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Python – The Programming Language & Its Implementations

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ABSTRACT- In the modern era when the developers work on Mathematical & Scientific computing, Data analytics, Data science, Machine learning, Internet of Things and Deep Learning types of technology, we don't have much time to learn java, C++, C type of language. We want a language which have easy syntax, simple to learn, concise in size and have maximum no. of built in library that make the task easy and fast and it should be much simpler to read and write a code ascompare to other language like C++, Java, C. so yes I am talking about one of the most popular programming language python. Python is a general purpose interpreted and highly used programming language and also comfortable with other language and how it is possible that's by python implementation come into picture. So in this paper we are going to discuss python and python implementations.

KEYWORDS- Python programming, Cpython, Jython, Implementations Types.

I. INTRODUCTION

In this paper I am going to explain the default implementation of python. Actually python language and python Implementations both are different language has the instructions, specifications, rules and implementation explain the way to understand and execute these rules. So both are different. Implementation means variant of python orpython come into many variant that known as implementation. There are Cpython, Jython, Iron python, PyPy, Brython and many more implementations of Python programming language. But we are discussing four most popular implementation Cpython, Jython, Iron python and PyPy.

II. PYTHON INPLEMENTATION

A. Cpython Language

Cpython is the most widely used implementation of python programming language. As we know that C is the mother of all programming language. It is written in C language. Guido van Rossum created Cpython language and Robert Bradshaw and Stefan Behnel is the Developer. It is a multipurpose programming language. Cpython can run at Linux, mac and Windows operating system. As all programming language has an extension, similarly Cpython also has .pyc, In Cpython, Python source code compiled into Code Execution by Cpython intermediate byte code by Cpython compiler and this code executed by the Cpython virtual machine which means that the Code written in Python is converted into C language. Cpython also gives you a highest compatibility of C extension modules and python packages. It is faster than the original python programming language because it is a compiled language. High traffic websites use Cpython Programming language. Cpython is the byte code interpreter of python that is written in C language. It is implement to gives C like performance along with codes mostly written in the Python language and allows extra syntax that is inspired by C. Cpython is the python with c data types.
Cpython programming Language is similar with python programming language with a little difference. To understand this, let us take the example, python code and its relevant Cpython code.

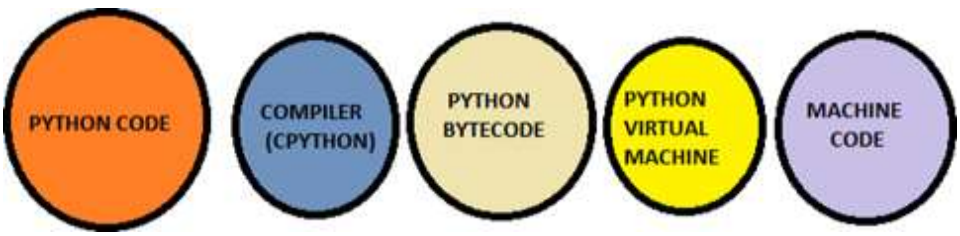

Figure 1: Code Execution by Cpython

PYTHON CODE
Example-1

```
def f1(x):
    return x**2-x num=f1(4) print('num:', num)
```

Example-2

```
def f2(a, b, N):
        s1 = 0
        dx = (b-a)/N
                for i in range(N):
                        s1 +=
                        (a+i*dx)
         return s1*dx num=f2(4, 6, 7) print(num)
```

Cpython Code Example-1

```
        cdef double f1(double a): return a**2-a
        num=f1(4) print('num:', num) Example-2
                def integrate_f(double a, double b, int N):
                cdef int i
                cdef double s2, a, dx s2 = 0
                dx = (b-a)/N
                for i in range(N): s2 += (a+i*dx)
                        return s * dx
                        num= integrate_f (4, 6, 7)
                print(num)
```

There are two codes, first one is python and second one is Cpython. Both have very little difference. In python variables have been implicitly declared and In Cpython variables explicitly declared. Cpython code improved the performance as well as speed

B. Jython Language

There is another Implementation of the Python programming language that is Jython, which can run on the Java platform. Which is written in python and java. Jython program compiles to a .class files. Jython was implement to give support to the python programming language on the java platforms it is beneficial for java background programmer. This implementation of Python in Java providing the benefits to python to running on the JVM, access and use the classes written in Java. Jython compiles python code into the java byte code. .In Jython programmer can be used classes of java instead of modules of python language it can import any java class and can be use in Jython. Two very popular programming Language namely Java and Python are integrated and ready to run. In Jython programs you can import and use any class of java.

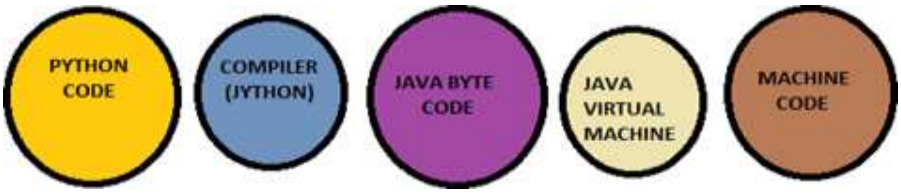

Figure 2: Code Execution by Jython

C. Iron Python Language

Iron Python is one of the most important implementations of the Python programming language. It is very fruitful for the C# programmers.This implementation of python is written in C#Language. It is written in C# so it can run on .Net environment i.e. CLR. Some of its code is generate by a code generator which is written in Python. In Iron Python two very popular programming Language namely C# and Python are integrated and ready to run. Similar to other implementations, at runtime it uses .Net Virtual Machine Common Language. Iron

D. PyPy Language

It is most fastest implementation of Python programming language if u want to run fast your code just use the PyPy . It is generally use for the speed because we all know that python is a dynamic programming language, it is said to be slow as the default CPython compiles the python source code in byte code which is slowas compared to

Python uses the .Net Framework and all libraries of python and others very efficiently

.NET languages can use Python code very efficiently. Iron Python have better performance in Python programs that use threads or cores. It has a JIT, just like CPython. Jython, it is an implementation of Python, the multi- programming, general- purpose, high-level programming language that is popular for the clarity of its code. Like Python programming, Iron Python code is much simple to read compared to other programming languages.

machine code. So, PyPy comes into the picture. PyPy is one of the important implementation of the Python programming language written in Python. The Interpreter is written in RPython it is a subset of python. PyPy runs faster than CPython because PyPy uses a just-in-time compiler.

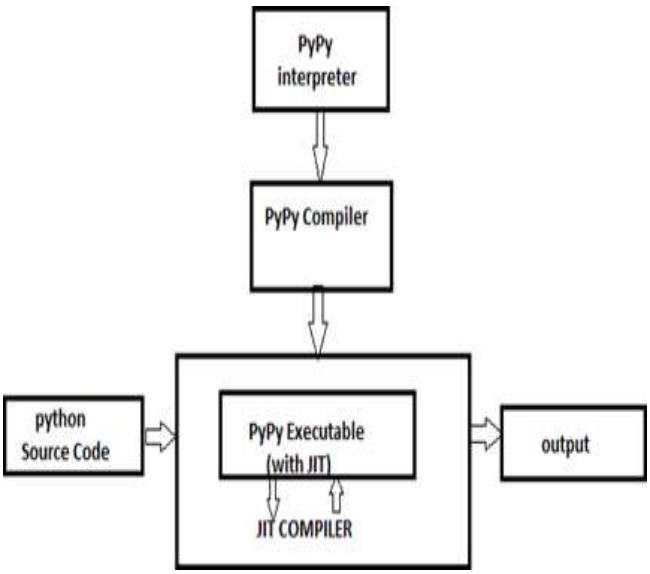

Figure 3: Code Execution by Iron Python

III. DIFFERENC BETWEEN VARIOUS IMPLEMENTATIONS

All the implementations of python are different to each other in terms of compiler they are used, in terms of language, in terms of environment they are used.They all are have different flavor in their own. The Programmers, who have different back ground is very comfortable with these integration of other language with python.

Table 1: Difference Between Various Implementations

S.NO	CPython/Python	Jython	Iron Python	PyPy
1	1994	2001	2006	2007
2	C Language	Java	C#	RPython
3	CPython Virtual Machine	JVM	.Net OR CLR	JIT Compiler

IV. FUTURE SCOPE OF PYTHON IMPLEMENTATION

According to the technical indexes, Python implementations have a fastest future Scope due to its popularity and uses of different languages and different type of compiler. Most of the developer has a command on a particular specialization such as, some developer work on java, some work on C#, some have a command on c but there is not any common platform to work together, but due to Popularity and uses in multiple areas, python. Cpython, Jython, iron python and PyPy have their own flavor. Developer can create modules in their own language and use with Python. Using PyPy we can create the speed of program. It is Mainly Popular for its speed and uses Just in time compiler. Iron python is popular for Industries purpose because it uses CLR, Jython is important for whom, who has a command in java and they want use java modules for efficiency purpose. Cpython is written in C and we all are known C isthe mother of all language.

V. CONCLUSION

In this paper, we briefly introduced the Python Implementations and how python Language are different from Python Implementations. The paper has also discussed that how these implementations are different to each other and which Language and compiler they are used. We have also discussed about the future Scope of python implementations. Python programming language as a suitable choice for learning coding and real-world programming.

REFERENCES

[1] https://jython.org
[2] "Programming Language Trends - O'ReillyRadar"Radar.oreilly.com. 2 August 2006.
[3] Kuhlman, Dave. "A Python Book: Beginning Python, Advanced Python, and Python.
[4] https://ironpython.net