

## **PROGRAMMING LANGUAGES AND THEIR POPULARITY WITH USERS**

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Analyzing the results of the annual survey on programming languages of IT specialists from Ukraine (8250 questionnaires), one can trace preferences. The most popular is still JavaScript, TypeScript is the language of the year in terms of growth rate, Python is in third place in popularity, and Rust is a favorite, but still not widespread (Рейтинг, 2024).

Python is one of the most popular programming languages, especially in the fields of machine learning, data processing, web development and automation. Its main advantage is the ease of studying and readability of the code, as well as the presence of a huge standard library. Python is suitable for scientific and mathematical problems, as well as for the development of artificial intelligence. At the same time, its disadvantage is relatively slow performance compared to compiled C++ or Java languages, as well as limited performance in multithreaded applications via Global Interpreter Lock (GIL). Python is not ideal for developing mobile applications or systems that require high performance.

JavaScript is a language without which it is impossible to imagine modern web

development. It is used to create interactive elements on sites, and it works directly in the browser without additional tools. JavaScript has a huge ecosystem of libraries and frameworks such as React, Angular and Vue.js. In addition to the front-end, it can also be used on the server via Node.js. However, dynamic typing of JavaScript often leads to unpredictable errors, and working on large projects can be difficult without TypeScript. The prevalence of language makes it vulnerable to attacks (Спажев, 2020).

Java is another very popular language that is often used in the corporate environment and for developing Android applications. Its main advantage is platform independence thanks to JVM (Java Virtual Machine). In addition, Java is well suited for large systems due to its highly typed object-oriented model and high performance. However, you need to write a lot of code to perform simple tasks. In addition, launching Java applications may take longer through JVM.

C++ is a language used for system programming, video game development, and high-performance applications. Its main advantage is the ability to control resources and work at a low level with the hardware. This makes C++ an excellent choice for situations where maximum performance is required. However, the language is quite difficult to learn and has a high risk of errors due to manual memory management. In addition, compiled C++ code is less portable between platforms.

C # is a programming language that is often used in game development through Unity, as well as for creating applications on the .NET platform. It is relatively easy to learn, especially if you are already familiar with other languages of the C family. C # supports modern programming concepts and works well with multithreading. However, development in C # is often tied to the Microsoft ecosystem, which may be a limitation for some developers (Спажев, 2020).

Go (Golang) is a young programming language that is becoming increasingly popular in the field of cloud technologies and system programming. Its main advantages are ease of syntax, high performance and built-in competitiveness support. Go compiles directly into machine code, which simplifies the deployment of applications. However, due to the young age of the language, its ecosystem is not yet

as developed as that of older languages, and it does not support all the features of object-oriented programming (Рибачок, 2024).

Ruby is the language best known for the Ruby on Rails framework used for web development. Ruby features simple and elegant syntax, as well as a wide selection of libraries for web development. However, its performance is lower compared to compiled languages, and it is less common outside of web development (Рейтинг, 2024).

Swift is the main language for developing applications for iOS and macOS. Swift is distinguished by speed of execution, modern syntax and strong typing, which protects against many errors. However, its use is limited mainly to the Apple ecosystem, it is also a relatively young language and may have problems with some libraries and tools.

Analyzing the popularity of programming languages, it can be noted that each language has its disadvantages and advantages, its areas of application as the most productive for solving a particular problem. Each language is unique and designed to solve a variety of problems. The choice of a particular language depends on what task the programmer faces.

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