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Article



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PYTHON PROGRAMMING LANGUAGE: FORMATION, OPPORTUNITIES AND DEVELOPMENT PROSPECTS

Abstract: It is impossible to imagine the operation of any electronic computer without software. Any program is created using special development tools and written using a specific programming language. Recently, the Python programming language has gained great popularity, which has made it one of the most relevant objects for considering the reasons for such high popularity.

Key words: Python programming language, Python language development, Python language applications.

Language: English

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Introduction

The main function of a programming language is to transfer information to an electronic device – what actions it will have to perform when an event occurs. Through the language and its constructions, the final functionality of the software is defined. Currently, there are about 9,000 development languages in the world, but recently the Python programming language has been widely known, which has actually been known for a long time, but it has gained great popularity recently.

This programming language is known for being used in various fields of development. It is used to create websites, write various kinds of software, and perform data analysis tasks. It is a general-purpose language, and therefore can be used to implement programs with fairly extensive functionality. Versatility combined with ease of development made this programming language one of the most popular at the current time [1].

The history of the Python language dates back to 1991. Its creator is Guido van Rossum, a programmer from the Netherlands, for whom the creation of this object-oriented programming language was a kind of hobby. The name Python was taken from the name of the television show "Monty Python's Flying Circus", and has nothing to do with snakes and other reptiles. This was the first version of Python, which had a large number of useful features, such as various data types, as well as error handling functions.

In 1994, version 1.0 was released, and it added functions for simple processing of data lists, including matching, filtering, and reduction.

On October 16, 2000, version 2.0 was released, which supports Unicode characters, a simplified method of looping through the list, and a large number of useful functions for programmers.

On December 3, 2008, Python 3.0 was released, which includes printing functionality, additional support for number division and error handling [2].

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This development language is based on borrowings from many different languages, such as ABC, Modula-3, C, C++, Algol-68, SmallTalk, the Unix shell, and other scripting languages.

The language falls under the Copyright Protection Act, and is distributed under the GNU General Public License. The support is provided by the non-profit organization Python Software Foundation, which was established on March 6, 2001 [3]. In fact, this is a small group of developers operating in the format of a free association, in which each participant can contribute their own achievements to the development of the language. This organization consists of a large number of developers from large organizations working in the field of creating programs and writing program code, who constantly participate in solving various tasks and are well aware of what they will ultimately need in order to successfully and effectively solve these tasks [4].

It is important to note the fact that at the moment Python is not only a programming language, it is simply a large set of development tools combined within a single ecosystem. Many large corporations use Python when writing their own software products or when creating various services, but they do not have the rights to the source code of the development language. For this reason, anyone can use Python for their own purposes, regardless of whether they are personal or commercial.

This language has many advantages. One of them is cross-platform - software products written in Python can be run on any operating system, be it Windows, macOS or Linux [5].

The code of programs that were written using Python is structured and can be easily read and disassembled down to individual structural elements. This fact makes it easy for even novice developers to learn this language. This is despite the fact that the language has huge capabilities and has been used to write quite complex web platforms, as well as highly loaded applications.

Python supports the paradigms of object-oriented programming, imperative programming, and dynamic typing, which makes it popular among developers who actively use the rapid application development model (RAD model).

As noted earlier, Python can be used when developing a website, or when writing software, when solving data analysis and visualization tasks. However, its ease of study has made it a universal tool for non-professional developers, such as accountants or researchers, who easily use it to solve various everyday tasks, such as organizing finance [6].

For the reason described above, this programming language is actively used in modern scientific circles, as it makes it easy to organize complex statistical calculations, analyze and visualize data, and generate machine learning algorithms.

Researchers can easily build a large number of different data visualization options, which include various kinds of charts, histograms, and graphs generated in both two-dimensional and three-dimensional versions. And the processes of data processing or implementing machine learning algorithms have long been simplified due to the developed libraries, the vivid examples of which are the TensorFlow and Keras libraries.

In addition to working with data, Python has increasingly been used in the development of websites or software products hosted on the server side of the system. In this case, the functionality implemented with its help is data exchange between the server and the client, data processing, database interaction, addressing routes, and ensuring security when working with a web application or website. There are several frameworks for web development using this programming language, the most famous of which are Django and Flask.

Python can also be used to write various kinds of scripts that automate certain repetitive tasks. For example, if you need to set up uploading content to a website, rename a set of files, perform simple calculations, or search for duplicate data, you can use self-written scripts that will automatically perform these tasks [7].

Python can also be useful in the process of software development. For example, it can be used when organizing assembly control, tracking errors that occur, or when performing software testing. All this, combined with writing various scripts, significantly simplifies the process of writing a software product and improves the quality of the program code. A number of existing tools written in Python for software testing include Green and Requestium.

The Python programming language community often expresses the opinion that this language can be used not only by developers or data analysts. It can be applied by any computer user to simplify everyday tasks performed using a personal computer. For example, you can automatically track stock exchanges and stock prices, rename a large number of files, convert text files to spreadsheet format, automatically fill out forms on websites without providing your personal data to any services, etc. In other words, the range of use of this language is quite extensive, which makes it so popular [8].

One of the most important advantages of this programming language is called interpretability, that is, the written program code does not require compilation and can be run immediately. This program code can be run on any personal computer, since interpreters of this programming language are available for any operating systems. However, this causes a disadvantage related to the speed of software startup, unlike interpreted languages, in which the application is compiled before launching.

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Due to interpretability, developers can more easily perform testing operations and move small amounts of software code between platforms. Due to the compatibility for most modern operating systems, Python is actually a universal development language. The simplicity of writing program code and the ease of reading it makes this language easy to learn, allowing the programmer to focus on the ultimate goal that he seeks to achieve when writing a program and not be distracted by analyzing specific steps and procedures and how he should implement them. It is for this reason that writing a script using this programming language is much easier and faster than in other scripting languages [9].

The peculiarity of the Python development language is that it has similarities to natural English, which makes it much easier to learn and master, unlike other programming languages. This similarity makes it easier to memorize its syntax and read the code when studying it.

Both when writing small scripts and when implementing large commercial projects, the Python programming language allows the developer to focus only on the implemented functionality, without being distracted by many small tasks. And the reliability of this programming language only increases its popularity [10].

Summarizing the factors that most often determine the choice of the Python programming language, these include its flexibility and compliance with the object-oriented programming paradigm.

Python, like any programming language, has both advantages and disadvantages. The advantages include:

- ease of learning – this advantage can be attributed to the fact that Python is quite clear, logical and readable. It is not characterized by complex syntax or difficult-to-remember rules, and English language skills are sufficient to master it;
- high demand for the language and developers who write in it. This is due to the widespread use of this language and the possibility of its application in various fields.;

- the use of Python in areas such as artificial intelligence and machine learning technologies. It allows you to perform calculations of any level of complexity, and also has a large number of ready-made libraries for solving these problems.;

- another advantage of this language is the cross-platform nature of the implemented software – written programs can be run not only under different operating systems, but also on various platforms, both on a personal computer and on mobile platforms.;

- the language is open source, available for download on the official website, and anyone can add something new to its functionality, if necessary.

The disadvantages of this programming language include:

- slow operation – this development language is not suitable for implementing high-performance software code;

- the minimum number of processor time optimizations provided, which is due to the special memory model of this programming language.

The presented disadvantages are interrelated and consist in the features of this programming language, and in fact, upgrading or changing the memory model will eliminate both disadvantages.

Despite these shortcomings, according to TIOBE statistics, Python received the title of "Programming Language of the Year TIOBE 2024". Python gained a whopping 9.3% in 2024. This is much more than its competitors: Java +2.3%, JavaScript +1.4% and Go +1.2%. Taking into account the objective assessment of this rating, based on the results of research in 25 search engines, it follows that the question of Python's popularity is fully justified. And the popularity of this language is the result of its rather long-term improvement by the Python Software Foundation community, as a result of which it has become a universal development language, received a large number of frameworks, has a friendly development environment and many detailed guides for novice developers.

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