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PROGRAMMING METHODS AND TECHNIQUES

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Currently, hundreds of thousands of different computer application programs have been developed and used for various applications. The most widely used programs are:

preparation of texts (documents) on the computer − text editors;
preparation of documents of printing quality − publishing systems;
tabular data processing − tabular processors;
processing arrays of information − database management systems.

The application program is any specific program that contributes to the solution of any problem within this problem area. For example, where the computer is entrusted with the task of monitoring the financial activities of any firm, a program for preparing payment information will be applicable. Application programs can also have a general nature, for example, to provide drafting and printing of documents, etc. Application programs can be used either autonomously, i.e. to solve the task independently of other programs, or it can be used as a part of software complexes or packages. It should be noted that software, including application software, is developed using special tools - programming languages by specialists in this field.

Solving any computer task is a process of processing data using a program. The creation of such a program involves the implementation of a number of successive stages:

formulation of the problem;
mathematical description and method selection;
development of a solution algorithm;
programming;
program testing and debugging;
operation of the program.

The first stage is setting the task. At this stage the following actions must be done: the purpose of the task is formulated; the relationship with other tasks is determined; the composition and form of presentation of input, intermediate and result information is disclosed; the forms and methods of information

control at the key stages of solving the problem are characterized; the forms of user interaction are done with the computer during problem solving.

At the second stage of program development, a formalized description of the program is performed, i.e., the means of the language of mathematics are established and the logical-mathematical dependencies between the initial and the resulting data are established and formulated. It is necessary to choose a numerical method of solution for tasks that allow the possibility of mathematical description and a schematic diagram of the solution in the form of a clearly understood sequence of elementary mathematical and logical operations for non-numerical tasks.

The third stage of preparing the solution of the task is the algorithmization of its solution, that is, the development of an original algorithm or adaptation of a known algorithm. Algorithmization is a complex process that is largely creative in nature. Setting the problem and its algorithmization make up to 20-30% of the total time for program development. The complexity and responsibility of implementing this stage is explained by the fact that, as a rule, there are many different algorithms to solve the same problem.

An algorithm is a precise prescription that defines a computational process that leads from varying initial data to a desired result. This is a finite set of rules that unambiguously reveal the content and sequence of operations for systematically solving a certain class of tasks in a finite number of steps.

The fourth stage is the compilation of the program. At this stage, the algorithm description is translated into one of the description languages available for computers.

Testing and debugging make up the final stage of developing a program for solving a problem on a computer. Both of these processes are functionally related, although their goals are somewhat different from each other.

Testing is a set of actions designed to demonstrate the correct operation of the program. The purpose of testing is to identify possible errors in developed programs by checking them on a set of pre-prepared control examples.

The testing process is accompanied by a debugging process, which involves a set of actions aimed at eliminating errors in the program. Debugging actions begin from the moment of detection of the erroneous operation facts of the program and end with the elimination of the causes that generate errors.

After the testing and debugging processes are completed, the software, together with the accompanying documentation, is handed over to the user for operation. The main purpose of the accompanying documentation is to provide the user with the necessary instructional materials for working with the program.

References

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