c-sharp

is a general-purpose, multi-paradigm programming language encompassing static typing, strong typing, lexically scoped, imperative, declarative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines

(C-Sharp) is a programming language developed by Microsoft that runs on the .NET Framework.

is used to develop web apps, desktop apps, mobile apps, games and much more.

LANGUAGE BASICS

⎫   The language is case-sensitive (So A and a are different)

⎫   Lines terminate with semi-colons

⎫   Code is put in code blocks { }

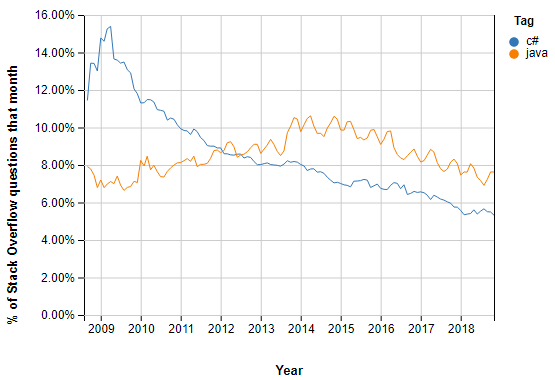
Contents

* Comments
* Variables
* Data Types
* Type Casting
* User Input
* Operators
* Math
* Strings
* Booleans
* If...Else
* Switch
* While Loop
* For Loop
* Break/Continue
* Arrays
* Method Parameters
* Method Overloading
* OOP
* Classes/Objects
* Class Members
* Constructors
* Access Modifiers
* Properties
* Inheritance
* Polymorphism
* Abstraction
* Interface
* Enums
* Files
* Exceptions

From java to c#

**KEY DIFFERENCE**

* Java runs on the Java Runtime Environment (JRE) whereas C# is designed to be run on the Common Language Runtime (CLR).
* Java is a class-based Object Oriented language whereas C# is Object-Oriented, functional, strong typing, component-oriented.
  + In a nutshell, object-oriented programming focuses on the relationships between classes that are combined into one large binary executable, while component-oriented programming focuses on interchangeable code modules that work independently and don't require you to be familiar with their inner workings to use them.
* Java doesn’t support for operator overloading whereas C# provides operator overloading for multiple operators.
* Java does not support pointers while C# supports pointer only in an unsafe mode.
* In Java, Arrays are a direct specialization of Object whereas arrays in C# are a specialization of System.



Here, is the list of few important characteristics of C# programming language:

* Support for automatic Garbage Collection
* Offers Standard Library
* Assembly Versioning
* Conditional Compilation
* Simple Multithreading
* Lambda and LINQ Expressions
* Integration with Windows

A type-safe language is one where the only operations that one can execute on data are the ones that are condoned by the data's type. That is, if your data is of type X and X doesn't support operation y , then the language will not allow you to to execute y(X) .

Conditional compilation is the process of selecting which code to compile and which code to not compile similar to the #if / #else / #endif in C and C++. Any statement that is not compiled in still must be syntactically correct.

The TIOBE Programming Community index is an indicator of the popularity of programming languages.

Language Integrated Query (LINQ, pronounced "link") is a [Microsoft](https://en.wikipedia.org/wiki/Microsoft) [.NET Framework](https://en.wikipedia.org/wiki/.NET_Framework) component that adds native data [querying](https://en.wikipedia.org/wiki/Query_language) capabilities to [.NET languages](https://en.wikipedia.org/wiki/List_of_CLI_languages), originally released as a major part of [.NET Framework 3.5](https://en.wikipedia.org/wiki/.NET_Framework_3.5) in 2007.

LINQ extends the language by the addition of query [expressions](https://en.wikipedia.org/wiki/Expression_(computer_science)), which are akin to [SQL](https://en.wikipedia.org/wiki/SQL) statements, and can be used to conveniently extract and process data from [arrays](https://en.wikipedia.org/wiki/Array_data_structure), enumerable [classes](https://en.wikipedia.org/wiki/Class_(computer_science)), [XML](https://en.wikipedia.org/wiki/XML) documents, [relational databases](https://en.wikipedia.org/wiki/Relational_database), and third-party data sources. Other uses, which utilize query expressions as a general framework for readably composing arbitrary computations, include the construction of event handlers

Lambda expressions in C# are used like [anonymous functions](https://www.geeksforgeeks.org/anonymous-method-in-c-sharp/), with the difference that in Lambda expressions you don’t need to specify the type of the value that you input thus making it more flexible to use.   
The ‘=>’ is the lambda operator which is used in all lambda expressions. The Lambda expression is divided into two parts, the left side is the input and the right is the expression.

**The Lambda Expressions can be of two types:**

* **Expression Lambda:** Consists of the input and the expression.  
  *Syntax:*

input => expression;

* **Statement Lambda:** Consists of the input and a set of statements to be executed.  
  *Syntax:*

input => { statements };

| **Parameters** | **Java** | **C#** |
| --- | --- | --- |
| Creation | Designed by Sun Microsystems. | Designed as part of Microsoft's .NET initiative. |
| Ecosystem | Has a huge opensource ecosystem. | Used to develop software for Microsoft platforms. |
| Support for generics | It is implemented using erasures and casts added upon compilation into bytecode. | Integrated into the CLI and allows type information to be available at runtime |
| Support for delegates | Requires use of an interface to achieve similar functionality. | Has delegates which serve as methods that can be called without knowledge of target object. |
| Checked exceptions | Only has one type of exception | Distinguishes between checked and unchecked exceptions |
| Polymorphism | Invokes the "virtual" keyword in a base class and "override" keyword in a derived class. | Enables polymorphism by default. |
| Designed for | Java programming language is intended to be run on a Java platform, by the help of Java Runtime Environment (JRE). | The C# programming language is designed to be run on the Common Language Runtime (CLR). |
| Safety type | Java type safety is safe. | C# type of safety is unsafe. |
| Built-in Datatype | Built-in data types that are passed by value are called simple types. | Built-in data types that are passed by value are known as primitive types. |
| Arrays | Arrays in Java are a direct specialization of Object. | Arrays in C# are a specialization of System. |
| Support for conditional compilation. | Java doesn't provide support for conditional compilation | C# supports conditional compilation feature with the help of preprocessor directives. |
| Support for Goto statement. | Java doesn't support the goto statement. | C# supports the goto statement. |
| Structure and unions | Java doesn't support structures and unions. | C# supports structures and unions. |
| Suited for | For concurrency and complex project. | It is mainly suited for game app development projects. |
| Installation | Requires JDK to run Java. | .Net framework provides a vast library of codes used by C# |
| Cross-platform support | Java is highly cross-platform with its byte code. | Compared to Java, C# need to improve on this feature. |
| IDE | Eclipse, NetBeans, IntelliJ IDEA | Visual Studio, MonoDevelop |
| Operator Overloading | No support for operator overloading | C# provides support for operator overloading for multiple operators. |
| Number of Public Classes | In Java, there is an only a single public class inside source code, or it will display compilation error. | In C#, there are multiple public classes included in the source code. |
| Control for API | It is controlled by an open community process. | Microsoft controls C# API. |
| Runtime Environment | Java supports JVM(Java Virtual Machine). | C# supports CLR(Common Language Runtime). |
| Platform Dependency | Java is a robust and platform independent language. | Code written in C# is windows specific. |
| Pointers | Java does not support pointers. | In C# you can use pointer only in an unsafe mode. |
| Floating point | Java supports strctfp keyword that means it results for a floating point will be the same for different platform. | C# does not offer support for strictfp keyword. This means that the result of floating point numbers may not be guaranteed to be the same across all platforms. |
| TIOBE Index | 1 | 6 |
| Famous companies using | Airbnb, Instagram, Spotify, Netflix, etc. | Stack Exchange, Microsoft, Coderus, Docplanner, etc. |
| Salary Range | The average salary earned by Java Developer is $102,633 per year in the United States. | The average salary for "C# sharp developer" is approximately $108,145 per year. |
| Tuples | No | Yes |

Here are some other major differences between C++ and C#.

* C++ compiles into machine code, while C# compiles to CLR, which is interpreted by ASP.NET.
* C++ requires you to handle memory manually, but C# runs in a virtual machine which can automatically handle memory management.
* C# does not use pointers, while C++ can use pointers anywhere.
* C++ can be used on any platform, though it was originally designed for Unix-based systems. C# is standardized but is rarely used outside of Windows environments.
* C++ can create stand-alone and console applications. C# can create a console, Windows, ASP.NET, and mobile applications, but cannot create stand-alone apps.

## https://assets-global.website-files.com/5ec7dad2e6f6295a9e2a23dd/5ee09ef8eef721288ff5293a_C-vs-C-vs-C.png

## Datatypes:

|  |  |  |
| --- | --- | --- |
| **Data Type** | **Size** | **Description** |
| int | 4 bytes | Stores whole numbers from -2,147,483,648 to 2,147,483,647 |
| long | 8 bytes | Stores whole numbers from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 |
| float | 4 bytes | Stores fractional numbers. Sufficient for storing 6 to 7 decimal digits |
| double | 8 bytes | Stores fractional numbers. Sufficient for storing 15 decimal digits |
| bool | 1 bit | Stores true or false values |
| char | 2 bytes | Stores a single character/letter, surrounded by single quotes |
| string | 2 bytes per character | Stores a sequence of characters, surrounded by double quotes |

### **Scientific Numbers**

A floating point number can also be a scientific number with an "e" to indicate the power of 10:

### **Example**

float f1 = 35e3F;

double d1 = 12E4D;

Console.WriteLine(f1);

Console.WriteLine(d1);

C# has the following access modifiers:

|  |  |
| --- | --- |
| **Modifier** | **Description** |
| public | The code is accessible for all classes |
| private | The code is only accessible within the same class |
| protected | The code is accessible within the same class, or in a class that is inherited from that class. You will learn more about [inheritance](https://www.w3schools.com/cs/cs_inheritance.asp) in a later chapter |
| internal | The code is only accessible within its own assembly, but not from another assembly. You will learn more about this in a later chapter |

## Filing

The File class from the System.IO namespace, allows us to work with files:

### **Example**

using System.IO; // include the System.IO namespace

File.SomeFileMethod(); // use the file class with methods

The File class has many useful methods for creating and getting information about files. For example:

|  |  |
| --- | --- |
| **Method** | **Description** |
| AppendText() | Appends text at the end of an existing file |
| Copy() | Copies a file |
| Create() | Creates or overwrites a file |
| Delete() | Deletes a file |
| Exists() | Tests whether the file exists |
| ReadAllText() | Reads the contents of a file |
| Replace() | Replaces the contents of a file with the contents of another file |
| WriteAllText() | Creates a new file and writes the contents to it. If the file already exists, it will be overwritten. |