ISSN: 2582-8118 ***Volume 4, Issue 2; March 2024***

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYSIS IN SCIENCE AND ENGINEERING

Web: https://www.iarj.in/index.php/ijrase/index

An Overview on Python Programming

Prof. (Dr.) Ihtiram Raza Khan
Senior Academician,
Jamia Hamdard, Delhi.

ABSTRACT

High-level object-oriented programming features are available in Python, a general-purpose programming language. It has gained popularity due to its readily apparent and uncomplicated syntax, portability, and ease of learning. Python is a computer language with features from both Java and C. Python is a good language for learning as well as practical programming. Guido van Rossum is the creator of Python, a potent high-level object-oriented programming language. We initially expose you to the features and characteristics of Python programming in this document. This essay also explores the reasons why Python has been named the programming language with the fastest growth in recent years, a claim bolstered by analysis of articles gleaned from well-known websites and magazines. We will talk about in this essay. An Introduction to Programming in Python.

KEYWORDS:

Programming, Python, Learning, Computer, Language, Object-Oriented, Interpreter, Byte Code, Syntax.

1. Introduction:

Python is a popular high-level, general-purpose programming language. In 1991, Guido van Rossum invented it, and the Python Software Foundation continued to develop it. Programmers may communicate their ideas in less lines of code because to its syntax, which was developed with readability of code as a primary focus. Python is a programming language that facilitates faster work and more effective system integration. Python comes in two main versions: Python 2 and Python 3. They are both very dissimilar.

Characteristics of python:

Python is a well-crafted language suitable for practical programming applications. Python is a dynamic, high-level, object-oriented, general-purpose programming language that may be used in a wide range of applications. It is interpreter-based. Python was created to be simple to use and comprehend. In recent times, Python has been regarded as an extremely user-friendly and beginner-friendly language.

Due to its popularity as a language that is easy for beginners to learn, Python has surpassed Java as the most widely used beginning language. Given that it is dynamically typed; Python offers great flexibility.

Additionally, Python is more tolerant of mistakes, so you can continue to compile and run your program until you reach the issue section. Python is a straightforward, versatile programming language. Programming languages allow several programming techniques, such as object-oriented and structural programming. There's also room for other styles. Because it can incorporate modular components created in other programming languages, Python is incredibly flexible. For instance, you can create a C++ application and import it as a module into Python. [1]

Python programming:

Writing code in the Python language, which primarily consists of variables, operators, loops, functions, and classes, is known as Python programming. The Python interpreter, which reads source code files and converts them into byte code that computers can understand, runs Python code. The computer's byte code is subsequently executed by the interpreter.

Advantages of Python programming:

Python has many benefits, like being cross-platform, having a huge and vibrant community, and being simple to learn and develop. Furthermore, Python boasts an enormous library and framework ecosystem that may be leveraged to expeditiously construct a multitude of applications. Additionally, Python uses less RAM. Python code is also typically shorter than code produced in other languages, such Java or C++.

Applications of Python:

Python is a dynamic programming language that is gaining popularity. It may be used to develop applications in many different fields, such as:

- Internet development: You can quickly create online applications using Python frameworks like Django, Pyramid, Flask, and Bottle and content management systems like Plone and Django CMS. Many internet protocols, such as HTTPS, FTP, SSL, and the processing of JSON, XML, and email, are handled by Python's standard library.
- Python is used to create cryptographic functions, which encompass many different algorithms for creating secure applications. Clients and servers for connection-oriented and connectionless protocols can be created with Python.
- With features like SciPy for Engineering, Math & Science, Pandas for data research and forecasting, Python for effective editing and recording of work sessions, as well as visual representations and parallel processing, Python is frequently used in empirical and statistical computing.
- Python is also utilized in the creation of e-commerce and ERP applications. While Odoo is an all-in-one management tool for enterprise administration applications, Tryton is a three-tier high-level general purpose application platform.

- Everything is an object in Python. Object-oriented programming, or OOP, facilitates the deft resolution of challenging issues. By constructing objects, OOP may be used to divide these complex issues into manageable pieces. [2]

Review of Literature:

Python is a language standard that has multiple implementation options. This specification has numerous implementations published in various languages. is an extremely advanced programming language that is relatively easy to learn. Python coding may be learned by anyone in a matter of hours or days. It may take some more time to become proficient with Python and all of its sophisticated ideas, modules, and packages. However, compared to other well-known languages like C, C++, and Java, understanding the fundamental grammar of Python is rather simple. Interpretation refers to the process of running source code in a programming language line by line as opposed to all at once. Because they are not interpreted, programming languages like Java and C++ must first be compiled in order to be used. Python does not require compilation because the interpreter processes it at runtime. Python is portable in that it allows code to be utilized across several machines. If a programming language centers its architecture around data and objects instead of functions and logic, it is said to be object-oriented. Conversely, if a programming language concentrates more on functions (reusable code), then it is procedure-oriented. (Chun, 2001). [3]. The Python Materials Genomics (pymatgen) package is a potent, open-source Python toolkit for materials analysis, according to S. P. Ong et al. High-throughput computational materials science efforts are greatly aided by a strong suite of software tools for performing post-calculation analysis to extract useful material properties from raw calculated data and initial setup for the calculations (such as the creation of structures and required input files). By providing a well-tested set of structure and thermodynamic analyses pertinent to a wide range of applications, defining core Python objects for materials data representation, and offering an open platform for researchers to collaborate on advanced analyses of materials data obtained both from first principles calculations and experimentation, the pymatgen library seeks to meet these needs. The pymatgen package also offers convenient ways to retrieve pertinent materials data via the RE presentational State Transfer (REST) Application Programming Interface (API) of the Materials Project. [4]

A important feature of the Python language that renders it appropriate for use as a tool in software development is its dynamic typing system and autonomous memory management technique. It can also facilitate the execution of scripting programs. It is significant to highlight that the Python language's development strategy is community-based, suggesting that its open-source platform is the foundation for its free reference implementation. While programs written in Python can run in any environment, regardless of the operating system, there are several interpreters available for the language for different systems software (Hetland 2010). [5]

Objectives:

- An Overview on Python Programming
- Features of Python Programming
- Applications of Python

Research Methodology:

This study's overall design was exploratory. The research paper is an endeavor that is founded on secondary data that was obtained from reliable online resources, newspapers, textbooks, journals, and publications. The research design of the study is mostly descriptive in nature.

Result and Discussion:

Features of Python Programming:

Many beneficial features that Python offers are enumerated below:

- **Easy to code:** High level programming languages include Python. When compared to other languages like C, C#, JavaScript, Java, etc., Python is incredibly simple to learn. Python is a fairly simple language to code with, and anyone can pick up the basics in a matter of hours or days. Furthermore, the language is developer-friendly.
- **Free and Open Source:** Since the Python language is open-source, the public can access its source code without restriction through its official website. As a result, you are free to download, use, and distribute it.
- **Object-Oriented Language:** Python's object-oriented programming is one of its main advantages. Python offers support for object-oriented languages, classes, object encapsulation, and other related ideas.
- **GUI Programming Support:** Python modules like PyQt5, PyQt4, wxPython, or Tk can be used to create graphical user interfaces. The most widely used tool for Python programmers to create graphical applications is PyQt5.
- **High-Level Language:** One such language is Python. Writing applications with Python reduces the need to memorize memory management and system design.
- **Extensible feature:** The language Python is extensible. Python code can be written in C or C++, and it can also be compiled into C/C++.
- **Python is a Portable Language:** It is also possible to run Python code on other platforms, such as Linux, UNIX, and Mac, without having to modify it. For instance, we can run Python code written for Windows on any platform.
- **Python is an integrated language:** Python's ability to be readily integrated with other languages, such as C, C++, and others, makes it an integrated language as well.
- **Interpreted Language:** Python is an Interpreted Language because, unlike other languages like C, C++, Java, etc., it executes code line by line at a time. This eliminates the need for compilation, which facilitates debugging. Python source code is transformed into byte code, which is an instant format.
- **Large Standard Library** Python comes with a sizable standard library that offers a wide range of modules and functions, saving you from having to create your own code for everything. Python has a large number of libraries for things like web browsers, regular expressions, and unit testing.
- **Language with Dynamic Typing:** Python is a language with dynamic typing. This means that we don't need to define the type of variable because it is selected at run time rather than beforehand (for example, int, double, long, etc.). [6]

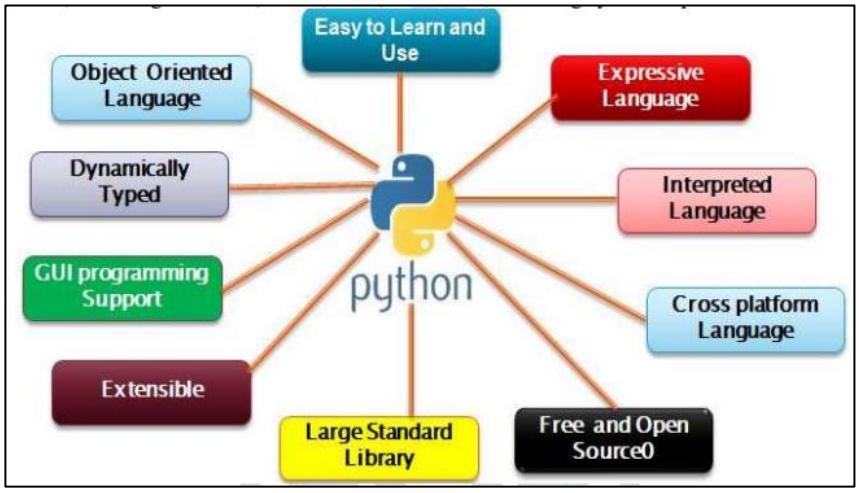

Figure 1: Diagrammatic Representation of Features of Python [SAHOSOFTTUTORIALS].

Programming languages have been around for a very long time. A new language that takes developers by storm is introduced every ten years. One of the most widely used and in-demand programming languages is python. According to a recent Stack Overflow poll, Python has surpassed other languages to become the most popular, including Java, C, and C++. The Python programming language is gaining popularity for the reasons listed below.

Simple and easy to learn: Python is quite basic and uncomplicated, making it simple to learn and easy to comprehend because it closely mimics the English language.

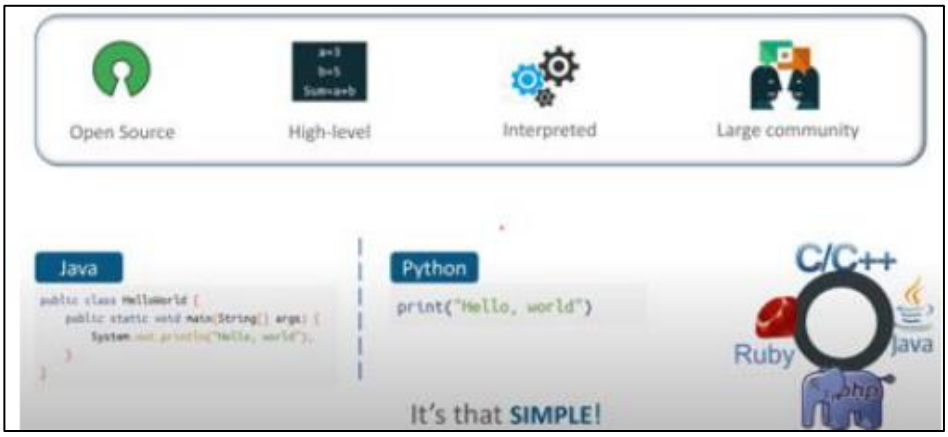

Figure 2: Simple and easy to learn

Community support: With three decades of existence behind Python, there has been ample opportunity for a well-established and encouraging community to emerge around the language. Python learners of all ages and ability levels can get the assistance they need to advance their understanding of the language in official documentation and YouTube lessons.

Web development: Python offers several options for web programming due to its many frameworks for creating websites. Python comes with a plethora of frameworks, including Django, Flask, Pylon, and many more. The main application for Python is in web development. [7]

Figure 3: Web development

Python programming offers several options as a framework for creating website pylons and top correlation between the quote that is much faster and more reliable than there

Use to machine learning and large data: Two of the most popular developments in computer science at the moment are big data and machine learning, which are assisting businesses in modernizing their workflows and procedures. The majority of this research and development is done in the Python language. Python is the second most widely used tool for analytics and data science, and it powers a huge number of data processing tasks in businesses worldwide. In the meantime, dozens of machine learning projects use Python libraries like TensorFlow for neural networks and OpenCV for computer vision every day.

Figure 4: Big data

Large-scale data and data processing Create a map reduce programming by using the thermal process state of spirit in the external HTML, and you can process large amounts of data with Python.

Effectiveness: Compared to more traditional programming languages like Java and C++, Python offers a distinct programming paradigm. But by using a "Pythonic" approach, developers may accomplish more in less time—often with just a few lines of code. Furthermore, Python's adaptability makes it possible to use the language in a range of contexts, including desktop programs, hardware programming, mobile and web development. [8]

At the Netherlands' National Research Institute for Mathematics and Computer Science in the late eighties and early nineties, Guido van Rossum created the programming language Python. Numerous additional languages, such as ABC, Modula-3, C, C++, Algol-68, Small Talk, Unix shell, and other scripting languages, are developed from Python. Copyright protects Python. The GNU General Public License (GPL) is now used to license Python source code, just like it does Perl. Although a core development team at the institute currently manages Python, Guido van Rossum continues to play a crucial role in steering its direction. November 1994 saw the release of Python 1.0. Python 2.0 was made available in 2000. The most recent version of Python 2 is 2.7.11. In the meantime, 2008 saw the release of Python 3.0. Python 3 and Python 2 are not backwardly compatible. In Python 3, the focus was on eliminating redundant programming structures and modules, with the goal of ensuring that "there should be one -- and preferably only one -- obvious way to do it." The most recent version of Python 3 is 3.7.4. Because of its elegance and simplicity, tech giants including Qualcomm, Hewlett-Packard, Quora, Cisco, IBM, Mozilla, Google, Dropbox, and Dropbox use this language. Python is favored by most developers over the many other programming languages available due to its focus on readability and efficiency. [9]

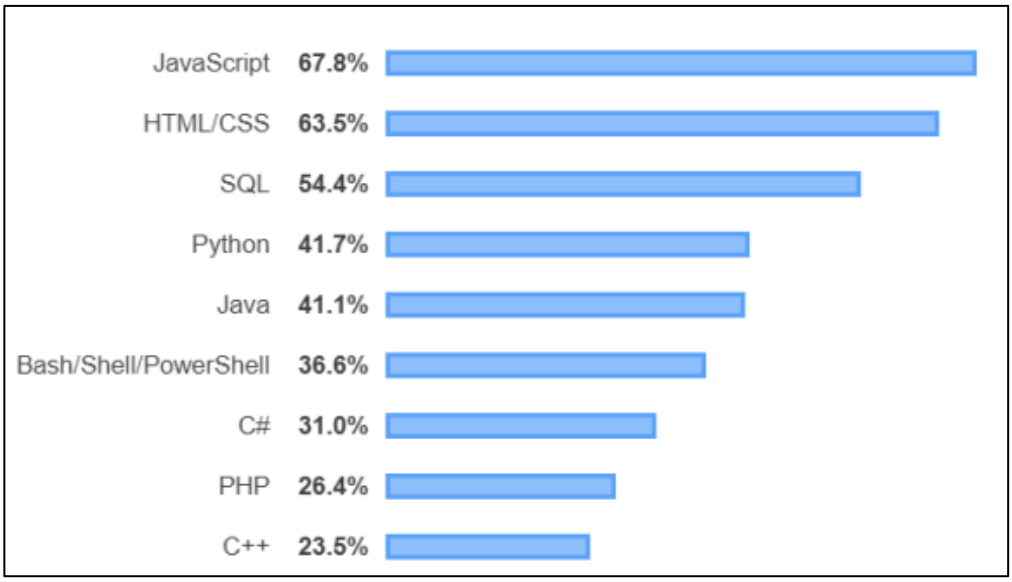

Figure 5: Most Popular Technology

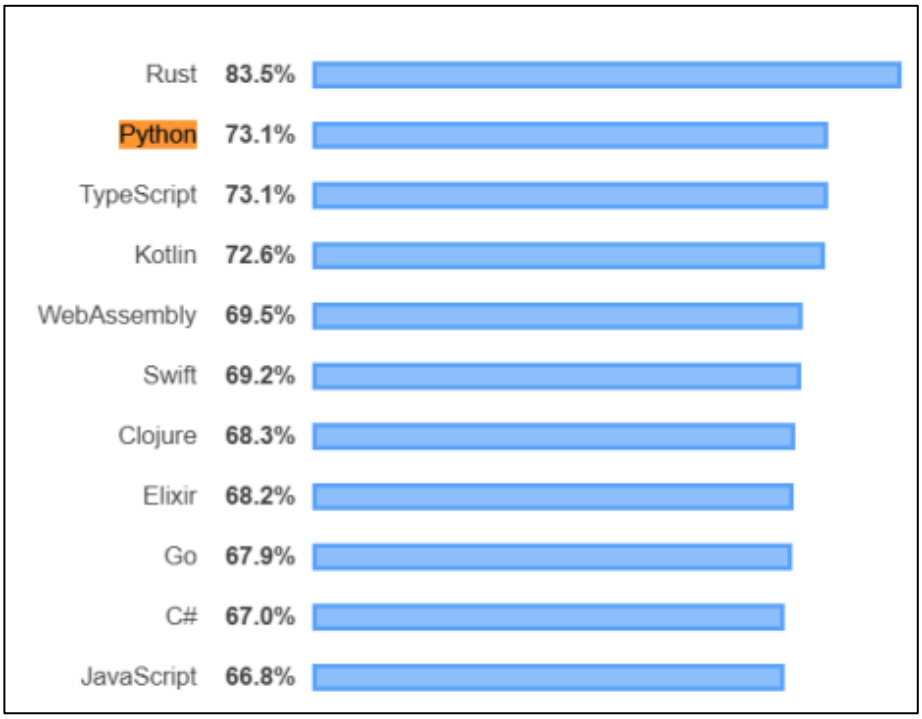

Figure 6: Most wanted language

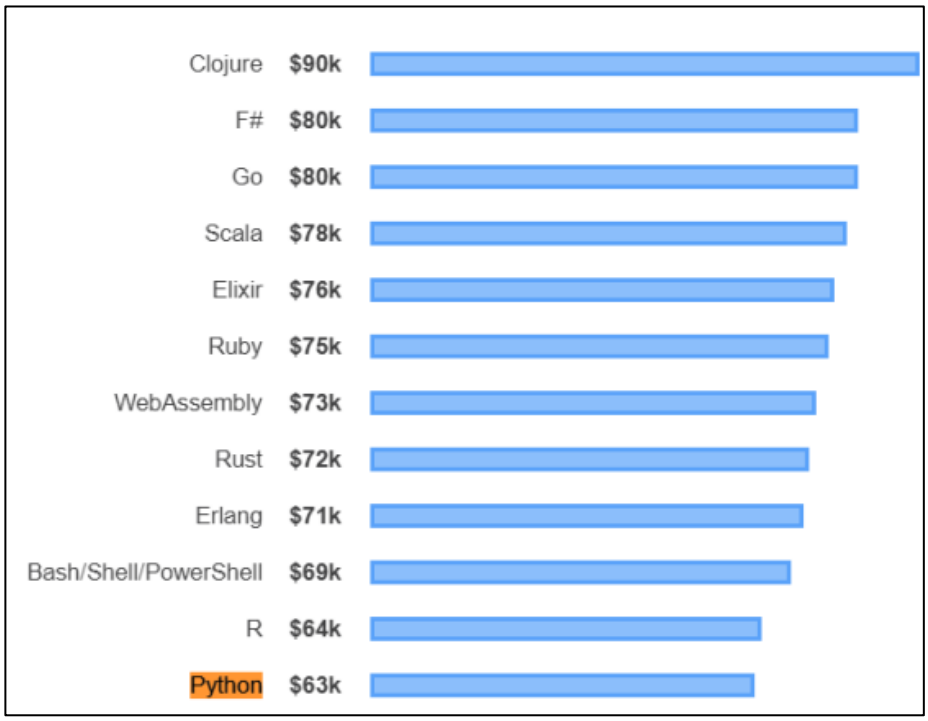

Figure 7: Highest Salary in worldwide

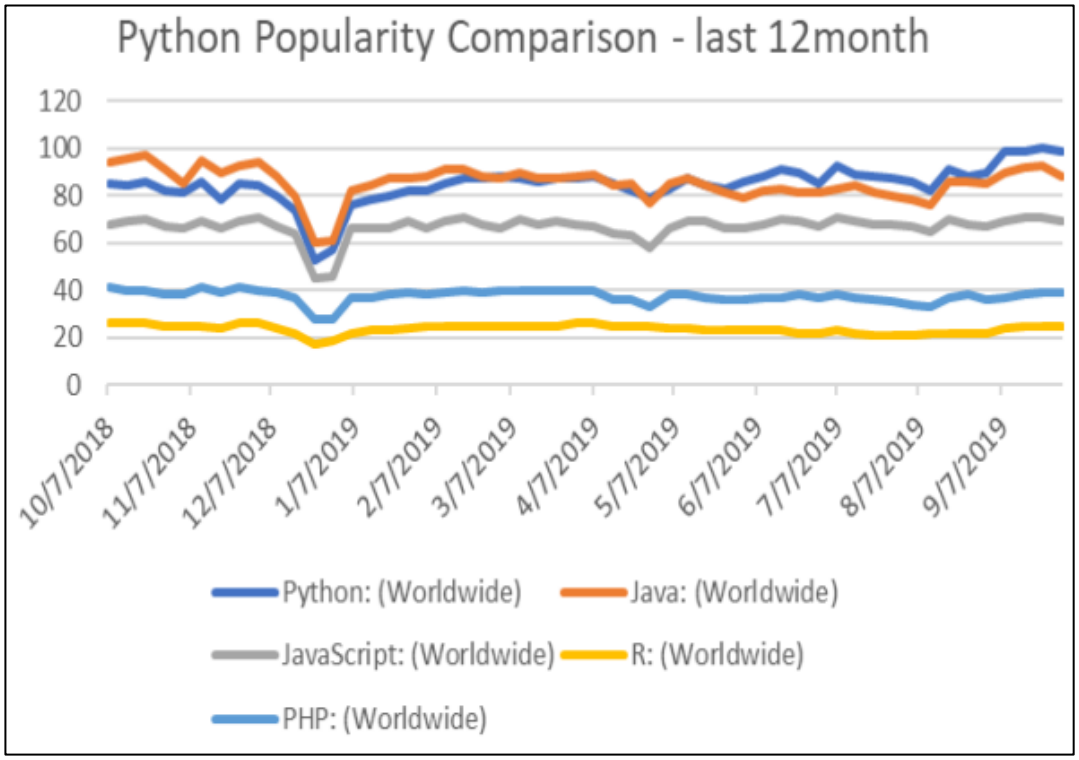

Figure 8: Python Popularity Comparison

Table 1: Advantages and Disadvantages of Python [10]:

Advantages of python	Disadvantages of python
Easy to read, learn and write	Slow Speed
Interpreted Language	Weak in mobile computing
Improve Productivity	Run-time Errors
Free and Open-source	Database Access
Extensive Support Libraries	Not Memory Efficient

Conclusion:

Python is a great option for programmers because of its ease of use, adaptability, and large library. Python is widely used by a variety of industries, including IT, finance, and healthcare, for scientific research, data analysis, and machine learning. Python's abundance of libraries and frameworks makes it more efficient and versatile than other programming languages like Java or C++, and its flexibility and ease of use make it suited for a wide range of applications. Based on these features, we discovered that Python is an open-source, quick, strong, portable, and easy language that works with a variety of other technologies.

References:

1. TIOBE Software Index (2011). "TIOBE Programming Community Index Python".
2. PYPL Index. (2020). PYPL Popularity of Programming Language. Available at: http://pypl.github.io/PYPL.html
3. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
4. S. P. Ong et al., "Python Materials Genomics (pymatgen): A robust, open-source python library for materials analysis," Comput. Mater. Sci., 2013, doi: 10.1016/j.commatsci.2012.10.028.
5. Hetland, Magnus Lie. Python Algorithms: Mastering Basic Algorithms in the Python Language. New York: Apress, 2010.
6. van Rossum, Guido; Eby, Phillip J. (10 May 2005). "PEP 342 – Coroutines via Enhanced Generators". Python Enhancement Proposals. Python Software Foundation. Archived from the original on 29 May 2020. Retrieved 19 February 2012.
7. "PEP 380". Python.org. Archived from the original on 4 June 2020. Retrieved 3 December 2012.
8. "division". python.org. Archived from the original on 20 July 2006. Retrieved 30 July 2014.
9. "PEP 0465 – A dedicated infix operator for matrix multiplication". python.org. Archived from the original on 4 June 2020. Retrieved 1 January 2016.
10. "Python 3.5.1 Release and Changelog". python.org. Archived from the original on 14 May 2020. Retrieved 1 January 2016.