

Dynamic Memory Allocation can be defined as a procedure in which the size of a data structure (like Array) is changed during the runtime.

C provides some functions to achieve these tasks. There are 4 library functions provided by C defined under <stdlib.h> header file to facilitate dynamic memory allocation in C programming. They are:

malloc()
calloc()
free()
realloc()
malloc() method

The “malloc” or “memory allocation” method in C is used to dynamically allocate a single large block of memory with the specified size. It returns a pointer of type void which can be cast into a pointer of any form. It doesn't Initialize memory at execution time so that it has initialized each block with the default garbage value initially.

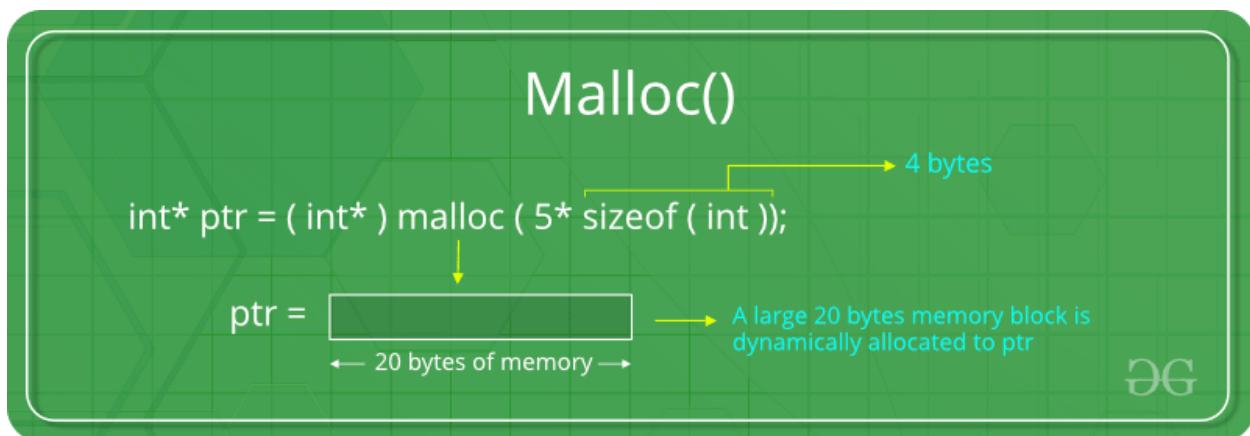
Syntax:

```
ptr = (cast-type*) malloc(byte-size)
```

For Example:

```
ptr = (int*) malloc(100 * sizeof(int));
```

Since the size of int is 4 bytes, this statement will allocate 400 bytes of memory. And, the pointer ptr holds the address of the first byte in the allocated memory.



```
#include <stdio.h>
#include <stdlib.h>
int main()
{
    // This pointer will hold the
    // base address of the block created
    int* ptr;
```

```

int n, i;
// Get the number of elements for the array
printf("Enter number of elements:");
scanf("%d",&n);
printf("Entered number of elements: %d\n", n);
// Dynamically allocate memory using malloc()
ptr = (int*)malloc(n * sizeof(int));
// Check if the memory has been successfully
// allocated by malloc or not
if (ptr == NULL) {
    printf("Memory not allocated.\n");
    exit(0);
}
else {
    // Memory has been successfully allocated
    printf("Memory successfully allocated using malloc.\n");
    // Get the elements of the array
    for (i = 0; i < n; ++i) {
        ptr[i] = i + 1;
    }

    // Print the elements of the array
    printf("The elements of the array are: ");
    for (i = 0; i < n; ++i) {
        printf("%d, ", ptr[i]);
    }
}
return 0;
}

```

Output:

```

Enter number of elements: 5
Memory successfully allocated using malloc.
The elements of the array are: 1, 2, 3, 4, 5,

```

calloc() method

“calloc” or “contiguous allocation” method in C is used to dynamically allocate the specified number of blocks of memory of the specified type. it is very much similar to malloc() but has two different points and these are:

It initializes each block with a default value ‘0’.

It has two parameters or arguments as compare to malloc().

Syntax:

```
ptr = (cast-type*)calloc(n, element-size);
```

here, n is the no. of elements and element-size is the size of each element.

For Example:

```
ptr = (float*) calloc(25, sizeof(float));
```

This statement allocates contiguous space in memory for 25 elements each with the size of the float.

