Dynamic allocation

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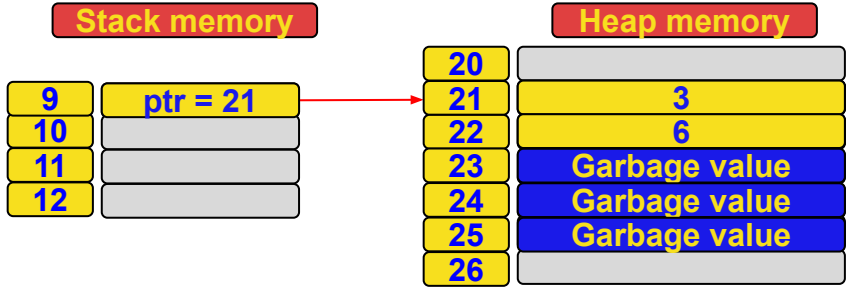
Introduction

- **Dynamic memory allocation** is provided by C language to control memory allocation **during run-time**.
- **Static memory allocation** means that the allocated memory space will **not be changed during execution**.
- Dynamic memory allocation is managed by **pointer** variables.
- Dynamic allocation takes place into the **heap** section of memory.
- **malloc**, **calloc**, **realloc**, and **free** are functions provided for dynamic allocation.

malloc function

- **Prototype:**
  - `void* malloc(size_t size);`
- It allocates a required **number of bytes**.
- It **doesn't initialize** the allocated memory with **zeros**.

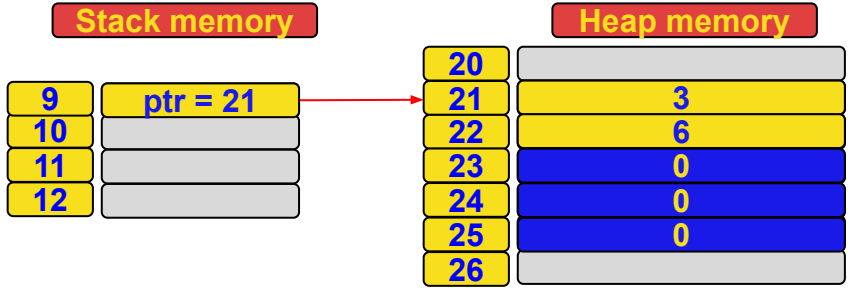
```
char *ptr;
ptr = (char*)malloc(5*sizeof(char));
ptr[0] = 3;
ptr[1] = 6;
```



calloc function

- **Prototype:**
  - `void *calloc(size_t nitems, size_t size);`
- It allocates a required **number of items of a specific size**.
- It **initializes** the allocated memory with **zeros**.

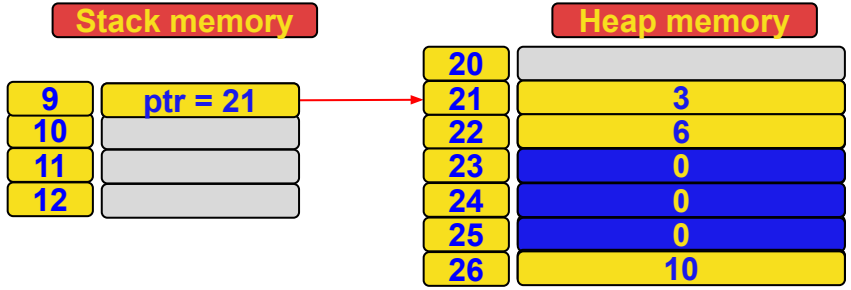
```
char *ptr;
ptr = (char*)calloc(5,
sizeof(char));
ptr[0] = 3;
ptr[1] = 6;
```



realloc function

- **Prototype:**
  - `void *realloc(void *ptr, size_t size);`
- It **allocates/deallocates** an additional **number of bytes**.
- It **initializes** the allocated memory with **zeros**.

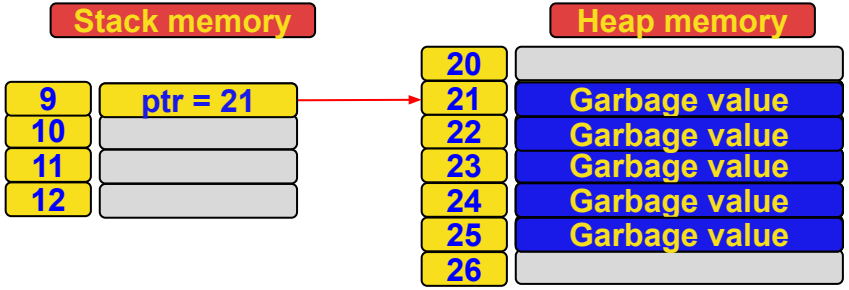
```
char *ptr;
ptr = (char*)calloc(5, sizeof(char));
ptr[0] = 3;
ptr[1] = 6;
ptr = realloc(ptr,6*sizeof(char));
ptr[5] = 10;
```



free function

- **Prototype:**
  - `void free(void *ptr);`
- It **deallocates** all allocated data pointed by a specific pointer.
- It **removes all data in the deallocated space**.

```
char *ptr;
ptr = (char*)calloc(5, sizeof(char));
ptr[0] = 3;
ptr[1] = 6;
free(ptr);
```



Summary

- Now you understand what is the dynamic allocation and when it is used.
- Now you are familiar with all dynamic allocation functions.
- Remember, malloc allocates number of bytes so be careful.
- Be careful, realloc allocates a new number of bytes.
- Remember, not freeing the allocated memory will consumes your memory.