vgremove /dev/zoomgroup
```

Result:

Volume group "zoomgroup" successfully removed

```
[root@localhost ~]# pvremove /dev/sda{10..12}
```

Result:

Labels on physical volume "/dev/sda10" successfully wiped

Labels on physical volume "/dev/sda11" successfully wiped

Labels on physical volume "/dev/sda12" successfully wiped

LAB 16 : REDUNDANT ARRAY OF INDEPENDENT DISKS (RAID)

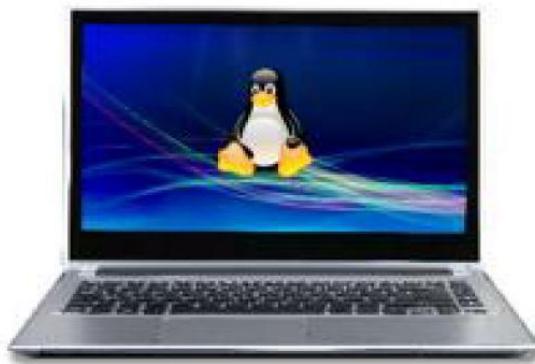
OBJECTIVE:

To backup data with RAID 5 Technology

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. To view list of all created partitions**Syntax:**

```
[root@localhost ~]# fdisk <option>
```

```
[root@localhost ~]# fdisk -l
```

Verification:

```
Disk /dev/sda: 32.2 GB, 32212254720 bytes, 62914560 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk label type: dos  
Disk identifier: 0x00040059
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	21506047	10240000	83	Linux
/dev/sda3		21506048	37890047	8192000	83	Linux
/dev/sda4		37890048	81788927	21949440	5	Extended
/dev/sda5		37894144	54278143	8192000	83	Linux
/dev/sda6		54280192	58376191	2048000	83	Linux
/dev/sda7		58378240	62474239	2048000	82	Linux swap / Solaris
/dev/sda8		37892096	37894143	1024	83	Linux
/dev/sda9		62476288	66381823	1952768	83	Linux
/dev/sda10		66383872	66588671	102400	83	Linux

Partition table entries are not in disk order

2. Add some partitions

```
[root@localhost ~]# fdisk /dev/sda
```

Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them.

Be careful before using the write command.

Command (m for help): **n**

All primary partitions are in use

Adding logical partition **11**

First sector (66590720-81788927, default 66590720):

Using default value 66590720

Last sector, +sectors or +size{K,M,G} (66590720-81788927, default 81788927): **+100M**

Partition 11 of type Linux and of size 100 MiB is set

Command (m for help): **n**

All primary partitions are in use

Adding logical partition **12**

First sector (66797568-81788927, default 66797568):

Using default value 66797568

Last sector, +sectors or +size{K,M,G} (66797568-81788927, default 81788927): **+100M**

Partition 12 of type Linux and of size 100 MiB is set

Command (m for help): **n**

All primary partitions are in use

Adding logical partition **13**

First sector (67004416-81788927, default 67004416):

Command (m for help): **n**

All primary partitions are in use

Adding logical partition **14**

Using default value 67004416

Last sector, +sectors or +size{K,M,G} (67004416-81788927, default 81788927): **+100M**

Partition 13 of type Linux and of size 100 MiB is set

First sector (67004416-81788927, default 67004416):

Using default value 67004416

Last sector, +sectors or +size{K,M,G} (67004416-81788927, default 81788927): **+100M**

Partition 13 of type Linux and of size 100 MiB is set

Command (m for help): **w**

The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy.

The kernel still uses the old table. The new table will be used at

the next reboot or after you run partprobe(8) or kpartx(8)

Syncing disks.

3. Update the newly added partitions to kernel

[root@localhost ~]# partprobe /dev/sda

4. check new added partitions

```
[root@localhost~]# fdisk -l
```

```
Disk /dev/sda: 32.2 GB, 32212254720 bytes, 62914560 sectors  
Units = sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk label type: dos  
Disk identifier: 0x00040059
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	21506047	10240000	83	Linux
/dev/sda3		21506048	37890047	8192000	83	Linux
/dev/sda4		37890048	81788927	21949440	5	Extended
/dev/sda5		37894144	54278143	8192000	83	Linux
/dev/sda6		54280192	58376191	2048000	83	Linux
/dev/sda7		58378240	62474239	2048000	82	Linux swap / Solaris
/dev/sda8		37892096	37894143	1024	83	Linux
/dev/sda9		62476288	66381823	1952768	82	Linux swap / Solaris
/dev/sda10		66383872	66588671	102400	83	Linux
/dev/sda11		66590720	66795519	102400	83	Linux
/dev/sda12		66797568	67002367	102400	83	Linux
/dev/sda13		67004416	67209215	102400	83	Linux
/dev/sda14		67211264	67416063	102400	83	Linux

Partition table entries are not in disk order

5. Create Meta disk by adding partitions or disks**Syntax:**

```
[root@localhost~]# madam -C <meta_disk> -n <partition_1> <partition2> ... <partitition_n>  
-l<raid_level>
```

-C (create metadisk)

-n (number of partition or disk)

-l (Raid level)

```
[root@localhost~]# mdadm -C /dev/md0 -n3 /dev/sda11 /dev/sda12 /dev/sda13 -l5
```

Result:

```
mdadm: Defaulting to version 1.2 metadata
```

```
mdadm: array /dev/md0 started
```

6. To see the detailed information of meta disk

Syntax:

```
[root@localhost~]# mdadm -D <meta_disk>
```

```
[root@localhost~]# mdadm -D /dev/md0
```

```
/dev/md0:
```

```
    Version : 1.2
```

```
    Creation Time : Wed Sep 2 01:30:30 2015
```

```
    Raid Level : raid5
```

```
    Array Size : 203776 (199.03 MiB 208.67 MB)
```

```
    Used Dev Size : 101888 (99.52 MiB 104.33 MB)
```

```
    Raid Devices : 3
```

```
    Total Devices : 3
```

```
    Persistence : Superblock is persistent
```

```
    Update Time : Wed Sep 2 01:30:37 2015
```

```
    State : clean
```

```
    Active Devices : 3
```

```
    Working Devices : 3
```

```
    Failed Devices : 0
```

```
    Spare Devices : 0
```

```
    Layout : left-symmetric
```

```
    Chunk Size : 512K
```

```
    Name : localhost.localdomain:0 (local to host localhost.localdomain)
```

```
    UUID : daefa120:0538a29e:1741e5b5:e56c7017
```

```
    Events : 18
```

Number	Major	Minor	RaidDevice	State	
0	8	11	0	active sync	/dev/sda11
1	8	12	1	active sync	/dev/sda12
3	8	13	2	active sync	/dev/sda13

7. Format the RAID meta disk

```
[root@localhost~]# mkfs.ext4 /dev/md0
```

Result:

```
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
Stride=512 blocks, Stripe width=1024 blocks
51000 inodes, 203776 blocks
10188 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=33816576
25 block groups
8192 blocks per group, 8192 fragments per group
2040 inodes per group
Superblock backups stored on blocks:
    8193, 24577, 40961, 57345, 73729

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done
```

8. Add a folder to mount the meta disk

```
[root@localhost~]# mkdir /raid
```

9. Mount the meta disk on directory to use**Syntax:**

```
[root@localhost~]# mount <meta_disk> <dir_name>
```

```
[root@localhost~]# mount /dev/md0 /raid
```

Verification:

```
[root@localhost~]# mount | grep /raid
```

```
/dev/md0 on /raid type ext4 (rw,relatime,seclabel,stripe=1024,data=ordered)
```

10. Enter into RAID mounted directory to add data

```
[root@localhost~]# cd /raid
```

```
[root@localhost raid]# ls
```

Result:

```
lost+found:
```

11. Write some content inside the RAID partition

```
[root@localhost raid]# cat > test
```

```
hello this is a test file of raid 5 on Linux_v7
```

ctrl+d (to save)

12. View the newly added file properties

```
[root@localhost raid]# ls -l
```

Result:

```
-rw-r--r-- 1 root root 4 Aug 31 15:02 test
```

13. To make the device faulty in RAID array

Syntax:

```
[root@localhost~]# mdadm <meta_disk> -f <partition_no.>
```

```
[root@localhost~]# mdadm /dev/md0 -f /dev/sda12
```

```
mdadm: set /dev/sda12 faulty in /dev/md0
```

14. To see the detailed information of /dev/md0 and check the faulty device which is displayed as spare.

```
[root@localhost~]# mdadm -D /dev/md0
```

Verification:

```
/dev/md0:
```

```
    Version : 1.2
```

```
    Creation Time : Fri Aug 14 01:59:05 2015
```

```
    Raid Level : raid5
```

```
    Array Size : 224256 (219.04 MiB 229.64 MB)
```

```
    Used Dev Size : 112128 (109.52 MiB 114.82 MB)
```

Raid Devices : 3
 Total Devices : 3
 Persistence : Superblock is persistent

Update Time : tue Sep 1 16:03:58 2015

State : clean, degraded

Active Devices : 2

Working Devices : 2

Failed Devices : 1

Spare Devices : 0

Layout : left-symmetric

Chunk Size : 512K

Name : client1:0 (local to host client)

UUID : 96e0a496:a53aa9da:01e2b8f5:0a5bde05

Events : 20

Number	Major	Minor	RaidDevice	State
1	0	0	spare device	/dev/sda12
2	8	12	active sync	/dev/sda11
3	8	13	active sync	/dev/sda13

15. To remove the faulty device

```
[root@localhost:raid]# mdadm -r <meta_disk> <partition_no.>
```

```
[root@localhost:raid]# mdadm /dev/md0 -r /dev/sda12
```

Result:

```
mdadm: hot removed /dev/sda12
```

16. To view the status of meta disk

```
[root@localhost:raid]# mdadm -D /dev/md0
```

/dev/md0:

Version : 1.2

Creation Time : tue Sep 1 16:13:45 2015

Raid Level : raid5

Array Size : 224256 (219.04 MiB 229.64 MB)

Used Dev Size : 112128 (109.52 MiB 114.82 MB)

Raid Devices : 3

Total Devices : 2

Persistence : Superblock is persistent

Update Time : Fri Aug 14 02:03:58 2015

State : clean, degraded

Active Devices : 2

Working Devices : 2

Failed Devices : 0

Spare Devices : 0

Layout : left-symmetric

Chunk Size : 512K

Name : web.zoomgroup.com:0 (local to host web.zoomgroup.com)

UUID : 96e0a496:a53aa9da:01e2b8f5:0a5bde05

Events : 20

Number	Major	Minor	RaidDevice	State
0	0	0	0	removed
1	8	12	1	active sync /dev/sda11
3	8	13	2	active sync /dev/sda13

17. To add new device into RAID

Syntax:

```
[root@localhost~]# mdadm --add <meta_disk> <partition_no.>
```

```
[root@localhost~]# mdadm --add /dev/md0 /dev/sda14
```

Verification:

```
mdadm: added /dev/sda14
```

```
[root@web ~]# mdadm -D /dev/md0
```

```
/dev/md0:
```

Version : 1.2

Creation Time : Fri Aug 14 01:59:05 2015

Raid Level : raid5

Array Size : 224256 (219.04 MiB 229.64 MB)

Used Dev Size : 112128 (109.52 MiB 114.82 MB)

Raid Devices : 3

Total Devices : 3

Persistence : Superblock is persistent

Update Time : Fri Aug 14 02:08:20 2015

State : clean, degraded, recovering
Active Devices : 2
Working Devices : 3
Failed Devices : 0
Spare Devices : 1
Layout : left-symmetric
Chunk Size : 512K
Rebuild Status : 40% complete
Name : web.zoomgroup.com:0 (local to host web.zoomgroup.com)
UUID : 96e0a496:a53aa9da:01e2b8f5:0a5bde05
Events : 42

Number	Major	Minor	RaidDevice	State
4	8	15	0	spare rebuilding /dev/sda14
1	8	12	1	active sync /dev/sda12
3	8	13	2	active sync /dev/sda13

18. Unmount the meta device before you stop the RAID.

Syntax:

```
[root@localhost~]# umount <meta_disk>
```

```
[root@localhost~]# umount /dev/md0
```

19. To stop the RAID

Syntax:

```
[root@localhost~]# mdadm -S <meta_disk>
```

```
[root@localhost~]# mdadm --S /dev/md0
```

Result:

```
mdadm: stopped /dev/md0
```

20. To activate or assemble the RAID meta device

Syntax:

```
[root@localhost~]# mdadm -A /dev/md0 <disk_1> <disk_2> <disk_3>
```

```
[root@localhost~]# mdadm -A /dev/md0 /dev/sda11 /dev/sda13 /dev/sda14
```

Result:

```
mdadm: /dev/md0 has been started with 3 drives.
```

LAB 17: BACKUP AND RESTORE USING TAR AND FILTER THE ARCHIVE THROUGH GZIP(-z)

OBJECTIVE:

To take Backup using tar and filter the archive through gzip

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Create a folder along with some other directories and files

```
[root@localhost ~]# mkdir /myfolder  
[root@localhost ~]# cd /myfolder/  
[root@localhost myfolder]# mkdir dir1  
[root@localhost myfolder]# touch 1 test_file tom_file  
[root@localhost myfolder]# ls  
dir1 test_file tom_file
```

2. To take a backup and compress the file

Syntax:

```
[root@localhost ~]# tar <options> <file_name.tar.gz> <source_files/folders>  
-c create  
-v verbose  
-f filename  
-z compress the backup file
```

```
[root@localhost ~]# tar -cvzf myfolder.tar.gz /myfolder
```

Result:

```
tar: Removing leading `/' from member names  
/myfolder/  
/myfolder/dir1/  
/myfolder/tom_file  
/myfolder/test_file  
/myfolder/1
```

Verification:

```
[root@localhost ~]# ls -ld myfolder.tar.gz  
-rw-r--r-- 1 root root 251 Jul 13 03:09 myfolder.tar.gz
```

3. To view the contents of the backup file

Syntax:

```
[root@localhost ~]# tar <options> <file_name.tar.gz>  
[root@localhost ~]# tar -tvzf myfolder.tar.gz
```

Result:

```
drwxrwxrwx root/root    0 2008-07-13 01:31:34 myfolder/
drwxr-xr-x root/root    0 2008-07-13 01:28:39 myfolder/dir1/
-rw-r--r-- tom/john    12 2008-07-13 01:29:51 myfolder/tom_file
-rw-rw-rw- root/root    0 2008-07-13 00:06:35 myfolder/test_file
-rw-r--r-- tom/john    0 2008-07-13 01:31:34 myfolder/1
```

4. To test the backup, delete the source folder data

```
[root@localhost ~]# rm -r /myfolder
```

Result:

```
rm: descend into directory `/myfolder'? y
rm: remove directory `/myfolder/dir1'? y
rm: remove regular file `/myfolder/tom_file'? y
rm: remove regular empty file `/myfolder/test_file'? y
rm: remove regular empty file `/myfolder/1'? y
rm: remove directory `/myfolder'? y
```

5. To restore the data

Syntax:

```
[root@localhost ~]# tar <options> <file_name.tar.gz> -C <new_dir>
[root@localhost ~]# tar -xvf /root/myfolder.tar.gz -C /
```

Result:

```
myfolder/
myfolder/dir1/
myfolder/tom_file
myfolder/test_file
myfolder/1
```

Verification:

```
[root@localhost /]# ls /myfolder
```

Result:

```
1 dir1 test_file tom_file
```

LAB 18: BACKUP AND RESTORE USING TAR AND FILTER THE ARCHIVE THROUGH BZIP2(-j)

OBJECTIVE:

To take Backup using tar and filter the archive through bzip2

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. To backup data

Syntax:

```
[root@localhost ~]# tar <options> <destination_file> <source_file.tar.bz2>
```

```
[root@localhost ~]# tar -cvjf /mnt/etc.tar.bz2 /etc
```

Result:

```
tar: Removing leading '/' from member names  
/etc/  
/etc/motd  
/etc/os-release  
/etc/sssd/  
/etc/favicon.png  
/etc/auto.master.d/  
/etc/smartmontools/  
/etc/smartmontools/smartd_warning.d/
```

2. To check the backup data

Syntax:

```
[root@localhost ~]# tar --<options> <destination_file.tar.bz2> <source_dir>
```

```
[root@localhost ~]# tar -tvjf /mnt/etc.tar.bz2 /etc
```

Result:

```
drwxr-xr-x root/root    0 2015-09-01 12:51 etc/  
-rw-r--r-- root/root    0 2013-06-07 20:01 etc/motd  
-rw-r--r-- root/root   254 2014-07-04 16:30 etc/os-release  
drwx----- root/root    0 2014-06-17 23:12 etc:sssd/
```

3. To restore data if it is lost

Syntax:

```
[root@localhost~]# tar -xvf <destination_file.bz2> -C <new_dir>
```

```
[root@localhost ~]# tar -xvf /mnt/etc.tar.bz2 -C /opt
```

Result:

```
etc/  
etc/motd  
etc/os-release
```

etc/sssd/
etc/favicon.png
etc/auto.master.d/
etc/smartmontools/
etc/smartmontools/smartd_warning.d/

4. Check the original data and backup file size

[root@localhost ~]# du -sh /etc

Result:

31M /etc

[root@localhost~]# du -sh /mnt/etc.tar.bz2

Result:

6.7M /mnt/etc.tar.bz2

Note : Size difference between original and backup file.

LAB 19: BACKUP AND RESTORE USING CPIO COMMAND

OBJECTIVE:

To take Backup using cpio command

PRE-REQUISITE:

Machine with Linux Installed

TOPOLOGY:



1. Enter into source directory from where you want the backup to be taken

```
[root@localhost ~]# cd /myfolder
```

2. To take backup of filtered output

Syntax:

```
[root@localhost ~]# <list files/folders> | cpio -ov > <destination/backup_file.cpio>
```

-o out
-v verbose
-t table of content
-l in

```
[root@localhost myfolder]# ls -d | cpio -ov > /mnt/zoom.cpio
```

Result:

```
1  
dir1  
myfolder.cpio  
test_file  
tom_file  
1 block
```

3. To view content of backup file

Syntax:

```
[root@localhost ]# cpio -tf <<destination_file>
```

```
[root@localhost ]# cpio -tf < /mnt/zoom.cpio
```

Result:

```
1  
dir1  
test_file  
tom_file  
1 block
```

4. To test backup file by removing the original folder data

```
[root@localhost myfolder]# rm -r *
```

Verification:

```
rm: remove regular empty file `1'? y  
rm: remove directory `dir1'? y  
rm: remove regular file `myfolder.cpio'? n  
rm: remove regular empty file `test_file'? y  
rm: remove regular file `tom_file'? y
```

5. To restore data into present working directory.

```
[root@localhost myfolder]# cpio -iv < destination_dir/file>
```

```
[root@localhost myfolder]# cpio -iv < /mnt/zoom.cpio
```

Verification:

```
1  
dir1  
test_file  
tom_file  
1 block
```

6. To check restored data

```
[root@localhost ~]# ls myfolder
```

Result:

```
1 dir test_file tom_file
```

LAB 20: NETWORK CONFIGURATION- IP ADDRESSING

OBJECTIVE:

To enable network communication between computers by assigning IP addresses.

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



1. To set the hostname temporarily

Syntax:

```
[root@localhost ~]# hostname <system_name>
```

```
[root@localhost ~]# hostname sys1.zoomgroup.com
```

2. To view the hostname

```
[root@localhost~]# hostname
```

```
sys1.zoomgroup.com
```

3. To set hostname permanently add in the following file

```
[root@sys1~]# vi /etc/hostname
```

```
sys1.zoomgroup.com
```

```
:wq!
```

4. To map ip and hostname locally add in following file

```
[root@sys1~]# vi /etc/hosts
```

```
127.0.0.1 Localhost.localdomain localhost
```

```
192.168.0.1 sys1.zoomgroup.com sys1
```

```
:wq!
```

Note: To update new configuration to kernel log out and log in to the operating system

5. Set ip address temporarily

Syntax:

```
[root@sys1~]# ifconfig <network_device_name> <IP address> netmask <netmask_value>
```

```
[root@sys1~]# ifconfig enp1s7 192.168.0.9 netmask 255.255.255.0
```

6. View the interface details.

```
[root@sys1~]# ifconfig
```

Result:

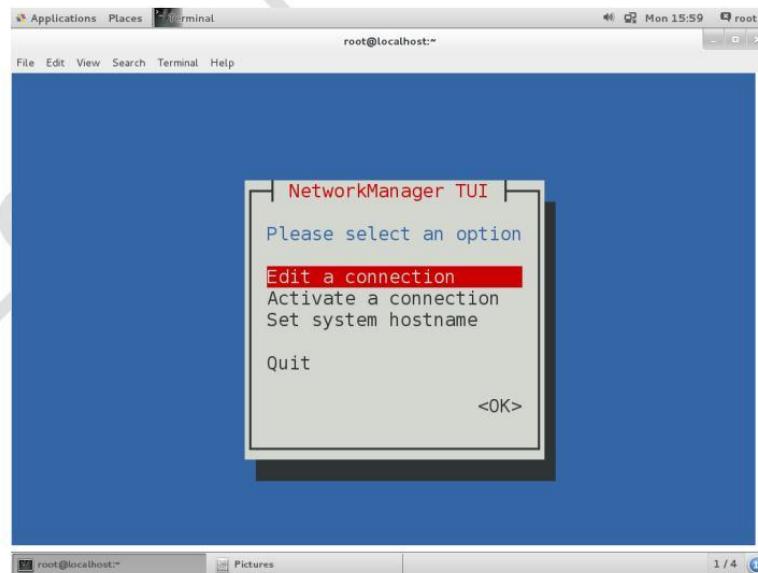
```
enp1s7 Link encap:Ethernet HWaddr 00:13:20:B7:1D:44
      inet addr:192.168.0.9 Bcast:192.168.0.255
        Mask:255.255.255.0
      inet6 addr: fe80::213:20ff:feb7:1d44/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:48153 errors:4 dropped:0 overruns:0 frame:4
        TX packets:21992 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:39512670 (37.6 MiB) TX bytes:1720318 (1.6 MiB)
```

```
lo    Link encap:Local Loopback
      inet addr:127.0.0.1 Mask:255.0.0.0
      inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING MTU:16436 Metric:1
        RX packets:1249 errors:0 dropped:0 overruns:0 frame:0
```

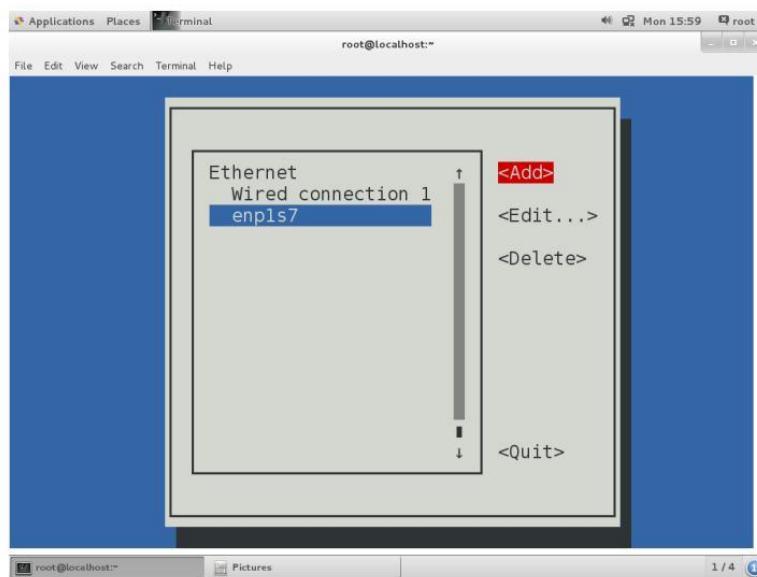
7. To set permanent ip address

```
[root@sys1~]# nmcli
```

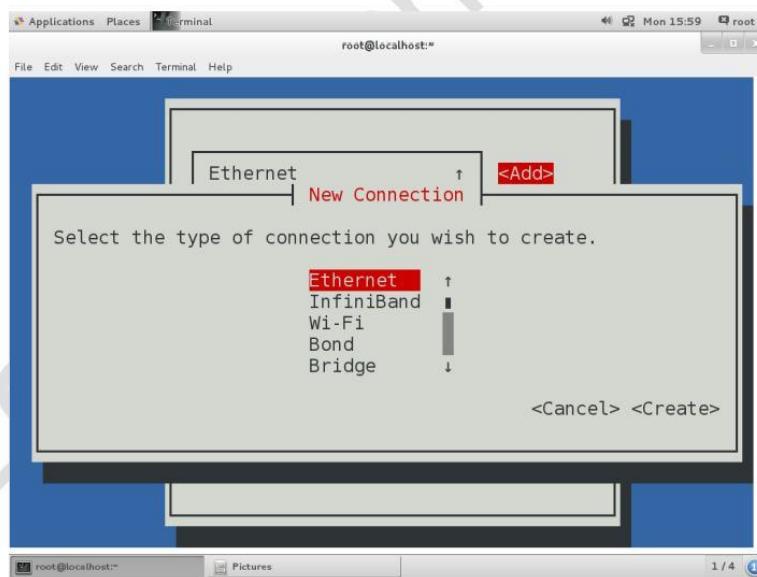
- Select Edit a connection



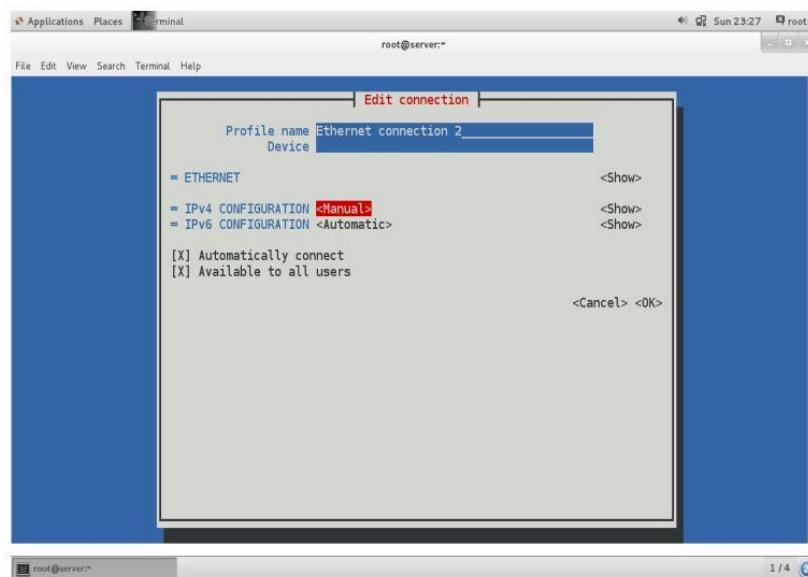
- Select device and Add option



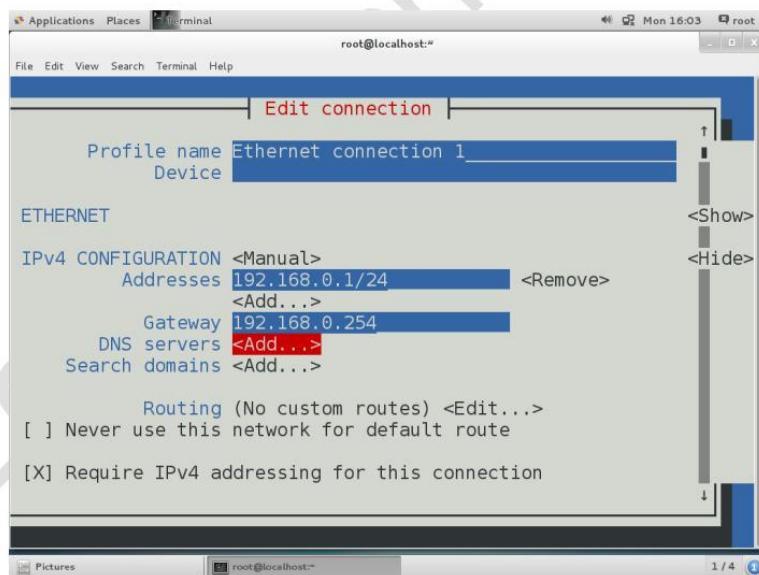
- Add Ethernet Device



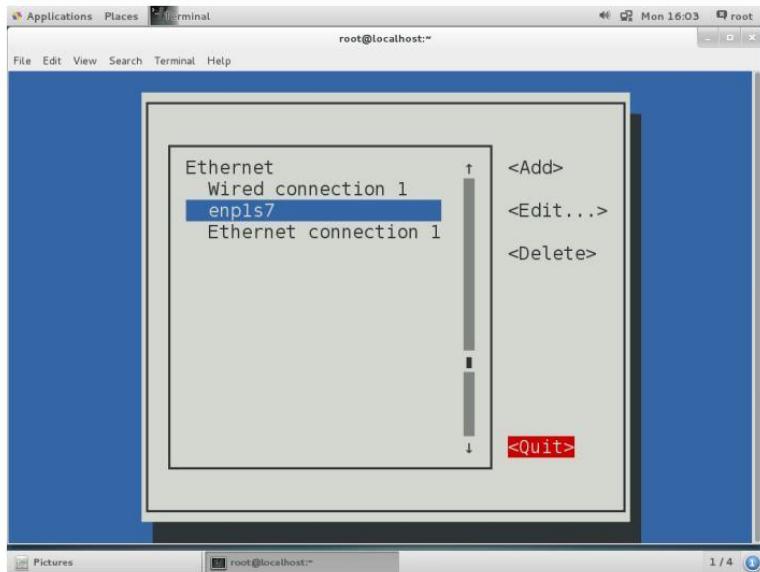
- **Select Static(Manual Method)**



- **Configure IP address , DNS server and gateway**



- Select quit to proceed



8. Restart the service to activate the newly configured ip address

Syntax:

```
[root@sys1~]# <commad> <service_name> <action>
```

```
[root@sys1~]# service network restart
```

OR

```
[root@sys1~]# systemctl enable network
```

9. To view new ip address

```
[root@sys1~]# ifconfig
```

```
enp1s7 Link encap:Ethernet HWaddr 00:13:20:B7:1D:44
inet addr:192.168.0.1 Bcast:192.168.0.255 Mask:255.255.255.0
inet6 addr: fe80::213:20ff:feb7:1d44/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
      RX packets:48153 errors:4 dropped:0 overruns:0 frame:4
      TX packets:21992 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:39512670 (37.6 MiB) TX bytes:1720318 (1.6 MiB)
```

```
lo      Link encap:Local Loopback
        inet addr:127.0.0.1 Mask:255.0.0.0
```

```
inet6 addr: ::1/128 Scope:Host  
UP LOOPBACK RUNNING MTU:16436 Metric:
```

10. To Enable the NIC card

Syntax:

```
[root@sys1~]# ifup <network_device_name>  
[root@sys1~]# ifup enp1s7
```

Verification:

```
[root@sys1~]# ifconfig  
  
enp1s7: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
        inet 192.168.0.1 netmask 255.255.255.0 broadcast 192.168.0.255  
        inet6 fe80::20c:29ff:fe6a:f2a6 prefixlen 64 scopeid 0x20<link>  
          ether 00:0c:29:6a:f2:a6 txqueuelen 1000 (Ethernet)  
            RX packets 25428 bytes 19635570 (18.7 MiB)  
            RX errors 0 dropped 0 overruns 0 frame 0  
            TX packets 17895 bytes 4108956 (3.9 MiB)  
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

11. To Disable NIC card

Syntax:

```
[root@sys1~]# ifdown <network_device_name>  
[root@sys1~]# ifdown enp1s7
```

Verification:

```
[root@sys1~]# ifconfig  
  
enp1s7: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
          ether 00:0c:29:6a:f2:a6 txqueuelen 1000 (Ethernet)  
            RX packets 25377 bytes 19628872 (18.7 MiB)  
            RX errors 0 dropped 0 overruns 0 frame 0  
            TX packets 17711 bytes 4093938 (3.9 MiB)  
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

12. To Remove an ip address ,remove the configuration file

```
[root@sys1~]# cd /etc/sysconfig/network-scripts/
```

```
[root@sys1network-scripts]# ls
```

Result:

```
ifcfg-enp1s7  ifdown-isdn  ifup-ipsec  ifup-routes  
ifcfg-lo     ifdown-ppp   ifup-ipx   ifup-sl  
ifdown      ifdown-sit  ifup-isdn  ifup-wireless  
ifdown-aliases  ifdown-sl  ifup-plip  init.ipv6-global  
ifdown-ipp  ifup      ifup-plusb  network-functions  
ifdown-ipsec  ifup-aliases  ifup-post  network-functions-ipv6  
ifdown-ipv6  ifup-ipp  ifup-ppp
```

```
[root@sys1network-scripts]# cat ifcfg- enp1s7
```

Result:

```
DEVICE=enp1s7  
ONBOOT=yes  
BOOTPROTO=static  
IPADDR=192.168.0.1  
NETMASK=255.255.255.0  
GATEWAY=192.168.0.254
```

```
[root@sys1network-scripts]# rm -rf ifcfg- enp1s7
```

Verification:

```
[root@sys1network-scripts]# ls  
ifcfg-lo     ifdown-ppp   ifup-ipx   ifup-sl  
ifdown      ifdown-sit  ifup-isdn  ifup-wireless  
ifdown-aliases  ifdown-sl  ifup-plip  init.ipv6-global  
ifdown-ipp  ifup      ifup-plusb  network-functions  
ifdown-ipsec  ifup-aliases  ifup-post  network-functions-ipv6  
ifdown-ipv6  ifup-ipp  ifup-ppp
```

Note: ifcfg-enp1s7 file is removed

13. To update ip changes start/restart the services

```
[root@sys1network-scripts]# service network restart
```

OR

```
[root@sys1network-scripts]# systemctl enable network
```

LAB 21: PACKAGE MANAGEMENT (RPM COMMAND)

OBJECTIVE:

To install packages using RPM command

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



System1

RPM or YUM Server

IP Address 192.168.0.250



System2

Client System

IP Address 192.168.0.X

To install packages from dvd

1. To query whether package is installed or not

Syntax:

```
[root@client ~]# rpm -q <package_name>
```

```
[root@client ~]# rpm -q zip
```

Result:

```
zip-3.0-10.el7.x86_64
```

2. To remove the installed package

Syntax:

```
[root@client ~]# rpm -e <package_name>
```

```
[root@client ~]# rpm -e zip --nodeps
```

```
[root@client ~]# rpm -q zip
```

Result:

```
Package zip is not installed
```

3. Insert dvd and mount it on dir

```
[root@client ~]# mount /dev/sr0 /media
```

```
mount: /dev/sr0 is write-protected, mounting read-only
```

4. To verify mount point of dvd

```
[root@client ~]# mount
```

Verification:

```
/dev/sda5 on / type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda2 on /usr type ext4 (rw,relatime,seclabel,data=ordered)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs
/dev/sda9 on /disk9 type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda1 on /boot type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda6 on /home type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda3 on /var type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sr0 on /media type iso9660
(ro,relatime,uid=0,gid=0,iocharset=utf8,mode=0400,dmode=0500)
```

5. Go to dvd mount point to install packages.

```
[root@client ]# cd /media/Packages
```

```
[root@client ]# ls
```

Result:

Displays the list of all packages with extension .rpm

6. To install , to view verbose output, and to check the progress of installation of packages with hash sign.

Syntax :

```
[root@client ]# rpm <option> <package_name.rpm>
```

-i install

-v verbose

-h to see the installation progress with hash

--force to install package forcefully if it is already installed

```
[root@client ]# rpm -ivh zip*.rpm
```

Verification:

Warning: zip-3.0-10.el7.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID f4a80eb5:

NOKEY

Preparing... ##### [100%]

Updating / installing...

1: zip-3.0-10.el7 ##### [100%]

To install packages from server by using 'NFS' service

1. To query package is installed or not

```
[root@client ~]# rpm -q vsftpd
```

Verification:

```
vsftpd-3.0-10.el7.x86_64
```

2. If package is installed remove it

```
[root@client ~]# rpm -e vsftpd
```

3. Mount a share folder of NFS share folder in linux client system

```
[root@client ~]# mount 192.168.0.250:/var/ftp/pub/centos7/Packages /mnt
```

```
[root@client ~]# mount
```

Verification:

```
/dev/sda5 on / type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda2 on /usr type ext4 (rw,relatime,seclabel,data=ordered)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs
192.168.0.250:/var/ftp/pub/centos7/Packages on /mnt type nfs
(rw,relatime,seclabel,data=ordered)
/dev/sda1 on /boot type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda6 on /home type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda3 on /var type ext4 (rw,relatime,seclabel,data=ordered)
```

```
[root@client ~]# cd /mnt
```

```
[root@client ~]# ls
```

Verification:

Displays the list of all packages with rpm extension.

4. To install packages forcefully if package is already installed

Syntax:

```
[root@client mnt]# rpm -ivh <package_name> --force
```

```
[root@client mnt]# rpm -ivh vsftpd*.rpm --force
```

Result:

```
Warning: vsftpd-3.0-10.el7.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID f4a80eb5:  
NOKEY
```

```
Preparing... ##### [100%]
```

```
Updating / installing...
```

```
1: vsftpd-3.0-10.el7 ##### [100%]
```

To query the packages with some more options of rpm

1. To query all installed packages whose name starts with word samba

Syntax:

```
[root@client mnt]# rpm -qa <package_name>
```

```
[root@client mnt]# rpm -qa samba*
```

Verification:

```
samba-client-4.1.1-31.el7.x86_64
```

```
samba-libs-4.1.1-31.el7.x86_64
```

```
samba-4.1.1-31.el7.x86_64
```

```
samba-common-4.1.1-31.el7.x86_64
```

2. To query the information of any package

Syntax:

```
[root@client mnt]# rpm -qi <package_name>
```

```
[root@client mnt]# rpm -qi samba
```

Result:

```
Name : samba
```

```
Epoch : 0
```

```
Version : 4.1.1
```

```
Release : 31.el7
```

```
Architecture: x86_64
```

```
Install Date: Mon 31 Aug 2015 01:39:38 AM IST
```

```
Group : System Environment/Daemons
```

```
Size : 1616509
```

License : GPLv3+ and LGPLv3+
Signature : RSA/SHA256, Fri 04 Jul 2014 10:23:17 AM IST, Key ID 24c6a8a7f4a80eb5
Source RPM : samba-4.1.1-31.el7.src.rpm
Build Date : Tue 17 Jun 2014 11:20:16 PM IST
Build Host : worker1.bsys.centos.org
Relocations : (not relocatable)
Packager : CentOS BuildSystem <<http://bugs.centos.org>>
Vendor : CentOS
URL : <http://www.samba.org/>
Summary : Server and Client software to interoperate with Windows machines
Description :
Samba is the standard Windows interoperability suite of programs for Linux and Unix.

3. To query the list of all files of particular package

Syntax:

```
[root@client mnt]# rpm -ql <package_name>
[root@client mnt]# rpm -ql samba
```

Result:

```
/etc/openldap/schema
/etc/openldap/schema/samba.schema
/usr/bin/eventlogadm
/usr/bin/smbstatus
..
..
/usr/share/man/man8/vfs_tsmsm.8.gz
/usr/share/man/man8/vfs_xattr_tdb.8.gz
/var/spool/samba
```

4. To query package related documentation and man pages

Syntax:

```
[root@client mnt]# rpm -qd <package_name>
[root@client mnt]# rpm -qd samba
```

Result:

```
/usr/share/doc/samba-4.1.1/COPYING
/usr/share/doc/samba-4.1.1/LDAP/README
/usr/share/doc/samba-4.1.1/LDAP/get_next_oid
/usr/share/doc/samba-4.1.1/LDAP/ol-schema-migrate.pl
```

5. To query package configuration files

Syntax:

```
[root@client mnt]# rpm -qc <package_name
```

```
[root@localhost ~]# rpm -qc samba-common
```

Result:

```
/etc/logrotate.d/samba  
/etc/samba/lmhosts  
/etc/samba/smb.conf  
/etc/sysconfig/samba
```

Zoom Technologies

LAB 22: PACKAGE MANAGEMENT (YUM COMMAND)

OBJECTIVE:

To install packages using YUM command

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



Note: In Labs 'YUM' Server has been already configured.

At client side edit the yum configuration file by providing the server ip-address and package directory path as follow.

1. Provide the YUM server IP address and package directory name in yum file

```
[root@client ~]# vi /etc/yum.repos.d/CentOS-Base.repo

[core]

name= Linux $releasever - $basearch - Debug

baseurl=ftp://192.168.0.250/pub/centos7/Packages

enabled=1

gpgcheck=1

gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
```

2. To see the list of packages available in repository i.e on yum server

Syntax:

```
[root@client ~]# yum list <package_name>
```

```
[root@client ~]# yum list samba*
```

Verification:

Loaded plugins: fastestmirror, refresh-packagekit, security

Loading mirror speeds from cached hostfile

core	1.2 kB	00:00
------	--------	-------

Installed Packages

samba.x86_64	3.5.10-125.el6	@core
samba-client.x86_64	3.5.10-125.el6	@core
samba-common.x86_64	3.5.10-125.el6	@core
samba-doc.x86_64	3.5.10-125.el6	@core
samba-domainjoin_64	3.5.10-125.el6	@core
samba-swat.x86_64	3.5.10-125.el6	@core
samba-winbind.x86_64	3.5.10-125.el6	@core
samba4-pidl.x86_64	4.0.0-23.alpha11.el6	@core

Available Packages

samba-common.i686	3.5.10-125.el6	core
samba-winbind-clients.i686	3.5.10-125.el6	core
samba-winbind-devel.i686	3.5.10-125.el6	core

3. To install packages

Syntax:

```
[root@ client ~]# yum install <package_name> -y
```

```
[root@ client ~]# yum install samba* -y
```

Loaded plugins: fastest mirror, refresh-packagekit, security

Setting up Install Process

Package samba-winbind-krb5-locator-3.5.10-125.el6.x86_64 already

Package samba-winbind-3.5.10-125.el6.x86_64 already installed and latest version

Package samba-winbind-clients-3.5.10-125.el6.x86_64 already installed and latest version

Resolving Dependencies

--> Running transaction check

--> Package samba.x86_64 0:3.5.10-125.el6 will be installed

Dependency Installed:

xinetd.x86_64 2:2.3.14-34.el6

Complete!

4. To see the list of installed packages in the local system

```
[root@client ~]# yum list installed samba*
```

Verification:

Loaded plugins: fastestmirror, refresh-packagekit, security

Loading mirror speeds from cached hostfile

Installed Packages

samba.x86_64	3.5.10-125.el6
samba-client.x86_64	3.5.10-125.el6
samba-common.x86_64	3.5.10-125.el6
samba-doc.x86_64	3.5.10-125.el6
samba-domainjoin-gui.x86_64	3.5.10-125.el6
samba-swat.x86_64	3.5.10-125.el6
samba-winbind.x86_64	3.5.10-125.el6
samba-winbind-clients.x86_64	3.5.10-125.el6
samba-winbind-devel.x86_64	3.5.10-125.el6
samba-winbind-krb5-locator.x86_	3.5.10-125.el6

LAB 23: DHCP SERVER

OBJECTIVE:

To provide Dynamic IP address to clients with a DHCP server

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



DHCP Server Configuration

1. Check whether the packages are installed or not

```
[root@dhcp ~]# rpm -qa | grep dhcp
```

Result:

```
dhcp-lib-4.2.5-27.el7.centos.x86_64
dhcp-common-4.2.5-27.el7.centos.x86_64
dhcp-4.2.5-27.el7.centos.x86_64
```

2. If packages are installed, remove them

```
[root@dhcp ~]# rpm -e dhcp-lib-4.2.5-27.el7.centos.x86_64
[root@dhcp ~]# rpm -e dhcp-common-4.2.5-27.el7.centos.x86_64
[root@dhcp ~]# rpm -e dhcp-4.2.5-27.el7.centos.x86_64
```

Note : While removing only give the name of packages, don't use yum otherwise dependencies will be also get removed.

3. To Install the packages

```
[root@dhcp ~]# yum install dhcp-* -y
```

Result:

```
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
Resolving Dependencies
--> Running transaction check
--> Package dhcp.x86_64 12:4.2.5-27.el7.centos will be installed
--> Package dhcp-common.x86_64 12:4.2.5-27.el7.centos will be installed
--> Package dhcp-lib-4.2.5-27.el7.centos.x86_64 will be installed
--> Finished Dependency Resolution
```

Install 3 Packages

Total download size: 801 k

Installed size: 1.8 M

Downloading packages:

```
Total                                         88 MB/s | 801
kB 00:00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Warning: RPMDB altered outside of yum.
```

Installed:

```
dhcp.x86_64 12:4.2.5-27.el7.centos      dhcp-common.x86_64 12:4.2.5-27.el7.centos
dhcp-libs.x86_64 12:4.2.5-27.el7.centos
```

Complete!

4. Copy the sample dhcp configuration file

```
[root@dhcp ~]# cp -rv /usr/share/doc/dhcp-4.2.5/dhcpd.conf.example
/etc/dhcp/dhcpd.conf
```

5. Edit the Main Configuration File

```
[root@dhcp ~]# vi /etc/dhcp/dhcpd.conf
```

Verification:

```
# A slightly different configuration for an internal subnet.
subnet 192.168.0.0 netmask 255.255.255.0 {
    range 192.168.0.1 192.168.0.200;
    option domain-name-servers 192.168.0.253;
    option domain-name "zoomgroup.com";
    option routers 192.168.0.254;
    default-lease-time 600;
    max-lease-time 7200;

    Host fantasia {
        Hardware ethernet 08:00:07:26:c0:a5;
        Fixed-address 192.168.0.200;
    }
}

## Network ID
## pool of IP address
## DNS IP
## DNS Name
## Gateway or Router IP

## fixed ip-address or DHCP
## reservation or
## mac binding
```

6. Start the services

```
[root@dhcp ~]# service dhcpcd restart
```

Result:

```
Redirecting to /bin/systemctl restart dhcpcd.service
#####
OR #####

```

```
[root@dhcp ~]# systemctl enable dhcpcd
```

Result:

```
In -s '/usr/lib/systemd/system/dhcpcd.service' '/etc/systemd/system/multi-
user.target.wants/dhcpcd.service'
```

DHCP Client Configuration

1. Select DHCP in nmtui command

```
[root@client ~]# nmtui
```

Select

Edit a connection => Ethernet name => IPv4 CONFIGURATION <Automatic>

2. To view DORA PROCESS and also get Dynamic IP-Address

```
[root@client ~]# dhclient -v
```

Verification:

```
Internet Systems Consortium DHCP Client 4.2.5
Copyright 2004-2013 Internet Systems Consortium.
All rights reserved.

For info, please visit https://www.isc.org/software/dhcp/
Listening on LPF/enp1s7/00:0c:29:df:d3:51
Sending on LPF/enp1s7/00:0c:29:df:d3:51
Sending on Socket/fallback
DHCPDISCOVER on enp1s7 to 255.255.255.255 port 67 interval 5 (xid=0x4d83e522)
DHCPREQUEST on enp1s7 to 255.255.255.255 port 67 (xid=0x4d83e522)
DHCPoffer from 192.168.0.252
DHCPACK from 192.168.0.252 (xid=0x4d83e522)
bound to 192.168.0.200 -- renewal in 742 seconds.
```

3. Start the service

```
[root@client ~]# service network restart
```

OR

```
[root@client ~]# systemctl enable network
```

4. To verify IP-Address

```
[root@client ~]# ifconfig
```

Verification:

```
enp1s7 Link encap:Ethernet HWaddr 00:13:20:B7:1D:44
inet addr:192.168.0.200 Bcast:192.168.0.255 Mask:255.255.255.0
inet6 addr: fe80::213:20ff:feb7:1d44/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
```

```
RX packets:48153 errors:4 dropped:0 overruns:0 frame:4  
TX packets:21992 errors:0 dropped:0 overruns:0 carrier:0  
collisions:0 txqueuelen:1000  
RX bytes:39512670 (37.6 MiB) TX bytes:1720318 (1.6 MiB)
```

5. To check gateway or router ip

```
[root@client ~]# route -nv
```

Verification:

Kernel IP routing table

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
0.0.0.0	192.168.0.254	0.0.0.0	UG	1024	0	0	enp1s7
192.168.0.0	0.0.0.0	255.255.255.0	U	0	0	0	enp1s7

6. To check DNS IP

```
[root@client ~]# cat /etc/resolv.conf
```

Verification:

```
# Generated by NetworkManager  
search zoomgroup.com  
nameserver 192.168.0.253
```

LAB 24 : FTP SERVER

OBJECTIVE:

To configure FTP server to act as a central repository of files which can be accessed by legitimate clients.

To download and upload files to an FTP server.

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



FTP Server Configuration for downloading files

1. Check whether the FTP package exists,
and install the application

```
[root@ftpserver ~]# rpm -q vsftpd
```

Verification:

vsftpd-3.0.2-9.el7.x86_64

If it exists ,remove the package

```
[root@ftpserver ~]# rpm -e vsftpd
```

Do a fresh install of the FTP pacakage

```
[root@ftpserver ~]# yum install vsftpd* -y
```

Verification:

Running transaction

Warning: RPMDB altered outside of yum.

Installing : vsftpd-3.0.2-9.el7.x86_64	1/1
--	-----

Verifying : vsftpd-3.0.2-9.el7.x86_64	1/1
---------------------------------------	-----

Installed:

vsftpd.x86_64 0:3.0.2-9.el7

2. Add some files to the ftp default directory

```
[root@ftpserver ~]# cd /var/ftp/pub
```

```
[root@ftpserver pub]# touch zoom.txt linux.txt music.mp3
```

Verification:

```
[root@ftpserver pub]# ls
```

linux.txt music.mp3 zoom.txt

3. Start the service

```
[root@ftpserver ~]# service vsftpd restart
```

Redirecting to /bin/systemctl restart vsftpd.service

OR

```
[root@ftpserver ~]# systemctl enable vsftpd
```

FTP Client Configuration for downloading files

1. Connect to ftp server to download files

```
[root@ftpclient ~]# ftp 192.168.0.X  
Name (192.168.0.X:root): ftp  
331 Please specify the password.  
Password: enter key  
230 Login successful.  
ftp> ls  
drwxr-xr-x 3 0 0 4096 aug 19 20:44 pub  
ftp> cd pub  
ftp> ls  
-rw-r--r-- 1 0 0 Jul 11 20:42 zoom.txt  
-rw-r--r-- 1 0 0 Jul 11 20:42 linux.txt  
-rw-r--r-- 1 0 0 Jul 11 20:42 music.mp3  
ftp>mget zoom.txt* linux.txt*  
ftp>bye
```

- 2 . To check downloaded files, move to client home directory

```
[root @ftpclient ~]# ls /root  
Result:  
Anaconda.cfg install.log install.log.syslog Desktop zoom.txt linux.txt
```

FTP Server Configuration for uploading files

1. Add new directory in ftp default directory

```
[root@ftpserver ~]# mkdir /var/ftp/upload
```

2. Give full permissions on new dir

```
[root@ftpserver ~]# chmod 777 /var/ftp/upload
```

Verification:

```
[root@ftpserver ~]# ls -ld /var/ftp/upload
drwxr-xr-x 2 root root 4096 Aug 31 08:30 /var/ftp/upload
```

3. Edit the ftp directory as follows...

```
[root@ftpserver ~]# vi /etc/vsftpd/vsftpd.conf
```

```
12      anonymous_enable=YES
16      local_enable=YES
29      anon_upload_enable=YES
37      dirmessage_enable=YES
86      ftppd_banner=Welcome to Zoom Linux.
```

```
:wq!
```

4. Restart the ftp service

```
[root@ftpserver ~]# service vsftpd restart
```

```
##### OR #####
[root@ftpserver ~]# systemctl enable vsftpd
```

FTP Client Configuration for uploading files

1. Connect ftp server from client system

```
[root@ftpclient ~]# ftp 192.168.0.X  
Name (192.168.0.X:root): ftp  
331 Please specify the password.  
Password: enter key  
230 Login successful.  
ftp>ls  
drwxr-xr-x 3 0 0 4096 aug 19 20:44 pub  
drwxrwxrwx 2 0 0 4096 aug 19 21:05 zoomupload  
ftp>pwd  
ftp>cd ..  
ftp>cd zoomupload  
ftp>pwd (to check present working directory)  
ftp>mput initial-setup-ks.cfg  
ftp>bye
```

Note: To check client uploaded files, move to ftp server and check in ftp

Verification:

```
[root@ftpserver ~]# ls /var/ftp/zoomupload
```

Verification:

```
initial-setup-ks.cfg
```

LAB 25: YUM SERVER

OBJECTIVE:

To configure YUM Deployment Server and client

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



YUM Server Configuration

1. Install ftp application by using the Linux OS dvd

```
[root@YumServer ~]# mount /dev/sr0 /media  
[root@YumServer ~]# cd /media/Packages
```

Verification:

```
[root@YumServer ~]# ls  
389-ds-base-libs-1.3.1.6-25.el7.x86_64.rpm  
a2ps-4.14-23.el7.i686.rpm  
a2ps-4.14-23.el7.x86_64.rpm  
abattis-cantarell-fonts-0.0.12-3.el7.noarch.rpm  
abrt-2.1.11-12.el7.centos.x86_64.rpm
```

```
[root@YumServer ~]# rpm -ivh vsftpd* --force
```

Result:

```
Preparing... ################################ [100%]  
Updating / installing...  
1:vsftpd-3.0.2-9.el7 ###### [ 50%]  
2:vsftpd-sysvinit-3.0.2-9.el7 ###### [100%]
```

2. Copy DVD's complete data into ftp dir

```
[root@YumServer ~]# cp -rv /media/* /var/ftp/pub
```

Result:

```
'/media/CentOS_BuildTag' -> '/var/ftp/pub/CentOS_BuildTag'  
'/media/EFI' -> '/var/ftp/pub/EFI'  
'/media/EFI/BOOT' -> '/var/ftp/pub/EFI/BOOT'  
'/media/EFI/BOOT/BOOTX64.efi' -> '/var/ftp/pub/EFI/BOOT/BOOTX64.efi'  
'/media/EFI/BOOT/fonts' -> '/var/ftp/pub/EFI/BOOT/fonts'  
'/media/EFI/BOOT/fonts/TRANS.TBL' -> '/var/ftp/pub/EFI/BOOT/fonts/TRANS.TBL'  
'/media/EFI/BOOT/fonts/unicode.pf2' -> '/var/ftp/pub/EFI/BOOT/fonts/unicode.pf2'
```

3. Create a repository at side where all rpms are copied

```
[root@YumServer ~]# cd /var/ftp/pub/Packages
```

```
[root@YumServer ~]# rpm -ivh createrepo* deltarpm* --force --nodeps
```

4. Remove the old repodata directory from where all rpms copied

```
[root@YumServer ~]# cd /var/ftp/pub
```

```
[root@YumServer ~]# rm -rf repodata
```

5. Create a new repodata (Repositories)

```
[root@YumServer ~]# createrepo -g <dvd_mount_point>/<repodata_dir>/<file>
```

```
[root@YumServer ~]# createrepo -g /media/Packages/repodata/repo.xml
```

```
/var/ftp/pub/Packages
```

6. Start FTP Service

```
[root@YumServer ~]# service vsftpd restart
```

```
##### OR #####
```

```
[root@YumServer ~]# systemctl enable vsftpd
```

7. Edit the yum configuration file, by providing the path of repository and IP-address

```
[root@YumClient ~]# vi /etc/yum.repos.d/CentOS-Base.repo
```

Verification:

```
[core]
```

```
name= Linux $releasever - $basearch - Debug
```

```
baseurl=ftp://192.168.0.250/pub/Packages
```

```
enabled=1
```

```
gpgcheck=1
```

```
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
```

```
:wq!
```

YUM Client Configuration

1. Edit the yum configuration file, by providing the path of repository and server ip-address

```
[root@YumClient ~]# vi /etc/yum.repos.d/CentOS-Base.repo

[core]
name= Linux $releasever - $basearch - Debug
baseurl=ftp://192.168.0.250/pub/Packages
enabled=1
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
:wq!
```

Verification:

```
[root@YumServer ~]# yum install firefox* -y

Loaded plugins: fastestmirror, langpacks
base                                         | 3.6 kB  00:00:00
Loading mirror speeds from cached hostfile
Resolving Dependencies
--> Running transaction check
--> Package firefox.x86_64 0:24.5.0-1.el7.centos will be installed
--> Finished Dependency Resolution
Installing : firefox-24.5.0-1.el7.centos.x86_64                               1/1
Verifying  : firefox-24.5.0-1.el7.centos.x86_64                               1/1
```

Installed:

```
firefox.x86_64 0:24.5.0-1.el7.centos
```

Complete!

LAB 26: NFS SERVER

OBJECTIVE:

To share Network resources with an NFS server

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



NFS Server Configuration

1. Install NFS application

```
[root@nfsserver ~]# yum install nfs* -y
```

```
[root@nfsserver ~]# rpm -qa nfs*
```

Verification:

```
nfs-utils-1.3.0-0.el7.x86_64  
nfsometer-1.7-0.el7.noarch  
nfs4-acl-tools-0.3.3-13.el7.x86_64  
nfstest-1.0.2-2.el7.noarch
```

2. Add a directory to share

```
[root@nfsserver ~]# mkdir /zoomshare
```

```
[root@nfsserver ~]# cat > /zoomshare/"Advanced Linux"
```

The zoomshare directory contains the names of Advanced Linux course topics
CLUSTERS, SAN, LDAP, SAMBA, NAGIOS, PROXY and TROUBLESHOOTING etc.

Ctrl+d (to save file data)

3. List the share directory data

```
[root@nfsserver ~]# ls /zoomshare
```

4. Give full permissions on share directory

```
[root@nfsserver ~]# chmod 777 /zoomshare
```

Verification:

```
[root@nfsserver ~]# ls -ld /zoomshare
```

```
drwxrwxrwx 2 root root 4096 Aug 31 12:57 /zoomshare
```

5. Provide share directory name in NFS configuration file and give share permissions.

```
[root@nfsserver ~]# vi /etc/exports  
/zoomshare    192.168.0.0/255.255.255.0(rw,sync)  
:wq!
```

6. Start the nfs service

```
[root@nfsserver ~]# service nfs restart  
##### OR #####  
[root@nfsserver ~]# systemctl enable nfs
```

7. Verify the list of exported directories where 192.168.0.X is the NFS server IP Address

```
[root@nfsserver ~]# showmount -e 192.168.0.X
```

Result:

Export list for 192.168.0.X :

```
/zoomshare 192.168.0.0/255.255.255.0
```

NFS Client Configuration

1. Verify the exported directory of server

```
[root@nfsclient ~]# showmount -e 192.168.0.X
```

Result:

Export list for 192.168.0.X :

```
/zoomshare 192.168.0.0/255.255.255.0
```

2. Mount the shared directory

```
[root@nfsclient ~]# mount 192.168.0.X:/zoomshare /mnt
```

3. Find the mount point of nfs server

```
[root@nfsclient ~]# mount
```

Verification:

```
/dev/sda5 on / type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda2 on /usr type ext4 (rw,relatime,seclabel,data=ordered)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs
192.168.0.250:/var/ftp/pub/centos7 on /mnt type nfs (rw,relatime,seclabel,data=ordered)
/dev/sda1 on /boot type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda6 on /home type ext4 (rw,relatime,seclabel,data=ordered)
/dev/sda3 on /var type ext4 (rw,relatime,seclabel,data=ordered)
```

4. **Check the server data**

```
[root@nfsclient ~]# cd /mnt/zoomshare
[root@nfsclient zoomshare ]# cat "Advanced Linux"
```

Verification: NFS share directory data can be shown

The zoomshare directory contains the names of Advanced Linux course topics
CLUSTERS, SAN, LDAP, SAMBA, NAGIOS, PROXY and TROUBLESHOOTING etc.

LAB 27: DNS SERVER

OBJECTIVE:

To provide name resolution in a network with a DNS server

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



DNS Server Configuration

1. Check and assign IP address to the DNS server according to your setup

```
[root@dns ~]# nmcli  
Profile name enp1s7  
Addresses 192.168.0.1/24  
DNS servers 192.168.0.X
```

```
[root@dns ~]# service network restart
```

```
[root@dns ~]# ifconfig
```

Verification:

```
Enp1s7: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
inet 192.168.0.1 netmask 255.255.255.0 broadcast 192.168.0.255  
inet6 fe80::20c:29ff:fe6a:f2a6 prefixlen 64 scopeid 0x20<link>  
ether 00:0c:29:6a:f2:a6 txqueuelen 1000 (Ethernet)  
RX packets 379 bytes 44431 (43.3 Kib)  
RX errors 0 dropped 0 overruns 0 frame 0  
TX packets 296 bytes 50119 (48.9 Kib)  
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

2. Change Hostname of computer

```
[root@dns ~]# hostname dns.zoomgroup.com
```

3. Map Hostname and IP for local resolution

```
[root@dns ~]# vi /etc/hosts  
127.0.0.1 localhost.localdomain localhost  
192.168.0.1 dns.zoomgroup.com dns  
:wq!
```

4. Change Hostname permanent

```
[root@dns ~]# vi /etc/hostname  
dns.zoomgroup.com
```

5. NOW LOG OFF and LOG IN to make the changes permanent in the kernel

6. Check the dns applications

```
[root@dns ~]# rpm -qa bind*
```

Verification:

```
bind-libs-lite-9.9.4-14.el7.x86_64
bind-chroot-9.9.4-14.el7.x86_64
bind-utils-9.9.4-14.el7.x86_64
bind-dyndb-ldap-3.5-4.el7.x86_64
bind-libs-9.9.4-14.el7.x86_64
bind-9.9.4-14.el7.x86_64
bind-license-9.9.4-14.el7.noarch
```

7. Remove the dns applications

```
[root@dns ~]# yum remove bind* -y
```

8. Install the dns applications

```
[root@dns ~]# yum install bind* -y
```

9. Edit DNS file and provide the IP address it listens on

```
[root@dns ~]# vi /etc/named.conf
```

```
11: listen-on port 53 { 127.0.0.1; 192.168.0.1; };
```

```
17: allow-query { localhost; 192.168.0.0/24; };
```

```
:wq!
```

10. Edit DNS file by providing zone file names

```
[root@dns ~]# vi /etc/named.rfc1912.zones
```

```
zone "zoomgroup.com" IN {  
    type master;  
    file "zoom.for";  
    allow-update { none; };  
};  
zone "0.168.192.in-addr.arpa" IN {  
    type master;  
    file "zoom.rev";  
    allow-update { none; };  
};  
  
:wq!
```

11. Create Forward Zone and Reverse Zone files

```
[root@dns ~]# cd /var/named
```

Verification:

```
[root@dns named]# ls
```

```
chroot data dynamic named.ca named.empty named.localhost named.loopback slaves
```

```
[root@dns named]# cp -p named.localhost zoom.for
```

```
[root@dns named]# cp -p named.loopback zoom.rev
```

Verification:

```
[root@dns named]# ll
```

```
total 40  
drwxr-x--- 7 root named 4096 Sep 1 06:54 chroot  
drwxrwx--- 2 named named 4096 Sep 1 07:04 data  
drwxrwx--- 2 named named 4096 Sep 1 07:04 dynamic  
-rw-r----- 1 root named 2076 Jan 28 2013 named.ca  
-rw-r----- 1 root named 152 Dec 15 2009 named.empty  
-rw-r----- 1 root named 152 Jun 21 2007 named.localhost  
-rw-r----- 1 root named 168 Dec 15 2009 named.loopback
```

```
drwxrwx--- 2 named named 4096 Jun 10 2014 slaves
-rw-r----- 1 root named 152 Jun 21 2007 zoom.for
-rw-r----- 1 root named 168 Dec 15 2009 zoom.rev
```

12. Edit Forward zone file

```
[root@dns named]# vi zoom.for
```

```
$TTL 86400
@ IN SOA dns.zoomgroup.com. root.zoomgroup.com. (
        42      ; serial (d. adams)
        3H      ; refresh
        15M     ; retry
        1W      ; expiry
        1D )    ; minimum
```

```
IN NS dns.zoomgroup.com.
dns IN A 192.168.0.1
nfs IN A 192.168.0.10
ftp IN A 192.168.0.11
smb IN A 192.168.0.12
mail IN A 192.168.0.13
zoomgroup.com. IN MX 5 mail
web IN A 192.168.0.14
www IN CNAME web
```

```
:wq!
```

13. Edit reverse zone file

```
[root@dns named]# vi zoom.rev
```

```
$TTL 86400
@ IN SOA dns.zoomgroup.com. root.zoomgroup.com. (
        1997022700 ; Serial
        28800      ; Refresh
        14400      ; Retry
        3600000   ; Expire
        86400 )    ; Minimum
```

```
IN NS dns.zoomgroup.com.
IN NS slavedns.zoomgroup.com.
```

```
1 IN PTR dns.zoomgroup.com.  
10 IN PTR nfs.zoom.com.  
11 IN PTR ftp.zoom.com.  
12 IN PTR smb.zoom.com.  
13 IN PTR mail.zoomgroup.com.  
14 IN PTR web.zoom.com.
```

:wq!

14. To Check the Syntax errors of Configuration file

Syntax:

```
[root@localhost ~]# named-checkconf <path_of_configuration_file>
```

```
[root@localhost ~]# named-checkconf /etc/named.conf
```

```
[root@localhost ~]# named-checkconf/etc/rfc1912.zones
```

Verification:

If no errors then no output will be displayed.

15. To Check the Zone file syntax errors

Syntax:

```
[root@localhost ~]# named-checkconf <Domain_name> <path_of_zone_files>
```

```
[root@localhost ~]# named-checkzone zoomgroup.com /var/named/zoom.for
```

```
[root@localhost ~]# named-checkzone zoomgroup.com /var/named/zoom.rev
```

16. Provide the IP address of the DNS Server

```
[root@dns named]# vi /etc/resolv.conf
```

```
nameserver 192.168.0.1
```

:wq!

17. Start the DNS service

```
[root@dns named]# service named restart  
Redirecting to /bin/systemctl restart named.service  
##### OR #####  
[root@dns named]# systemctl enable named
```

DNS Client Configuration

1. Provide the DNS server ip in resolv.conf file

```
[root@dns named]# vi /etc/resolv.conf  
nameserver 192.168.0.1  
:wq!
```

2. Check the forward lookup zone Resolution Answer by using dig command

Syntax:

```
[root@dns named]# dig <Fully _qualified _domain _name>  
[root@dns named]# dig dns.zoomgroup.com
```

Result:

```
; <>> DiG 9.9.4-RedHat-9.9.4-14.el7 <>> dns.zoomgroup.com  
;; global options: +cmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 21811  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags:; udp: 4096  
;; QUESTION SECTION:  
;dns.zoomgroup.com. IN A  
  
;; ANSWER SECTION:  
dns.zoomgroup.com. 86400 IN A 192.168.0.1  
  
;; AUTHORITY SECTION:  
zoomgroup.com. 86400 IN NS dns.zoomgroup.com.
```

```
;; Query time: 1 msec
;; SERVER: 192.168.0.1#53(192.168.0.1)
;; WHEN: Tue Sep 01 07:32:23 IST 2015
;; MSG SIZE rcvd: 76
```

3. Check the reverse lookup zone Resolution Answer by using dig command

Verification:

```
[root@dns named]# dig -x <self_system_ip>
[root@dns named]# dig -x 192.168.0.1
```

Result:

```
; <>>> DiG 9.9.4-RedHat-9.9.4-14.el7 <>>> -x 192.168.0.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 53498
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;1.0.168.192.in-addr.arpa. IN PTR

;; ANSWER SECTION:
1.0.168.192.in-addr.arpa. 86400 IN PTR dns.zoomgroup.com.

;; AUTHORITY SECTION:
0.168.192.in-addr.arpa. 86400 IN NS 0.168.192.in-addr.arpa.

;; ADDITIONAL SECTION:
0.168.192.in-addr.arpa. 86400 IN A 192.168.0.1

;; Query time: 0 msec
;; SERVER: 192.168.0.1#53(192.168.0.1)
;; WHEN: Tue Sep 01 07:36:13 IST 2015
;; MSG SIZE rcvd: 114
```

4 . Check the Resolution Answer by using ping command

Verification:

```
[root@server ~]# ping dns.zoomgroup.com
```

```
PING dns.zoomgroup.com (192.168.0.110) 56(84) bytes of data.
```

```
64 bytes from server.zoomgroup.com (192.168.0.1): icmp_seq=1 ttl=64
```

```
64 bytes from server.zoomgroup.com (192.168.0.1): icmp_seq=2 ttl=64
```

```
64 bytes from server.zoomgroup.com (192.168.0.1): icmp_seq=3 ttl=64
```

Zoom Technologies

LAB 28: POSTFIX MAIL SERVER

OBJECTIVE:

To configure Postfix mail server to send and receive mails

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



Mail Server Configuration

1. Check the ip-address on the server chosen as mail server

```
[root@client ~]# ifconfig
```

2. Assign the IP address for mail server

```
[root@client ~]# nmtui
```

Profile name enp1s7

Addresses 192.168.0.20/24

DNS servers 192.168.0.1

```
[root@client ~]# service network restart
```

3. Change Hostname permanently

```
[root@client ~]# hostname mail.zoomgroup.com
```

```
[root@client ~]# vi /etc/hostname
```

mail.zoomgroup.com

:wq!

4. Map Hostname and IP for local resolution

```
[root@client ~]# vi /etc/hosts
```

127.0.0.1 localhost.localdomain localhost

192.168.0.20 mail.zoomgroup.com mail

:wq!

Verification:

```
[root@client ~]# hostname
```

mail.zoomgroup.com

5. NOW LOG OFF and LOG IN to make the changes permanent in the kernel

6. Check whether postfix is already installed

```
[root@mail ~]# rpm -qa postfix*
```

Verification:

```
postfix-2.10.1-6.el7.x86_64
```

remove postfix if it's already installed

```
[root@mail ~]# yum remove postfix* -y
```

7. Do a fresh install of postfix

```
[root@mail ~]# yum install postfix* -y
```

8. Edit postfix configuration file by providing domain name

```
[root@mail ~]# vi /etc/postfix/main.cf
```

```
75. myhostname = mail.zoomgroup.com
```

```
83. mydomain = zoomgroup.com
```

```
:wq!
```

9. Start the service

```
[root@mail ~]# service postfix restart
```

```
##### OR #####
```

```
[root@mail ~]# systemctl restart postfix
```

10. Create users, assign passwords and test the mail at command prompt by using mail client utility.

```
[root@mail ~]# useradd tom
```

```
[root@mail ~]# useradd john
```

```
[root@mail ~]# passwd tom
```

```
[root@mail ~]# passwd john
```

11. Switch to a user tom and compose a mail to john

```
[root@mail ~]# su - tom
```

Verification: tom composing mail to john in cli mode

```
[tom@mail ~]$ mail john@mail.zoomgroup.com
```

Subject: test mail from tom
he hello
test mail from tom
mail test 1

Note:New row first column type dot(.) To end the message

Cc: tom@mail.zoomgroup.com

```
[tom@mail ~]$
```

```
[tom@mail ~]$ exit
```

12. Switch to user john and check the mails

```
[root@mail ~]# su - john
```

```
[john@mail ~]$
```

13. Type mail and see the output as below

```
[john@mail ~]$ mail
```

Result:

Mail version 8.1 6/6/93. Type ? for help.
"/var/spool/mail/john": 1 message 1 new
>N 1 tom@mail.zoomgroup.com Sat Jul 12 04:54 19/601 "test mail from tom"
and 1
Message 1:
From tom@mail.zoomgroup.com Sat Jul 12 04:54:18 2013
Date: Sat, 12 Jul 2013 04:51:38 -0400
From: tom@mail.zoomgroup.com
To: john@mail.zoomgroup.com
Subject: test mail from tom
Cc: tom@mail.zoomgroup.com

he hello
 test mail from tom
 mail test 1

 and x
 You have mail in /var/spool/mail/john

[john@mail ~]\$ exit

Configuration of Squirrel Mail to compose the mail on GUI mode

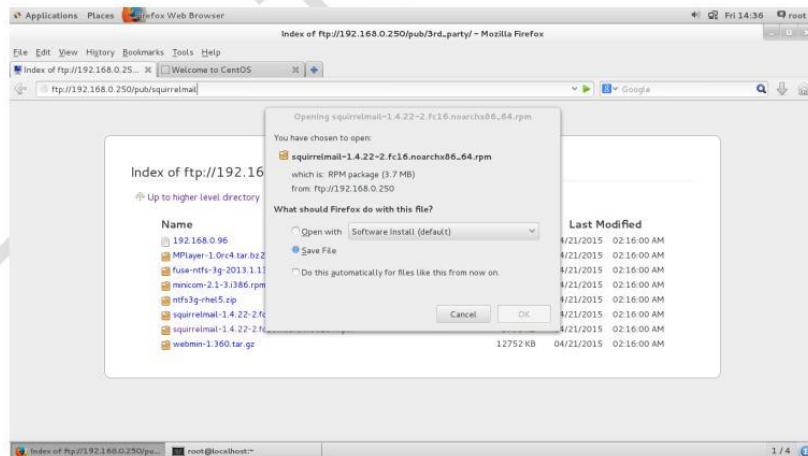
1. Check and install the following packages

```
[root@mail ~]# yum install httpd* perl-5* php* curl* dovecot* mod_ssl* hunspell-en*
tmpwatch* -y
```

2. Check and download squirrelmail package from Lab server

[root@mail ~]# firefox <ftp://192.168.0.250/pub>

Verification:



Note: After downloading squirrelmail-1.4.22-2.fc16.noarch.rpm and php-mbstring-5.4.16-21.el7.x86_64.rpm packages install with rpm.

```
[root@mail ~]# cd /root/Downloads  
[root@mail ~]# ls  
[root@mail ~]# rpm -ivh php-mbstring-5.4.16-21.el7.x86_64.rpm php-mbstring-5.4.16-  
21.el7.x86_64.rpm
```

3. Edit first dovecot configuration file

```
[root@mail ~]# vi /etc/dovecot/conf.d/10-auth.conf
```

```
10: disable_plaintext_auth = no    (before from line remove # and change from 'yes' into 'no')  
100: auth_mechanisms = plain login(before from line remove # and at last add login)
```

4. Edit dovecot second configuration file

```
[root@mail ~]# vi /etc/dovecot/conf.d/10-mail.conf
```

```
25: mail_location = mbox: ~/mail: INBOX=/var/spool/mail/%u (before from line remove # and  
complete the directory by adding spool)  
119: mail_access_group = mail(remove # from beginning of line and mail at last)
```

5. Copy squirrelmail directory data into apache default directory

```
[root@mail ~]# cp -rv /usr/share/squirrelmail/* /var/www/html
```

6. Start the services

```
[root@mail ~]# service postfix restart
```

Restarting postfix (via systemctl):

OR

```
[root@mail ~]# systemctl enable postfix
```

```
[root@mail ~]# service dovecot restart  
Redirecting to /bin/systemctl restart dovecot.service
```

OR

```
[root@mail ~]# systemctl enable dovecot
```

```
[root@mail ~]# service httpd restart  
Redirecting to /bin/systemctl restart httpd.service
```

OR

```
[root@mail ~]# systemctl enable httpd
```

Mail Server Client Configuration

1. Provide the DNS server IP-address

```
[root@mailclient ~]# vi /etc/resolv.conf  
nameserver 192.168.0.x
```

2. Append the mailserver information in host file

```
[root@mailclient ~]# vi /etc/hosts  
192.168.0. Client_ip_x mailclient.zoomgroup.com mailclient  
192.168.0. Mail_Server_x mail.zoomgroup.com mail  
:wq!
```

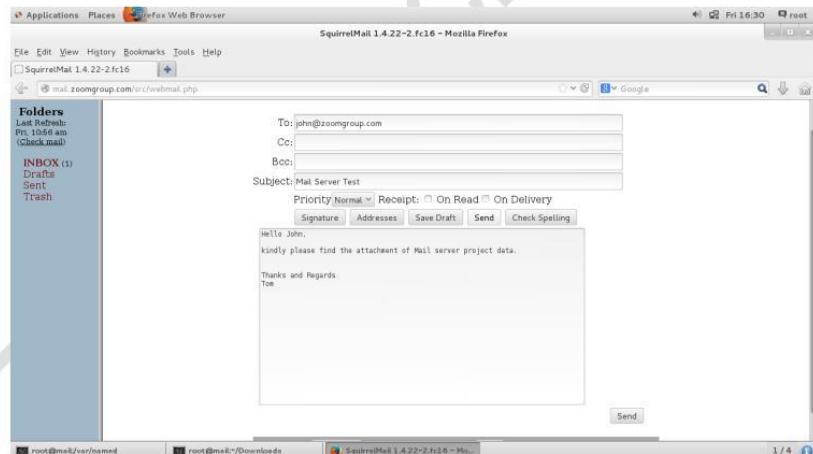
3. Compose the mails via web browser

[root@mailclient ~]# Firefox http://mail.zoomgroup.com

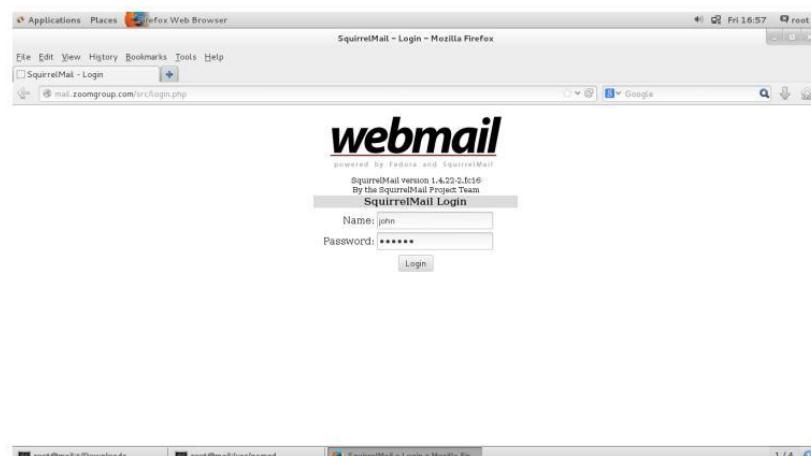
Verification: tom login into an account



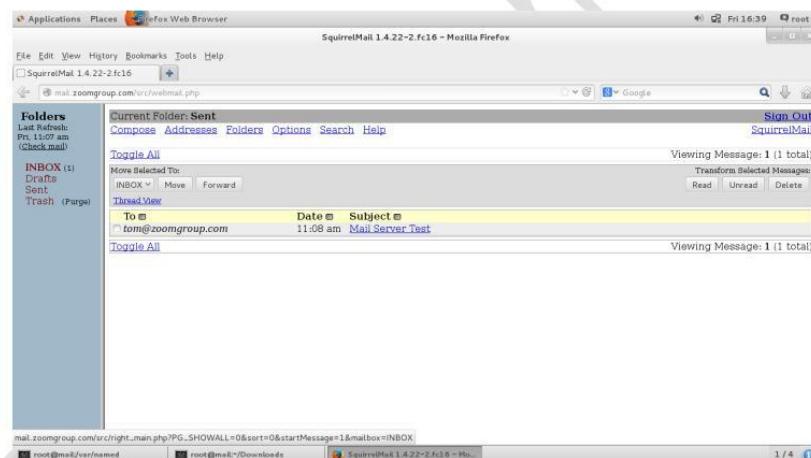
Verification: tom composing the mail to john



Verification: john logs into an account



Verification: john checking the mail which sent by tom



LAB 29: APACHE WEB SERVER

OBJECTIVE:

To Host websites by using APACHE Web Server

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



Apache Server Configuration to host websites based on names

Example:

```
www.zoomgroup.com  
www.google.com  
www.yahoo.com
```

1. Assign an ip address to the server

```
[root@web ~]# nmtui  
[root@web ~]# service network restart  
##### OR #####  
[root@web ~]# systemctl enable network  
[root@web ~]# ifconfig
```

2. Configure the hosts file

```
[root@web ~]# vi /etc/hosts  
127.0.0.1 localhost.localdomain localhost  
192.168.0.x1 www.zoomgroup.com  
192.168.0.x1 www.google.com  
192.168.0.x1 www.yahoo.com  
:wq!
```

3. Edit the httpd configuration File

```
[root@web ~]# vi /etc/httpd/conf/httpd.conf  
At end of line write the following settings  
##### NAME BASED #####  
<VirtualHost *:80>  
    ServerAdmin root@yahoo.com  
    DocumentRoot /var/www/html  
    ServerName www.yahoo.com  
    DirectoryIndex yahoo.html  
</VirtualHost>
```

```
<VirtualHost *:80>
    ServerAdmin root@google.com
    DocumentRoot /var/www/html
    ServerName www.google.com
    DirectoryIndex google.html
</VirtualHost>
```

```
<VirtualHost *:80>
    ServerAdmin root@zoomgroup.com
    DocumentRoot /var/www/html
    ServerName www.zoomgroup.com
    DirectoryIndex zoomgroup.html
</VirtualHost>
```

wq: (save and quit)

4. Create the webpage files with .html extension

```
[root@web ~]# cd /var/www/html
```

```
[root@web ~]# vi yahoo.html
```

```
<html>
<body bgcolor=yellow>
    <marquee><h1> THIS IS YAHOO WEBSITE </h1></marquee>
        <h6> HOSTED IN LINUX SESSION </h6>
    </body>
</html>
```

NOTE: - Similarly create zoomgroup.html google.html in /var/www/html folder or download original website pages then paste into webserver directory as .html file e.g. yahoo.html from www.yahoo.com website.

5. Start the Web service

```
[root@web ~]# service httpd restart
```

OR

```
[root@web ~]# systemctl enable httpd
```

Web Server Client Configuration

1. Provide the IP Address of DNS server if DNS Server is configured on the network

```
[root@webclient ~]# vi /etc/resolv.conf
```

```
nameserver 192.168.0.DNS_IP
```

OR

2. Append the Websites information in host file.

```
[root@webclient ~]# vi /etc/hosts
```

```
192.168.0.x1 www.zoomgroup.com
```

```
192.168.0.x1 www.yahoo.com
```

```
192.168.0.x1 www.google.com
```

```
:wq!
```

3. Open the Browser and access websites

```
[root@webclient ~]# firefox http://www.yahoo.com
```

Result:

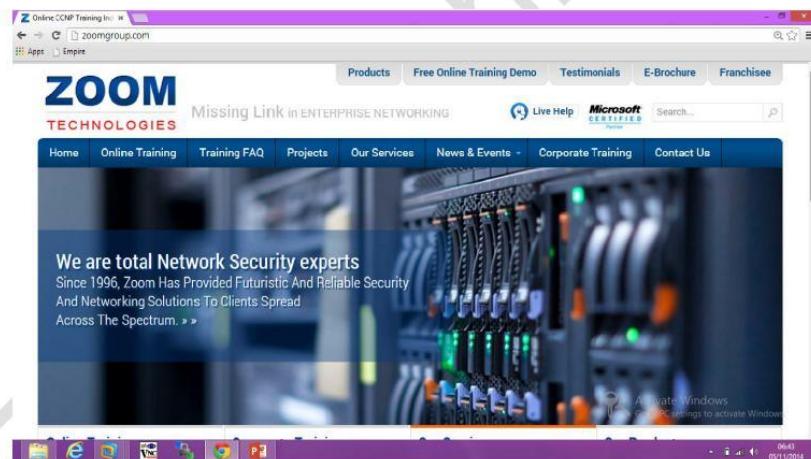


Verification:

Access www.google.com via browser



Access www.zoomgroup.com via browser



Apache Server Configuration to host websites based on IP addresses1. **Assigning another Virtual IP on Ethernet interface of the web server for IP Based Hosting**

```
[root@web ~]# nmcli
```

```
Edit a connection => enp1s7 => IPv4 CONFIGURATION
```

```
192.168.0.X1/24
```

```
ADD =>
```

```
192.168.0.X2/24 = OK
```

```
[root@web ~]# service network restart
```

2. **To check the ip address**

```
[root@web ~]# ip addr show
```

Verification:

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp1s7: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether 00:0c:29:6a:f2:a6 brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.X1/24 brd 192.168.0.255 scope global enp1s7
        valid_lft forever preferred_lft forever
    inet 192.168.0.X2/24 brd 192.168.0.255 scope global secondary enp1s7
        valid_lft forever preferred_lft forever
    inet6 fe80::20c:29ff:fe6a:f2a6/64 scope link
        valid_lft forever preferred_lft forever
```

3. **Makesure the hostfile configuration by providing new ip to website**

```
[root@web ~]# vi /etc/hosts
```

```
127.0.0.1 localhost.localdomain localhost
192.168.0.X1 www.yahoo.com
192.168.0.X1 www.zoomgroup.com
192.168.0.X2 www.google.com
:wq!
```

4. Edit the webserver file by providing new IP address

```
[root@web ~]# vi /etc/httpd/conf/httpd.conf
```

```
<VirtualHost 192.168.0.X2:80>
    ServerAdmin root@google.com
    DocumentRoot /var/www/html
    ServerName www.google.com
    DirectoryIndex google.html
</VirtualHost>
:wq
```

5. Start the service

```
[root@web ~]# service httpd restart
```

OR

```
[root@web ~]# systemctl restart httpd
```

Web Server Client Configuration

1. Open the Browser and type

```
[root@webclient ~]# Firefox and
```

Verification:<http://192.168.0.X2>



Port based websites configuration

1. Edit the webserver file by providing port numbers

```
[root@web ~]# vi /etc/httpd/conf/httpd.conf
```

```
Listen 8000
```

```
<VirtualHost *:8000>
```

```
    ServerAdmin root@zoomgroup.com
```

```
    DocumentRoot /var/www/html
```

```
    ServerName www.zoomgroup.com
```

```
    DirectoryIndex zoomgroup.html
```

```
</VirtualHost>
```

```
:wq
```

2. Start the service

```
[root@web ~]# service httpd restart
```

Web Server Client Configuration

1. Provide the ip address of DNS server, if DNS Server is configured.

```
[root@webclient ~]# vi /etc/resolv.conf
```

```
nameserver 192.168.0.DNS_1P
```

2. Append the websites information in host file.

```
[root@webclient ~]# vi /etc/hosts
```

```
#### append these names ####
```

```
192.168.0.X1 www.zoomgroup.com
```

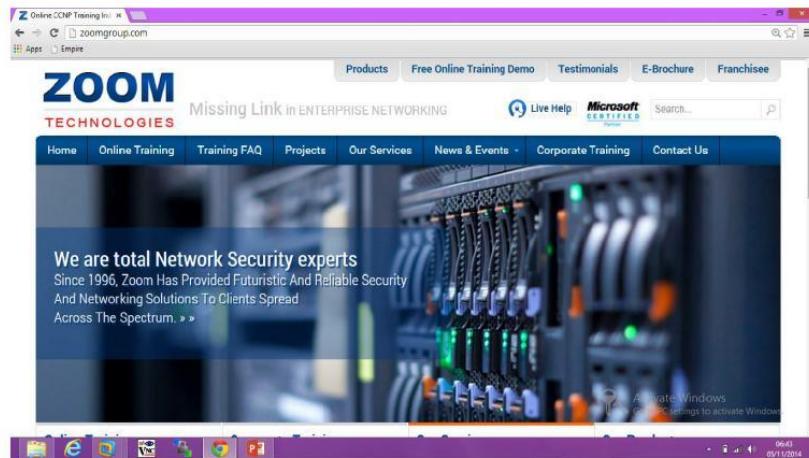
```
192.168.0.X1 www.yahoo.com
```

```
192.168.0.X1 www.google.com
```

3. Open the Browser and type

[root@webclient ~]# firefox and access <http://www.zoomgroup.com:8000>

Verification:



LAB 30: AUTHENTICATION ON APACHE WEB SERVER

OBJECTIVE:

To authenticate clients accessing the website hosted on an Apache Server.

PRE-REQUISITE:

Two Machines with Linux Installed. Continue from the previous exercise

TOPOLOGY:



Web Server Authentication

1. Continue from the previous exercise. Edit the webserver file

```
[root@web ~]# vi /etc/httpd/conf/httpd.conf

<Directory /var/www/html>
AuthName "zoom-secure"
AuthUserFile /mnt/web
AuthType Basic
Require Valid-User
</Directory>

:wq!
```

2. Create a user and set password for web authentication

```
[root@web ~]# useradd tom
[root@web ~]# htpasswd -c /mnt/web tom
```

3. Start the service

```
[root@web ~]# service httpd restart
```

Web Client Authentication

1. Provide the IP address of DNS server if DNS Server is configured on the network

```
[root@webclient ~]# vi /etc/resolv.conf  
nameserver 192.168.0.DNS_1P
```

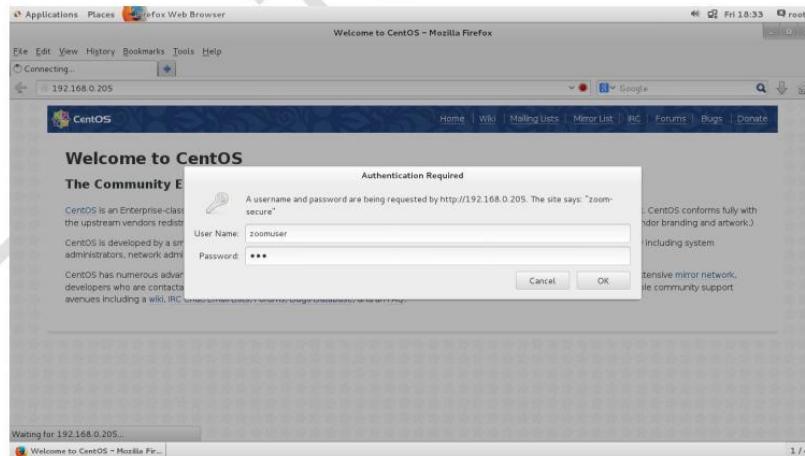
2. Append the Websites' information in host file.

```
[root@webclient ~]# vi /etc/hosts
```

```
192.168.0.X1 www.zoomgroup.com  
192.168.0.X1 www.yahoo.com  
192.168.0.X1 www.google.com
```

3. Open the Browser and type

```
[root@webclient ~]# firefox http://www.zoomgroup.com
```

Verification: client trying to browse zoomgroup website

Verification: After giving the right credentials client can browse the website



Zoom Technologies

LAB 31: WEBMIN ADMINISTRATION

OBJECTIVE:

To use WebMin browser based tool to manage the network services

PRE-REQUISITE:

Two Machines with Linux Installed.

TOPOLOGY:



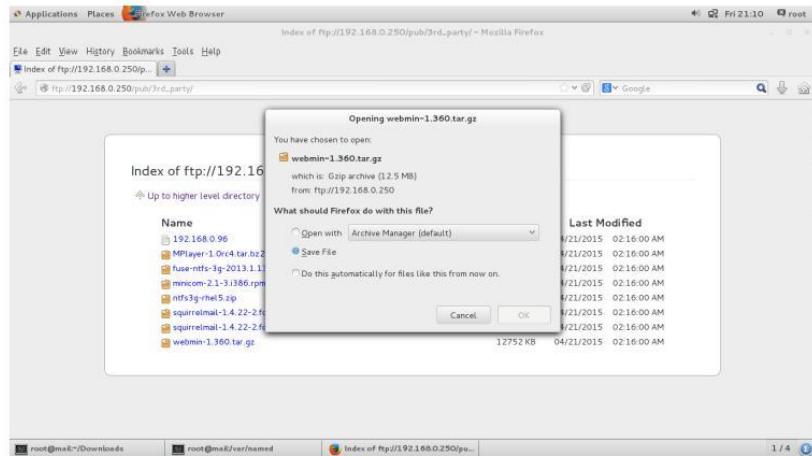
GUI Based application to manage network via browser

1. Download webmin application from LAB server

[root@server ~]# firefox

ftp://192.168.0.250

Verification:



2. Check the downloaded package

[root@server ~]# cd /root/Downloads

Verification:

[root@server Downloads]# ls

webmin-1.360.tar.gz

3. Extract the package

[root@server Downloads]# tar -xvzf webmin-1.360.tar.gz

4. To list extracted directory

[root@server Downloads]# ls

Verification:

Webmin-1.360 webmin-1.360.tar.gz

5. Enter into webmin package directory

```
[root@server Downloads]# cd webmin-1.360
```

```
[root@server Downloads]# ls
```

6. To install webmin run the following command.

```
[root@server webmail ]# ./setup.sh
```

Verification:

```
*****
```

```
*      Welcome to the Webmin setup script, version 1.360      *
```

```
*****
```

Webmin is a web-based interface that allows Unix-like operating systems and common Unix services to be easily administered.

Installing Webmin in /opt/webmin-1.360 ...

```
*****
```

Webmin uses separate directories for configuration files and log files.

Web server port (default 10000): <press enter>

Login name (default admin): <press enter>

Login password:

Password again:

The Perl SSLeay library is not installed. SSL not available.

Start Webmin at boot time (y/n):y

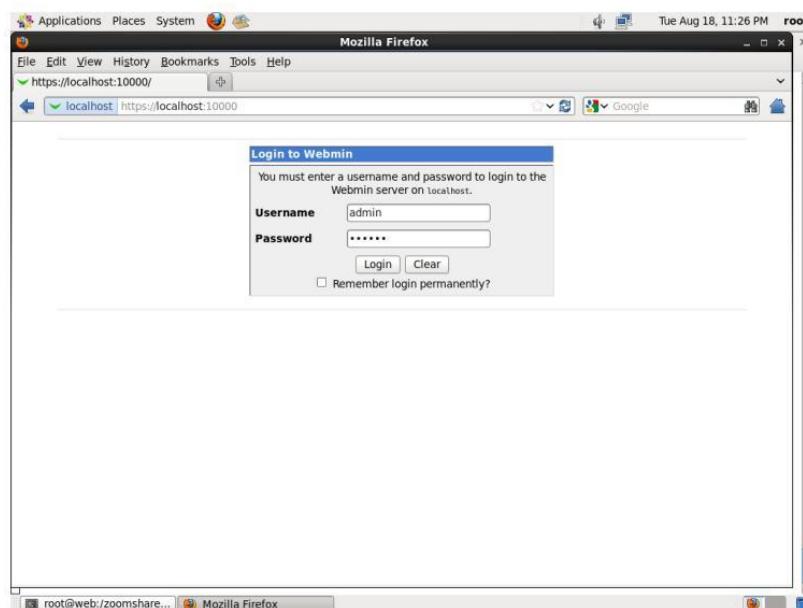
Webmin has been installed and started successfully. Use your web browser to go to

<http://localhost:10000/> and login with the name and password you entered previously.

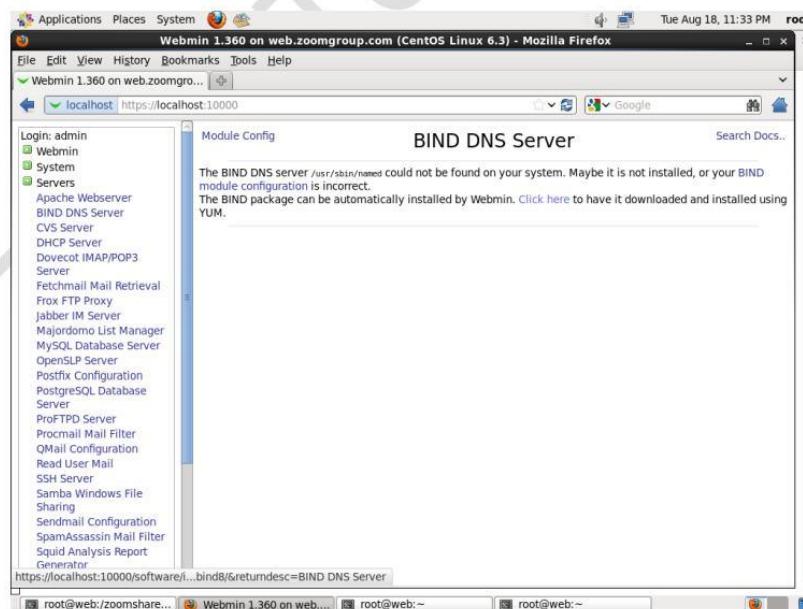
7. Open the Browser, to access it

```
[root@server opt]# firefox http://localhost:10000
```

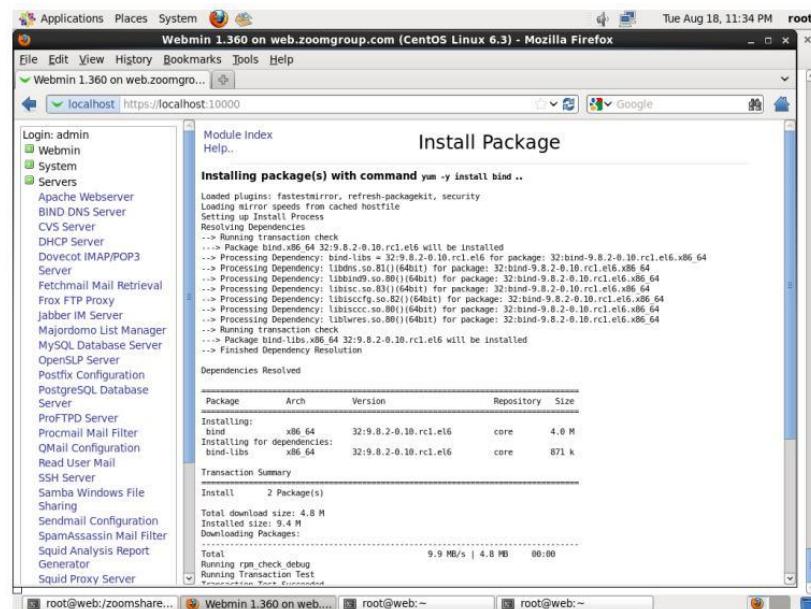
Verification: Providing username and password



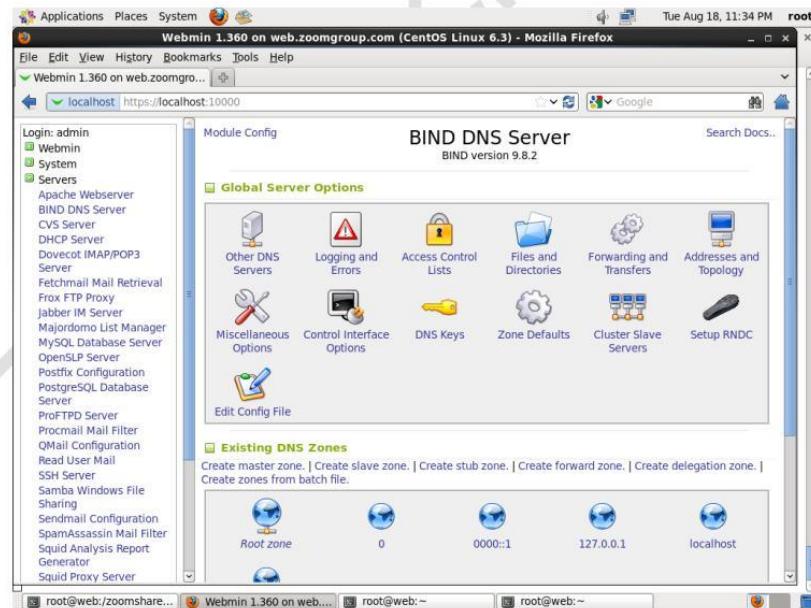
Verification: Installing DNS applications on webmin interface



Verification: Installing DNS applications



Interface for DNS configuration



8. **To Change the admin password after webmin installation**

```
[root@server opt]# cd webmin-1.360
```

```
[root@server webmin-1.360]# ./changepass.pl /etc/webmin/ admin admin
```

9. **To Uninstall webmin**

```
[root@server opt]# sh /etc/webmin/uninstall.sh
```

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