All RHEL Practical Reference

1. **Basic /Advanced commands and College Structure**
2. **Links Creation (Symbolic & Hard link)**
3. **Changing IP Addresses (CommandLine, GUI & Network Scripting)**
4. **Implementing User & Groups**
5. **Implementing NFS (Network File System)**
6. **Implementing Samba Server**
7. **Implementing FTP (File Transfer Protocol)**
8. **Implementing Apache Web Server (HTML,SSI,PHP)**
9. **Configuring Booting with Grub (Grand Unified Bootloader)**
10. **Implementing Shell Scripting**

How to Install RHEL 6.9 From Online:

To install RHEL 6.9 on your computer, you can follow these steps:

1. Download the RHEL 6.9 ISO from the internet archive by visiting this link:
[https://archive.org/download/rhel-server-6.9-x86_64-dvd/rhel-server-6.9-x86_64-dvd.iso]
2. Install VMware or VirtualBox on your computer. If you have a low-end PC, it's recommended to use VirtualBox.
3. Open the virtualization software and create a new virtual machine.
4. When setting up the virtual machine, browse and select the RHEL 6.9 ISO file you downloaded in Step 1 as the installation source.
5. Start the virtual machine. During the boot process, you will see an option to "Install RHEL." Press the "Tab" key when this option appears.
6. After pressing "Tab," a prompt will appear. Type in "askmethod" (without quotes) and then press "Enter."
7. Now, follow the on-screen instructions to complete the installation.
You will be prompted to configure necessary packages and settings during the installation process.

For RHEL 6 or those who are not having vsftpd,samba like packages preinstalled:

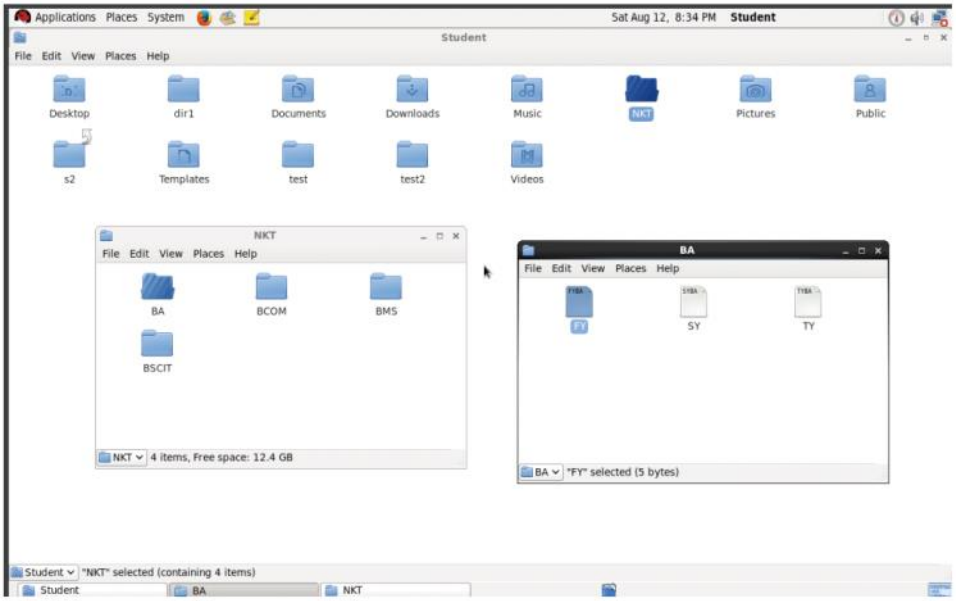
1. Create an oracle or redhat account but not personal a company profile (give test details)
https://www.redhat.com/en
Note Username and password
Or use common account **only for nkt students 2023**
nktpta202324@gmail.com
123redhatRr@
2. Open cmd with root privileges
$su -
3. **$subscription-manager register**
Enter oracle username and password
4. **$subscription-manager list --available**
Find the pool ID which can copy using **control+shift+c and paste control+shift+v**
5. **$subscription-manager attach --pool = Your Pool ID**
After successful installation we can install any package from red hat repositories(Server)

Practical 1 : Basic commands and College Structure

1. Basic commands and College Structure

College Structure

```
$ ls
$ mkdir NKT
$ cd NKT
$ mkdir BCOM
$ mkdir BA
$ mkdir BSCIT
$ mkdir BMS
$ ls -a
$ ls -l
$ cd BCOM
$ cat >> FY
$ cat >> SY
$ cat >> TY
$ cd ..
$ cd BA
$ cat >> FY
$ cat >> SY
$ cat >> TY
$ cd ..
$ cd BMS
$ cat >> FY
$ cat >> SY
$ cat >> TY
$ cd ..
$ cd BSCIT
$ cat >> FY
$ cat >> SY
$ cat >> TY
$ cd ..
$ ls -l
```



Practical 1 : Basic commands and College Structure

Ls

list dir contents

-a	Hidden files
-l	More details
-F	File type
-r	reverse
-R	recursively
-S	Sizes formatting
*	All files listing

mkdir

create dir

-p	/some dir

rmdir

remove directory

-r	recursively
-f	Forcefully

rm

remove file

-rf	Recursively,forcefully
-v	Verbose(progress)
-i	interactive

Pwd

print current dir

cp

copy

mv

move

cat >>

to create a file and edit

cat

view file contents

tac

view file contents (reverse)

cd ..

go up one dir

head

Display beginning 10 lines of a file

tail

Display last 10 lines of a file

Practical 1 : Basic commands and College Structure

More
: View text one page at a time

Less
: Allows backward and single line movement to view text (unlike more)

man
: manual

touch
: creates empty file

date
: prints date

cal
: prints calender

who
: display users

Practical 1 : Advanced commands

1. Advanced commands

Piping

send the result of a command to another command
e,g ps + less
a = show processes for all users
u = display the process's user/owner
x = also show processes not attached to a terminal
# ps aux | less
| is used to combine two cmds

Redirection

sends the output of a command to a file
ps aux > ~/test.txt (~ - creates test file in home dir)

>	Overwrite(del prev)
>>	Append(add)

Top

To Show Current System Activity

Running	the number of active processes
Sleeping	the number of processes currently loaded in memory, which not doing any activity
Stopped	the number of processes that have been sent a stop signal but haven't yet freed all the resources they were using
Zombie	An unmanageable process state because the parent of the zombie process has disappeared and the child still exists but cannot be managed because the parent is needed to manage that process.

Cron

Daemon	process that starts automatically when server boots
Configuration	set of different configuration files that tell cron what to do

Minute	0–59
Hour	0–23
Day of month	1–31
Month	1–12
Day of week	0–7 (0 and 7 are Sunday)

E,g	0 2 3 4 * indicates that a cron job will start on minute 0 of hour 2 (2 a.m.) on the third day of the fourth month.

Steps:

a. Logged in to normal user acc (not root)
b. $ crontab -e
c. to send an email message every five minutes:
*/1 * * * * mail -s "hello root" root <
I to insert and :wq to save and exit
d. Wait five minutes. Then, in a root terminal, type mail | check mail
e. $crontab -r | To delete crontab file

Practical 1 : Advanced commands

kill
kill signal pid
To terminate processes using PID

1	SIGHUP To reinitialize and read configuration files again
9	SIGKILL The process is simply cut off
15	Sigterm ask a process to stop its activity

Killall
To terminate processes using Name

Find
To search files
Example 1:
Name begins with hosts
find / -name "hosts*"
Example 2:
To locate files that belong to a specific user
find / -user "maya"
Example 3:
Find any file less than 3 days old
find / -mtime -3
Example 4:
Find .txt file less than 3 days old. # find . –name “*.txt”-
Example 5:
Find file having size larger than 10000k # find . size +10000k

Grep
To find specific character strings in a file

jobs
Show all current jobs

fg
Foreground process

Bg
$Pwd &

ps
To find what process is doing
ps afx - returns a treelike overview of all current processes
ps aux - returns usage information for every process

USER	The name of the user who run process.
PID	The process identification number
%CPU	The percentage of CPU cycles used by a process.
%MEM	The percentage of memory used by a process.
VSZ	The virtual memory size. Total memory claimed by a process.
RSS	The resident memory size. Total memory process is actually using.
TTY	If the process is started from a terminal then it shows device name of the terminal
STAT	The current status of the process. S for sleeping, R for running, Z for zombie state.
START	The time that the process started.
TIME	Time in seconds that a process has used CPU cycles since it was started.

Practical 2 : Links

Symbolic	**File can be accessed using different references pointing as it contains the path of original file and not the contents**

Syntax :

 # ln –s filename linkname

E,g :

 # ln -s test.txt testshortcut.txt

Hard	**File can be accessed using many different names having actual file contents**

Syntax :

 # ln filename linkname

E,g :

 # ln test1.txt testshortcut1.txt

Practical 3: Changing Network Address

1. GUI
    1. su -
    2. $system-config-network
    3. Select device configuration
    4. To change eth0
    5. Enter info
        i. Name eth0
        ii. Device eth0
        iii. Use dhcp
        iv. Static ip 192.168.0.1
        v. Netmask 255.255.255.0
        vi. Default gateway 192.168.0.1
    6. $service network start
    7. $service network restart
    8. $ifconfig
2. CLI
    1. $su -
    2. $ifconfig
    3. $ifconfig eth0 192.168.0.1 netmask 255.255.255.0 up
    4. $ifconfig or $ip addr show
3. Network Scripts
    1. $su -
    2. $vi /etc/sysconfig/network-scripts/ifcfg-eth0
    3. $service network restart
    4. $ifconfig

Practical 4: User Creation

Syntax :

a. **useradd** [-p passwd] [-u uid [-o]] OR useradd -D [-g group] [-b(home_dir] [-f inactive_time] [-e expire_date] [-s shell]

b. **usermod** [-p passwd] [-u uid [-o]] [-g group] [-G group[,...]] [-c comment] [-d dir [-m]] [-s shell][-e date] [-f inactive] [-l new_username] [-L|-U] username

c. **userdel** [-r also rem home dir] [f del files unowned] username

Syntax:

To add a user:
 # useradd newusername

To delete a user:
 # userdel username

To change a user's username:
 # usermod -l newusername oldusername

To change a user's home directory:
 # usermod -d /new/home/directory username

To change a user's primary group:
 # usermod -g newgroupname username

To add a user to additional groups:
 # usermod -a -G group1,group2 username

To change a user's shell:
 # usermod -s /path/to/new/shell username

To set the user's expiration date (e.g., to disable an account):
 # usermod -e YYYY-MM-DD username

Create a Group:
 # groupadd groupname

Delete a Group:
 # groupdel groupname

Add User to a Group:
 # usermod -aG groupname username

Remove User from a Group:
 # usermod -G - username

Practical 5: NFS

$ su -
$ rpm -qa | grep nfs //List All installed RPM packages containing "nfs" in their names
$ cd /
$ cd home
$ ls
$ mkdir test
$ cd test
$ touch f1 f2 f3
$ cat >> s1
Hello World

$ vi /etc/exports
Insert this line :
/home/test *(rw,sync)
and then press
(esc) : w q
(enter)
$ service nfs start
$ ifconfig
$ showmount -e 192.168.87.172 //your ip address
$ service iptables stop
$ service iptables status

$ chmod -R 777 /home/test
$ cd ..
$ pwd
$ ls

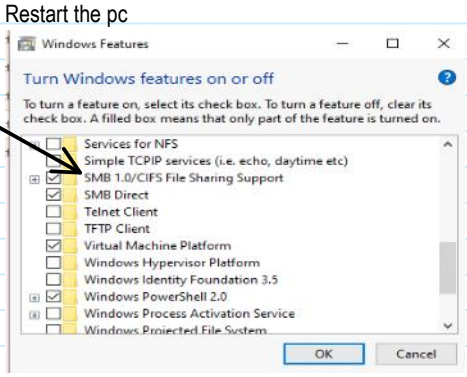
$ mkdir nfsclient
$ mount -t nfs 192.168.87.172:/home/test /home/nfsclient
$ cd nfsclient

$ ls -l
$ ls -a

Practical 6: Samba Server (lin from win)

In latest windows 10 and 11 by default SMB 1.0 is disabled and SMB client version 4 is not supported in rhel 6

To Enable it :

1. Press start button and search turn windows features on or off
2. Enable this SMB 1.0 as sh\own in figure
3. Restart the pc
4. 

Make Sure Your virtual machine is connected to host using **Bridged Adapter**

1. **$rpm -q samba samba-common samba-client**
2. **$rpm -qa | grep samba**
   If not installed then install using
   $yum install samba
   //If it gives package not found error then register your system using the steps given in first page
3. **$su -**
   Enter password
4. **$cd /**
5. **$mkdir myshare**
6. **cd /myshare**
7. **$touch file1**
8. **$vi /etc/samba/smb.conf**
   In Global make Workgroup name as = WORKGROUP
   Add this line in last
   [myshare]
   comment = any comment
   path = /myshare
   writable = yes
   browseable = yes
9. | | |
   |---|---|
   | **$testparm** | //to check syntactical errors |
10. **$setsebool -P samba_export_all_rw on**
11. **$setsebool -P samba_enable_home_dirs on**
12. **$ls -ldZ /myshare** //It will display default_t label which needs to be set to samba_share to enable edting system files
13. **$chcon -t samba_share_t /myshare**
14. **$service iptables stop**
15. **$useradd test**
16. **$smbpasswd -a test**
    Password 123
17. **$service smb start**
18. **$service nmb start** //To use hostname instead of ip addresses nmb package is used
19. | | |
    |---|---|
    | **$smbclient -U test -L localhost** | //to check details of share |
    | **$ip addr show or $hostname** | //make sure internet is connected check eth ip address |

    Now open cmd in windows os to test connection between rhel and windows
    In windows cmd
20. Ping your rhel ip address or hostname to verify connection

e,g **$ping 192.168.31.172 OR**	//if packets sent 4 and received 4 then successful connection is established
e,g **$ping mylinuxpc**	//if packets sent 4 and received 4 then successful connection is established **Here mylinux pc is hostname of rhel**

21. Open windows explorer and right click network and click map network drive In folder textbox enter rhel server ip address
    e,g **\\192.168.31.172\myshare**
    OR
    e,g **\\mylinuxpc\myshare**
    Enter username and password
    Username test
    Password 123
    Now we can read and write or sync linux Folder from windows in realtime all the files in /myshare dir from both the os.

Practical 6: Samba Server (win from lin)

To Access Windows Folder in Linux First Verify the following :

Check if windows account has password or not , if not then smbclient will not work due to security concern

Step 1

Give password to current account using the following steps

1. Press Ctrl + Alt + Del
2. Click Change a password
3. Keep Old Password Empty
4. Enter new Password 123

OR

Step 1

Create a new test user account with password

1. Press windows button and search other users
2. Click Someone else to this pc
3. Click I don't have person`s sign in info
4. Click add a user without microsoft acc
5. Enter username test
   Pass 123
6. Restart and login to test account in windows

Step 2

Login and open cmd and enter ipconfig (Note the ip address)

Open Windows Explorer and create a new folder test in C:/

Right click on folder And go to properties click Sharing -> Share -> Share

(To Allow modifying click advance -> permission -> click full control allow)

Step 3

Now In Linux OS Vmware enter

$smbclient //windows_ip_address/share_name -U windows_username //here share name is folder name

e,g

$smbclient //192.168.129.228/test -U MyWinPC

smb>Enter SMB commands which are as follows

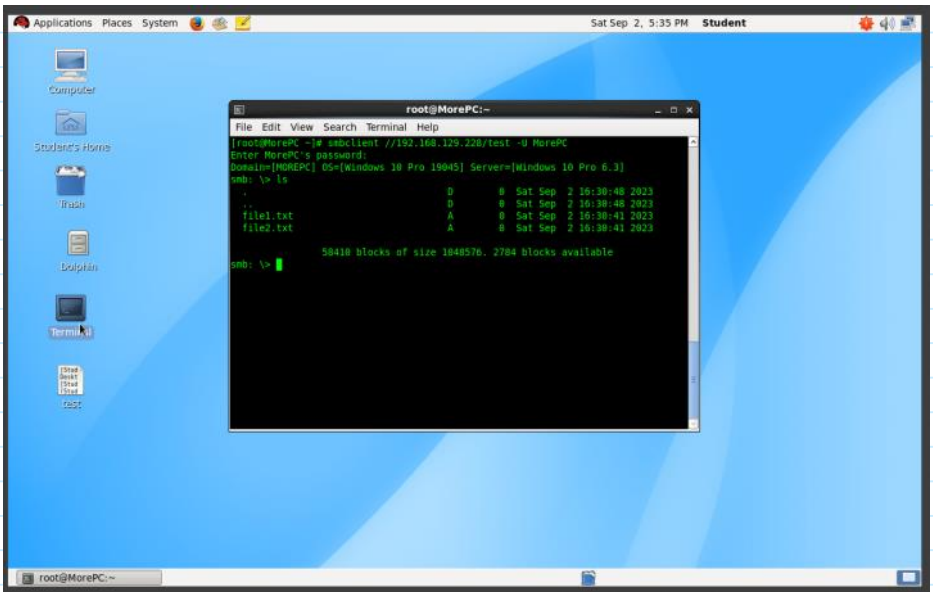
$ls	List files in the shared windows folder.
$get filename	Download a file from the shared folder.
$put filename	Upload a file to the shared folder.
$cd foldername	Change directory.
$exit	To exit windows folder

Optional

Other Workarounds :

Create and log on to same student account username and password on both windows and linux

Check/change workgroup name in windows as WORKGROUP.



Practical 7: FTP

1. | $yum install vsftpd | (press y and enter whenever prompted) |
   | --- | --- |
   | $yum install ftp | (press y and enter whenever prompted) |
2. su -
3. rpm -qa | grep vsftpd
4. Service vsftpd start
5. Service vsftpd restart
6. Service vsftpd status
7. Service iptables stop
8. Service iptables status
9. Setsebool ftp_home_dir=1
10. Getsebool -a | grep ftp
11. Useradd test
12. Passwd test
13. Ls -idZ /var/ftp/pub
14. Chgrp ftp /var/ftp/pub
15. Chown ftp /vfar/ftp/pub
16. Cd /var/ftp/pub
17. Touch a1 a2 a3
18. Cat >> f1
    Hello world
19. Cd /
20. Ifconfig
21. ftp 192.168.71.172 (add ip of ur linux sys)
    Enter username and password
    Login Successful

Practical 8a: Apache Server

1. Check httpd Package
   # rpm -qa | grep httpd
2. **# chkconfig httpd on**
3. **# service httpd start**
4. **# service httpd restart**
5. **# cd /var/www/html**
6. **# vim test.html**

```
<!DOCTYPE html>
<head>
    <title>Simple HTML Page</title>
</head>
<body>
    <h1> Hello World </h1>
</body>
</html>
```

7. Esc : wq
8. Open Firefox browser and enter url
   http://localhost/test.html

Practical 8b: Apache SSI (Server Side Includes)

1. Check IP address and package #rpm -qa | grep httpd and be a root user **#su -**
   #ifconfig
2. #dig (Your_IP_Address)
   e,g **#dig 192.168.1.3**

3. **#vim /etc/httpd/conf/httpd.conf**
4. Go to the last (pgDown Button) and uncomment(remove #) the following
   1. NameVirtualHost *:80
   2. <VirtualHost *:80>
   3. DocumentRoot
   4. </VirtualHost>
5. Change the path of Document Root to /var/www/html

```
#
# Use name-based virtual hosting.
#
NameVirtualHost *:80
#
# NOTE: NameVirtualHost cannot be used without a port specifier
# (e.g. :80) if mod_ssl is being used, due to the nature of the
# SSL protocol.
#

#
# VirtualHost example:
# Almost any Apache directive may go into a VirtualHost container.
# The first VirtualHost section is used for requests without a known
# server name.
#
<VirtualHost *:80>
#    ServerAdmin webmaster@dummy-host.example.com
    DocumentRoot /var/www/html
#    ServerName dummy-host.example.com
#    ErrorLog logs/dummy-host.example.com-error_log
#    CustomLog logs/dummy-host.example.com-access_log common
</VirtualHost>
-- INSERT --                                              1005,31
```

6. Now press pg up button and find this line upside line no. 339 and change Directory path to /var/www/html and add Includes after indexes

```
<Directory "/var/www/html">

#
# Possible values for the Options directive are "None", "All",
# or any combination of:
#   Indexes Includes FollowSymLinks SymLinksifOwnerMatch ExecCGI MultiViews
#
# Note that "MultiViews" must be named *explicitly* --- "Options All"
# doesn't give it to you.
#
# The Options directive is both complicated and important.  Please see
# http://httpd.apache.org/docs-2.2/mod/core.html#options
# for more information.
#
    Options Indexes Includes FollowSymLinks

#
# AllowOverride controls what directives may be placed in .htaccess files.
# It can be "All", "None", or any combination of the keywords:
#   Options FileInfo AuthConfig Limit
#
    AllowOverride None
                                                       339,0-1
```

7.
8. Esc :wq
9. **#service httpd restart**
10. To resolve any warning Uncomment servername in line 273

```
root@MorePC:/var/www/html
File  Edit  View  Search  Terminal  Help
# You will have to access it by its address anyway, and this will make
# redirections work in a sensible way.
#
ServerName www.example.com:80

#
# UseCanonicalName: Determines how Apache constructs self-referencing
# URLs and the SERVER_NAME and SERVER_PORT variables.
# When set "Off", Apache will use the Hostname and Port supplied
# by the client.  When set "On", Apache will use the value of the
# ServerName directive.
#
UseCanonicalName Off

#
# DocumentRoot: The directory out of which you will serve your
# documents. By default, all requests are taken from this directory, but
# symbolic links and aliases may be used to point to other locations.
#
DocumentRoot "/var/www/html"

#
# Each directory to which Apache has access can be configured with respect
                                                       273,1         27%
```

11. Esc:wq

Practical 8b: Apache

12. **#chkconfig httpd on**
13. **#cd /var/www/html**
14. **#chmod -R 777 /var/www/html**
15. **#vim sitest.shtm**l (Any Name with extension .shtml)

Enter the code

```
<!DOCTYPE html>
<html>
<head>
   <title>SSI Test Page</title>
</head>
<body>
   SSI Test Page Output
   <hr>
   <p align="center">
      This file was last modified on :
      <!--#echo var="LAST_MODIFIED" -->
   </p>
</body>
</html>
```

16. Esc :wq
17. Now open firefox browser and enter http://localhost/sitest.shtml (Your filename with extension)

Practical 8c: Apache Server (PHP)

In /var/www/html dir

1. **# vim hello.php**

```
<!DOCTYPE html>
<head>
        <title>PHP Test</title>
</head>
<body>
        <?php echo '<p> Welcome to the world of PHP </p>'; ?>
</body>
</html>
```

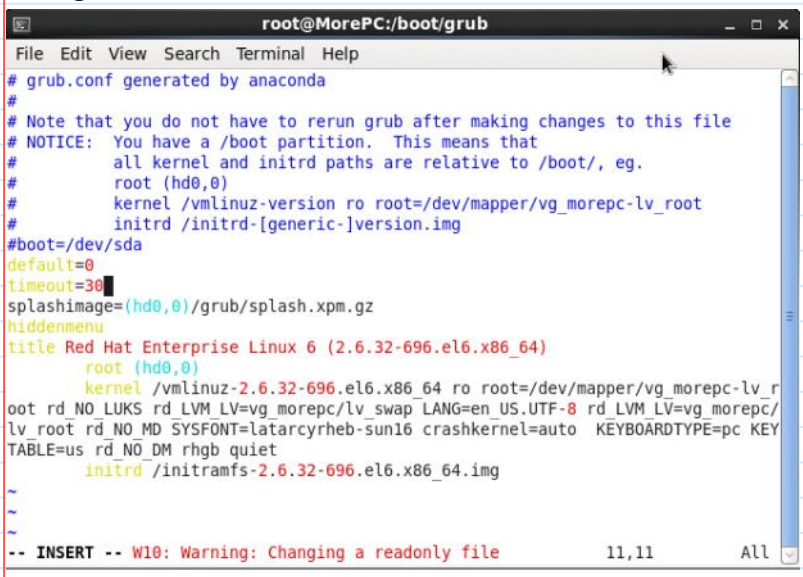
2. Esc : wq
3. Open Firefox browser and enter url
   http://localhost/hello.php

Practical 9: GRUB (Grand Unified Bootloader)

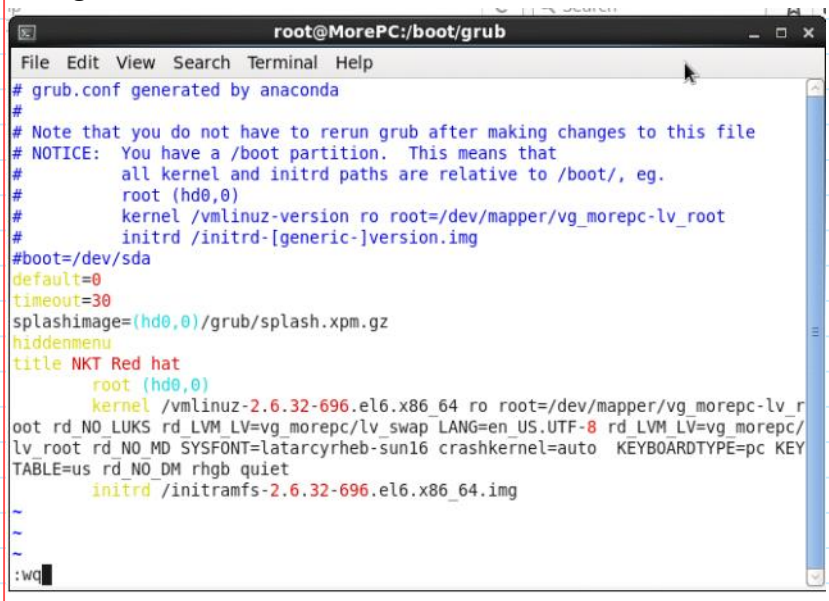
1. **# vim /boot/grub/grub.conf**

```
# 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/mapper/vg_morepc-lv_root
#          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 6 (2.6.32-696.el6.x86_64)
        root (hd0,0)
        kernel /vmlinuz-2.6.32-696.el6.x86_64 ro root=/dev/mapper/vg_morepc-lv_r
oot rd_NO_LUKS rd_LVM_LV=vg_morepc/lv_swap LANG=en_US.UTF-8 rd_LVM_LV=vg_morepc/
lv_root rd_NO_MD SYSFONT=latarcyrheb-sun16 crashkernel=auto  KEYBOARDTYPE=pc KEY
TABLE=us rd_NO_DM rhgb quiet
        initrd /initramfs-2.6.32-696.el6.x86_64.img
~
~
~
-- INSERT -- W10: Warning: Changing a readonly file          11,10         All
```

2. **Change Timeout to 30 sec**



3. **Change Title To NKT Red hat**



Esc : wq

4. If read only warning occurs

   Then **Esc :w q !**

5. **#init 6** //To restart machine

Practical 9: GRUB (Grand Unified Bootloader)

Description :

1] Default:-

The default command specifies which menu entry will be booted by default if the user doesn't make a selection within the timeout period.

This is usually set to a numerical index corresponding to a menu entry.

2]Time out:-

The set timeout command defines the time (in seconds) that the boot menu is displayed before the default entry is automatically booted.

3]Hidden menu:-

In GRUB configuration files, the "hiddenmenu" option is used to control whether the GRUB menu is hidden or shown during system startup.

When "hiddenmenu" is enabled, the GRUB menu is not displayed by default, and it only appears if certain conditions are met or if the user explicitly activates it.

4]Title:-

In GRUB configuration files, the "title" is a descriptive label for an entry in the boot menu.

It is not the actual title that appears in the boot menu itself but a human-readable identifier that helps users understand which entry corresponds to which operating system or configuration.

5]Root:-

In a GRUB (Grand Unified Bootloader) configuration file, the term "root" is typically used to specify the root filesystem for a particular boot menu entry.

It represented in a format like (hdX,Y) for hard drive X, partition Y.

6]kernel:-

In a GRUB (Grand Unified Bootloader) configuration file, the "kernel" (often spelled as "linux" in GRUB configuration files) is a directive that specifies the location of the Linux kernel image that should be loaded when a particular boot menu entry is selected.

7]initrd:-

The initrd line specifies the location of the initial RAM disk (initramfs or initrd.img) that is loaded along with the kernel. The initrd image is used to provide additional modules and drivers needed for the kernel to properly mount the root filesystem and complete the boot process.

Practical 10: Implementing Shell Scripting

Indentation** and **spaces** and **case sensitivity matters

a. Write a script to find largest number using if statement

1. #vim hello.sh

```
#!/bin/bash
# Greatest of three numbers

echo "Enter the First number :"
read First
echo "Enter the Second number :"
read Second
echo "Enter the Third number :"
read Third

if [ $First -gt $Second ] && [ $First -gt $Third ]; then
    echo -e "The Greatest number is $First"
elif [ $Second -gt $First ] && [ $Second -gt $Third ]; then
    echo -e "The Greatest number is $Second"
else
    echo -e "The Greatest number is $Third"
fi
```

2. Esc : wq
3. #sh hello.sh

b. Write a script to which print first 10 numbers
Using For loop

1. #vim for.sh

```
#!/bin/bash
# Print first 10 numbers using a for loop

echo "Using a for loop:"
for ((i=1; i<=10; i++)); do
    echo "$i"
done
```

2. Esc : wq
3. #sh for.sh

Using While loop

1. #vim while.sh

```
#!/bin/bash
# Print First 10 numbers using While loop

echo "Using a while loop :"
i=1
while [ $i -le 10 ]; do
    echo "$i"
    i=$((i+1))
done
```

2. Esc : wq
3. #sh while.sh

Practical 10: Implementing Shell Scripting

c. Write a script which accepts the number from user check whether given number prime or not

1. #vim prime.sh

```
#!/bin/bash
# Check whether a given number is prime or not

echo "Enter a number:"
read num

if [ $num -lt 2 ]; then
    echo "The number $num is not a prime number"
    exit
fi

factors=0
for ((i=2; i*i<=$num; i++)); do
    if [ $((num % i)) -eq 0 ]; then
        factors=$((factors+1))
        break
    fi
done

if [ $factors -eq 0 ]; then
    echo "$num is a prime number"
else
    echo "$num is not a prime number"
fi
```

2. esc : wq
3. #sh prime.sh