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C# vs. C++: Which Language is Right for Your Software Project?

In an age where you have plenty of programming languages to choose from, it's difficult to figure out which language to use when you set up your projects. Once you choose a language, it can be extremely difficult to switch to a new one, so consider your options carefully. You can work closely with your developer to choose a language for your application(s), but to help you make the right decision, here are some similarities and differences between two common programming languages, C# and C++.

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THE BASICS

At a very basic level, both C# and C++ have similar code. C# is much newer to the game, however. It was introduced by Microsoft as a Java competitor in 2000. C++ has been a foundation language for many other languages, and it was introduced way back in the 1980s. Consequently, C++ has a much more prominent appearance in applications.

Both C++ and C# are **object-oriented languages**

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desktop applications, but C# is much more popular now for both applications. C++ is considered a more prestigious language used for applications such as games, operating systems, and very low-level programming that requires better control of hardware on the PC or server.

If your application is a simple web or desktop application, most developers will urge you to work with C# if it's their language of choice. If you want an application that works directly with computer hardware or deals with application development that C# is not efficient with, your developer will likely urge you to go with C++.

C# VS. C++: MAJOR SIMILARITIES

C# is a C-based language, so it makes the two syntaxes similar. The developer uses brackets to segment coding structures, and the C-style object-oriented code that includes dependencies and libraries are very similar. If the coder is familiar with Java or C++, it's very easy to move on to C#. However, moving from C# to C++ is likely more difficult for a **C# developer (https://www.upwork.com/hire/c-sharp-developers/)** because it's a much more low-level language. C# handles much of the overhead that must be considered in a C++ program. This is just one reason C++ is considered a *more difficult language to learn* in the development world.

Because **C# was developed to compete against Java (https://www.upwork.com/hiring/development/c-vs-java/)**, it's much more similar to the Java language, but it still has similarities with C++ which include:

- **Object-oriented:** Although the syntax is slightly different, the concept of classes, inheritance and polymorphism.
- **Compiled languages:** Unlike Java which is an interpreted language, both C# and C++ are compiled languages. This means that before an application is launched on a PC or the server, the code must be converted to binaries. An executable EXE file is an example of a compiled file that could be written in C++ or C#.

C# AND C++ DIFFERENCES

The similarities of C++ and C# are few, because the languages are much more different than they are similar. Although the syntax is similar, don't assume that the languages are similar behind the scenes.

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C	C++	C#
Procedural	Supports object-oriented	Supports object-oriented
Lowest level of abstraction	Low level of abstraction	High level of abstraction
Manual memory management	Manual memory management	Garbage collection
Very lightweight, compiled	Lightweight, compiled	Interpreted into bytecode, compiled by CLR, larger binaries & overhead
Fast, top-notch performance	Comparable to C	Standard performance
Can code for any platform	Can code for any platform	Targeted toward Windows OS
Allows coding almost anything, given the syntax is right	Allows coding almost anything, given the syntax is right	Shows compiler warnings to reduce serious errors
Good for embedded devices and system level code	Good for server-side applications, networking, gaming, and device drivers	Good for simple web, mobile, and desktop applications

(http://www.upwork.com/hiring/development/c-sharp-vs-c-plus-plus/)

A list of differences between the two languages include:

- **Size of binaries:** We mentioned that the two languages are compiled languages that turn your code into binary files. C# has a lot of overhead and libraries included before it will compile. C++ is much more lightweight. Therefore, C# binaries are much larger after it compiles compared to C++.
- **Performance:** C++ is widely used when higher level languages are not efficient. C++ code is much faster than C# code, which makes it a better solution for applications where performance is important. For instance, your network analysis software might need some C++ code, but performance is probably not a huge issue for a standard word processing application coded in C#.
- **Garbage collection:** With C#, you don't have to worry much about garbage collection. With C++, you have no automatic garbage collection and must allocate and deallocate memory for your objects.
- **Platform target:** C# programs are usually targeted towards the Windows operating system, although Microsoft is working towards cross-platform support for C# programs. With C++, you can code for any platform including Mac, Windows and Linux.
- **Types of projects: C++ programmers (https://www.upwork.com/hire/c--freelancers/)** generally focus on applications that work directly with hardware or that need better

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networking, gaming, and even device drivers for your PC. C# is generally used for web, mobile and desktop applications.

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- **Compiler warnings:** C++ will let you do almost anything provided the syntax is right. It's a flexible language, but you can cause some real damage to the operating system. C# is much more protected and gives you compiler errors and warnings without allowing you to make some serious errors that C++ will allow.

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WHICH LANGUAGE SHOULD YOU USE FOR YOUR PROJECT?

C# developers and C++ developers have different skill sets, so you can post a project and determine which platform is the most efficient for your project after discussing it with both sides.

A general rule of thumb is that web and desktop development is done using a higher level language such as C#. C# is a part of the **.NET language (https://www.upwork.com/hiring/development/dot-net-tips-and-best-practices/)**, which is especially targeted for web development, but it also works easily with a Windows-based program. Although Microsoft is trying to port their language to Linux systems, it's best to stick with C# and Windows environments.

C++ is a lot more well-rounded in terms of platforms and target applications, but the developer pool is more limited since it's not as popular for web and mobile applications. If your project is focused on extremely low-level processing, then you may need a C++ developer. You can also use C++ to create efficient, fast applications for server-side software. Ultimately, you can use C++ for much more than C# but it's not always the most cost-efficient way to handle your project.

The best way to decide on the right language is to post your project and ask developers for their opinion. Developers and advocates for both languages will pitch their ideas and give you more information on your specific project to help you decide.

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