Laboratory Assignments 3
Subject: Design Principles of Operating Systems
Subject code: CSE 3249

Assignment 3: Shell Programming using user defined variables, arithmetic operators, conditional statements.

Objective of this Assignment:

- To learn the proper use of user defined variables and arithmetic operators in shell programming.
- To write shell script producing solution to decision making problems.

1. Write a shell script **iaop** to perform integer arithmetic on two numbers, where the value of the two numbers will be given during runtime.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > iaop.sh
echo "Enter first num :"
read num1
echo "Enter sec num :"
read num2
sum=$((num1+num2))
echo "Sum of $num1 and $num2 is $sum"
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x iaop.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./iaop.sh
Enter first num :
23
Enter sec num :
14
Sum of 23 and 14 is 37
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

2. Write a shell script **faop** to perform floating point arithmetic on two numbers, where the value of the two numbers will be given during runtime.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > faop.sh
#!/bin/bash
echo "Enter first float num:"
read a
echo "Enter second float num:"
read b

sum=$(echo "$a + $b" | bc -l)
sub=$(echo "$a - $b" | bc -l)
mul=$(echo "$a * $b" | bc -l)

if (( $(echo "$b == 0" | bc -l) )); then
    div="Error: Division by zero"
else
    div=$(echo "scale=2; $a / $b" | bc -l)
fi
```

```
echo "Addition: $sum"
echo "Subtraction: $sub"
echo "Multiplication: $mul"
echo "Division: $div"
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x faop.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./faop.sh
Enter first float num:
2.5
Enter second float num:
12.4
Addition: 14.9
Subtraction: -9.9
Multiplication: 31.00
Division: .20
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

3. Ramesh's basic salary is input through the keyboard. His dearness allowance is 40% of basic salary, and house rent allowance is 30% of basic salary. Write a program to calculate his gross salary.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > ramesh.sh
echo "Enter Ramesh's basic salary:"
read basic

da=$(echo "0.4 * $basic" | bc -l)
hra=$(echo "0.3 * $basic" | bc -l)
gross=$(echo "$basic + $da + $hra" | bc -l)

echo "Dearness Allowance: $da"
echo "House Rent Allowance: $hra"
echo "Gross Salary: $gross"
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x ramesh.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./ramesh.sh
Enter Ramesh's basic salary:
50000
Dearness Allowance: 20000.0
House Rent Allowance: 15000.0
Gross Salary: 85000.0
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

4. Write a shell script to accept a list of 10 numbers from the user and count how many are **even** and how many are **odd**.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > evenOdd.sh
even=0
odd=0

echo "Enter 10 numbers:"

for ((i=1; i<=10; i++))
do
    read num
    if (( num % 2 == 0 ))
    then
        ((even++))
    else
        ((odd++))
    fi
done

echo "Total even numbers: $even"
echo "Total odd numbers: $odd"
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x evenOdd.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./evenOdd.sh
Enter 10 numbers:
1
2
3
4
5
6
7
8
9
10
Total even numbers: 5
Total odd numbers: 5
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

5. If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit was made or loss incurred.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > price.sh
echo "Enter cost price:"
read cp
echo "Enter selling price:"
read sp

if (( $(echo "$sp > $cp" | bc -l) )); then
    profit=$(echo "$sp - $cp" | bc -l)
    echo "Profit: $profit"
elif (( $(echo "$sp < $cp" | bc -l) )); then
    loss=$(echo "$cp - $sp" | bc -l)
    echo "Loss: $loss"
else
    echo "No profit, no loss"
fi
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x price.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./price.sh
Enter cost price:
50
Enter selling price:
90
Profit: 40
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

6. Write a shell script which receives any year from the keyboard and determines, whether the year is a leap year or not. If no argument is supplied the current year should be assumed.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > leap.sh
echo "Enter a year:"
read year
year=${year:-$(date +%Y)}
if (( year % 4 == 0 && (year % 100 != 0 || year % 400 == 0) )); then
    echo "$year is a leap year"
else
    echo "$year is not a leap year"
fi
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x leap.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./leap.sh
Enter a year:
2008
2008 is a leap year
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

7. Write a shell script **allow** that will display a message to enter internal mark and percentage in attendance, if the entered mark is greater than equal to 20 and entered percentage in attendance is greater that equal to 75 then display the message Allowed for Semester otherwise display the message Not allowed.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > allow.sh
echo "Enter internal mark:"
read mark
echo "Enter attendance percentage:"
read attend

if (( mark >= 20 )) && (( attend >= 75 )); then
    echo "Allowed for Semester"
else
    echo "Not allowed"
fi
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x allow.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./allow.sh
Enter internal mark:
78
Enter attendance percentage:
66
Not allowed
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

8. Write a shell script **large3** that will compare three numbers passed as command line arguments and display the largest one.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > large3.sh
if [ $# -ne 3 ]; then
    echo "Usage: $0 num1 num2 num3"
    exit 1
fi

a=$1
b=$2
c=$3

if (( a >= b && a >= c )); then
    echo "Largest: $a"
elif (( b >= c )); then
    echo "Largest: $b"
else
    echo "Largest: $c"
fi
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x large3.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./large3.sh
Usage: ./large3.sh num1 num2 num3
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./large3.sh 13 35 85
Largest: 85
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

9. Write a shell script **check_char** which will display one message to enter a character and according to the character entered it will display appropriate message from the following options:
    - You entered a lower case alphabet
    - You entered an upper case alphabet.
    - You have entered a digit.
    - You have entered a special symbol.

    You have entered more than one character.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > check_char.sh
echo "Enter a character:"
read char

if [ ${#char} -ne 1 ]; then
    echo "You have entered more than one character."
elif [[ $char =~ [a-z] ]]; then
    echo "You entered a lower case alphabet"
elif [[ $char =~ [A-Z] ]]; then
    echo "You entered an upper case alphabet"
elif [[ $char =~ [0-9] ]]; then
    echo "You have entered a digit"
else
    echo "You have entered a special symbol"
fi
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x check_char.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./check_char.sh
Enter a character:
r
You entered a lower case alphabet
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

10. Write a shell script **class_time** which will display one message to enter a day andaccording to the day entered it will display the DOS class time along with the room information or the message “No class on day_name” or “Holiday” for Sunday.

```
iteradmin@D001-38:~/Desktop/A3_DPOS$ cat > class_time.sh
echo "Enter a day:"
read day

case "$day" in
    Monday)    echo "DOS class: 10:00 AM - Room 101" ;;
    Tuesday)   echo "DOS class: 11:30 AM - Room 102" ;;
    Wednesday) echo "DOS class: 09:00 AM - Room 103" ;;
    Thursday)  echo "DOS class: 02:00 PM - Room 104" ;;
    Friday)    echo "DOS class: 03:30 PM - Room 105" ;;
    Saturday)  echo "No class on Saturday" ;;
    Sunday)    echo "Holiday" ;;
    *)         echo "Invalid day" ;;
esac
^C
iteradmin@D001-38:~/Desktop/A3_DPOS$ chmod +x class_time.sh
iteradmin@D001-38:~/Desktop/A3_DPOS$ ./class_time.sh
Enter a day:
Monday
DOS class: 10:00 AM - Room 101
iteradmin@D001-38:~/Desktop/A3_DPOS$
```

11. Write a shell script **filechk** that will take two file names as command line arguments, and check whether the content of two files are same or not . If contents of two files are same, then it will display the message: Files filename1 and filename2 have same content.then delete the second file and display the message: So filename2 is deleted. Otherwise display the message: Files filename1 and filename2 have different content.

```
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ cat filechk.sh

if [ $# -ne 2 ]
then
    echo "Usage: $0 <file1> <file2>"
    exit 1
fi

file1=$1
file2=$2

# Check if both files exist
if [ ! -f "$file1" ]
then
    echo "File $file1 not found."
    exit 1
fi

if [ ! -f "$file2" ]
then
    echo "File $file2 not found."
    exit 1
fi

# Compare files
if cmp -s "$file1" "$file2"
then
    echo "Files $file1 and $file2 have same content."
    rm "$file2"
    echo "So $file2 is deleted."
else
    echo "Files $file1 and $file2 have different content."
fi
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ chmod +x filechk.sh
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ ./filechk.sh fileA.txt fileB.txt
File fileA.txt not found.
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ cat > fileA.txt
Hello World
^C
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ cat > fileB.txt
Hello World
^C
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ ./filechk.sh fileA.txt fileB.txt
Files fileA.txt and fileB.txt have same content.
So fileB.txt is deleted.
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ ls
allow.sh  check_char.sh  class_time.sh  evenOdd.sh  faop.sh  fileA.txt  filechk.sh  iaop.sh  large3.sh  leap.sh  price.sh  ramesh.sh
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$
```

12. Write a shell script **calculator** that will take three command line arguments, where the first argument will specify the first operand, second argument will specify the operator and the third argument will specify the second operand and display the output of the arithmetic operation specified in the following format: op1 operator op2 = result .

If the arguments will be passed in any other sequence, it will display the message:

"Invalid input "

Enter input in following format: op1 operator op2

```
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ cat >calculator.sh

if [ $# -ne 3 ]
then
    echo "Invalid input"
    echo "Enter input in following format:"
    echo "op1 operator op2"
    exit 1
fi

op1=$1
operator=$2
op2=$3

if ! [[ $op1 =~ ^[0-9]+$ ]] || ! [[ $op2 =~ ^[0-9]+$ ]]
then
    echo "Invalid input"
    echo "Enter input in following format:"
    echo "op1 operator op2"
    exit 1
fi

case $operator in
    +) result=$((op1 + op2)) ;;
    -) result=$((op1 - op2)) ;;
    x) result=$((op1 * op2)) ;;
    /)
        if [ $op2 -eq 0 ]
        then
            echo "Error: Division by zero not allowed"
            exit 1
        fi
        result=$((op1 / op2)) ;;
    %) result=$((op1 % op2)) ;;
    ^) result=$((op1 ** op2)) ;;
    *)
        echo "Invalid input"
        echo "Enter input in following format:"
        echo "op1 operator op2"
        exit 1 ;;
esac

echo "$op1 $operator $op2 = $result"
^C
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ chmod +x calculator.sh
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ ./calculator.sh 10 + 30
10 + 30 = 40
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ ./calculator.sh 10 x 30
10 x 30 = 300
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$ ./calculator.sh 10 % 30
10 % 30 = 10
swayam@ubuntu-box:~/Downloads/OS_3/A3_DPOS$
```