

Integrated development environments (IDEs) aim to integrate all such help. Programs were mostly entered using punched cards or paper tape. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. There exist a lot of different approaches for each of those tasks. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. 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. The first computer program is generally dated to 1843, when mathematician Ada Lovelace published an algorithm to calculate a sequence of Bernoulli numbers, intended to be carried out by Charles Babbage's Analytical Engine. Following a consistent programming style often helps readability. It affects the aspects of quality above, including portability, usability and most importantly maintainability. However, readability is more than just programming style. The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination (debugging). 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. 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. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Auxiliary tasks accompanying and related to programming include analyzing requirements, testing, debugging (investigating and fixing problems), implementation of build systems, and management of derived artifacts, such as programs' machine code. Assembly languages were soon developed that let the programmer specify instruction in a text format (e.g., ADD X, TOTAL), with abbreviations for each operation code and meaningful names for specifying addresses. 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. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. 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. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. 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.