Birla Institute of Technology & Science, Pilani
Computer Programming (CSF111)
Lab-4

Objectives

Conditional control structure

YOU SHOULD NOT COPY AND PASTE THE PROGRAMS. READ THE QUESTION, TRY TO WRITE A PROGRAM YOURSELF, AND TEST IT. IF YOU ARE UNABLE TO WRITE PROGRAM, THEN READ THE SOLUTION, UNDERSTAND IT AND THEN WRITE THE PROGRAM YOURSELF ... WITH OUT LOOKING AT THE SOLUTION. THIS IS THE ONLY WAY YOU WILL LEARN ... COPY PASTE WILL NOT HELP YOU OUT.

Conditional Control Structure

Normally, program flows along line by line in the order in which it appears in your source code. But, it is sometimes required to execute a particular portion of code only if certain condition is true; or false i.e. you have to make decision in your program. There are three major decision making structures.

The one way decision using if statement

The if statement enables you to test for a condition (such as whether two variables are equal) and branch to different parts of your code, depending on the result or the conditions with relational and logical operators are also included. The simplest form is

```
if (TestExpr)
{block of statements executed if condition is true; }
```

Two way decision using if-else statement

If else statement is used when we want to take one branch if your condition is true, another if it is false. The form of if else is as follows

```
if (TestExpr)
{ block of statements executed if condition is true; }
else
{ block of statements executed if condition is true; }
```

Multi-way Decision

Multi-way decision statements use if-else-if nested ifs. They are used to evaluate a test expression that could have several possible values. It is often used to choose between ranges of values. The form of multi-way decision is as follows

```
if (TestExpr)
{ block of statements executed if condition is true; }
else if(TestExpr)
{ block of statements executed if condition is true; }
else
{ block of statements executed if condition is true; }
```

Note: If only one statement is to be followed by the if or else condition then there is no need of parenthesis.

Ex-1 Write a program that inputs an integer and determine if it is even or odd.

```
#include<stdio.h>
```

```
int main()
{ int i;
printf("Enter  Number\n");
scanf("%d",&i);
if(i%2==0)
printf("number is even\n");
else
printf("number is odd\n);
return 0;
}
```

Ex-2 Write a program which takes three sides of a triangle input and calculates its area ,if these conditions are satisfied a+b>c, b+c>a, a+c>b, calculate area=(a+b+c)/2

```
#include<stdio.h>
int main()
{
 int side1,side2,side3;
printf("\n enter the value of sides\n");
scanf("%d%d%d",&side1,&side2,&side3);
if(side1+side2 > side3)
if(side1+side3> side2)
if(side2+side3> side1)
printf("\n Area = %f\n", (a+b+c)\2);
return 0;
}
```

Ex-3 Write a program which takes a character input & checks if it is a vowel or consonant.

```
#include<stdio.h>
int main()
{char c;
Printf("enter character\n");
scanf(" %c",&c);
if(c == 'a' || c == 'e' || c== 'i' || c=='o' || c== 'u')
printf(" %c is vowel\n",c);
else
printf("%c is consonant",c);
}
```

Ex-4 Write a program (calc.c) that does the job of a simple calculator with three operations(addition, division and power).

```
#include <stdio.h>
#include <math.h>
int main(void)
{
int num1, num2;
float res;
char op;
printf ("Enter First Number\n");
scanf("%d",&num1);
printf ("Enter Second Number\n");
scanf("%d",&num2);
printf ("Enter the operator (+ , / , ^)\n");
scanf (" %c",&op);
if (op == '+')
res = num1 + num2;     /*Implicit Type Casting */
else if (op == '/')
res = (float)num1/(float)num2; /*Explicit Type Casting */
else if (op == '^')
res = pow(num1,num2);
else
{
printf ("\n Invalid Operator");
return (0);
}
printf ("\n num1 %c num2 = %f",op,res);
return (0);
}
```

[NOTE: Since you have included math.h library, you need to explicitly link it during compile time. Therefore for compiling the above program write gcc –lm calc.c Also try the option gcc –lm calc.c –o mycalculator].

Switch Statement

The *switch* statement is provided by C to select one of several alternatives. The switch statement is especially useful when the selection is based on the value of a single variable or of a simple expression (also called the controlling expression). The value of this expression may be char or int but not double.

Ex-5 Consider again the same program (calc.c) using switch-case conditional construct. Try it and understand the difference between the two versions of the same program.

```
#include <stdio.h>
#include <math.h>
int main(void)
```

```
{
int num1, num2;
float res;
char op;
printf ("Enter First Number\n");
scanf("%d",&num1);
printf ("Enter Second Number\n");
scanf("%d",&num2);
printf ("Enter the operator (+ , / , ^)\n");
scanf (" %c",&op);
switch (op){
case '+':
res = num1 + num2;
break;
case '/':
res = (float)num1/(float)num2;
break;
case '^':
res = pow(num1,num2);
break;
default:
printf ("\n Invalid Operator");
return (0);
}
printf ("\n num1 %c num2 = %f",op,res);
return (0);
}
```

Exercises

1) Rewrite the program Ex-4 (calc.c) using simple if statement.

2) Replace the statement "res = (float)num1/(float)num2" in any version of the above programs by "res = (float)num1/num2" and observe what happens. Does the output change? Why.

3) Remove all the break statements from Ex-5 (with switch-case construct) and try to execute the program with few inputs. Observe the difference.

4) Write a program to find whether an entered year of a twenty-first century is a leap year or not. Your program should give an error message if the year entered does not belong to twenty-first century. Hint: A year is a leap year if it is divisible by 4, except that any year divisible by 100 is a leap year only if it is divisible by 400.

5) Write a program that returns a letter grade based on a quiz score. The input will be the integer score from a ten point quiz. (Use nested if-else)

The letter grades are assigned by:

9 - 10 "A" 7 - 8 "B" 5 - 6 "C" 3 - 4 "D" < 3 "F"

6) Rewrite the program in Q.5 using switch statement.

7) Write a C program that takes month number as an input and displays the number of days in the month. If input is greater than 12 or less than 1 then program should display an error message.