Short-term Hands-on Supplementary Course on C Programming

SESSION 9: Pointers

NIVEDHITHA D
KARTHIK D

Time: 6:30 - 8:00 PM
Date: June 22th, 2022
Location: Online

Agenda

1. Administrative Instructions
2. What are Pointers?
3. Declaring and using Pointers
4. Pointer Arithmetic
5. Double Pointers
6. Pointers and Arrays
7. Static vs. Dynamic Memory Allocation
8. Dynamic Memory Allocation in C
    a. Primitive Types
    b. Arrays and Strings
    c. Functions
9. Tutorial: Arrays and Pointers
10. Next Session

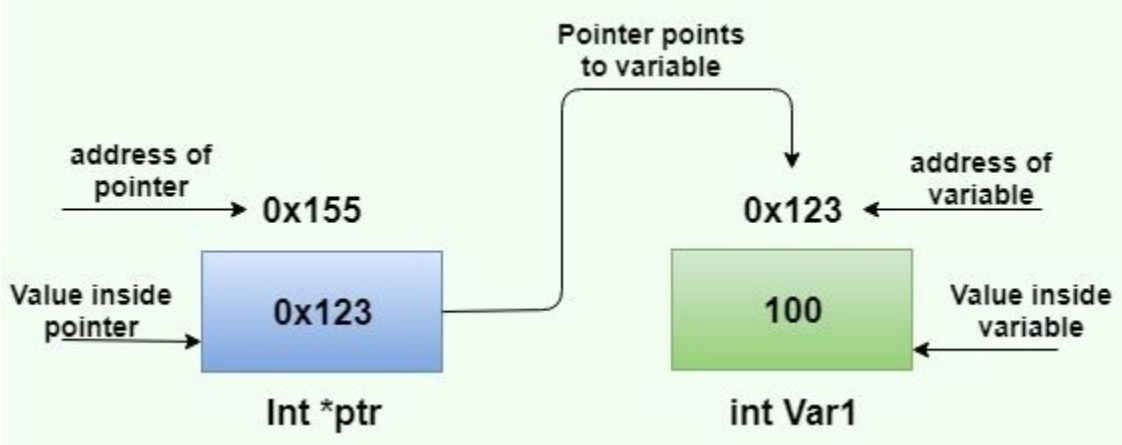
Administrative Instructions

- Please fill out the feedback form - will be shared in the chat
- Join us on Microsoft Teams,
  Team Code: **rzlaicv**

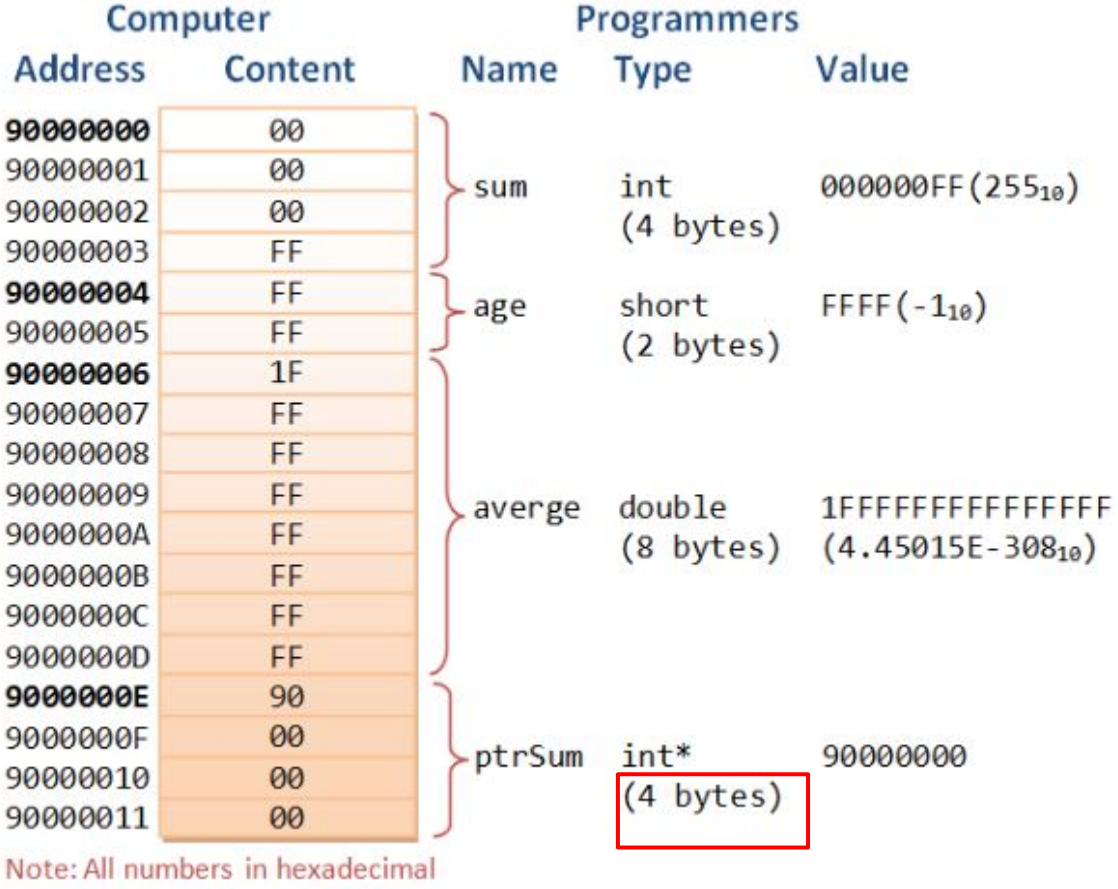
GITHUB REPOSITORY! ⭐🌟

What are Pointers?

A *pointer variable* (or *pointer* in short) is basically the same as the other variables, which can store a piece of data. Unlike normal variable which stores a value (such as an `int`, a `double`, a `char`), a *pointer stores a memory address*.



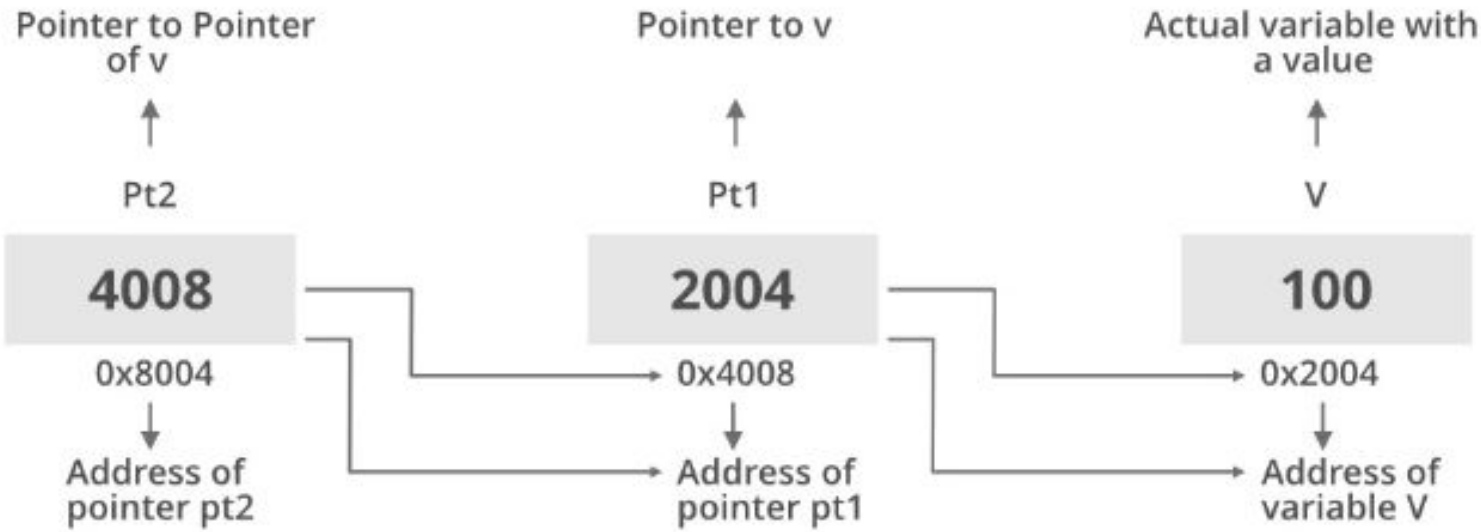
Declaring and using Pointers



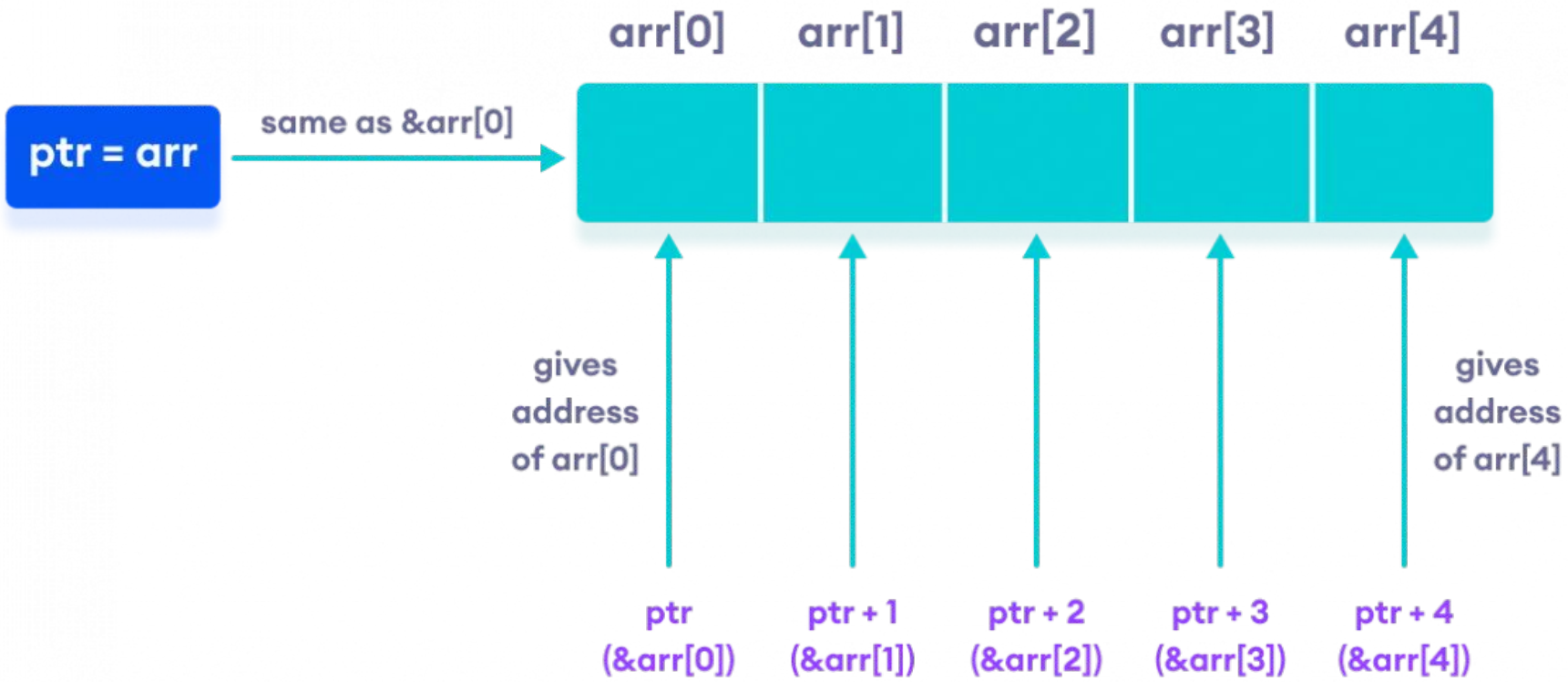

```
type *ptr;
// or
type* ptr;
// or
type * ptr;
```

```c
#include <stdio.h>

int main(void) {
    int sum = 255;
    short age = -1;
    double average = 4.45015E-308;
    int* ptrSum = &sum;
}
```

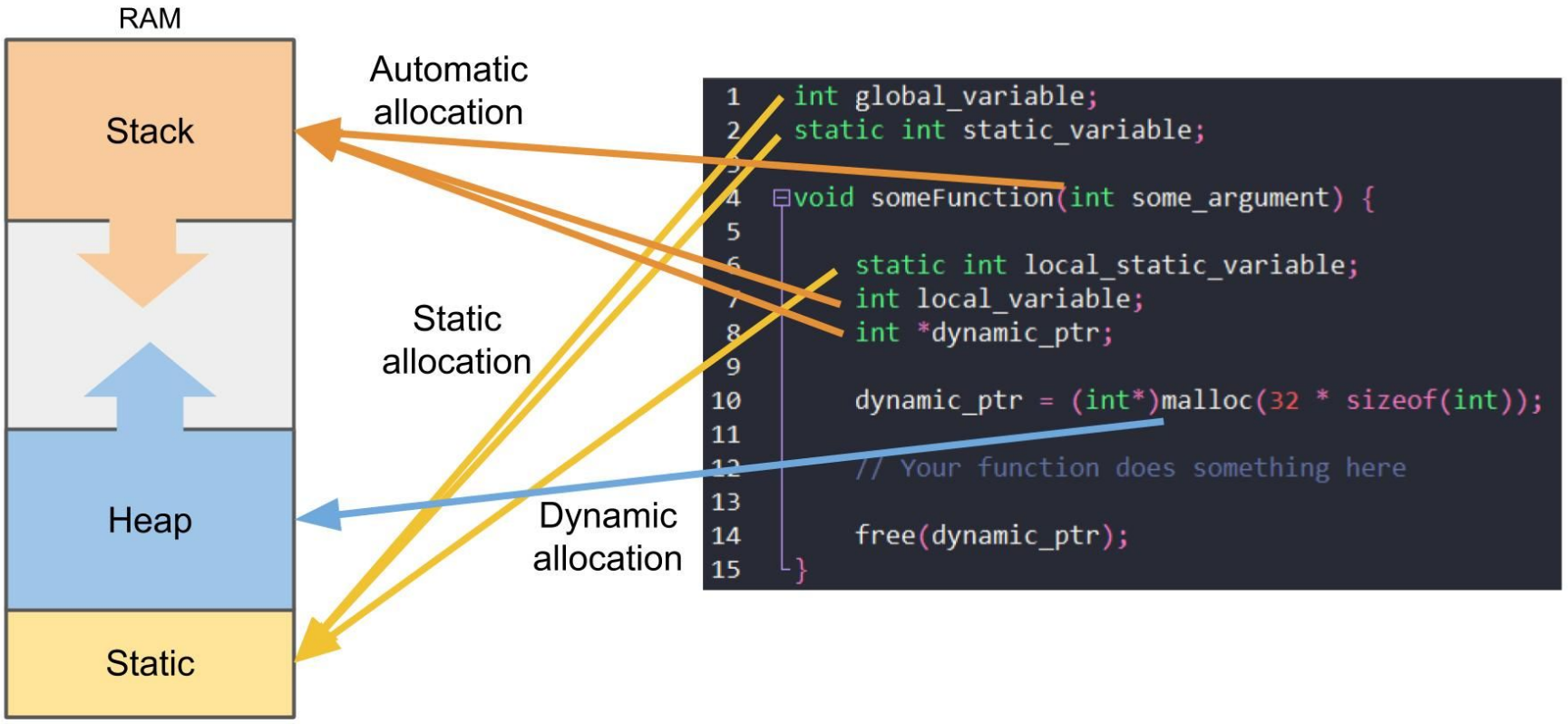
Double Pointers



Pointers & Arrays



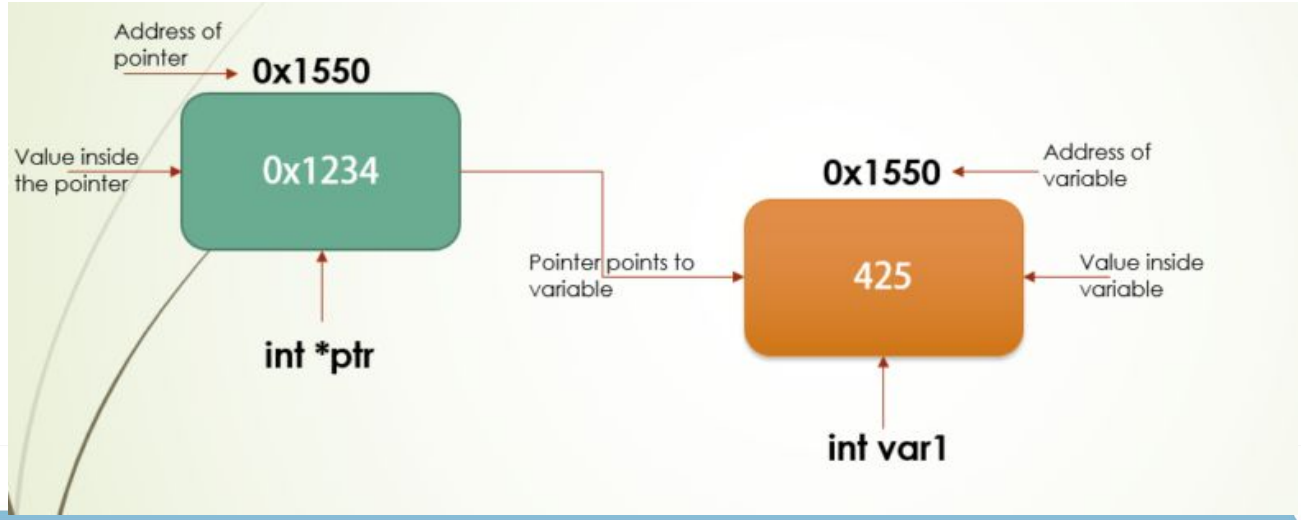
Memory Allocation in C



Static vs. Dynamic Memory Allocation

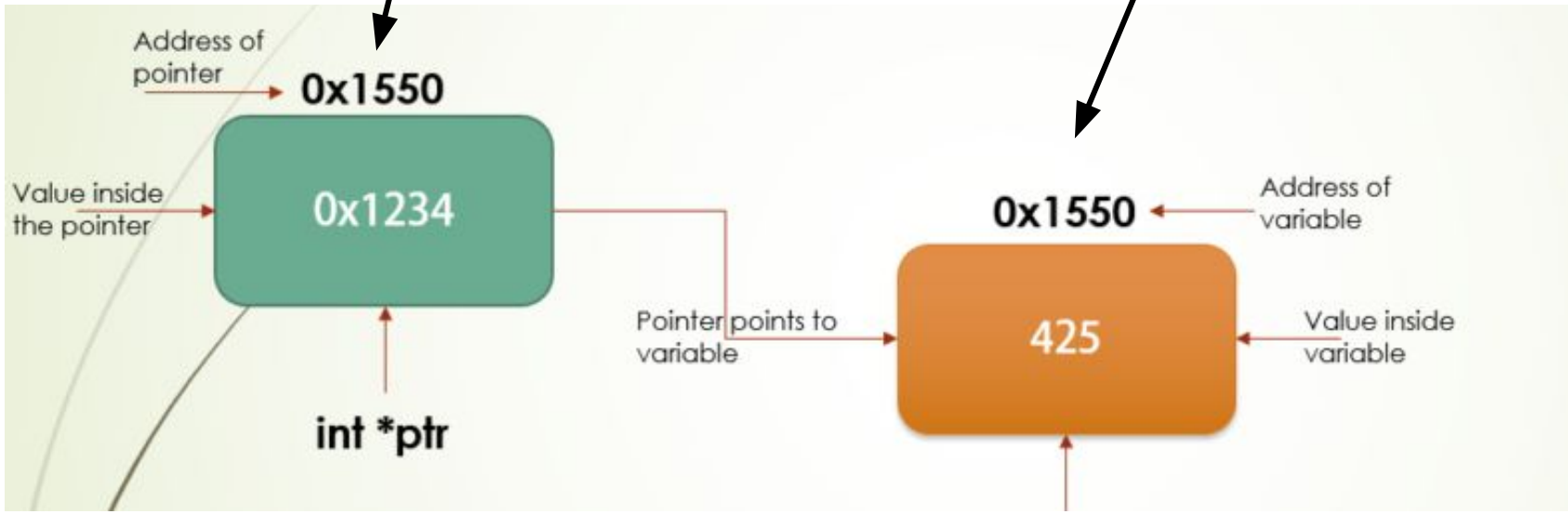
Dynamic Memory	Static Memory
Allocated at run time	Allocated at compile time
Memory can be altered during program execution	Memory cannot be altered during program execution
Example: Linked list	Example: Array

- The **heap** is often called **unnamed variable space**

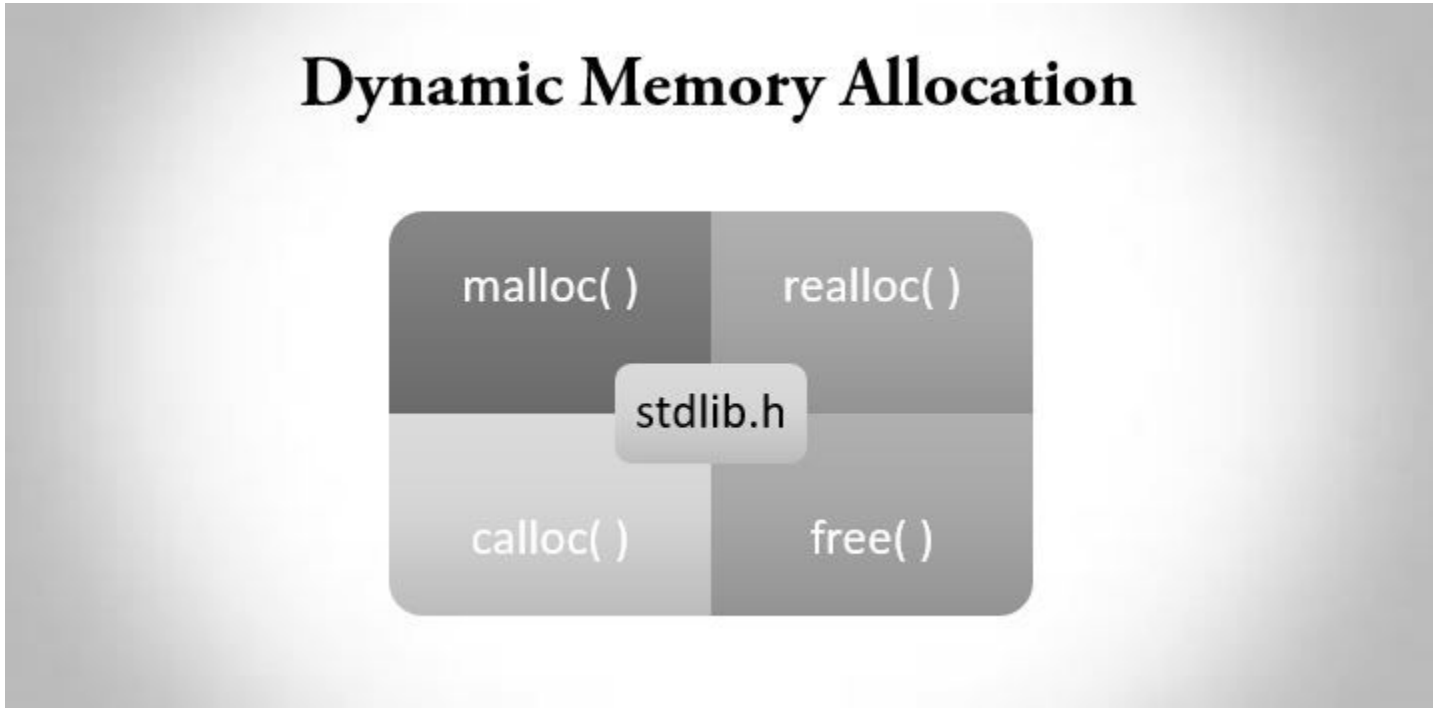


This is in
Stack/Global

This is in **Heap**
(if dynamically allocated)



Dynamic Memory Allocation in C



Syntax:

- void *malloc(size_t size);
- void *calloc(size_t num, size_t size);
- void *realloc(void *ptr, size_t new_size);
- void free(void* ptr);

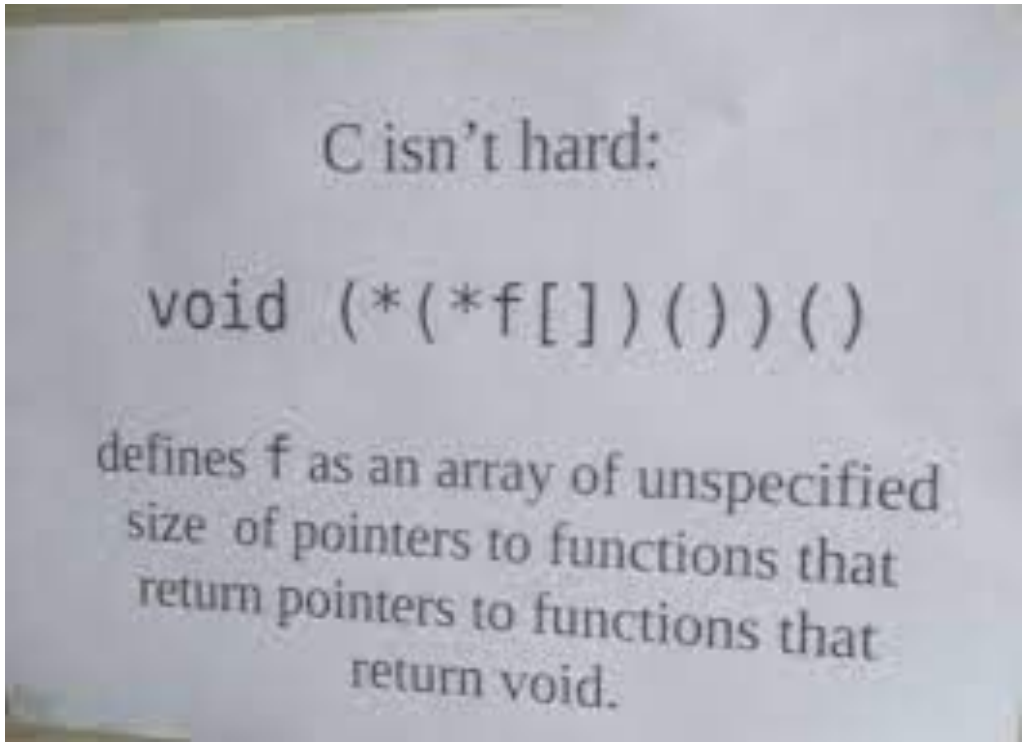
TUTORIAL

Creating and Returning Pointers from Functions

```
int create_array(int size){
    int *arr = malloc(5*sizeof(int));

    int arr1[] = {1, 2, 3, 4, 5}; /// int *arr -> start addr of array

    for(int i=0;i < 5; i++){
        *(arr+i) = *(arr1+i);
    }

    return *(arr);
}
```

Next Session

MORE POINTERS!!!



Any Questions