

Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Many applications use a mix of several languages in their construction and use. Following a consistent programming style often helps readability. Unreadable code often leads to bugs, inefficiencies, and duplicated code. Their jobs usually involve: Although programming has been presented in the media as a somewhat mathematical subject, some research shows that good programmers have strong skills in natural human languages, and that learning to code is similar to learning a foreign language. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. However, readability is more than just programming style. Different programming languages support different styles of programming (called programming paradigms). Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). 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. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Code-breaking algorithms have also existed for centuries. Some languages are more prone to some kinds of faults because their specification does not require compilers to perform as much checking as other languages. 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. Provided the functions in a library follow the appropriate run-time conventions (e.g., method of passing arguments), then these functions may be written in any other language. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. 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. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. 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. Proficient programming usually requires expertise in several different subjects, including knowledge of the application domain, details of programming languages and generic code libraries, specialized algorithms, and formal logic. 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. 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.