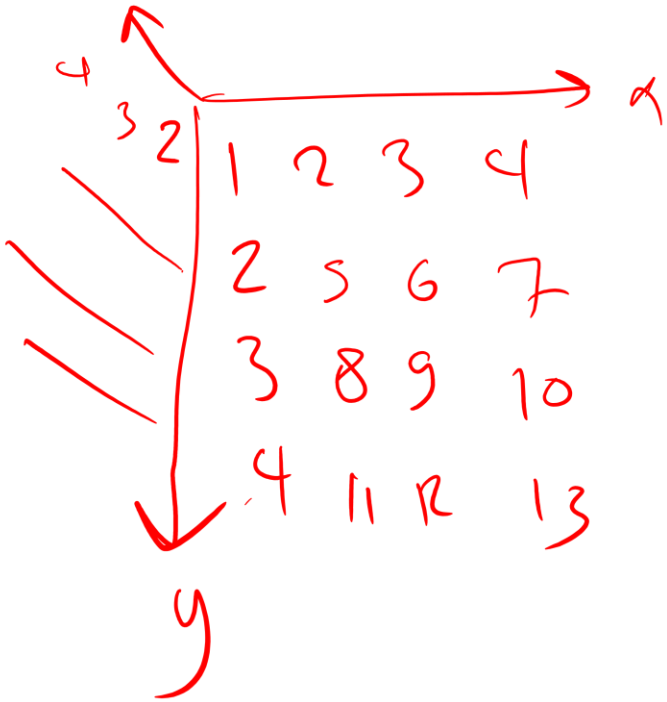
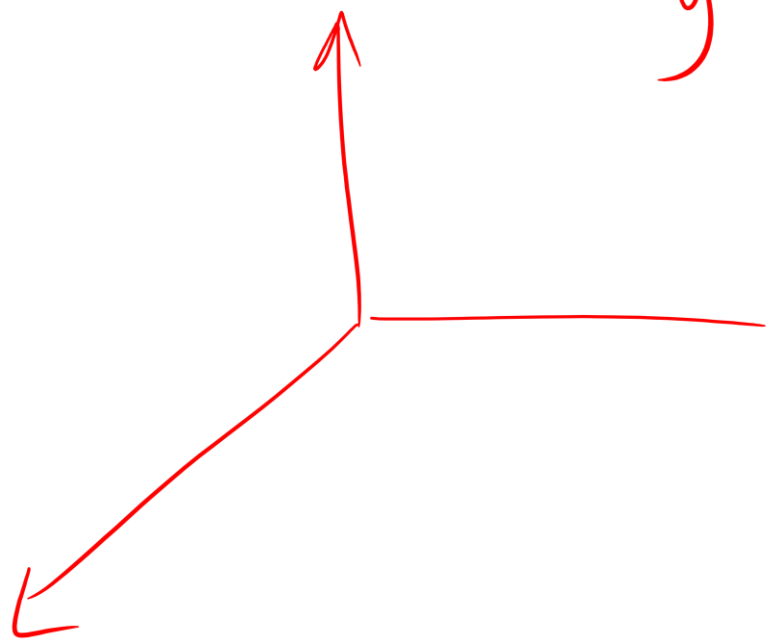
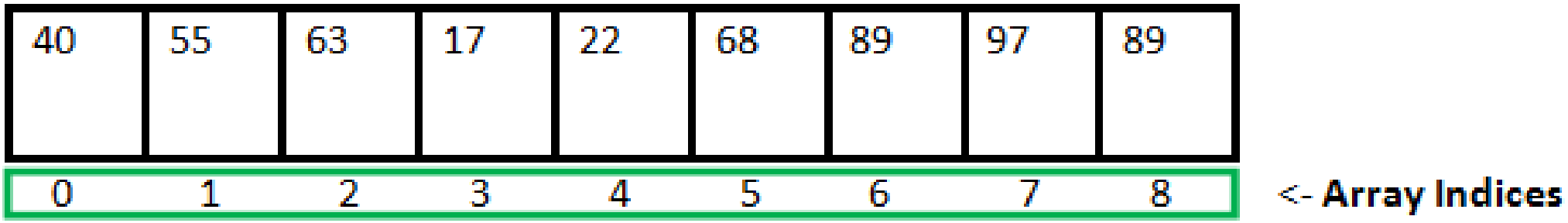
array 2D [3][2] = { 1 , 2 ,
2 , 3 ,
3 , 4 };





Session 11

Mostafa Akram



Array Length = 9
First Index = 0
Last Index = 8

Dynamic Memory Allocation

- Since C is a structured language, it has some fixed rules for programming. One of them includes changing the size of an array. An array is a collection of items stored at contiguous memory locations.

Dynamic Memory Allocation

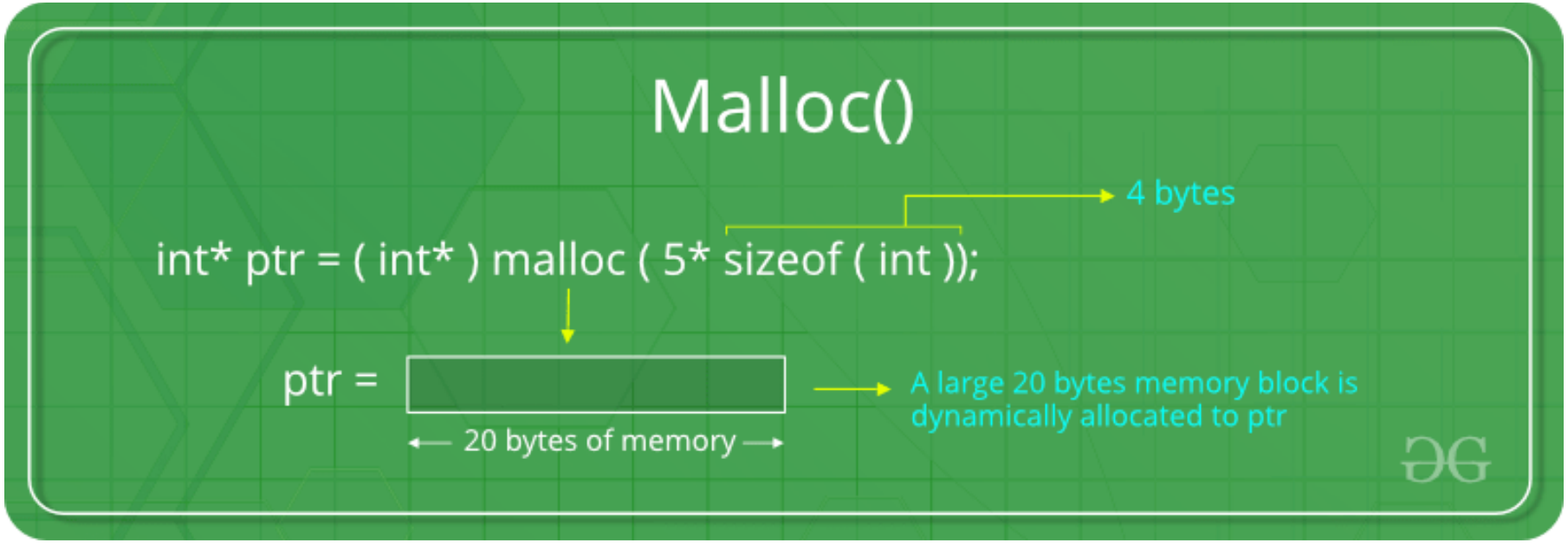
- There are 4 library functions provided by C defined under **<stdlib.h>** header file to facilitate dynamic memory allocation in C programming.

1.malloc()

2.calloc()

3.free()

4.realloc()



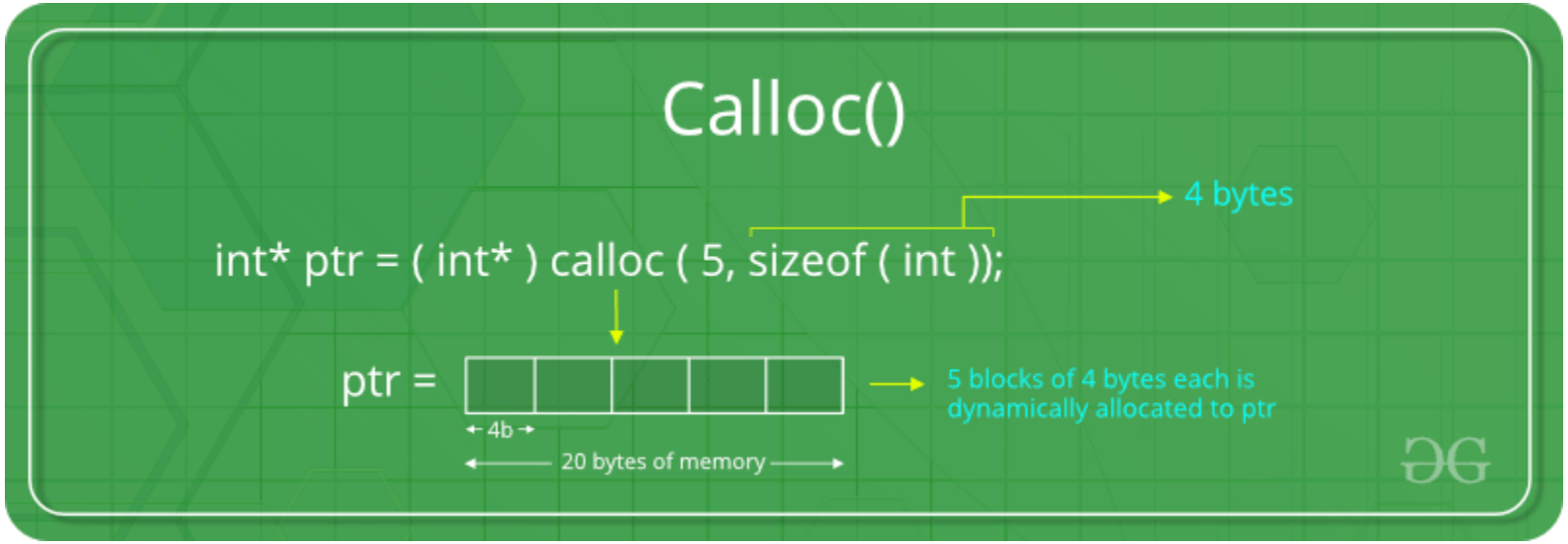
C malloc() method

malloc” or **“memory allocation”** method in C is used to dynamically allocate a single large block of memory with the specified size.

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

For Example:

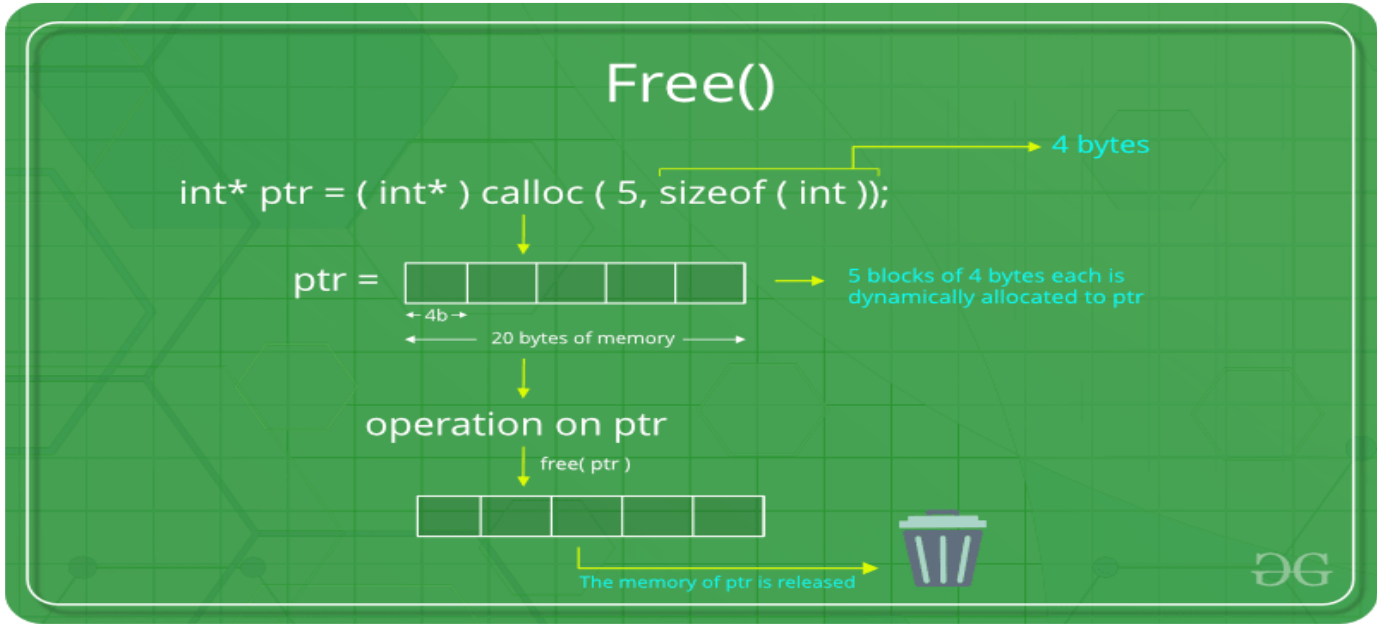
ptr = (int*) malloc(100 * sizeof(int));



C calloc() method

1. **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:
2. It initializes each block with a default value ‘0’.

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



C free() method

1. **“free”** method in C is used to dynamically **de-allocate** the memory. The memory allocated using functions malloc() and calloc() is not de-allocated on their own. Hence the free() method is used, whenever the dynamic memory allocation takes place. It helps to reduce wastage of memory by freeing it.

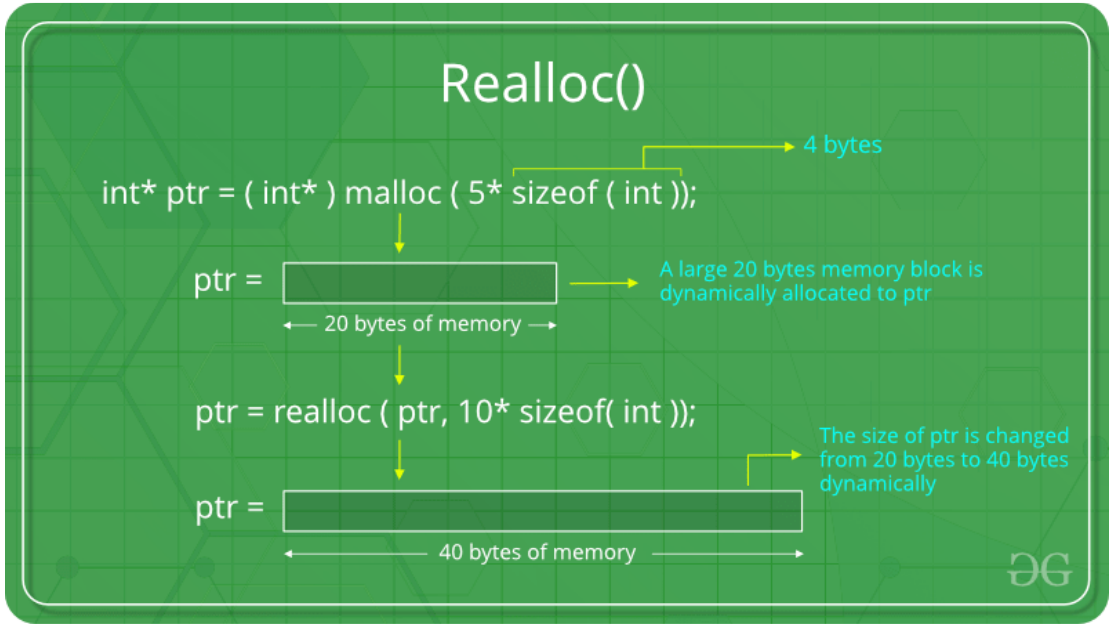
Types of Pointers in C

- **Dangling pointer**

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


    // After below free call, ptr becomes a dangling pointer
    free(ptr);
    printf("Memory freed\n");


    // removing Dangling Pointer
    ptr = NULL;
```



C realloc() method

- **“realloc”** or **“re-allocation”** method in C is used to dynamically change the memory allocation of a previously allocated memory. In other words, if the memory previously allocated with the help of malloc or calloc is insufficient, realloc can be used to **dynamically re-allocate memory**. re-allocation of memory maintains the already present value and new blocks will be initialized with the default garbage value.

Task

- Implement calloc and realloc functions

Links