

Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. 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. Computer programmers are those who write computer software. The first compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Programmers typically use high-level programming languages that are more easily intelligible to humans than machine code, which is directly executed by the central processing unit. Unreadable code often leads to bugs, inefficiencies, and duplicated code. Programs were mostly entered using punched cards or paper tape. 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. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. 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. 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. 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. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. Ideally, the programming language best suited for the task at hand will be selected. 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. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. Programs were mostly entered using punched cards or paper tape. There exist a lot of different approaches for each of those tasks. 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.