

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). 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. Also, specific user environment and usage history can make it difficult to reproduce the problem. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. 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. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. A similar technique used for database design is Entity-Relationship Modeling (ER Modeling). Following a consistent programming style often helps readability. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Many applications use a mix of several languages in their construction and use. 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. 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. Many programmers use forms of Agile software development where the various stages of formal software development are more integrated together into short cycles that take a few weeks rather than years. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. Unreadable code often leads to bugs, inefficiencies, and duplicated code. 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. Languages form an approximate spectrum from "low-level" to "high-level"; "low-level" languages are typically more machine-oriented and faster to execute, whereas "high-level" languages are more abstract and easier to use but execute less quickly. 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. 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. Ideally, the programming language best suited for the task at hand will be selected. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Programmable devices have existed for centuries.