

In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. 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. 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. 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. 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. 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. 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. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. 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. 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. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Techniques like Code refactoring can enhance readability. Various visual programming languages have also been developed with the intent to resolve readability concerns by adopting non-traditional approaches to code structure and display. Following a consistent programming style often helps readability. Allen Downey, in his book *How To Think Like A Computer Scientist*, writes: Many computer languages provide a mechanism to call functions provided by shared libraries. Trial-and-error/divide-and-conquer is needed: the programmer will try to remove some parts of the original test case and check if the problem still exists. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. 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). The choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages, or individual preference.