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Structured Programming
Lecture 9 – for loop Statement

for loop Statement Structure

- The for statement allows you to execute a block of code a specified number of times.
- The for loop is designed to allow a counter variable that is initialized at the beginning of the loop and incremented (or decremented) on each iteration of the loop. The general form of the for statement is:

General Form of for loop statement Structure	
for (initialization; condition; incrementation) statement1;	→ **One Statement**

for (initialization; condition; incrementation)
{
statement1;
statement2;
:
statement N;
}
	→ **Multiple Statements**

Example 12:

```
for ( i = 0 ; i < 10 ; i ++ )
cout << i ;
```

Output:
0 1 2 3 4 5 6 7 8 9

Example 13:

```
for ( i = 0 ; i < 10 ; i += 2 )
cout << i ;
```

Output:
even numbers only
0 2 4 6 8

Example 14:

```
for ( i = 1; i < 10 ; i += 2 )
cout << i ;
```

Output:
odd numbers only
1 3 5 7 9

Example 15:

```
for ( int i = 1; i <= 5 ; i++ )
cout << "Hello!" << endl ;
cout << "*" << endl ;
```

Output:

```
Hello!
Hello!
Hello!
Hello!
Hello!
*
```

Example 16:

```
for ( int i = 1; i <= 5 ; i++ )
{
cout << "Hello!" << endl ;
cout << "*" << endl ;
}
```

Output:

```
Hello!
*
Hello!
*
Hello!
*
Hello!
*
Hello!
*
```

Example 17: Write a C++ program to sum the numbers between 1 and 100.

```
#include<iostream.h>
# include<conio.h>
main ( )
{
int sum = 0 ;
for ( int i = 1 ; i <= 100 ; i++ )
sum = sum + i ;
cout << "sum= "<< sum ;
getch ( ) ;
}
```

Output:
sum= 5050

Example 18: Write a C++ program to find the result of the following:

$$\sum_{i=1}^{20} i^2$$

```
#include<iostream.h>
# include<conio.h>
main ( )
{
int sum = 0 ;
for ( int i = 1 ; i <= 20 ; i++ )
sum = sum + ( i * i ) ;
cout<< "sum= "<< sum ;
getch ( ) ;
}
```

Output:
sum= 2870

Example 20: Write a C++ program to read 10 integer numbers, and find the sum of these numbers and check if its positive, negative and zero.

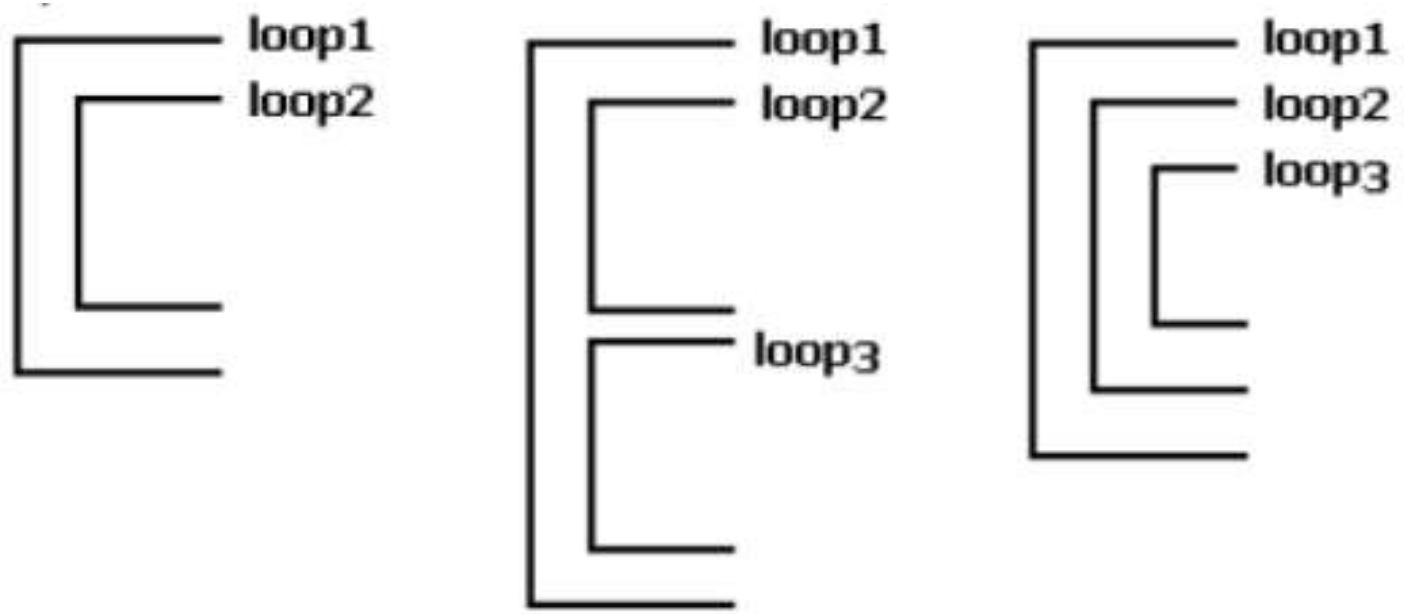
```
#include<iostream.h>
# include<conio.h>
main ( )
{

int sum = 0, x ;
for ( int i = 1 ; i <= 10 ; i++ )
{
cin >> x ;
sum = sum + x ;
if ( x > 0 )
     cout << x << "x is a positive \n" ;
else
if ( x < 0 )
cout << x << "x is a negative \n" ;
else
cout << x << "x is a zero \n" ;
}
cout << "sum= " << sum ;
getch ( ) ;
}
```

Output:

```
1 2 3 -4 0 5 3 -1 0 -7
1  x is a positive
2  x is a positive
3  x is a positive
-4  x is a negative
0   x is a zero
5  x is a positive
3  x is a positive
-1 x is a negative
0  x is a zero
-7 x is a negative
sum= 2
```

Nested for loop

- loops can be put one inside another to solve certain programming problems. Loops may be nested as follows:

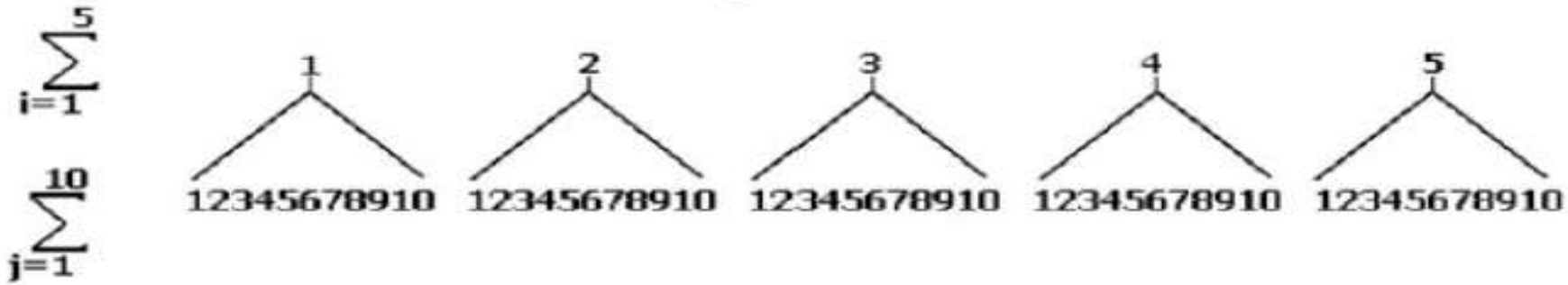


Example 21: Write a C++ program to print the following form.

```
#include<iostream.h>
# include<conio.h>
main ( )
{
for ( int i = 1; i <= 5 ; i++ )
{
 for (int j = 1 ; j <= i ; j++ )
 cout << "*" ;
 cout << endl ;
}
getch ( ) ;
}
```

Example 22: Write a C++ program to find the result of the following equation.

$$\sum_{i=1}^{5}\sum_{j=1}^{10} i + 2j$$




```
#include<iostream.h>
#include<conio.h>
main ( )
{
   int i, j, sum = 0;
for ( i =1; i <= 5 ; i++ )
    for ( j = 1 ; j <= 10 ; j++ )
       sum = sum + ( i + 2 * j ) ;
cout << "sum is:" << sum ;
getch ( ) ;
}
```

Output:
S=700

Example 23: Write a C++ program to find the maximum number from 10 numbers.

```
#include<iostream.h>
# include<conio.h>
main ( )
{
   int max = 0, x ;
for ( int i =1; i <= 10 ; i++ )
{
 cin >> x ;
if ( x > max )
max = x ;
}
 cout << "max = " << max ;
 getch ( ) ;
 }
```

Output:

100 2 3 4 5 6 77 88 999 0

max = 999

Break Control Statements

- Break statement causes enclosing loop or switch to be terminated immediately. It can be used to end an infinite loop, or to force it to end before its natural end. The general form of the break statement is:

  break;

Example 24:

```
for ( int i = 1 ; i < 100 ; i++ )
{
cout << i ;
if ( i == 10 )
break ;
}
```

Output:

1 2 3 4 5 6 7 8 9 10

Example 25: Write a C++ program to read 10 integer numbers and the program will be stopped when the number is negative otherwise compute the square root of the number.

```
#include<iostream.h>
# include<conio.h>
# include<math.h>
main ( )
{
int i, x ;
for ( i=1 ; i <= 10 ; i++ )
{
 cin >> x ;
if ( x < 0 )
break ;
else
 cout << sqrt ( x ) << endl ;
 }
 getch ( ) ;
 }
```

Output:

```
2
sqrt=1.41421
4
sqrt=2
9
sqrt=3
16
sqrt=4
-4
```

Example 26: Write a C++ program to read 10 integer numbers and the number of (-100) must not be counted and print the count of even number.

```
#include<iostream.h>
# include<conio.h>
main ( )
{
int i, x, m = 0 ;
for ( i=1 ; i <= 10 ; i++)
{
 cin >> x;
if ( x == -100 )
continue ;
else
if ( x  %  2== 0 )
m ++ ;
}
cout << "m=" << m ;
getch ( ) ;
}
```

Output:

2 3 4 4 6 7 -100 8 9 2

m=6

Example 27: Write a C++ program which input a sequences of integer numbers and compute their sum when the value is -19 must not be counted and the program finished when the number is 9.

```
#include<iostream.h>
# include<conio.h>
main ( )
{
int x, sum = 0 ;
for ( ; ; )
{
 cin >> x ;
if ( x == 9 )
break ;
if ( x == -19 )
continue ;
else
sum = sum + x ;
}
cout << "sum=" << sum ;
getch ( ) ;
}
```

Output:

```
5
6
2
8
-19
8
9
sum=29
```