

In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. Many applications use a mix of several languages in their construction and use. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Use of a static code analysis tool can help detect some possible problems. 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. Techniques like Code refactoring can enhance readability. Many applications use a mix of several languages in their construction and use. Programs were mostly entered using punched cards or paper tape. 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. 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). However, with the concept of the stored-program computer introduced in 1949, both programs and data were stored and manipulated in the same way in computer memory. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. Code-breaking algorithms have also existed for centuries. Also, specific user environment and usage history can make it difficult to reproduce the problem. 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. Whatever the approach to development may be, the final program must satisfy some fundamental properties. 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). Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. 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). Normally the first step in debugging is to attempt to reproduce the problem.