ME 172

C Programming Language Sessional
Lecture 7

Syntax of while Loop

- The simplest of all looping structures is the while statement.
- The while loop is an entry controlled loop.

While loop syntax

```
while(test condition)
{
    body of the loop ;
}
```

Example 1

Program to evaluate the following series using for loop :

$$y = 1^2 + 2^2 + 3^2 + 4^2 + 5^2 + \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots n^{th} \text{ term}$$

```c
#include<stdio.h>

void main()
{
 int sum,n;
 sum = 0;
 n = 1;
 while(n<=10)
 {
          sum = sum +n*n;
          n = n+1;
 }
 printf("sum = %d\n",sum);

}
```

Example 1

Program to evaluate the following series using for loop :

$$y = 1^2 + 3^2 + 5^2 + \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 20^{th} \text{ term}$$

Infinite Loop

Try to avoid always infinite loop

```c
#include<stdio.h>

void main()
{
 int i=1;

 while(i)
 {
    printf("Infinite loop makes you dizzy");
 }
}
```

```c
#include<stdio.h>

void main()
{
 int i=1;

 for( ; ; )
 {
    printf("Infinite loop makes you dizzy");
 }
}
```

Example 1

Program to evaluate the following series using for loop :

$$y = 1 - 2 + 3 - 4 + \ldots\ldots N$$

Example 1

Program to evaluate the following series using for loop :

y = 1-2+3-4+........N

```c
#include<stdio.h>

int main()
{
  long int i,j=1,n,sum=0;
  printf("\n Enter the value of n:=");
  scanf("%ld",&n);
  for(i=1;i<=n;i++)
   {
    sum=sum+i*j;
    j=-j;
   }
  printf("\n The required sum is:=%ld",sum);
return 0;
}
```

Nested for loop

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```c
#include<stdio.h>

void main()
{
    int i,n = 10,r;




        for(r=1;r<=n;r++)
  {
        printf("\n%d|",r);
         for(i=1;i<=n;i++)
                    {
                        printf("%6d",r*i);
                }
        printf("\n");
} }
```

The break Statement

- There are situations, which require early exit from the loop.
- This can be accomplished by using break statement.

Example 3:

```
#include<stdio.h>
 void main()
 {
  int i, j;
  printf("use the break statment\n");
  for(i=1; i<=10;i++)
  {
            j = i*i;
            if(j == 25)
                        break;
            printf("%d\n",j);
  }    }
```

Example 4

Write a program to find the prime numbers between 0 to 100.

Use nested *for* loops.

Solution of Example 4

```c
#include<stdio.h>
void main()
{
int i,j,n;
printf(" Enter the no. upto which we have to find the prime no. ");
scanf("%d",&n); printf("\n");
for(i=2;i<=n;i++)
{
for(j=2;j<=i-1;j++)
{if(i%j==0) break;} //Number is divisible by some other number.
if(i==j) printf("\t%d",i); //Number was divisible by itself
}//Continue loop upto nth number
}
```

Example 5

$$\sin(x) = x - x^3/3! + x^5/5! - x^7/7! + \ldots \text{ 20}^{\text{th}} \text{ term}$$

Example 5

```c
#define PI 3.14159
void main(void){
    int i, j, k=1, m, n, fact;
    float y=0.0, deg, x;
    printf("Enter a degree to evaluate sine:");
    scanf("%f",&deg);
    printf("\nEnter how many terms you want to consider:");
    scanf("%d",&n);
    x=(deg*PI)/180;
    for(j=1, m=1; j<=n; j++, m=m+2) {
            fact = 1;
            for(i=1; i<=m; i++)      fact = fact*i;
            y += k * pow(x,m) / (float) fact ;
            k=k*(-1);
    }
    printf("\nResult obtained from the program: %f ",y);
    printf("\nResult obtained from the library function: %f ",sin(x));
}
```

That's all about today....