C Pointers

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Creating Pointers

You learned from the previous chapter, that we can get the **memory address** of a variable with the reference operator `&`:

Example

```
int myAge = 43; // an int variable

printf("%d", myAge);  // Outputs the value of myAge (43)
printf("%p", &myAge); // Outputs the memory address of myAge (0x7ffe5367e044)
```

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In the example above, `&myAge` is also known as a **pointer**.

A **pointer** is a variable that stores the memory address of another variable as its value.

A **pointer variable points to a data type** (like `int`) of the same type, and is created with the `*` operator. The address of the variable you are working with is assigned to the pointer:

Example

```
int myAge = 43;     // An int variable
int* ptr = &myAge;  // A pointer variable, with the name ptr, that stores the address of myAge

// Output the value of myAge (43)
printf("%d\n", myAge);

// Output the memory address of myAge (0x7ffe5367e044)
printf("%p\n", &myAge);

// Output the memory address of myAge with the pointer (0x7ffe5367e044)
printf("%p\n", ptr);
```

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Example explained

Create a pointer variable with the name `ptr`, that **points to** an `int` variable (`myAge`). Note that the type of the pointer has to match the type of the variable you're working with.

Use the `&` operator to store the memory address of the `myAge` variable, and assign it to the pointer.

Now, `ptr` holds the value of `myAge`'s memory address.

Dereference

In the example above, we used the pointer variable to get the memory address of a variable (used together with the `&` **reference** operator).

However, you can also get the value of the variable the pointer points to, by using the `*` operator (the **dereference** operator):

Example

```
int myAge = 43;     // Variable declaration
int* ptr = &myAge;  // Pointer declaration

// Reference: Output the memory address of myAge with the pointer
(0x7ffe5367e044)
printf("%p\n", ptr);

// Dereference: Output the value of myAge with the pointer (43)
printf("%d\n", *ptr);
```

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Note that the `*` sign can be confusing here, as it does two different things in our code:

- When used in declaration (`int* ptr`), it creates a **pointer variable**.
- When not used in declaration, it act as a **dereference operator**.

Why Should I Learn About Pointers?

Pointers are one of the things that make C stand out from other programming languages, like Python and Java.

This chapter was just a short introduction to Pointers. They are important in C, because they give you the ability to manipulate the data in the computer's memory - this can reduce the code and improve the performance. **However**, pointers must be handled with care, since it is possible to damage data stored in other memory addresses.

Good To Know: There are three ways to declare pointer variables, but the first way is mostly used:

```
int* myNum; // Most used
int *myNum;
int * myNum;
```

C Exercises

Test Yourself With Exercises

Exercise:

Create a pointer variable called **ptr**, that points to the `int` variable myAge:

```
int myAge = 43;
          = &myAge;
```

Submit Answer »

Start the Exercise

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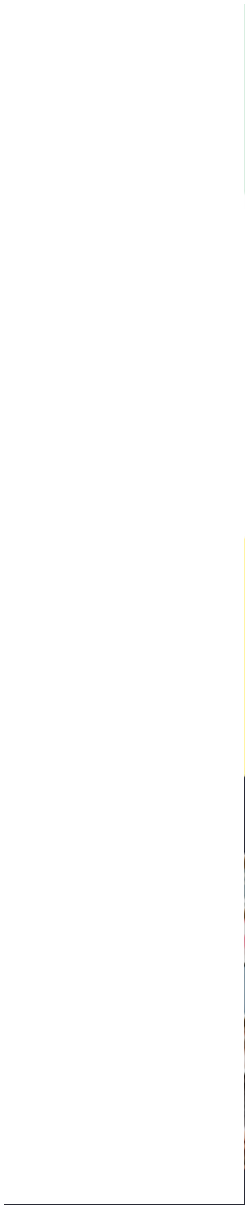

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