

Sometimes software development is known as software engineering, especially when it employs formal methods or follows an engineering design process. 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. Later a control panel (plug board) added to his 1906 Type I Tabulator allowed it to be programmed for different jobs, and by the late 1940s, unit record equipment such as the IBM 602 and IBM 604, were programmed by control panels in a similar way, as were the first electronic computers. FORTRAN, the first widely used high-level language to have a functional implementation, came out in 1957, and many other languages were soon developed—in particular, COBOL aimed at commercial data processing, and Lisp for computer research. Also, specific user environment and usage history can make it difficult to reproduce the problem. Ideally, the programming language best suited for the task at hand will be selected. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. Integrated development environments (IDEs) aim to integrate all such help. 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. Methods of measuring programming language popularity include: counting the number of job advertisements that mention the language, the number of books sold and courses teaching the language (this overestimates the importance of newer languages), and estimates of the number of existing lines of code written in the language (this underestimates the number of users of business languages such as COBOL). In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. 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. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. Also, specific user environment and usage history can make it difficult to reproduce the problem. A similar technique used for database design is Entity-Relationship Modeling (ER Modeling). Use of a static code analysis tool can help detect some possible problems. One approach popular for requirements analysis is Use Case analysis. Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. There exist a lot of different approaches for each of those tasks. Some languages are very popular for particular kinds of applications, while some languages are regularly used to write many different kinds of applications. 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. Allen Downey, in his book *How To Think Like A Computer Scientist*, writes: Many computer languages provide a mechanism to call functions provided by shared libraries.