Math Series

C Programming

UG Sem-3 Major (Kalyani University)

Day - 05

While Loop

while loop can be addressed as an entry control loop. It is completed in 3 steps.

- Variable initialization.(e.g int x=0;)
- condition(e.g while(x<=10))
- Variable increment or decrement (x++ or x-- or x=x+2)

Note: Do not forget to increase the variable used in the condition (i++), otherwise the loop will never end!

While Loop: Syntax :

```
variable initialization ;

while (condition)

{

 statements ;

 variable increment or decrement ;

}
```

Flowchart of While Loop

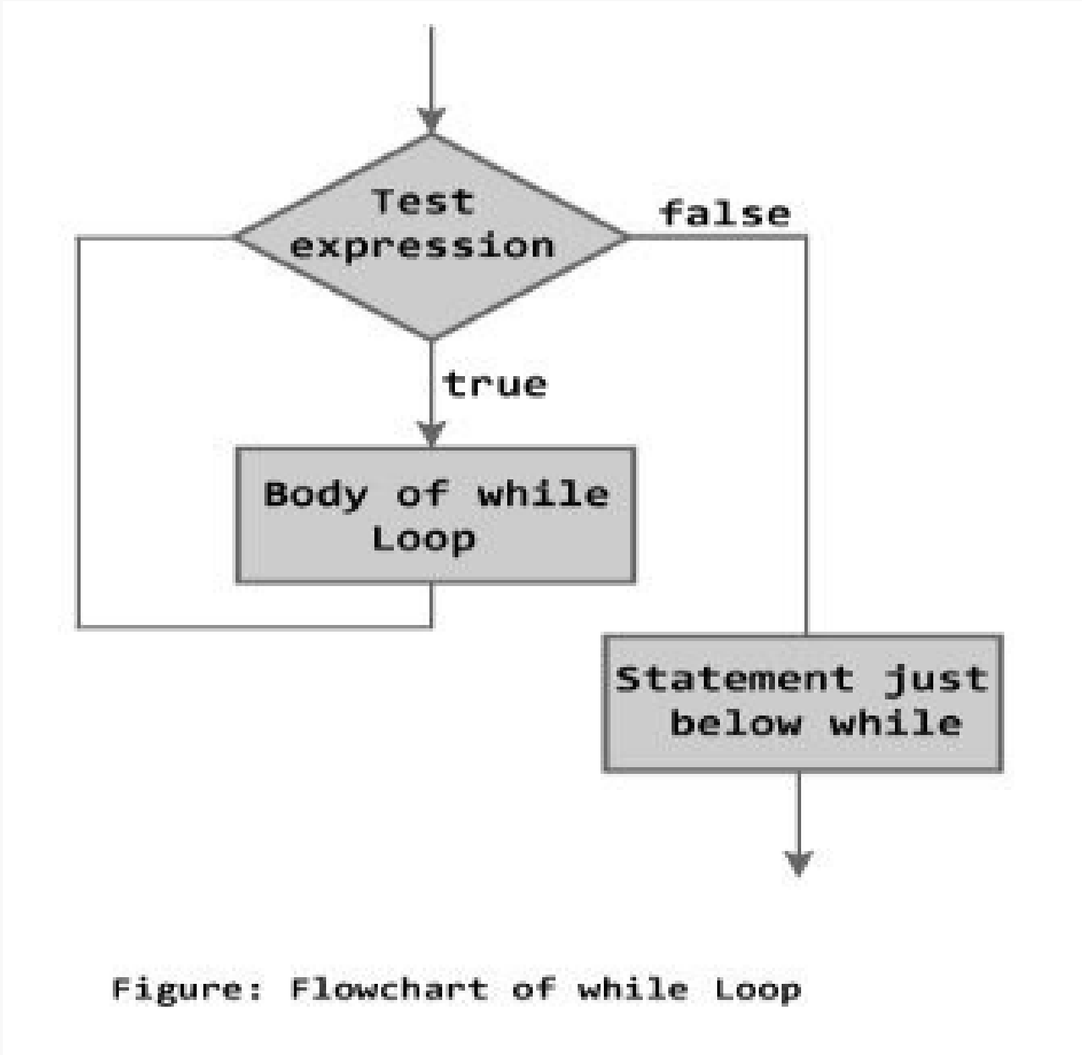


Figure: Flowchart of while Loop

Do-While Loop

The do-while loop is an exit controlled loop statement The body of the loop are executed first and then the condition is evaluated. If it is true, then the body of the loop is executed once again. The process of execution of body of the loop is continued until the condition finally becomes false and the control is transferred to the statement immediately after the loop. The statements are always executed at least once.

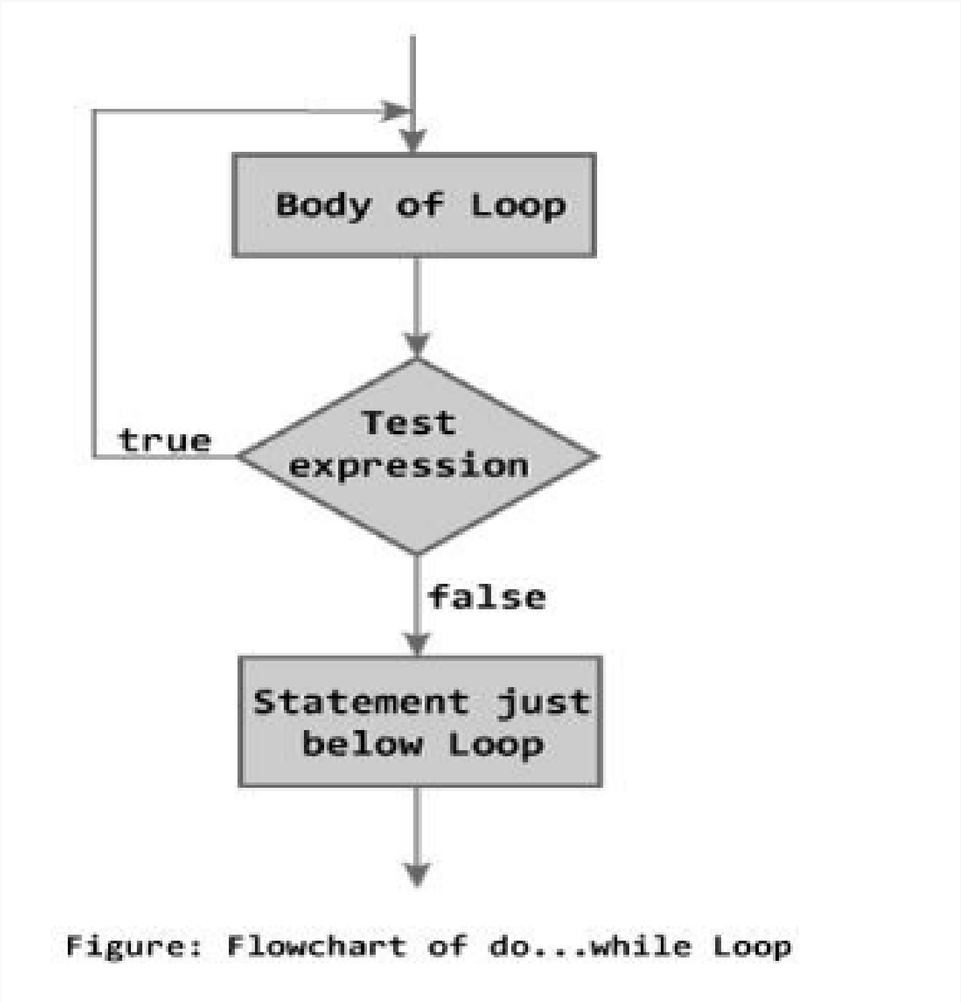


Figure: Flowchart of do...while Loop

Examples of While Loop

```c
int countdown = 3;

while (countdown > 0) {
  printf("%d\n", countdown);
  countdown--;
}
printf("Happy New Year!!\n");
```

```c
#include <stdio.h>

// check this code correct or incorrect

int main() {
  int i = 10;

  while (i < 5) {
    printf("Test Code\n");
    i++;
  }

  return 0;
}
```

Examples of Do-While Loop

```c
int i = 10;

do {
   printf("i is %d\n", i);
   i++;
} while (i < 5);
```

```c
int i = 10;

do {
   i++;
   printf("i is %d\n", i);

} while (i < 5);
```

Output??

Arrays in C

An array is a data structured that can store a fixed size sequential collection of elements of same data type..

Or,

Array is a collection or group of elements (data). All the elements of array are homogeneous (similar). It has contiguous memory location.

Advantage of C Array

*1) **Code Optimization:** Less code to the access the data.*

*2) **Easy to traverse data:** By using the for loop, we can retrieve the elements of an array easily.*

*3) **Easy to sort data:** To sort the elements of array, we need a few lines of code only.*

*4) **Random Access:** We can access any element randomly using the array.*

Arrays in C

Disadvantage of Array:

Fixed Size: Whatever size, we define at the time of declaration of array, we can't exceed the limit. So, it doesn't grow the size dynamically.

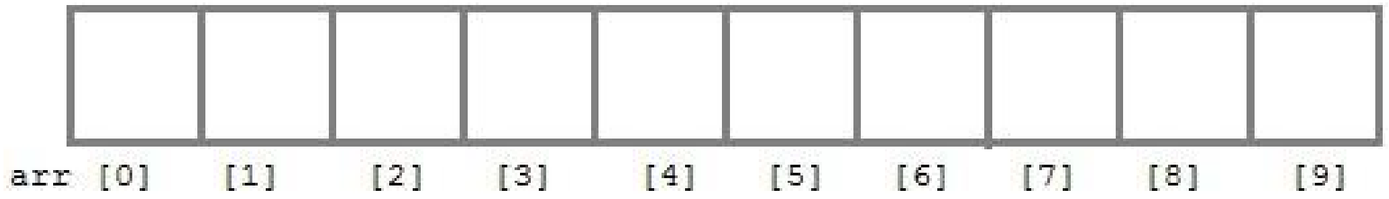
Declaration of an Array:

data-type variable-name[size/length of array];

For example:

```
int arr[10];
```

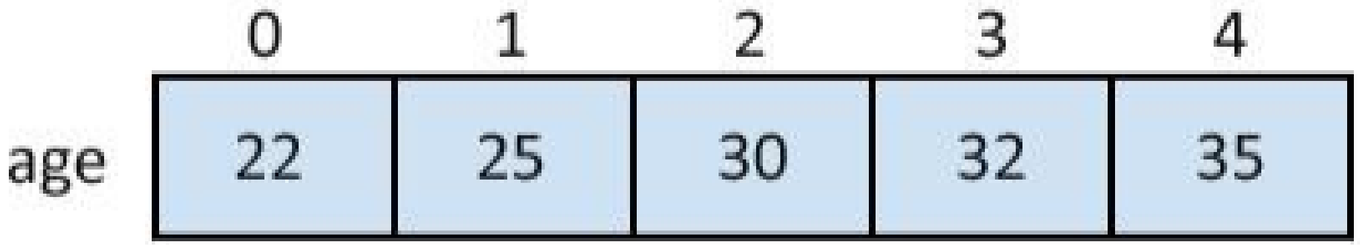
Here int is the data type, arr is the name of the array and 10 is the size of array. It means array arr can only contain 10 elements of int type. Index of an array starts from 0 to size-1 i.e
first element of arr array will be stored at arr[0] address and last element will occupy arr[9].



Arrays in C

Example

```
int age[5]={22,25,30,32,35};
```




```
int marks[4]={ 67, 87, 56, 77 };   //integer array initialization

float area[5]={ 23.4, 6.8, 5.5 };   //float array initialization

int marks[4]={ 67, 87, 56, 77, 59 };    //Compile time error
```

Arrays in C

Example

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int age[5]={22,25,30,32,35};
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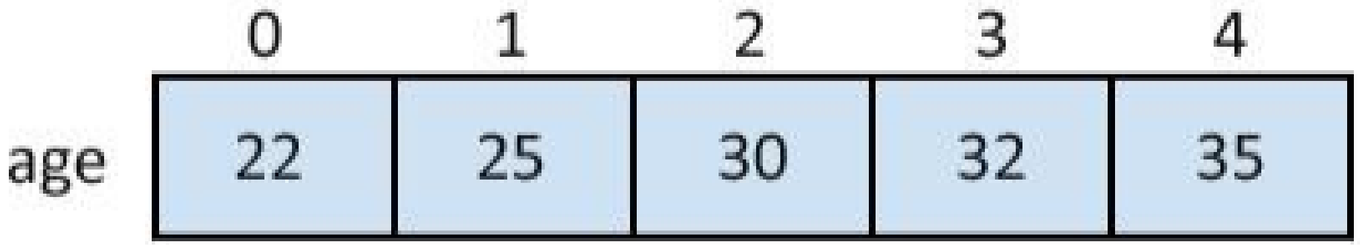


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```

Arrays in C

Ex : consider character initialization

```
char b[8] = {'C','O','M','P','U','T','E','R'};
```

The array b is initialized as

b[0]	b[1]	b[2]	b[3]	b[4]	b[5]	b[6]	b[7]
C	O	M	P	U	T	E	R

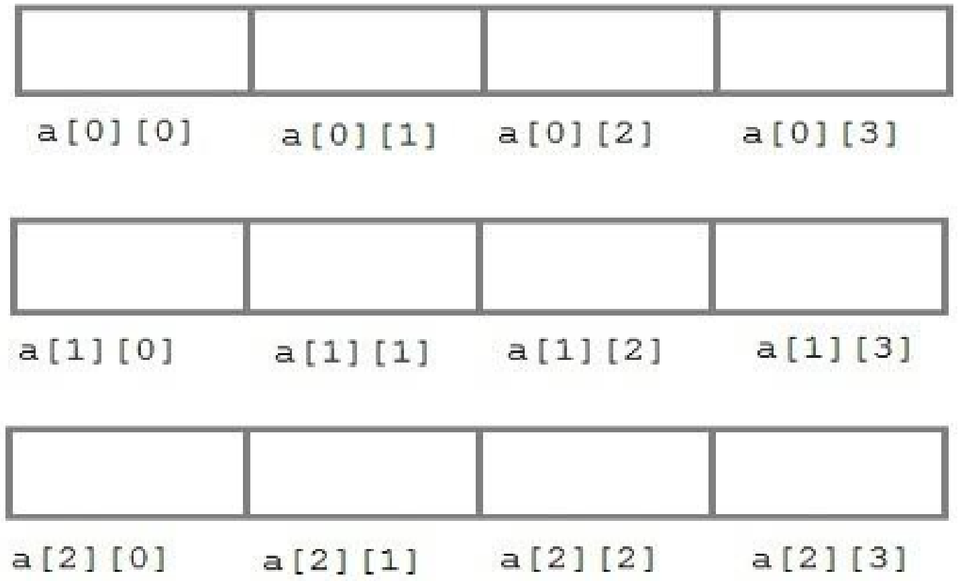
Two-Dimensional Arrays

The two dimensional array in C language is represented in the form of rows and columns, also known as matrix. It is also known as array of arrays or list of arrays.
The two dimensional, three dimensional or other dimensional arrays are also known as multidimensional arrays.

```
int a[3][4];
```

Declaration of two dimensional Array:

data_type array_name[size1][size2];



Two-Dimensional Arrays

Initialization of 2D Array:

int arr[4][3]={{1,2,3},{2,3,4},{3,4,5},{4,5,6}};