19AIE202: Operating Systems

LAB SHEET 3

Linux Shell Programming

Shell Scripting Tutorial

Conditional Statements:

There are total 5 conditional statements which can be used in bash programming

1. if statement

2. if-else statement

3. if..elif..else..fi statement (Else If ladder)

4. if..then..else..if..then..fi..fi..(Nested if)

5. switch statement

if statement

```
if [ expression ]
then
    statement
fi
```

Sample Code
```
#Initializing two variables
a=10
b=20


#Check whether they are equal
if [ $a == $b ]
then
```

```
        echo "a is equal to b"
fi


#Check whether they are not equal
if [ $a != $b ]
then
        echo "a is not equal to b"
fi
```

if-else statement

```
if [ expression ]
then
    statement1
else
    statement2
fi
```

Sample Code
```
#Initializing two variables
a=20
b=20


if [ $a == $b ]
then
        #If they are equal then print this
        echo "a is equal to b"
else
        #else print this
        echo "a is not equal to b"
fi
```

if..elif..else..fi statement (Else If ladder)

```
if [ expression1 ]
then
    statement1
    statement2
    .
elif [ expression2 ]
then
    statement3
    statement4
    .
else
    statement5
fi
```

if..then..else..if..then..fi..fi..(Nested if)

```
if [ expression1 ]
then
    statement1
    statement2
    .
else
    if [ expression2 ]
    then
        statement3
        .
    fi
fi
```

switch statement

```
case  in
```

```
    Pattern 1) Statement 1;;

    Pattern n) Statement n;;
esac
```
Sample code


```
CARS="bmw"


#Pass the variable in string
case "$CARS" in
    #case 1
    "mercedes") echo "Headquarters - Affalterbach, Germany" ;;


    #case 2
    "audi") echo "Headquarters - Ingolstadt, Germany" ;;


    #case 3
    "bmw") echo "Headquarters - Chennai, Tamil Nadu, India" ;;
esac
```


Looping Statements in Shell Scripting:

There are total 2 looping statements which can be used in bash programming

1. while statement
2. for statement

To alter the flow of loop statements, two commands are used they are,

1. break
2. continue

while statement
```
while command
do
```

```
    Statement to be executed
done


a=0
# -lt is less than operator


#Iterate the loop until a less than 10
while [ $a -lt 10 ]
do
    # Print the values
    echo $a


    # increment the value
    a=`expr $a + 1`
done
```

for statement

```
for var in word1 word2 ...wordn
do
    Statement to be executed
done
```

for loop with break statement

```
#Start of for loop
for a in 1 2 3 4 5 6 7 8 9 10
do
    # if a is equal to 5 break the loop
    if [ $a == 5 ]
    then
        break
    fi
```

```
    # Print the value

    echo "Iteration no $a"
done
```

Brace expansion

We use the brace expansion {m..n} to generate string in shell script.

```
{1..5} will give 1 2 3 4 5

{a..f} will give a b c d e f

{Z..T} will give Z Y X W V U T

{-5..5} will give -5 -4 -3 -2 -1 0 1 2 3 4 5

{A,B,C,D} will give A B C D

{A,B,C{1..3},D} will give A B C1 C2 C3 D
```

```
#!/bin/sh for i in {1..10}do  echo $idone
```

```
#!/bin/sh for ch in {A..Z}do  echo $chdone
```

using the seq command and set FIRST to 1, INCREMENT to 2 and LAST to 10.

```
#!/bin/shfor i in $(seq 1 2 10)do  echo $idone
```

```
for (( var=val; var<=val2; var++ ))do  # body of for loopdone
```

Write a Shell Script to print the following pattern

```
11 21 2 31 2 3 4
```

```
#!/bin/sh for r in {1..4}do  for i in $(seq 1 $r)  do    printf "$i "  done
printf "\n"done
```

Lab Exercises

1. Write shell scripts for the following:
   a. To take your name, programme name and enrolment number as input from user and print it on the screen.
   b. To find the sum, the average and the product of four integers.
   c. Write a program to check whether a number is even or odd.
   d. To exchange the values of two variables.
   e. To find the lines containing a number in a file.
   f. To concatenate two strings and find the length of the resultant string.
   g. To concatenate the contents of two files.
   h. Write a shell script that would wait 5 seconds and then display the time.
2. The length and breadth of a rectangle and radius of a circle are provided as user input. Write a shell script that will calculate the area and perimeter of the rectangle and the area and circumference of the circle.

Hint: - Area of Rectangle = L*B Perimeter of Rectangle = 2(L+B) Area of Circle = $\pi.r^2$ Circumference of circle = 2. $\pi.r$

3. Write a menu driven shell program to read two numbers and print the results of all the arithmetic operations. (+ , - , * , / , % , ++ , --)
4. Write two separate shell scripts to find the factorial of a number using *while* statement and *for* statement.
5. Given a file of numbers (one number per line), write a shell script that will find the lowest and highest number.
6. Write a shell program to read n numbers into an array and display the average of them.
7. Write a shell program to print the following Patterns.

8. Write a shell program to read two matrices, add them and print the output matrix.
9. Write a program to read a matrix and print the transpose of it.
10. Run the program *cal.sh* given to you

   a. Give different inputs and verify the output
   b. Modify the cal.sh to accept more than one month, as in