

Whatever the approach to development may be, the final program must satisfy some fundamental properties. Different programming languages support different styles of programming (called programming paradigms). 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. 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. There exist a lot of different approaches for each of those tasks. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. It affects the aspects of quality above, including portability, usability and most importantly maintainability. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Debugging is often done with IDEs. Standalone debuggers like GDB are also used, and these often provide less of a visual environment, usually using a command line. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. As early as the 9th century, a programmable music sequencer was invented by the Persian Banu Musa brothers, who described an automated mechanical flute player in the Book of Ingenious Devices. Programmable devices have existed for centuries. One approach popular for requirements analysis is Use Case analysis. 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). 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. Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. 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. 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. However, readability is more than just programming style. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. While these are sometimes considered programming, often the term software development is used for this larger overall process – with the terms programming, implementation, and coding reserved for the writing and editing of code per se. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. Different programming languages support different styles of programming (called programming paradigms). 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.