

Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. For this purpose, algorithms are classified into orders using so-called Big O notation, which expresses resource use, such as execution time or memory consumption, in terms of the size of an input. Some of these factors include: The presentation aspects of this (such as indents, line breaks, color highlighting, and so on) are often handled by the source code editor, but the content aspects reflect the programmer's talent and skills. It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. 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. 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. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination (debugging). 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 applications use a mix of several languages in their construction and use. It affects the aspects of quality above, including portability, usability and most importantly maintainability. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. 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. Scripting and breakpointing is also part of this process. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware. 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. Scripting and breakpointing is also part of this process. Later a control panel (plug board) added to his 1906 Type I Tabulator allowed it to be programmed for different jobs, and by the late 1940s, unit record equipment such as the IBM 602 and IBM 604, were programmed by control panels in a similar way, as were the first electronic computers. 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. Also, specific user environment and usage history can make it difficult to reproduce the problem. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Integrated development environments (IDEs) aim to integrate all such help. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. 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. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware.