

However, Charles Babbage had already written his first program for the Analytical Engine in 1837. 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). 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. Whatever the approach to development may be, the final program must satisfy some fundamental properties. 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. Some languages are very popular for particular kinds of applications, while some languages are regularly used to write many different kinds of applications. 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. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. Different programming languages support different styles of programming (called programming paradigms). Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. 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. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. There are many approaches to the Software development process. 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. Different programming languages support different styles of programming (called programming paradigms). Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. 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. 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. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. Programming languages are essential for software development. It affects the aspects of quality above, including portability, usability and most importantly maintainability. 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. For example, when a bug in a compiler can make it crash when parsing some large source file, a simplification of the test case that results in only few lines from the original source file can be sufficient to reproduce the same crash. 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.