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Julia

**Basic Info:**

* Julia is a highly efficient high-level language that is designed for the purpose of carrying out numerical and scientific computing.
* The inception of this programming language can be traced back to 2009
* The developers were able to launch a commercial release on February 2012
* The lead developers Alan Edelman, Jeff Bezanson, Stefan Karpinski and Viral Shah

**Main Features:**

* Multiple dispatch: providing ability to define function behavior across many combinations of argument types
* Dynamic type system: types for documentation, optimization, and dispatch
* Performance approaching that of statically-typed languages like C
* A built-in package manager
* Lisp-like macros and other metaprogramming facilities
* Call C functions directly: no wrappers or special APIs
* Ability to interface with other languages, e.g. Python with PyCall, R with RCall, and Java/Scala with JavaCall.
* Powerful shell-like abilities to manage other processes
* Designed for parallel and distributed computing
* Coroutines: lightweight green threading
* User-defined types are as fast and compact as built-ins
* Automatic generation of efficient, specialized code for different argument types
* Elegant and extensible conversions and promotions for numeric and other types
* Efficient support for Unicode, including but not limited to UTF-8

**Reasons to use:**

* Julia is a high-level language so it is closer to other popular programming languages like Python, C, R, etc.
* Julia is a combination of both dynamic and static typed language.
* Julia is fully open-source and free, hence it can be downloaded and worked upon easily.
* Julia is built for scientific computations just like in Python, R, and MATLAB alongside it has its roots in the general-purpose programming.
* Julia can work on Python, C and Fortran libraries by directly calling them.
* Julia is known to be a combination of Python and C programming language. Hence, it has a very high execution speed of C as compared to Python, R, and MATLAB.
* Julia provides the flexibility of writing fewer lines of codes as in Python and C.

**VS. Python:**

* Julia is faster as compared to Python, because of its just-in-time(JIT) compilation.
* Julia is highly more compatible with mathematical computations.
* Julia allocates memory to variables automatically, like Python.

**VS. C/C++:**

* In Julia the dispatch is generally handled at compile time, emulation of multiple dispatch in C++ involves some kind of virtual function/runtime dispatch
* Julia will be more performant than C++ would be with a similar programming paradigm

**VS. Java:**

* Julia is faster than Java as it has execution speed very similar to that of C/C++
* Being a young language, Julia has less popularity and hence it has less number of users than java.
* Julia is a dynamic but weekly typed language having some benefits of static typed languages
* Julia is a language where array indexing starts from 1.

**Application of Julia:**

* With the help of ARM support, Julia will soon be used on Android Smartphones.
* the Federal Reserve Bank of New York used Julia to make models of the United States economy.
* Julia is e.g. used by NASA; and Brazilian equivalent (INPE) for space mission planning/satellite simulation

# References

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Tomar, S. A. (2020, April 4). *Julia Language Introduction*. Retrieved November 24, 2020, from GeeksforGeeks: https://www.geeksforgeeks.org/julia-language-introduction/#:~:text=Why%20Julia%20Programming%20Language%3F%20Julia%20has%20many%20reasons,for%20anyone%2C%20especially%20for%20Python%20and%20C%20programmers.

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