

The academic field and the engineering practice of computer programming are both largely concerned with discovering and implementing the most efficient algorithms for a given class of problems. 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. For example, when a bug in a compiler can make it crash when parsing some large source file, a simplification of the test case that results in only few lines from the original source file can be sufficient to reproduce the same crash. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. Ideally, the programming language best suited for the task at hand will be selected. Normally the first step in debugging is to attempt to reproduce the problem. 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. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. It is very difficult to determine what are the most popular modern programming languages. For example, when a bug in a compiler can make it crash when parsing some large source file, a simplification of the test case that results in only few lines from the original source file can be sufficient to reproduce the same crash. Unreadable code often leads to bugs, inefficiencies, and duplicated code. Computer programmers are those who write computer software. 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 involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. Many applications use a mix of several languages in their construction and use. 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. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. There exist a lot of different approaches for each of those tasks. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. Computer programmers are those who write computer software. Many applications use a mix of several languages in their construction and use.