Short-term Hands-on Supplementary Course on C Programming



SESSION 9: Pointers

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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

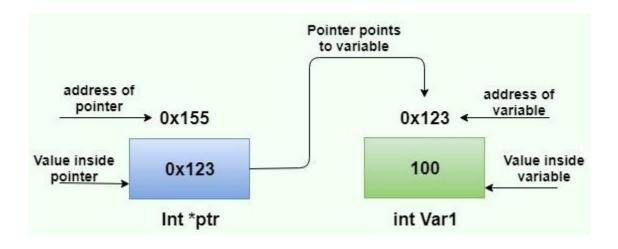
- Please fill out the feedback form will be shared in the chat
- Join us on Microsoft Teams,
 Team Code: rzlaicv





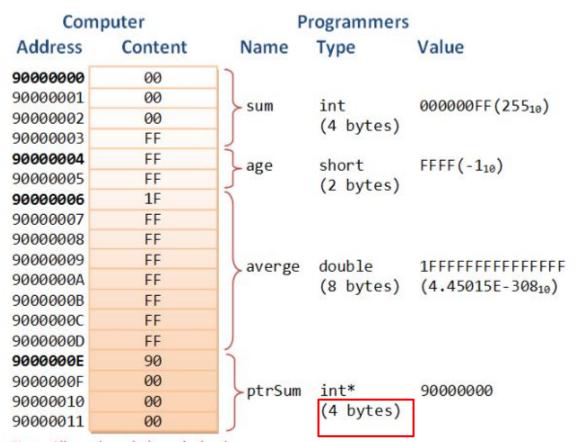
What are Pointers?

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



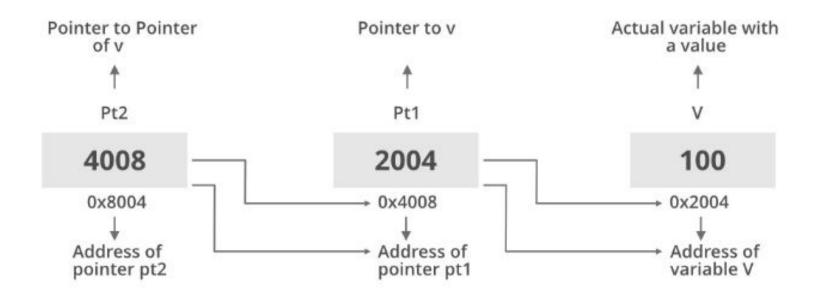
```
type *ptr;
// or
type* ptr;
// or
type * ptr;
```

```
1 #include <stdio.h>
2
3 v int main(void) {
4    int sum = 255;
5    short age = -1;
6    double average =
4.45015E-308;
7    int* ptrSum = &sum;
8 }
```

Note: All numbers in hexadecimal

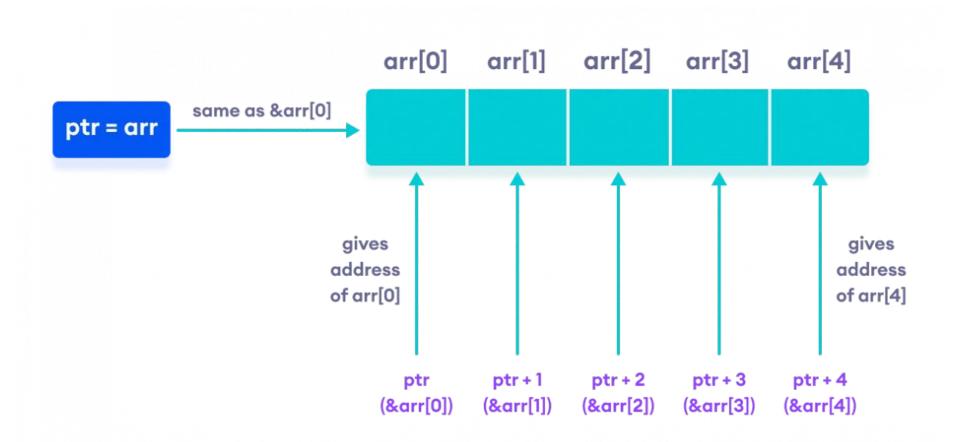


Double Pointers



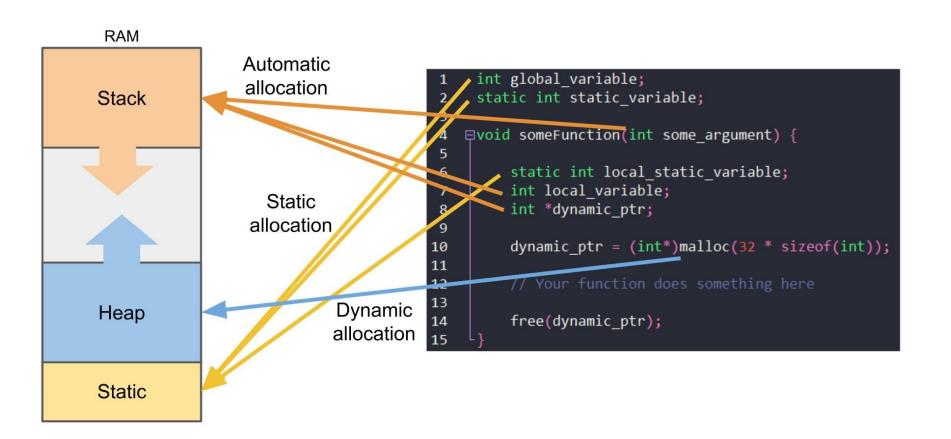


Pointers & Arrays





Memory Allocation in C

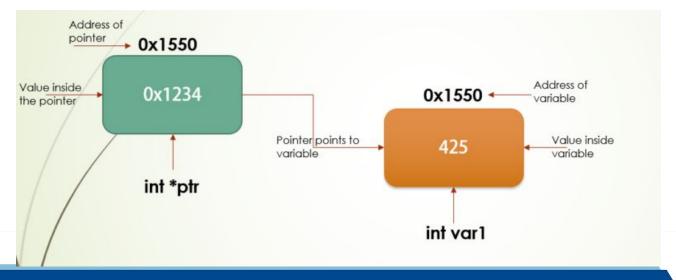




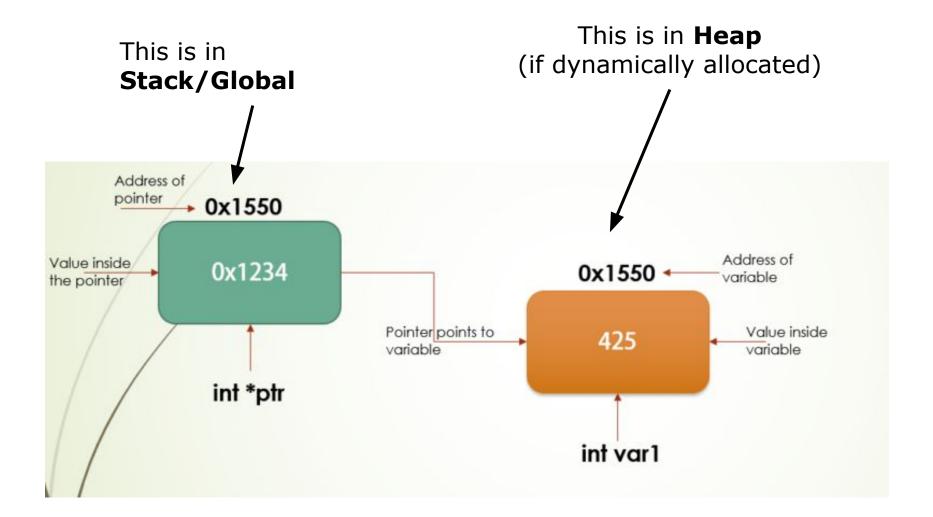
Static vs. Dynamic Memory Allocation

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

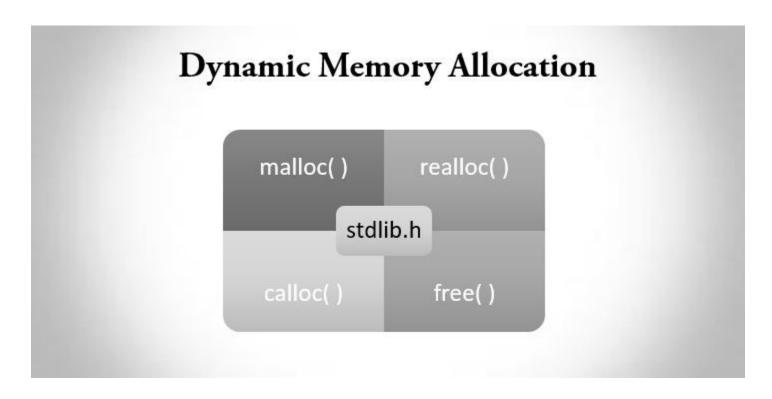








Dynamic Memory Allocation in C



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

Pointers



Next Session

MORE POINTERS!!!

```
C isn't hard:
 void (*(*f[])())()
defines f as an array of unspecified
 size of pointers to functions that
 return pointers to functions that
          return void.
```



Any Questions

