

Introduction to C#



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C# at a glance

- Developed by Microsoft
- Syntax based on C++
- Heavily Object Orientated
- Strongly Typed
- Garbage Collector
- Portable code

Syntax

- General syntax is heavily influenced by C++
 - Statements terminated by ;
 - Variable declarations, statements are all the same as C++
 - However don't be fooled, the language works very different to C++ behind the scenes

C# Types

- C# is a strongly typed language
- Every datatype falls under one of two categories
 - Value
 - Reference

Value Type

- Stores data within itself

```
//An example of a value type
double pi = 3.14159;
//Here the value of 3.14159 is stored within 'pi'
```

- Changes to data do not effect any other object
- Two main categories of Value types:
 - Structures (structs)
 - Enumerations

Reference Types

- Stores a reference to the actual data

```
Form f1; // Allocate the reference  
f1 = new Form(); // Allocate the object
```

- Three main types of references are:
 - Class
 - Interface
 - Delegate

Pointers in C#

- Objects are referenced by a safe pointer
- This pointer will either point to:
 - The object it is referencing
 - Or NULL
- There are no “dangling” pointers

C# Stack or Heap

- Microsoft's .NET employs a stack or heap based memory allocation
 - Value types are typically allocated on the stack
 - Reference types are typically allocated on the heap
- There are some exceptions to this rule

Example

```
class Player
{
    // heap allocated member variables
    int health = 0;
    string name = "Kratos";

    void DecreaseHealth(int decrement)
    {
        // stack allocated local variables (including decrement)
        int newHealthValue = health - decrement;
        health = newHealthValue;
    }
}
```

Summary

- C# is a robust, powerful language developed by Microsoft
- Syntax is very similar to C++, but works very differently behind the scenes
- Memory is automatically managed for you in C#

References

- Microsoft, 2014, *C# Tutorials*
 - <http://msdn.microsoft.com/en-us/library/aa288436%28v=vs.71%29.aspx>
- Microsoft, 2014, *C# For C++ Developers*
 - <http://msdn.microsoft.com/en-us/library/yyaad03b%28v=vs.90%29.aspx>