C PROGRAMMING

LECTURE 3

ITERATIONS

LOOPS:

This involves repeating some portion of the program either a specified number of times or until a particular condition is being satisfied. This repetitive operation is done through a loop control instruction.

There are 3 types of loops:

1) FOR loop
2) WHILE loop
3) DO-WHILE loop

WHILE LOOP:

It is often used in programming when we want to do a task certain number of times.

// A simple example to count sum of first 10 integers

Count = 1;

Sum = 0;

While (Count < = 10)

{

      Sum = Sum + count;

      Count++;

}

The general expression of while can be stated as :

initialize loop counter ;

While (test loop counter using a condition)

{

       Do this;

       And this;

}

FOR LOOP:

The FOR loop allows us to specify 3 things about a loop in a single line.

1) Specify the initial value of the loop counter.
2) Testing the loop counter to check whether its value has reached the number of repetitions required.
3) Increasing the loop counter value each time the code segment within loop has been executed.

The general form of the FOR loop is as follows:

For (initialize counter; test counter; Increment counter)

{

       Do this;

       And this;

       And this;

}

```
// sample program to count sum of first 10 integers

Int i, sum = 0;

For(i=1; i<= 10 ; i++)

{

        Sum = Sum + i;

}
```

NESTING LOOPS:

```
* Demonstration of nested loops */

main( )

{

 int r, c, sum ;

 for ( r = 1 ; r <= 3 ; r++ ) /* outer loop */

 {

        for ( c = 1 ; c <= 2 ; c++ ) /* inner loop */

        {

        sum = r + c ;

        printf ( "r = %d c = %d sum = %d\n", r, c, sum ) ;

        }

 }

}
```

DO-WHILE LOOP:

Consider the following two examples: one is with WHILE loop and the other with DO-WHILE loop.

```
main( )
{
 while ( 4 < 1 )
 printf ( "Hello there \n") ;
}
```

Here, since the condition fails the first time itself, the printf( ) will not get executed at all.

```
main( )
{
 do
 {
 printf ( "Hello there \n") ;
 } while ( 4 < 1 ) ;
}
```

In this program the printf( ) would be executed once, since first the body of the loop is executed and then the condition is tested.

SUMMARY:

    a) The three type of loops available in C are for, while, and do- while.
    b)   A break statement takes the execution control out of the loop.

c) A continue statement skips the execution of the statements after it and takes the control to the beginning of the loop.

d) A do-while loop is used to ensure that the statements within the loop are executed at least once.

e) The ++ operator increments the operand by 1, whereas, the -- operator decrements it by 1.

f) The operators +=, -=, *=, /=, %= are compound assignment operators. They modify the value of the operand to the left of them.