

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. Programs were mostly entered using punched cards or paper tape. For example, COBOL is still strong in corporate data centers often on large mainframe computers, Fortran in engineering applications, scripting languages in Web development, and C in embedded software. 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. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. 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. 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. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Readability is important because programmers spend the majority of their time reading, trying to understand, reusing and modifying existing source code, rather than writing new source code. In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. Computer programmers are those who write computer software. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Programmable devices have existed for centuries. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. 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. Whatever the approach to development may be, the final program must satisfy some fundamental properties. 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. 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. Ideally, the programming language best suited for the task at hand will be selected. Scripting and breakpointing is also part of this process. Computer programmers are those who write computer software. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Readability is important because programmers spend the majority of their time reading, trying to understand, reusing and modifying existing source code, rather than writing new source code. Programming languages are essential for software development.