Assignment-3 Set-A

Linux and Shell Scripting

Course Code:- CAP448

Date of Submission:- 27-11-21

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Section:- D2112

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Assignment-3 Set-A

Ques: What is the need of special variables? Explain. Also write a shell program which includes any five special variables.

Ans:- Special variables plays an important role in writing shell scripting. Special variables have special meaning in shell scripting. It stores the data during the course of execution. They have some special meaning in programming. These variables are reserved for specific functions. There are some of the special variables and their functions are given below:-

1. $0 :- It is used to show the name of the current script file.

2. $n :- These variables correspond to the arguments with which script was invoked. For example, n is any integer value. Then $1 is used to represent the first argument in the script that is given by user. Similarly $2 is used to represent the 2nd argument that is given by the user and so on.

3. $$:- It shows the process ID of current shell. For shell scripts, $$ is used to represent the process ID under which they are executing. These are used with echo on shell.

4. $## : It shows the number of arguments that is passed to script.

5. $@ : In this, all the arguments are individually double quoted. If a script receives two arguments, then $a is equivalent to $1 $2.

6. $* : It is same as $@. All the arguments are double quoted. If a script receives two arguments, $* is equivalent to $1 $2.

7. $? : It represents the last command executed. means the exit status of the last command executed

8. $! : It represent or show the process ID of the last background command.

9. $- : It shows the last argument of the previous command

=> $@ and $* holds the complete parameter list. The difference between them is that "$*" is a single word, containing all the arguments to the shell, joined together with spaces whereas "$@" is identical to arguments received by the shell. The resulting list completely match which is given to the shell: "$@" breaking up the arguments if there are spaces between them but "$*" does not breaking the arguments.

=> Exit Status ($?) returns the numerical value. The exit status of a command is a numerical value that is returned after the execution of the command. It indicates that different types of errors thrown in case the command was not executed successfully. An exit status 0 indicates success and 1 indicates failure.

Program :-

On Terminal, open and create a shell file :

```
[root@sirjan root]# gedit ist.sh
[root@sirjan root]# chmod 777 ist.sh
```

ist.sh

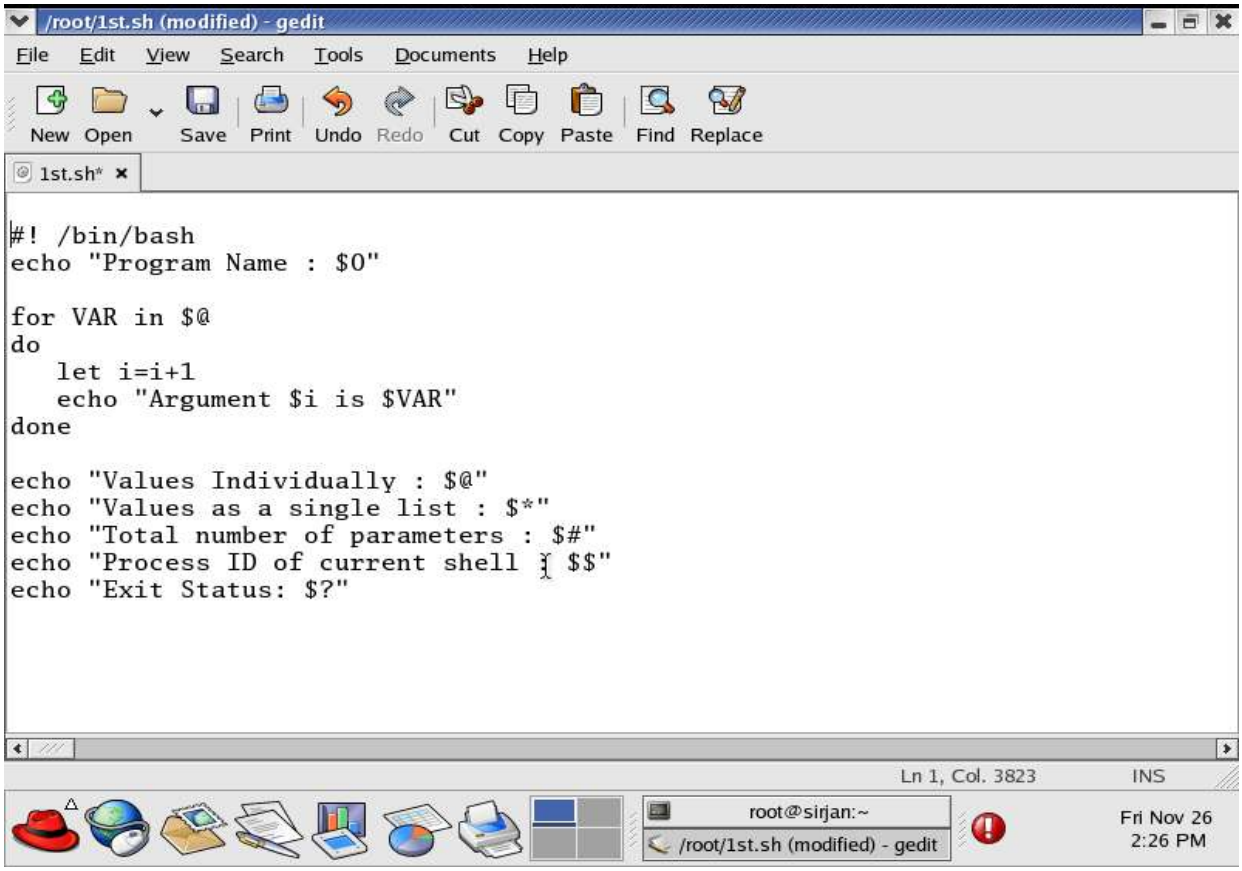
```
#! /bin/bash
echo "Program Name : $0"

for VAR in $@
do
    let i= i+1
    echo "Argument $i is $VAR"
done

echo "Values Individually : $@"
echo "Values As a single List : $*"
echo "Total number of parameters : $#"
echo "Process ID of current shell : $$"
```

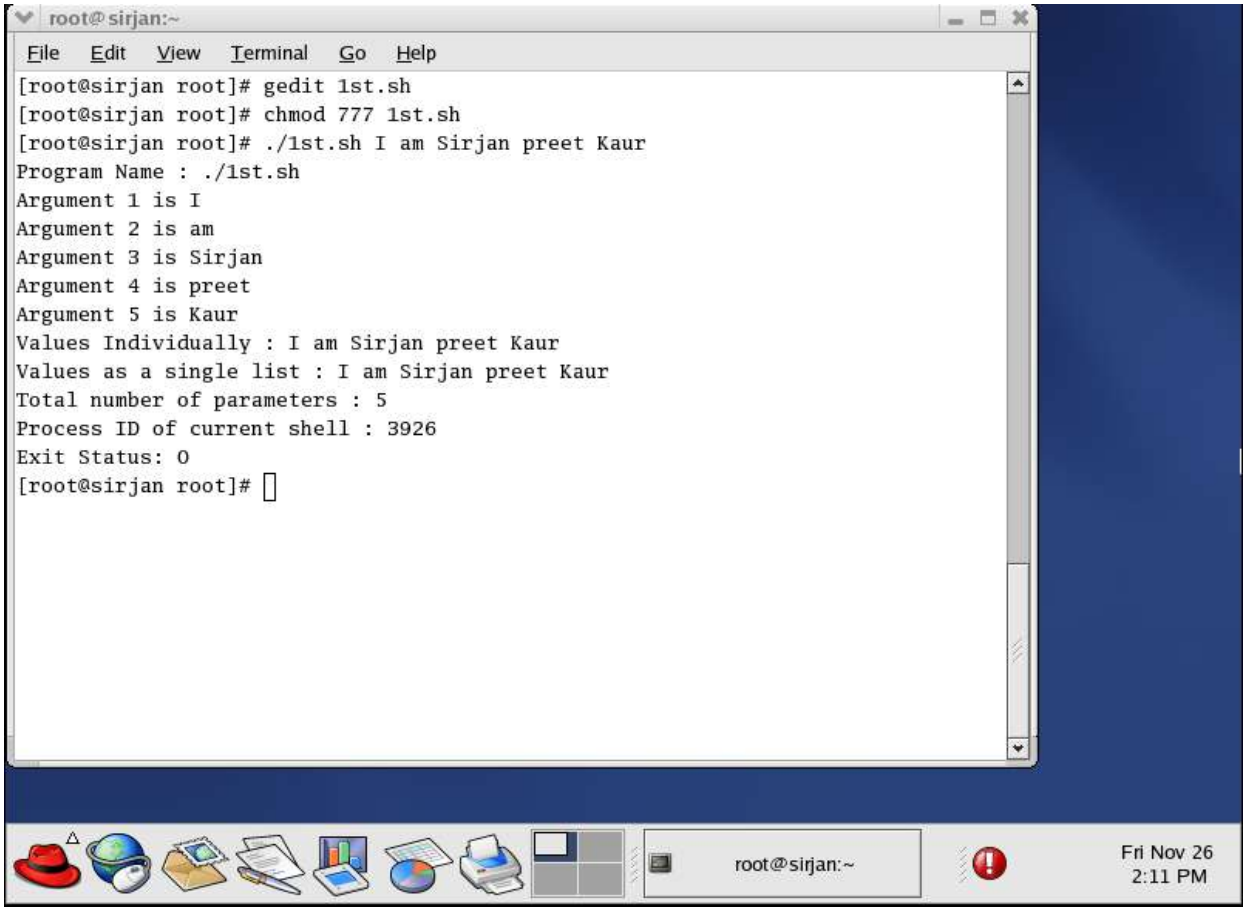
```
echo "Exit Status : $?"
```

Output:-

```
[root@sirjan root]# gedit 1st.sh
[root@sirjan root]# chmod 777 1st.sh
[root@sirjan root]# ./1st.sh I am Sirjan preet kaur
Program Name : ./1st.sh
Argument 1 is I
Argument 2 is am
Argument 3 is Sirjan
Argument 4 is preet
Argument 5 is kaur
Values Individually : I am Sirjan preet kaur
Values as a single list : I am Sirjan preet kaur
Total number of parameters : 5
Process ID of current shell : 3926
Exit Status : 0
[root@sirjan root]#
```

So, above program depicts the usage of special variables. All scripts run in command : ./1st.sh I am Sirjan preet kaur


/root/1st.sh (modified) - gedit
File Edit View Search Tools Documents Help
New Open Save Print Undo Redo Cut Copy Paste Find Replace
1st.sh*
#! /bin/bash
echo "Program Name : $0"
for VAR in $@
do
let i=i+1
echo "Argument $i is $VAR"
done
echo "Values Individually : $@"
echo "Values as a single list : $*"
echo "Total number of parameters : $#"
echo "Process ID of current shell : $$"
echo "Exit Status: $?"
Ln 1, Col. 3823
INS
root@sirjan:~
/root/1st.sh (modified) - gedit
Fri Nov 26
2:26 PM


root@sirjan:~
File Edit View Terminal Go Help
[root@sirjan root]# gedit 1st.sh
[root@sirjan root]# chmod 777 1st.sh
[root@sirjan root]# ./1st.sh I am Sirjan preet Kaur
Program Name : ./1st.sh
Argument 1 is I
Argument 2 is am
Argument 3 is Sirjan
Argument 4 is preet
Argument 5 is Kaur
Values Individually : I am Sirjan preet Kaur
Values as a single list : I am Sirjan preet Kaur
Total number of parameters : 5
Process ID of current shell : 3926
Exit Status: 0
[root@sirjan root]#
root@sirjan:~
Fri Nov 26
2:11 PM

Ques: Write a shell script which must include all the arithmetic operators, if-elif-else statement and case statement. Execute the program in Linux and attach the screenshot of output.

Ans: Shell scripting is an open-source program that is designed to be run by Unix/Linux shell. It provides a platform to execute code in Linux. Shell scripting includes a series of commands for the shell to execute. To write shell script, type as follows:-

On Terminal:-

```
[root@sirjan root]# gedit assign.sh
[root@sirjan root]# chmod 777 assign.sh
```

chmod 777 is used to give permission. Now the file is opened and write the script as follows:-

assign.sh

```
#!/bin/bash
ch="Y"
while [$ch=='y' -o $ch=='Y']
do
echo Select the operation you want to perform:
echo 1. Addition
echo 2. Subtraction
echo 3. Multiplication
echo 4. Division
echo 5. Modulus
echo 6. Assignment
echo 7. Equal
```

```
echo 8. Not Equal
echo 9. Find greatest among three numbers
echo Enter your choice between 1 to 9:
read choice
echo "Enter first Number:"
read a
echo "Enter Second Number:"
read b
case "$choice" in
        1) echo "Addition:" `expr $a + $b`
        ;;
        2) echo "Subtraction:" `expr $a - $b`
        ;;
        3) echo "Multiplication:" `expr $a \* $b`
        ;;
        4) echo "Division:" `expr $b / $a`
        ;;
        5) echo "Modulus:" `expr $b % $a`
        ;;
        6) echo "Assigning value of $b in a:"
           echo `expr a=$b`
        ;;
        7) echo "Equality:" `expr $a == $b`
           if [ $a == $b ]
           then
             echo "$a is equal to $b
           else
             echo "$a is not equal to $b"
           fi
        ;;
        8) echo "Equality:" `expr $a != $b`
```

```
if [ $a != $b ]
then
  echo "$a is not equal to $b"
else
  echo "$a is equal to $b"
fi
;;
9) echo "Enter Third number is :"
      read c
  echo "The greatest number is :"
  if [ $a -gt $b ] && [ $a -gt $c ]
  then echo $a is greatest among $b and $c
  elif [ $b -gt $a ] && [ $b -gt $c ]
  then echo $b is greatest among $a and $c
  else
  echo $c is greatest among $a and $b
  fi
;;
*) echo "Invalid Choice"
   exit
   ;;
esac
echo -n "do you want to continue (y/n):"
read ch
done
```

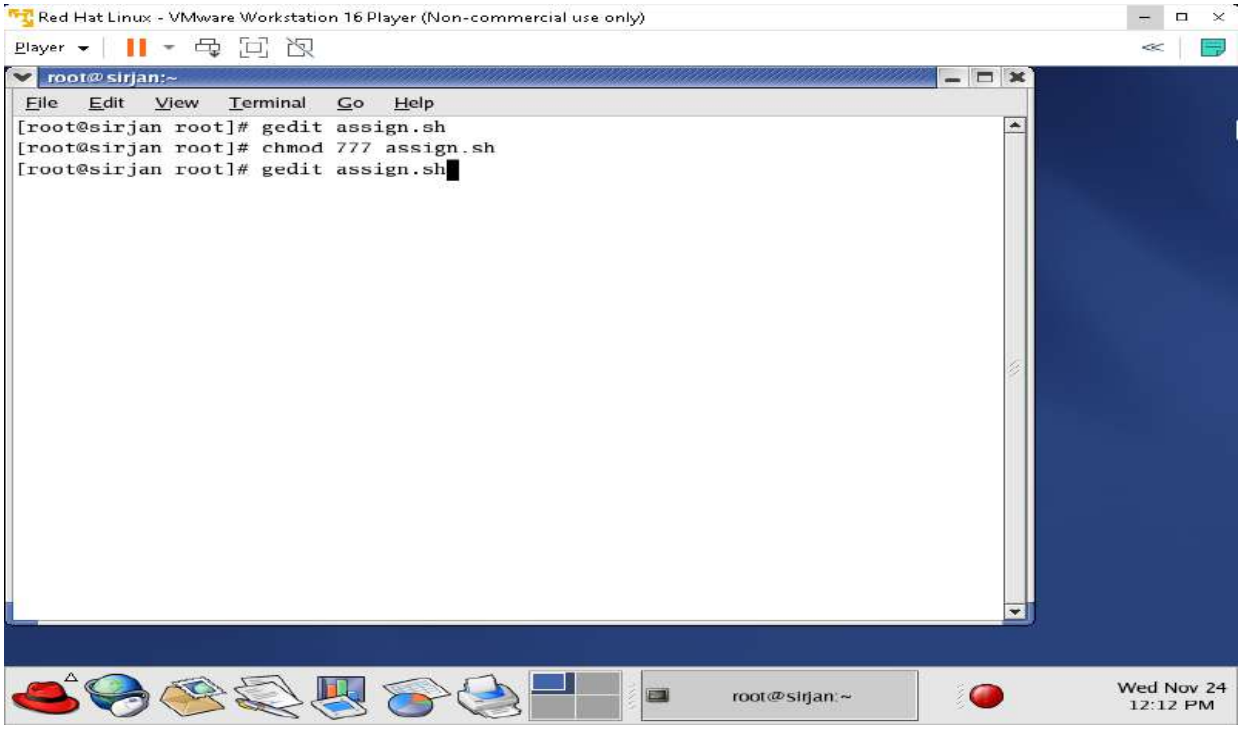
To execute a program, type :-

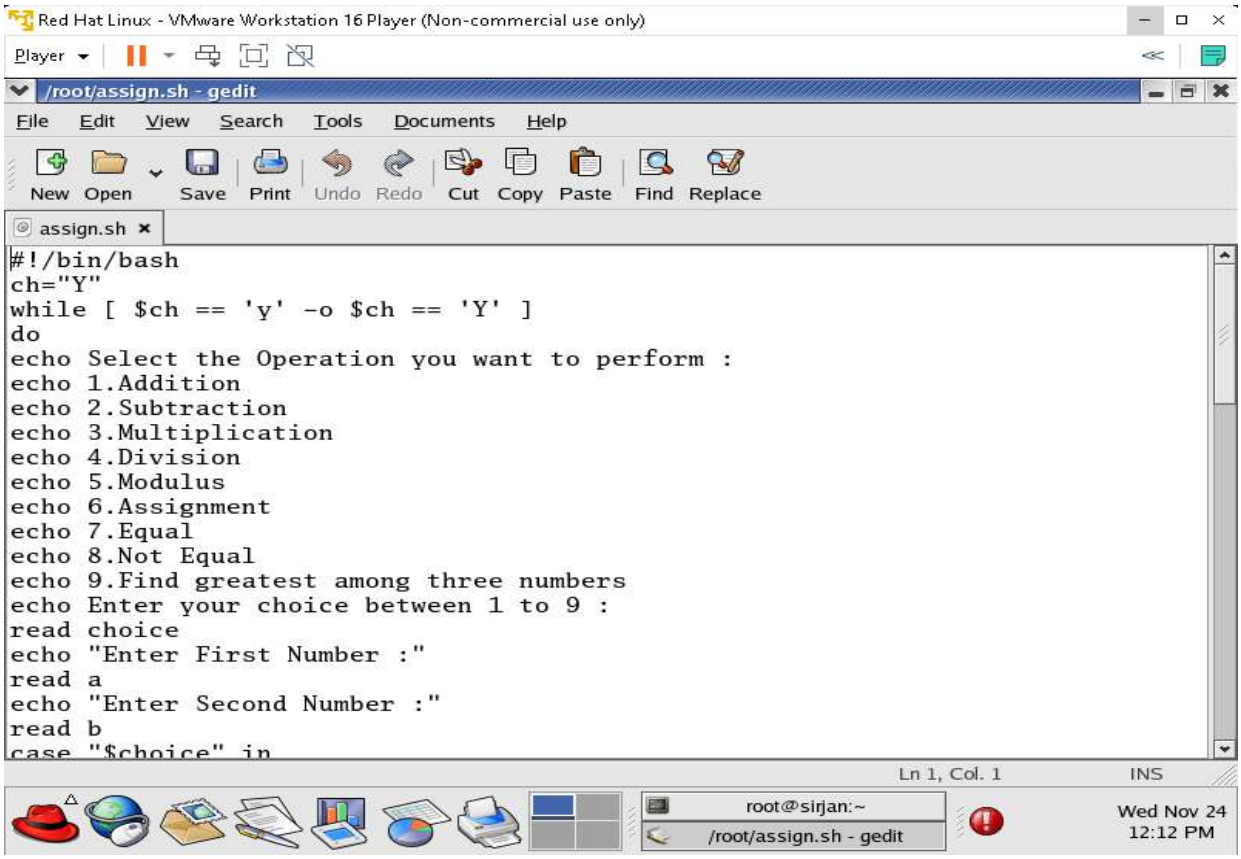
```
[root@sirjan root]#./assign.sh
```

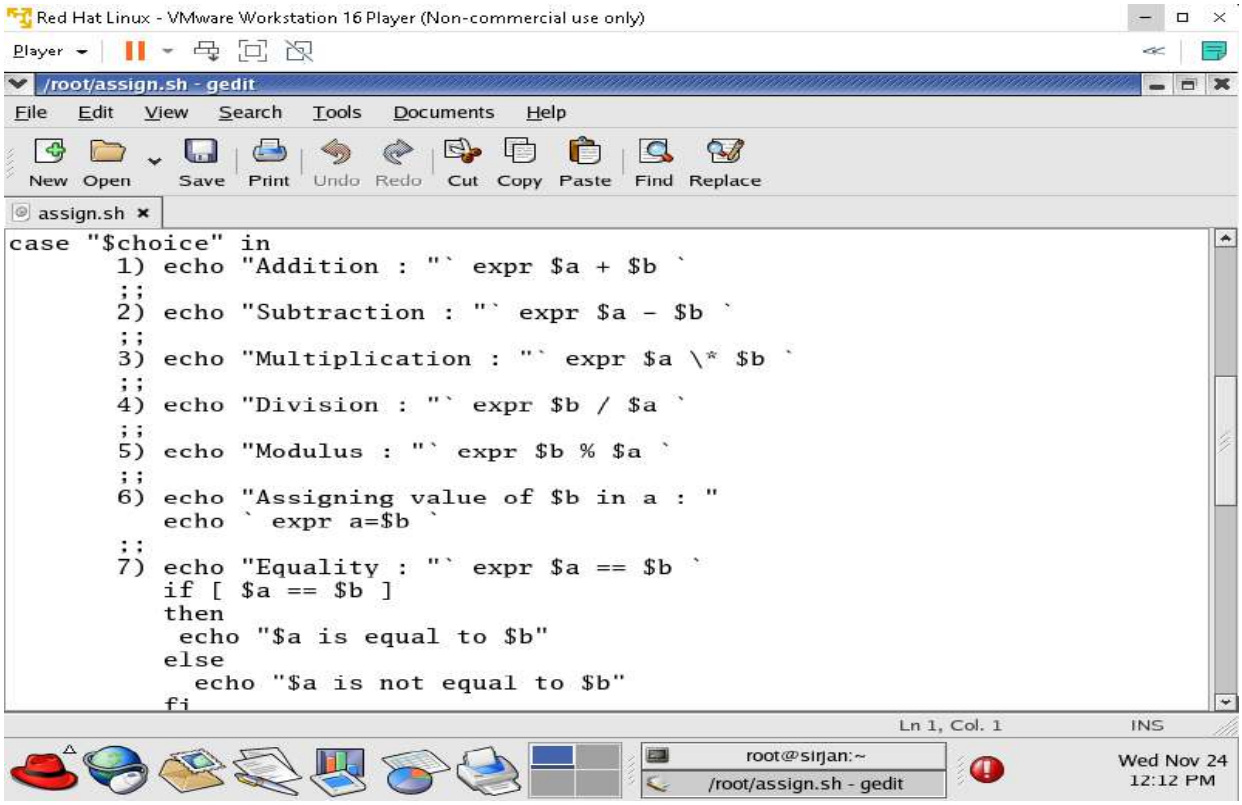
The output of program is given below:-

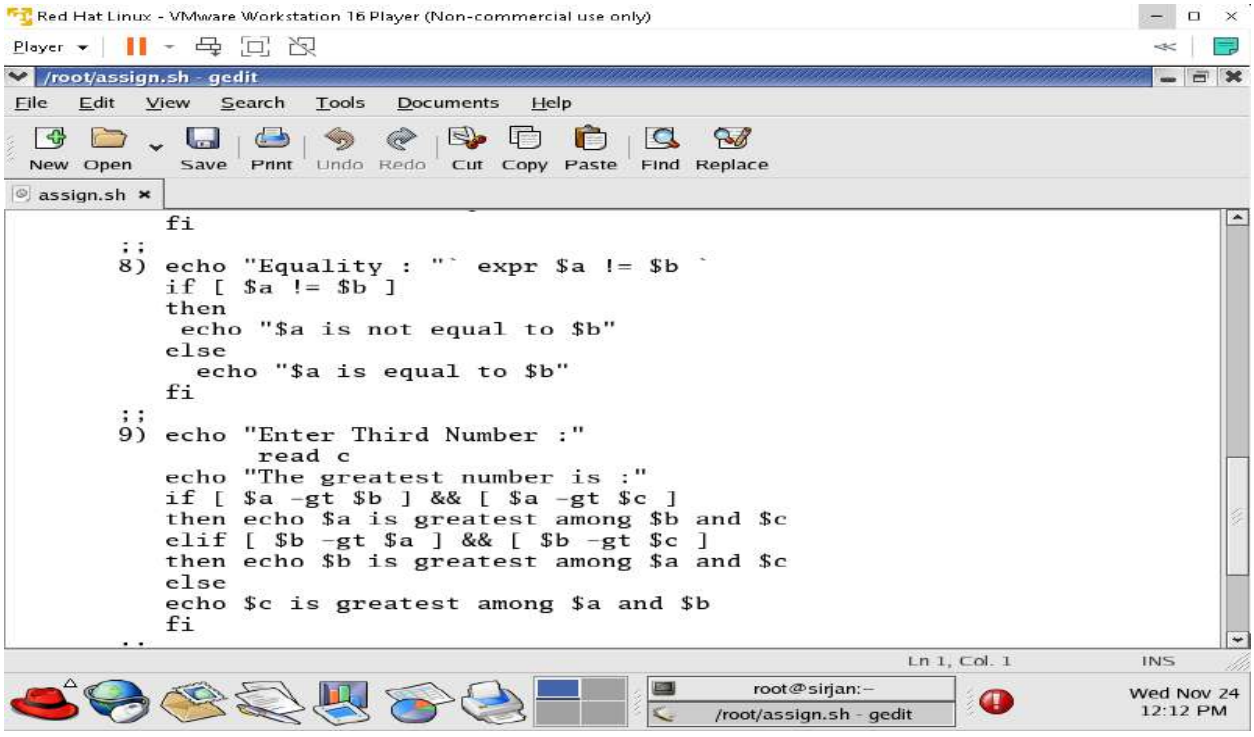
```
[root@sirjan root]# ./assign.sh
Select the Operation you want to perform:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Modulus
6. Assignment
7. Equal
8. Not Equal
9. Find greatest among three numbers
Enter your choice between 1 to 9:
1
Enter First Number:
23
Enter Second Number:
45
Addition : 68
do you want to continue(y/n):y
Select the Operation you want to perform:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Modulus
6. Assignment
7. Equal
8. Not Equal
9. Find greatest among three numbers
Enter your choice between 1 to 9:
9
```

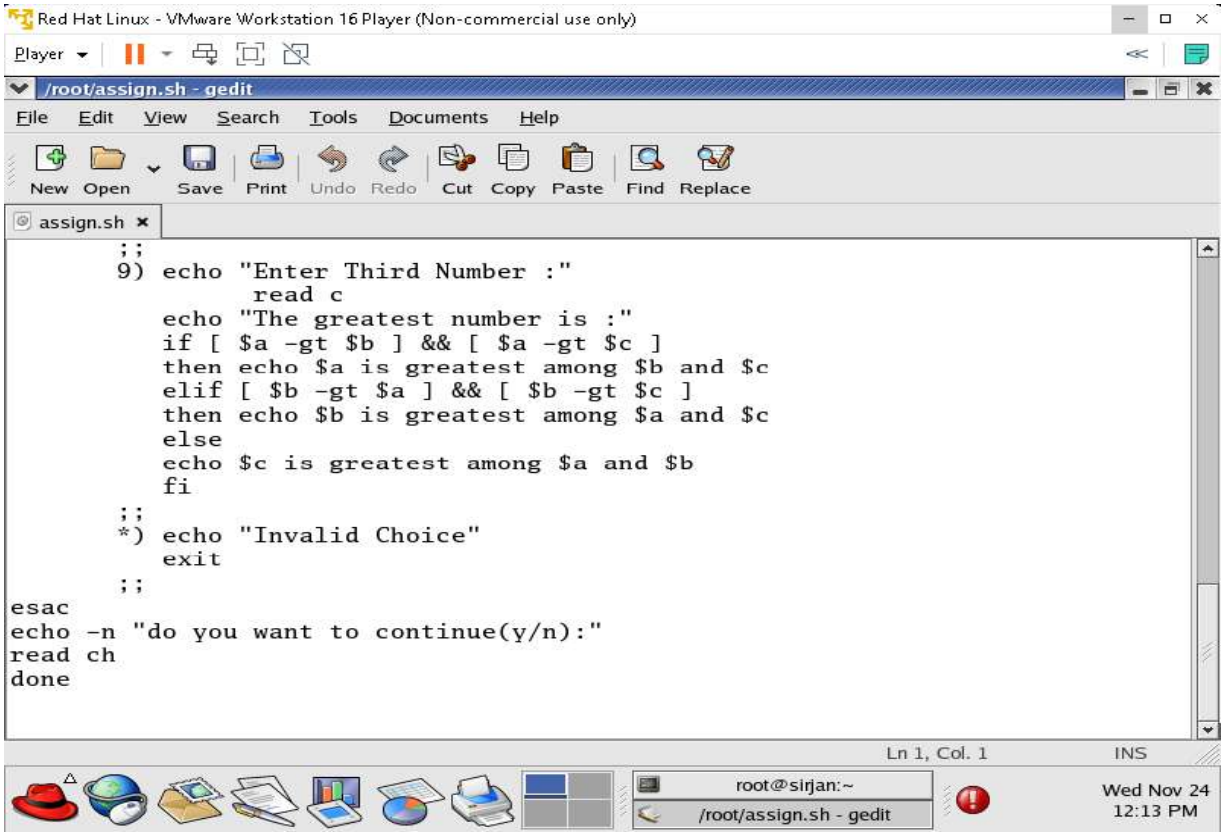
```
Enter First Number:
64
Enter Second Number:
88
Enter Third Number:
85
The greatest number is:
88 is greatest among 64 and 85
do you want to continue(y/n):y
Select the operation you want to perform:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Modulus
6. Assignment
7. Equal
8. Not Equal
9. Find greatest among three numbers
Enter your choice between 1 to 9:
5
Enter First Number:
6
Enter Second Number:
1
Modulus: 1
do you want to continue(y/n):n
```

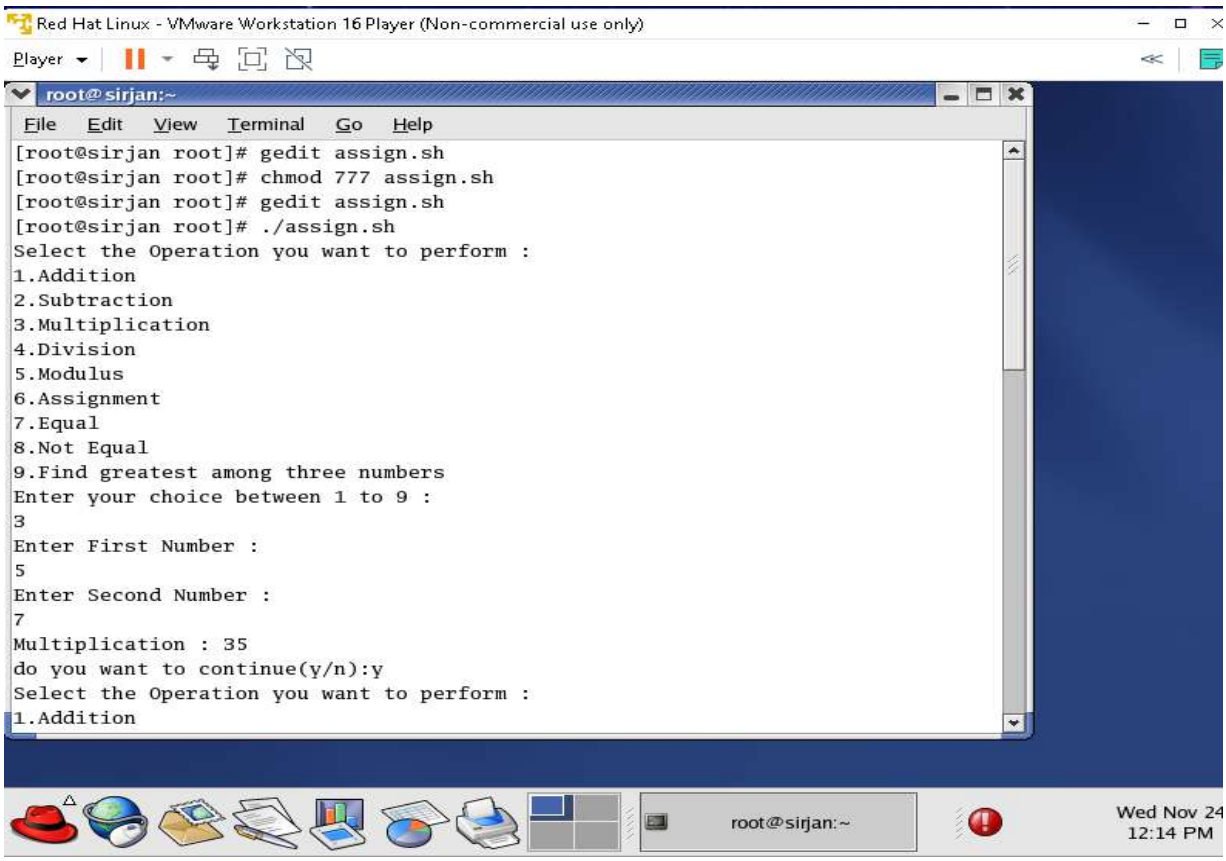

Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
root@sirjan:~
File Edit View Terminal Go Help
[root@sirjan root]# gedit assign.sh
[root@sirjan root]# chmod 777 assign.sh
[root@sirjan root]# gedit assign.sh
root@sirjan:~
Wed Nov 24
12:12 PM

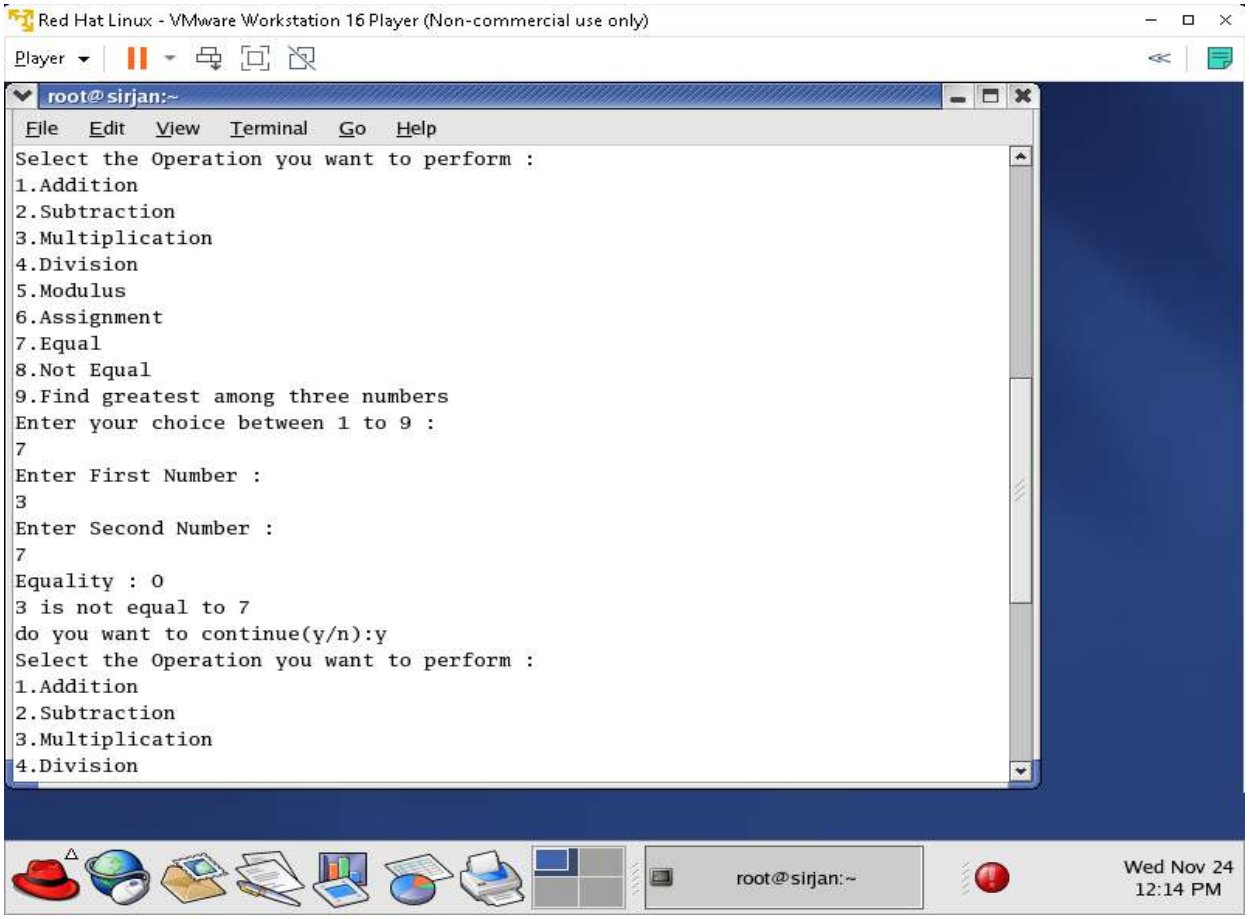

Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
/root/assign.sh - gedit
File Edit View Search Tools Documents Help
New Open Save Print Undo Redo Cut Copy Paste Find Replace
assign.sh
#!/bin/bash
ch="Y"
while [$ch == 'y' -o $ch == 'Y']
do
echo Select the Operation you want to perform :
echo 1.Addition
echo 2.Subtraction
echo 3.Multiplication
echo 4.Division
echo 5.Modulus
echo 6.Assignment
echo 7.Equal
echo 8.Not Equal
echo 9.Find greatest among three numbers
echo Enter your choice between 1 to 9 :
read choice
echo "Enter First Number :"
read a
echo "Enter Second Number :"
read b
case "$choice" in
Ln 1, Col. 1
INS
root@sirjan:~
/root/assign.sh - gedit
Wed Nov 24
12:12 PM

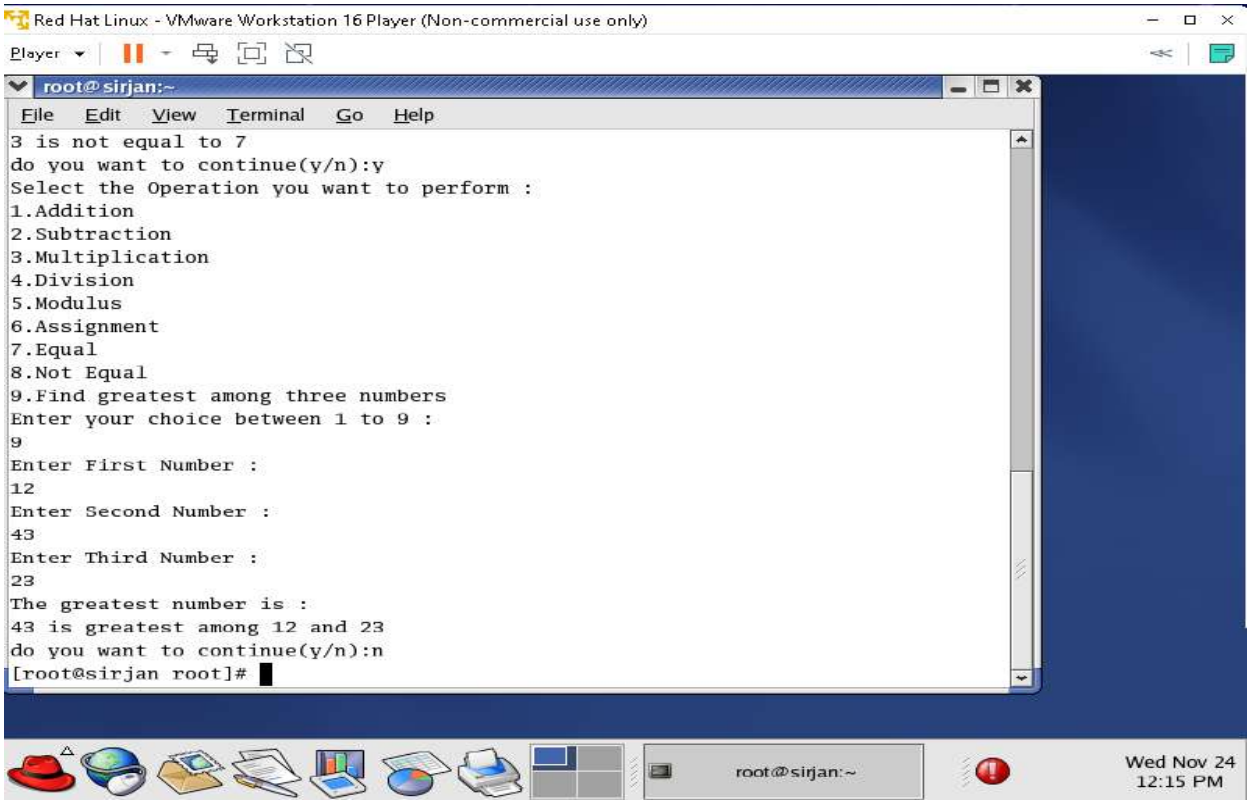

Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
/root/assign.sh - gedit
File Edit View Search Tools Documents Help
New Open Save Print Undo Redo Cut Copy Paste Find Replace
assign.sh
case "$choice" in
1) echo "Addition : "` expr $a + $b `
;;
2) echo "Subtraction : "` expr $a - $b `
;;
3) echo "Multiplication : "` expr $a \* $b `
;;
4) echo "Division : "` expr $b / $a `
;;
5) echo "Modulus : "` expr $b % $a `
;;
6) echo "Assigning value of $b in a : "
echo ` expr a=$b `
;;
7) echo "Equality : "` expr $a == $b `
if [$a == $b]
then
echo "$a is equal to $b"
else
echo "$a is not equal to $b"
fi
Ln 1, Col. 1
INS
root@sirjan:~
/root/assign.sh - gedit
Wed Nov 24
12:12 PM


Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
/root/assign.sh - gedit
File Edit View Search Tools Documents Help
New Open Save Print Undo Redo Cut Copy Paste Find Replace
assign.sh
fi
;;
8) echo "Equality : "` expr $a != $b `
if [$a != $b]
then
echo "$a is not equal to $b"
else
echo "$a is equal to $b"
fi
;;
9) echo "Enter Third Number :"
read c
echo "The greatest number is :"
if [$a -gt $b] && [$a -gt $c]
then echo $a is greatest among $b and $c
elif [$b -gt $a] && [$b -gt $c]
then echo $b is greatest among $a and $c
else
echo $c is greatest among $a and $b
fi
Ln 1, Col. 1
INS
root@sirjan:~
/root/assign.sh - gedit
Wed Nov 24
12:12 PM


Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
/root/assign.sh - gedit
File Edit View Search Tools Documents Help
New Open Save Print Undo Redo Cut Copy Paste Find Replace
assign.sh
;;
9) echo "Enter Third Number :"
read c
echo "The greatest number is :"
if [$a -gt $b] && [$a -gt $c]
then echo $a is greatest among $b and $c
elif [$b -gt $a] && [$b -gt $c]
then echo $b is greatest among $a and $c
else
echo $c is greatest among $a and $b
fi
;;
*) echo "Invalid Choice"
exit
;;
esac
echo -n "do you want to continue(y/n):"
read ch
done
Ln 1, Col. 1
INS
root@sirjan:~
/root/assign.sh - gedit
Wed Nov 24
12:13 PM


Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
root@sirjan:~
File Edit View Terminal Go Help
[root@sirjan root]# gedit assign.sh
[root@sirjan root]# chmod 777 assign.sh
[root@sirjan root]# gedit assign.sh
[root@sirjan root]# ./assign.sh
Select the Operation you want to perform :
1.Addition
2.Subtraction
3.Multiplication
4.Division
5.Modulus
6.Assignment
7.Equal
8.Not Equal
9.Find greatest among three numbers
Enter your choice between 1 to 9 :
3
Enter First Number :
5
Enter Second Number :
7
Multiplication : 35
do you want to continue(y/n):y
Select the Operation you want to perform :
1.Addition
root@sirjan:~
Wed Nov 24
12:14 PM


Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
root@sirjan:~
File Edit View Terminal Go Help
Select the Operation you want to perform :
1.Addition
2.Subtraction
3.Multiplication
4.Division
5.Modulus
6.Assignment
7.Equal
8.Not Equal
9.Find greatest among three numbers
Enter your choice between 1 to 9 :
7
Enter First Number :
3
Enter Second Number :
7
Equality : 0
3 is not equal to 7
do you want to continue(y/n):y
Select the Operation you want to perform :
1.Addition
2.Subtraction
3.Multiplication
4.Division
root@sirjan:~
Wed Nov 24
12:14 PM


Red Hat Linux - VMware Workstation 16 Player (Non-commercial use only)
Player
root@sirjan:~
File Edit View Terminal Go Help
3 is not equal to 7
do you want to continue(y/n):y
Select the Operation you want to perform :
1.Addition
2.Subtraction
3.Multiplication
4.Division
5.Modulus
6.Assignment
7.Equal
8.Not Equal
9.Find greatest among three numbers
Enter your choice between 1 to 9 :
9
Enter First Number :
12
Enter Second Number :
43
Enter Third Number :
23
The greatest number is :
43 is greatest among 12 and 23
do you want to continue(y/n):n
[root@sirjan root]#
root@sirjan:~
Wed Nov 24
12:15 PM

Ques3: What is the significance of Apache Server? Write down the steps to configure Apache single and cross platform.

Ans: Everyday we access webserver. When we open some website on the browser and the data that we get is from web server that is the data is stored on web server. 90% of the worlds web server are configured with Linux. Webserver are managed and configured.

Apache server is a web server application that supports HTML pages, CSS styles. We use Apache server for the webserver configuration. We can host our HTML pages, websites on the webserver, then we can access the web pages. Apache server is also known as webserver or http server. We can host our websites on webservers. Apache Server is maintained by Apache Software Foundation. Apache is responsible for accepting HTTP requests from Internet users and sending them their desired information in the form of web pages.

In Linux, we will make Linux as web server. We will make a web page and host that page on webserver, then we will access web page from the Linux as well as from windows. To configure webserver, we need to install Package for that particular server. The steps are given below:

Steps to Configure Web Server Or Apache Server :-

There are two platforms on which we can configure web-server.

1. Single Platform :- Single platform means Linux to Linux. In this we create a web page, and we can access the same web page through Linux only.

2. Cross Platform :- Cross platform means Linux to windows. In this, the web page that is made in Linux can be accessed from Linux as well as from windows also.

1. Single Platform :- First thing, we will do is to install the package. For Apache server, httpd package is required. The steps are :-

1. Firstly, we mount CD1. In CD1, httpd package is there.

2. Install httpd package by using rpm in Terminal

```
#rpm -ivh /mnt/cdrom/RedHat/RPMS/
        httpd-2.040-21.i386.rpm
```

Then it will show progress bar that means package is successfully installed. To check that httpd package installed or not, type command :-

`rpm -q httpd`

Then it will show the package name

3. Now, go to package management by using following command:-

`#redhat-config-packages`

4. Now package Management is opened. Add or Remove Packages interface will open. Now scroll down and go to server (web server) option. If web server is not enabled, you have to enable it.

5. After enabling and click on details. Now there are two packages you have to select. First is: httpd-manual that is for the Documentation for the httpd web server and second is mod_ssl that is used for Hardware cryptographic accelerator support. Enable these two packages and close it.

6. Now create a webpage. But before you have to create a directory in the following location.

`#mkdir /var/www/html/myweb`

myweb is the name of the directory. Now inside this directory, we create html page index.html. Because index.html is very first pg of all website and rest of the web pages of website are

linked with index.html. If you do not create a web page using index.html then the browser will not show the webpage. So it is mandatory to make index.html. To create web page inside myweb directory, the following command is used:-

```
#gedit /var/www/html/myweb/index.html
```

To Now index.html page is opened and we can write the script on that:-

index.html

```
<html>
<head>
<title> Form </title>
</head>
<body>
<font size=4 color="blue">STUDENT REGISTRATION FORM </form> <br> <br>
<b>STUDENT NAME </b>
<input type="text" name="student">
<br> <br>
<b> GENDER </b>
<input type="radio" name="gender" value="male">
MALE
<input type="radio" name="gender" value="female">
<br> <br>
<button type="submit"> SUBMIT </button>
</body>
</html>
```

Now Save and close.

8. Give permission to this file to entire location.

```
# chmod 777 /var/www/html/myweb/index.html
```

9. Now, Start the services of httpd.

```
# service httpd start/restart
```

start is used for the very first time
restart is used when we make some changes also
so we can start at first time and then restart
several times or required time.

10. Now Go to Browser and type

```
http://localhost
```

It will access the web page that you created
and it will give you output.

In case the page is loaded, then you need to make changes in configuration file To open configuration file

```
# gedit /etc/httpd/conf/httpd.conf
```

In this file you have to make changes. First change is remove "#" from:
ServerRoot "/etc/httpd"
Listen 80
DocumentRoot "/var/www/html"
Now go to end of file, and copy <virtualhost>

</VirtualHost>, paste it just below that make the following changes:

Remove Hash, then:

```
<VirtualHost *:80>
    ServerAdmin abc@mypage.edu
    DoumentRoot /var/www/html/myweb
    ServerName mypage.edu
    ErrorLog logs/mypage.edu-error_log
    CustomLog logs/mypge.edu-access_log common
</VirtualHost>
```

Now, Save the file and close it.

On terminal, restart the services and open browser. It will show the webpage. Type the following on browser

http://localhost

It will show the following output:

STUDENT REGISTRATION FORM

STUDENT NAME [ ]

GENDER ○MALE ○FEMALE

[SUBMIT]

In this way we can configure Apache server in single Platform.

2. Cross Platform:- Single platform must be done if we want to configure cross platform.

1. Mount CD1 and install package httpd

2. Now, go to package management by using following command:-

```
# redhat-config-packages
```

Select webserver and go into details. Selet the first two packages and enable them = httpd-manual and hwcrypto. Click on close.

3. Create a webpage by using following commands

```
# mkdir /var/www/html/myweb
```

```
# gedit /var/www/html/myweb/index.html
```

4. Now, the index.html file is opened and now write html code on this as follows:-

index.html

```
<html>
<head>
<title>Form</title>
</head>
<body>
<font size=4 color="blue">STUDENT REGISTRATION
```

```
FORM</form><br><br>
<b>STUDENT NAME</b>
<input type="text" name="student"><br><br>
<b>GENDER</b>
<input type="radio" name="gender" value="male">
MALE
<input type="radio" name="gender" value="female">
<br><br>
<button type="submit">SUBMIT</button>
</button>
</html>
```

Save and close.

5. We need to give permission to this file :-

```
# chmod 777 /var/www/html/myweb/index.html
```

6. Start the services of httpd :-

```
# service httpd start/restart
```

We have done the steps till single platform and now we need to open web page on windows browser. For this, further steps are given.

7. Restart the Internet services - Make sure that Internet must be connected in Linux and stop iptables

```
# service network restart
```

```
# service iptables stop
```

iptables stop the information of network traffic because vmware bouncing connection sometimes. It will not allow the window to access linux data. So there is need to stop the services of iptables that's why above command is used.

8. Next is to make the changes in configuration file :-

```
#gedit /etc/httpd/conf/httpd.conf
```

The configuration file is opened now. The following changes we need to perform :-

(i) Remove # from the following three lines :-

```
ServerRoot "/etc/httpd"
Listen 80
DocumentRoot "/var/www/html"
```

"#" is used to make command. We have to make them uncommented by removing "#".

(ii) Now go to end of file by scrolling down and copy the <VirtualHost> - </VirtualHost> and paste just below it.

(iii) Remove hash from all the lines from <VirtualHost> to </VirtualHost>. Changes are as shown below :-

```
<VirtualHost *:80>
    ServerAdmin abc@mypage.edu
    DocumentRoot /var/www/html/myweb
    ServerName mypage.edu
    ErrorLog logs/mypage.edu-error_log
    CustomLog logs/mypage.edu-access_log common
</VirtualHost>
```

=> In first line, 80 is the port number to access the web pages

=> In second line, Server Admin act as admin of server. It is kind of email id of server Admin so we take as abc@mypage.edu. You can give any name to that. Wherever dummy host.example.com is written, you will provide mypage.edu

=> Now, In next line, we need to provide the path of our directory in which web page or html page is created.

=> In next line, ErrorLog will store the error related to mypage.edu.

=> CustomLog include the details about the accessibility when mypage.edu page is accessed.

That are the changes we need to do in configuration file.

Q. After that restart the services and check ip address

```
#service httpd restart
```

```
#ip addr show
```

This will show the IP address. Now we have to make changes in host file.

10. To make changes in host file of Linux, type command:-

```
#gedit /etc/hosts
```

It will open the hosts file. Do not make changes in already written data. Just type the ipaddress and server name at the end of file as:-

```
192.168.1.5  mypage.edu
```

Save and close the file.

11. Now, go to Windows, open control panel, go to Windows Defender Firewall, go to Turn Windows Defender Firewall on or off and Turn off the Windows Defender Firewall

12. Now, again go to Control Panel, Programs and features, click Turn Windows features on or off. Now, the Windows feature interface is opened. Select Internet Information Services and enable its sub-parts. Click on OK

13. There is need to make some changes on the host file of Windows. Go to:-

```
C:\Windows\System32\drivers\etc
```

14. Copy the hosts file and paste it on desktop. Now open the hosts file and make changes as:

```
192.168.1.6 mypage.edu
```

Now write ipaddress and servername at the end of file, save and close it. Now cut this file and paste to the same location:

```
C:\Windows\System32\drivers\etc
```

It will ask you, do you want to replace file, click Replace file. Do not make changes to already written content.

15. Go to browser in windows and type mypage.edu. Start service on Linux and on windows type mypage.edu and then the following page is opened in browser.

STUDENT REGISTRATION FORM

STUDENT NAME [ ]

GENDER ○MALE ○FEMALE

[SUBMIT]

In this way, we can access the web page from Linux to Windows on cross platform.