

# DECISION MAKING STATEMENTS

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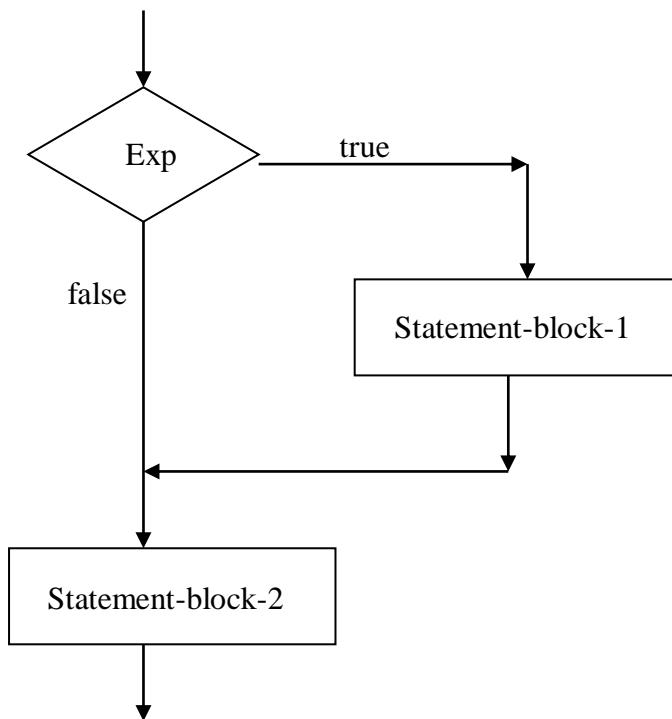
# DECISION MAKING STATEMENTS

## Decision making with IF statement:

The **if** statement is a powerful decision making statement and is used to control the flow of execution of statements. It is basically a two-way decision statement and is used in conjunction with an expression.

```
if (expression)
{
    statement-block;
}
```

The statement-block may be a single statement or a group of statements. If the expression is true the statement-block will be executed. Otherwise the statement-block will be skipped and the execution will jump to the statement after the closing brace.



## Compound Statement:

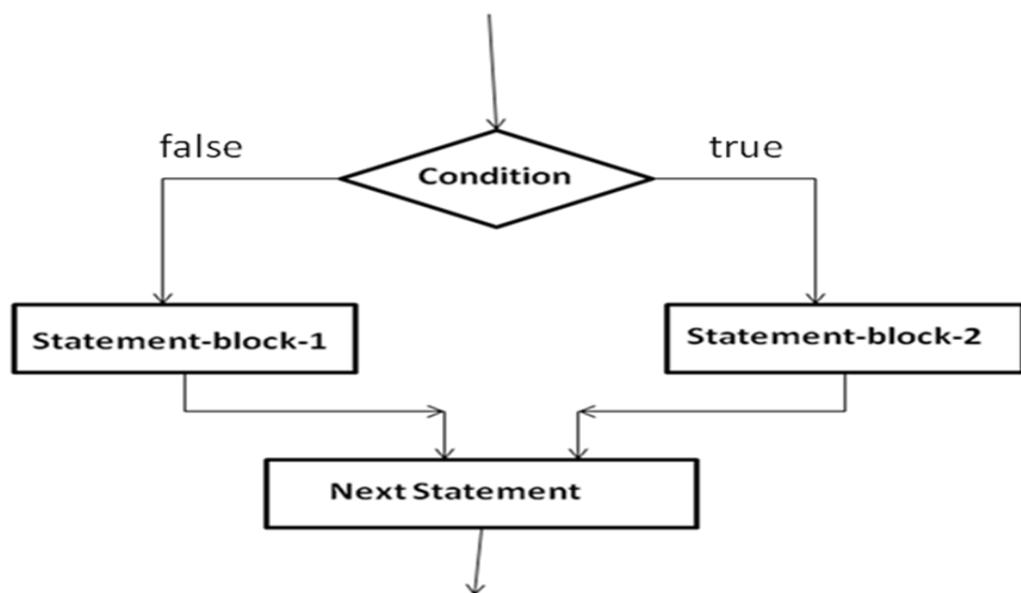
More than one statements enclosed within curly braces is said to be compound statement

```
{
    Statement_1;
    Statement_2;
    Statement_3;
}
```

## The general form of if-else statement:

```
if (expression)
{
    statement_block_1;
}
else
{
    statement_block_2;
}
```

If the expression is true statement\_block\_1 will be executed. Otherwise statement\_block\_2 will be executed. In both cases control is transferred to subsequent statements after if statement.



```
/*-----Ex 1-----  
Program to find large among 2 numbers  
-----*/  
  
#include <stdio.h>  
#include<conio.h>  
void main()  
{  
    int a,b,big;  
  
    clrscr();  
  
    printf("Enter 2 numbers ");  
    scanf("%d%d",&a,&b);  
  
    if (a>b)  
        big=a;  
    else  
        big=b;  
  
    printf("biggest number = %d\n",big);  
    getch();  
}
```

### **OUTPUT**

Enter 2 numbers 50 60  
biggest number = 60

Enter 2 numbers 70 35  
biggest number = 70

```
/*-----Ex2-----  
Program to determine whether the given integer number is even or odd-----*/  
  
#include <stdio.h>  
#include<conio.h>  
void main()  
{  
    int num;  
  
    clrscr();  
  
    printf("Enter a number");  
    scanf("%d",&num);  
  
    if (num%2==0)  
        printf("%d is even number\n",num);  
    else  
        printf("%d is an odd number\n",num);  
  
    getch();  
}
```

### **OUTPUT**

Enter a number 25  
25 is an odd number

Enter a number 28  
28 is even number

-----Ex3-----  
Program to find large among 3 numbers

```
/*
-----Ex3-----
Program to find large among 3 numbers
*/
#include <stdio.h>
#include<conio.h>
void main()
{
    int a,b,c,big;

    clrscr();

    printf("Enter 3 numbers ");
    scanf("%d%d%d",&a,&b,&c);

    if ((a>b)&&(a>c))
        big=a;
    else
        if ((b>a)&&(b>c))
            big=b;
        else
            big=c;

    printf("biggest number = %d\n",big);
    getch();
}
```

### **OUTPUT**

Enter 3 numbers 25 75 30  
biggest number = 75

Enter 3 numbers 87 25 68  
biggest number = 87

/\*-----Ex4-----

**Program to find large among 3 numbers**

-----\*/

```
#include <stdio.h>
#include<conio.h>
void main()
{
    int a,b,c,big;

    clrscr();

    printf("Enter 3 numbers ");
    scanf("%d%d%d",&a,&b,&c);

    big=a;

    if (b>big)
        big=b;

    if (c>big)
        big=c;

    printf("biggest number = %d\n",big);

    getch();
}
```

**OUTPUT**

Enter 3 numbers 45 75 60  
biggest number = 75

/\*-----Ex5-----  
Program to read student no, marks in 3 subjects and find total, average and result  
pass mark in each subject is 40.

```
----- */
#include <stdio.h>
#include<conio.h>
void main()
{
    int stno, m1,m2,m3,tot;
    float avg;

    clrscr();

    printf("Enter student number ");
    scanf("%d",&stno);

    printf("Enter m1 m2 m3\n");
    scanf("%d%d%d",&m1,&m2,&m3);

    tot=m1+m2+m3;
    avg=(float)tot/3;

    printf("Total marks = %d\n",tot);
    printf("Average Marks = %f\n",avg);

    if ((m1<40)|| (m2<40)|| (m3<40))
        printf("Result=Fail\n");
    else
        printf("Result=Pass\n");

    getch();
}
```

## OUTPUT

```
enter student number 556
enter m1 m2 m3 45 56 75
Total Marks= 176
Average Marks = 58.66
Result = Pass
```

```
enter student number 528
enter 1 m2 m3 67 23 76
Total Marks= 166
Average Marks = 55.33
Result = Fail
```

**Nesting of if-else :** When a series of decisions are involved, we may have to use more than one if-else statement in nested form.

```
if (cond-1)
    stmt_1;
else
if (cond-2)
    stmt_2;
else
if (cond-3)
    stmt_3;
else
    stmt_4;
```

/\*-----Ex6-----

Program to read student no, marks in 3 subjects and find total, average and result  
pass mark in each subject is 40. find class.

```
if avg>=70 class = Distinction
if avg>=60 class = First class
if avg>=50 class = Second class
otherwise class = Third class
```

\*/

```
#include <stdio.h>
#include<conio.h>
void main()
{
    int stno, m1,m2,m3,tot;
    float avg;

    clrscr();
    printf("Enter student number ");
    scanf("%d",&stno);

    printf("Enter m1 m2 m3\n");
    scanf("%d%d%d",&m1,&m2,&m3);

    tot=m1+m2+m3;
    avg=(float)tot/3;
    printf("Total marks = %d\n",tot);
    printf("Average Marks = %f\n",avg);

    if ((m1<40)||(m2<40)|(m3<40))
        printf("Result=Fail\n");
    else
        if (avg>=70)
            printf("Result=Distinction\n");
        else
            if (avg>=60)
                printf("Result=First Class\n");
            else
                if (avg>=50)
                    printf("Result=Second Class\n");
                else
                    printf("Result=Third Class\n");

    getch();
}
```

/\*-----Ex7-----

Program to find electricity bill

read consumer number, previous reading, present reading

nou=present - previous

unit cost is as follows

if nou<=100 unitcost=Rs.2/-

if nou<=300 unitcost=Rs.4/-

if nou<=500 unitcost=Rs.6/-

otherwise unitcost=Rs.7/- Find electricity bill.

\*/

```
#include <stdio.h>
#include<conio.h>
void main()
{
    int con_no, previous,present,nou,unitcost,bill;

    clrscr();

    printf("Enter consumer number ");
    scanf("%d",&con_no);

    printf("Enter previous meter reading\n");
    scanf("%d",&previous);

    printf("Enter present meter reading\n");
    scanf("%d",&present);

    nou=present-previous;

    if (nou<=100)
        unitcost = 2;
    else
        if (nou<=300)
            unitcost=4;
        else
            if (nou<=500)
                unitcost=6;
            else
                unitcost=7;

    bill = nou * unitcost;

    printf(" number of units = %d\n",nou);
    printf(" unit cost = %d\n",unitcost);
    printf(" electric bill =%d\n",bill);

    getch();
}
```

/\*-----Ex8-----

Program to find salary of an employee

read employee number, basic salary. find hra, da,gross salary, income tax, net salary

hra is 12% of basic salary

da is 95 % of basic salary

gross=basic + hra + da

if gross <= 10000 then it=10% of gross else

if gross <=30000 then it=20% of gross else

if gross <=50000 then it=25% of gross else

it=30% of gross

\*/

```
#include <stdio.h>
#include<conio.h>
void main()
{
    int empno;
    float basic,hra,da,gross,it,net;

    clrscr();

    printf("Enter Employee number ");
    scanf("%d",&empno);
    printf("Enter basic salary \n");
    scanf("%f",&basic);

    hra=basic*12/100;
    da=basic*95/100;
    gross=basic+hra+da;

    if (gross<=10000)
        it=gross*10/100;
    else
        if (gross<=30000)
            it=gross*20/100;
        else
            if (gross<=50000)
                it=gross*25/100;
            else
                it=gross*30/100;
    net=gross-it;

    printf(" hra = %f\n",hra);
    printf(" da = %f\n",da);
    printf(" gross = %f\n",gross);
    printf(" it = %f\n",it);
    printf(" net = %f\n",net);

    getch();
}
```

*Quadratic Equation is  $ax^2 + bx + c = 0$*

$$root1 = \frac{-b + \sqrt{b^2 - 4*a*c}}{2*a}$$

$$root2 = \frac{-b - \sqrt{b^2 - 4*a*c}}{2*a}$$

/\*-----Ex9-----

### Program to find roots of a quadratic equation

\*/

```
#include <stdio.h>
#include<conio.h>
#include <math.h>
void main()
{
    float a,b,c, root1,root2,disc;

    clrscr();
    printf("Enter a,b,c\n");
    scanf("%f %f %f", &a, &b, &c);

    disc=b*b-4*a*c;
    printf("discriminant =%f\n",disc);

    if (disc==0)
    {
        root1= -b/(2*a);
        root2= -b/(2*a);
        printf("root1=%f  root2=%f\n",root1,root2);
        printf("roots are real and equal\n");
    }
    else
    if (disc>0)
    {
        root1=(-b+sqrt(disc))/(2*a);
        root2=(-b-sqrt(disc))/(2*a);
        printf("root1=%f  root2=%f\n",root1,root2);
        printf("roots are real and not equal\n");
    }
    else
        printf("Roots are imaginary\n");

    getch();
}
```

## **OUTPUT**

Enter a,b,c : 2 3 4  
discriminant = -23.00  
roots are imaginary

Enter a,b,c : 2 4 2  
discriminant = 0.0  
root1 = -1.00 root2= -1.00  
roots are real and equal

Enter a,b,c : 2 5 3  
discriminant = 1.00  
root1 = -1.00 root2= -1.50  
roots are real and not equal

# The Switch Statement:

When one of the many alternatives is to be selected, we can design a program using if statements to control the selection. C has a built-in multi way decision statement known as **switch**. The switch statement tests the value of a given variable or expression against a list of case values and when a match is found, a block of statements associated with that case is executed.

General form

```
switch (expression)
{
    case value1 : block-1;
    break;

    case value2 : block-2;
    break;

    case value3 : block-3;
    break;

    ...
    ...
    ...
    ...

    default : default-block;
}
```

The expression is an integer expression or characters. value1, value2.... are constants and are known as case labels. Each of these values should be unique within a switch statement. block1, block2 ... are statement lists and may contain zero or more statements. There is no need to put braces around these blocks. Note that case labels end with a colon (:)

When the switch is executed, the value of the expression is successively compared against the values value-1, value-2... If a case is found whose value matches with the value of the expression, then the block of statements that follow the case are executed.

The **break** statement at the end of each block signal the end of a particular case and causes an exit from the switch statement, transferring the control to the statements following the switch.

The default is an optional case. When present, it will be executed if the value of the expression does not match with any of these case values. If not present, no action takes place if all matches fail and the control goes to the next statement of switch.

```

/*-----Ex10-----
program to read code of a color and to display name of the color code using switch stmt
-----*/
#include <stdio.h>
#include<conio.h>
void main()
{
    char cc;

    clrscr();

    printf("Enter color code\n");
    fflush(stdin);
    scanf("%c",&cc);

    switch(cc)
    {
        case 'r': printf("Red\n");
                    break;

        case 'b': printf("Blue\n");
                    break;

        case 'g': printf("Green\n");
                    break;

        case 'y': printf("Yellow\n");
                    break;

        case 'w': printf("White\n");
                    break;

        default : printf("incorrect color code\n");
    }

    getch();
}

```

### **OUTPUT**

**enter color code  
y  
Yellow**

**enter color code  
w  
White**

```

/*-----Ex11-----
Program to find the result of an operator applied on two operands using switch statement
-----*/
#include<stdio.h>
#include<conio.h>
void main()
{
    int a,b,sum,diff,product,division,rem;
    char op;

    clrscr();

    printf("enter two operands ");
    scanf("%d%d",&a,&b);

    printf("enter your operator + - * / % ? ");
    fflush(stdin);
    scanf("%c",&op);

    switch(op)
    {
        case '+': sum = a+b;
                    printf("sum=%d\n",sum);
                    break;

        case '-': diff = a - b;
                    printf("difference=%d\n",diff);
                    break;

        case '*': product = a * b;
                    printf("product=%d\n",product);
                    break;

        case '/': division = a / b;
                    printf("division=%d\n",division);
                    break;

        case '%': rem = a % b;
                    printf("Remainder %d\n",rem);
                    break;

        default : printf("error");
    }
    getch();
}

```

### OUTPUT

**enter two operands 10 20**  
**enter your operator +-\*/%? +**  
**sum =30**

**enter two operands 5 45**  
**enter your operator +-\*/%? \***  
**product =225**

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