

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. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. However, with the concept of the stored-program computer introduced in 1949, both programs and data were stored and manipulated in the same way in computer memory. It affects the aspects of quality above, including portability, usability and most importantly maintainability. However, Charles Babbage had already written his first program for the Analytical Engine in 1837.

Trial-and-error/divide-and-conquer is needed: the programmer will try to remove some parts of the original test case and check if the problem still exists. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. 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. 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. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware. 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. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. Programmable devices have existed for centuries. 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, readability is more than just programming style. Programs were mostly entered using punched cards or paper tape. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Different programming languages support different styles of programming (called programming paradigms). By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers.