Unit-4
Part-1

Course Name: BCA

Subject Code : 1CS1010101

Subject Name: FUNDAMENTALS OF COMPUTER PROGRAMMING

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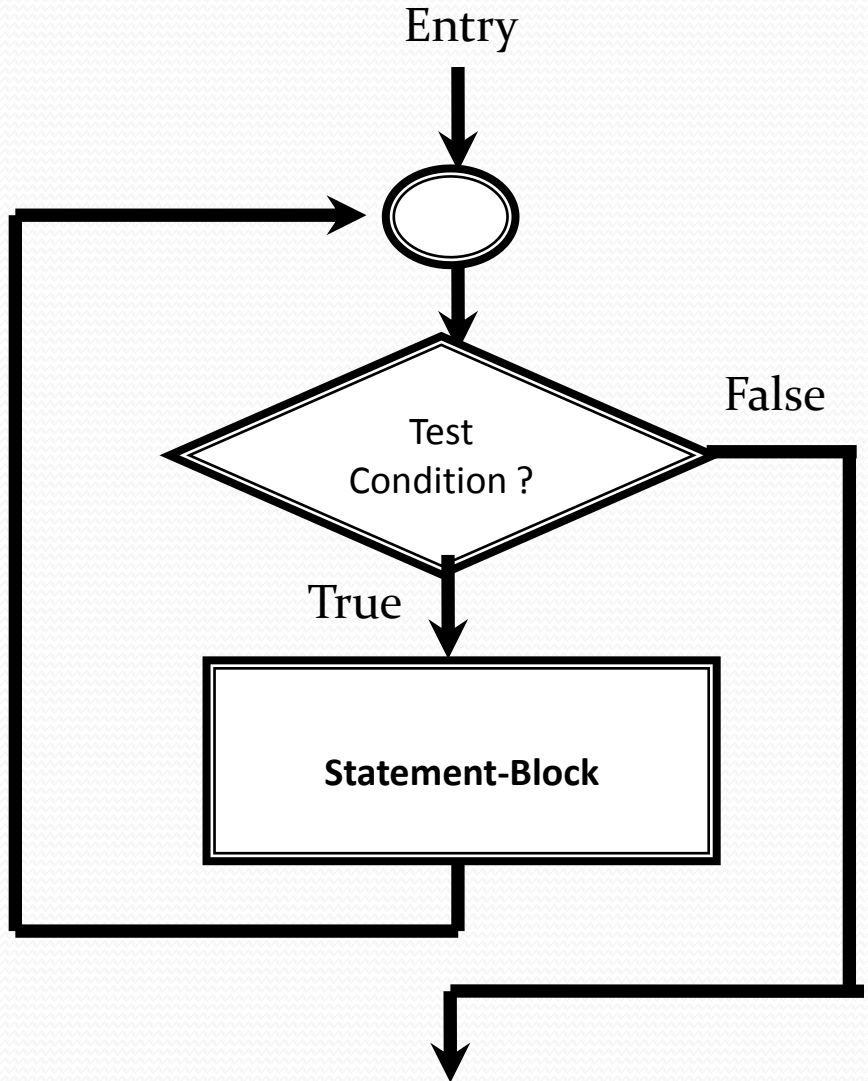**Studies, Sankalchand Patel University,Visnagar.**

Loop Structures in C Language

- There are three types of loops are used in C language.

  1. while loop
  2. for loop
  3. do while loop

While loop

- **General syntax**

while (Test condition)
  {
  Body of the Loop
  }

Entry

Test Condition ?

False

True

Statement-Block

While Loop

- In the while loop Statement-Block is executed repeatedly until the condition is true.

- while loop is a entry control loop. In while loop first condition is checked if it is true then statement block is executed

Sample Program using While loop
Program to print Ram for 100 times

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i=1;
    clrscr();
    while(i<=100)
    {
    printf("Ram\t");
    i=i+1;
    }
    getch();
}
```

Output:

Ram   Ram   Ram   Ram--------- 100 Times

Sample Program using While loop
Program to print Ram for given limits

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i=1,limit;
    clrscr();
    printf("Enter the limit\n");
    scanf("%d",&limit);
    while(i<=limit)
    {
    printf("Ram\t");
    i=i+1;
    }
    getch();
}
```

Output:
Enter the limit
5
Ram   Ram   Ram   Ram   Ram

Sample Program using While loop
Program to print 1 to 100.

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i=1;
    clrscr();
    while(i<=100)
    {
    printf("%d\t" , i);
    i++;
    }
    getch();
}
```

Output:

1   2   3   4   6   ---------- 99 100

Sample Program using While loop
Program to print 100 to 1.

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i=100;
    clrscr();
    while(i>=1)
    {
    printf("%d\t" , i);
    i--;
    }
    getch();
}
```

Output:

100 99 98 97 96 -------- 3 2 1

Sample Program using While loop
Program for sum of digits of given no(e.g.   123 --->1+2+3 = 6)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int n, rem, sum=0;
    clrscr();
    printf("Enter any number\n");
    scanf("%d",&n);
    while(n!=0)
    {
      rem=n%10;
      sum=sum+rem;
      n=n/10;
    }
    printf("Sum of digits=%d\n",sum);
    getch();
}
```

Output:
Enter any number
123
Sum of digits=6

Sample Program using While loop
Program for Reverse number (e.g. 123 ---> Reverse no=321)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int n,rem,sum=0;
    clrscr();
    printf("Enter any number\n");
    scanf("%d",&n);
    while(n!=0)
    {
      rem=n%10;
      sum=(sum*10)+rem;
      n=n/10;
    }
   printf("Reverse No=%d\n",sum);
   getch();
}
```

Output:

Enter any number
123
Reserves No=321

Sample Program using While loop
Program for Check weather the number is palindrome or not

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
   int n,rem,sum=0,k;
   clrscr();
   printf("Enter any number\n");
   scanf("%d",&n);
   k=n;
   while(n!=0)
   {
     rem=n%10;
     sum=(sum*10)+rem;
     n=n/10;
   }

  if(k==sum)
  {
  printf(" %d  is  palindrome ", k);
  }
  else
  {
   printf("%d is not Palindrome ", k );
  }
  getch();
}
```
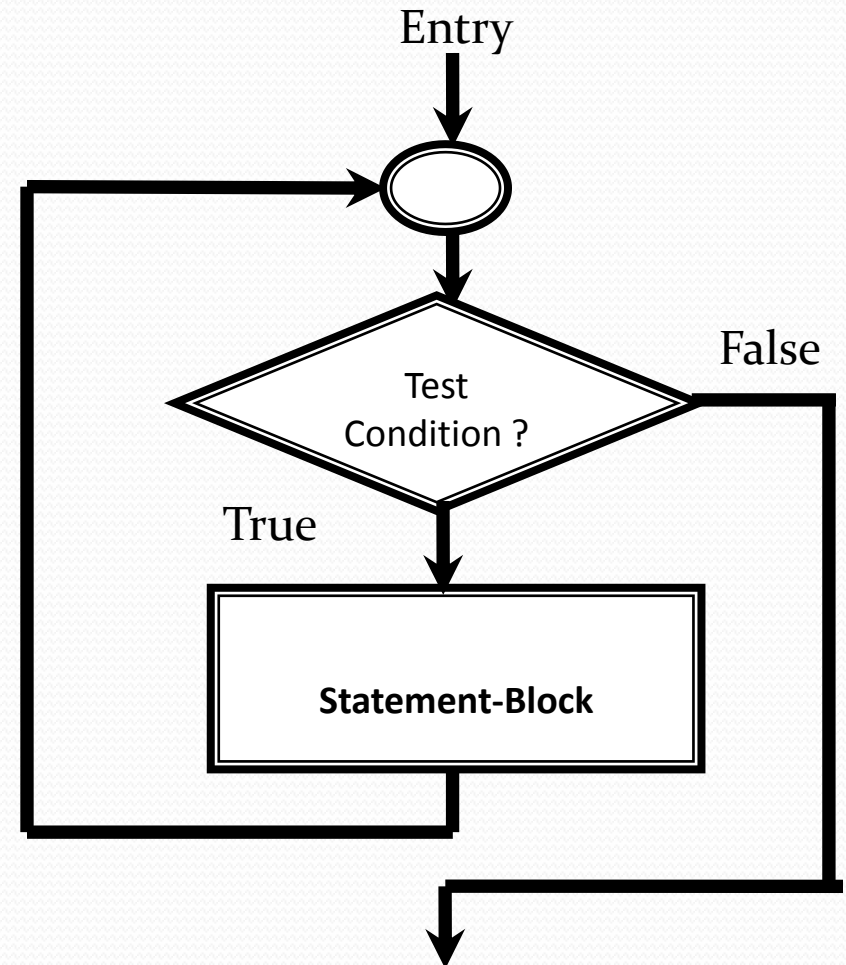
Output:

Enter any number
121
121 is palindrome

For loop

General Syntax

for (Init ; Test Condition ; Incr / Decr)

{

Statement-Block

}

Graphical Representation

For Loop

- Initialization of the control variables is done first, using assignment statements.

- Then Condition is checked and If it is true then statement block is executed. Then increment or decrement is done. Then once again condition is checked.

- This process is done repeatedly until the condition is true.

- For loop is a entry control loop. In for loop first condition is checked if it is true then statement block is executed

Sample Program using For loop
Program to print Ram for 100 times

```
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i;
    clrscr();
    for(i=1;i<=100;i++)
    {
    printf("Ram\t");
    }

    getch();

}
```

Output:

Ram   Ram   Ram   Ram--------- 100 Times

Sample Program using For loop
Program to print Ram for given limit

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,limit;
    clrscr();
    printf("Enter the limit\n");
    scanf("%d",&limit);
    for(i=1;i<=limit;i++)
    {
    printf("Ram\t");
    }

    getch();

}
```

Output:
Enter the limit
5
Ram   Ram   Ram   Ram   Ram

Sample Program using For loop
Program to print 1 to 100

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
  int i;
 clrscr();

  for(i=1;i<=100;i++)
   {
   printf("%d\t", i);
    }

   getch();

}
```

Output:
1 2 3 4 5 ----- 98   99   100

Sample Program using For loop
Program to print odd values in 1 to 100

```
#include<stdio.h>
#include<conio.h>
void main(void)
{
  int i;
 clrscr();

  for(i=1;i<=100;i=i+2)
  {
   printf("%d\t", i);
  }

  getch();

}
```

Output:

1   3   5 ----- ------ 95 97 99

Sample Program using For loop
Program to print even values in 1 to 100

```
#include<stdio.h>
#include<conio.h>
void main(void)
{
  int i;
 clrscr();

  for(i=2;i<=100;i=i+2)
  {
   printf("%d\t", i);
  }

  getch();

}
```

Output:

2   4   6 ----- ------- 96   98   100

Sample Program using For loop
program to identify Sum of 1 to100(1+2+3+--------+100= 5050)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
  int i,sum=0;
  clrscr();
for(i=1;i<=100;i++)
  {
  sum = sum+i;
  }
printf("Sum=%d\n",sum);
getch();
}
```

Output:
Sum=5050

Sample Program using For loop
program to identify Sum of 1 to given limit(e.g 1+2+3+4+5---+limit)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
   int i,sum=0,limit;
   clrscr();
  printf("Enter any value\n");
  scanf("%d",&limit);
  for(i=1;i<=limit;i++)
   {
   sum = sum+i;
   }
printf("Sum=%d\n",sum);
getch();
}
```

Output:
Enter any Value
100
Sum=5050

Sample Program using For loop
program for Sum of odd values and even values from 1 to 100
(1+3+5+7........+99 =2500) (2+4+6+8........+100=2550)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
  int i,osum=0,esum=0;
  clrscr();
  for(i=1;i<=100;i=i+2)
  {
  osum=osum+i;
  }
  for(i=2;i<=100;i=i+2)
  {
  esum=esum+i;
  }
  printf("Odd Sum=%d\n",osum);
  printf("Even Sum=%d\n",esum);
  getch();
}
```

Output:

Odd Sum=2500
Even Sum=2550

Sample Program using For loop
program to identify factorial of given number.
(e.g 5 factorial= 1*2*3*4*5 = 120)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
 long int fact=1,n,i;
 clrscr();
 printf("Enter any number\n");
 scanf("%ld",&n);
 for(i=1;i<=n;i++)
 {
 fact=fact*i;
 }
printf("Factorial=%ld",fact);
getch();
}
```

Output:
Enter any number
5
Factorial=20

Sample Program using For loop
Program for table of given number

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
  int i,n;
  clrscr();
  printf("Enter any number\n");
  scanf("%d",&n);
  for(i=1;i<=10;i++)
  {
    printf("%d * %d = %d\n",n,i,i*n);
  }
  getch();
}
```

Output:
Enter any number
5

5 * 1=5
5 * 2=10
5 * 3=15
5 * 4=20
5 * 5=25
5 * 6=30
5 * 7=35
5 * 8=40
5 * 9=45
5 * 10=50

Sample Program using For loop
Program to check weather the given number is prime or not

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int n,i,rem,k;
    clrscr();
    printf("Enter any number\n");
    scanf("%d",&n);
    for(i=2;i<n;i++)
    {
     rem=n%i;
     if(rem==0)
       {
        k=1;
       }
    }
    if(k==1)
     {
     printf("%d is not prime\n",n);
     }
     else
     {
     printf("%d is prime\n",n);
     }
  getch();
}
```

Output:

Enter any number
7
7 is prime

Sample Program using For loop
Program to display first 25 numbers of Fibonacci series

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
  long int a=0,b=1,c,i;
  clrscr();
  printf("%ld\t%ld\t",a,b);
  for(i=1;i<=23;i++)
  {
   c=a+b;
   printf("%ld\t",c);
   a=b;
   b=c;
  }
getch();
}
```
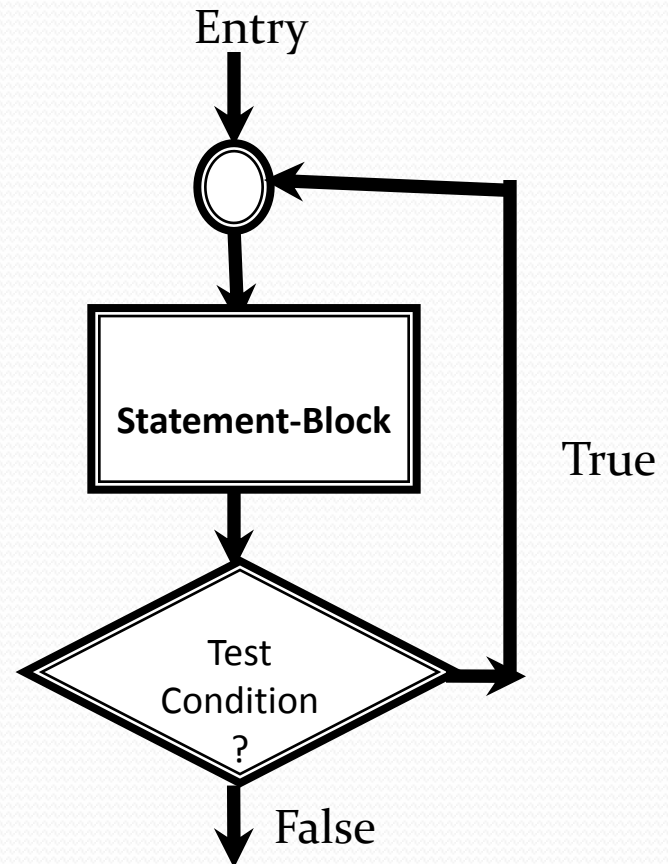
Output:

0	1	1	2	3	5	8	13	21	34	55	89	144

233	377	610	987	1597	2584	4181	6765	10946	17711

28657	46368

Do-While loop

General Syntax

do

{

 Statement Block

}

while (test condition);

Graphical Representation

Entry

Statement-Block

True

Test
Condition
?

False

Do-While loop

- In the do-while loop Statement-Block is executed repeatedly until the condition is true.

- Do-while loop is a exit control loop. In do-while loop statement block is executed first and then condition is checked.

- In Do-while loop Statement-Block is executed at least for one time even though condition is false from beginning.

Sample Program using Do -While loop
Program to print Ram for 100 times

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
   int i=1;
   clrscr();

  do
  {
    printf("Ram\t");
    i=i+1;
  }while(i<=100);

   getch();
}
```

Output:

Ram   Ram   Ram   Ram--------- 100 Times

Break Statement

Break is used for getting out of the loop.

- Sample program for break.

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
 int i;
 clrscr();

 for(i=1;i<=10;i++)
  {
  printf("Ram\n");
  if(i>=5)
   {
   break;
   }
  printf("Laxman\n");
  }
 getch();
}
```

Output:

Ram

Laxman

Ram

Laxman

Ram

laxman

Ram

laxman

Ram

Continue Statement

- **Continue is used for Continue the part of the body of the loop.**
- **When ever the continue is executed loop is going for next iteration**

- Sample program for break.

```
#include<stdio.h>
#include<conio.h>
void main(void)
{
  int i;
  clrscr();
for(i=1;i<=10;i++)
  {
  printf("Ram\n");
  if(i>=5)
   {
   continue;
   }
  printf("Laxman\n");
  }
  getch();
}
```

Output:

Ram
Laxman
Ram
Laxman
Ram
laxman
Ram
laxman
Ram
Ram
Ram
Ram
Ram

Nesting of Loop(Loop within Loop)

- If one loop is inside the other loop then it is called nesting of loops.

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j;
    clrscr();
    for(i=1;i<=5;i++)
    {
    for(j=1;j<=5;j++)
     {
     printf("*  ");
     }
     printf("\n");
     }
     getch();
}
```

Output:

```
*   *   *   *   *

*   *   *   *   *

*   *   *   *   *

*   *   *   *   *

*   *   *   *   *
```

Nesting of Loop(Loop within Loop)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j;
    clrscr();
    for(i=1;i<=5;i++)
    {
  for(j=1;j<=5;j++)
    {
    printf("%d  ", j );
    }
    printf("\n");
    }
    getch();
}
```

Output:

```
1   2   3   4   5
1   2   3   4   5
1   2   3   4   5
1   2   3   4   5
1   2   3   4   5
```

Nesting of Loop(Loop within Loop)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j;
    clrscr();
    for(i=1;i<=5;i++)
    {
  for(j=1;j<=5;j++)
    {
    printf("%d  ", i );
    }
    printf("\n");
    }
    getch();
}
```

Output:

```
1   1   1   1   1
2   2   2   2   2
3   3   3   3   3
4   4   4   4   4
5   5   5   5   5
```

Nesting of Loop(Loop within Loop)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j;
    clrscr();
    for(i=1;i<=5;i++)
    {
  for(j=1;j<=i;j++)
    {
    printf("*  " );
    }
    printf("\n");
    }
    getch();
}
```

Output:

*

*   *

*   *   *

*   *   *   *

*   *   *   *   *

Nesting of Loop(Loop within Loop)

```
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j,sp;
    clrscr();
    for(i=1;i<=5;i++)
    {
    for(sp=5;sp>=i;sp--)
    {
    printf("  ");
    }
    for(j=1;j<=i;j++)
    {
    printf("*  ");
    }
    printf("\n");

    }
    getch();
}
```

Output:

```
        *
      *   *
    *   *   *
  *   *   *   *
*   *   *   *   *
```

Nesting of Loop(Loop within Loop)

```
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j,sp;
    clrscr();
    for(i=1;i<=5;i++)
    {
for(j=5;j>=i;j--)
{
printf("*  ");
}
printf("\n");

    }
    getch();
}
```

Output:

```
*   *   *   *   *

*   *   *   *

*   *   *

*   *

*
```

Nesting of Loop(Loop within Loop)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j,sp;
    clrscr();

    for(i=1;i<=5;i++)
    {
    for(sp=1;sp<=i;sp++)
    {
    printf("   ");
    }
    for(j=5;j>=i;j--)
    {
    printf("*  ");
    }
    printf("\n");

    }
    getch();
}
```

Output:

```
*   *   *   *   *
  *   *   *   *
    *   *   *
      *   *
        *
```

Nesting of Loop(Loop within Loop)

```c
#include<stdio.h>
#include<conio.h>
void main(void)
{
    int i,j,sp;
    clrscr();
    for(i=1;i<=5;i++)
    {
      for(sp=5;sp>=i;sp--)
      {
      printf("  ");
      }
      for(j=1;j<=i;j++)
      {
      printf("* ");
      }
      printf("\n");
    }

    for(i=1;i<=5;i++)
    {
      for(sp=1;sp<=i;sp++)
      {
      printf("  ");
      }
      for(j=5;j>=i;j--)
      {
      printf("* ");
      }
      printf("\n");

    }
    getch();
}
```

Output:

```
          *
        *   *
      *   *   *
    *   *   *   *
  *   *   *   *   *
  *   *   *   *   *
    *   *   *   *
      *   *   *
        *   *
          *
```

End of Part-1
Thanks