

It affects the aspects of quality above, including portability, usability and most importantly maintainability. 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. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Scripting and breakpointing is also part of this process. Also, specific user environment and usage history can make it difficult to reproduce the problem. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in *A Manuscript on Deciphering Cryptographic Messages*. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. 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. In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. However, readability is more than just programming style. One approach popular for requirements analysis is Use Case analysis. Programmable devices have existed for centuries. Expert programmers are familiar with a variety of well-established algorithms and their respective complexities and use this knowledge to choose algorithms that are best suited to the circumstances. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware. Assembly languages were soon developed that let the programmer specify instruction in a text format (e.g., ADD X, TOTAL), with abbreviations for each operation code and meaningful names for specifying addresses. However, readability is more than just programming style. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. 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. Sometimes software development is known as software engineering, especially when it employs formal methods or follows an engineering design process. 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. 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). Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Scripting and breakpointing is also part of this process. Unreadable code often leads to bugs, inefficiencies, and duplicated code. Scripting and breakpointing is also part of this process.