

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. 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. Programs were mostly entered using punched cards or paper tape. They are the building blocks for all software, from the simplest applications to the most sophisticated ones. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. Sometimes software development is known as software engineering, especially when it employs formal methods or follows an engineering design process. 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. 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. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. It is usually easier to code in "high-level" languages than in "low-level" ones. Auxiliary tasks accompanying and related to programming include analyzing requirements, testing, debugging (investigating and fixing problems), implementation of build systems, and management of derived artifacts, such as programs' machine code. Unreadable code often leads to bugs, inefficiencies, and duplicated code. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. New languages are generally designed around the syntax of a prior language with new functionality added, (for example C++ adds object-orientation to C, and Java adds memory management and bytecode to C++, but as a result, loses efficiency and the ability for low-level manipulation). It affects the aspects of quality above, including portability, usability and most importantly maintainability. Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. Programs were mostly entered using punched cards or paper tape. Ideally, the programming language best suited for the task at hand will be selected. 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. Unreadable code often leads to bugs, inefficiencies, and duplicated code. 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. 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.