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**DEPARTMENT OF INFORMATION TECHNOLOGY  
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**T.Y. B. Sc. (I.T) SEM V  
RJ SUIT P504**

**LINUX SYSTEM ADMINISTRATION**

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Roll No. : 3030

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**LA Journal****Practical 0: Installation of RHEL 6.X**

Step 1: Download the ‘VMware Workstation’ on which we will install Our OS of ‘RHEL 6.X’.

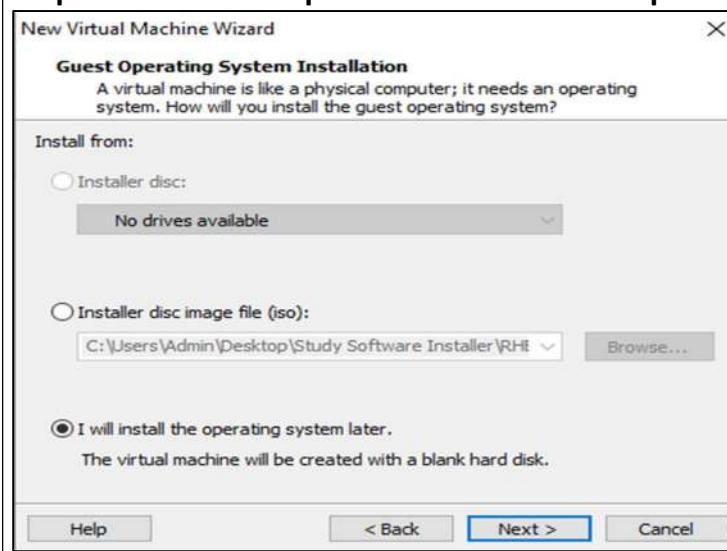
Step 2: Open ‘VMware Workstation’ and click on the ‘Create New Project’.



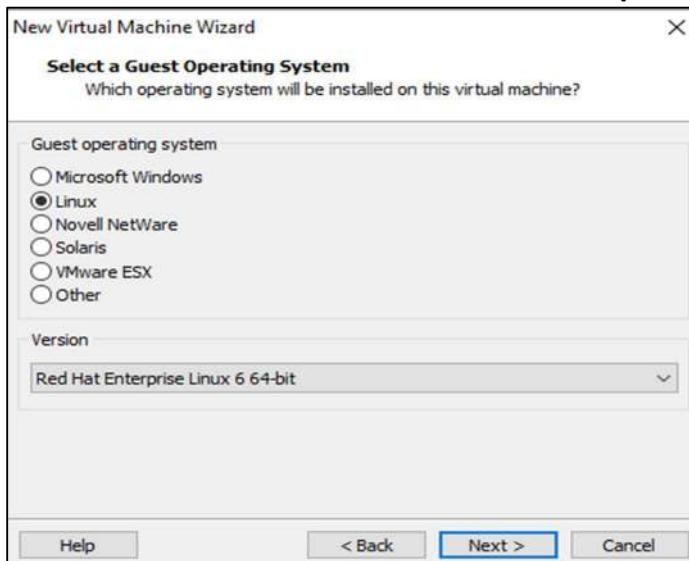
Step 3: A New Window will open, then select ‘Typical (recommended)’ and then click on “Next >”.



Step 4: Choose the option “I will install the operating system Later.” Then click on “Next >”.

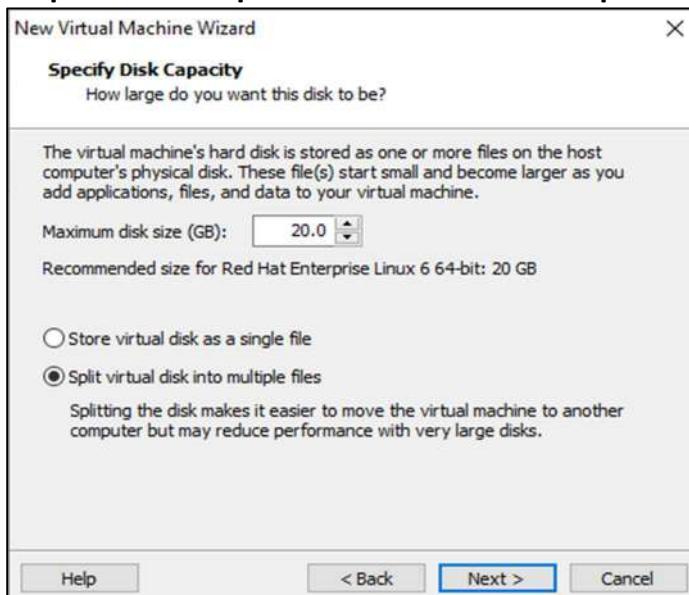


- Step 5: 1. Choose “Linux” from the Guest operating System.  
2. In Version choose “Red Hat Enterprise Linux 6 64-bit”.**

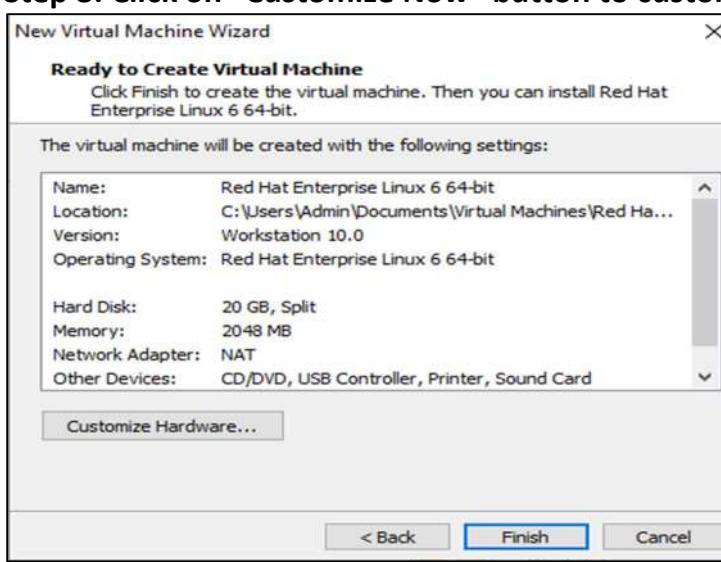


**Step 6: Click on “Next >” Nothing to change in Name the Virtual Machine.**

**Step 7: Select “Split virtual disk into multiple files” and Click on “Next >”.**

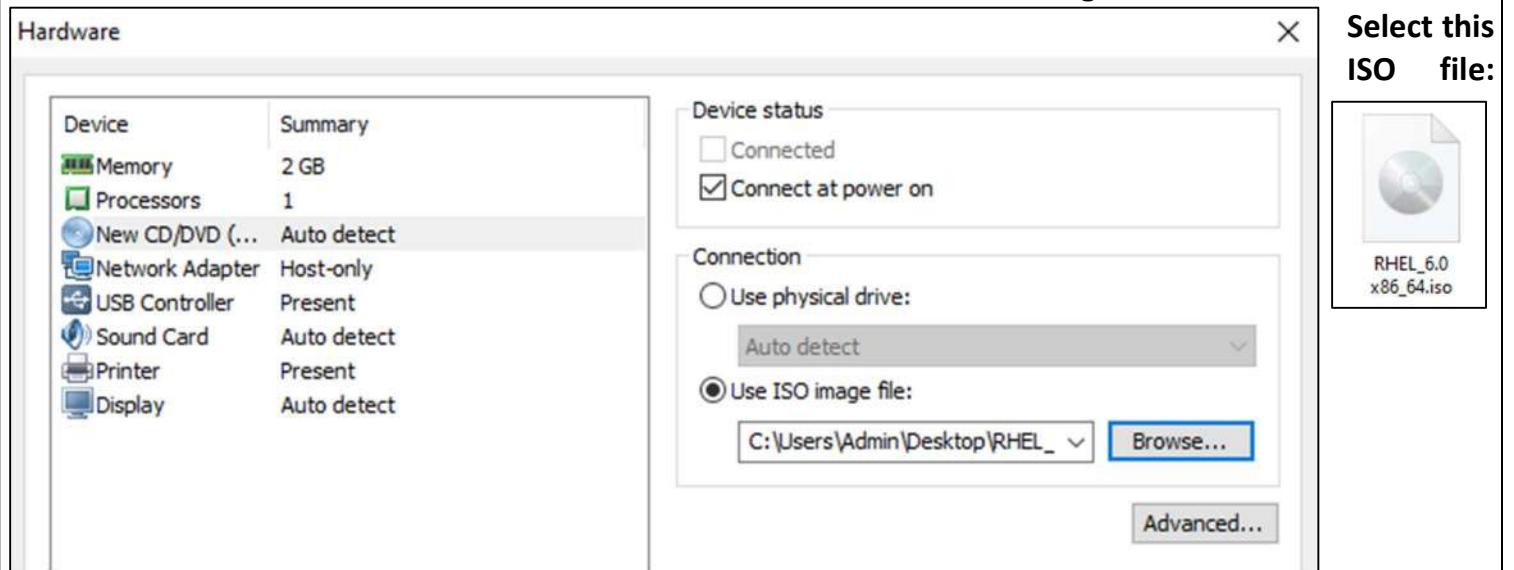


**Step 8: Click on “Customize Now” button to customize some changes**

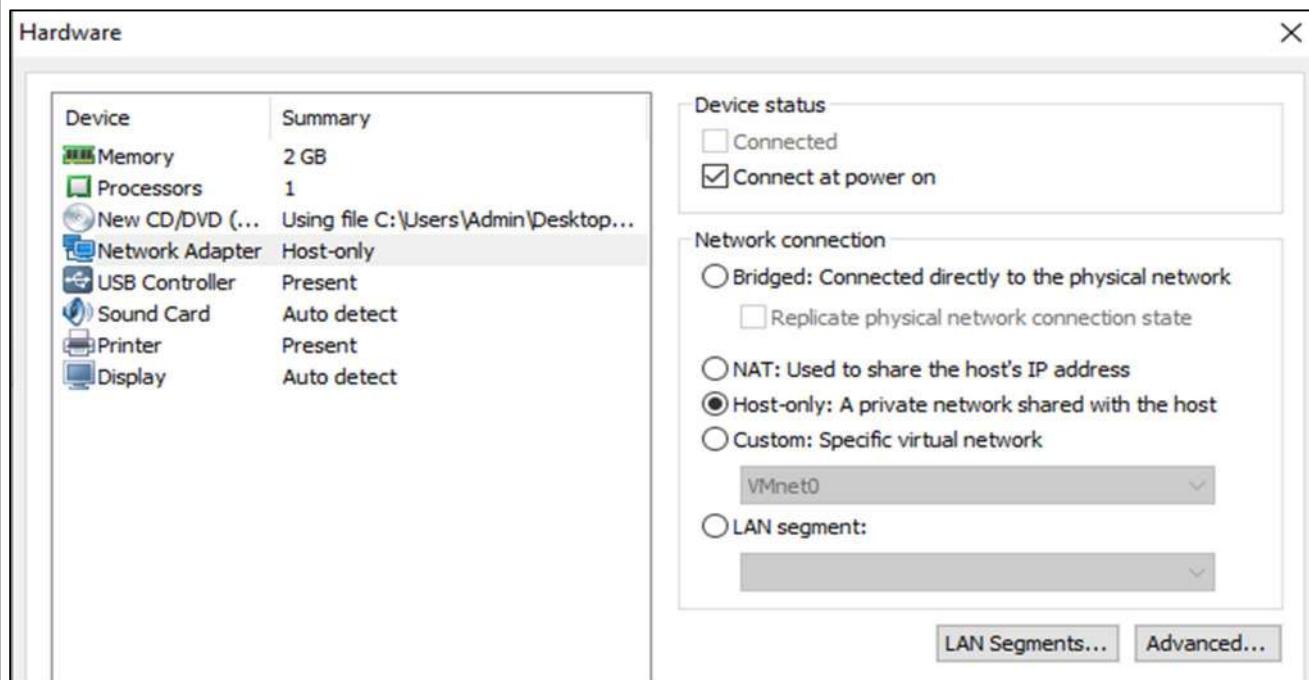


**Step 9:**

**1<sup>st</sup> : Select “New CD/DVD” from Device, then select the “Use ISO image file” and then Browse and Select this ISO file:**



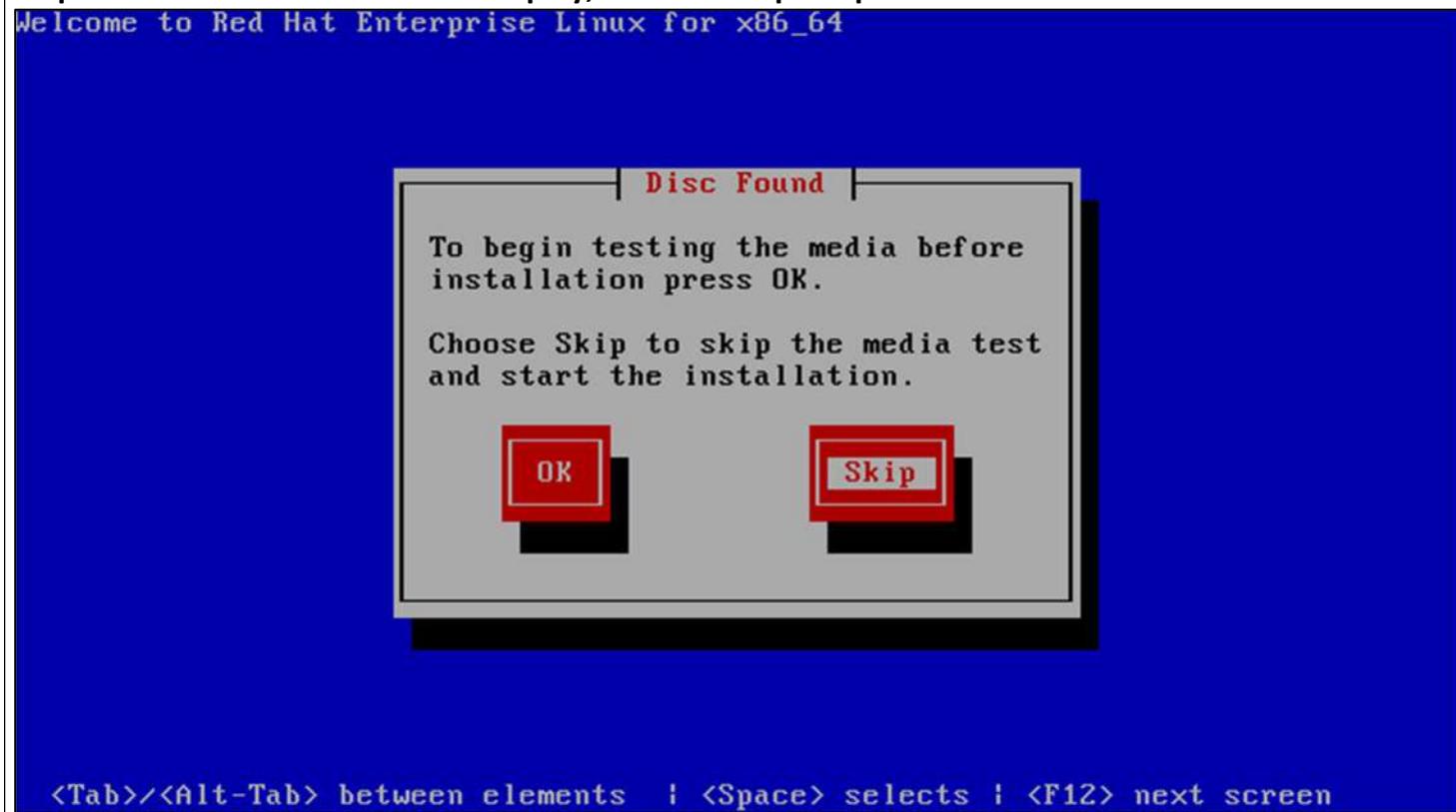
**2<sup>nd</sup> : Then select “Network Adapter” from device and select “Host-only” then close it. And click on Finish button.**



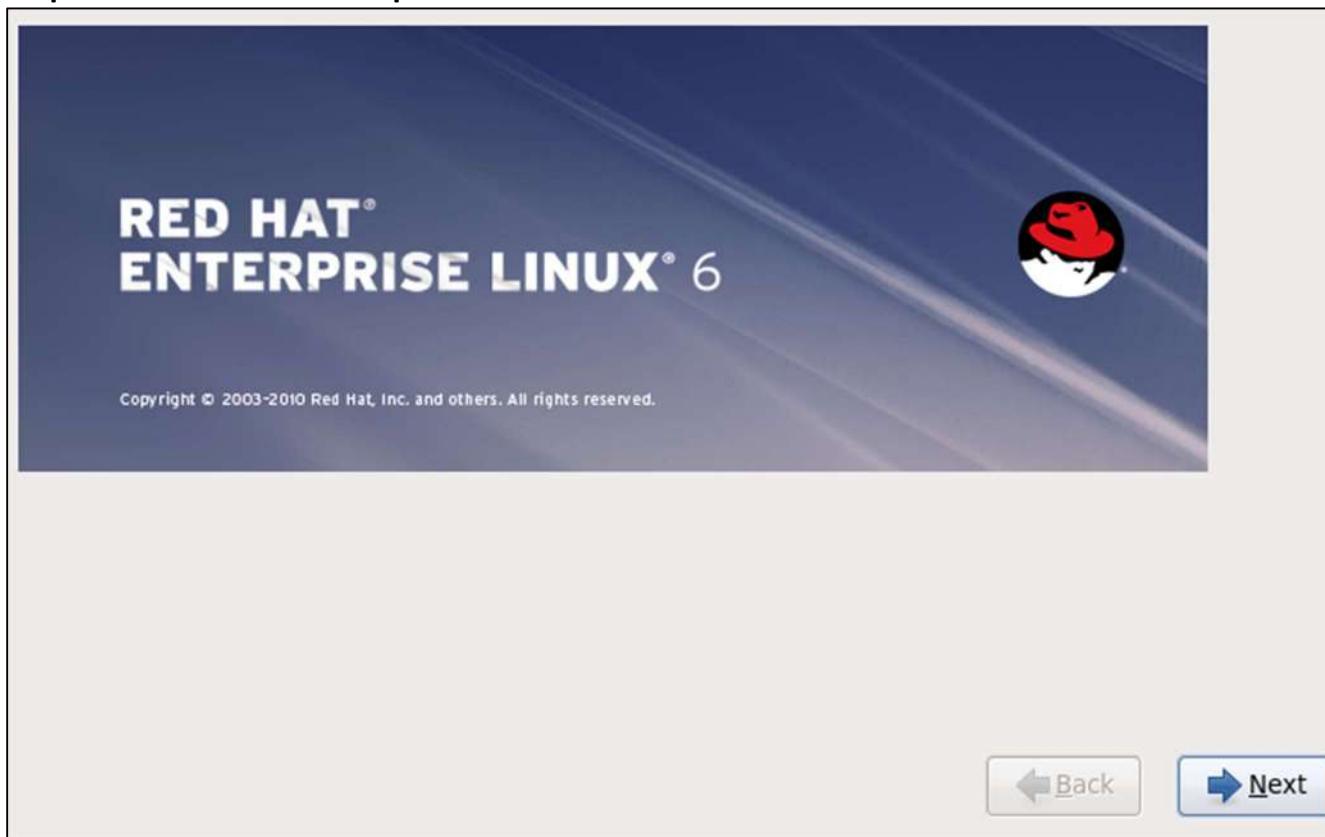
Step 10: Now you can Power ON your OS and do the Installation of RHEL 6.X. After Power ON, please wait for some time it will take about 1 minute to setup some setting.



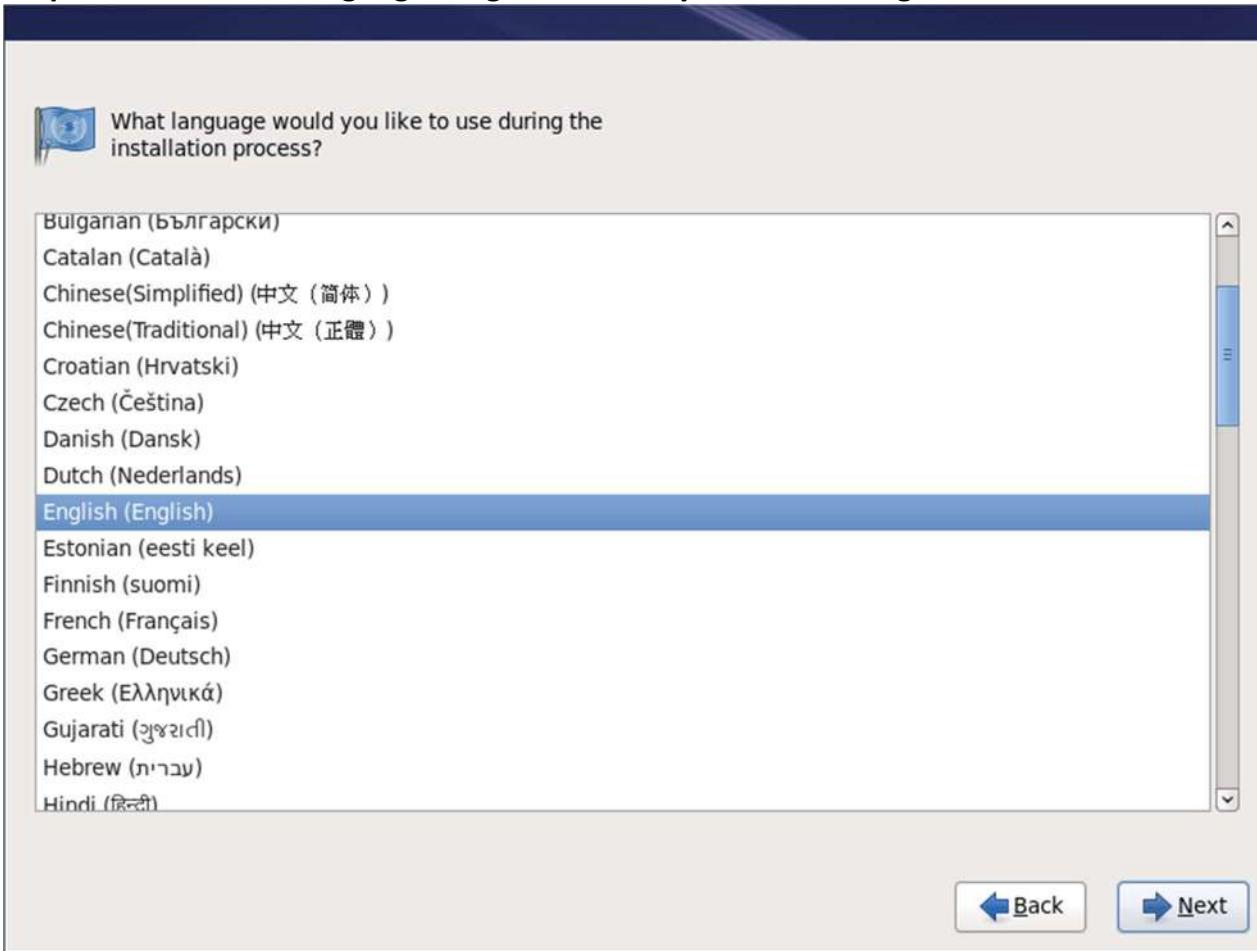
Step 11: Welcome screen will be display, click on “Skip” to proceed further.

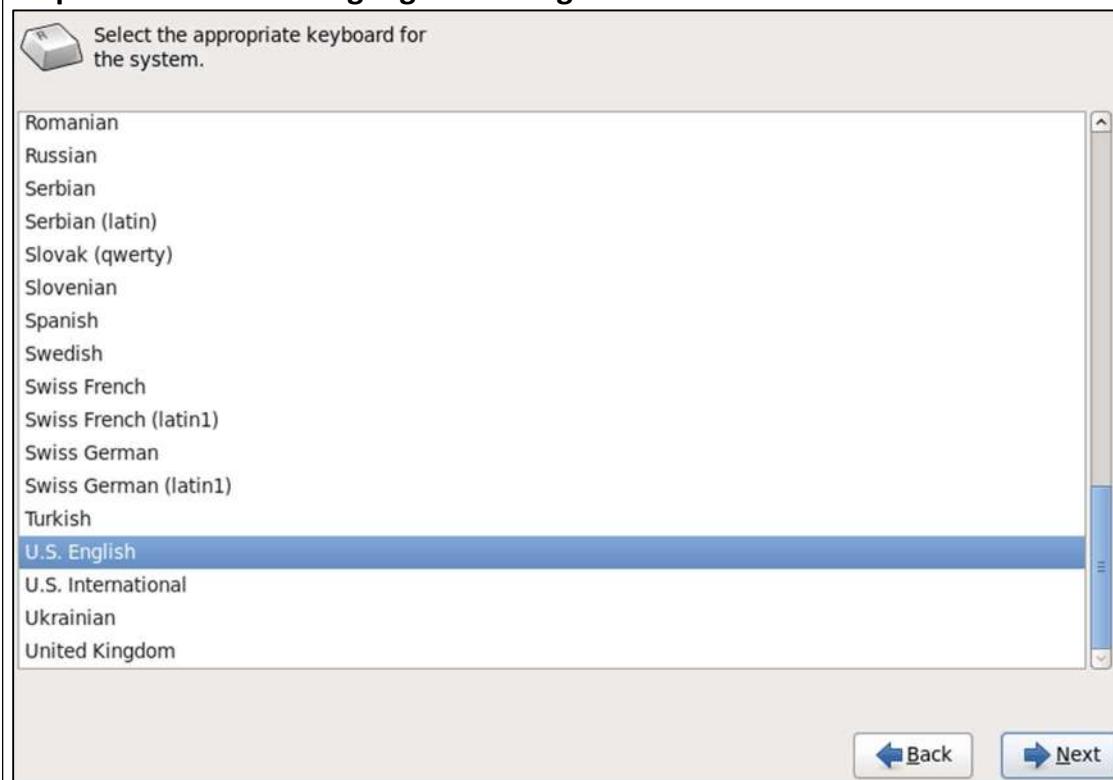


Step 12: Click on “Next” to proceed with the installation.



Step 13: Choose the language “English”, which you want during installation then Click on “Next”.



**Step 14: Choose the language “U.S. English” and click on “Next”.****Step 15: Choose “Basic Storage Devices” and then click on “Next”.**

What type of devices will your installation involve?

**Basic Storage Devices**

- Installs or upgrades to typical types of storage devices. If you're not sure which option is right for you, this is probably it.

**Specialized Storage Devices**

- Installs or upgrades to enterprise devices such as Storage Area Networks (SANs). This option will allow you to add FCoE / iSCSI / zFCP disks and to filter out devices the installer should ignore.

**Step 16: This Warning screen will appear, so Click on “Re-initialize all”.**

**Step 17:** After that you have to type your hostname, as we have kept it as “localhost.localdomain” then click on “Next”.



**Step 18:** Select the city “Asia/Kolkata” from the option for System Clock and click on “Next”.



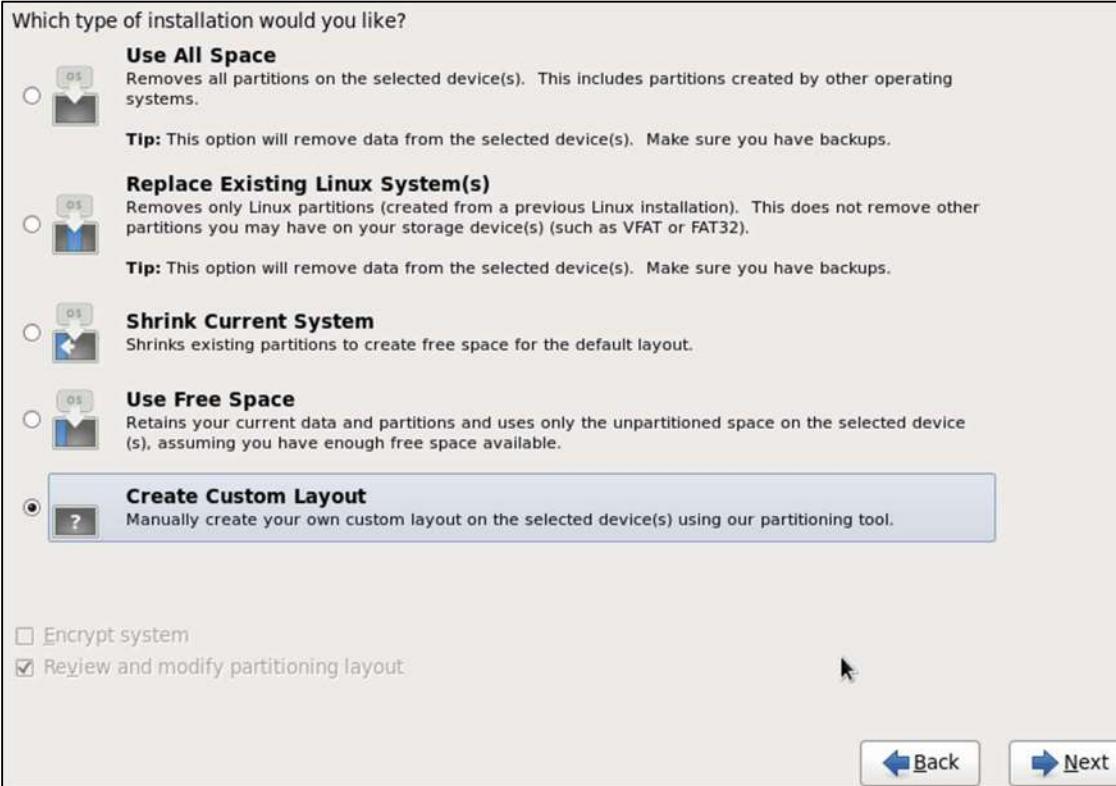
**Step 19:** After setting the System clock, Now set the Root password and Again type it in Confirm then click on “Next”. (Root Password : tytuser)



**Step 20:** As we have set a weak password so we will click on “Use Anyway” and proceed to further process.



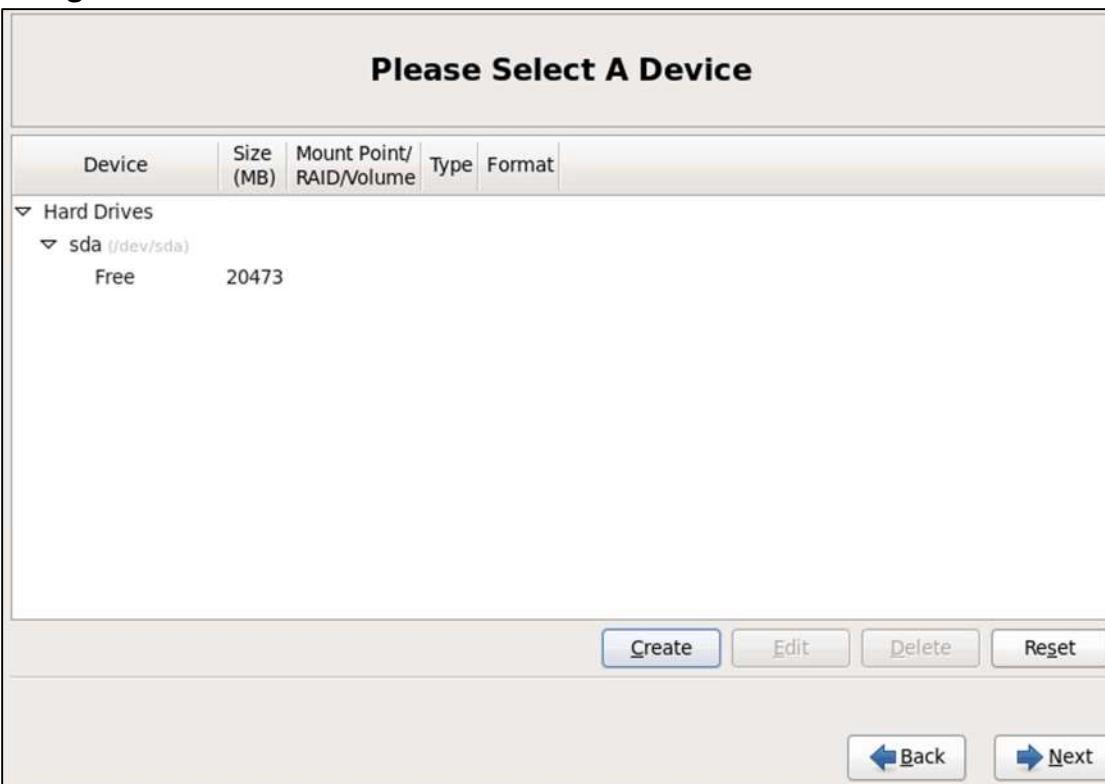
**Step 21: Select the type of installation you want to install, we will click on “Create Custom Layout” and Click on “Next”.**



**Step 22: Now we will create partitions for root, boot and swap files.**

- 1) / (root) : file type (ext4) : size (10000) : click on Force to be a primary partition then click on OK.
- 2) /boot : file type (ext4) : size (2000) : then click on OK.
- 3) file type (swap) : size (4000) : then click on OK.

Then Click on “Next” then again a warning window will open, click on “Format” and then click on “Write changes to disk”.



### Create Storage

**Create Partition**

Standard Partition  
General purpose partition creation

**Create Software RAID**

RAID Partition  
Create a RAID formatted partition

RAID Device  
Requires at least 2 free RAID formatted partitions

**Create LVM**

LVM Volume Group  
Requires at least 1 free LVM formatted partition

LVM Logical Volume  
Create a logical volume on selected volume group

LVM Physical Volume  
Create an LVM formatted partition

**Information**

[Cancel](#) [Create](#)

### Add Partition

Mount Point: /

File System Type: ext4

sda 20480 MB VMware, VMware Virtual S

Allowable Drives:

Size (MB): 10000

Additional Size Options

Fixed size

Fill all space up to (MB): 10000

Fill to maximum allowable size

Force to be a primary partition

Encrypt

[Cancel](#) [OK](#)

### Add Partition

Mount Point: <Not Applicable>

File System Type: swap

sda 20480 MB VMware, VMware Virtual S

Allowable Drives:

Size (MB): 4000

Additional Size Options

Fixed size

Fill all space up to (MB): 1

Fill to maximum allowable size

Force to be a primary partition

Encrypt

[Cancel](#) [OK](#)

### Add Partition

Mount Point: /boot

File System Type: ext4

sda 20480 MB VMware, VMware Virtual S

Allowable Drives:

Size (MB): 2000

Additional Size Options

Fixed size

Fill all space up to (MB): 1

Fill to maximum allowable size

Force to be a primary partition

Encrypt

[Cancel](#) [OK](#)

Device	Size (MB)	Mount Point/ RAID/Volume	Type	Format
<b>Hard Drives</b>				
sda (/dev/sda)				
sda1	2000	/boot	ext4	✓
sda2	10000	/	ext4	✓
sda3	4000		swap	✓
Free	4479			

### Format Warnings

 The following pre-existing devices have been selected to be formatted, destroying all data.

/dev/sda	partition table (MSDOS)
----------	-------------------------

[Cancel](#) [Format](#)

### Writing storage configuration to disk

 The partitioning options you have selected will now be written to disk. Any data on deleted or reformatted partitions will be lost.

[Go back](#) [Write changes to disk](#)

**Step 23: Click on “Next”.**

Install boot loader on /dev/sda. [Change device](#)

Use a boot loader password [Change password](#)

**Boot loader operating system list**

Default	Label	Device
<input checked="" type="radio"/>	Red Hat Enterprise Linux	/dev/sda2

[Add](#) [Edit](#) [Delete](#)

[Back](#) [Next](#)

**Step 24: Select “Desktop” and choose “Customize now” then click on “Next”.**

The default installation of Red Hat Enterprise Linux is a basic server install. You can optionally select a different set of software now.

Basic Server  
 Database Server  
 Web Server  
 Virtual Host  
 Desktop  
 Software Development Workstation  
 Minimal

Please select any additional repositories that you want to use for software installation.

High Availability  
 Load Balancer  
 Red Hat Enterprise Linux

[+ Add additional software repositories](#) [Modify repository](#)

You can further customize the software selection now, or after install via the software management application.

Customize later  Customize now

[Back](#) [Next](#)

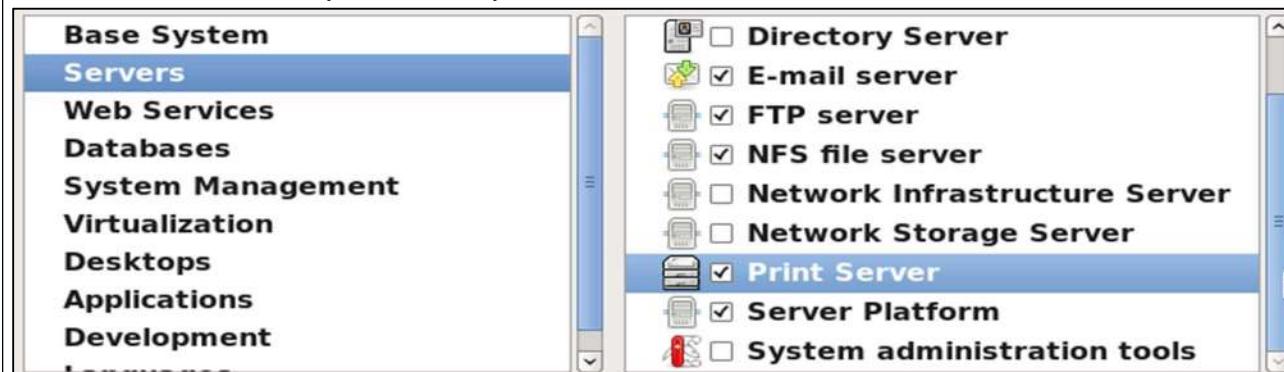
Step 25: On this window we will select some packages to be installed from several servers.

Select from:

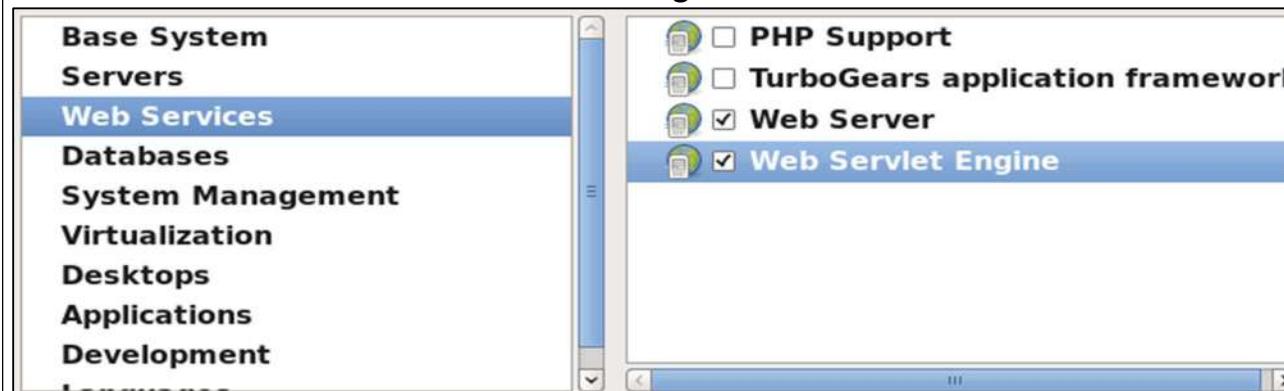
Base system : Networking Tools, Performance Tools and Security Tools.



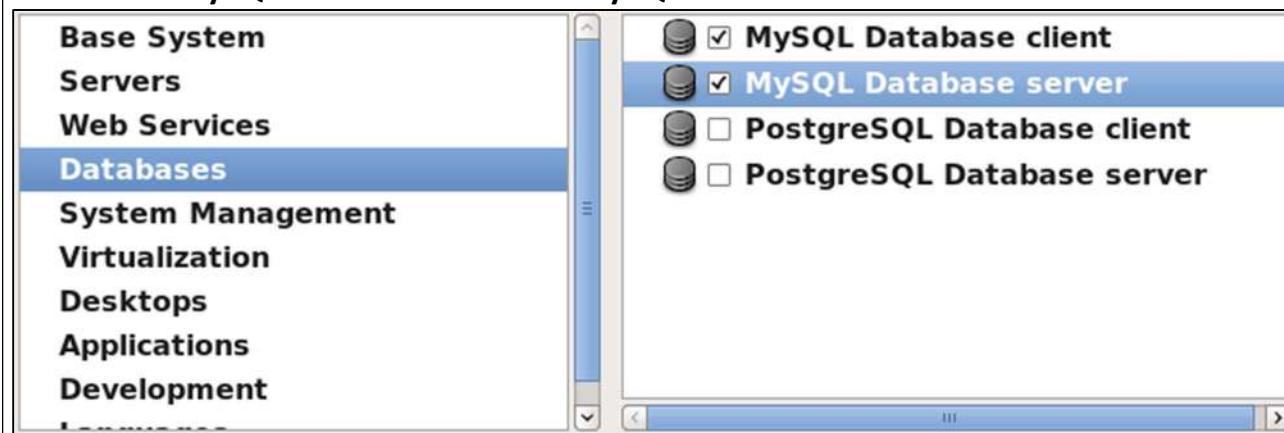
Servers: E-mail server, FTP server, NFS server and Print server.



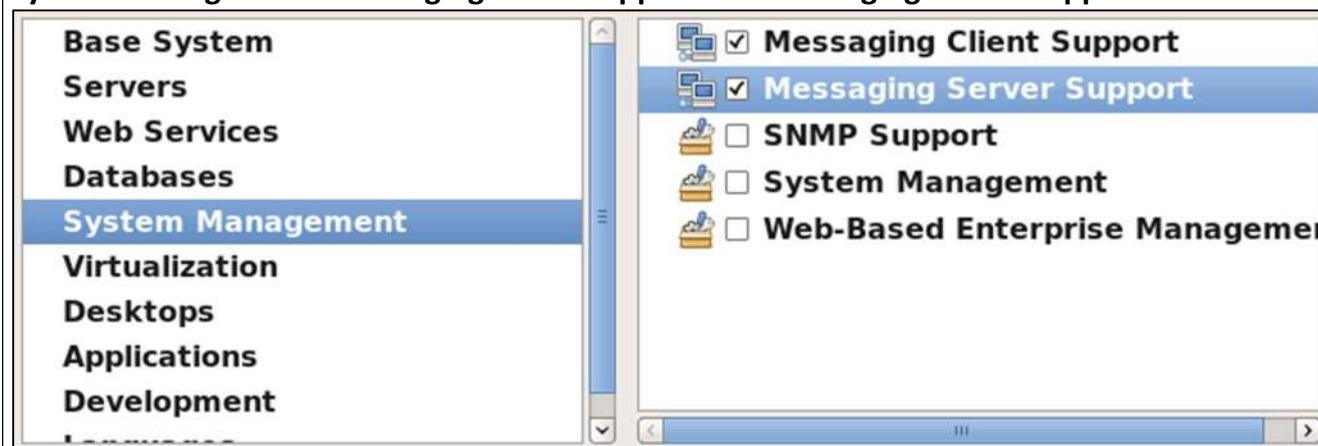
Web Services: Web server and Web Servlet Engine.



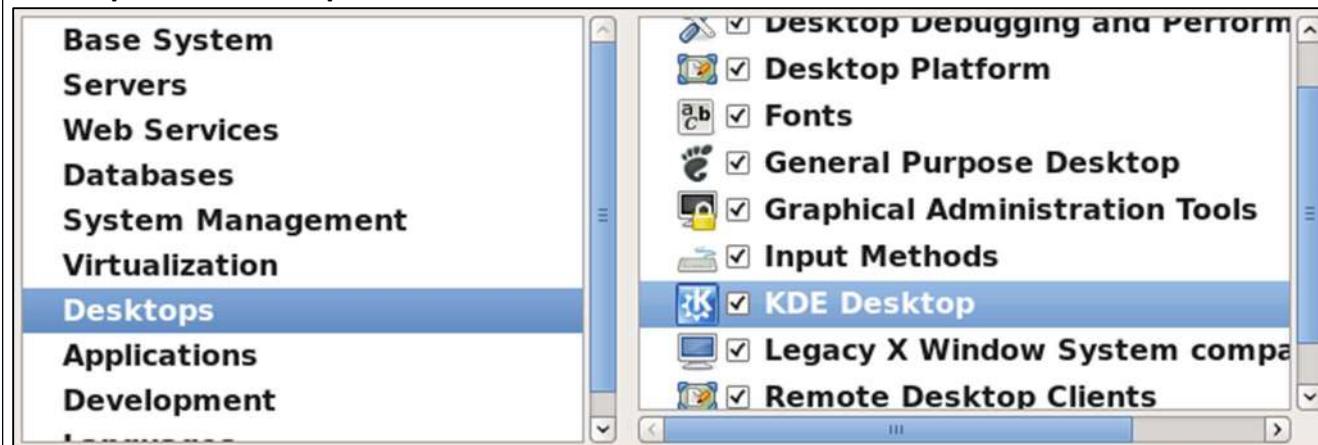
Databases: MySQL Database client and MySQL Database server.



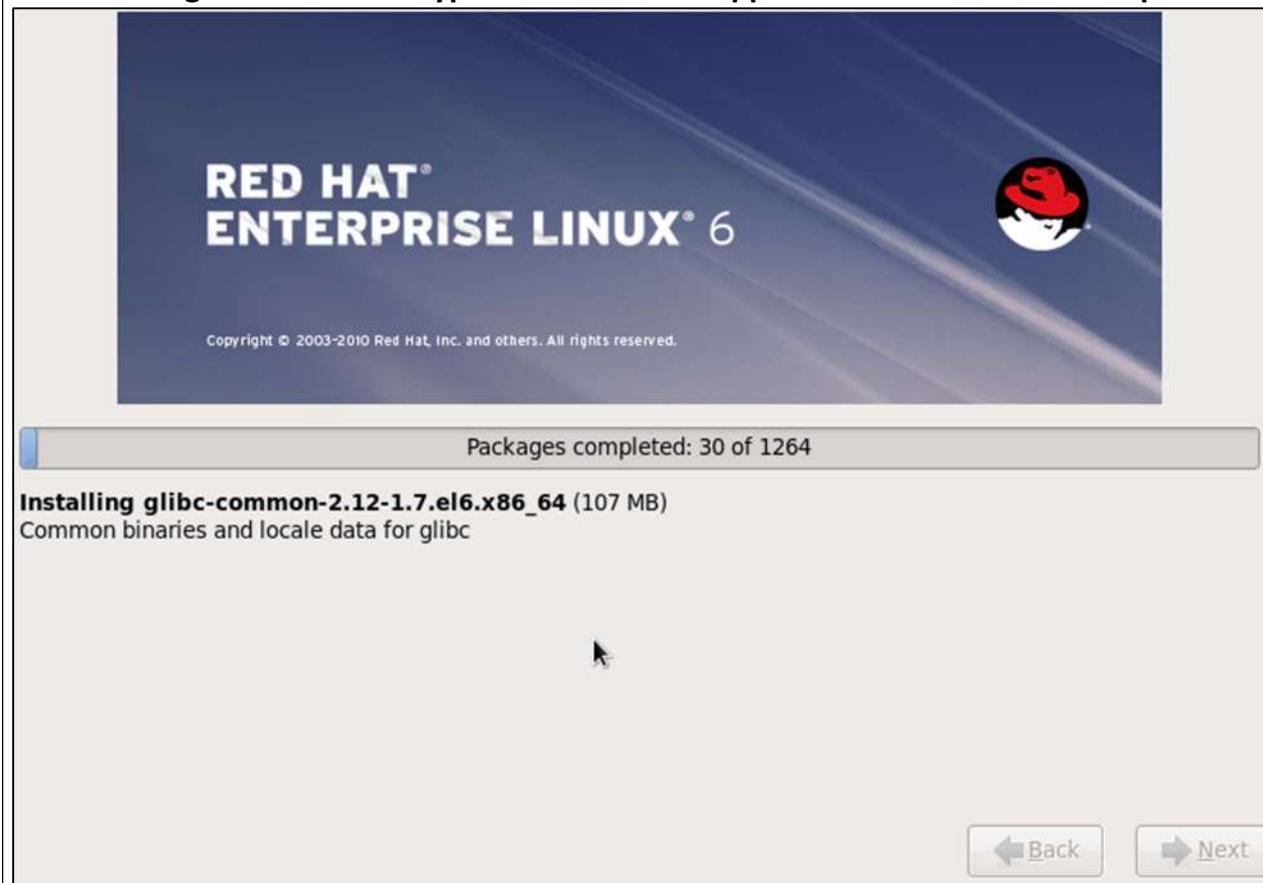
## System Management: Messaging Client Support and Messaging Server Support.



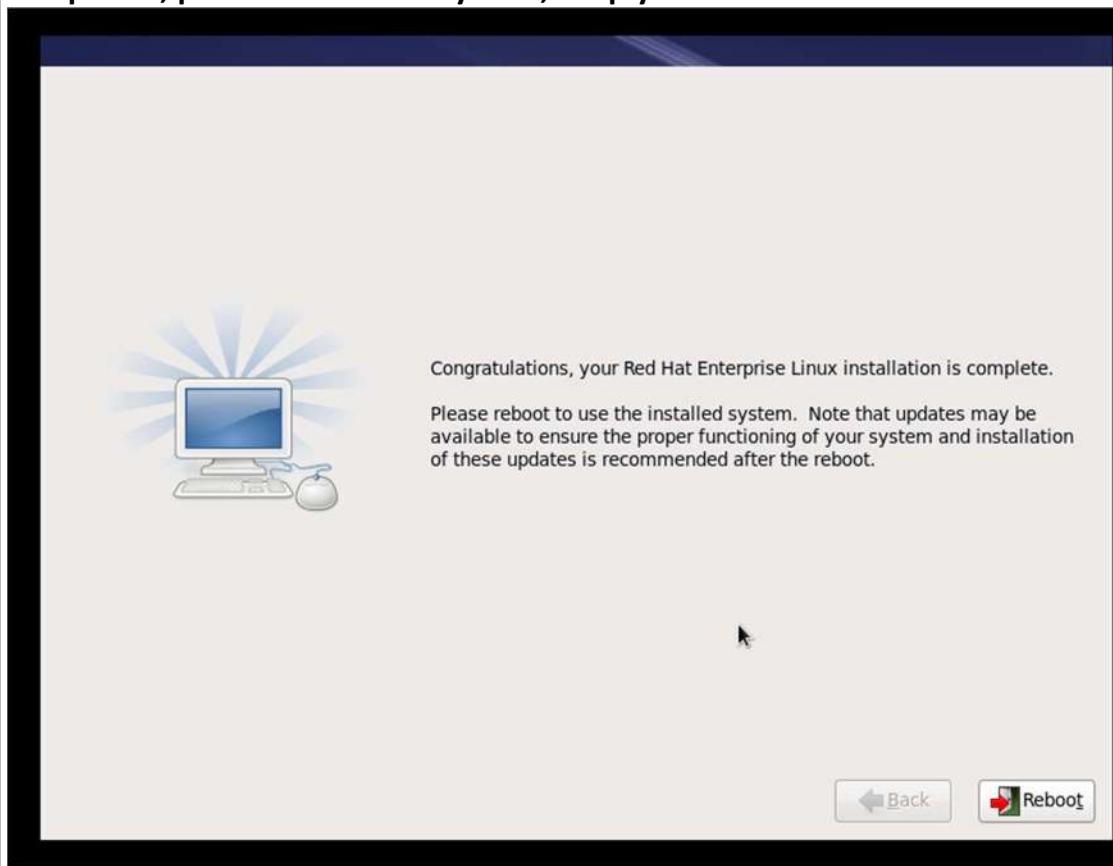
## Desktops: KDE Desktop



After Clicking on "Next" this type of window will appear and the installation is proceeded.



Step 26: After Completion of installation, this window will show a message that the installation is completed, please reboot the system, simply click on “Reboot”.



After clicking on reboot, the system will reboot the OS and Start it.

```
Running anaconda 13.21.82, the Red Hat Enterprise Linux system installer - please wait.
14:11:42 Starting graphical installation.
disabling swap...
  /dev/sda3
unmounting filesystems...
  /mnt/runtime done
    disabling /dev/loop0 LOOP_CLR_FD failed: 16
  /proc done
  /dev/pts done
  /sys done
  /selinux done
  /mnt/sysimage/boot done
  /mnt/sysimage/dev/pts done
  /mnt/sysimage/dev/shm done
  /mnt/sysimage/dev done
  /mnt/sysimage/proc/bus/usb done
  /mnt/sysimage/proc done
  /mnt/sysimage/sys done
  /mnt/sysimage/selinux done
  /mnt/sysimage done
waiting for mdraid sets to become clean...
Error: mdadm exited with status: 127
sending termination signals...done
```

Red Hat Enterprise Linux Server 6.8

Step 27: A Welcome screen will appear, just click on “Forward” to start the system.

- › Welcome
- License Information
- Set Up Software Updates
- Create User
- Date and Time
- Kdump

# Welcome

There are a few more steps to take before your system is ready to use.  
The Setup Agent will now guide you through some basic configuration.  
Please click the "Forward" button in the lower right corner to continue



[Back](#)

[Forward](#)

Now they have given the License Information, we can read it and tick on “Yes” after reading the whole document and then click on “Forward”.

- › License Information
- Set Up Software Updates
- Create User
- Date and Time
- Kdump

# License Information

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- Yes, I agree to the License Agreement  
 No, I do not agree

[Back](#)

[Forward](#)

Step 28: Now Create One User ID by entering the details and click on “Forward”:

Username: rjcit    Full name: rjcit    Password: rjcituser    Confirm Password: rjcituser

Welcome  
License  
Information  
Set Up  
Software  
Updates  
Create User  
Date and  
Time  
Kdump

## Create User

You must create a 'username' for regular (non-administrative) use of your system. To create a system 'username', please provide the information requested below.

Username:	<input type="text" value="rjcit"/>
Full Name:	<input type="text" value="rjcit"/>
Password:	<input type="password" value="....."/>
Confirm Password:	<input type="password" value="....."/>

If you need to use network authentication, such as Kerberos or NIS, please click the Use Network Login button.

[Use Network Login...](#)

If you need more control when creating the user (specifying home directory, and/or UID), please click the Advanced button.

[Advanced...](#)

[Back](#)

[Forward](#)

As we have typed a Weak Password so a dialog box will appear if we want to change our password, if not then click on “Yes”.



**Step 29:** Now set the date time, if you want that system should accept the it over the network then select the option “Synchronize date and time over the network” and then click on “Forward”.

Welcome  
License  
Information  
Set Up  
Software  
Updates  
Create User  
Date and  
Time  
Kdump

## Date and Time

Please set the date and time for the system.

### Date and Time

Current date and time: Sun 03 Jul 2022 08:53:55 PM IST

Synchronize date and time over the network

Manually set the date and time of your system:

#### Date

<	July	>	< 2022 >			
Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

#### Time

Hour : 20

Minute : 52

Second : 24

Back

Forward

### Date and Time

Current date and time: Sun 03 Jul 2022 08:54:05 PM IST

Synchronize date and time over the network

Synchronize date and time on your computer with a remote time server using the Network Time Protocol:

#### NTP Servers

0.rhel.pool.ntp.org  
1.rhel.pool.ntp.org  
2.rhel.pool.ntp.org

Add

Edit

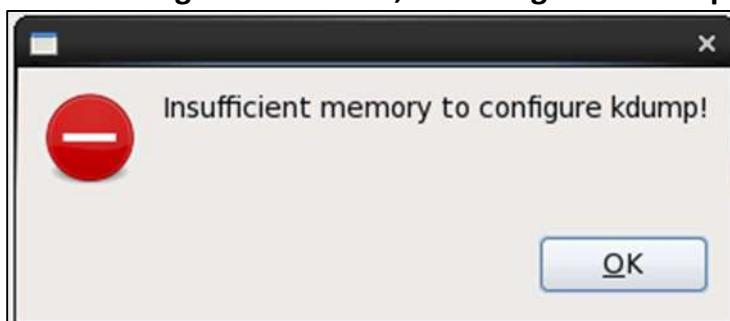
Delete

▷ Advanced Options

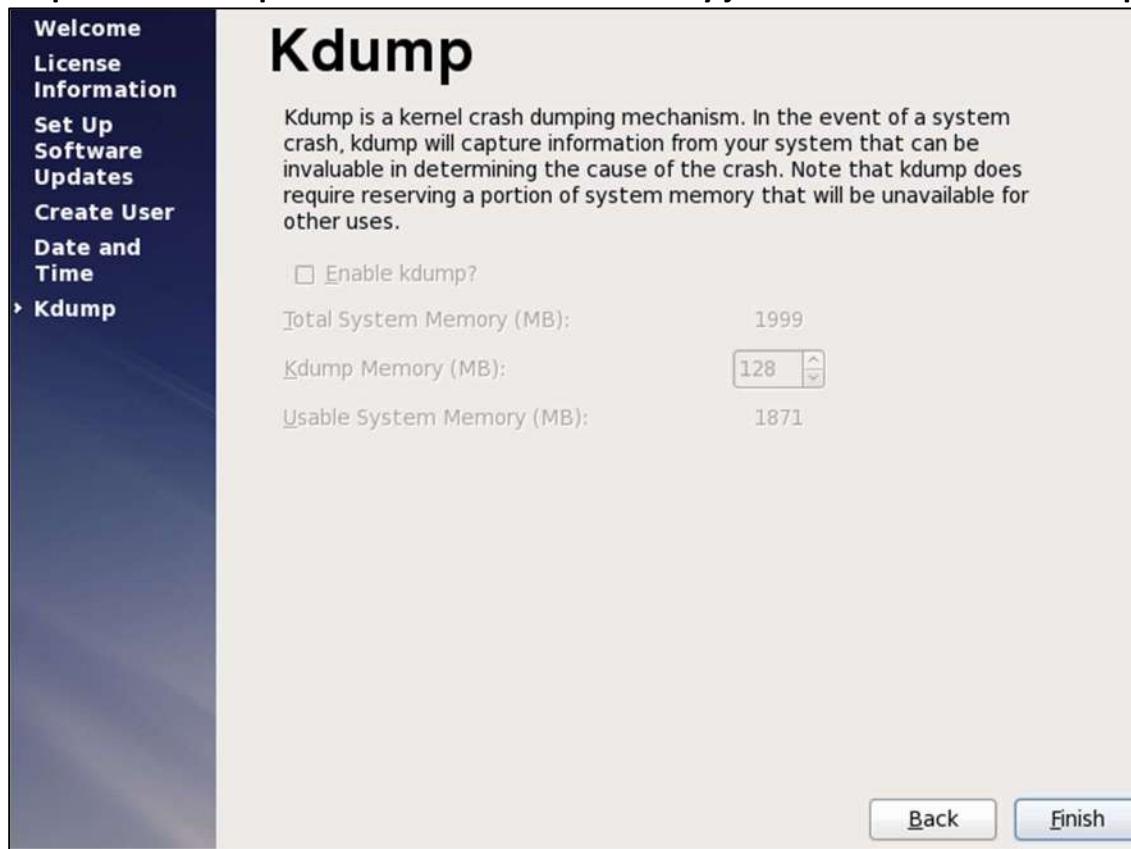
Back

Forward

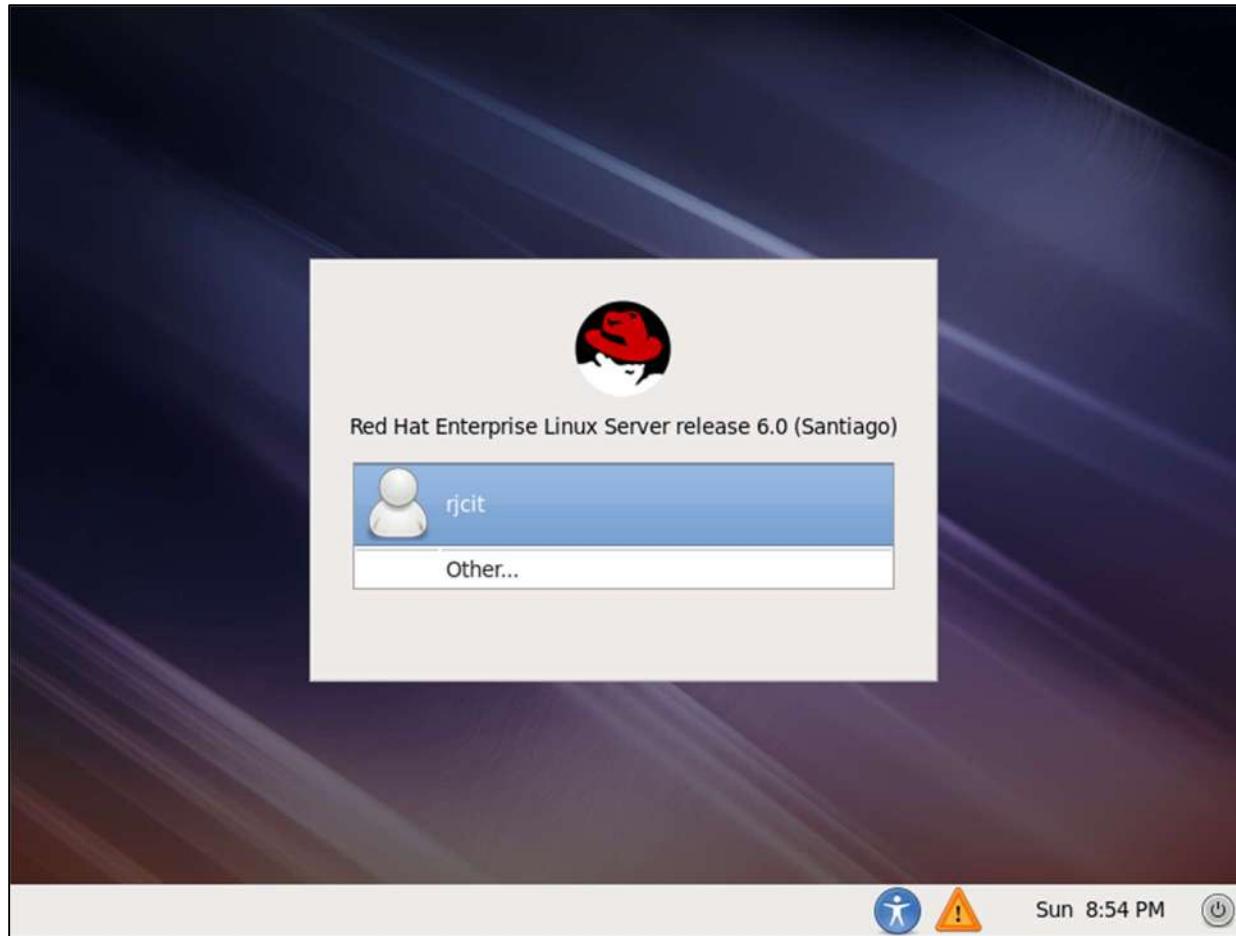
After clicking on “Forward”, A message box will appear, click on “OK”.



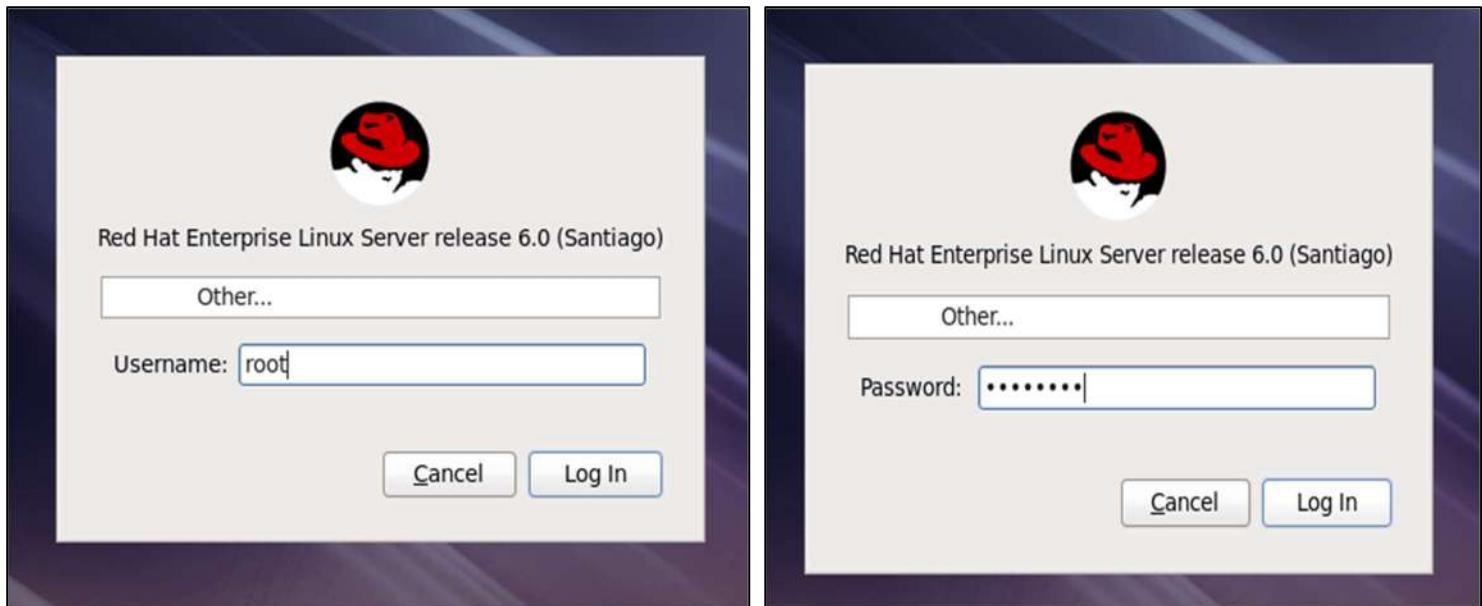
Step 30: A “Kdump” will be created automatically just click on “Finish” to complete the setup.



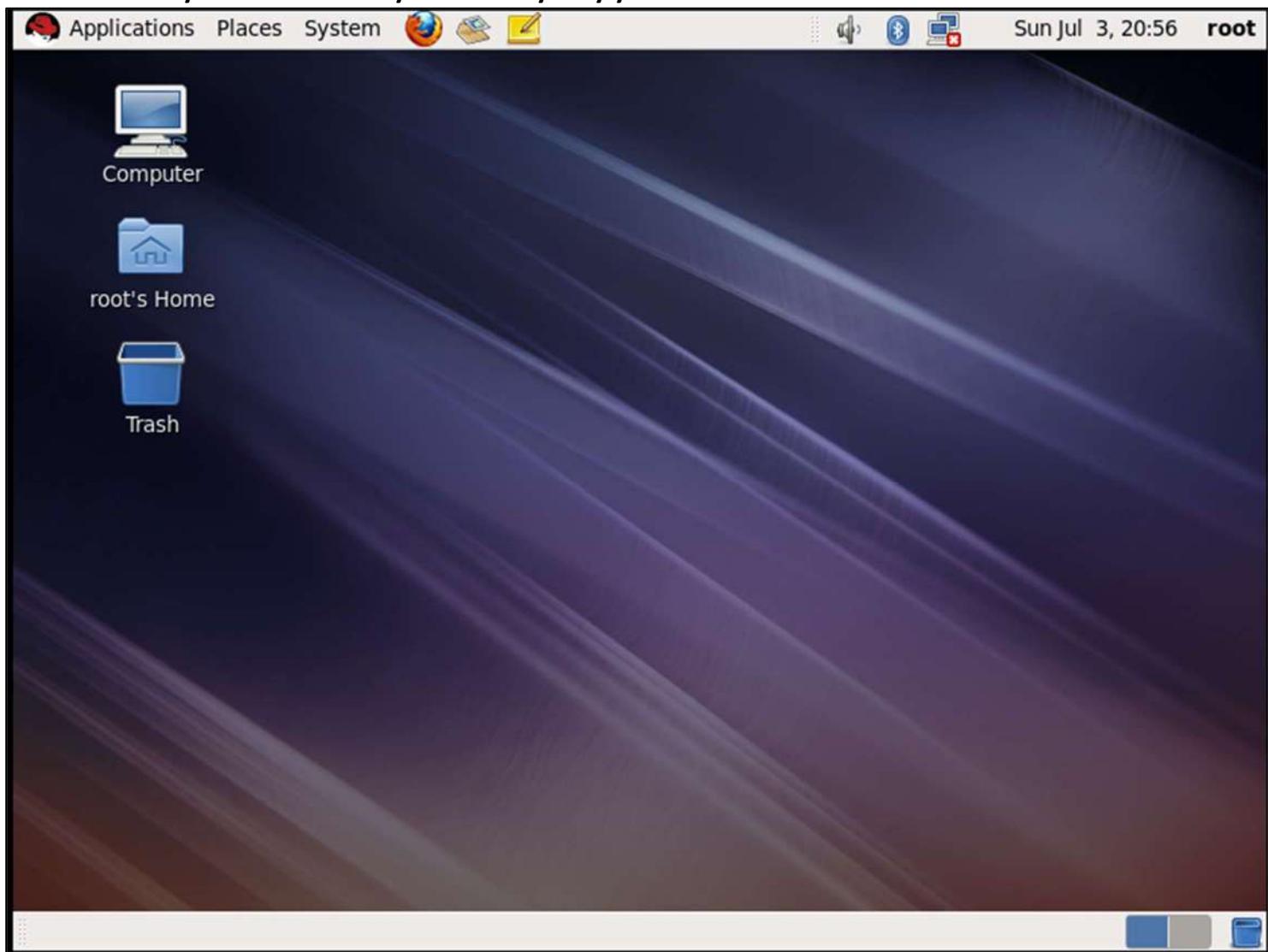
Now you can login as a user using “rjcit” or as a root (admin) using “Other...”.



Click on "Other" to login as a root (admin) and then type username as "root", then type password on next screen "tyituser".



That's It. Now you can use the system in any way you want.



## Practical 1: Graphical user Interface and Command Line Interface process

### a) The Command Line Interface:

1. man : It is used to display the user manual of any command that we can run on the terminal.

```
[root@localhost ~]# man -l
man: invalid option -- 'l'
man, version 1.6f

usage: man [-adfhktw] [section] [-M path] [-P pager] [-S list]
           [-m system] [-p string] name ...

a : find all matching entries
c : do not use cat file
d : print gobs of debugging information
D : as for -d, but also display the pages
f : same as whatis(1)
h : print this help message
k : same as apropos(1)
K : search for a string in all pages
t : use troff to format pages for printing
w : print location of man page(s) that would be displayed
   (if no name given: print directories that would be searched)
W : as for -w, but display filenames only

C file  : use 'file' as configuration file
M path   : set search path for manual pages to 'path'
P pager  : use program 'pager' to display pages
S list   : colon separated section list
m system : search for alternate system's man pages
p string : string tells which preprocessors to run
            e - [n]eqn(1)  p - pic(1)  t - tbl(1)
            g - grap(1)    r - refer(1)  v - vgrind(1)
```

```
root@localhost:~#
File Edit View Search Terminal Help
[root@localhost ~]# cd
[root@localhost ~]# man -k time | grep 8
/sbin/ldconfig [ldconfig] (8) - configure dynamic linker run-time bindings
booleans          (8) - Policy booleans enable runtime customization of SELinux
nux policy
kbdrate          (8) - reset the keyboard repeat rate and delay time
ntpd              (8) - Network Time Protocol (NTP) daemon
ntpdate          (8) - set the date and time via NTP
ntpstat          (8) - show network time synchronisation status
nptime            (8) - read kernel time variables
pam_time          (8) - PAM module for time control access
pam_timestamp     (8) - Authenticate using cached successful authentication
attempts
pam_timestamp_check (8) - Check to see if the default timestamp is valid
prelink           (8) - prelink ELF shared libraries and binaries to speed up
p startup time
rtcwake           (8) - enter a system sleep state until specified wakeup time
me
staprune          (8) - systemtap runtime
sysctl            (8) - configure kernel parameters at runtime
system-config-date (8) - graphical interface for changing system date and time
tickadj           (8) - set time-related kernel variables
tmpwatch          (8) - removes files which haven't been accessed for a period of time
tzselect          (8) - select a timezone
```

2. Date: It displays and sets the system date and time.

```
[root@localhost ~]# date 05061256
Fri May  6 12:56:00 IST 2022
[root@localhost ~]#
[root@localhost ~]#
[root@localhost ~]# date 06300821
Thu Jun 30 08:21:00 IST 2022
```

### 3. Create a directory with your name/tempdir. Copy all files

a) **mkdir** : It allows the user to create directories.

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

b) **cp** : This command is used to copying files from one location to another location.

```
root@localhost:~#
File Edit View Search Terminal Help
[root@localhost ~]# cp /etc/[abc]* /tempdir
cp: omitting directory '/etc/abrt'
cp: omitting directory '/etc/acpi'
cp: omitting directory '/etc/akonadi'
cp: omitting directory '/etc/alsa'
cp: omitting directory '/etc/alternatives'
cp: omitting directory '/etc/audisp'
cp: omitting directory '/etc/audit'
cp: omitting directory '/etc/avahi'
cp: omitting directory '/etc/bash_completion.d'
cp: omitting directory '/etc/blkid'
cp: omitting directory '/etc/bluetooth'
cp: omitting directory '/etc/bonobo-activation'
cp: omitting directory '/etc/certmonger'
cp: omitting directory '/etc/chkconfig.d'
cp: omitting directory '/etc/cron.d'
cp: omitting directory '/etc/cron.daily'
cp: omitting directory '/etc/cron.hourly'
cp: omitting directory '/etc/cron.monthly'
cp: omitting directory '/etc/cron.weekly'
cp: omitting directory '/etc/cups'
[root@localhost ~]# ls /tempdir
adjtime      asound.conf          auto.net        cgrules.conf   csh.login
aliases       at.deny             auto.smb        cron.deny
aliases.db    autofs_ldap_auth.conf bashrc         crontab
anacrontab   auto.master        cas.conf       crypttab
anthy-conf   auto.misc          cgconfig.conf  csh.cshrc
```

c) **ls** : It is used to list files or directories in Linux.

```
[root@localhost ~]# ls /
bin  cgroup  etc  lib  lost+found  misc  net  proc  sbin  srv  tempdir  usr
boot  dev  home  lib64  media  mnt  opt  root  selinux  sys  tmp  var
```

d) **man ls** : It is used to display the user manual of any command that we can run on the terminal.

```
[root@localhost ~]# man ls
[1]+  Stopped                  man ls
```

root@localhost:~

File	Edit	View	Search	Terminal	Help
LS(1)	User Commands			LS(1)	
<b>NAME</b>	<b>ls</b> - list directory contents				
<b>SYNOPSIS</b>	<b>ls</b> [ <u>OPTION</u> ]... [ <u>FILE</u> ]...				
<b>DESCRIPTION</b>	List information about the <b>FILEs</b> (the current directory by default). Sort entries alphabetically if none of <b>-cftuvSUX</b> nor <b>--sort</b> .				
Mandatory arguments to long options are mandatory for short options too.					
<b>-a, --all</b>	do not ignore entries starting with .				
<b>-A, --almost-all</b>	do not list implied . and ..				
<b>--author</b>	with <b>-l</b> , print the author of each file				
<b>-b, --escape</b>	print octal escapes for nongraphic characters				
<b>--block-size=<u>SIZE</u></b>	use <u>SIZE</u> -byte blocks. See <u>SIZE</u> format below				

e) **ls -t** : It is used show the sorted filed modification by time.

```
[root@localhost ~]# ls -t
Desktop      Downloads    Pictures    Templates    anaconda-ks.cfg    install.log.syslog
Documents    Music        Public      Videos      install.log
```

f) **ls -t etc :**

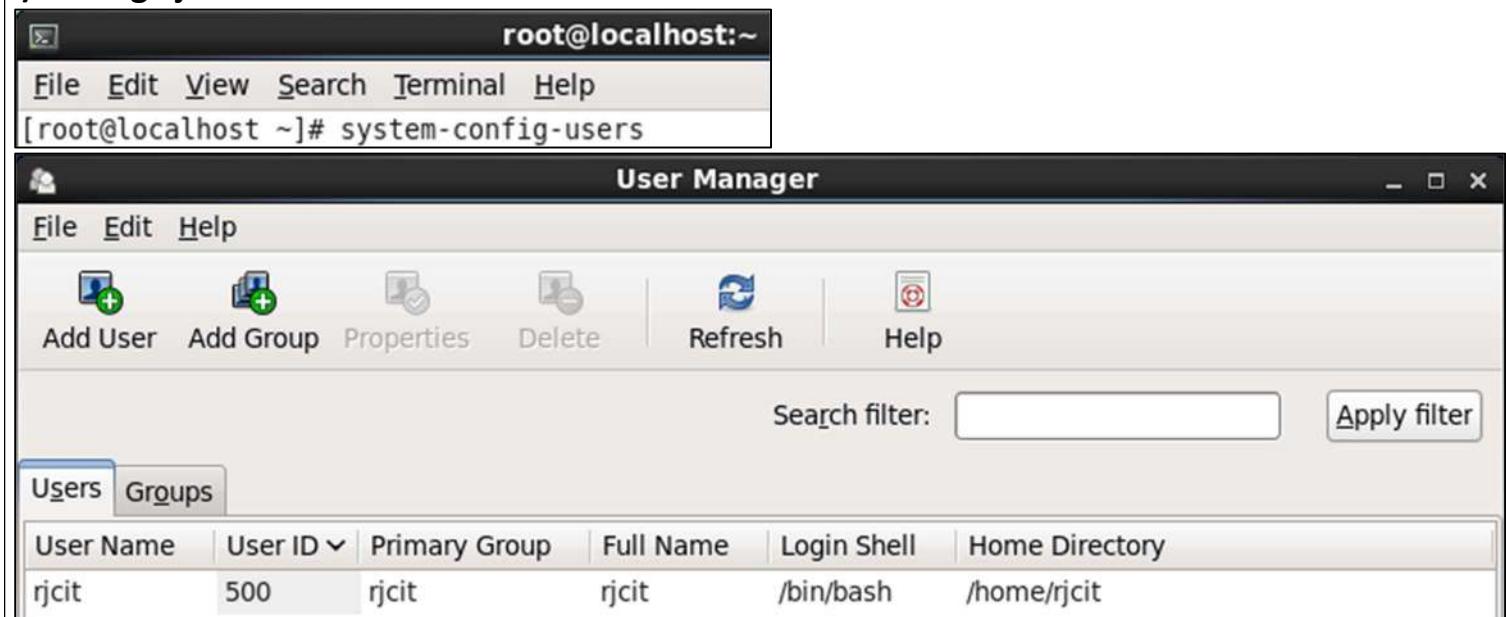
```
[root@localhost ~]# ls -t /etc
mtab          skel          ssl           DIR_COLORS
reader.conf   gnome-vfs-2.0  xml           DIR_COLORS.256color
prelink.cache avahi         pm            DIR_COLORS.lightbgcolor
sysconfig     samba         mdadm.conf   anacrontab
adjtime       nslcd.conf   crypttab    cron.deny
ntp.conf      certmonger   fstab        vimrc
shadow        snmp          resolv.conf  virc
```

**g) find :** It is used to find files and directories.

```
[root@localhost ~]# find / -size +100M
/media/RHEL_6.0 x86_64 Disc 1/images/install.img
/proc/kcore
find: `/proc/2716/task/2716/fd/5': No such file or directory
find: `/proc/2716/task/2716/fdinfo/5': No such file or directory
find: `/proc/2716/fd/5': No such file or directory
find: `/proc/2716/fdinfo/5': No such file or directory
/sys/devices/pci0000:00/0000:00:0f.0/resource1
/sys/devices/pci0000:00/0000:00:0f.0/resource1_wc
/usr/share/icons/oxygen/icon-theme.cache
```

**4) Manage processes:** A process in Linux is nothing but a program in execution. It's a running instance of a program. Any command that you execute starts a process.

**i) Manage jobs :**



**bg:** This command in Linux is used to place foreground jobs in background.

```
[root@localhost ~]# system-config-users
^Z
[1]+  Stopped                  system-config-users
[root@localhost ~]# bg
[1]+ system-config-users &
[root@localhost ~]# jobs
[1]+  Running                  system-config-users &
```

**fg:** This command in Linux used to put a background job in foreground.

```
[root@localhost ~]# fg
system-config-users
^Z
[1]+  Stopped                  system-config-users
[root@localhost ~]# jobs
[1]+  Stopped                  system-config-users
```

## ii. Parent & Child process:

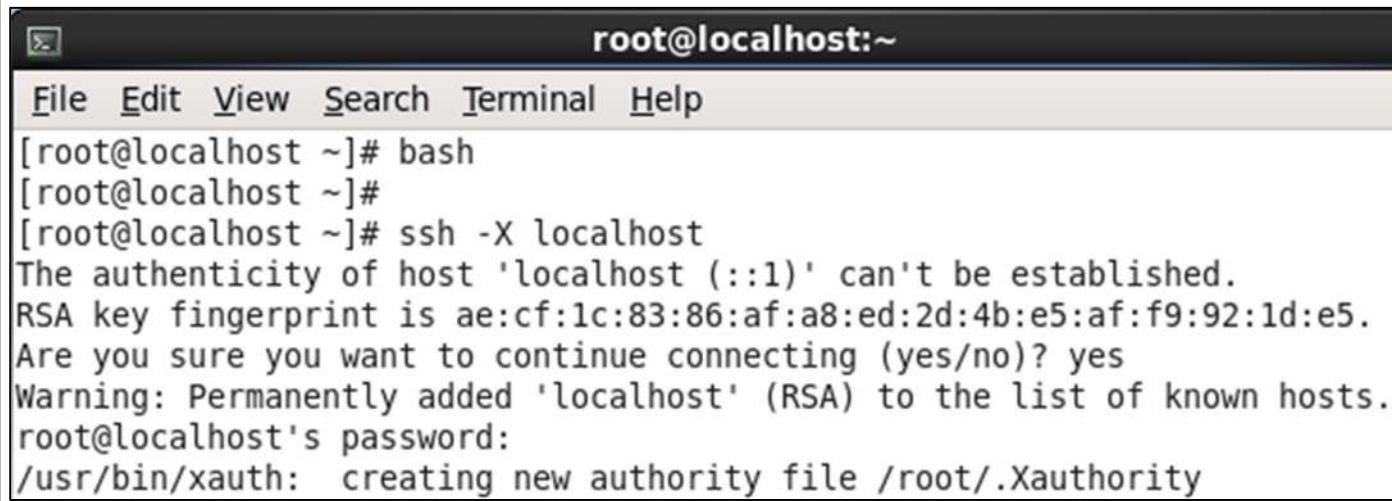
**Parent Process:** All the processes in operating system are created when a process executes the fork() system call except the startup process. The process that used the fork() system call is the parent process.

**Child process:** A child process is a process created by a parent process in operating system using a fork() system call. A child process may also be called a subprocess or a subtask. A child process is created as its parent process's copy and inherits most of its attributes.

**Note: A parent process may have multiple child processes but a child process can only have one parent process. If a child process has no parent process, it was created directly by the kernel.**

**bash:** The Linux Bash is also known as 'Bourne-again Shell.' It is a command language interpreter for the Linux based system. It is a replacement of Bourne shell (sh). It was developed under the GNU Project and written by Brian Fox.

**ssh:** ssh stands for "Secure Shell". It is a protocol used to securely connect to a remote server/system. ssh is secure in the sense that it transfers the data in encrypted form between the host and the client.



```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# bash  
[root@localhost ~]# [root@localhost ~]# ssh -X localhost  
The authenticity of host 'localhost (::1)' can't be established.  
RSA key fingerprint is ae:cf:1c:83:86:af:a8:ed:2d:4b:e5:af:f9:92:1d:e5.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added 'localhost' (RSA) to the list of known hosts.  
root@localhost's password:  
/usr/bin/xauth: creating new authority file /root/.Xauthority
```

**ps:** It is used to list the currently running processes and their PIDs along with some other information depends on different options. It reads the process information from the virtual files in /proc file-system. /proc contains virtual files, this is the reason it's referred as a virtual file system.

```

root@localhost:~#
File Edit View Search Terminal Help
[root@localhost ~]# ps aux
PID TTY      STAT   TIME COMMAND
 2 ?        S      0:00 [kthreadd]
 3 ?        S      0:00 \_ [migration/0]
 4 ?        S      0:00 \_ [ksoftirqd/0]
 5 ?        S      0:00 \_ [watchdog/0]
 6 ?        S      0:00 \_ [events/0]
 7 ?        S      0:00 \_ [cpuset]
 8 ?        S      0:00 \_ [khelper]
 9 ?        S      0:00 \_ [netns]
10 ?       S      0:00 \_ [async/mgr]
11 ?       S      0:00 \_ [pm]
12 ?       S      0:00 \_ [sync_supers]
13 ?       S      0:00 \_ [bdi-default]
14 ?       S      0:00 \_ [kintegrityd/0]
15 ?       S      0:00 \_ [kblockd/0]
16 ?       S      0:00 \_ [kacpid]
17 ?       S      0:00 \_ [kacpi_notify]
18 ?       S      0:00 \_ [kacpi_hotplug]
19 ?       S      0:00 \_ [ata/0]
20 ?       S      0:00 \_ [ata_aux]
21 ?       S      0:00 \_ [ksuspend_usbd]
22 ?       S      0:00 \_ [khubd]
23 ?       S      0:00 \_ [kseriod]

430 ?       S      0:01 \_ [jbd2/sda2-8]
431 ?       S      0:00 \_ [ext4-dio-unwrit]
463 ?       S      0:00 \_ [kauditd]
705 ?       S      0:00 \_ [flush-8:0]
736 ?       S      0:00 \_ [vmmemctl]
917 ?       S      0:00 \_ [jbd2/sda1-8]
918 ?       S      0:00 \_ [ext4-dio-unwrit]
1313 ?      S      0:00 \_ [rpciod/0]
 1 ?       Ss     0:04 /sbin/init
 515 ?      S<s   0:00 /sbin/udevd -d
1801 ?      S<    0:00 \_ /sbin/udevd -d
1802 ?      S<    0:00 \_ /sbin/udevd -d
1147 ?      Sl    0:00 /sbin/rsyslogd -c 4
1195 ?      Ss    0:00 rpcbind
1207 ?      Ss    0:00 mdadm --monitor --scan -f --pid-file=/var/run/mdadm/m
1225 ?      Ssl   0:00 dbus-daemon --system
1236 ?      Ssl   0:00 NetworkManager --pid-file=/var/run/NetworkManager/Net
2454 ?      S      0:00 \_ /sbin/dhclient -d -4 -sf /usr/libexec/nm-dhcp-cl
1241 ?      S      0:00 /usr/sbin/modem-manager
1249 ?      Ss    0:00 /usr/sbin/wpa_supplicant -c /etc/wpa_supplicant/wpa_s
1251 ?      S      0:00 avahi-daemon: registering [linux.local]
1252 ?      Ss    0:00 \_ avahi-daemon: chroot helper
1269 ?      Ss    0:00 rpc.statd
1320 ?      Ss    0:00 rpc.idmapd
1330 ?      Ss    0:00 cupsd -C /etc/cups/cupsd.conf
1355 ?      Ss    0:00 /usr/sbin/acpid
1364 ?      Ss    0:00 hal
1365 ?      S      0:00 \_ hald-runner
1409 ?      S      0:00 \_ hald-addon-input: Listening on /dev/input/eve

```

```

2118 ? S 0:01 /usr/libexec/wnck-applet --oaf-activate-iid=OAFIID:GN
2120 ? S 0:00 /usr/libexec/udisks-daemon
2121 ? S 0:00 \_ udisks-daemon: polling /dev/sr0
2123 ? S 0:00 /usr/libexec/gvfsd-trash --spawner :1.8 /org/gtk/gvfs
2125 ? Sl 0:00 /usr/libexec/gvfs-afc-volume-monitor
2128 ? S 0:00 /usr/libexec/gvfs-gphoto2-volume-monitor
2133 ? S 0:00 /usr/libexec/clock-applet --oaf-activate-iid=OAFIID:G
2136 ? S 0:00 /usr/libexec/gdm-user-switch-applet --oaf-activate-ii
2134 ? S 0:00 /usr/libexec/notification-area-applet --oaf-activate-
2135 ? S 0:00 /usr/bin/gnote --panel-applet --oaf-activate-iid=OAFI
2164 ? S 0:00 /usr/libexec/im-settings-daemon
2178 ? S<sl 0:02 /usr/bin/pulseaudio --start
2196 ? S 0:00 \_ /usr/libexec/pulse/gconf-helper
2225 ? Ss 0:01 gnome-screensaver
2295 ? Ss 0:00 /usr/sbin/restorecond -u
2416 ? S 0:00 /usr/libexec/gconf-im-settings-daemon
2437 ? S 0:00 /usr/libexec/gvfsd-burn --spawner :1.8 /org/gtk/gvfs/
2599 ? S 0:00 /usr/libexec/gvfsd-computer --spawner :1.8 /org/gtk/g
2604 ? S 0:00 /usr/libexec/gvfsd-metadata
2746 ? Sl 0:00 gnome-terminal
2747 ? S 0:00 \_ gnome-pty-helper
2748 pts/0 Ss 0:00 \_ bash
2758 pts/0 S 0:00 \_ bash
2767 pts/0 S+ 0:00 \_ ssh -X localhost

```

**kill:** This command is used to terminate the processes manually.

```
[root@localhost ~]# kill 2758
[root@localhost ~]# kill 2767Killed by signal 15.
```

**dd if=/dev/zero of=/dev/null & :** To create duplicate data(dd) input files(if) of /dev/zero into output files(of) of /dev/null to run in background(&)

```
[root@localhost ~]# dd if=/dev/zero of=/dev/null &
[3] 2295
[root@localhost ~]# dd if=/dev/zero of=/dev/null &
[4] 2297
[root@localhost ~]# dd if=/dev/zero of=/dev/null &
[5] 2298
[root@localhost ~]# dd if=/dev/zero of=/dev/null &
[6] 2299
```

**Top:** This command shows a real-time view of running processes in Linux and displays kernel-managed tasks.

```
root@localhost:~ [root@localhost ~]# top
top - 03:07:54 up 4 min, 2 users, load average: 4.55, 2.29, 0.94
Tasks: 176 total, 6 running, 170 sleeping, 0 stopped, 0 zombie
Cpu(s): 25.9%us, 73.8%sy, 0.0%ni, 0.0%id, 0.0%wa, 0.3%hi, 0.0%si, 0.0%st
Mem: 2047728k total, 536456k used, 1511272k free, 25244k buffers
Swap: 4095992k total, 0k used, 4095992k free, 196168k cached

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
2295 root 20 0 102m 636 532 R 18.8 0.0 0:26.99 dd
2294 root 20 0 102m 632 532 R 18.5 0.0 0:36.01 dd
2297 root 20 0 102m 636 532 R 18.5 0.0 0:26.30 dd
2298 root 20 0 102m 636 532 R 18.5 0.0 0:26.01 dd
2299 root 20 0 102m 636 532 R 18.1 0.0 0:25.87 dd
1647 root 20 0 152m 22m 6456 S 5.2 1.1 0:02.49 Xorg
2277 root 20 0 293m 13m 9512 S 1.3 0.7 0:00.47 gnome-terminal
2303 root 20 0 14940 1236 900 R 0.3 0.1 0:00.18 top
 1 root 20 0 19248 1424 1156 S 0.0 0.1 0:03.80 init
 2 root 20 0 0 0 0 S 0.0 0.0 0:00.01 kthreadd
 3 root RT 0 0 0 0 S 0.0 0.0 0:00.00 migration/0
 4 root 20 0 0 0 0 S 0.0 0.0 0:00.00 ksoftirqd/0
 5 root RT 0 0 0 0 S 0.0 0.0 0:00.00 watchdog/0
 6 root 20 0 0 0 0 S 0.0 0.0 0:00.00 events/0
 7 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuset
 8 root 20 0 0 0 0 S 0.0 0.0 0:00.00 khelper
 9 root 20 0 0 0 0 S 0.0 0.0 0:00.00 netns
10 root 20 0 0 0 0 S 0.0 0.0 0:00.00 async/mgr
11 root 20 0 0 0 0 S 0.0 0.0 0:00.00 pm
12 root 20 0 0 0 0 S 0.0 0.0 0:00.00 sync_supers
```

Press **k** to kill the process which we have created using dd command.

PID to kill: 2294

Kill PID 2294 with signal [15]:

As you can see now the process with PID: 2294 has been terminated.

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
2299	root	20	0	102m	636	532	R	24.3	0.0	1:06.15	dd
2295	root	20	0	102m	636	532	R	23.9	0.0	1:07.27	dd
2298	root	20	0	102m	636	532	R	23.9	0.0	1:06.30	dd
2297	root	20	0	102m	636	532	R	23.6	0.0	1:06.57	dd
1647	root	20	0	152m	22m	6456	S	1.3	1.1	0:02.86	Xorg
2277	root	20	0	293m	13m	9512	S	0.6	0.7	0:00.59	gnome-terminal
2303	root	20	0	14940	1244	908	R	0.3	0.1	0:00.42	top

So we will terminate all the processes which we have created above using command dd.

[2]	Terminated	dd if=/dev/zero of=/dev/null
[4]	Terminated	dd if=/dev/zero of=/dev/null
[5]-	Terminated	dd if=/dev/zero of=/dev/null
[6]+	Terminated	dd if=/dev/zero of=/dev/null

**iv. Mail:**

**su:** Switch user(su) lets you switch the current user to any other user.

**su - :** It lets you to switch the current user into any other user with that user environment.

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

**crontab:** The crontab is a list of commands that you want to run on a regular schedule, and also the name of the command used to manage that list. Crontab stands for “cron table,” because it uses the job scheduler cron to execute tasks; cron itself is named after “chronos,” the Greek word for time. cron is the system process which will automatically perform tasks for you according to a set schedule. The schedule is called the crontab, which is also the name of the program used to edit that schedule.

**crontab -e:** To schedule a process and installing a new crontab.

```
[rjcit@localhost ~]$ crontab -e
no crontab for rjcit - using an empty one
crontab: installing new crontab
```

**Process :** \*/5 \* \* \* \* mail -s “Hello Root this is Rjcit user.” Root <

A screenshot of a terminal window titled "rjcit@localhost:~". The window contains a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". Below the menu is a command line: \*/5 \* \* \* \* mail -s "Hello Root this is Rjcit user." root <. The window has a standard window frame with a close button in the top-left corner.

**mail:** This command is used to show the Cron Daemon.

```
[root@localhost rjcit]# mail
Heirloom Mail version 12.4 7/29/08. Type ? for help.
"/var/spool/mail/rjcit": 4 messages 3 new 4 unread
U 1 Cron Daemon      Tue Jul 19 03:30  23/909  "Cron <rjcit@localhost>"
>N 2 Cron Daemon     Tue Jul 19 03:35  22/899  "Cron <rjcit@localhost>"
N 3 Cron Daemon     Tue Jul 19 03:40  22/899  "Cron <rjcit@localhost>"
N 4 Cron Daemon     Tue Jul 19 03:45  22/899  "Cron <rjcit@localhost>"
& Held 4 messages in /var/spool/mail/rjcit
You have mail in /var/spool/mail/rjcit
```

## Practical 2: Storage devices and links, Backup and Repository

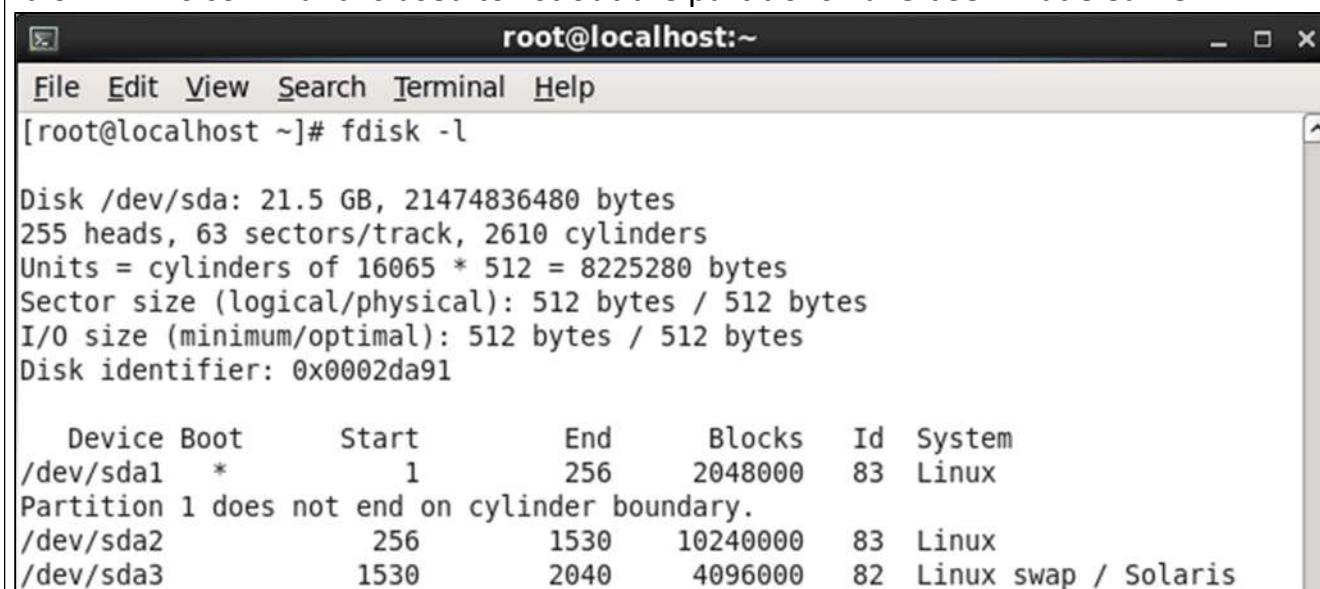
### A] Working with Storage devices and links:

#### i) Working with Storage devices:

##### i. Creating the partition:

**fdisk** : It is also known as format disk is a dialog-driven command in Linux used for creating and manipulating disk partition table. It is used for the view, create, delete, change, resize, copy and move partitions on a hard drive using the dialog-driven interface.

**fdisk -l**: This command is used to list out the partitions have been made earlier.



```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# fdisk -l  
  
Disk /dev/sda: 21.5 GB, 21474836480 bytes  
255 heads, 63 sectors/track, 2610 cylinders  
Units = cylinders of 16065 * 512 = 8225280 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk identifier: 0x0002da91  
  
Device Boot Start End Blocks Id System  
/dev/sda1 * 1 256 2048000 83 Linux  
Partition 1 does not end on cylinder boundary.  
/dev/sda2 256 1530 10240000 83 Linux  
/dev/sda3 1530 2040 4096000 82 Linux swap / Solaris
```

**fdisk /dev/sda**: To create a partition of /dev/sda.

Press m : for help

```

root@localhost:~ 
File Edit View Search Terminal Help
[root@localhost ~]# fdisk /dev/sda

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
switch off the mode (command 'c') and change display units to
sectors (command 'u').

Command (m for help): m
Command action
  a  toggle a bootable flag
  b  edit bsd disklabel
  c  toggle the dos compatibility flag
  d  delete a partition
  l  list known partition types
  m  print this menu
  n  add a new partition
  o  create a new empty DOS partition table
  p  print the partition table
  q  quit without saving changes
  s  create a new empty Sun disklabel
  t  change a partition's system id
  u  change display/entry units
  v  verify the partition table
  w  write table to disk and exit
  x  extra functionality (experts only)

```

## 1) For Primary partition:

a) Press **n**: For adding a new partition then press Enter.

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

b) Press **p**: For primary partition then press Enter.

**Command action**

- e extended
- p primary partition (1-4)

**p**  
Selected partition 4

c) **First cylinder value**: Press Enter (for default value).

d) **Last cylinder value**: +20M

Selected partition 4  
 First cylinder (2040-2610, default 2040):  
 Using default value 2040  
 Last cylinder, +cylinders or +size{K,M,G} (2040-2610, default 2610): +20M

e) Press **w**: To write the table to disk and exit.

**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.

**partx**: It tries to parse the partition table and list its contents. It optionally adds or removes partitions.

**partx -a:** Add the specified partitions, or read the disk and add all partitions.

```
[root@localhost ~]# partx -a /dev/sda
BLKPG: Device or resource busy
error adding partition 1
BLKPG: Device or resource busy
error adding partition 2
BLKPG: Device or resource busy
error adding partition 3
BLKPG: Device or resource busy
error adding partition 4
```

**partx -l:** List the partitions.

```
[root@localhost ~]# partx -l /dev/sda
# 1:      2048- 4098047 ( 4096000 sectors,  2097 MB)
# 2:  4098048- 24578047 ( 20480000 sectors, 10485 MB)
# 3: 24578048- 32770047 ( 8192000 sectors,  4194 MB)
# 4: 32770048- 32820794 (    50747 sectors,     25 MB)
```

**Now Checking the new partition made with the help fdisk -l command.**

Device	Boot	Start	End	Blocks	Id	System
/dev/sdal	*	1	256	2048000	83	Linux
Partition 1 does not end on cylinder boundary.						
/dev/sda2		256	1530	10240000	83	Linux
/dev/sda3		1530	2040	4096000	82	Linux swap / Solaris
/dev/sda4		2040	2043	25373+	83	Linux

**mkfs.ext4:** This command can create an ext4 file system from disk partitions.

```
root@localhost:~
```

File Edit View Search Terminal Help

```
[root@localhost ~]# mkfs.ext4 /dev/sda4
mke2fs 1.41.12 (17-May-2010)
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
Stride=0 blocks, Stripe width=0 blocks
6368 inodes, 25372 blocks
1268 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=26214400
4 block groups
8192 blocks per group, 8192 fragments per group
1592 inodes per group
Superblock backups stored on blocks:
    8193, 24577

Writing inode tables: done
Creating journal (1024 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 33 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

**mkdir /file1:** To make an file1 directory in home directory.

```
[root@localhost /]# mkdir /file1
```

**cd /:** change the directory to root.

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

**ls /:** to list out the files and directories of root.

```
[root@localhost /]# ls /
bin  cgroup  etc  home  lib64  media  mnt  opt  root  selinux  sys  tmp  var
boot  dev  file1  lib  lost+found  misc  net  proc  sbin  srv  tempdir  usr
```

**/etc/fstab:** It is a **system configuration file** that contains all available disks, disk partitions and their options. Each file system is described on a separate line. Each line contains six fields separated by one or more spaces or tabs. If you add a new hard disk or have to repartition the existing one, you'll probably need to modify this file.

The /etc/fstab file is used by the **mount** command, which reads the file to determine which options should be used when **mounting** the specified device.

**vim:** It is an advanced and highly configurable text editor built to enable efficient text editing. Vim text editor is developed by Bram Moolenaar. It supports most file types and vim editor is also known as a programmer's editor. We can use its plugin based on our needs.

```
[root@localhost /]# vim /etc/fstab
```

This type of Window will be open.

```
# /etc/fstab
# Created by anaconda on Sun Jul  3 19:59:25 2022
#
# Accessible filesystems, by reference, are maintained under '/dev/disk'
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
#
UUID=b2192fb5-78e2-4132-93a9-c71c6189698a  /          ext4    defaults      1  1
UUID=93f1c77c-b34c-44c7-b239-3850fa4ffea8  /boot      ext4    defaults      1  2
UUID=3ec7b3c1-3f36-40c5-b679-ef665f8d84a3  swap      swap    defaults      0  0
tmpfs           /dev/shm      tmpfs   defaults      0  0
devpts          /dev/pts      devpts  gid=5,mode=620  0  0
sysfs           /sys         sysfs   defaults      0  0
proc            /proc        proc    defaults      0  0
```

**Press i:** To Enter some content into it.

Now, Add a line below the last line: /dev/sda4      /file1      ext4    defaults    0 0

**Press ‘Esc’ button and type “:wq!” : To save and exit the window.**

**mount:** This command is used to mount the filesystem found on a device to big tree structure (Linux filesystem) rooted at '/'.

**mount -a:** To mount all the devices described at /etc/fstab.

```
[root@localhost /]# mount -a
```

**df:** This command is used to show the amount of free disk space on each mounted disk.

```
[root@localhost /]# df
Filesystem      1K-blocks    Used Available Use% Mounted on
/dev/sda2        10079084  3497496   6069588  37% /
tmpfs            1023864       264   1023600   1% /dev/shm
/dev/sdal        2015824     55880   1857544   3% /boot
/dev/sr0          3351190    3351190        0 100% /media/RHEL_6.0_x86_64 Disc 1
/dev/sda4         24561      1335     21958   6% /file1
```

**df -hT**: This command is used to show the file system in the human-readable format and will also print the file system type.

```
[root@localhost /]# df -hT
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 9.7G 3.4G 5.8G 37% /
tmpfs tmpfs 1000M 264K 1000M 1% /dev/shm
/dev/sda1 ext4 2.0G 55M 1.8G 3% /boot
/dev/sr0 iso9660 3.2G 3.2G 0 100% /media/RHEL_6.0_x86_64 Disc 1
/dev/sda4 ext4 24M 1.4M 22M 6% /file1
```

## Now, Remove the partition:

**umount:** This command **unmounts** a previously mounted device, directory, file, or file system.

```
[root@localhost /]# umount /dev/sda4
```

**vim /etc/fstab:** Remove the line which we have added before.

```
# 
# /etc/fstab
# Created by anaconda on Sun Jul  3 19:59:25 2022
#
# Accessible filesystems, by reference, are maintained under '/dev/disk'
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
#
UUID=b2192fb5-78e2-4132-93a9-c71c6189698a / ext4 defaults 1 1
UUID=93f1c77c-b34c-44c7-b239-3850fa4ffea8 /boot ext4 defaults 1 2
UUID=3ec7b3c1-3f36-40c5-b679-ef665f8d84a3 swap swap defaults 0 0
tmpfs /dev/shm tmpfs defaults 0 0
devpts /dev/pts devpts gid=5,mode=620 0 0
sysfs /sys sysfs defaults 0 0
proc /proc proc defaults 0 0
/dev/sda4 /file1 ext4 defaults 0 0
```

After removing the line save and exit from vim /etc/fstab.

```
# 
# /etc/fstab
# Created by anaconda on Sun Jul  3 19:59:25 2022
#
# Accessible filesystems, by reference, are maintained under '/dev/disk'
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
#
UUID=b2192fb5-78e2-4132-93a9-c71c6189698a / ext4 defaults 1 1
UUID=93f1c77c-b34c-44c7-b239-3850fa4ffea8 /boot ext4 defaults 1 2
UUID=3ec7b3c1-3f36-40c5-b679-ef665f8d84a3 swap swap defaults 0 0
tmpfs /dev/shm tmpfs defaults 0 0
devpts /dev/pts devpts gid=5,mode=620 0 0
sysfs /sys sysfs defaults 0 0
proc /proc proc defaults 0 0
```

**rmdir:** This command is used remove empty directories from the filesystem in Linux. The **rmdir** command removes each and every directory specified in the command line only if these directories are empty. So if the specified directory has some directories or files in it then this cannot be removed by **rmdir** command.

**rmdir /file1:** Remove the directory named “/file1” which has been created earlier.

```
[root@localhost /]# rmdir /file1
```

**Now, Remove the partition “/dev/sda4” by command fdisk /dev/sda**

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

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to switch off the mode (command 'c') and change display units to sectors (command 'u').

Command (m for help): m

Command action

a	toggle a bootable flag
b	edit bsd disklabel
c	toggle the dos compatibility flag
d	delete a partition
l	list known partition types
m	print this menu
n	add a new partition
o	create a new empty DOS partition table
p	print the partition table
q	quit without saving changes
s	create a new empty Sun disklabel
t	change a partition's system id
u	change display/entry units
v	verify the partition table
w	write table to disk and exit
x	extra functionality (experts only)

1) Press **d**: To delete a partition.

2) Give the **partition number**: 4 and press Enter.

3) Press **w**: To save and exit from disk partition.

```
Command (m for help): d
Partition number (1-4): 4
```

```
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.

**Checking the deletion of partition by command fdisk /dev/sda:**

```

root@localhost:/# fdisk /dev/sda
WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
switch off the mode (command 'c') and change display units to
sectors (command 'u').

Command (m for help): m
Command action
  a  toggle a bootable flag
  b  edit bsd disklabel
  c  toggle the dos compatibility flag
  d  delete a partition
  l  list known partition types
  m  print this menu
  n  add a new partition
  o  create a new empty DOS partition table
  p  print the partition table
  q  quit without saving changes
  s  create a new empty Sun disklabel
  t  change a partition's system id
  u  change display/entry units
  v  verify the partition table
  w  write table to disk and exit
  x  extra functionality (experts only)

Command (m for help): d
Partition number (1-4): 4

Command (m for help): w

```

```

root@localhost:/# 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.

```

### Also checking the partition by partx command:

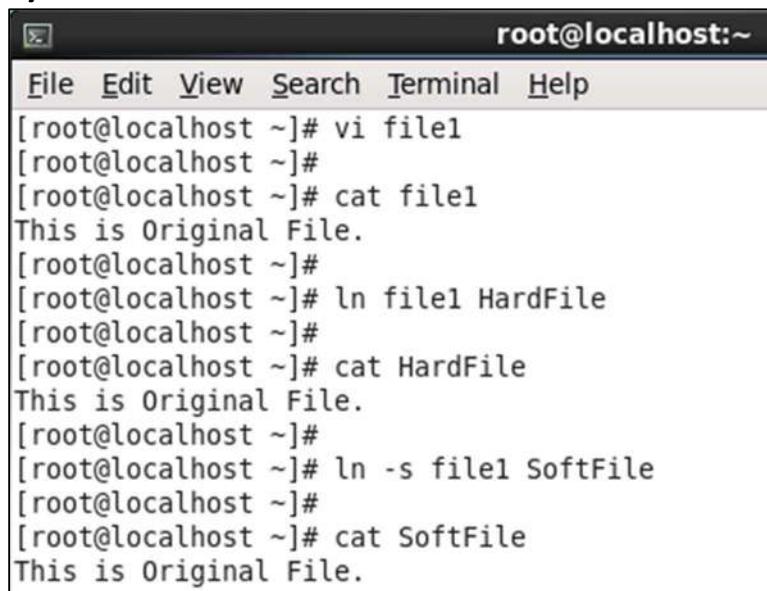
```

[root@localhost /]# partx -a /dev/sda
BLKPG: Device or resource busy
error adding partition 1
BLKPG: Device or resource busy
error adding partition 2
BLKPG: Device or resource busy
error adding partition 3

```

### Checking the disk space that was occupied by /dev/sda4 is free or not by command df -h

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda2	9.7G	3.4G	5.8G	37%	/
tmpfs	996M	264K	996M	1%	/dev/shm
/dev/sda1	2.0G	55M	1.8G	3%	/boot
/dev/sr0	3.2G	3.2G	0	100%	/media/RHEL_6.0_x86_64 Disc 1

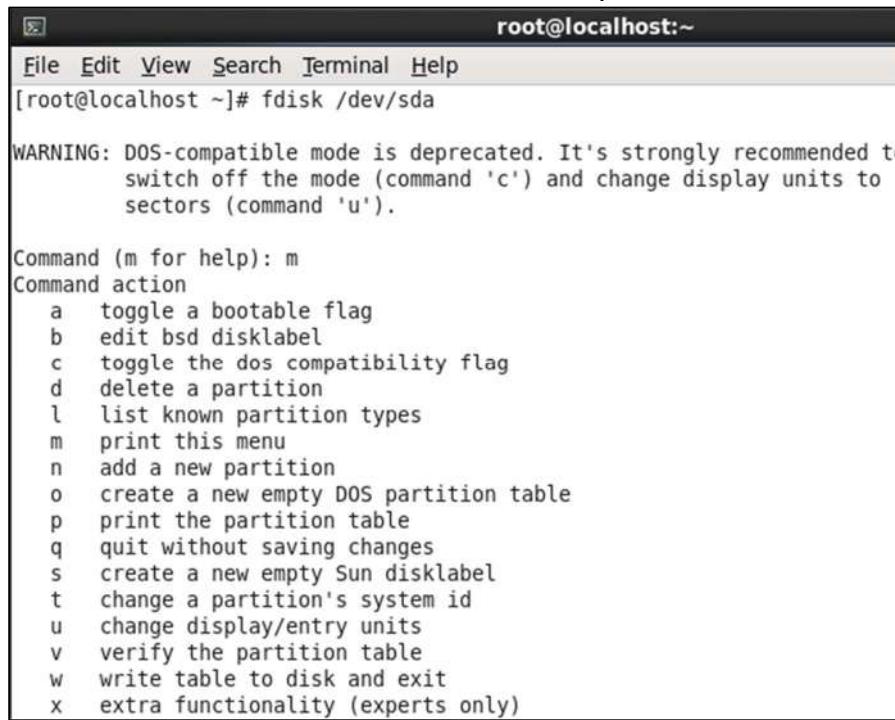
**ii) Links:**


```
root@localhost:~#
File Edit View Search Terminal Help
[root@localhost ~]# vi file1
[root@localhost ~]#
[root@localhost ~]# cat file1
This is Original File.
[root@localhost ~]#
[root@localhost ~]# ln file1 HardFile
[root@localhost ~]#
[root@localhost ~]# cat HardFile
This is Original File.
[root@localhost ~]#
[root@localhost ~]# ln -s file1 SoftFile
[root@localhost ~]#
[root@localhost ~]# cat SoftFile
This is Original File.
```

**iii) LVM Partition:**

**Create one physical volume /dev/sda5 and one volume group tybscit-A then create one logical volume user1 and finally mount this volume to directory /user1.**

First, We need to create one extended partition.

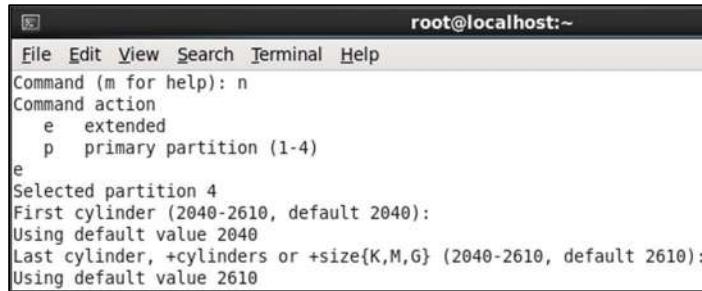


```
root@localhost:~#
File Edit View Search Terminal Help
[root@localhost ~]# fdisk /dev/sda

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
         switch off the mode (command 'c') and change display units to
         sectors (command 'u').

Command (m for help): m
Command action
 a toggle a bootable flag
 b edit bsd disklabel
 c toggle the dos compatibility flag
 d delete a partition
 l list known partition types
 m print this menu
 n add a new partition
 o create a new empty DOS partition table
 p print the partition table
 q quit without saving changes
 s create a new empty Sun disklabel
 t change a partition's system id
 u change display/entry units
 v verify the partition table
 w write table to disk and exit
 x extra functionality (experts only)
```

**1) Press n and press enter: To create a new partition.**



```
root@localhost:~#
File Edit View Search Terminal Help
Command (m for help): n
Command action
 e extended
 p primary partition (1-4)
e
Selected partition 4
First cylinder (2040-2610, default 2040):
Using default value 2040
Last cylinder, +cyinders or +size{K,M,G} (2040-2610, default 2610):
Using default value 2610
```

**2) Press p and press enter:** To print the partition table.

```
root@localhost:~
```

File Edit View Search Terminal Help

Command (m for help): p

Disk /dev/sda: 21.5 GB, 21474836480 bytes  
 255 heads, 63 sectors/track, 2610 cylinders  
 Units = cylinders of 16065 \* 512 = 8225280 bytes  
 Sector size (logical/physical): 512 bytes / 512 bytes  
 I/O size (minimum/optimal): 512 bytes / 512 bytes  
 Disk identifier: 0x0002da91

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	1	256	2048000	83	Linux
Partition 1 does not end on cylinder boundary.						
/dev/sda2		256	1530	10240000	83	Linux
/dev/sda3		1530	2040	4096000	82	Linux swap / Solaris
/dev/sda4		2040	2610	4579801	5	Extended

**3) As we will press n and press enter, we could not make any other partition greater 4.**

```
root@localhost:~
```

File Edit View Search Terminal Help

Command (m for help): n

First cylinder (2040-2610, default 2040):

Using default value 2040

Last cylinder, +cylinders or +size{K,M,G} (2040-2610, default 2610):

Using default value 2610

**4) Press t and press enter: To change the partition's system id.**

```
root@localhost:~
```

File Edit View Search Terminal Help

Command (m for help): t

Partition number (1-5): 5

Hex code (type L to list codes): 8e

Changed system type of partition 5 to 8e (Linux LVM)

Command (m for help): p

Disk /dev/sda: 21.5 GB, 21474836480 bytes  
 255 heads, 63 sectors/track, 2610 cylinders  
 Units = cylinders of 16065 \* 512 = 8225280 bytes  
 Sector size (logical/physical): 512 bytes / 512 bytes  
 I/O size (minimum/optimal): 512 bytes / 512 bytes  
 Disk identifier: 0x0002da91

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	1	256	2048000	83	Linux
Partition 1 does not end on cylinder boundary.						
/dev/sda2		256	1530	10240000	83	Linux
/dev/sda3		1530	2040	4096000	82	Linux swap / Solaris
/dev/sda4		2040	2610	4579801	5	Extended
/dev/sda5		2040	2610	4579769+	8e	Linux LVM

**5) Press w and press enter:** To save and exit from fdisk command.

```
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.
```

**i) Physical volume:** It is any physical storage device, such as a Hard Disk Drive ( HDD ), Solid State Drive ( SSD ), or partition, that has been initialized as a physical volume with LVM.

**Create a physical volume (pvcreate):** This initializes a Physical Volume (PV) on a device so the device is recognized as belonging to LVM. This allows the PV to be used in a Volume Group (VG).

**pvcreate /dev/sda5:** creates a physical volume

```
[root@localhost ~]# pvcreate /dev/sda5
Physical volume "/dev/sda5" successfully created
```

**pvs:** It provides physical volume information in a configurable form, displaying one line per physical volume.

```
[root@localhost ~]# pvs
PV          VG   Fmt Attr PSize PFree
/dev/sda5      lvm2 a-  4.37g 4.37g
```

**ii) Volume group:** To create a volume group from one or more physical volumes, use the vgcreate command. The vgcreate command creates a new volume group by name and adds at least one physical volume to it.

**vgcreate tybscit-A /dev/sda5:** This command creates a new volume group by name and adds at least one physical volume to it.

```
[root@localhost ~]# vgcreate tybscit-A /dev/sda5
Volume group "tybscit-A" successfully created
```

**vgs:** It provides volume group information in a configurable form, displaying one line per volume group.

```
[root@localhost ~]# vgs
VG          #PV #LV #SN Attr   VSize VFree
tybscit-A    1   0   0 wz--n- 4.36g 4.36g
```

**iii) Logical volume:** The logical volume is carved from a volume group using the free extents on the physical volumes that make up the volume group. Normally logical volumes use up any space available on the underlying physical volumes on a next-free basis. Modifying the logical volume frees and reallocates space in the physical volumes.

**lvcreate -n user1 -L +2GB tybscit-A:** This command is used to create logical volume. If you do not specify a name for the logical volume, the default name “lvol#” is used where # is the internal number of the logical volume.

```
[root@localhost ~]# lvcreate -n user1 -L +2GB tybscit-A
Logical volume "user1" created
```

**lvs:** It provides logical volume information in a configurable form, displaying one line per logical volume.

```
[root@localhost ~]# lvs
  LV      VG      Attr  LSize Origin Snap%  Move Log Copy%  Convert
  user1  tybscit-A -wi-a- 2.00g
```

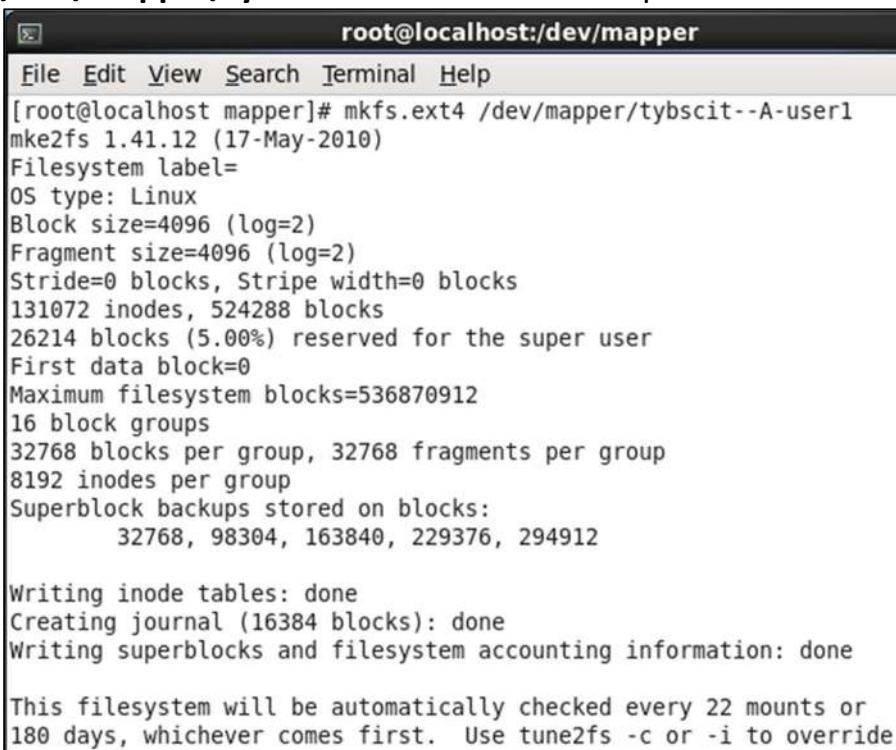
**/dev/mapper:** It is a framework provided by the Linux kernel for mapping physical block devices onto higher-level virtual block devices. It forms the foundation of the logical volume manager (LVM), software RAIDs and dm-crypt disk encryption, and offers additional features such as file system snapshots.

**cd /dev/mapper:** Changes directory to /dev/mapper.

```
[root@localhost ~]# cd /dev/mapper
[root@localhost mapper]# ls
control  tybscit--A-user1
```

**mkfs:** makes a new file system on a specified device.

**mkfs.ext4 /dev/mapper/tybscit--A-user1:** It will create an ext4 file system on /dev/mapper/tybscit--A-user1 from disk partitions.



The screenshot shows a terminal window titled "root@localhost:/dev/mapper". The window contains the following text output of the mkfs command:

```
File Edit View Search Terminal Help
[root@localhost mapper]# mkfs.ext4 /dev/mapper/tybscit--A-user1
mke2fs 1.41.12 (17-May-2010)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
131072 inodes, 524288 blocks
26214 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=536870912
16 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912

Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 22 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

**mkdir /user1:** It will make a /user1 directory.

```
[root@localhost mapper]# mkdir /user1
```

**mount /dev/mapper/tybscit--A-user1 /user1:** It will mount the /dev/mapper/tybscit--A-user1 on /user1.

**df -h:** It is an inbuilt utility that will find the available and disk usage space on Linux servers/storage.

```
[root@localhost mapper]# mount /dev/mapper/tybscit--A-user1 /user1
[root@localhost mapper]#
[root@localhost mapper]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda2        9.7G  3.4G  5.8G  37% /
tmpfs           1000M 264K 1000M   1% /dev/shm
/dev/sda1        2.0G  55M  1.8G   3% /boot
/dev/sr0         3.2G  3.2G    0 100% /media/RHEL_6.0_x86_64 Disc 1
/dev/mapper/tybscit--A-user1
                  2.0G  67M  1.9G   4% /user1
```

Now, we will unmount the device and remove the partitions we have made earlier.

**umount /dev/mapper//tybscit--A-user1:** It will unmount the previously mounted device.

```
[root@localhost mapper]# umount /dev/mapper//tybscit--A-user1
```

**lvremove:** It is used to delete the logical volume.

**lvremove /dev/mapper/tybscit--A-user1:** To remove the logical volume “/dev/mapper/tybscit--A-user1”.

```
[root@localhost mapper]# lvremove /dev/mapper/tybscit--A-user1
Do you really want to remove active logical volume user1? [y/n]: y
Logical volume "user1" successfully removed
```

**vgremove:** It is used to delete the volume group.

**vgremove tybscit-A:** To remove the volume group “tybscit-A”.

```
[root@localhost mapper]# vgremove tybscit-A
Volume group "tybscit-A" successfully removed
```

**pvremove:** It is used to delete the physical volume.

**vgremove tybscit-A:** To remove the physical volume “/dev/sda5”.

```
[root@localhost mapper]# pvremove /dev/sda5
Labels on physical volume "/dev/sda5" successfully wiped
```

**df -h:** It is an inbuilt utility that will find the available and disk usage space on Linux servers/storage.

```
[root@localhost mapper]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda2        9.7G  3.4G  5.8G  37% /
tmpfs           1000M 264K 1000M   1% /dev/shm
/dev/sda1        2.0G  55M  1.8G   3% /boot
/dev/sr0         3.2G  3.2G    0 100% /media/RHEL_6.0_x86_64 Disc 1
```

**C] Creating a Repository:**

**cd /media:** Change the directory to /media to install some packages to create a repository.

```
[root@localhost mapper]# cd /media
```

**ls:** To list out the files and directories in that current directory.

```
[root@localhost media]# ls
RHEL_6.0 x86_64 Disc 1
```

**cd RHEL\_6.0\ x86\_64\ Disc\ 1/:** To change the directory to “RHEL\_6.0\ x86\_64\ Disc\ 1/”.

```
[root@localhost media]# cd RHEL_6.0\ x86_64\ Disc\ 1/
[root@localhost RHEL_6.0 x86_64 Disc 1]#
[root@localhost RHEL_6.0 x86_64 Disc 1]# ls
EFI                               RELEASE-NOTES-es-ES.html    RELEASE-NOTES-si-LK.html
EULA                             RELEASE-NOTES-fr-FR.html    RELEASE-NOTES-ta-IN.html
GPL                                RELEASE-NOTES-gu-IN.html    RELEASE-NOTES-te-IN.html
HighAvailability                  RELEASE-NOTES-hi-IN.html    RELEASE-NOTES-zh-CN.html
images                            RELEASE-NOTES-it-IT.html    RELEASE-NOTES-zh-TW.html
isolinux                         RELEASE-NOTES-ja-JP.html    repodata
LoadBalancer                      RELEASE-NOTES-kn-IN.html    ResilientStorage
media.repo                        RELEASE-NOTES-ko-KR.html    RPM-GPG-KEY-redhat-beta
Packages                          RELEASE-NOTES-ml-IN.html    RPM-GPG-KEY-redhat-release
README                            RELEASE-NOTES-mr-IN.html    ScalableFileSystem
RELEASE-NOTES-as-IN.html          RELEASE-NOTES-or-IN.html    Server
RELEASE-NOTES-bn-IN.html          RELEASE-NOTES-pa-IN.html    TRANS.TBL
RELEASE-NOTES-de-DE.html          RELEASE-NOTES-pt-BR.html
RELEASE-NOTES-en-US.html          RELEASE-NOTES-ru-RU.html
```

**cd /:** Change the directory to root to make a new directory.

```
[root@localhost RHEL_6.0 x86_64 Disc 1]# cd /
```

**mkdir /RHEL6:** Making a new directory named “/RHEL6”.

```
[root@localhost /]# mkdir /RHEL6
```

**ls:** to list out the files and directory of the root.

```
[root@localhost /]# ls
bin      dev     lib       media   net     RHEL6   selinux  tempdir  usr
boot    etc     lib64     misc    opt     root   srv      tmp     var
cgroup  home   lost+found mnt    proc   sbin   sys     user1
```

**cd /RHEL6:** Change the directory to “/RHEL6”.

```
[root@localhost /]# cd /RHEL6
```

**cp -vr /media/rhel\_6.0\ x86\_64\ Disc\ 1/\* /RHEL6/:** Copy the all the files of "/media/rhel\_6.0\ x86\_64\ Disc\ 1/" to "/RHEL6"

```
root@localhost:/RHEL6
File Edit View Search Terminal Help
/media/RHEL_6.0 x86_64 Disc 1/Server/repo/584d7599e3345b7b4967a0d0e8ea575d7fca13a0b94aa8eb79718285270b4bf0-filelists.sqlite.bz2' -> `/RHEL6/Server/repo/584d7599e3345b7b4967a0d0e8ea575d7fca13a0b94aa8eb79718285270b4bf0-filelists.sqlite.bz2'
`/media/RHEL_6.0 x86_64 Disc 1/Server/repo/7e94eeabef95726e82318ff8b73520540d2747feb3c0425130fcfad560340c1-primary.sqlite.bz2' -> `/RHEL6/Server/repo/7e94eeabef95726e82318ff8b73520540d2747feb3c0425130fcfad560340c1-primary.sqlite.bz2'
`/media/RHEL_6.0 x86_64 Disc 1/Server/repo/96d51def1716f261fc4eac5a7d33a90ba4797cd7b392b699f69688492fa908c3-other.sqlite.bz2' -> `/RHEL6/Server/repo/96d51def1716f261fc4eac5a7d33a90ba4797cd7b392b699f69688492fa908c3-other.sqlite.bz2'
`/media/RHEL_6.0 x86_64 Disc 1/Server/repo/9fdbd7e178fda12876d517949e0bd9b7bc020660d5b8acfcc70a0a4bdc20c53f-primary.xml.gz' -> `/RHEL6/Server/repo/9fdbd7e178fda12876d517949e0bd9b7bc020660d5b8acfcc70a0a4bdc20c53f-primary.xml.gz'
`/media/RHEL_6.0 x86_64 Disc 1/Server/repo/TRANS.TBL' -> `/RHEL6/Server/repo/TRANS.TBL'
`/media/RHEL_6.0 x86_64 Disc 1/Server/repo/eac9e33f7bd10af0eb5e07d5c3eb1a05f978b158049e6197b5adb84dal1a6f6d4-other.xml.gz' -> `/RHEL6/Server/repo/eac9e33f7bd10af0eb5e07d5c3eb1a05f978b158049e6197b5adb84dal1a6f6d4-other.xml.gz'
`/media/RHEL_6.0 x86_64 Disc 1/Server/repo/repomd.xml' -> `/RHEL6/Server/repo/repomd.xml'
`/media/RHEL_6.0 x86_64 Disc 1/TRANS.TBL' -> `/RHEL6/TRANS.TBL'
```

**cd RHEL\_6.0\ x86\_64\ Disc\ 1/:** To change the directory to "RHEL\_6.0\ x86\_64\ Disc\ 1/".

```
[root@localhost RHEL6]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
```

**rpm:** It is a command-line utility for managing packages on Unix/Linux systems. It allows you to install, query, update, verify and remove RPM packages. It is the default package manager for Red Hat based systems and only works with the .rpm format.

**rpm -ivh createrepo-0.9.8-4.el6.noarch.rpm:** -ivh is used to install the package with printing 50 hash marks as a package archive is unpacked with verbose for nicer display.

It will not a create a repo as the following dependencies are not installed which is necessary to create a repo.

**So we will, install that dependencies also:**

**rpm -ivh deltarpm-3.5-0.5.20090913git.el6.x86\_64.rpm:** To install the deltarpm dependency.

```
[root@localhost Packages]# rpm -ivh deltarpm-3.5-0.5.20090913git.el6.x86_64.rpm
warning: deltarpm-3.5-0.5.20090913git.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID fd431d51: NOKEY
Preparing...                                           #####[100%]
1:deltarpm                                         #####[100%]
```

**rpm -ivh python-deltarpm-3.5-0.5.20090913git.el6.x86\_64.rpm:** To install the python-deltarpm dependency.

```
[root@localhost Packages]# rpm -ivh python-deltarpm-3.5-0.5.20090913git.el6.x86_64.rpm
warning: python-deltarpm-3.5-0.5.20090913git.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID fd431d51: NOKEY
Preparing...                                           #####[100%]
1:python-deltarpm                                 #####[100%]
```

Now, we will run the command “`rpm -ivh createrepo-0.9.8-4.el6.noarch.rpm`” to create a repository.

```
[root@localhost Packages]# rpm -ivh createrepo-0.9.8-4.el6.noarch.rpm
warning: createrepo-0.9.8-4.el6.noarch.rpm: Header V3 RSA/SHA256 Signature, key
ID fd431d51: NOKEY
Preparing... ################################################ [100%]
 1:createrepo ################################################ [100%]
```

Now checking, if the packages are installed or not by simply running the rpm installation command:

```
[root@localhost Packages]# rpm -ivh createrepo-0.9.8-4.el6.noarch.rpm
warning: createrepo-0.9.8-4.el6.noarch.rpm: Header V3 RSA/SHA256 Signature, key
ID fd431d51: NOKEY
Preparing... ################################################ [100%]
  package createrepo-0.9.8-4.el6.noarch is already installed
[root@localhost Packages]#
[root@localhost Packages]# rpm -ivh deltarpm-3.5-0.5.20090913git.el6.x86_64.rpm
warning: deltarpm-3.5-0.5.20090913git.el6.x86_64.rpm: Header V3 RSA/SHA256 Signa
ture, key ID fd431d51: NOKEY
Preparing... ################################################ [100%]
  package deltarpm-3.5-0.5.20090913git.el6.x86_64 is already installed
```

**createrepo:** It is a program that creates a repomd (xml-based rpm metadata) repository from a set of rpms.

**createrepo /myrepo:** This will create a repository in “/myrepo” directory.

```
[root@localhost Packages]# createrepo /myrepo
Directory /myrepo must exist
```

Since, there is no directory name “/myrepo”, so we will create it in another directory

**cd /etc/yum/pluginconf.d/:** To change its directory from “Packages” to “/etc/yum/pluginconf.d/”.

```
[root@localhost Packages]# cd /etc/yum/pluginconf.d/
[root@localhost pluginconf.d]#
```

**createrepo --database /RHEL6/Packages:** This creates the necessary metadata for your yum repository, as well as the **sqlite** database for speeding up yum operations in the directory **/RHEL6/Packages**.

```
[root@localhost pluginconf.d]# createrepo --database /RHEL6/Packages/
1417/3431 - mvapich-common-1.2.0-0.3562.5.el6.noarch.rpm
iso-8859-1 encoding on Ville Skyttä <ville.skytta@iki.fi> - 2.8.2-2

3431/3431 - netpbm-10.47.05-11.el6.x86_64.rpm
Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete
[root@localhost pluginconf.d]#
```

**cd /etc/yum.repos.d:** Changing directory to “/etc/yum.repos.d”.

```
[root@localhost pluginconf.d]# cd /etc/yum.repos.d
[root@localhost yum.repos.d]#
```

**vi rhel.repo:** opening an vi editor.

```
[root@localhost yum.repos.d]# vi rhel.repo
```

```
root@localhost:/etc/yum.repos.d
File Edit View Search Terminal Help
[rhel]
name=rhel6
baseurl=file:///RHEL6/Packages

:wq!
```

## Yum:

**yum repolist:** Lists all enabled repositories.

```
[root@localhost yum.repos.d]# yum repolist
Loaded plugins: refresh-packagekit, rhnplugin
This system is not registered with RHN.
RHN support will be disabled.
rhel
rhel/primary_db
repo id          repo name      status
rhel              rhel6          3,431
repolist: 3,431
```

**nmap:** The nmap command line utility is used for port scanning and finding out all the ways a computer communicates with other computers on a network.

**yum search nmap:** It will search the nmap.

```
[root@localhost yum.repos.d]# yum search nmap
Loaded plugins: refresh-packagekit, rhnplugin
This system is not registered with RHN.
RHN support will be disabled.
=====
Matched: nmap =====
nmap.x86_64 : Network exploration tool and security scanner
```

**yum install dhcp:** It will install the dhcp package and will also install it.

```
[root@localhost yum.repos.d]# yum install dhcp
Loaded plugins: refresh-packagekit, rhnplugin
This system is not registered with RHN.
RHN support will be disabled.
Setting up Install Process
Resolving Dependencies
--> Running transaction check
--> Package dhcp.x86_64 12:4.1.1-12.P1.el6 set to be updated
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package      Arch      Version      Repository      Size
=====
Installing:
  dhcp        x86_64    12:4.1.1-12.P1.el6    rhel           820 k

Transaction Summary
=====
Install       1 Package(s)
Upgrade       0 Package(s)

Total download size: 820 k
Installed size: 2.0 M
Is this ok [y/N]: y
Downloading Packages:
warning: rpmts_HdrFromFdno: Header V3 RSA/SHA256 Signature, key ID fd431d51: NOKEY
Public key for dhcp-4.1.1-12.P1.el6.x86_64.rpm is not installed
```

### Practical 3: Working with RPM Storage and Networking:

#### a) Using Query Options (-q):

**cd RHEL\_6.0\ x86\_64\ Disc\ 1/Packages:** To change the directory to “RHEL\_6.0\ x86\_64\ Disc\ 1/Packages”.

```
[root@localhost ~]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
[root@localhost Packages]#
```

Now, Install a rpm package:

**rpm -ivh vlock-1.3-31.el6.x86\_64.rpm:** To install a package name “vlock-1.3-31.el6.x86\_64.rpm”.

```
[root@localhost Packages]# rpm -ivh vlock-1.3-31.el6.x86_64.rpm
warning: vlock-1.3-31.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID fd4
31d51: NOKEY
Preparing... ################################################ [100%]
1:vlock ################################################ [100%]
```

**rpm -qR vlock:** To check the dependencies of installed RPM Package “vlock”.

```
[root@localhost Packages]# rpm -qR vlock
/etc/pam.d/system-auth
config(vlock) = 1.3-31.el6
libc.so.6()(64bit)
libc.so.6(GLIBC_2.2.5)(64bit)
libc.so.6(GLIBC_2.3.4)(64bit)
libdl.so.2()(64bit)
libpam.so.0()(64bit)
libpam.so.0(LIBPAM 1.0)(64bit)
libpam_misc.so.0()(64bit)
libpam_misc.so.0(LIBPAM_MISC_1.0)(64bit)
pam >= 0.59
rpmlib(CompressedFileNames) <= 3.0.4-1
rpmlib(FileDigests) <= 4.6.0-1
rpmlib(PayloadFilesHavePrefix) <= 4.0-1
rtld(GNU_HASH)
rpmlib(PayloadIsXz) <= 5.2-1
```

**rpm -qpR createrepo-0.9.8-4.el6.noarch.rpm:** To check dependencies of RPM Package “createrepo-0.9.8-4.el6.noarch.rpm” before Installing.

```
[root@localhost Packages]# rpm -qpR createrepo-0.9.8-4.el6.noarch.rpm
warning: createrepo-0.9.8-4.el6.noarch.rpm: Header V3 RSA/SHA256 Signature, key
ID fd431d51: NOKEY
/bin/sh
/usr/bin/env
/usr/bin/python
deltarpm
libxml2-python
python >= 2.1
python(abi) = 2.6
python-deltarpm
rpm >= 4.1.1
rpm-python
rpmlib(CompressedFileNames) <= 3.0.4-1
rpmlib(FileDigests) <= 4.6.0-1
rpmlib(PartialHardlinkSets) <= 4.0.4-1
rpmlib(PayloadFilesHavePrefix) <= 4.0-1
yum >= 3.2.23-10
yum-metadata-parser
rpmlib(PayloadIsXz) <= 5.2-1
```

**rpm -ivh --nodeps createrepo-0.9.8-4.el6.noarch.rpm:** To Install a RPM Package “**createrepo-0.9.8-4.el6.noarch.rpm**” Without dependencies.

```
[root@localhost Packages]# rpm -ivh --nodeps createrepo-0.9.8-4.el6.noarch.rpm
warning: createrepo-0.9.8-4.el6.noarch.rpm: Header V3 RSA/SHA256 Signature, key
ID fd431d51: NOKEY
Preparing... ################################################ [100%]
package createrepo-0.9.8-4.el6.noarch is already installed
```

**rpm -q vlock:** To check an Installed RPM Package name “**vlock**”.

```
[root@localhost Packages]# rpm -q vlock
vlock-1.3-31.el6.x86_64
```

**rpm -ql vlock:** To List all files of an installed RPM package “**vlock**”.

```
[root@localhost Packages]# rpm -ql vlock
/etc/pam.d/vlock
/usr/bin/vlock
/usr/share/doc/vlock-1.3
/usr/share/doc/vlock-1.3/COPYING
/usr/share/doc/vlock-1.3/README
/usr/share/man/man1/vlock.1.gz
```

**rpm -qa:** To List All Installed RPM Packages..

```
[root@localhost Packages]# rpm -qa
redhat-lsb-printing-4.0-2.1.el6.x86_64
perl-Test-Harness-3.17-115.el6.x86_64
java_cup-0.10k-5.el6.x86_64
libgfortran-4.4.4-13.el6.x86_64
kdepim-runtime-4.3.4-4.el6.x86_64
iwl1000-firmware-128.50.3.1-1.1.el6.noarch
perl-Module-Load-0.16-115.el6.x86_64
log4j-1.2.14-6.4.el6.x86_64
libimobiledevice-0.9.7-4.el6.x86_64
kdebase-runtime-libs-4.3.4-9.el6.x86_64
ipw2100-firmware-1.3-11.el6.noarch
perl-IO-Compress-Base-2.020-115.el6.x86_64
jakarta-commons-httpclient-3.1-0.6.el6.x86_64
perl-Encode-Detect-1.01-2.el6.x86_64
kdeplasma-addons-libs-4.3.4-5.el6.x86_64
createrepo-0.9.8-4.el6.noarch
perl-File-Fetch-0.26-115.el6.x86_64
plymouth-theme-rings-0.8.3-17.el6.noarch
tmpwatch-2.9.16-3.el6.x86_64
gdm-2.30.4-21.el6.x86_64
sgml-common-0.6.3-32.el6.noarch
kmid-common-2.0-0.14.20080213svn.el6.noarch
gstreamer-tools-0.10.29-1.el6.x86_64
```

**rpm -e vlock:** To Remove a RPM Package “**vlock**”.

```
[root@localhost Packages]# rpm -e vlock
```

**rpm -qi vdftpd:** To Query an Information of Installed RPM Package “vdftpd”.

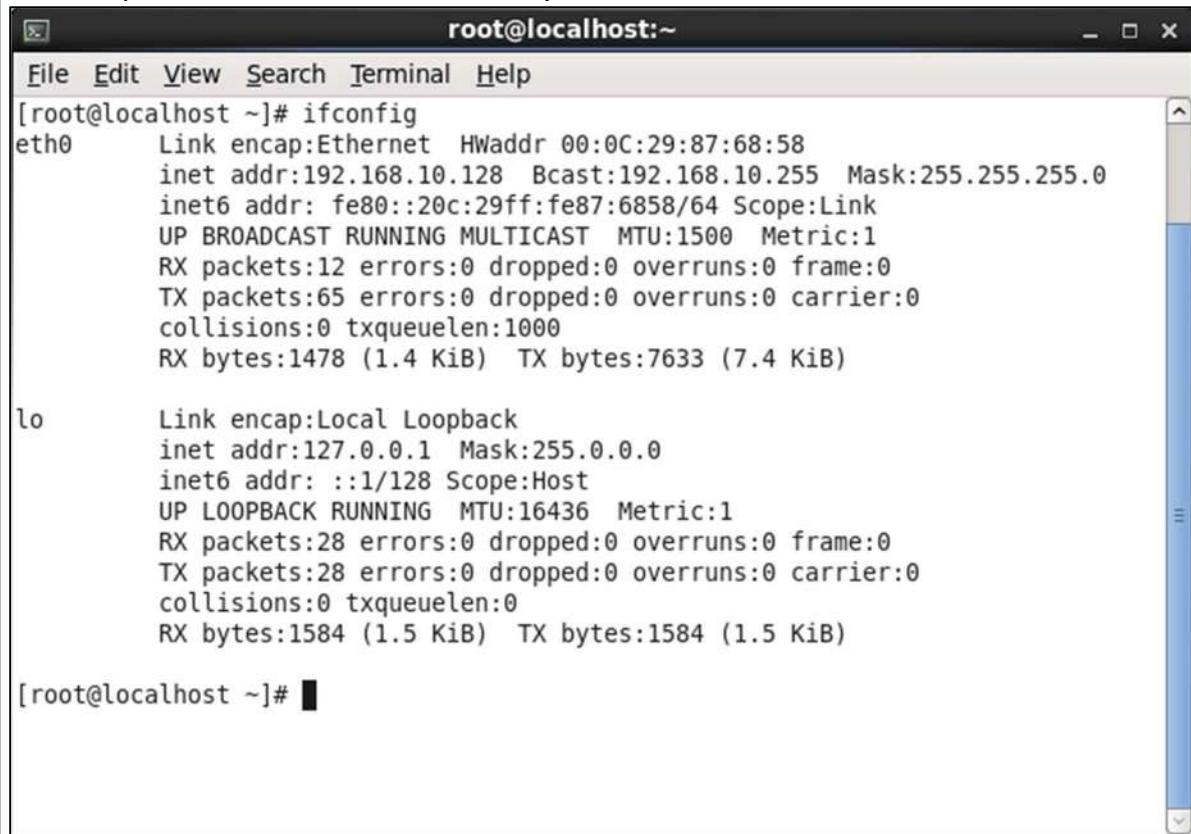
```
[root@localhost Packages]# rpm -qi vsftpd
Name        : vsftpd                               Relocations: (not relocatable)
Version     : 2.2.2                                Vendor: Red Hat, Inc.
Release     : 6.el6                                 Build Date: Wed 26 May 2010 06:16:30
PM IST
Install Date: Sun 03 Jul 2022 08:07:16 PM IST      Build Host: x86-004.build.bos
.redhat.com
Group       : System Environment/Daemons          Source RPM: vsftpd-2.2.2-6.el6.src.r
pm
Size        : 338480                               License: GPLv2 with exceptions
Signature   : RSA/8, Tue 17 Aug 2010 01:49:04 AM IST, Key ID 199e2f91fd431d51
Packager    : Red Hat, Inc. <http://bugzilla.redhat.com/bugzilla>
URL         : http://vsftpd.beasts.org/
Summary     : Very Secure Ftp Daemon
Description :
vsftpd is a Very Secure FTP daemon. It was written completely from
scratch.
```

**rpm -ivh --replacepkgs vlock-1.3-31.el6.x86\_64.rpm:** To install a already installed packages in your system.

```
[root@localhost Packages]# rpm -ivh vlock-1.3-31.el6.x86_64.rpm
warning: vlock-1.3-31.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID fd4
31d51: NOKEY
Preparing...                                              ##### [100%]
 1:vlock                                              ##### [100%]
[root@localhost Packages]#
[root@localhost Packages]# rpm -ivh --replacepkgs vlock-1.3-31.el6.x86_64.rpm
warning: vlock-1.3-31.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID fd4
31d51: NOKEY
Preparing...                                              ##### [100%]
 1:vlock                                              ##### [100%]
```

## b) Connecting to the Network:

**ifconfig:** It is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary.



```
[root@localhost ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:87:68:58
          inet addr:192.168.10.128 Bcast:192.168.10.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe87:6858/64 Scope:Link
                  UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
                  RX packets:12 errors:0 dropped:0 overruns:0 frame:0
                  TX packets:65 errors:0 dropped:0 overruns:0 carrier:0
                  collisions:0 txqueuelen:1000
                  RX bytes:1478 (1.4 KiB) TX bytes:7633 (7.4 KiB)

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:28 errors:0 dropped:0 overruns:0 frame:0
                  TX packets:28 errors:0 dropped:0 overruns:0 carrier:0
                  collisions:0 txqueuelen:0
                  RX bytes:1584 (1.5 KiB) TX bytes:1584 (1.5 KiB)

[root@localhost ~]#
```

**Now, we will graphically change the ipaddress:**

Click on the computer icon, then hover on the “VPN Connections” and click “Configure VPN...”



Go to Wired tab and click on System eth0 and Edit it:



Then go to IPv4(IP version 4) Settings: and take the method as “Manual” and add a address manually.

Click on Add button and write the following details and then click on Apply:



After configuring the ipaddress again type the command “ifconfig” to check the address has been set.

**Note:** You should restart the network so it could configure it and show you the ipaddress which you have set now.

```
[root@localhost ~]# service network restart
Shutting down interface eth0: Device state: 3 (disconnected) [ OK ]
Shutting down loopback interface: [ OK ]
Bringing up loopback interface: [ OK ]

[root@localhost ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:87:68:58
          inet addr:192.168.1.3 Bcast:192.168.1.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe87:6858/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:49 errors:0 dropped:0 overruns:0 frame:0
          TX packets:27 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3804 (3.7 KiB) TX bytes:3999 (3.9 KiB)

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:20 errors:0 dropped:0 overruns:0 frame:0
          TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1180 (1.1 KiB) TX bytes:1180 (1.1 KiB)
```

**ip route:** It can be used to show and manage routes on your server.

**ip route show:** It is used to display the current routing configuration.

```
[root@localhost ~]# ip route show
192.168.1.0/24 dev eth0 proto kernel scope link src 192.168.1.3 metric 1
```

**ip addr show:** To list all network interfaces and the associated IP address

```
[root@localhost ~]# ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 16436 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
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether 00:0c:29:68:58 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.3/24 brd 192.168.1.255 scope global eth0
        inet6 fe80::20c:29ff:fe87:6858/64 scope link
            valid_lft forever preferred_lft forever
3: pan0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN
    link/ether 52:76:5a:a6:a3:75 brd ff:ff:ff:ff:ff:ff
```

**ping:** This command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message “PING” and get a response from the server/host this time is recorded which is called latency.

```
[root@localhost ~]# ping 192.168.1.3
PING 192.168.1.3 (192.168.1.3) 56(84) bytes of data.
64 bytes from 192.168.1.3: icmp_seq=1 ttl=64 time=0.028 ms
64 bytes from 192.168.1.3: icmp_seq=2 ttl=64 time=0.036 ms
64 bytes from 192.168.1.3: icmp_seq=3 ttl=64 time=0.038 ms
64 bytes from 192.168.1.3: icmp_seq=4 ttl=64 time=0.037 ms
64 bytes from 192.168.1.3: icmp_seq=5 ttl=64 time=0.036 ms
64 bytes from 192.168.1.3: icmp_seq=6 ttl=64 time=0.037 ms
^Z
[1]+  Stopped                  ping 192.168.1.3
```

**ip addr add dev eth0 192.168.10.10/24:** To add an IP address such as 192.168.10.10/24 to the network device with the name eth0

```
[root@localhost ~]# ip addr add dev eth0 192.168.10.10/24
```

**ip route show:** To show whether the above command have successfully added a ip address.

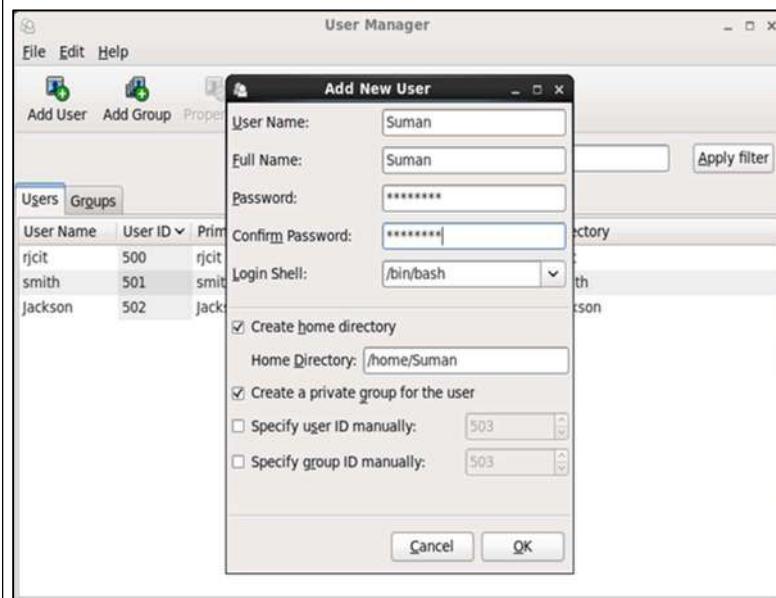
```
[root@localhost ~]# ip route show
192.168.1.0/24 dev eth0 proto kernel scope link src 192.168.1.3 metric 1
192.168.10.0/24 dev eth0 proto kernel scope link src 192.168.10.10
```

## Practical 4: Working with Users, Groups, and Permissions:

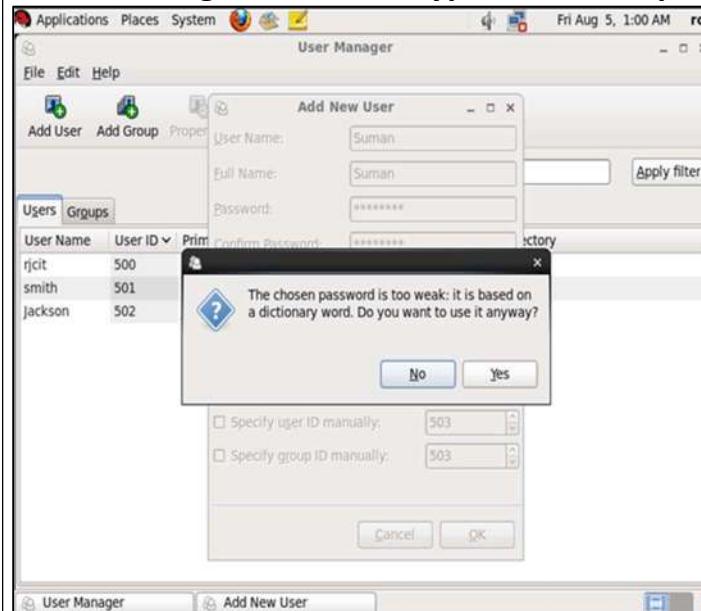
**Graphically Add Users And Groups:**

**System ->Administration -> Users and Groups**

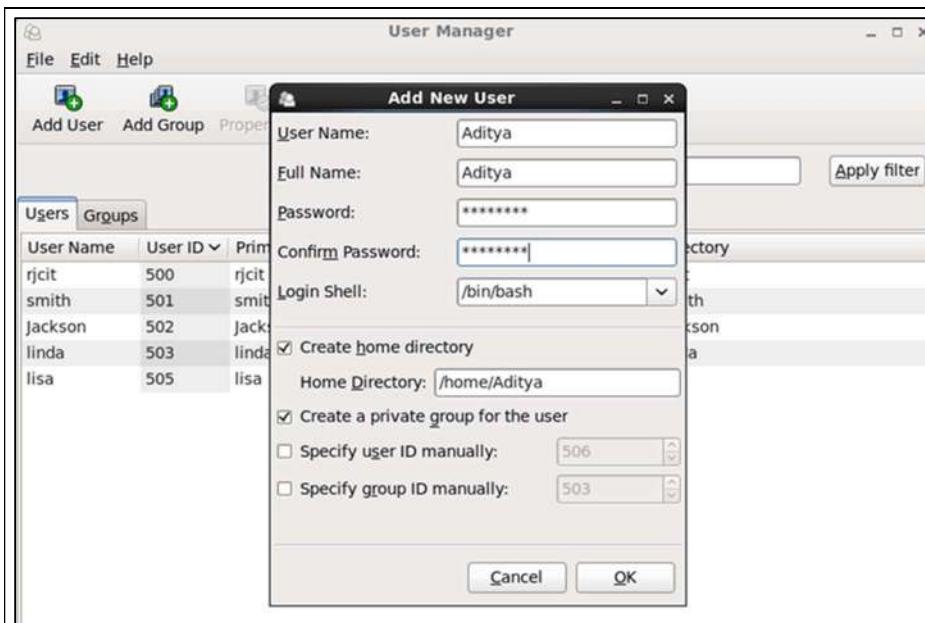
**Click on Add User**



**After Clicking Add Button Type name and password and click on yes**



User Manager					
<a href="#">File</a> <a href="#">Edit</a> <a href="#">Help</a> <span style="float: right;"> <a href="#"></a> <a href="#"></a> <a href="#"></a> <a href="#"></a> <a href="#"></a> <a href="#"></a> </span>					
<input type="text" value="Search filter:"/> <span style="float: right;"><a href="#">Apply filter</a></span>					
<a href="#">Users</a> <a href="#">Groups</a>					
User Name	User ID	Primary Group	Full Name	Login Shell	Home Directory
rjcit	500	rjcit	rjcit	/bin/bash	/home/rjcit
smith	501	smith	smith	/bin/bash	/home smith
Jackson	502	Jackson	Jackson	/bin/bash	/home Jackson
Suman	503	Suman	Suman	/bin/bash	/home Suman

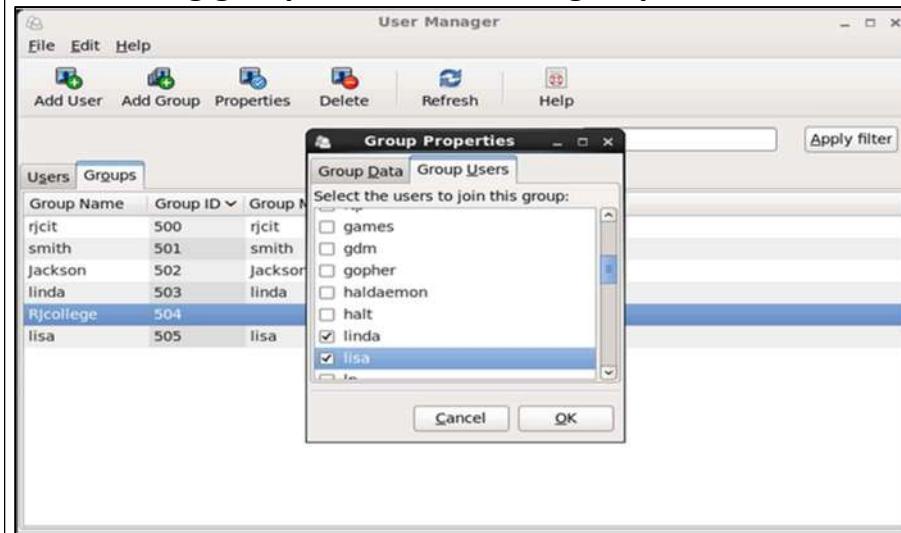


## Add Group:

Click on Add Group Button



After adding group name select the group members



## 1] Becoming Super User

Creating user account “smith” to grant him the privileges of super user.

```
[root@localhost ~]# useradd smith
[root@localhost ~]# passwd smith
Changing password for user smith.
New password:
BAD PASSWORD: it is based on a dictionary word
Retype new password:
passwd: all authentication tokens updated successfully.
```

## Step2: Open the file /etc/sudoers

```
[root@localhost ~]# vi /etc/sudoers
```

Add this line for smith

**smith ALL=(ALL) ALL**

```
root@localhost:~
File Edit View Search Terminal Help
Defaults    secure_path = /sbin:/bin:/usr/sbin:/usr/bin

## Next comes the main part: which users can run what software on
## which machines (the sudoers file can be shared between multiple
## systems).
## Syntax:
##
##       user      MACHINE=COMMANDS
##
## The COMMANDS section may have other options added to it.
##
## Allow root to run any commands anywhere
root    ALL=(ALL)      ALL
smith   ALL=(ALL)      ALL

## Allows members of the 'sys' group to run networking, software,
## service management apps and more.
# %sys  ALL = NETWORKING, SOFTWARE, SERVICES, STORAGE, DELEGATING, PROCESSES, LOC
ATE, DRIVERS

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

-- INSERT --
```

```
root@localhost:~
File Edit View Search Terminal Help
Defaults    secure_path = /sbin:/bin:/usr/sbin:/usr/bin

## Next comes the main part: which users can run what software on
## which machines (the sudoers file can be shared between multiple
## systems).
## Syntax:
##
##       user      MACHINE=COMMANDS
##
## The COMMANDS section may have other options added to it.
##
## Allow root to run any commands anywhere
root    ALL=(ALL)      ALL
smith   ALL=(ALL)      ALL

## Allows members of the 'sys' group to run networking, software,
## service management apps and more.
# %sys  ALL = NETWORKING, SOFTWARE, SERVICES, STORAGE, DELEGATING, PROCESSES, LOC
ATE, DRIVERS

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

:wq!
```

## To see the changes which is made in /etc/sudoers run visudo command

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

```
root@localhost:~#
File Edit View Search Terminal Help
# Defaults env_keep += "HOME"
Defaults secure_path = /sbin:/bin:/usr/sbin:/usr/bin

## Next comes the main part: which users can run what software on
## which machines (the sudoers file can be shared between multiple
## systems).
## Syntax:
##
##     user      MACHINE=COMMANDS
##
## The COMMANDS section may have other options added to it.
##
## Allow root to run any commands anywhere
root    ALL=(ALL)      ALL
smith   ALL=(ALL)      ALL

## Allows members of the 'sys' group to run networking, software,
## service management apps and more.
# %sys ALL = NETWORKING, SOFTWARE, SERVICES, STORAGE, DELEGATING, PROCESSES, LOC
ATE, DRIVERS

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

**Test the configuration by making smith to login and perform any administrative activity as shown below:**

**a)Add user Jackson using sudo:**

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

```
[smith@localhost ~]$ sudo useradd Jackson
```

We trust you have received the usual lecture from the local System Administrator. It usually boils down to these three things:

- #1) Respect the privacy of others.
- #2) Think before you type.
- #3) With great power comes great responsibility.

```
[sudo] password for smith:
```

**b)Changing password of Jackson using sudo:**

```
[smith@localhost ~]$ sudo passwd Jackson
Changing password for user Jackson.
New password:
BAD PASSWORD: it is based on a dictionary word
Retype new password:
passwd: all authentication tokens updated successfully.
[smith@localhost ~]$
```

## 2] Temporarily changing identity with the help of su command:

a)When root changes identity temporarily, with the help of su command, the system never asks for password:

```
[root@localhost ~]# su - Jackson
[Jackson@localhost ~]$
```

b)when any local user tries to change the identity temporarily, redhat system asks for the password as shown below:

```
[Jackson@localhost ~]$ su - smith
Password:
[smith@localhost ~]$
```

### 3]Administrative commands

#### 1) useradd command with its options:

- c :Set command for user: 'Jisha' account.
- u :Sets userID(uid)
- o :Allows non-unique UIDs
- s :Gives shell to user as shell

```
[root@localhost ~]# useradd -c "this is jisha's account" -u 601 -o -s /sbin/bash Jisha
```

To check ,the file /etc/passwd shows the entry at last

Use command “**cat /etc/passwd**”.

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

```
rpc:x:32:32:Rpcbind Daemon:/var/cache/rpcbind:/sbin/nologin
rtkit:x:499:499:RealtimeKit:/proc:/sbin/nologin
abrt:x:498:498::/etc/abrt:/sbin/nologin
nsqd:x:28:28:NSCD Daemon:/sbin/nologin
apache:x:48:48:Apache:/var/www:/sbin/nologin
saslauthd:x:497:494:"Saslauthd user":/var/empty/saslauth:/sbin/nologin
postfix:x:89:89::/var/spool/postfix:/sbin/nologin
haldaemon:x:68:68:HAL daemon:/sbin/nologin
mysql:x:27:27:MySQL Server:/var/lib/mysql:/bin/bash
nsldc:x:65:55:LDAP Client User:/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
ntp:x:38:38::/etc/ntp:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
nfsnobody:x:65534:65534:Anonymous NFS User:/var/lib/nfs:/sbin/nologin
pulse:x:496:493:PulseAudio System Daemon:/var/run/pulse:/sbin/nologin
gdm:x:42:42::/var/lib/gdm:/sbin/nologin
webalizer:x:67:67:Webalizer:/var/www/usage:/sbin/nologin
qpid:x:495:488:Owner of Qpid Daemons:/var/lib/qpid:/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/var/empty/sshd:/sbin/nologin
dovecot:x:97:97:Dovecot IMAP server:/usr/libexec/dovecot:/sbin/nologin
dovenull:x:494:487:Dovecot's unauthorized user:/usr/libexec/dovecot:/sbin/nologin
tcpdump:x:72:72::/sbin/nologin
oprofile:x:16:16:Special user account to be used by OProfile:/home/oprofile:/sbin/nologin
tomcat:x:91:91:Apache Tomcat:/usr/share/tomcat6:/bin/sh
rjcit:x:500:500:rjcit:/home/rjcit:/bin/bash
smith:x:501:501::/home smith:/bin/bash
Jackson:x:502:502::/home/Jackson:/bin/bash
Jisha:x:601:601:this is jisha's account:/home/Jisha:/sbin/bash
[root@localhost ~]#
```

#### 2) chage command is used to change the user's password.

```
[root@localhost ~]# chage -m 15 -M 25 -E 24/07/2022 -W 7 Jisha
```

```
[root@localhost ~]# chage -m 15 -M 25 -E 24/07/2022 -W 7 Jisha
[root@localhost ~]# chage -l Jisha
Last password change : Aug 04, 2022
Password expires      : Aug 29, 2022
Password inactive     : never
Account expires        : Dec 07, 2023
Minimum number of days between password change : 15
Maximum number of days between password change   : 25
Number of days of warning before password expires : 7
[root@localhost ~]#
```

To check the details about password in the file use **cat /etc/shadow**

```
[root@localhost ~]# cat /etc/shadow
```

```

nscd:!!!:19173:::::
apache:!!!:19173:::::
saslauth:!!!:19173:::::
postfix:!!!:19173:::::
haldaemon:!!!:19173:::::
mysql:!!!:19173:::::
nslcd:!!!:19173:::::
avahi:!!!:19173:::::
ntp:!!!:19173:::::
rpcuser:!!!:19173:::::
nfsnobody:!!!:19173:::::
pulse:!!!:19173:::::
gdm:!!!:19173:::::
webalizer:!!!:19173:::::
qpid:!!!:19173:::::
sshd:!!!:19173:::::
dovecot:!!!:19173:::::
dovewnull:!!!:19173:::::
tcpdump:!!!:19173:::::
oprofile:!!!:19173:::::
tomcat:!!!:19173:::::
rjcit:$6$yEZ2euazvQ4Z8fZi$omD3HnzZqmkWhbZSV5Id63wZ6i/rAXJnfwjWNqkmThpJBGhksXzIjSMKiaVP5gViUovSWP6
0.H6thPz8qyDwu0:19173:0:99999:7:::
smith:$6$9ZgbZoJq$dj1utxB5QbgnFvAMFdXq2jpaJ8bsZXLMyGjd8jNtgtKeFskwikwFeSAfEijl9yi4MswU/fXeIx08.4
5kAXsm/:19208:0:99999:7:::
Jackson:$6$y0cGsm8C$TEuarJg287DdBMCBfihbJpCeA9Ns30/giT7bZA0/Edeua1CTcihcSRbKYsLMy047mSatq3P4Td1pi
y42.kz8I0:19208:0:99999:7:::
Jisha:!!!:19208:15:25:7::19698:
[root@localhost ~]#

```

### 3) passwd command to lock or unlock user's password:

```

[root@localhost ~]# passwd -u Jisha
Unlocking password for user Jisha.
passwd: Warning: unlocked password would be empty.
passwd: Unsafe operation (use -f to force)
[root@localhost ~]#

```

```

[root@localhost ~]# passwd -l Jisha
Locking password for user Jisha.
passwd: Success
[root@localhost ~]#

```

### 4) chsh command to change the shell of user:

```

[root@localhost ~]# chsh -s /sbin/nologin Jisha
Changing shell for Jisha.
Shell changed.
[root@localhost ~]#

```

### 5) groupadd command to create a new group and gpasswd command to add members and administrator in the group:

-A :specifies name of the group administrator  
 -M :specifies members to be added in the group

```

[root@localhost ~]# groupadd friends
[root@localhost ~]# gpasswd -M smith,Jackson,Jisha -A smith friends

```

To see above things use cat /etc/group

```

[root@localhost ~]# cat /etc/group

```

The command displays name of the group: group password: group id: group members

```
postfix:x:89:
haldaemon:x:68:haldaemon
mysql:x:27:
ldap:x:55:
avahi:x:70:
ntp:x:38:
rpcuser:x:29:
nfsnobody:x:65534:
pulse:x:493:
pulse-access:x:492:
fuse:x:491:
gdm:x:42:
stapdev:x:490:
stapusr:x:489:
webalizer:x:67:
qpidd:x:488:
sshd:x:74:
dovecot:x:97:
dovenull:x:487:
tcpdump:x:72:
oprofile:x:16:
slocate:x:21:
tomcat:x:91:
rjcit:x:500:
smith:x:501:
Jackson:x:502:
Jisha:x:601:
friends:x:602:smith,Jackson,Jisha
```

## 6) userdel to delete the user

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

you can check in /etc/passwd, the user Jisha no longer exists.

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

```
rjcit:x:500:500:rjcit:/home/rjcit:/bin/bash
smith:x:501:501::/home smith:/bin/bash
Jackson:x:502:502::/home/Jackson:/bin/bash
```

## 7) groupdel to delete the group which is no longer used

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

you can check in /etc/group, the group friends no longer exist.

```
[root@localhost ~]# cat /etc/group
```

```
saslauth:x:494:
postdrop:x:90:
postfix:x:89:
haldaemon:x:68:haldaemon
mysql:x:27:
ldap:x:55:
avahi:x:70:
ntp:x:38:
rpcuser:x:29:
nfsnobody:x:65534:
pulse:x:493:
pulse-access:x:492:
fuse:x:491:
gdm:x:42:
stapdev:x:490:
stapusr:x:489:
webalizer:x:67:
qpidd:x:488:
sshd:x:74:
dovecot:x:97:
dovenull:x:487:
tcpdump:x:72:
oprofile:x:16:
slocate:x:21:
tomcat:x:91:
rjcit:x:500:
smith:x:501:
Jackson:x:502:
```

**Practical 5: Firewall and Cryptographic services:****a) Securing Server with iptables:****service iptables stop:** To Stop Firewalls.

```
[root@server ~]# service iptables stop
iptables: Flushing firewall rules: [ OK ]
iptables: Setting chains to policy ACCEPT: filter [ OK ]
iptables: Unloading modules: [ OK ]
```

**service iptables restart:** To Restart Firewalls.

```
[root@server ~]# service iptables restart
iptables: Applying firewall rules: [ OK ]
```

**iptables -L:**

```
[root@server ~]# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source          destination
ACCEPT    all  --  anywhere        anywhere         state RELATED,ESTAB
LISTED
ACCEPT    icmp --  anywhere        anywhere
ACCEPT    all  --  anywhere        anywhere
ACCEPT    tcp  --  anywhere        anywhere         state NEW tcp dpt:s
sh
REJECT    all  --  anywhere        anywhere         reject-with icmp-ho
st-prohibited

Chain FORWARD (policy ACCEPT)
target     prot opt source          destination
REJECT    all  --  anywhere        anywhere         reject-with icmp-ho
st-prohibited

Chain OUTPUT (policy ACCEPT)
target     prot opt source          destination
```

**Iptables command to accept connections by default(accept).**

```
[root@server ~]# iptables -P INPUT ACCEPT
[root@server ~]# iptables -P FORWARD ACCEPT
[root@server ~]# iptables -P OUTPUT ACCEPT
```

**Iptables command to deny all the connections(drop).**

```
[root@server ~]# iptables -P INPUT DROP
[root@server ~]# iptables -P FORWARD DROP
[root@server ~]# iptables -P OUTPUT DROP
```

**Iptables command to reject all network connections(reject).**

```
[root@server ~]# iptables -A INPUT -j REJECT
[root@server ~]# iptables -A FORWARD -j REJECT
[root@server ~]# iptables -A OUTPUT -j REJECT
```

**Iptables -L: to check the connections.**

```
[root@server ~]# iptables -L
Chain INPUT (policy DROP)
target     prot opt source               destination
ACCEPT    all  --  anywhere             anywhere            state RELATED,ESTAB
LISTED
ACCEPT    icmp --  anywhere             anywhere
ACCEPT    all  --  anywhere             anywhere
ACCEPT    tcp   --  anywhere             anywhere           state NEW tcp dpt:s
sh
REJECT    all  --  anywhere             anywhere          reject-with icmp-ho
st-prohibited
REJECT    all  --  anywhere             anywhere          reject-with icmp-po
rt-unreachable

Chain FORWARD (policy DROP)
target     prot opt source               destination
REJECT    all  --  anywhere             anywhere          reject-with icmp-ho
st-prohibited
REJECT    all  --  anywhere             anywhere          reject-with icmp-po
```

**Accept host with IP address 192.168.1.5**

```
[root@server ~]# iptables -A INPUT -p tcp -s 192.168.1.5 --dport ssh -j ACCEPT
```

**Block all incoming connections to port 22.**

```
[root@server ~]# iptables -A INPUT -i eth0 -p tcp --dport 22 -m state --state NEW,ESTABLISH -j ACCEPT
```

**Allowing All incoming ssh connection**

```
[root@server ~]# iptables -A INPUT -p tcp -s 192.168.1.5 --dport ssh -j ACCEPT
```

**Allowing outgoing ssh connection for specific address**

```
[root@server ~]# iptables -A OUTPUT -p tcp -d 192.168.1.3 --sport ssh -j ACCEPT
```

**Allowing outgoing ssh connection which established for incoming ssh connection request**

```
[root@server ~]# iptables -A OUTPUT -o eth0 -p tcp --sport 22 -m state --state NEW,ESTABLISH -j ACCEPT
```

**Iptables for incoming ping request**

```
[root@server ~]# iptables -A INPUT -p icmp --icmp-type echo-request -j DROP
```

**To drop all outgoing telnet connection**

```
[root@server ~]# iptables -A OUTPUT -p tcp --dport telnet -j DROP
```

**To Reject all incoming telnet connection**

```
[root@server ~]# iptables -A INPUT -p tcp --dport telnet -j REJECT
```

**Iptables to reject all incoming traffic except ssh & local connection**

```
[root@server ~]# iptables -A INPUT -i lo -j ACCEPT
[root@server ~]# iptables -A INPUT -p tcp --dport ssh -j ACCEPT
[root@server ~]# iptables -A INPUT -j REJECT
```

**Iptables to drop all the incoming connections on a specific network interface**

```
[root@server ~]# iptables -A INPUT -i eth0 -s 192.168.0.0/24 -j DROP
```

**Iptables -L: to show all the work done by above commands.**

```
[root@server ~]# iptables -L
Chain INPUT (policy DROP)
target     prot opt source          destination
ACCEPT    all  --  anywhere        anywhere      state RELATED,ESTABLISHED
ACCEPT    icmp --  anywhere        anywhere
ACCEPT    all  --  anywhere        anywhere
ACCEPT    tcp  --  anywhere        anywhere      state NEW tcp dpt:ssh
REJECT    all  --  anywhere        anywhere      reject-with icmp-host-prohibited
REJECT    all  --  anywhere        anywhere      reject-with icmp-port-unreachable
ACCEPT    tcp  --  192.168.1.5    anywhere      anywhere
REJECT    tcp  --  anywhere        anywhere      tcp dpt:ssh reject-with icmp-port-unreachable
ACCEPT    tcp  --  192.168.1.5    anywhere      anywhere
REJECT    tcp  --  anywhere        anywhere      tcp dpt:ssh reject-with icmp-port-unreachable
ACCEPT    tcp  --  anywhere        anywhere      tcp dpt:ssh state NEW,ESTABLISHED
DROP      icmp --  anywhere        anywhere      icmp echo-request
REJECT    tcp  --  anywhere        anywhere      tcp dpt:telnet reject-with icmp-port-unreachable
ACCEPT    all  --  anywhere        anywhere
ACCEPT    all  --  anywhere        anywhere
ACCEPT    tcp  --  anywhere        anywhere      tcp dpt:ssh
REJECT    all  --  anywhere        anywhere      reject-with icmp-port-unreachable
DROP      all  --  192.168.0.0/24  anywhere

Chain FORWARD (policy DROP)
target     prot opt source          destination
REJECT    all  --  anywhere        anywhere      reject-with icmp-host-prohibited
REJECT    all  --  anywhere        anywhere      reject-with icmp-port-unreachable

Chain OUTPUT (policy DROP)
target     prot opt source          destination
REJECT    all  --  anywhere        anywhere      reject-with icmp-port-unreachable
ACCEPT    tcp  --  anywhere        anywhere      tcp spt:ssh state NEW,ESTABLISHED
ACCEPT    tcp  --  anywhere        server.tyit.com  tcp spt:ssh
ACCEPT    tcp  --  anywhere        server.tyit.com  tcp spt:ssh
ACCEPT    tcp  --  anywhere        anywhere      tcp spt:ssh state NEW,ESTABLISHED
DROP      tcp  --  anywhere        anywhere      tcp dpt:telnet
```

**To Flush all the rules -Iptables -F**

```
[root@localhost ~]# iptables -F
[root@localhost ~]# iptables -L
Chain INPUT (policy DROP)
target     prot opt source          destination
destination

Chain FORWARD (policy DROP)
target     prot opt source          destination
destination

Chain OUTPUT (policy DROP)
target     prot opt source          destination
destination
```

**b) Setting Up Cryptographic Services:****useradd linda:** to add another user called linda.**passwd linda:** to set password for linda.

```
[root@localhost ~]# useradd linda
[root@localhost ~]#
[root@localhost ~]# passwd linda
Changing password for user linda.
New password:
BAD PASSWORD: it is too short
BAD PASSWORD: is too simple
Retype new password:
passwd: all authentication tokens updated successfully.
```

**useradd lisa:** to add another user called lisa.**passwd lisa:** to set password for lisa.

```
[root@localhost ~]# passwd lisa
Changing password for user lisa.
New password:
BAD PASSWORD: it is based on a dictionary word
BAD PASSWORD: is too simple
Retype new password:
passwd: all authentication tokens updated successfully.
```

**Login to Linda's account:****gpg --gen -key:** to generate a specific key or secret key for the user linda.

```
[linda@localhost ~]$ gpg --gen-key
gpg (GnuPG) 2.0.14; Copyright (C) 2009 Free Software Foundation, Inc.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Please select what kind of key you want:
 (1) RSA and RSA (default)
 (2) DSA and Elgamal
 (3) DSA (sign only)
 (4) RSA (sign only)
Your selection? 1
RSA keys may be between 1024 and 4096 bits long.
What keysize do you want? (2048) 1024
Requested keysize is 1024 bits
Please specify how long the key should be valid.
    0 = key does not expire
    <n> = key expires in n days
    <n>w = key expires in n weeks
    <n>m = key expires in n months
    <n>y = key expires in n years
Key is valid for? (0) 10
Key expires at Mon 15 Aug 2022 04:15:19 AM IST
Is this correct? (y/N) y

GnuPG needs to construct a user ID to identify your key.
```

```
GnuPG needs to construct a user ID to identify your key.
```

```
Real name: linda  
Email address: linda@example.com  
Comment: non  
You selected this USER-ID:  
    "linda (non) <linda@example.com>"
```

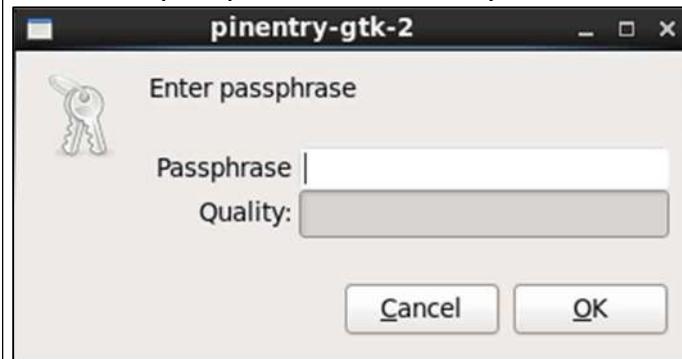
```
Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? o  
You need a Passphrase to protect your secret key.
```

```
can't connect to `/home/linda/.gnupg/S.gpg-agent': No such file or directory  
We need to generate a lot of random bytes. It is a good idea to perform  
some other action (type on the keyboard, move the mouse, utilize the  
disks) during the prime generation; this gives the random number  
generator a better chance to gain enough entropy.
```

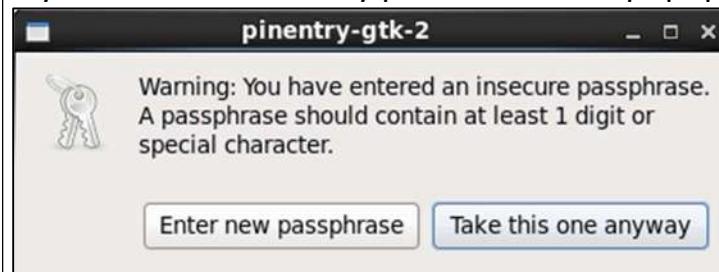
```
We need to generate a lot of random bytes. It is a good idea to perform  
some other action (type on the keyboard, move the mouse, utilize the  
disks) during the prime generation; this gives the random number  
generator a better chance to gain enough entropy.
```

```
gpg: key 7E4B8649 marked as ultimately trusted  
public and secret key created and signed.
```

Enter the passphrase for the key



If you have written easy password it will popup this dialog box, click on “Take this one anyway”.



Again type your passphrase here.



```

gpg: checking the trustdb
gpg: 3 marginal(s) needed, 1 complete(s) needed, PGP trust model
gpg: depth: 0 valid: 1 signed: 0 trust: 0-, 0q, 0n, 0m, 0f, 1u
gpg: next trustdb check due at 2022-08-14
pub 1024R/7E4B8649 2022-08-04 [expires: 2022-08-14]
    Key fingerprint = B991 0B8D 213F B608 7845 3F13 36C7 8E47 7E4B 8649
uid             linda (non) <linda@example.com>
sub 1024R/093D1396 2022-08-04 [expires: 2022-08-14]

```

**gpg --export:** to export the generated key.

```
[linda@localhost ~]$ gpg --export -a > /tmp/linda.key
```

Also,

**gpg --import:** to import the generated key of other user.

```
[linda@localhost ~]$ gpg --import < /tmp/lisa.key
gpg: key 22380CAB: public key "lisaa (non) <lisaa@example.com>" imported
gpg: Total number processed: 1
gpg:                      imported: 1 (RSA: 1)
```

**gpg --list-keys:** to list down the generated key.

```
[linda@localhost ~]$ gpg --list-keys
/home/linda/.gnupg/pubring.gpg
-----
pub 1024R/7E4B8649 2022-08-04 [expires: 2022-08-14]
uid             linda (non) <linda@example.com>
sub 1024R/093D1396 2022-08-04 [expires: 2022-08-14]

pub 1024R/22380CAB 2022-08-04 [expires: 2022-08-14]
uid             lisaa (non) <lisaa@example.com>
sub 1024R/886FD64B 2022-08-04 [expires: 2022-08-14]
```

## Now, login as Lisa:

**gpg --gen-key:** to generate a specific key or secret key for the user lisa.

```

lisa@localhost:~ 
File Edit View Search Terminal Help
[lisa@localhost ~]$ gpg --gen-key
gpg (GnuPG) 2.0.14; Copyright (C) 2009 Free Software Foundation, Inc.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Please select what kind of key you want:
 (1) RSA and RSA (default)
 (2) DSA and Elgamal
 (3) DSA (sign only)
 (4) RSA (sign only)
Your selection? 1
RSA keys may be between 1024 and 4096 bits long.
What keysize do you want? (2048) 1024
Requested keysize is 1024 bits
Please specify how long the key should be valid.
 0 = key does not expire
 <n> = key expires in n days
 <n>w = key expires in n weeks
 <n>m = key expires in n months
 <n>y = key expires in n years
Key is valid for? (0) 10
Key expires at Mon 15 Aug 2022 04:19:25 AM IST
Is this correct? (y/N) y

GnuPG needs to construct a user ID to identify your key.

Real name: lisaa
Email address: lisaa@example.com
Comment: non

```

```

Comment: non
You selected this USER-ID:
  "lisaa (non) <lisaa@example.com>"

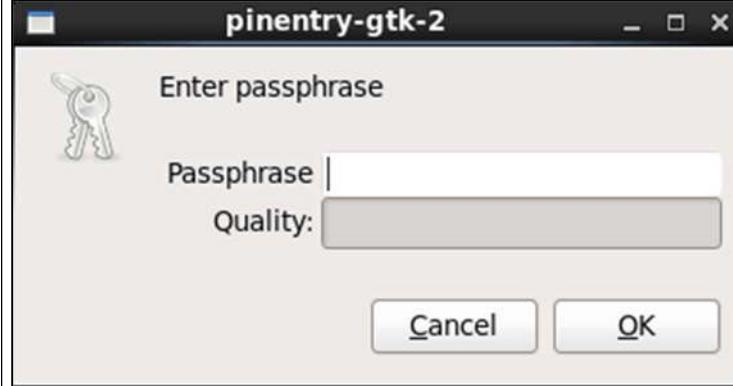
Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? o
You need a Passphrase to protect your secret key.

can't connect to `/home/lisa/.gnupg/S.gpg-agent': No such file or directory
We need to generate a lot of random bytes. It is a good idea to perform
some other action (type on the keyboard, move the mouse, utilize the
disks) during the prime generation; this gives the random number
generator a better chance to gain enough entropy.
We need to generate a lot of random bytes. It is a good idea to perform
some other action (type on the keyboard, move the mouse, utilize the
disks) during the prime generation; this gives the random number
generator a better chance to gain enough entropy.
gpg: key 22380CAB marked as ultimately trusted
public and secret key created and signed.

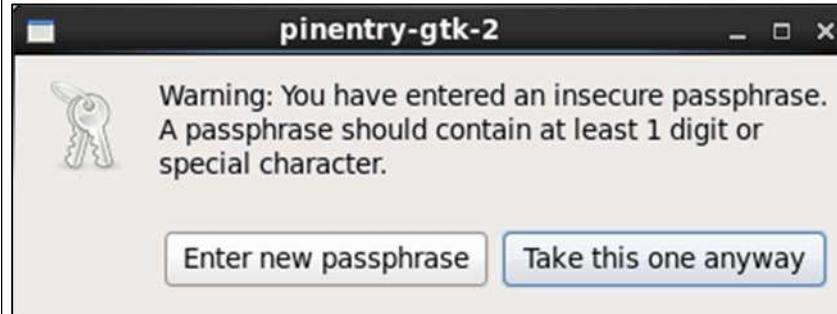
gpg: checking the trustdb
gpg: 3 marginal(s) needed, 1 complete(s) needed, PGP trust model
gpg: depth: 0 valid: 1 signed: 0 trust: 0-, 0q, 0n, 0m, 0f, 1u
gpg: next trustdb check due at 2022-08-14
pub 1024R/22380CAB 2022-08-04 [expires: 2022-08-14]
  Key fingerprint = FA4F CA48 7B09 2A5F 393C F89E F769 D109 2238 0CAB
uid           lisaa (non) <lisaa@example.com>
sub 1024R/886FD64B 2022-08-04 [expires: 2022-08-14]

```

Enter the passphrase for the key



If you have written easy password it will popup this dialog box, click on “Take this one anyway”.



Again type your passphrase here.



**gpg --export:** to export the generated key.

```
[lisa@localhost ~]$ gpg --export -a > /tmp/lisa.key
```

Also,

**gpg --import:** to import the generated key of other user.

```
[lisa@localhost ~]$ gpg --import < /tmp/linda.key
gpg: key 7E4B8649: public key "linda (non) <linda@example.com>" imported
gpg: Total number processed: 1
gpg:                      imported: 1  (RSA: 1)
```

**gpg --list-keys:** to list down the generated key.

```
[lisa@localhost ~]$ gpg --list-keys
/home/lisa/.gnupg/pubring.gpg
-----
pub  1024R/22380CAB 2022-08-04 [expires: 2022-08-14]
uid  lisaa (non) <lisaa@example.com>
sub  1024R/886FD64B 2022-08-04 [expires: 2022-08-14]

pub  1024R/7E4B8649 2022-08-04 [expires: 2022-08-14]
uid  linda (non) <linda@example.com>
sub  1024R/093D1396 2022-08-04 [expires: 2022-08-14]
```

Create a **secret1.txt** file and add a message in it.

```
[lisa@localhost ~]$ cat > secret1.txt
Hii Lisa
```

**gpg -e secret1.txt:** to convert the file into an encrypted file.

```
[lisa@localhost ~]$ gpg -e secret1.txt
You did not specify a user ID. (you may use "-r")

Current recipients:

Enter the user ID. End with an empty line: linda
gpg: 093D1396: There is no assurance this key belongs to the named user

pub 1024R/093D1396 2022-08-04 linda (non) <linda@example.com>
  Primary key fingerprint: B991 0B8D 213F B608 7845  3F13 36C7 8E47 7E4B 8649
  Subkey fingerprint: 3318 EB32 8BA5 5330 5C3B  400A 4C53 B010 093D 1396

It is NOT certain that the key belongs to the person named
in the user ID. If you *really* know what you are doing,
you may answer the next question with yes.

Use this key anyway? (y/N) y

Current recipients:
1024R/093D1396 2022-08-04 "linda (non) <linda@example.com>"

Enter the user ID. End with an empty line:
```

**cp secret1.txt.gpg /tmp:** to copy the secret1.txt.gpg file into /tmp directory.

```
[lisa@localhost ~]$ cp secret1.txt.gpg /tmp
```

**Again login to linda:**

**gpg -d /tmp/secret1.txt:** it will decrypt the encrypted file in the /tmp directory.

```
[linda@localhost ~]$ gpg -d /tmp/secret1.txt.gpg
```

Type the passphrase to show the message in encrypted file.



We can now see the encrypted message from lisa.

```
[linda@localhost ~]$ gpg -d /tmp/secret1.txt.gpg

You need a passphrase to unlock the secret key for
user: "linda (non) <linda@example.com>"
1024-bit RSA key, ID 093D1396, created 2022-08-04 (main key ID 7E4B8649)

can't connect to `/home/linda/.gnupg/S.gpg-agent': No such file or directory
gpg: encrypted with 1024-bit RSA key, ID 093D1396, created 2022-08-04
  "linda (non) <linda@example.com>"

Hii Lisa
```

Likewise, we will create a secret.txt file to show it in the Linda's account

```
[linda@localhost ~]$ cat > secret.txt
Hi! Lisa
This is Linda here.
```

**cp secret.txt.gpg /tmp:** to copy the secret.txt.gpg file into /tmp directory.

```
[linda@localhost ~]$ gpg -e secret.txt
You did not specify a user ID. (you may use "-r")

Current recipients:

Enter the user ID. End with an empty line: lisaa
gpg: 886FD64B: There is no assurance this key belongs to the named user

pub 1024R/886FD64B 2022-08-04 lisaa (non) <lisa@example.com>
  Primary key fingerprint: FA4F CA48 7B09 2A5F 393C F89E F769 D109 2238 0CAB
    Subkey fingerprint: AE63 B428 3DFC A865 0989 F26D A0BA 4884 886F D64B

It is NOT certain that the key belongs to the person named
in the user ID. If you *really* know what you are doing,
you may answer the next question with yes.

Use this key anyway? (y/N) y

Current recipients:
1024R/886FD64B 2022-08-04 "lisaa (non) <lisa@example.com>

Enter the user ID. End with an empty line:
```

**cp secret1.txt.gpg /tmp:** to copy the secret1.txt.gpg file into /tmp directory.

```
[linda@localhost ~]$ cp secret.txt.gpg /tmp
```

**Again login to lisa:**

**gpg -d /tmp/secret1.txt:** it will decrypt the encrypted file in the /tmp directory.

```
[lisa@localhost ~]$ gpg -d /tmp/secret1.txt.gpg

You need a passphrase to unlock the secret key for
user: "lisaa (non) <lisa@example.com>"
1024-bit RSA key, ID 886FD64B, created 2022-08-04 (main key ID 22380CAB)

can't connect to `/home/lisa/.gnupg/S.gpg-agent': No such file or directory
gpg: encrypted with 1024-bit RSA key, ID 886FD64B, created 2022-08-04
  "lisaa (non) <lisa@example.com>"

Hi! Lisa
This is Linda here.
```

## Practical 6: Configuring Server for File Sharing:

### a) Configuring NFS Server and Client:

Install the NFS packages then start the bind server.

```
[root@server ~]# service named start  
Starting named: named: already running
```

[ OK ]

check whether the NFS is installed or not.

```
[root@server ~]# rpm -q nfs-utils  
nfs-utils-1.2.2-7.el6.x86_64
```

Check the IP Address to set a NFS Server.

```
[root@server ~]# ifconfig eth0  
eth0      Link encap:Ethernet  HWaddr 00:0C:29:9E:1C:A0  
          inet  addr:192.168.1.5  Bcast:192.168.1.255  Mask:255.255.255.0  
          inet6 addr: fe80::20c:29ff:fe9e:1ca0/64 Scope:Link  
            UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
            RX packets:93592 errors:0 dropped:0 overruns:0 frame:0  
            TX packets:17 errors:0 dropped:0 overruns:0 carrier:0  
            collisions:0 txqueuelen:1000  
            RX bytes:7803319 (7.4 MiB)   TX bytes:3753 (3.6 KiB)
```

make directory as data1 and alpha that is to be exported and create some files into it.

```
[root@server ~]# mkdir /data1
```

```
[root@server ~]# touch /data1/{1.txt,2.txt}
```

```
[root@server ~]# mkdir /alpha
```

```
[root@server ~]# touch /alpha/{3.txt,4.txt}
```

```
[root@server ~]# ls /data1  
1.txt  2.txt
```

Give All permissions

```
[root@server ~]# chmod -R 777 /data1
```

```
[root@server ~]# chmod -R 777 /alpha
```

Open the configuration files using vi /etc/exports

```
[root@server ~]# vi /etc/exports
```

```
/data1  
/alpha (rw,sync)
```

Restart the services of rpcbind and nfs.

```
[root@server ~]# service rpcbind restart
```

```
Stopping rpcbind:
```

```
[ OK ]
```

```
Starting rpcbind:
```

```
[ OK ]
```

```
[root@server ~]# service nfs restart
```

```
Shutting down NFS mountd:
```

```
[FAILED]
```

```
Shutting down NFS daemon:
```

```
[FAILED]
```

```
Shutting down NFS quotas:
```

```
[FAILED]
```

```
Starting NFS services: exportfs: No options for /data1 : suggest (sync) to avoid warning
```

```
exportfs: No host name given with /alpha (rw,sync), suggest *(rw,sync) to avoid warning
```

```
Starting NFS quotas:
```

```
[ OK ]
```

```
Starting NFS daemon:
```

```
[ OK ]
```

```
Starting NFS mountd:
```

```
[ OK ]
```

Stop the firewall

```
[root@server ~]# service iptables stop
```

```
iptables: Flushing firewall rules:
```

```
[ OK ]
```

```
iptables: Setting chains to policy ACCEPT: filter
```

```
[ OK ]
```

```
iptables: Unloading modules:
```

```
[ OK ]
```

showmount command shows the all shared directories in a given IP Address.

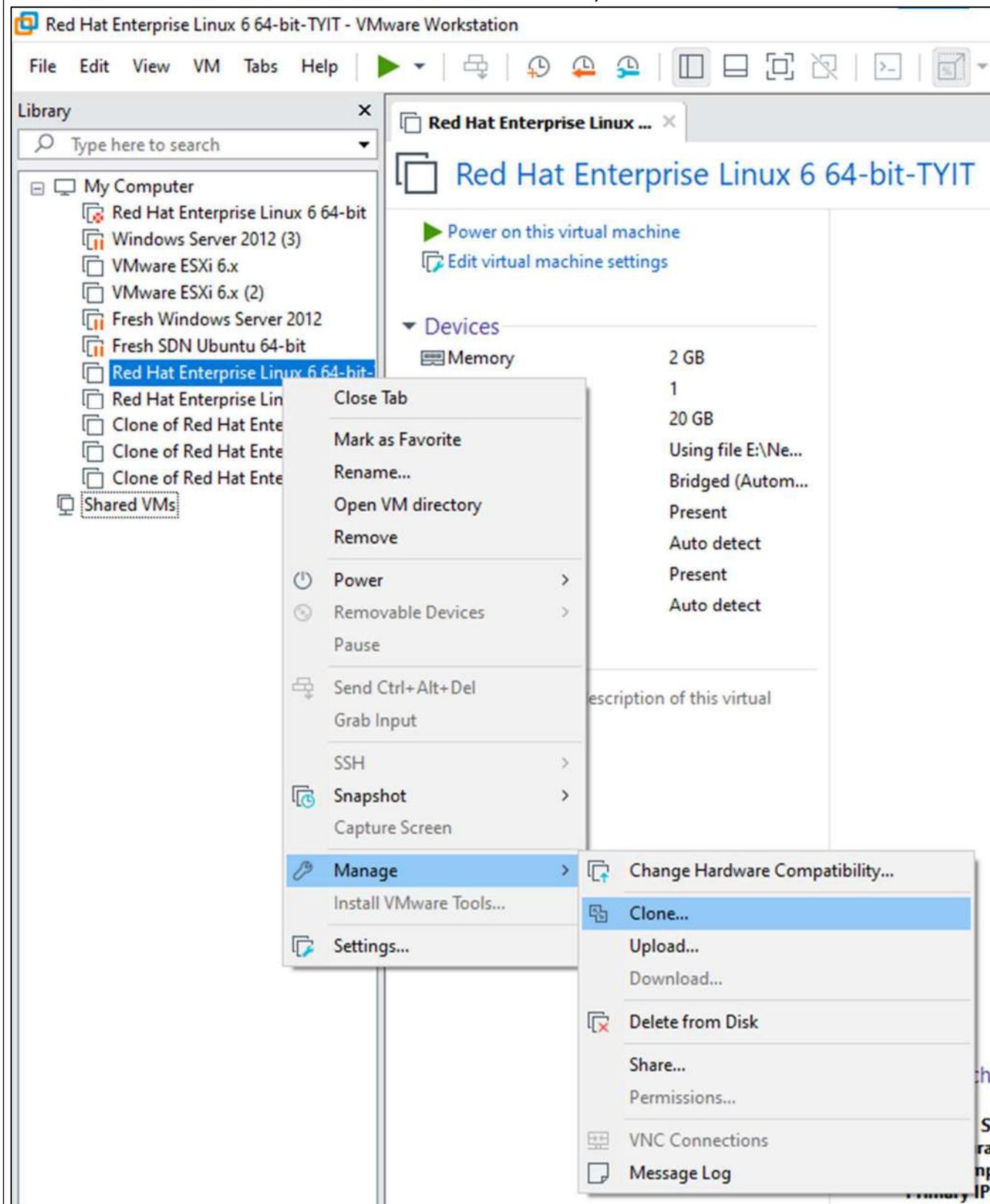
```
[root@server ~]# showmount -e 192.168.1.5
```

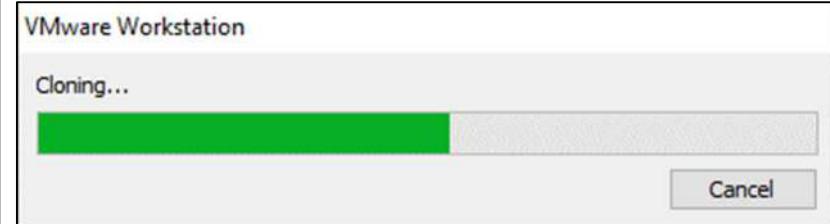
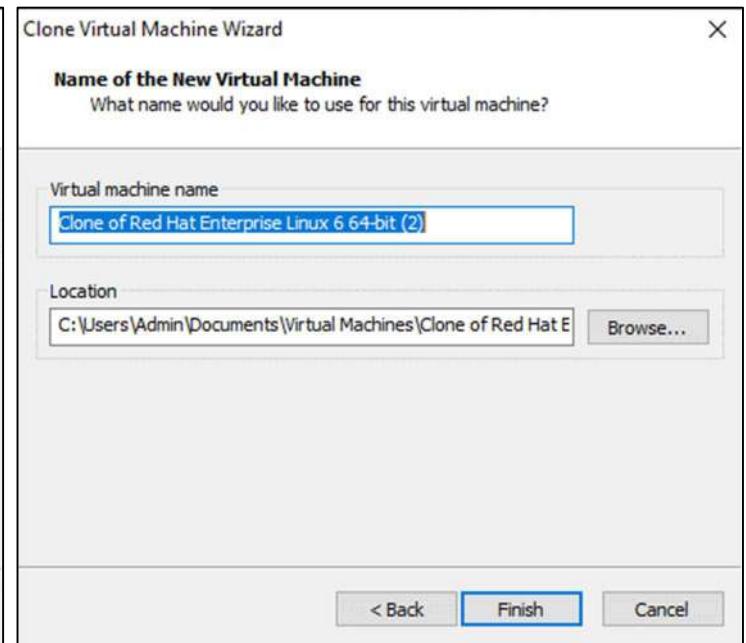
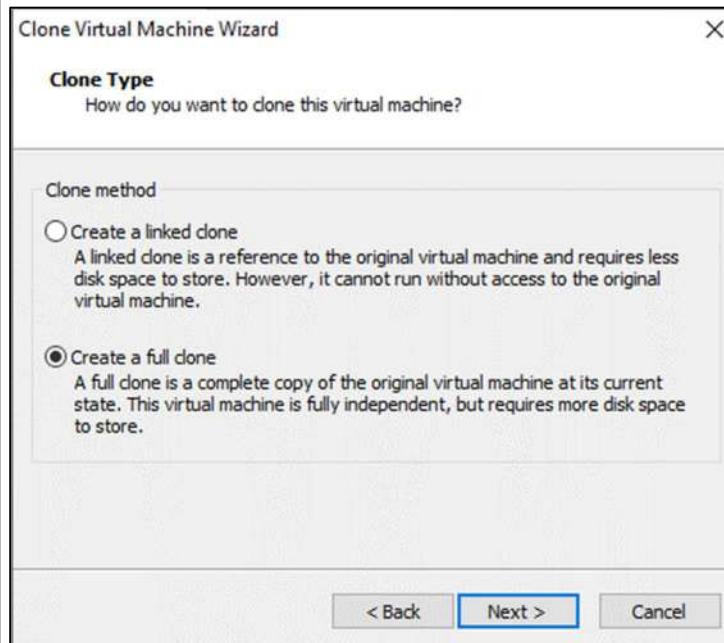
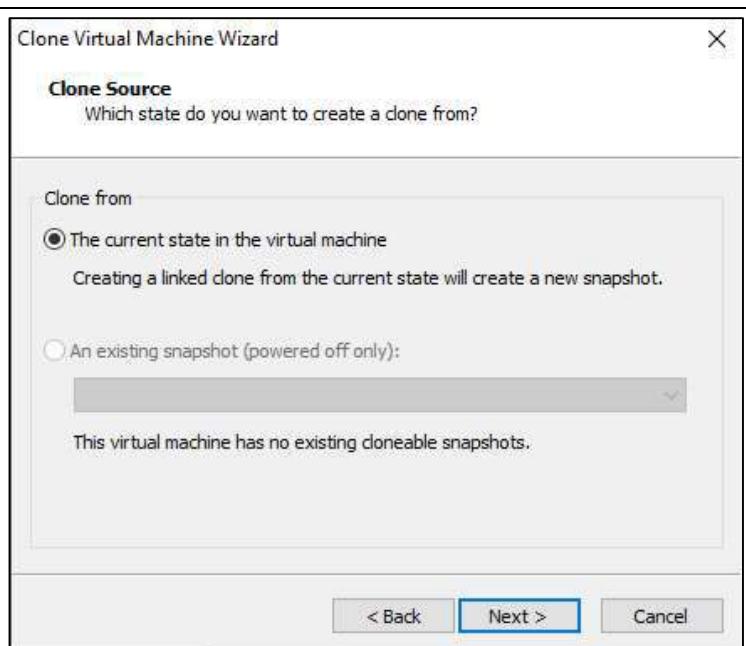
```
Export list for 192.168.1.5:
```

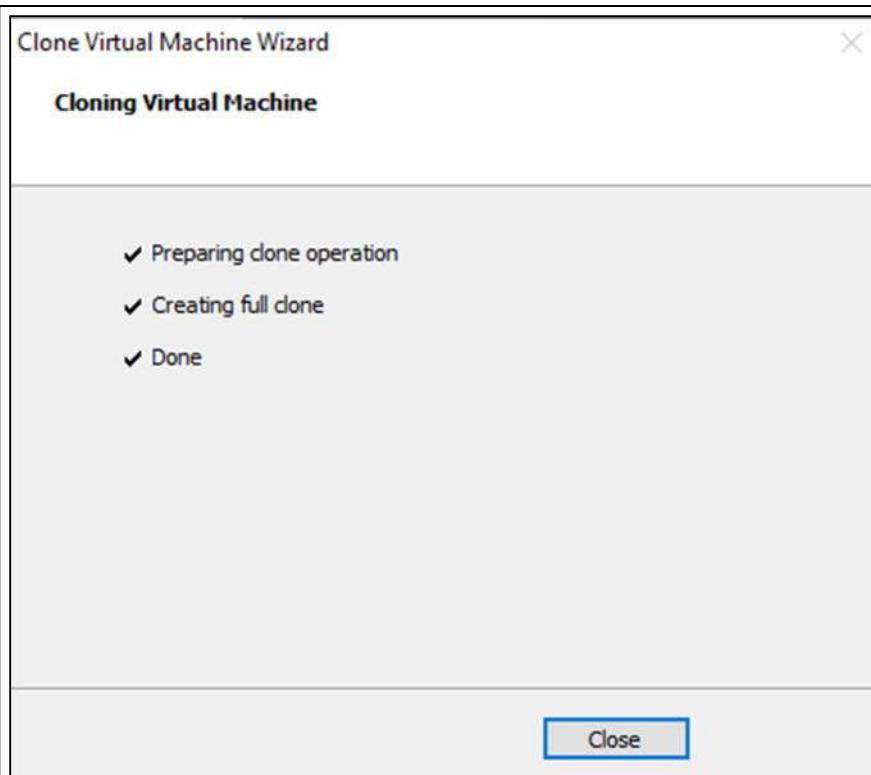
```
/alpha *
```

```
/data1 *
```

shut down the main machine and make a clone of it ,then start the clone machine.







### Mount the directory.

```
[root@server ~]# mount -t nfs 192.168.1.5:/data1 localdir1
[root@server ~]#
[root@server ~]# mount -t nfs 192.168.1.5:/alpha localdir2
```

### Use ls command to see if the files are mounted in the directory or not.

```
[root@server ~]# ls localdir1
1.txt 2.txt
[root@server ~]#
[root@server ~]# ls localdir2
3.txt 4.txt
```

## b) Configuring FTP:

Go to the Packages directory to install some package.

```
[root@localhost Packages]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
File Edit View Search Terminal Help
[root@localhost ~]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
[root@localhost Packages]#
```

Install vsftpd packages, using rpm -ivh vsftpd\*

```
[root@localhost Packages]# rpm -ivh vsftpd*
warning: vsftpd-2.2.2-6.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID f
d431d51: NOKEY
Preparing... ###### [100%]
package vsftpd-2.2.2-6.el6.x86_64 is already installed
```

Install ftp packages using rpm -ivh ftp\*

```
[root@localhost Packages]# rpm -ivh ftp*
warning: ftp-0.17-51.1.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID fd
431d51: NOKEY
Preparing... ###### [100%]
1:ftp ###### [100%]
```

Check whether the ftp packages are installed or not using command ,rpm -qa |grep ftp

```
[root@localhost Packages]# rpm -qa | grep ftp
report-plugin-ftp-0.18-7.el6.x86_64
gvfs-obexftp-1.4.3-9.el6.x86_64
ftp-0.17-51.1.el6.x86_64
report-config-ftp-0.18-7.el6.x86_64
vsftpd-2.2.2-6.el6.x86_64
```

Starting vsftpd services at boot time using the command, chkconfig vsftpd on.

```
[root@localhost Packages]# chkconfig vsftpd on
[root@localhost Packages]# chkconfig --list | grep ftp
vsftpd      0:off  1:off  2:on   3:on   4:on   5:on   6:off
```

Creating file which is ftpfile using cat in pub directory, for that go to the pub directory using command, cd /var/ftp/pub.

```
[root@localhost Packages]# cd /var/ftp/pub/
```

```
[root@localhost pub]# cat > ftpfile
Hello
This is my FTP file.
[root@localhost pub]#
```

Use ctrl + d to save and quit.

Verify the IP Address of the linux machine to be configured as ftp.

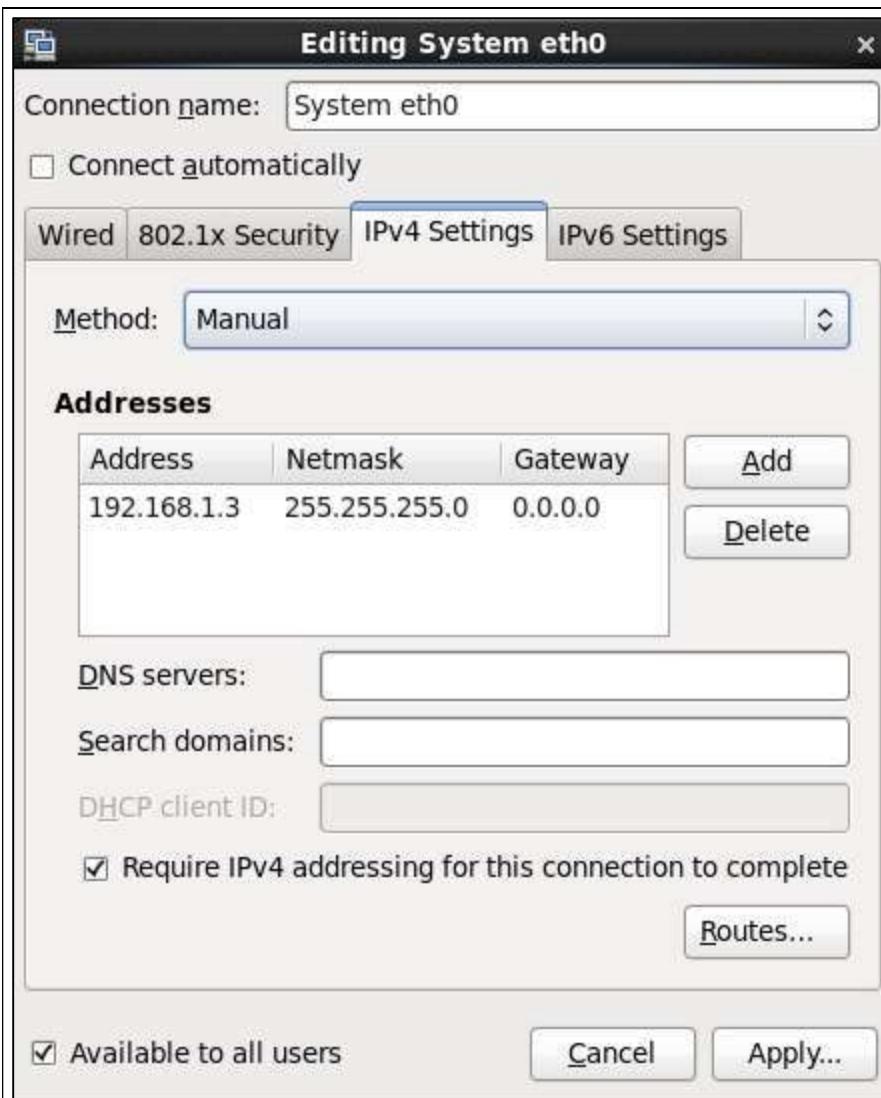
```
[root@localhost ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:87:68:58
          inet addr:192.168.10.128 Bcast:192.168.10.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe87:6858/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:12 errors:0 dropped:0 overruns:0 frame:0
          TX packets:65 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1478 (1.4 KiB) TX bytes:7633 (7.4 KiB)

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:28 errors:0 dropped:0 overruns:0 frame:0
          TX packets:28 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1584 (1.5 KiB) TX bytes:1584 (1.5 KiB)
```

Configure Linux Network connections

Computer icon => VPN Connections => Configure VPN...





**Ifconfig:** for checking the ip address.

```
[root@localhost pub]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:87:68:58
          inet addr:192.168.1.3 Bcast:192.168.1.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe87:6858/64 Scope:Link
            UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
            RX packets:21 errors:0 dropped:0 overruns:0 frame:0
            TX packets:22 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:1932 (1.8 KiB) TX bytes:3672 (3.5 KiB)

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:16 errors:0 dropped:0 overruns:0 frame:0
            TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:0
            RX bytes:916 (916.0 b) TX bytes:916 (916.0 b)
```

Open configuration file using , vi /etc/vsftpd/vsftpd.conf

```
[root@localhost pub]# vi /etc/vsftpd/vsftpd.conf
```

Remove "#" from anon\_upload\_enable=YES

```
# Uncomment this to allow the anonymous FTP user to upload files. This only
# has an effect if the above global write enable is activated. Also, you will
# obviously need to create a directory writable by the FTP user.
anon_upload_enable=YES
#
```

Using :wq!, save and quit.

Start the vsftpd service

[root@localhost ~]# service vsftpd restart	[ FAILED ]
Shutting down vsftpd:	[ OK ]
Starting vsftpd for vsftpd:	[ OK ]

[root@localhost ~]# service vsftpd restart	[ OK ]
Shutting down vsftpd:	[ OK ]
Starting vsftpd for vsftpd:	[ OK ]

Now use, [ftp 192.168.1.3](http://192.168.1.3) and Login with an anonymous user and to log off, we use bye command

```
[root@localhost ~]# ftp 192.168.1.3
Connected to 192.168.1.3 (192.168.1.3).
220 (vsFTPd 2.2.2)
Name (192.168.1.3:root): anonymous
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls -a
227 Entering Passive Mode (192,168,1,3,223,140).
150 Here comes the directory listing.
drwxr-xr-x    3 0          0          4096 Jul  3 14:37 .
drwxr-xr-x    3 0          0          4096 Jul  3 14:37 ..
drwxr-xr-x    2 0          0          4096 Aug  4 20:08 pub
226 Directory send OK.
ftp> bye
221 Goodbye.
```

Allow ftp anonymous write enable as follows:

```
#getsebool -a | grep ftp #setsebool -P allow_ftp_anon_write on.
```

```
[root@localhost ~]# getsebool -a|grep ftp
allow_ftpd_anon_write --> off
allow_ftpd_full_access --> off
allow_ftpd_use_cifs --> off
allow_ftpd_use_nfs --> off
ftpd_home_dir --> off
ftpd_connect_db --> off
httpd_enable_ftp_server --> off
sftpd_anon_write --> off
sftpd_enable_homedirs --> off
sftpd_full_access --> off
sftpd_write_ssh_home --> off
tftp_anon_write --> off
```

```
[root@localhost ~]# setsebool -P allow_ftpd_anon_write on
```

Allow System user to get access to ftp server

```
#getsebool -a | grep ftp #setsebool -P ftp_home_dir on
```

```
[root@localhost ~]# getsebool -a|grep ftp
allow_ftpd_anon_write --> on
allow_ftpd_full_access --> off
allow_ftpd_use_cifs --> off
allow_ftpd_use_nfs --> off
ftp_home_dir --> off
ftpd_connect_db --> off
httpd_enable_ftp_server --> off
sftpd_anon_write --> off
sftpd_enable_homedirs --> off
sftpd_full_access --> off
sftpd_write_ssh_home --> off
tftp_anon_write --> off
```

```
[root@localhost ~]# setsebool -P ftp_home_dir=1
```

```
[root@localhost ~]# getsebool -a|grep ftp
allow_ftpd_anon_write --> on
allow_ftpd_full_access --> off
allow_ftpd_use_cifs --> off
allow_ftpd_use_nfs --> off
ftp_home_dir --> on
ftpd_connect_db --> off
httpd_enable_ftp_server --> off
sftpd_anon_write --> off
sftpd_enable_homedirs --> off
sftpd_full_access --> off
sftpd_write_ssh_home --> off
tftp_anon_write --> off
```

By default /var/ftp is ftp user Home directory.

Check the context of file /var/ftp/pub and change to ftp

```
#ls -ldZ /var/ftp/pub
```

```
[root@localhost ~]# ls -ldZ /var/ftp/pub
drwxr-xr-x. root root system_u:object_r:public_content_t:s0 /var/ftp/pub
```

```
#chgrp ftp /var/ftp/pub
```

```
[root@localhost ~]# chgrp ftp /var/ftp/pub
```

```
#chown ftp /var/ftp/pub
```

```
[root@localhost ~]# chown ftp /var/ftp/pub
```

```
#ls -ldZ /var/ftp/pub
```

```
[root@localhost ~]# ls -ldZ /var/ftp/pub
drwxr-xr-x. ftp ftp system_u:object_r:public_content_t:s0 /var/ftp/pub
```

Create a file txt file in pub directory and write the content then save the document using ctrl + d.

```
[root@localhost ~]# chgrp ftp /var/ftp/pub
```

```
[root@localhost ~]# chown ftp /var/ftp/pub
```

**#cd /var/ftp/pub**

```
[root@localhost ~]# cd /var/ftp/pub
```

**#touch T1 T2 T3**

```
[root@localhost pub]# touch F1 F2 F3
```

**#cat > ftpfile.txt**

```
[root@localhost pub]# cat > ftpfile.txt
```

```
[root@localhost pub]# ls  
F1  F2  F3  ftpfile  ftpfile.txt
```

Start the vsftpd service and enable it .

```
[root@localhost pub]# service vsftpd restart
```

```
Shutting down vsftpd:
```

[ OK ]

```
Starting vsftpd for vsftpd:
```

[ OK ]

Give full permission to the directory **/var/ftp/pub** & start the ftp by using “**service vsftpd start**”.

```
[root@localhost pub]# chkconfig vsftpd on
```

```
[root@localhost pub]# chkconfig --list|grep vsftpd
```

```
vsftpd      0:off  1:off  2:on   3:on   4:on   5:on   6:off
```

```
[root@localhost pub]# chmod -R 777 /var/ftp/pub
```

Now FTP is configured

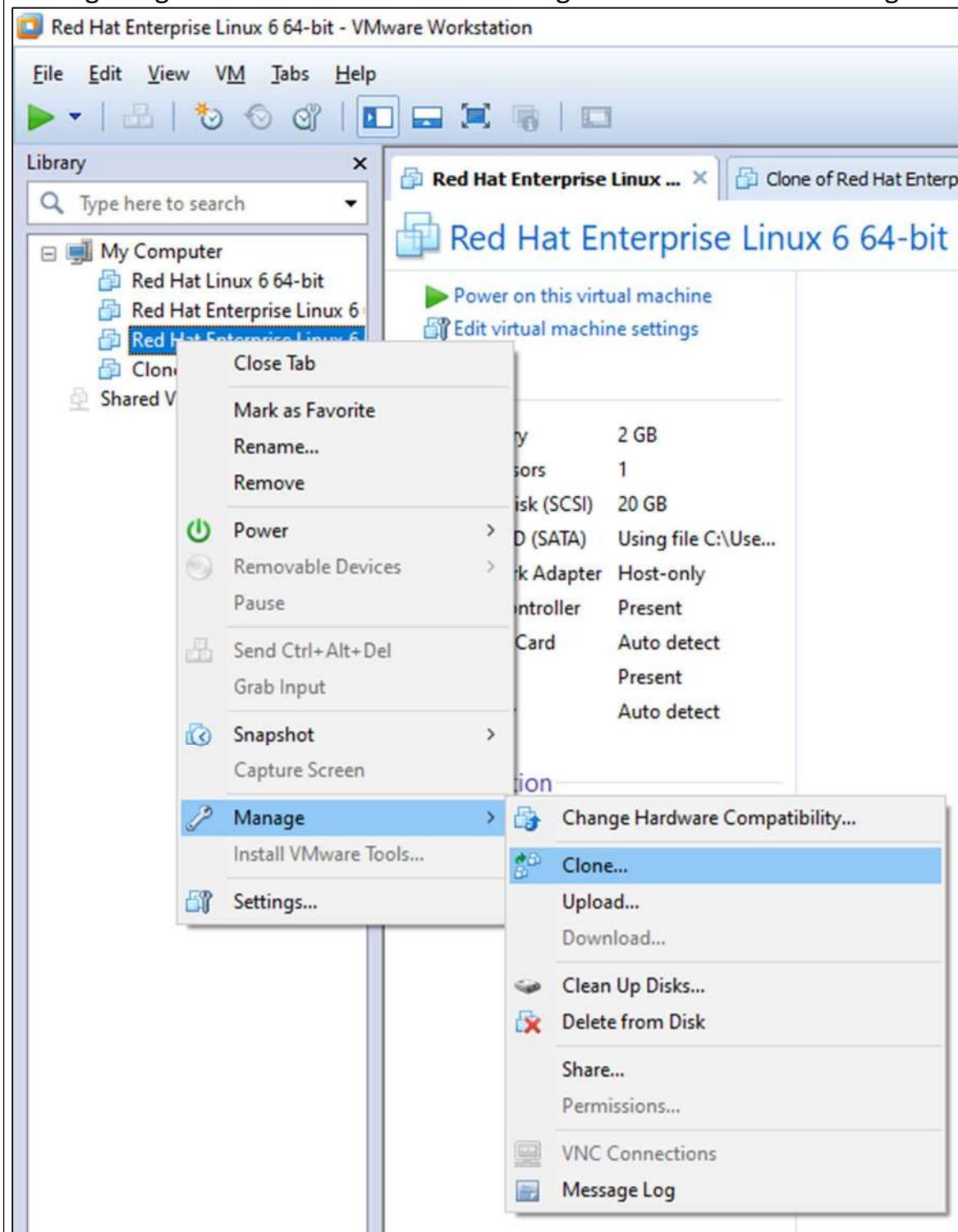
Write the following link in Mozilla Firefox. "<ftp://192.168.1.3/pub/>".

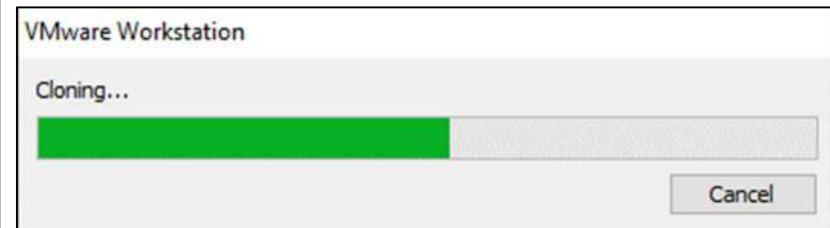
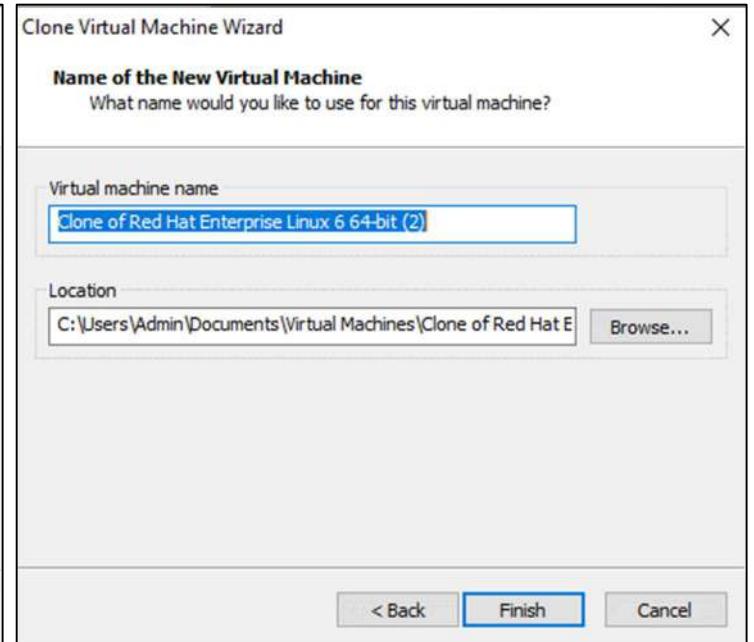
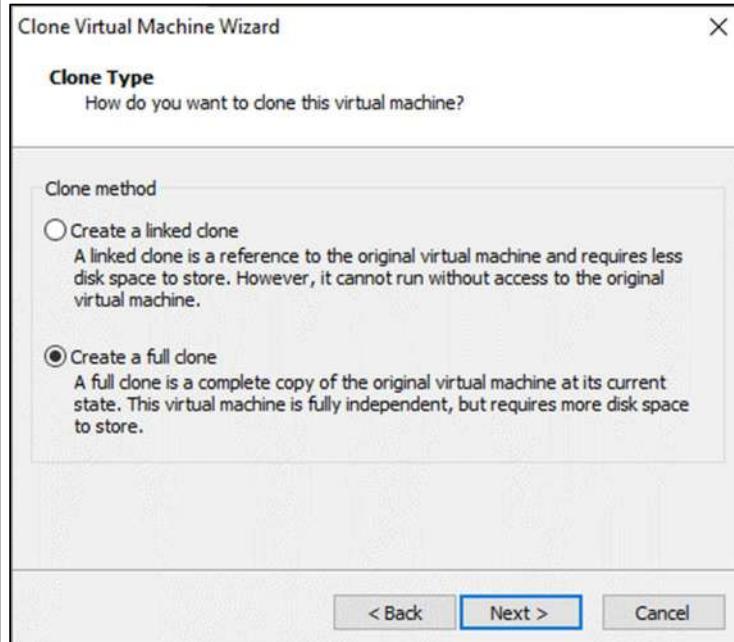
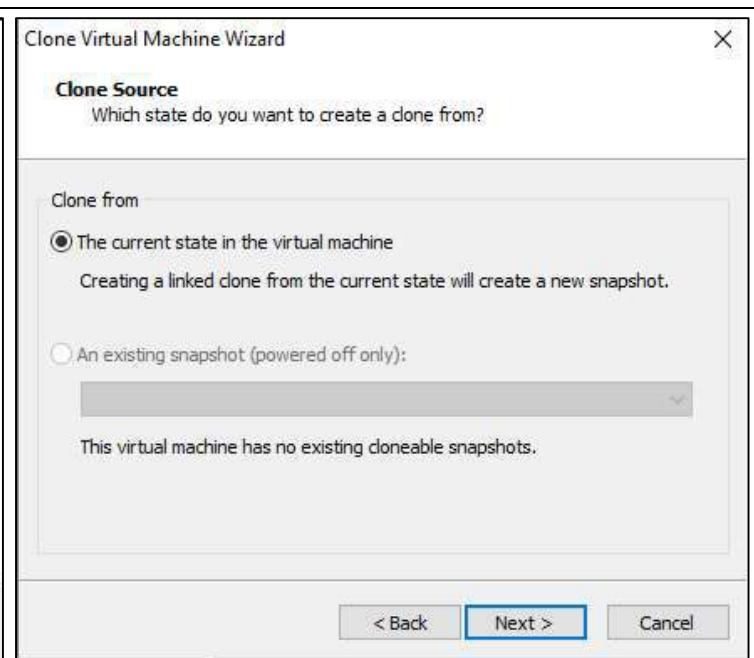
The screenshot shows a Mozilla Firefox browser window with the title "Index of ftp://192.168.1.3/pub/ - Mozilla Firefox". The address bar contains "ftp://192.168.1.3/pub/". The main content area displays an FTP directory listing:

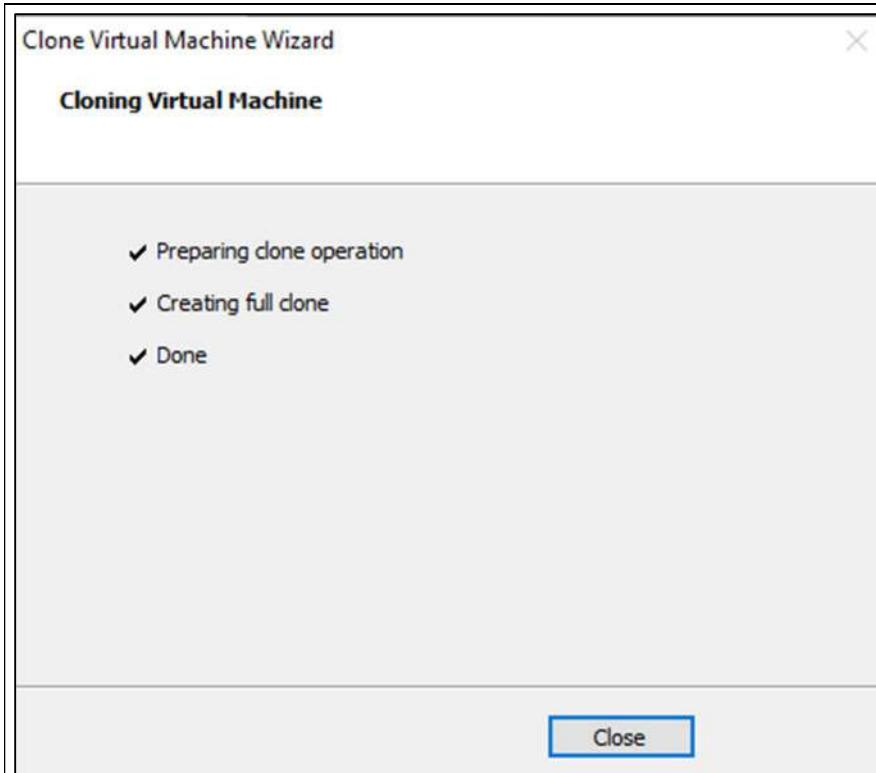
Name	Size	Last Modified
F1		08/04/2022 08:43:00 PM
F2		08/04/2022 08:43:00 PM
F3		08/04/2022 08:43:00 PM
ftpfile	1 KB	08/04/2022 08:09:00 PM
ftpfile.txt	1 KB	08/04/2022 08:43:00 PM

Below the table, there is a link "Up to higher level directory". The status bar at the bottom left says "Done" and the bottom right shows the Firefox icon.

cloning the given Machine and then checking the IP address and setting that IP address.







Now, checking pub directory as we have seen in the above system PC

A screenshot of a Mozilla Firefox browser window. The title bar says "Problem loading page - Mozilla Firefox". The address bar shows "ftp://192.168.1.3/pub/". The main content area displays an "Unable to connect" error message with the following text:

**Unable to connect**

Firefox can't establish a connection to the server at 192.168.1.3.

- The site could be temporarily unavailable or too busy. Try again in a few moments.
- If you are unable to load any pages, check your computer's network connection.
- If your computer or network is protected by a firewall or proxy, make sure that Firefox is permitted to access the Web.

At the bottom of the browser window, there are buttons for "Try Again" and "Done". The status bar at the bottom shows "[root@localhost:~]".

As an error have occurred it means the clone PC has some other ipaddress.

So we can see the ipaddress by terminal and also by GUI.

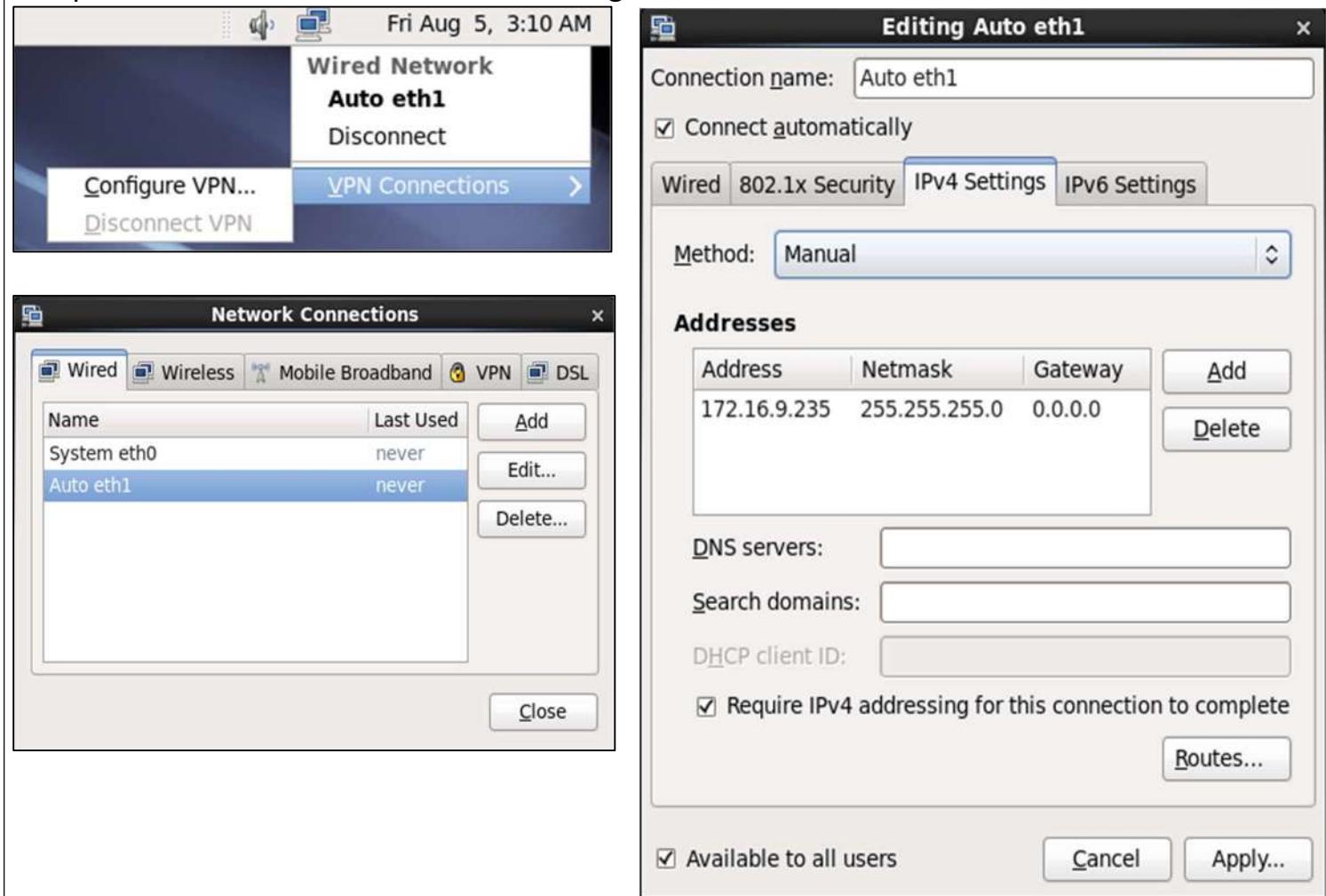
For terminal purpose type "ifconfig".

```
[root@localhost ~]# ifconfig
eth1      Link encap:Ethernet HWaddr 00:0C:29:A3:A2:6A
          inet addr:172.16.9.235 Bcast:172.16.9.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fea3:a26a/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:69 errors:0 dropped:0 overruns:0 frame:0
          TX packets:213 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:5826 (5.6 KiB) TX bytes:21635 (21.1 KiB)

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:18 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1050 (1.0 KiB) TX bytes:1050 (1.0 KiB)
```

## Configure Linux Network connections

Computer icon => VPN Connections => Configure VPN...



**service network restart:** to restart the network.

```
[root@localhost ~]# service network restart
Shutting down loopback interface: [ OK ]
Bringing up loopback interface: [ OK ]
```

For test the FTP use <ftp://172.16.9.235/pub/>

Index of <ftp://172.16.9.235/pub/>

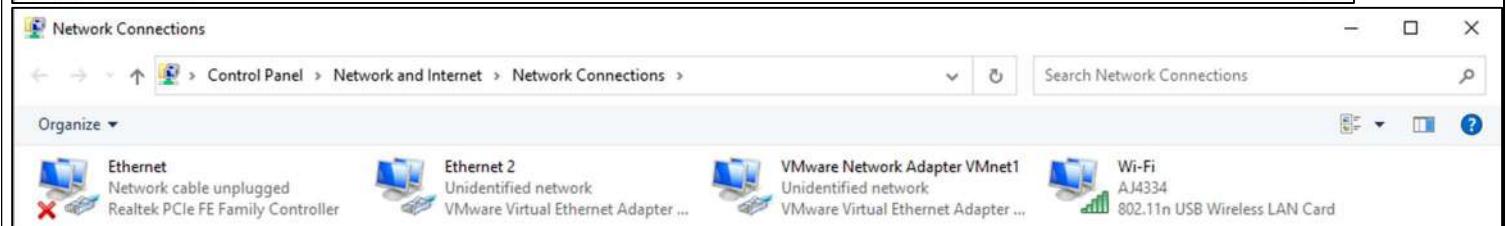
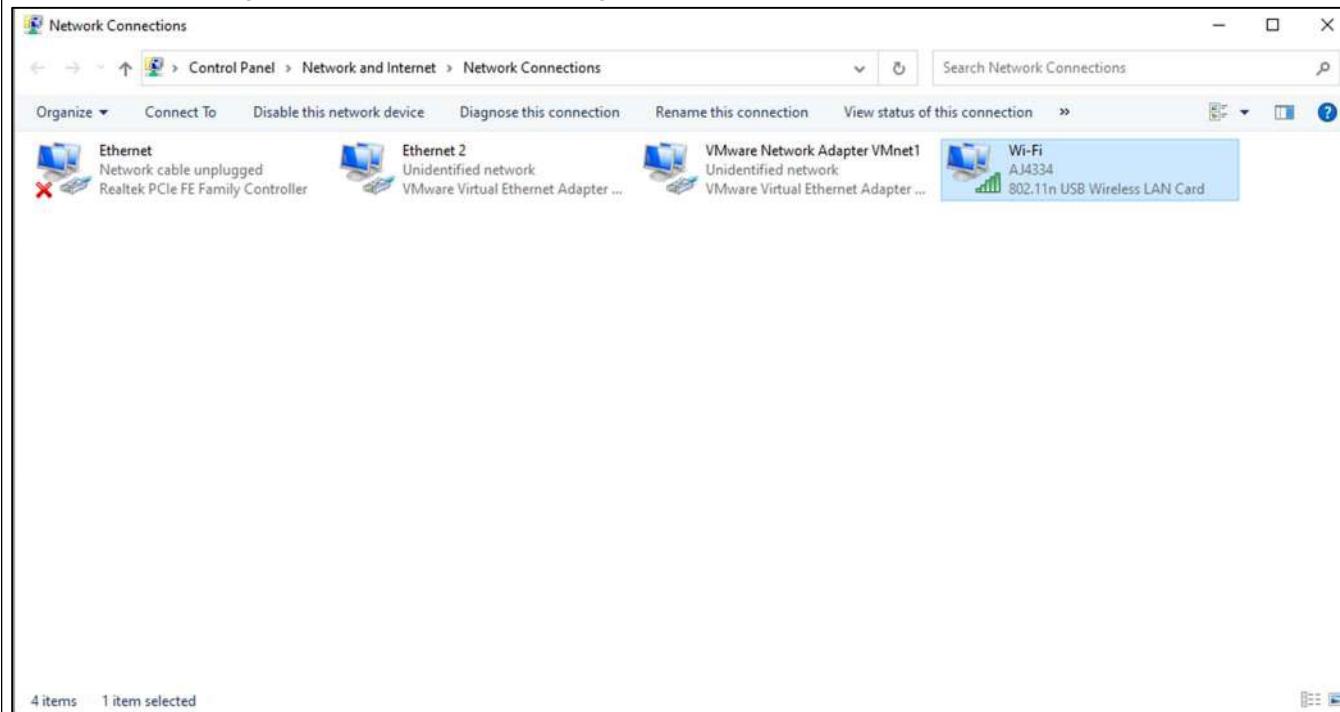
[Up to higher level directory](#)

Name	Size	Last Modified
F1		08/04/2022 08:43:00 PM
F2		08/04/2022 08:43:00 PM
F3		08/04/2022 08:43:00 PM
ftpfile	1 KB	08/04/2022 08:09:00 PM
ftpfile.txt	1 KB	08/04/2022 08:43:00 PM

**c) Configuring Samba Server:**

Open Windows Network Connections Folder through this path

**“Control Panel\Network and Internet\Network Connections”**



Click on Windows Connected Internet Service.



Click on Details... To view the System IPv4 Address “192.168.1.10”.

The screenshot shows two windows side-by-side. On the left is the 'Wi-Fi Status' window with tabs for 'General' and 'Activity'. It displays connection details like IPv4 Connectivity (Internet), IPv6 Connectivity (Internet), Media State (Enabled), SSID (AJ4334), Duration (02:24:32), Speed (150.0 Mbps), and Signal Quality (4 bars). Below these are 'Details...' and 'Wireless Properties' buttons. On the right is the 'Network Connection Details' window, which lists various network properties with their values. The 'IPv4 Address' is highlighted in blue as 192.168.1.10. Other listed properties include Description (802.11n USB Wireless LAN Card), Physical Address (1C-BF-CE-DE-D7-22), DHCP Enabled (Yes), Lease Obtained (Thursday, August 4, 2022 7:43:27 PM), Lease Expires (Friday, August 5, 2022 7:43:27 PM), IPv4 Default Gateway (192.168.1.254), IPv4 DHCP Server (192.168.1.254), IPv4 DNS Servers (192.168.54.42, 8.8.8.8), and IPv4 WINS Server (NetBIOS over Tcpip Enabled: Yes).

Now, Open The VMware Network Adapter and click on Properties.

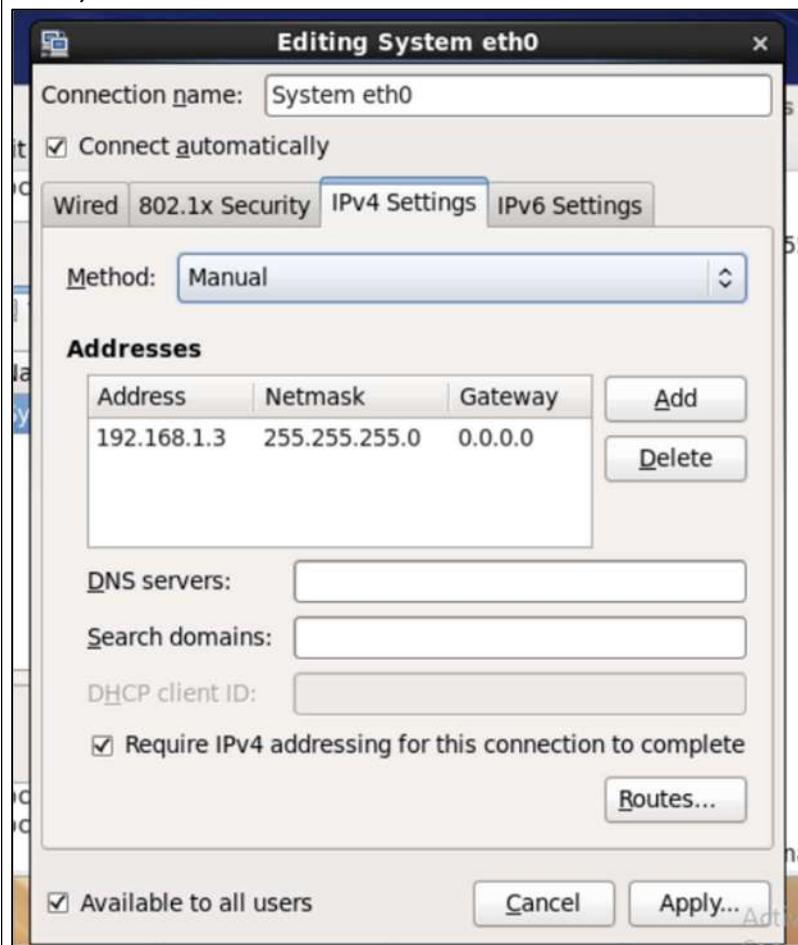


Now click on Internet Protocol Version 4 and set the below lines as follow:

IP address: 192.168.1.11  
Subnet mask: 255.255.255.0  
Default gateway: 192.168.1.254

The screenshot shows two windows. On the left is the 'VMware Network Adapter VMnet1 Properties' window under the 'Networking' tab. It shows 'Connect using:' as 'VMware Virtual Ethernet Adapter for VMnet1' and lists items like Client for Microsoft Networks, Internet Protocol Version 4 (TCP/IPv4) (which is selected and highlighted in blue), and Microsoft LLDP Protocol Driver. On the right is the 'Internet Protocol Version 4 (TCP/IPv4) Properties' window. Under the 'General' tab, it shows options for getting IP settings automatically or using a static IP. The 'Use the following IP address' option is selected, with the IP address set to 192.168.1.11, Subnet mask to 255.255.255.0, and Default gateway to 192.168.1.254. There are also sections for DNS server addresses and validation settings.

Now, Switch on the Linux Machine on VMware and the set IP address for it.



Ifconfig: to check the ip address of the system.

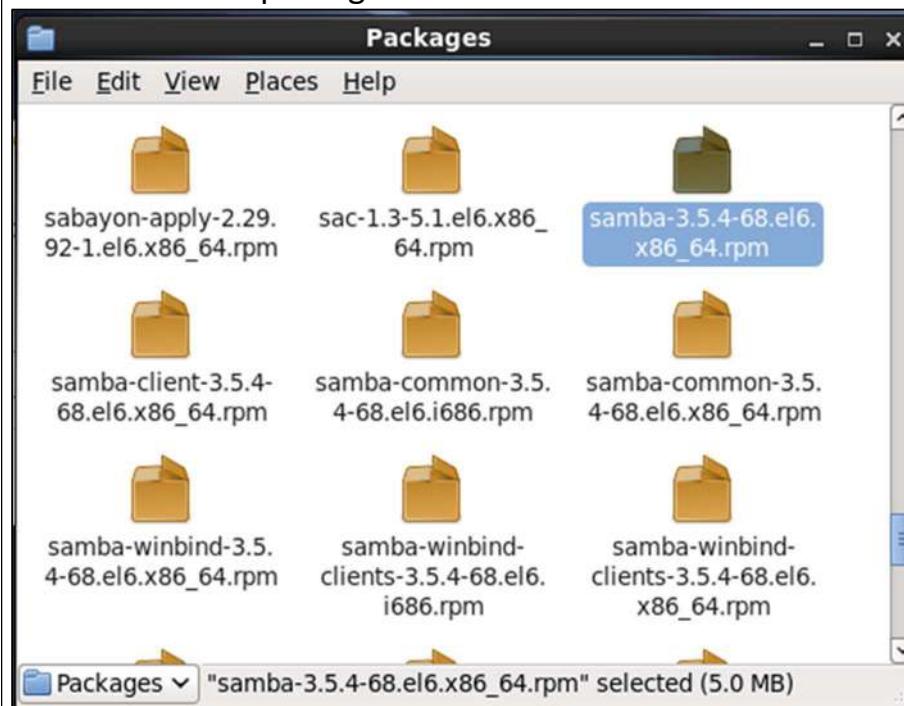
```
[root@localhost ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:87:68:58
          inet addr:192.168.1.3 Bcast:192.168.1.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe87:6858/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:16 errors:0 dropped:0 overruns:0 frame:0
          TX packets:27 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1504 (1.4 KiB) TX bytes:4069 (3.9 KiB)

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:18 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1050 (1.0 KiB) TX bytes:1050 (1.0 KiB)
```

Go to the packages directory

```
[root@localhost ~]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
[root@localhost Packages]#
```

Install all samba packages.



Check whether the samba package is installed or not.

```
[root@localhost Packages]# rpm -qa | grep samba
samba-winbind-clients-3.5.4-68.el6.i686
samba-client-3.5.4-68.el6.x86_64
samba-winbind-3.5.4-68.el6.x86_64
samba-winbind-clients-3.5.4-68.el6.x86_64
samba-common-3.5.4-68.el6.x86_64
samba-3.5.4-68.el6.x86_64
samba-common-3.5.4-68.el6.i686
```

Create a Samba user account that has access to the share.

```
[root@localhost home]# smbpasswd -a osr
New SMB password:
Retype new SMB password:
tdbsam_open: Converting version 0.0 database to version 4.0.
tdbsam_convert_backup: updated /var/lib/samba/private/passdb.tdb file.
account_policy_get: tdb_fetch_uint32 failed for type 1 (min password length), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 2 (password history), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 3 (user must logon to change password), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 4 (maximum password age), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 5 (minimum password age), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 6 (lockout duration), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 7 (reset count minutes), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 8 (bad lockout attempt), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 9 (disconnect time), returning 0
account_policy_get: tdb_fetch_uint32 failed for type 10 (refuse machine password change), returning 0
Added user osr.
```

Create a directory /data on the Linux file system on the Samba server.

```
[root@localhost Packages]# cd /home
[root@localhost home]#
```

```
[root@localhost home]# mkdir /data
[root@localhost home]#
```

Change directory as data.

```
[root@localhost home]# cd /data
[root@localhost data]#
```

```
[root@localhost data]# touch f1 f2 f3
```

```
[root@localhost data]# cat > test
This Is Samba Practical
```

```
[root@localhost data]# cd /home
```

Give full permission to this directory then, Set directory with the samba share t type, if you want to treat the files as samba share data.

```
[root@localhost home]# chmod 777 /data
```

```
[root@localhost home]# chcon -t samba_share_t /data
```

Open smb.conf file with vi editor.

```
[root@localhost home]# vi /etc/samba/smb.conf
```

**Add the below data at the end of the file:**

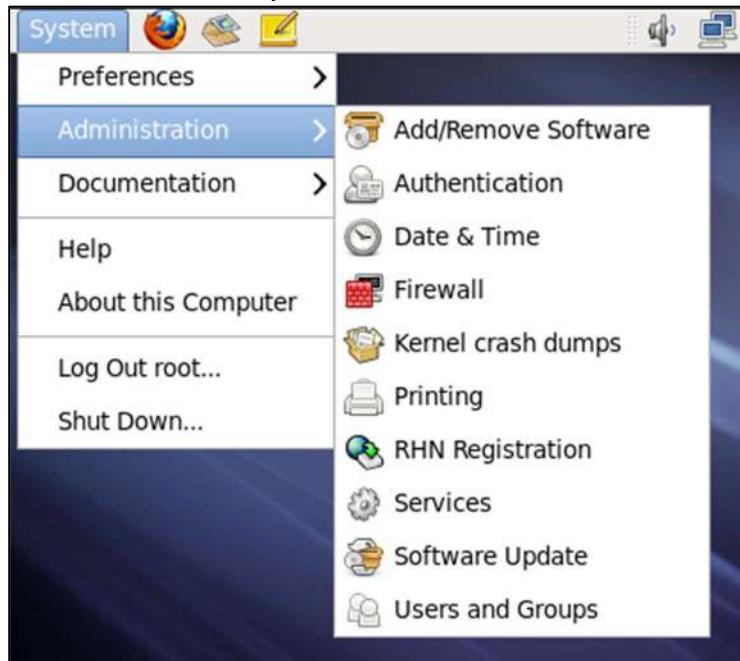
```
;;
[ data ]
comment = data
path = /home/data
public = yes
writable = yes
write list = osr
user list = osr
:wq!
```

Restart the smb service.

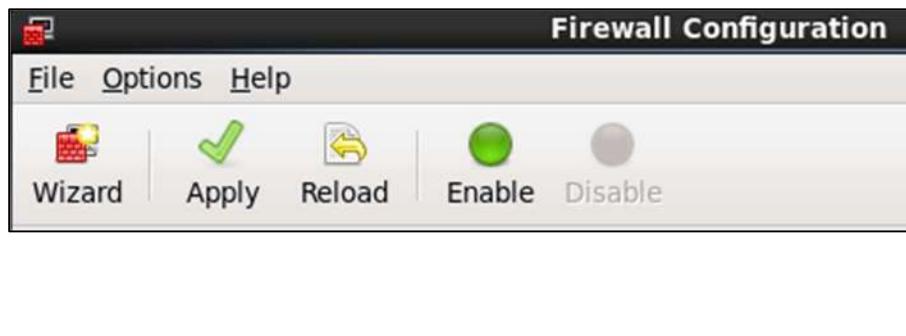
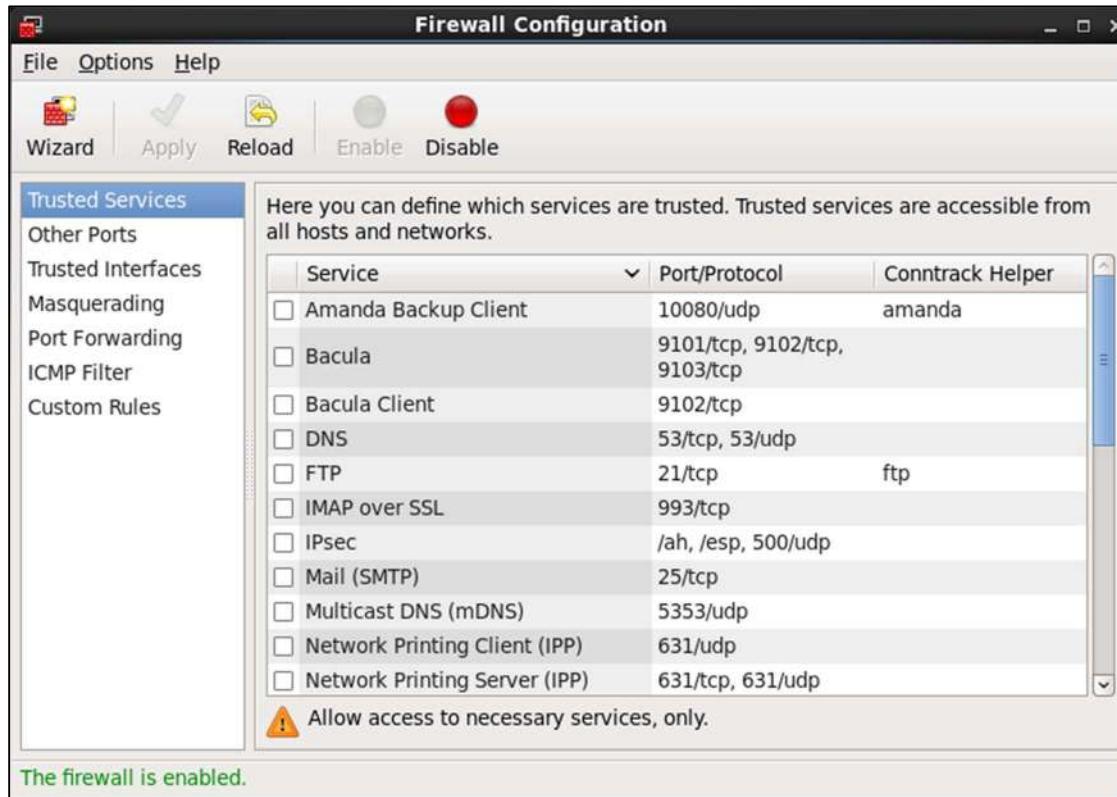
```
[root@localhost ~]# service smb restart
Shutting down SMB services: [ FAILED ]
Starting SMB services: [ OK ]
```

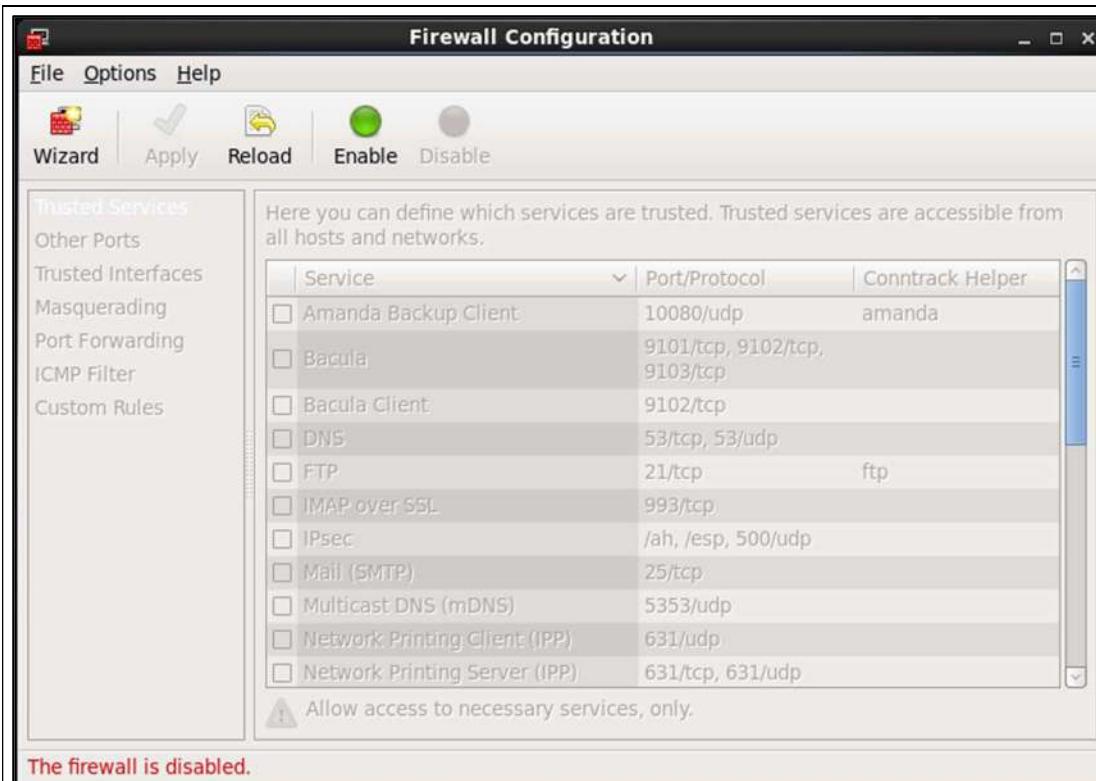
```
[root@localhost ~]# service smb restart
Shutting down SMB services: [ OK ]
Starting SMB services: [ OK ]
```

**Go to Firewall:** System => Administration => Firewall.



Turning off the firewall by clicking on Disable then clicking on apply to make changes.



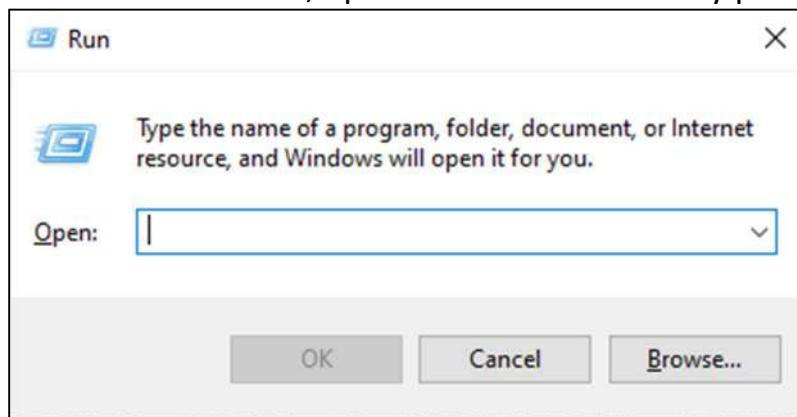


Now, try to ping the ipaddress of the system to receive the packets from Windows Server.

Ping 192.168.1.3

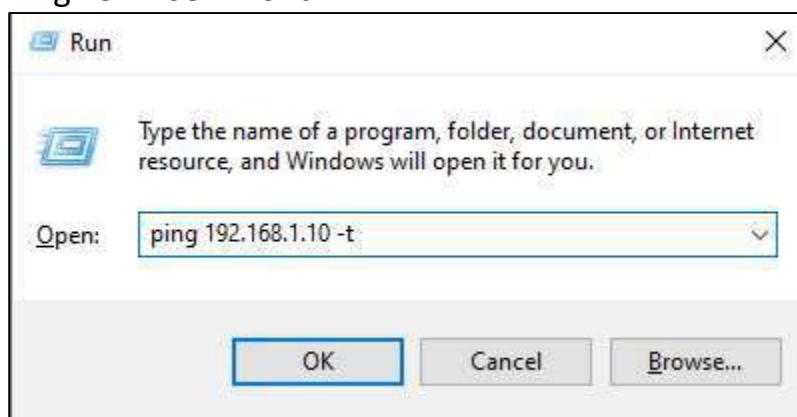
```
root@localhost:~ [root@localhost ~]# ping 192.168.1.3
PING 192.168.1.3 (192.168.1.3) 56(84) bytes of data.
64 bytes from 192.168.1.3: icmp_seq=1 ttl=64 time=0.022 ms
64 bytes from 192.168.1.3: icmp_seq=2 ttl=64 time=0.038 ms
64 bytes from 192.168.1.3: icmp_seq=3 ttl=64 time=0.032 ms
64 bytes from 192.168.1.3: icmp_seq=4 ttl=64 time=0.031 ms
64 bytes from 192.168.1.3: icmp_seq=5 ttl=64 time=0.041 ms
64 bytes from 192.168.1.3: icmp_seq=6 ttl=64 time=0.038 ms
64 bytes from 192.168.1.3: icmp_seq=7 ttl=64 time=0.034 ms
64 bytes from 192.168.1.3: icmp_seq=8 ttl=64 time=0.032 ms
64 bytes from 192.168.1.3: icmp_seq=9 ttl=64 time=0.045 ms
64 bytes from 192.168.1.3: icmp_seq=10 ttl=64 time=0.031 ms
64 bytes from 192.168.1.3: icmp_seq=11 ttl=64 time=0.032 ms
64 bytes from 192.168.1.3: icmp_seq=12 ttl=64 time=0.059 ms
64 bytes from 192.168.1.3: icmp_seq=13 ttl=64 time=0.039 ms
64 bytes from 192.168.1.3: icmp_seq=14 ttl=64 time=0.036 ms
^C64 bytes from 192.168.1.3: icmp_seq=15 ttl=64 time=0.048 ms
64 bytes from 192.168.1.3: icmp_seq=16 ttl=64 time=0.036 ms
--- 192.168.1.3 ping statistics ---
16 packets transmitted, 16 received, 0% packet loss, time 15446ms
rtt min/avg/max/mdev = 0.022/0.037/0.059/0.008 ms
```

On Windows Server, open the run command by pressing “Windows + r”.



Type ping ipaddress of the Windows System to receive packets from VMware Networks.

Ping 192.168.1.10 -t

A screenshot of a Windows Command Prompt window. The title bar says "C:\Windows\system32\ping.exe". The main area displays the output of a ping command:

```
Pinging 192.168.1.10 with 32 bytes of data:  
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128  
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
```

**Practical 7: DNS, DHCP and Mail Server:****a) Configuring DNS:**

- A Domain Name System (DNS) server, or name server, is used to resolve an IP address to a hostname or vice versa.
- This is necessary because, although domain names are easy for people remember, computer or machines, access websites based on IP addresses.
- When we type in a web browser, e.g. [www.google.com](http://www.google.com), our Internet Service Provider views the DNS associated with the domain name, translates it into a machine friendly IP address (for example: 216.58.203.196 is the IP for google.com) and directs our Internet connection to the correct website.
- DNS is a hierarchically distributed database that creates hierarchical names that can be resolved to IP address. The IP address are then resolved to MAC addresses. Therefore, DNS provides the means for naming IP hosts, and for locating IP hosts when they are queried for by name.

Check the IP address.

```
[root@localhost ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:95:98:4D
          inet addr:192.168.1.3 Bcast:192.168.1.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe95:984d/64 Scope:Link
            UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
            RX packets:0 errors:0 dropped:0 overruns:0 frame:0
            TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:0 (0.0 b) TX bytes:2804 (2.7 KiB)

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:14 errors:0 dropped:0 overruns:0 frame:0
            TX packets:14 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:0
```

open vi /etc/sysconfig/network-scripts/ifcfg-eth0

```
[root@localhost ~]# vi /etc/sysconfig/network-scripts/ifcfg-eth0
```

```
[root@localhost:~]
File Edit View Search Terminal Help
DEVICE="eth0"
NM_CONTROLLED="yes"
ONBOOT=yes
TYPE=Ethernet
BOOTPROTO=none
IPADDR=192.168.1.3
PREFIX=24
DEFROUTE=yes
IPV4_FAILURE_FATAL=yes
IPV6INIT=no
NAME="System eth0"
UUID=5fb06bd0-0bb0-7ffb-45f1-d6edd65f3e03
HWADDR=00:0C:29:9E:1C:A0
```

Type DNS1=192.168.1.3

```
DNS1=192.168.1.3
```

Open vi /etc/hosts

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

Enter 192.168.1.3 server.tyit.com.server then save and quit by “:wq!”.

```
[root@localhost:~]
File Edit View Search Terminal Help
127.0.0.1      localhost.localdomain  localhost
::1            localhost6.localdomain6  localhost6
192.168.1.3  server.tyit.com  server
```

vi /etc/sysconfig/network

```
[root@localhost ~]# vi /etc/sysconfig/network
```

Enter the HOSTNAME=server.tyit.com

```
[root@localhost:~]
File Edit View Search Terminal Help
NETWORKING=yes
HOSTNAME=server.tyit.com
```

```
vi /etc/resolv.conf
```

```
[root@localhost ~]# vi /etc/resolv.conf
```

Type nameserver 192.168.1.3 then save and quit.

```
# Generated by NetworkManager
search tyit.com
nameserver 192.168.1.3
```

Install All bind packages

```
[root@localhost ~]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
[root@localhost Packages]#
[root@localhost Packages]# rpm -ivh bind*
warning: bind-9.7.0-5.P2.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID
fd431d51: NOKEY
Preparing... ################################################ [100%]
      package bind-libs-32:9.7.0-5.P2.el6.x86_64 is already installed
      package bind-utils-32:9.7.0-5.P2.el6.x86_64 is already installed
```

Come to home directory using cd command

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

Query to check whether the bind packages are installed or not.

```
[root@localhost ~]# rpm -qa | grep bind*
binutils-2.20.51.0.2-5.11.el6.x86_64
samba-winbind-clients-3.5.4-68.el6.i686
bind-chroot-9.7.0-5.P2.el6.x86_64
libini_config-0.5.1-28.el6.x86_64
PackageKit-device-rebind-0.5.8-13.el6.x86_64
samba-winbind-3.5.4-68.el6.x86_64
bind-dyndb-ldap-0.1.0-0.9.b.el6.x86_64
samba-winbind-clients-3.5.4-68.el6.x86_64
bind-libs-9.7.0-5.P2.el6.x86_64
ypbind-1.20.4-29.el6.x86_64
bind-utils-9.7.0-5.P2.el6.x86_64
bind-9.7.0-5.P2.el6.x86_64
rpcbind-0.2.0-8.el6.x86_64
libproxy-bin-0.3.0-2.el6.x86_64
```

vi /etc/named.conf

```
[root@localhost ~]# vi /etc/named.conf
```

For setting number press ESC and type : se nu

**Line 11:** listen-on port 53 {192.168.1.3; }

**Line 12:** For commenting this line put # Sign in front of it.

**Line 17 :** allow-query { any; };

Check the last line of file and note down the last line

```

10 options {
11     listen-on port 53 { 192.168.1.3; };
12 #     listen-on-v6 port 53 { ::1; };
13     directory      "/var/named";
14     dump-file      "/var/named/data/cache_dump.db";
15     statistics-file "/var/named/data/named_stats.txt";
16     memstatistics-file "/var/named/data/named_mem_stats.txt";
17     allow-query    { any; };

```

Open that line which we have noted down before, vi /etc/named.rfc1912.zones.

```
[root@localhost ~]# vi /etc/named.rfc1912.zones
```

**Line 13:** Change Zone “localhost.localdomain” IN to zone “tyit.com” IN.

**Line:15:** Change file “named.localhost” to “forward.zone”.

<pre> 13 zone "localhost.localdomain" IN { 14     type master; 15     file "named.localhost"; 16     allow-update { none; }; </pre>	<pre> 13 zone "tyit.com" IN { 14     type master; 15     file "forward.zone"; 16     allow-update { none; }; 17 }; </pre>
---	---

**Line 30:** change zone “1.0.0.127.in-addr.arpa” IN to zone “1.168.192.in-addr.arpa” IN

**Line 33:** change file “named.loopback” to file “reverse.zone”

```

31 zone "1.168.192.in-addr.arpa" IN {
32     type master;
33     file "reverse.zone";
34     allow-update { none; };
35 };

```

Change directory to cd /var/named

```
[root@localhost ~]# cd /var/named
```

```
[root@localhost named]# ls
chroot dynamic named.empty      named.loopback
data   named.ca   named.localhost slaves
```

Copy the files into new file using cp named.localhost forward.zone

```
[root@localhost named]# cp named.localhost forward.zone
```

Copy the files into new file using cp named.localhost reverse.zone

```
[root@localhost named]# cp named.localhost reverse.zone
```

Type ls to see those files.

```
[root@localhost named]# ls
chroot  dynamic      named.ca      named.localhost  reverse.zone
data    forward.zone  named.empty   named.loopback  slaves
```

Open forward zone file using vi forward.zone

```
[root@localhost named]# vi forward.zone
```

Change the few lines of below window

```
$TTL 1D
@ IN SOA @ rname.invalid. (
    0 ; serial
    1D ; refresh
    1H ; retry
    1W ; expire
    3H ) ; minimum
NS      @
A       127.0.0.1
AAAA   ::1
```

Like this

```
$TTL 1D
@ IN SOA server.tyit.com. root.server.tyit.com. (
    0 ; serial
    1D ; refresh
    1H ; retry
    1W ; expire
    3H ) ; minimum
IN      NS      server.tyit.com.
server IN      A       192.168.1.3
```

Open reverse zone file using vi reverse.zone

```
[root@localhost named]# vi reverse.zone
```

Change the few lines of below window

```
$TTL 1D
@ IN SOA @ rname.invalid. (
    0 ; serial
    1D ; refresh
    1H ; retry
    1W ; expire
    3H ) ; minimum
NS      @
A       127.0.0.1
AAAA   ::1
```

Like this

```
$TTL 1D
@ IN SOA server.tyit.com. root.server.tyit.com. (
    0 ; serial
    1D ; refresh
    1H ; retry
    1W ; expire
    3H ) ; minimum
IN      NS      server.tyit.com.
3      IN      PTR     server.tyit.com.
```

chgrp named forward.zone

```
[root@localhost named]# chgrp named forward.zone
```

chgrp named reverse.zone

```
[root@localhost named]# chgrp named reverse.zone
```

Start the dns server using service named start

```
root@server:~
```

```
File Edit View Search Terminal Help
```

```
[root@server ~]# service named start
Starting named: [ OK ]
```

Check the dns is configured

Use dig command: dig server.tyit.com

```
[root@server ~]# dig server.tyit.com

; <>> DiG 9.7.0-P2-RedHat-9.7.0-5.P2.el6 <>> server.tyit.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 30306
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 0

;; QUESTION SECTION:
server.tyit.com.      IN      A

;; ANSWER SECTION:
server.tyit.com.    86400   IN      A      192.168.1.3

;; AUTHORITY SECTION:
tyit.com.            86400   IN      NS      server.tyit.com.

;; Query time: 0 msec
;; SERVER: 192.168.1.3#53(192.168.1.3)
;; WHEN: Fri Aug  5 10:13:29 2022
;; MSG SIZE rcvd: 63
```

OR

Dig -x 192.168.1.3

```
[root@server ~]# dig -x 192.168.1.3

; <>> DiG 9.7.0-P2-RedHat-9.7.0-5.P2.el6 <>> -x 192.168.1.3
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 64457
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1

;; QUESTION SECTION:
;3.1.168.192.in-addr.arpa.     IN      PTR

;; ANSWER SECTION:
3.1.168.192.in-addr.arpa. 86400 IN      PTR      server.tyit.com.

;; AUTHORITY SECTION:
1.168.192.in-addr.arpa. 86400   IN      NS      server.tyit.com.

;; ADDITIONAL SECTION:
server.tyit.com.          86400   IN      A      192.168.1.3

;; Query time: 0 msec
;; SERVER: 192.168.1.3#53(192.168.1.3)
;; WHEN: Fri Aug  5 10:12:32 2022
```

### b) Configuring DHCP:

- The Dynamic Host Configuration Protocol (DHCP) is used to assign IP-related configuration to hosts in our network.
- DHCP server makes managing a network a lot easier, because it gives the administrator the option to manage IP-related configuration on a single, central location on the network, instead of on multiple different hosts.
- A DHCP server can be configured to assign more than 80 different parameters to its clients, of which the most commonly used are IP addresses, default gateways, and the IP address of the DNS name servers.
- When client comes up, it will send a DHCP request on the network. This DHCP request is sent as a broadcast, and the DHCP server that receives the DHCP request will answer and assign an available IP address.
- Because the DHCP request is sent as a broadcast, we can have just one DHCP server per subnet.
- If multiple DHCP servers are available, there is no way to determine which DHCP server assigns the IP addresses. In such cases, it is common to set up failover DHCP, which means that two DHCP services together are servicing the same subnet, and one DHCP server completely takes over if something goes wrong.

Set IP Address and check using ifconfig.

```
[root@localhost ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:9E:1C:A0
          inet addr:192.168.1.3 Bcast:192.168.1.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe9e:1ca0/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:15 errors:0 dropped:0 overruns:0 frame:0
          TX packets:28 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1752 (1.7 KiB) TX bytes:4063 (3.9 KiB)

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:18 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1070 (1.0 KiB) TX bytes:1070 (1.0 KiB)
```

Go to the packages directory to install some package.

```
[root@localhost ~]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
```

Copy the file name dhcpcd.conf.sample to dhcpcd.conf.

```
[root@localhost Packages]# cp /usr/share/doc/dhcp-4.1.1/dhcpcd.conf.sample /etc/dhcp/dhcpcd.conf
cp: overwrite `/etc/dhcp/dhcpcd.conf'? y
```

Check whether the dhcp packages are installed or not.

```
[root@localhost Packages]# rpm -qa | grep dhcp
dhcp-4.1.1-12.P1.el6.x86_64
```

Open dhcp configuration file.

```
[root@localhost Packages]# vi /etc/dhcp/dhcpd.conf
```

Remove # from authoritative:

```
# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
authoritative;

subnet 10.152.187.0 netmask 255.255.255.0 {
#
# This is a very basic subnet declaration.

subnet 192.168.1.0 netmask 255.255.255.0 {
    range 192.168.1.10 192.168.1.20;
    option routers rtr-239-0-1.example.org, rtr-239-0-2.example.org;
}
```

Start the DHCP service by using service dhcpcd start

```
[root@localhost Packages]# service dhcpcd start
Starting dhcpcd: [ OK ]
```

Restart it using service dhcpcd restart

```
[root@localhost Packages]# service dhcpcd restart
Shutting down dhcpcd: [ OK ]
Starting dhcpcd: [ OK ]
```

chkconfig –list dhcpcd

```
[root@localhost Packages]# chkconfig --list dhcpcd
dhcpcd      0:off   1:off   2:off   3:off   4:off   5:off   6:off
```

chkconfig dhcpcd on

```
[root@localhost Packages]# chkconfig dhcpcd on
[root@localhost Packages]# chkconfig --list dhcpcd
dhcpcd      0:off   1:off   2:on    3:on    4:on    5:on    6:off
```

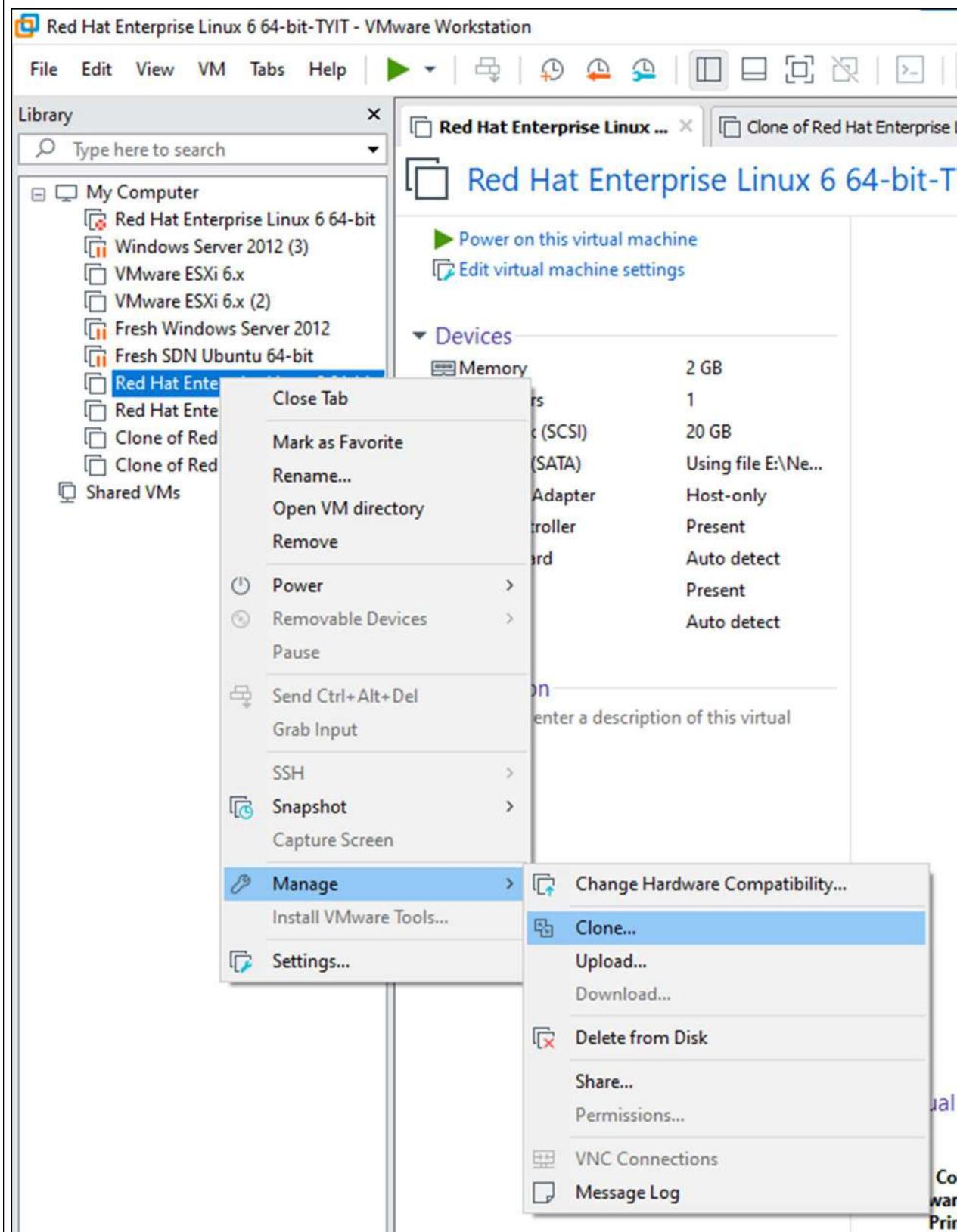
stop the firewall.

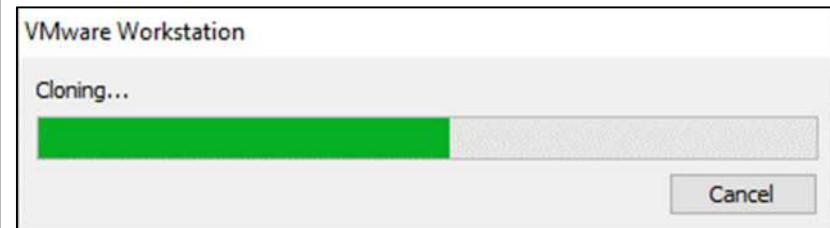
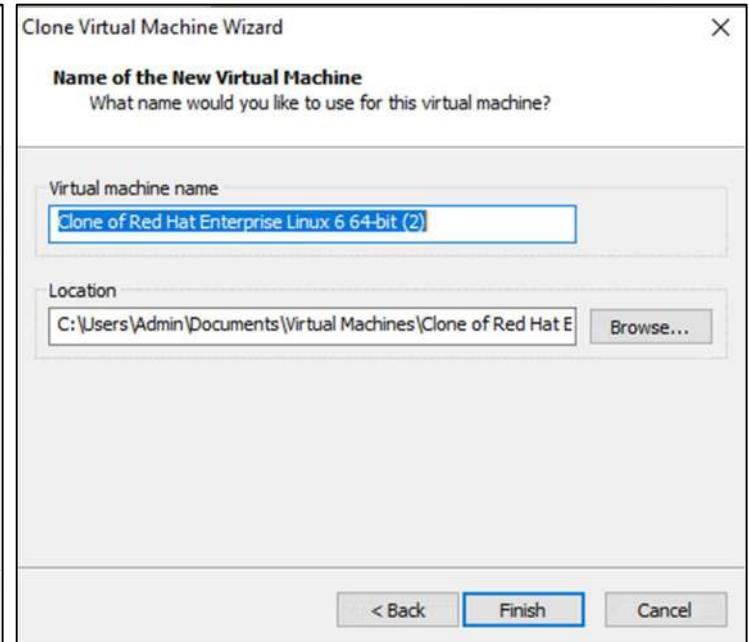
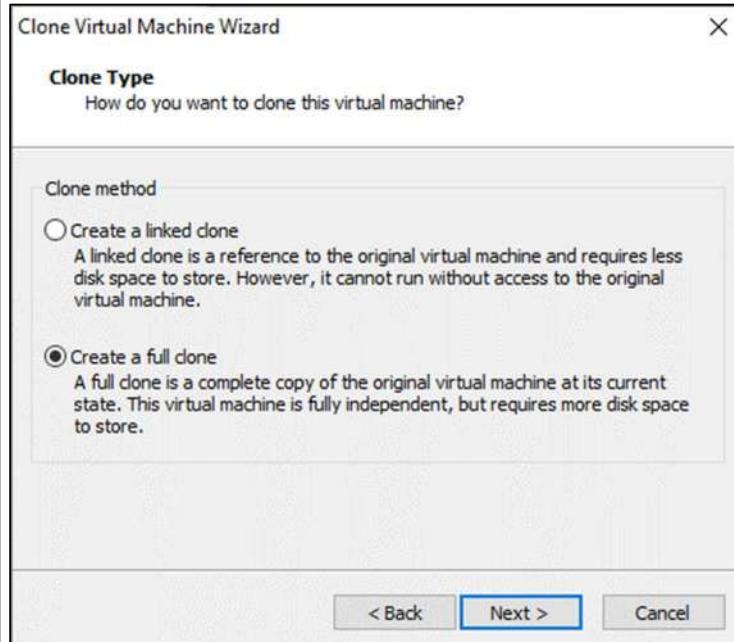
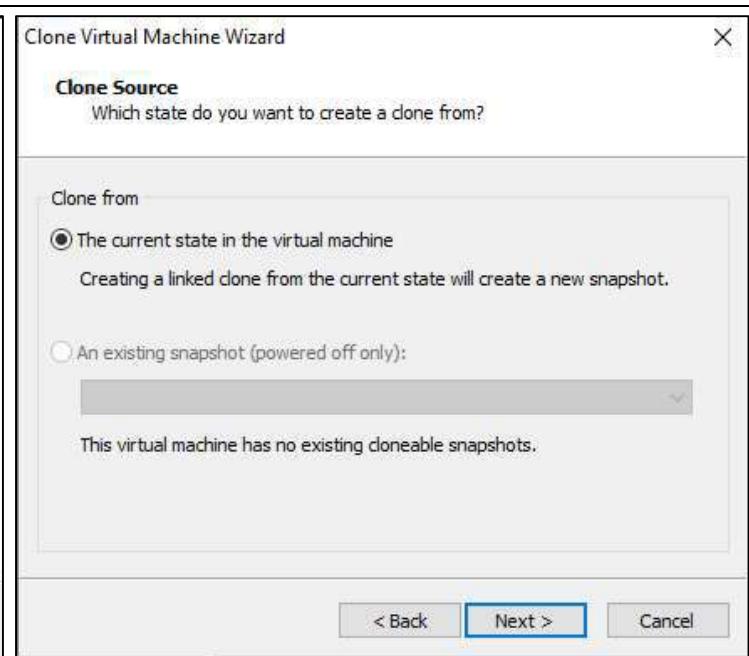
```
[root@localhost Packages]# service iptables stop
iptables: Flushing firewall rules: [ OK ]
iptables: Setting chains to policy ACCEPT: filter [ OK ]
iptables: Unloading modules: [ OK ]
```

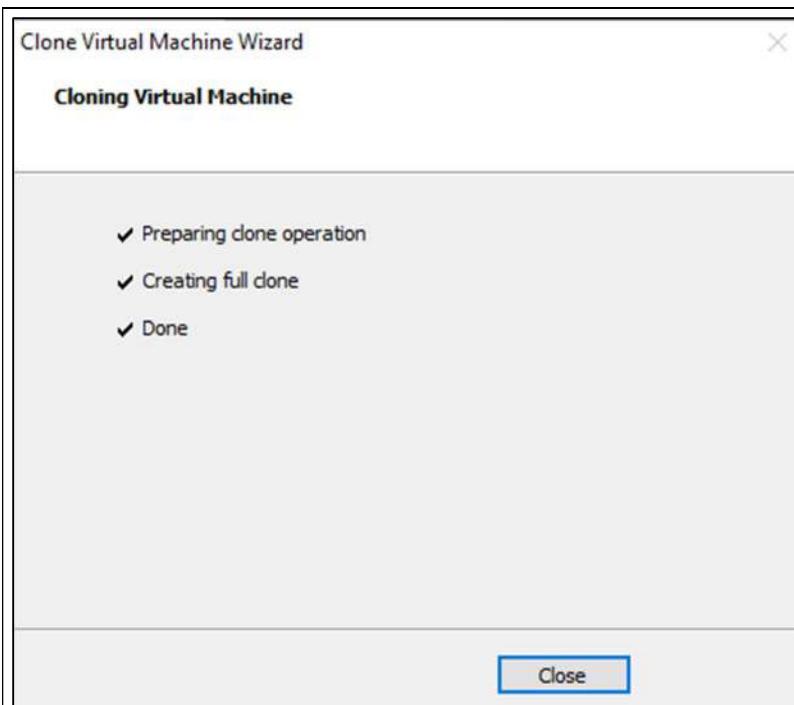
setenforce 0

```
[root@localhost Packages]# setenforce 0
```

Make a clone of the machine.







Configure Linux Network connections

Computer icon => VPN Connections => Configure VPN...



As we can see it has been set to Automatic (DHCP) it means DHCP is working.



The final output is that IP address which is given as a range.

```
root@server:~          File Edit View Search Terminal Help
[root@server ~]# ifconfig
eth2      Link encap:Ethernet HWaddr 00:0C:29:14:A2:7E
          inet addr:192.168.1.21 Bcast:192.168.1.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe14:a27e/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:6 errors:0 dropped:0 overruns:0 frame:0
          TX packets:28 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:926 (926.0 b) TX bytes:6455 (6.3 KiB)

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:18 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1060 (1.0 KiB) TX bytes:1060 (1.0 KiB)
```

## Practical 8: Setting Up a Mail Server:

### a) Configuring mail using mutt:

- Mutt is a command line-based Email client. It's a very useful and powerful tool to send and read mails from command line in UNIX based systems.
- Mutt also supports POP and IMAP protocols for receiving mails. It opens with a colored interface to send Email which makes it user friendly to send emails from command line.
- The Mut MUA is available in the default Red Hat Enterprise Linux repositories, but you'll have to install it.

Send a mail form one user to another using mail server by mutt package.

First, we have to install mutt package to run the mail server.

Click on the RHEL cd icon that will be displayed on main window system.



After that search and click on Packages folder in which there is mutt package.



Type mutt and install it.



Click on “Continue Anyway”.



Click on “Install”.



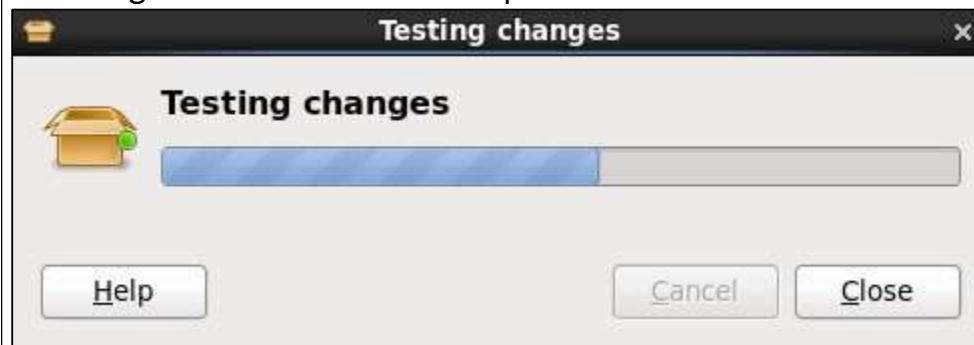
As we can see it is finding and resolving the dependencies.



Click on “Install” to install those 2 additional packages.



Installing the mutt with those dependencies.



Now, to check whether the mutt package has been installed or not, we use the command

**Rpm -qa | grep mutt**

```
[root@localhost ~]# rpm -qa | grep mutt
mutt-1.5.20-2.20091214hg736b6a.el6.x86_64
```

Now, we will create 2 additional users whom we will share the mail.

**useradd user101**

**passwd user101**

```
[root@server ~]# useradd user101
[root@server ~]# passwd
Changing password for user root.
New password:
BAD PASSWORD: it is based on a dictionary word
Retype new password:
passwd: all authentication tokens updated successfully.
```

**useradd user102**

**passwd user102**

```
[root@server ~]# useradd user102
[root@server ~]# passwd
Changing password for user root.
New password:
BAD PASSWORD: it is based on a dictionary word
Retype new password:
passwd: all authentication tokens updated successfully.
```

**switch to user101 using su – user101 and type message.**

```
[root@server ~]# su - user101
```

**ctrl+d to save and quit.**

```
[user101@server ~]$ mail -s Hello user102
Hello User102
This is User101
EOT
[user101@server ~]$
```

**switch to user102 to check user101's message.**

```
[user101@server ~]$ su - user102
```

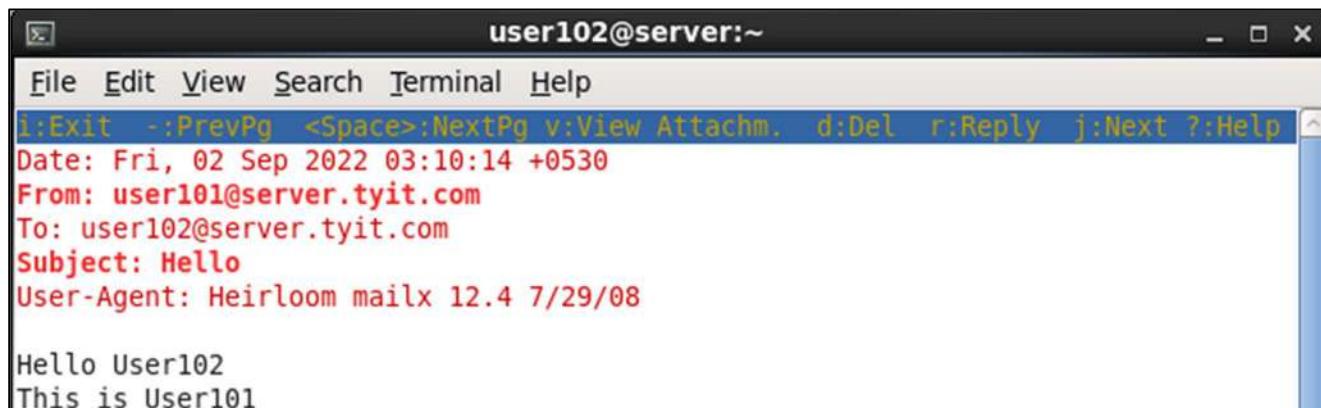
**mutt**

```
[user102@server ~]$ mutt
```

Type y



Press Enter.



Type r to reply to that mail.

Then enter the message to reply, then save and quit using :wq!.

A screenshot of a terminal window titled "user102@server:~". The window contains the following text:

```
On Fri, Sep 02, 2022 at 03:10:14AM +0530, user101@server.tyit.com wrote:  
> Hello User102  
> This is User101  
Hello User101  
This is User102
```

Type y to send the message.

A screenshot of the Mutt email client interface. The window title is "user102@server:~". The message header is:

```
y:Send q:Abort t:To c:CC s:Subj a:Attach file d:Descrip ?:Help
```

The message body fields are:

```
From: user102@server.tyit.com  
To: user101@server.tyit.com  
Cc:  
Bcc:  
Subject: Re: Hello  
Reply-To:  
Fcc: ~/sent  
Security: Clear
```

The message footer shows an attachment:

```
-- Attachments  
- I 1 /tmp/mutt-server-513-2928-2 [text/plain, 7bit, us-ascii, 0.1K]
```

The status bar at the bottom indicates:

```
-- Mutt: Compose [Approx. msg size: 0.1K Atts: 1] -----
```

As the mail has been sent.

The screenshot shows a terminal window titled "user102@server:~". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". Below the menu is a status bar with keyboard shortcuts: i:Exit -:PrevPg <Space>:NextPg v:View Attachm. d:Del r:Reply j:Next ?:Help. The main area displays an email message:  
Date: Fri, 02 Sep 2022 03:10:14 +0530  
From: user101@server.tyit.com  
To: user102@server.tyit.com  
Subject: Hello  
User-Agent: Heirloom mailx 12.4 7/29/08  
  
Hello User102  
This is User101  
  
At the bottom of the window, there is a message bar:  
-N +- 1/1: user101@server.tyit. Hello -- (all)  
Mail sent.

Now switch to user101 using su – user101

```
[user102@server ~]$ su - user101
```

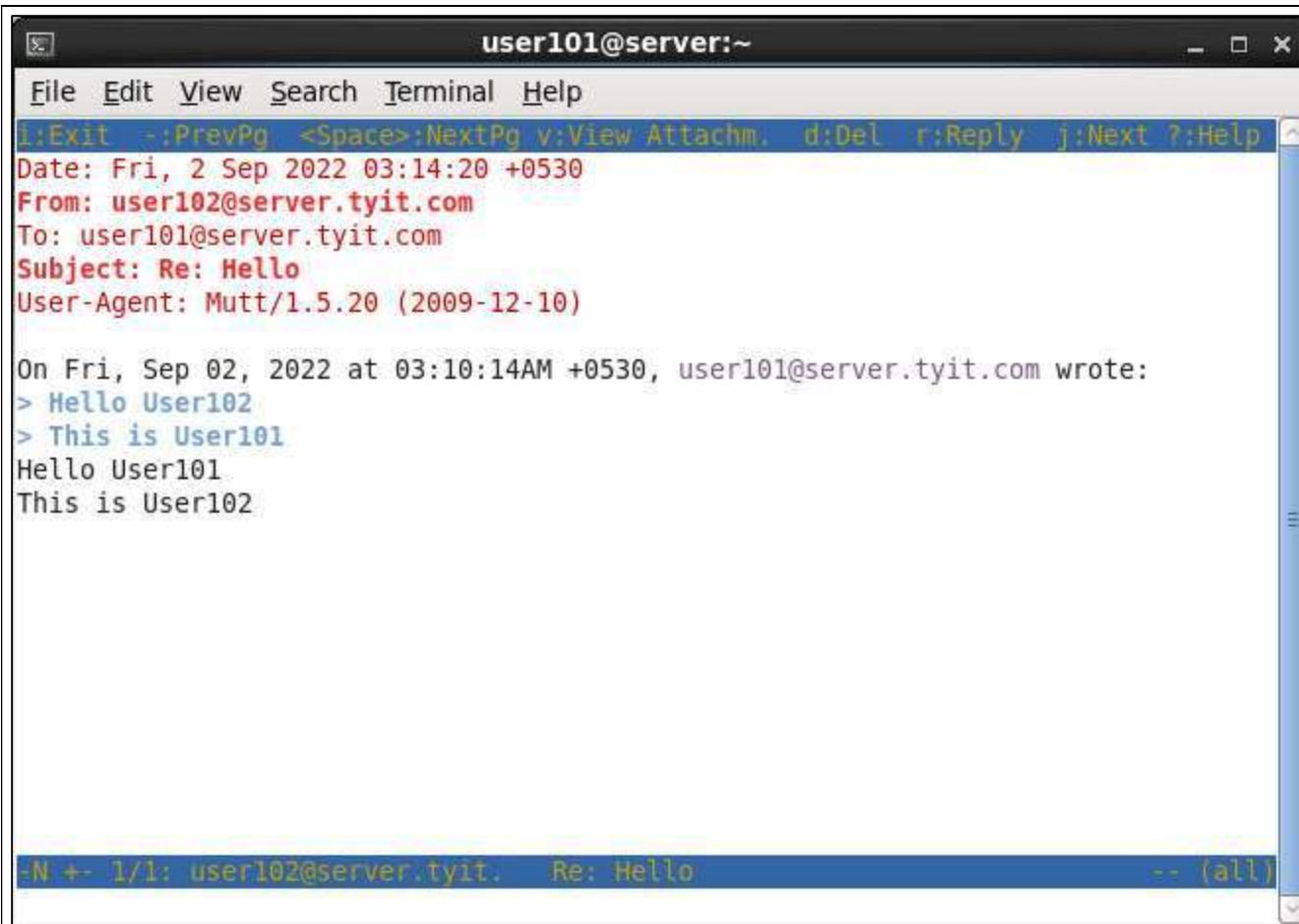
```
[user101@server ~]$  
You have new mail in /var/spool/mail/user101
```

mutt

```
[user101@server ~]$ mutt
```

As we can see there is an reply mail press enter to read it.

The screenshot shows a terminal window titled "user101@server:~". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". Below the menu is a status bar with keyboard shortcuts: q:Quit d:Del u:Undel s:Save m:Mail r:Reply g:Group ?:Help. The main area displays an email message:  
1 N + Sep 02 user102@server. ( 6) Re: Hello



## b) Configuring mail using Postfix mail server:

- Postfix is a Mail Transfer Agent (MTA).
- We can setup Postfix for two scenarios:
  - Setup Postfix for local email delivery.
  - set up Postfix for mail delivery to other domains on the Internet
- Postfix mail server cannot receive messages from other computers after a default installation. That is because, by default, Postfix binds to the loopback IP address only.
- To configure Postfix for basic email delivery, we need to open the server to the outside world to make sure that it binds to ports other than the loopback port. To do this, you'll have to change a parameter in the /etc/postfix/main.cf file.

Go to packages directory to install postfix package.

```
[root@server ~]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
```

**rpm -ivh postfix\*** : To install all the postfix package.

```
[root@server Packages]# rpm -ivh postfix*
warning: postfix-2.6.6-2.el6.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID
fd431d51: NOKEY
Preparing... ################################################ [100%]
package postfix-2:2.6.6-2.el6.x86_64 is already installed
```

Start the basic postfix service.

```
[root@server Packages]# /etc/init.d/postfix start
```

If start does not show any responses, then restart it using “**/etc/init.d/postfix restart**”

```
[root@server Packages]# /etc/init.d/postfix restart
Shutting down postfix: [ OK ]
Starting postfix: [ OK ]
```

Check the services which should be on during boot time.

```
[root@server Packages]# chkconfig --list postfix
postfix      0:off   1:off   2:off   3:off   4:off   5:off   6:off
```

On the services at boot time of postfix.

```
[root@server Packages]# chkconfig postfix on
```

Check services.

```
[root@server Packages]# chkconfig --list postfix
postfix      0:off   1:off   2:on    3:on    4:on    5:on    6:off
```

Open the postfix configuration file.

```
[root@server Packages]# vi /etc/postfix/main.cf
```

Following changes need to be done:

Line no. 75: It will be commented and another hostname will be displayed over there.

```
75 #myhostname = host.domain.tld
76 #myhostname = virtual.domain.tld
```

Line no. 75: Uncomment it and change the hostname to “**server.tyit.com**”.

```
75 myhostname = server.tyit.com
76 #myhostname = virtual.domain.tld
```

Line no. 98: It is commented

```
98 #myorigin = $myhostname
```

Line no. 98: Uncomment it

```
98 myorigin = $myhostname
```

Line no. 113: It is commented

```
113 inet_interfaces = all
```

Line no. 113: Uncomment it

```
113 inet_interfaces = all
```

Line no. 116: It is uncommented

```
116 inet_interfaces = localhost
```

Line no. 116: Comment it

```
116 #inet_interfaces = localhost
```

Line no. 264: It is commented and other ipaddress will be there.

```
264 #mynetworks = 168.100.189.0/28, 127.0.0.0/8
```

Line no. 264: Uncomment it and change the ipaddress to “**192.168.1.0/28**”.

```
264 mynetworks = 192.168.1.0/28, 127.0.0.0/8
```

Line no. 426: It is commented

```
426 #mail_spool_directory = /var/spool/mail
```

Line no. 426: Uncomment it

```
426 mail_spool_directory = /var/spool/mail
```

:wq! : Save & quit.

```
:wq!
```

Restart the postfix services.

```
[root@server Packages]# service postfix restart
Shutting down postfix: [ OK ]
Starting postfix: [ OK ]
```

Using mail command to send a mail to linda user using “[mail linda@server.tyit.com](mailto:linda@server.tyit.com)” and write a message in it.

```
[root@server Packages]# mail linda@server.tyit.com
Subject: This is a Test mail
Email Sent Through Postfix Server.
EOT
```

Switch to linda user.

```
[root@server Packages]# su - linda
[linda@server ~]$
```

Write mail command without any parameters to show the mail received.

As we type mail and press enter you can see there is one mail from root.

```
[linda@server ~]$ mail
Heirloom Mail version 12.4 7/29/08. Type ? for help.
"/var/spool/mail/linda": 1 message 1 new
>N 1 root           Fri Sep 16 03:49 18/620  "This is a Test mail"
& 1
```

Type 1 for showing the first mail message.

```
Message 1:
From root@server.tyit.com  Fri Sep 16 03:49:37 2022
Return-Path: <root@server.tyit.com>
X-Original-To: linda@server.tyit.com
Delivered-To: linda@server.tyit.com
Date: Fri, 16 Sep 2022 03:49:37 +0530
To: linda@server.tyit.com
Subject: This is a Test mail
User-Agent: Heirloom mailx 12.4 7/29/08
Content-Type: text/plain; charset=us-ascii
From: root@server.tyit.com (root)
Status: R
```

Email Sent Through Postfix Server.

Press “Ctrl + d” to exit the from the mail environment and at last there will be shown how many message are the in the directory “/var/spool/mail/linda”.

```
& Held 1 message in /var/spool/mail/linda
You have mail in /var/spool/mail/linda
```

```
[linda@server ~]$ mail
Heirloom Mail version 12.4 7/29/08. Type ? for help.
"/var/spool/mail/linda": 1 message 1 new
>N 1 root           Fri Sep 16 03:49 18/620  "This is a Test mail"
& 1
Message 1:
From root@server.tyit.com  Fri Sep 16 03:49:37 2022
Return-Path: <root@server.tyit.com>
X-Original-To: linda@server.tyit.com
Delivered-To: linda@server.tyit.com
Date: Fri, 16 Sep 2022 03:49:37 +0530
To: linda@server.tyit.com
Subject: This is a Test mail
User-Agent: Heirloom mailx 12.4 7/29/08
Content-Type: text/plain; charset=us-ascii
From: root@server.tyit.com (root)
Status: R
```

Email Sent Through Postfix Server.

```
& Held 1 message in /var/spool/mail/linda
You have mail in /var/spool/mail/linda
```

### Practical 9: Configuring Apache Web Server on Red Hat Enterprise Linux:

- Apache is one of the most used services on Red Hat Enterprise Linux.
- Apache is a remarkable piece of application software. It is the most widely used Web Server application in the world with more than 50% share in the commercial web server market.
- Apache is most widely used Web Server application in Unix-like operating systems but can be used on almost all platforms such as Windows, OS X, OS /2, etc.
- Reason it is famous is because it's open source, highly secure, very fast & very reliable. It can be customized to meet our needs with the help of using various modules & extensions.

**Ifconfig:** to check the ipaddress of the system.

```
[root@server ~]# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0C:29:87:68:58
          inet addr:192.168.1.3 Bcast:192.168.1.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe87:6858/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:1354 errors:0 dropped:0 overruns:0 frame:0
          TX packets:29 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:86596 (84.5 KiB) TX bytes:4179 (4.0 KiB)

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:162 errors:0 dropped:0 overruns:0 frame:0
          TX packets:162 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:11144 (10.8 KiB) TX bytes:11144 (10.8 KiB)
```

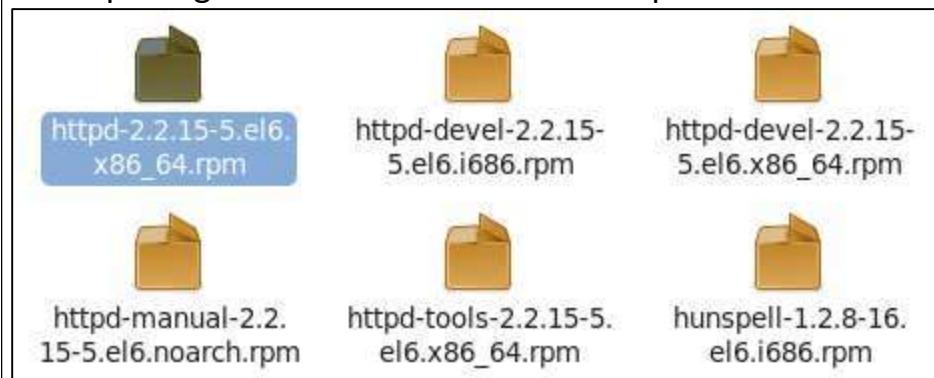
Go to packages directory and install httpd package.

```
[root@server ~]# cd /media/RHEL_6.0\ x86_64\ Disc\ 1/Packages
[root@server Packages]#
```

**rpm -ivh httpd\*:** to install all the httpd packages.

```
[root@server Packages]# rpm -ivh httpd*
```

This 5 packages are need to be install for apache server.



**rpm -qa | grep httpd:** to check the packages are installed or not.

```
[root@server Packages]# rpm -qa | grep httpd
httpd-manual-2.2.15-5.el6.noarch
httpd-devel-2.2.15-5.el6.x86_64
httpd-devel-2.2.15-5.el6.i686
httpd-tools-2.2.15-5.el6.x86_64
httpd-2.2.15-5.el6.x86_64
```

On the services at boot time of httpd.

```
[root@server Packages]# chkconfig httpd on
```

Start the httpd service by using “**service httpd start**”.

```
[root@server Packages]# service httpd start
```

```
Starting httpd:
```

[ OK ]

Change directory to root directory.

```
[root@server /]# cd ~
[root@server ~]# pwd
/root
```

Make a directory name as “**/var/www/virtual/www.tyit.com/html/**”

```
[root@server ~]# mkdir -p /var/www/virtual/www.tyit.com/html/
```

Create a index.html file in the above mention directory using

“**vi /var/www/virtual/www.tyit.com/html/index.html**”.

```
[root@server ~]# vi /var/www/virtual/www.tyit.com/html/index.html
```

Write the html code that will be shown in the browser.

```
<html>
<head>Linux Apache Website</head>
<body>
Today We Complete Apache Web Server Practical.
</body>
</html>
```

Start the DNS service using “**service named start**”.

```
[root@server ~]# service named start
Starting named: named: already running
```

[ OK ]

Check the DNS server using “**dig -x 192.168.1.3**” OR “**dig server.tyit.com**”

```
[root@server ~]# dig -x 192.168.1.3
; <>> DiG 9.7.0-P2-RedHat-9.7.0-5.P2.el6 <>> -x 192.168.1.3
;; global options: +cmd
;; Got answer:
;; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 27053
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1
;; QUESTION SECTION:
3.1.168.192.in-addr.arpa. IN PTR
;; ANSWER SECTION:
3.1.168.192.in-addr.arpa. 86400 IN PTR server.tyit.com.
;; AUTHORITY SECTION:
1.168.192.in-addr.arpa. 86400 IN NS server.tyit.com.
;; ADDITIONAL SECTION:
server.tyit.com. 86400 IN A 192.168.1.3
;; Query time: 0 msec
;; SERVER: 192.168.1.3#53(192.168.1.3)
;; WHEN: Sun Sep 18 17:43:30 2022
;; MSG SIZE rcvd: 101
```

```
[root@server ~]# dig server.tyit.com
; <>> DiG 9.7.0-P2-RedHat-9.7.0-5.P2.el6 <>> server.tyit.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 62763
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 0
;; QUESTION SECTION:
server.tyit.com. IN A
;; ANSWER SECTION:
server.tyit.com. 86400 IN A 192.168.1.3
;; AUTHORITY SECTION:
tyit.com. 86400 IN NS server.tyit.com.
;; Query time: 0 msec
;; SERVER: 192.168.1.3#53(192.168.1.3)
;; WHEN: Sun Sep 18 17:43:42 2022
;; MSG SIZE rcvd: 63
```

Open the httpd.conf file for configuration of httpd.

```
[root@server ~]# vi /etc/httpd/conf/httpd.conf
```

Go to the end of the file and copy the last commented lines and edit it as it is shown below.

```
#<VirtualHost *:80>
#   ServerAdmin webmaster@dummy-host.example.com
#   DocumentRoot /www/docs/dummy-host.example.com
#   ServerName dummy-host.example.com
#   ErrorLog logs/dummy-host.example.com-error_log
#   CustomLog logs/dummy-host.example.com-access_log common
#</VirtualHost>

<VirtualHost 192.168.1.3:80>
  ServerAdmin root@www.server.tyit.com
  DocumentRoot /var/www/virtual/www.tyit.com/html
  ServerName server.tyit.com
  ErrorLog logs/www.tyit.com-error_log
  CustomLog logs/www.tyit.com-access_log common
</VirtualHost>
```

Now, restart the httpd service for checking the configuration changes.

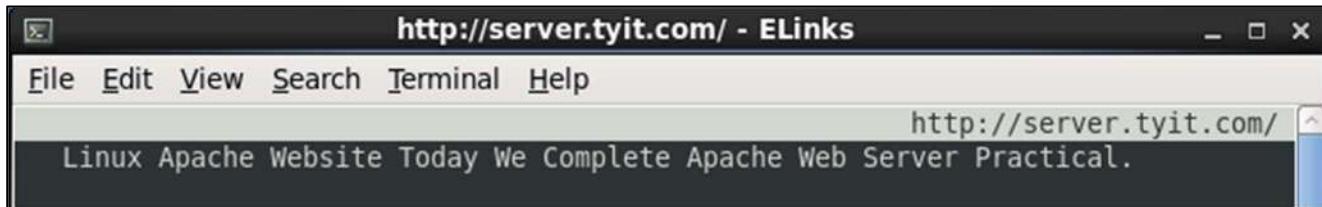
```
[root@server ~]# service httpd restart
Stopping httpd: [OK]
Starting httpd: [OK]
```

For using links command we need to install it also from packages directory or directly install it from Packages folder by searching “**eLinks**” package.

Using this command we can see the index.html page.

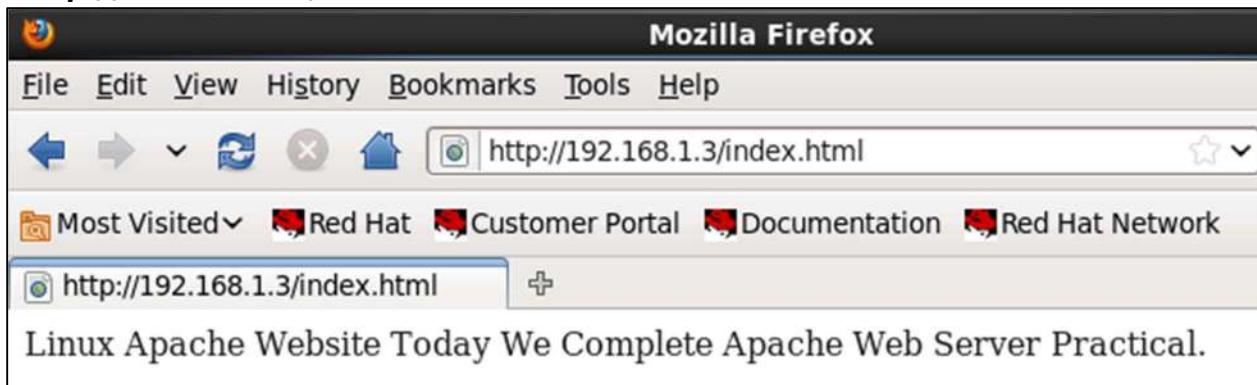
```
[root@server ~]# links server.tyit.com
```

#### Output:



Using Firefox we can also see the index.html page on it by using ipaddress.

**"http://192.168.1.3/index.html"**



**Practical 10: Working with Shell Scripts:****i) Program that demonstrates the use of if..else with test****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog1
```

**code (script):**

```
echo Enter any number
read n
if test $n -gt 0
then
    echo $n is positive
else
    echo $n is negative
fi
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog1
```

**Output:**

```
[root@server ~]# bash Prog1
Enter Any number:
4
4 is positive.
[root@server ~]#
[root@server ~]# bash Prog1
Enter Any number:
-5
-5 is negative.
```

**ii) Program to check existing file****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog2
```

**code (script):**

```
echo Enter the file name:
read fname
if [ -f $fname ]
then
    echo the File Exists.
else
    echo the File with name $fname does not exists
fi
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog2
```

**Output:**

```
[root@server ~]# bash Prog2
Enter the file name:
Jonny.sh
the File with name Jonny.sh does not exists
[root@server ~]#
[root@server ~]# bash Prog2
Enter the file name:
file.sh
the File Exists.
```

**iii) Program for string comparison****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog3
```

**code (script):**

```
echo Enter two Strings
read str1
read str2
if [ $str1 = $str2 ]
then
    echo The strings are identical
else
    echo The Strings are not identical
fi
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog3
```

**Output:**

```
[root@server ~]# bash Prog3
Enter two Strings
aditya
aditya
The strings are identical
[root@server ~]#
[root@server ~]# bash Prog3
Enter two Strings
aditya
anjali
The Strings are not identical
```

**iv) Program to check whether file has a permission to write****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog4
```

**code (script):**

```
echo Enter the File name:
read fname
if [ -w $fname ]
then
    echo Type text to append. To stop press Ctrl + D.
    cat >> $fname
else
    echo The has no write permission.
fi
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog4
```

**Output:**

```
[root@server ~]# bash Prog4
Enter the File name:
file.sh
Type text to append. To stop press Ctrl + D.
echo Job Completed.
[root@server ~]#
[root@server ~]# bash Prog4
Enter the File name:
Jonny.sh
The has no write permission.
```

**v) Program to give grades using expr command****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog5
```

**code (script):**

```
echo $per
if [ $per -lt 35 ]
then
    echo Grade = Fail
fi
if [ $per -ge 35 -a $per -lt 45 ]
then
    echo Grade = Third
fi
if [ $per -ge 45 -a $per -lt 60 ]
then
    echo Grade = Second
fi
if [ $per -ge 60 -a $per -lt 75 ]
then
    echo Grade = First
fi
if [ $per -ge 75 ]
then
    echo Grade = First D
fi
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog5
```

**Output:**

```
[root@server ~]# bash Prog5
Enter the marks in the Five Subjects
65 84 95 34 25
60
Grade = First
```

vi) Program to check whether the number is +ve or -ve usin elif

Create a vi editor to write the script:

```
[root@server ~]# vi Prog6
```

code (script):

```
echo Enter the number:  
read a  
if [ $a -lt 0 ]  
then  
    echo $a is Negative.  
elif [ $a -gt 0 ]  
then  
    echo $a is Positive.  
else  
    echo $a is ZERO.  
fi
```

Change mod to execute for execution of the file.

```
[root@server ~]# chmod +x Prog6
```

Output:

```
[root@server ~]# bash Prog6  
Enter the number:  
5  
5 is Positive.  
[root@server ~]#  
[root@server ~]# bash Prog6  
Enter the number:  
-5  
-5 is Negative.  
[root@server ~]# bash Prog6  
Enter the number:  
0  
0 is ZERO.
```

**vii) Program to print the day of the week using case.. in****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog7
```

**code (script):**

```
echo Enter the Day Number:
read num
case $num in
1) echo Sunday;;
2) echo Monday;;
3) echo Tuesday;;
4) echo Wednesday;;
5) echo Thursday;;
6) echo Friday;;
7) echo Saturday;;
*) echo Enter the number bet 1 to 7;;
esac
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog7
```

**Output:**

```
[root@server ~]# bash Prog7
Enter the Day Number:
2
Monday
[root@server ~]# bash Prog7
Enter the Day Number:
7
Saturday
```

**viii) Program to find the pattern using case****Create a vi editor to write the script**

```
[root@server ~]# vi Prog8
```

**code (script):**

```
echo Enter the Word:
read str
case $str in
[aeiou]*) echo The Word begins with a vowels;;
[0-9]*) echo The word begins with a digit;;
*[0-9]) echo The word ends with a digit;;
????) echo The word entered is 4 lettered word;;
*) echo The word entered is either starts with a Constraints or incorrect input;;
esac
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog8
```

**Output:**

```
[root@server ~]# bash Prog8
Enter the Word:
adam
The Word begins with a vowels
[root@server ~]#
[root@server ~]# bash Prog8
Enter the Word:
1243
The word begins with a digit
[root@server ~]#
[root@server ~]# bash Prog8
Enter the Word:
Adam@
The word entered is either starts with a Constraints or incorrect input
```

**ix) Menu Driven Program****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog9
```

**code (script):**

```
echo Enter
echo 1 To see the contents of /etc/passwd
echo 2 To see list of users
echo 3 To see present working directory
echo 4 exit
echo enter your choice
read n
case $n in
1)      cat /etc/passwd;;
2)      ls /home;;
3)      pwd;;
4)      exit;;
*)      echo Enter the choice as 1, 2, 3, or 4;;
esac
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog9
```

**Output:**

```
[root@server ~]# bash Prog9
Enter
1 To see the contents of /etc/passwd
2 To see list of users
3 To see present working directory
4 exit
enter your choice
2
Aditya f1 f2 f3 jackson linda lisa osr rjcit Rohan smith usrl usr2
[root@server ~]#
[root@server ~]# bash Prog9
Enter
1 To see the contents of /etc/passwd
2 To see list of users
3 To see present working directory
4 exit
enter your choice
3
[root@server ~]#
```

x) Program to print first n number and their sum: while loop

Create a vi editor to write the script:

```
[root@server ~]# vi Prog10
```

code (script):

```
i=1
sum=0
while [ $i -le 10 ]
do
    echo $i
    sum=`expr $sum + $i`
    i=`expr $i + 1`
done
echo The Sum is: $sum
```

Change mod to execute for execution of the file.

```
[root@server ~]# chmod +x Prog10
```

Output:

```
[root@server ~]# bash Prog10
1
2
3
4
5
6
7
8
9
10
The Sum is: 55
```

**xi) Program to print first n numbers and their sum: do..until****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog11
```

**code (script):**

```
i=1
sum=0
until [ $i -gt 10 ]
do
    echo $i
    sum=`expr $sum + $i`
    i=`expr $i + 1`
done
echo The Sum is: $sum
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog11
```

**Output:**

```
[root@server ~]# bash Prog11
1
2
3
4
5
6
7
8
9
10
The Sum is: 55
```

**xii) Program to illustrate the use of For Loop****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog12
```

**code (script):**

```
sum=0
for i in 1 2 3 4 5 6 7 8 9 10
do
    sum=`expr $sum + $i`
    echo $i
done
echo The Sum is: $sum
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog12
```

**Output:**

```
[root@server ~]# bash Prog12
1
2
3
4
5
6
7
8
9
10
The Sum is: 55
```

**xiii) Program to print summation 1+2+3+-----n****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog13
```

**code (script):**

```
echo Enter the Number:
read n
i=1
sum=0
while [ $i -le $n ]
do
    sum=`expr $sum + $i`
    i=`expr $i + 1`
done
echo "Summnation=$sum"
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog13
```

**Output:**

```
[root@server ~]# bash Prog13
Enter the Number:
6
Summnation=21
```

**xiv) Program to print table****Create a vi editor to write the script:**

```
[root@server ~]# vi Prog14
```

**code (script):**

```
j=1
echo Input Number:
read n
echo "Print Table of $n"
for i in 1 2 3 4 5 6 7 8 9 10
do
    j=`expr $n \* $i`
    echo "$n x $i = $j"
    i=`expr $i + 1`
done
```

**Change mod to execute for execution of the file.**

```
[root@server ~]# chmod +x Prog14
```

**Output:**

```
[root@server ~]# bash Prog14
Input Number:
8
Print Table of 8
8 x 1 = 8
8 x 2 = 16
8 x 3 = 24
8 x 4 = 32
8 x 5 = 40
8 x 6 = 48
8 x 7 = 56
8 x 8 = 64
8 x 9 = 72
8 x 10 = 80
```

## Practical 11: Configuring Booting with GRUB:

Install the Grub package from packages folder by searching “grub”.



Open grub configuration file in the “/boot/grub/grub.conf” directory.

```
[root@server ~]# vi /boot/grub/grub.conf
```

Copy the last 6 lines from title Red Hat Enterprise Linux and paste it below and make some changes in it.

```
root@server:~#
File Edit View Search Terminal Help
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE: You have a /boot partition. This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#          kernel /vmlinuz-version ro root=/dev/sda2
#          initrd /initrd-[generic]-version.img
#boot=/dev/sda
default=0
timeout=5
splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title Red Hat Enterprise Linux (2.6.32-71.el6.x86_64)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-71.el6.x86_64 ro root=UUID=b2192fb5-78e2-4132-93a
9-c71c6189698a rd NO_LUKS rd NO_LVM rd NO_MD rd NO_DM LANG=en_US.UTF-8 SYSFONT=l
atarcyrheb-sun16 KEYBOARDTYPE=pc KEYTABLE=us crashkernel=auto rhgb quiet
    initrd /initramfs-2.6.32-71.el6.x86_64.img
```

Only change the title as shown below.

```
title My Client Machine (RHEL6)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-71.el6.x86_64 ro root=UUID=b2192fb5-78e2-4132-93a
9-c71c6189698a rd NO_LUKS rd NO_LVM rd NO_MD rd NO_DM LANG=en_US.UTF-8 SYSFONT=l
atarcyrheb-sun16 KEYBOARDTYPE=pc KEYTABLE=us crashkernel=auto rhgb quiet
    initrd /initramfs-2.6.32-71.el6.x86_64.img
```

Also change the timeout service.

```
timeout=5
```

Increase it by 30.

```
timeout=30
```

Like this will be shown after changes.

```
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE: You have a /boot partition. This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#          kernel /vmlinuz-version ro root=/dev/sda2
#          initrd /initrd-[generic]-version.img
#boot=/dev/sda
default=0
timeout=30
splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title Red Hat Enterprise Linux (2.6.32-71.el6.x86_64)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-71.el6.x86_64 ro root=UUID=b2192fb5-78e2-4132-93a
9-c71c6189698a rd_NO_LUKS rd_NO_LVM rd_NO_MD rd_NO_DM LANG=en_US.UTF-8 SYSFONT=l
atarcyrheb-sun16 KEYBOARDTYPE=pc KEYTABLE=us crashkernel=auto rhgb quiet
    initrd /initramfs-2.6.32-71.el6.x86_64.img

title My Client Machine (RHEL6)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-71.el6.x86_64 ro root=UUID=b2192fb5-78e2-4132-93a
9-c71c6189698a rd_NO_LUKS rd_NO_LVM rd_NO_MD rd_NO_DM LANG=en_US.UTF-8 SYSFONT=l
atarcyrheb-sun16 KEYBOARDTYPE=pc KEYTABLE=us crashkernel=auto rhgb quiet
    initrd /initramfs-2.6.32-71.el6.x86_64.img
```

Restart the Linux environment by using “**init 6**”.

```
[root@server ~]# init 6
```

After restarting we can see there is a 30 seconds timeout shown at last of the 2<sup>nd</sup> sentence.

```
Press any key to enter the menu

Booting Red Hat Enterprise Linux (2.6.32-71.el6.x86_64) in 26 seconds...■
```

By pressing any key it will ask about which environment do we want to run.

As we can see both the grub entries are shown below

```
GNU GRUB version 0.97 (635K lower / 2094976K upper memory)
```

```
Red Hat Enterprise Linux (2.6.32-71.el6.x86_64)
```

```
My Client Machine (RHEL6)
```

Use the ↑ and ↓ keys to select which entry is highlighted.

Press enter to boot the selected OS, 'e' to edit the commands before booting, 'a' to modify the kernel arguments before booting, or 'c' for a command-line.

By up and down arrow we can select the environment which we want to run.

By pressing enter on our new environment which we have created by name "My Client Machine." It will open the same environment as of the Red Hat Enterprise Linux, it means the environment is working correctly.

```
GNU GRUB version 0.97 (635K lower / 2094976K upper memory)
```

```
Red Hat Enterprise Linux (2.6.32-71.el6.x86_64)
```

```
My Client Machine (RHEL6)
```

Use the ↑ and ↓ keys to select which entry is highlighted.

Press enter to boot the selected OS, 'e' to edit the commands before booting, 'a' to modify the kernel arguments before booting, or 'c' for a command-line.