

Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. 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. Proficient programming usually requires expertise in several different subjects, including knowledge of the application domain, details of programming languages and generic code libraries, specialized algorithms, and formal logic. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. 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. It is usually easier to code in "high-level" languages than in "low-level" ones. However, readability is more than just programming style. The following properties are among the most important: In computer programming, readability refers to the ease with which a human reader can comprehend the purpose, control flow, and operation of source code. Scripting and breakpointing is also part of this process. Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. Code-breaking algorithms have also existed for centuries. 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. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. Computer programmers are those who write computer software. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. It is usually easier to code in "high-level" languages than in "low-level" ones. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. There exist a lot of different approaches for each of those tasks. However, readability is more than just programming style. 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. 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. 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 the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages.