Decision making statements in C

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Introduction to decision making statement in C

- Also known as control statements
- Controls the flow of execution
- Executes program until a specified condition is met
- One of the most important parts in programming

Decision making statements in C

- if statement
- switch statement
- Conditional operator statement
- goto statement

If statement

- The expression must evaluate to true or false.
- The “statement” can be a group of statements in braces:
- Syntax:

```
if(expression)
{
 Statement 1;
 Statement 2;
}
```

Example

```
#include<stdio.h>
#include<conio.h>
main( )
{
  int n ;
  printf ( "Enter your age: " ) ;
  scanf ("%d", &n ) ;
  if ( n>=20 )
  {
    printf ("\nYou are in your adulthood. " ) ;
  }
  getch();
}
```

```
Enter any number: 25
You are in your adulthood.
```

If else statement

- An extension version of if statement.
- Generally in the form of if (test expression)

```
if (test expression)
{
   true block statement(s)
}
 else
{
 false block statement(s)
 }
```

Example

```
#include<stdio.h>
#include<conio.h>
main()
{
    int age;
    printf("\n enter your age:");
    scanf("%d",&age);
    if(age>=18)
    {
     printf("eligible for citizenship");
    }
    else
    {
      printf("\n NOT ELIGIBLE");
    }
    getch();
}
```

```
enter your age:13
NOT ELIGIBLE
enter your age:20
eligible for citizenship
```

If …else if…. else statement

- It is used to give series of decision
- Syntax:

```
if (condition)
{
//statement 1
}
else if (condition 2)
{
//statement 2
}
else
{
// statement when all condition are false
}
```

//Program to find the roots of the quadratic equations ax^2+bx+c=0

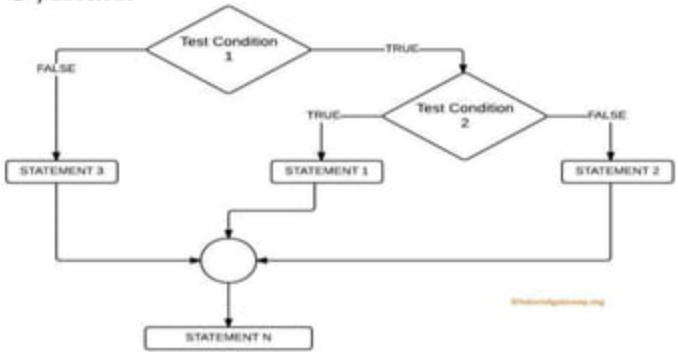
```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
float a,b,c,d,r1,r2;
printf("Enter coefficients a, b and c: ");
scanf("%f%f%f",&a,&b,&c);
d=b*b-4*a*c;
if(d==0)
{
r1=-b/(2*a);
printf("\n Roots are equal and is %.3f",r1);
}
else if(d>0)
{
d=sqrt(d);
r1=(-b+d)/(2*a);
r2=(-b-d)/(2*a);
printf("\nRoots are real and r1=%.3f, r2=%.3f",r1,r2);
}
else
{
d=sqrt(fabs(d));
printf("\n Roots are imaginary");
printf("\n r1=%.3f + i%.3f",-b/(2*a),d/(2*a));
printf("\n r2=%.3f - i%.3f",-b/(2*a),d/(2*a));
}
getch();
```

```
Enter coefficients a, b, c: 1
2
1
Roots are equal and is -1.000
```

Nested if-else statement

- New block of if-else statement defined in existing if or else block statement.

- Syntax:




```
if(condition)
{
   if(condition)
    {
      statement
    }
   else
    {
      statement
    }
}
else
{
  statement
}
```

```
#include <stdio.h>
#include <conio.h>
void main( )
{
 int a,b,c;
 printf("Enter 3 numbers: \n");
 scanf("%d%d%d",&a,&b,&c);
 if(a>b)
 {
  if( a > c)
  {
    printf("%d is greatest",a);
  }
  else
  {
    printf("%d is greatest",c);
  }
 }
 else
 {
  if( b> c)
   {
     printf("%d is greatest",b);
   }
  else
   {
     printf("%d is greatest",c);
   }
 }
getch();
}
```

Using Nested-if statement to check greatest number among three input numbers

```
Enter 3 numbers:
9
11
5
11 is greatest
```

```
Enter 3 numbers:
49
55
88
88 is greatest
```

The switch statement

- Multi-way decision statement
- Tests the value of a given variable against a list of case values
- when a match is found, a block of statements associated with that case is executed.

Syntax of switch statement

```
switch (var)
{
      case case value 1:
      statements;
      break;
      case case value 2:
      statements;
      break;
      …….
      …….
      case case value n:
      default:
      statements;
      break;
}
```

Should be an integer or characters

Known as case labels and should be constants or constant expressions
And should be end with semicolon

Example

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

    char operator;
    float firstNumber,secondNumber;
    printf("Enter an operator (+, -): ");
    scanf("%c", &operator);
    printf("Enter two operands: ");
    scanf("%f %f",&firstNumber, &secondNumber);
    switch(operator)
    {
        case '+':
            printf("%f + %f = %f",firstNumber, secondNumber, firstNumber +
secondNumber);
            break;

        case '-':
            printf("%f - %f = %f",firstNumber, secondNumber, firstNumber -
secondNumber);
            break;

        default:
            printf("Error! operator is not correct");
    }
    return 0;
}
```

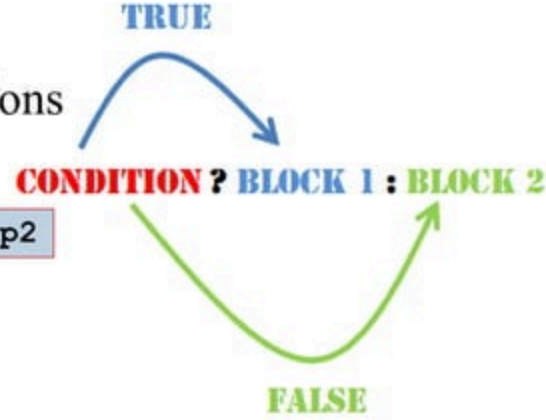
```
Enter an operator(+,-): -
Enter two operands: 6
4
6.000000 - 4.000000 = 2.000000
```

```
Enter an operator(+,-): /
Enter two operands: 9
3
Error! operator is not correct
```

The ?: operator

- Known as conditional operator
- Used for making two-way decisions
- Syntax:

```
Conditional expression ? exp1: exp2
```



Example:

```
#include <stdio.h>
#include <conio.h>
#include <math.h>
void main()  //If True first exp is executed
{
    int a;    //If False second exp is executed
    printf("Enter a number: ");
    scanf("%d",&a);
   (a%2==0?printf("Even"):printf("Odd"));
   getch();
}
```

```
Enter a number: 9
Odd
```

```
Enter a number: 8
Even
```

The GOTO statement

- Rarely used statement
- Provides an unconditional jump from 'goto' to a labelled statement in the same function
- Syntax:

```
goto label;
----------
----------
label;
statement;
```

Forward jump

```
label;
statement;
----------
----------
goto label;
```

Backward jump

- Requires label to identify the place where the branch is to be made

Example:

```
Enter a number: 9

Square root of 9.000000---->3.000000
Enter a number: 25

Square root of 25.000000---->5.000000
```

```c
#include <stdio.h>
#include <conio.h>
#include <math.h>
void main()
{
    float y,x;
    read:
    printf("\nEnter a number: ");
    scanf("%f",&y);
    if(y<0) goto read;
    x=sqrt(y);
    printf("\nSquare root of %f---->%f\n",y,x);
    goto read;
}
```

References:

- Websites:
  - google.com
  - codecadamy.com
  - tutorialspoint.com
- External sources:
  - Text book: Programming in ANSIC (E-Balagurusamy)

Queries