# Loop

SESSION 6

## Objectives

- Understand ‘for’ loop in ‘C’
- Work with comma operator
- Understand nested loops
- Understand the ‘while’ loop and the ‘do-while’ loop
- Work with break and continue statements
- Understand the exit() function

## What is a loop

**Section of code in a program**

**which is executed repeatedly,**

**until a specific condition is satisfied**

# 3 types of loop structures

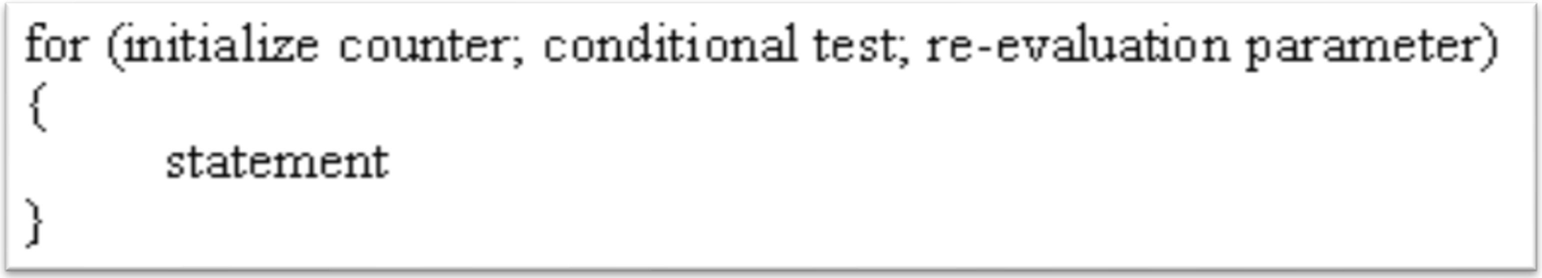
The for loop

The while loop

The do….while loop

## The for loop -1/2

**Syntax**



```
for (initialize counter; conditional test; re-evaluation parameter)
{
        statement
}
```

- **The initialize counter**: an assignment statement that sets the loop control variable, before entering the loop
- **The statement**, which forms the body of the loop, can either be a single statement or a compound statement
- **The evaluation parameter**: defines how the loop control variable changes, each time the loop is executed

# The for loop - 2/2

- The three sections of the **for** loop must be separated by a semicolon(**;**)
- The **for** loop continues to execute as long as the conditional test evaluates to true.
- Example

```
main(){
 int count;
 printf("\tThis is a \n");
 for(count = 1; count <=6 ; count++ )
    printf("\n\t\t nice");

 printf("\n\t\t world. \n");
}
```

## The Comma Operator

The scope of the **for** loop can be extended by including more than one initializations or increment expressions in the for loop specification

**The format is** : **exprn1 , exprn2 ;**

### Example

```
main(){
   int i, j , max;
   printf("Please enter the maximum value \n");
   printf("for which a table can be printed: ");
   scanf("%d", &max);
   for( i=0, j=max ; i <=max ; i++, j-- )
      printf("\n%d  +  %d  =  %d",i, j, i + j);
 }
```

## Nested for Loops - 1/2

The for loop will be termed as a **nested for** loop when it is written as follows

```
for (i = 1;  i<max1;  i++)
    {
         ...
         for ( j = 0;  j < = max2;  j++ )
         {
              ...
         }
         ...
    }
```

# Nested for Loops – 2/2

## Example

```
#include <stdio.h>
  main() {
    int i, j, k;
    i = 0;
    printf("Enter no. of rows :");
    scanf("%d", &i);
    printf("\n");
    for (j = 0; j < i ; j++ ) {
      printf("\n");
      for (k = 0; k <= j; k++) /*inner for loop*/
        printf("*");
    }
  }
```

## The while Loop- 1/2

### Syntax

```
while (condition is true) {
        statements ;
}
```

**The while loop repeats statements while a certain specified condition is True**

# The while Loop – 2/2

## Example

```
/* A simple program using the while loop */

 #include <stdio.h>
 main() {
    int count = 1;
    while( count <= 10)
    {
       printf("\n This is iteration %d\n",count);
       count++;
    }
    printf("\n The loop is completed. \n");
  }
```

## do…while Loop – 1/2

**Syntax**

```
    do {
            statements;
     } while (condition is true) ;
```

- In the **do while** loop the body of the code is executed once before the test is performed
- When the condition becomes **False** in a **do while** the loop will be terminated, and the control goes to the statement that appears immediately after the **while** statement

## do...while Loop – 2/2

### Example

```
#include <stdio.h>
main() {
   int num1, num2 = 0;
   do    {
         printf( "\nEnter a number : ");
         scanf(“%d”,&num1);
         printf( " No. is %d",num1);
         num2++;
   } while (num1 != 0);
   printf ("\nThe total numbers entered were %d",--num2);

  /*num2 is decremented before printing because count for
   last integer (0) is not to be considered */
}
```

## Jump Statements – 1/7

return expression

- The return statement is used to return from a function
- It causes execution to return to the point at which the call to the function was made
- The return statement can have a value with it, which it returns to the program

## Jump Statements – 2/7

goto label

- The goto statement transfers control to any other statement within the same function in a C program
- It actually violates the rules of a strictly structured programming language
- They reduce program reliability and make program difficult to maintain

# Jump Statements – 3/7

## break statement

- The break statement is used to terminate a case in a switch statement
- It can also be used for abrupt termination of a loop
- When the break statement is encountered in a loop, the loop is terminated immediately and control is passed to the statement following the loop

# Jump Statements – 4/7

## Example of break

```
#include <stdio.h>
main () {
   int count1, count2;
   for(count1 = 1, count2 = 0;count1 <=100; count1++)
   {
      printf("Enter count2 : ");
      scanf("%d", &count2);
      if(count2 == 10) break;
   }
}
```

## Jump Statements – 5/7

### continue statement

- The continue statement causes the next iteration of the enclosing loop to begin
- When this statement is encountered, the remaining statements in the body of the loop are skipped and the control is passed on to the re-initialization step

## Jump Statements – 6/7

### Example of continue

```
#include <stdio.h>
 main(){
    int num;
    for(num = 1; num <=100; num++){
       if(num % 9 == 0)
           continue;
       printf("%d\t",num);
    }
  }
```

## Jump Statements – 7/7

### exit() function

- The exit() is used to break out of the program
- The use of this function causes immediate termination of the program and control rests in the hands of the operating system