

Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. 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. The academic field and the engineering practice of computer programming are both largely concerned with discovering and implementing the most efficient algorithms for a given class of problems. Ideally, the programming language best suited for the task at hand will be selected. 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. Programmers typically use high-level programming languages that are more easily intelligible to humans than machine code, which is directly executed by the central processing unit. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. FORTRAN, the first widely used high-level language to have a functional implementation, came out in 1957, and many other languages were soon developed—in particular, COBOL aimed at commercial data processing, and Lisp for computer research. 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. 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. 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. 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. There exist a lot of different approaches for each of those tasks. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Programming languages are essential for software development. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. 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. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Code-breaking algorithms have also existed for centuries. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA.