

## DEVELOPMENT TENDENCIES AND CLASSIFICATION OF PROGRAMMING LANGUAGES TAUGHT IN HIGH SCHOOLS

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### ANNOTATION

The article analyzes the development trends of programming languages in general secondary schools and their principles of operation.

**Keywords:** Programming language, Delphi, Pascal, Java, C++, Scratch.

Differentiated (differentiated) education is an effective teaching strategy adapted to different learning styles of educational content and processes in each class.

Normal spoken language consists of four basic elements: signs, words, phrases, and sentences.

A programming language contains similar elements, only words are called elementary constructions, expressions, sentences - operators.

A programming language is a formal notation system, a language for writing computer programs.

Any programming language consists of a set of rules:

- Characters (letters, numbers, special characters, etc.) specified for a specific language that can be used when writing an alphabetic program.
- Syntax - the rules for constructing special constructions from alphabet symbols, with the help of which an algorithm is created.
- System of rules for interpretation of semantic-language structures.

Any computer program is implemented using alphabetic characters using syntactic and semantic rules.

The programs for the first EHM were written by programmers in machine code language. It was a very difficult and time-consuming process. It used to be a long time between starting to build a program and trying to use it. Solving such problems could be done only by developing and optimizing the programming process.

Delphi is based on the Pascal programming language, which proves to be the most versatile and easy-to-learn language. At the same time, it is convenient to use when creating complex applications, including working with the Internet, databases and enterprise applications.

With the advent of the Delphi environment, it introduced visual user interface design, developed the object-oriented language Object Pascal (later renamed Delphi), and had database access tools that were unique in their simplicity and power. . The Delphi language has significantly surpassed Basic and even C++ in terms of its capabilities, but at the same time it has turned out to be very reliable and easy to learn (especially compared to C++). As a result, the Delphi environment made it easier for developers to create their own components and create

professional applications from them. The Delphi environment has become, in fact, the best programming tool for the Windows operating system.

Delphi is a visual development environment based on the Object Pascal language. Object Pascal is the "big brother" of the classical Pascal language. One of the brightest and most powerful versions was Delphi 7 from Borland. It's great for learning, but it can't be used to create mobile apps. Modern versions of Delphi generation XE not only have an improved development environment in terms of convenience, but also a significantly improved Object Pascal language, which allows you to create applications for Microsoft Windows, Mac OS, iOS and Android.

DELPHI is an environment for "quick writing" of applications, a strongly typed and object-oriented DELPHI language based on Object Pascal as a programming language.

DELPHI programming language is developed and distributed in two variants: Delphi Client-Server and Delphi for Windows.

In 1991, Visual Basic's syntax was similar to that of Basic, making the code very difficult to read when programmed incorrectly.

Microsoft Visual Basic is a software development tool developed by Microsoft that includes a programming language and development environment. Visual Basic inherits the spirit, style, and partly the syntax of its ancestor BASIC, which has many dialects. At the same time, Visual Basic combines the procedures and elements of object-oriented and component-oriented programming languages. The Visual Basic development environment includes tools for visually designing user interfaces.

This language is very tied to its development environment and the Windows operating system, and is a tool for writing Windows-only applications.

The Visual Basic programming language has hundreds of commands, functions, and special symbols. It is not only intended for use in Visual Basic software, but Microsoft Visual Basic for Application is included in Microsoft Excel, Microsoft Word, Microsoft Access, Microsoft PowerPoint, Microsoft Project, and other Windows applications.

C# is an object-oriented programming language with static data typing. Its syntax is close to Java and C++. The language has a very large standard library, as well as additional libraries that are freely available. The main disadvantage of the C# programming language is that it is aimed at the Windows operating system. But even though there are suitable tools for writing programs, they are very difficult to master. C# is suitable for learning in specialized classes, but due to the transition of educational institutions to the native operating system, this becomes impossible. The C# language implements the positive aspects of the previous languages C, C++, Java. The syntax of the C# language adopted the basis of the syntax of C++. The main architect of the language is Anders Hejlsberg, who is also the author of Turbo Pascal, Delphi, TypeScript. This language offered richer language features and mechanisms than Java. In addition, new elements have been introduced here, in particular properties, modifiers used in function parameters, indexers, etc.

Scratch was created in 2007 by University of Massachusetts professor Mitchell Resnick and Alan Key, and is currently being studied as an educational GUI programming environment. Scratch is based on Logo and Squeak, a graphical programming language that allows you to control interactions and actions between different types of values. Scratch is an educational programming language with a pure graphical interface. This language was created as a tool to

make programming simple and intuitive. The goal is to enable children with no programming experience to learn the basic principles of imperative, object-oriented, and multithreaded programming. Lego blocks are used in many cases during the organization of the educational process, because of the construction of simple constructions according to the scheme and the convenient interface, it is possible to teach the elements of programming languages -even in elementary schools. The Scratch language was invented specifically to teach programming to children. This is a kind of virtual constructor, in which the child creates real programs! It does not require any special skills and abilities: you only need a simple computer and access to the Internet. It doesn't matter if you don't have constant access to the Internet: the program can be downloaded to your computer and used without network access. Interesting projects, bright illustrations, clear instructions - thanks to all this, you can easily understand the basics of programming, understand computer logic, which will allow you to easily switch to programming in more complex languages -in the future. This program is available for free in three versions: for Mac OS, Windows and Linux.

Currently, the number of programming languages is more than two and a half thousand, and this number is increasing every year. Z.S. Seydametov and V.A. The most popular languages today are Python, Java, C ++, C #, PHP, and JavaScript based on the TIOBE index, which determines the frequency of requests and the survey conducted by Temnenko on the choice of programming language.

Research on the popularity of programming languages is done not only by the frequency of requests or their opinions on the network, but also there are ratings based on expert evaluations. Such rankings include, for example, the ranking of programming languages from the DOU Developers Association. The most popular languages chosen by experts are Python, Java, C#, JavaScript, PHP, C++, Ruby, Objective-C.

The capabilities of programming languages, programming system, and ease of learning for teaching the Department of Informatics and Information Technology in general secondary schools were comparatively studied and analyzed (Table 1).

Dastur nomi	Operating system	Programming system	Opportunities
<b>Java</b>	Windows, Linux, Mac OS	A high-level programming language	creating websites, OS software, mobile applications, games
<b>C++</b>	Windows, Linux,	A high-level programming language	Applications, games, mathematical calculations, creation of neural networks
<b>C#</b>	Windows, Linux, Mac OS	A high-level programming language	Build apps, games and websites
<b>Borland Delphi</b>	Windows, Linux	A high-level programming language	Web programming, working with databases, object-oriented programs
<b>Python</b>	Windows, Linux, Mac OS X, FreeBSD, Android, iOS and others	A high-level programming language	Creating applications, games and websites, mathematical calculations, neural networks, system software, operating systems, artificial intelligence

Based on the conducted analysis, the ranking of programming languages and the comparative analysis of their capabilities, it can be said that today, in the lower grades of secondary schools,

Scratch is used as a modern visual programming language in the lower grades, and in the upper grades, the Python programming language with wide opportunities is used as the main programming language. training is of great importance in the development of skilled, mature personnel in programming in our country.

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