C++ vs Java vs Python a comparison

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C++, Java, and Python; these are undoubtedly 3 of the most preferred programming languages in the present times. Pick up any top programming languages list and you're going to see each of the trio securing their place on it. However, if you're to choose a winner among the three? Which one will it be? Obviously, this isn't a question with a concrete answer.

Each one of the triad, C++, Java, and Python, has their own advantages and issues that they call forth with their use. C++ is preferred for its speed and memory management, while Java's platform independency makes it an opportune option for cross-platform development. Python, on the other hand, is more like a human language with high readability, less complex syntax, and an active community support.

Choosing among C++, Java, and Python depends on the specific requirements that a programming task calls for. Personal preference is yet another parameter that adds value to each of the 3 options. Typically, it is advised to stick to a preferred programming language until one gets adequately adept in the same. Before advancing with the dissimilarities of C++, Java, and Python, let's first have a brief review of their important aspects:

C++ Highlights

- A wide range of applications, varying from simple GUI applications to vivid 3D games and real-time mathematical simulations
- Efficient, fast, and powerful
- Highly portable, a top choice for multi-device, multi-platform development
- Object-oriented programming language leveraging classes, data abstraction and encapsulation, inheritance, and polymorphism
- Rich function library
- Supports exception handling and function overloading

Java Highlights

- Designed for distributed computing

- Easy to compile, debug, learn, and write
- High degree of robustness
- Multi threaded, capable of performing different tasks simultaneously within a program
- Object-oriented, allows the creation of modular programs and reusable code
- Platform-independent, easy to migrate from one system to another
- Supports automatic memory allocation and garbage collection

Python Highlights

- Active community support and rapid development
- Batteries are included language
- Easy-to-learn, clear syntax
- Extensible to a greater degree
- Free, open source, cross-platform
- High-level language with high readability and reliability
- Object-oriented nature
- Python programs are easy to modify for supporting different database engines
- Used for prototyping and testing code that is later to be implemented using other programming languages

Now that we are done with knowing about the individual preferred qualities of each of C++, Java, and Python, it's time to compare them. We'll do it on a 1-on-1 basis. So, here we go:

C++ vs. Java

Perhaps the biggest advantage of using Java over C++ is portability. The code requires to be recompiled for every platform a C++ program is intended to run upon. This isn't the case with Java bytecode, which works on different operating systems. While C++ supports operator overloading, there is no provision for the same in Java. On the other hand, Java supports documentation comment. This isn't present in C++.

Though both C++ and Java support memory management, it is different in each of the 2 general purpose programming languages. C++ relies on pointers, structures, and union for managing memory. Instead of these, Java relies on interfaces, references, and thread for managing memory. C++ supports single as well as the multiple form of inheritance. On the other side, Java achieves multiple inheritance partially by means of interfaces.

Java comes with an inbuilt support for threads, while there is no support for threads in C++. While Java has rich libraries, with a wide range of classes, C++ comes with libraries with low-level capabilities. Both functions and variable can reside inside classes in Java. However, the same reside outside classes in C++.

C++ vs. Python

Though both are used for general purpose programming scenarios, there's a galore of differences between C++ and Python. Thanks to its WORA (Write Once, Run Anywhere) design philosophy, Python code runs on all operating systems with Python installed on the same. This isn't, however, the case with C++, which necessitates being recompiled every time the code is to be run on a machine with a different operating system.

Unlike C++, a variable can be used directly without the need of its declaration in Python code. C++ uses pointers to a great extent and doesn't offer garbage collection. Hence, it is prone to a memory leak. For efficient memory management, Python comes with a built-in dynamic memory allocation and garbage collection features. While Python is a high-level language, C++ is an intermediate-level programming language.

C++ requires a declaration of a datatype before using it. In addition to lessening the ambiguity of the code, this eases error handling. The downside of this is that the code becomes extensive. Python drops the need of mentioning the type of data before using it, hence the code becomes shorter. Consequently, error handling becomes difficult. C++ supports OOPS functionalities, including classes, operator overloading, and virtual functions. Python doesn't.

Java vs. Python

Perhaps the biggest advantage of using Java over Python is speed. Java code is much faster than Python code. Java is strongly typed. It means that you need to define the exact datatype of variables. This isn't the case in Python as it is dynamic i.e. there is no need to define the exact datatype of variables. Python is an interpreted programming language. On the contrary, Java is a compiled programming language.

Python programs are 3 to 5 times shorter than equivalent Java programs. This is because Java is more syntactically complex than Python. While Java's syntax relies heavily on curly braces ({}) and semicolon (;), Python's syntax leverages indentation. Like C++, Python supports both single and multiple types of inheritance. On the other hand, Java supports only multiple inheritance and that too partially.

A Final Thought

There is an endless debate regarding the best programming language; C++, Java, Python, or any other. Well, there can't be a single winner. This is because each programming language is designed to address distinct issues. The downside of doing this is that some issues remain unaddressed and hence might become the weakness for that language.

In the crux, the best programming language might vary from context to context. So, it's important to first pin down all requirements and then choose a programming language that can do the most without presenting many issues. Happy programming!

Author Bio:

Saurabh has worked globally for telecom and finance giants in various capacities. After working for a decade in Infosys and Sapient, he started his first startup, Leno, to solve a hyperlocal book-sharing problem. He is interested in product marketing, and analytics. His latest venture Hackr.io recommends the best programming courses for every programming language. All the tutorials are submitted and voted by the programming

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1. Jogendra Arora 2019-11-16 10:43:49.0

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   I want to learn front end language but confuse which one is best for development
   ERP software, advice please.
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