

Programming languages are essential for software development. 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. 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 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. Unreadable code often leads to bugs, inefficiencies, and duplicated code. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. Readability is important because programmers spend the majority of their time reading, trying to understand, reusing and modifying existing source code, rather than writing new source code. Their jobs usually involve: Although programming has been presented in the media as a somewhat mathematical subject, some research shows that good programmers have strong skills in natural human languages, and that learning to code is similar to learning a foreign language. However, because an assembly language is little more than a different notation for a machine language, two machines with different instruction sets also have different assembly languages. 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. Code-breaking algorithms have also existed for centuries. Computer programmers are those who write computer software. 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). Scripting and breakpointing is also part of this process. These compiled languages allow the programmer to write programs in terms that are syntactically richer, and more capable of abstracting the code, making it easy to target varying machine instruction sets via compilation declarations and heuristics. Various visual programming languages have also been developed with the intent to resolve readability concerns by adopting non-traditional approaches to code structure and display. It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. 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. Normally the first step in debugging is to attempt to reproduce the problem. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware.