

Expert programmers are familiar with a variety of well-established algorithms and their respective complexities and use this knowledge to choose algorithms that are best suited to the circumstances. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. Many applications use a mix of several languages in their construction and use. Whatever the approach to development may be, the final program must satisfy some fundamental properties. Allen Downey, in his book *How To Think Like A Computer Scientist*, writes: Many computer languages provide a mechanism to call functions provided by shared libraries. Many programmers use forms of Agile software development where the various stages of formal software development are more integrated together into short cycles that take a few weeks rather than years. For this purpose, algorithms are classified into orders using so-called Big O notation, which expresses resource use, such as execution time or memory consumption, in terms of the size of an input. Following a consistent programming style often helps readability. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. It is usually easier to code in "high-level" languages than in "low-level" ones. However, readability is more than just programming style. Also, specific user environment and usage history can make it difficult to reproduce the problem. Ideally, the programming language best suited for the task at hand will be selected. New languages are generally designed around the syntax of a prior language with new functionality added, (for example C++ adds object-orientation to C, and Java adds memory management and bytecode to C++, but as a result, loses efficiency and the ability for low-level manipulation). Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. It is usually easier to code in "high-level" languages than in "low-level" ones. Some of these factors include: The presentation aspects of this (such as indents, line breaks, color highlighting, and so on) are often handled by the source code editor, but the content aspects reflect the programmer's talent and skills. Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). Scripting and breakpointing is also part of this process. Trade-offs from this ideal involve finding enough programmers who know the language to build a team, the availability of compilers for that language, and the efficiency with which programs written in a given language execute. Languages form an approximate spectrum from "low-level" to "high-level"; "low-level" languages are typically more machine-oriented and faster to execute, whereas "high-level" languages are more abstract and easier to use but execute less quickly. In 1206, the Arab engineer Al-Jazari invented a programmable drum machine where a musical mechanical automaton could be made to play different rhythms and drum patterns, via pegs and cams. Some languages are more prone to some kinds of faults because their specification does not require compilers to perform as much checking as other languages. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware.