

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. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware. 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. 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. While these are sometimes considered programming, often the term software development is used for this larger overall process – with the terms programming, implementation, and coding reserved for the writing and editing of code per se. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in *A Manuscript on Deciphering Cryptographic Messages*. Methods of measuring programming language popularity include: counting the number of job advertisements that mention the language, the number of books sold and courses teaching the language (this overestimates the importance of newer languages), and estimates of the number of existing lines of code written in the language (this underestimates the number of users of business languages such as COBOL). It affects the aspects of quality above, including portability, usability and most importantly maintainability. When debugging the problem in a GUI, the programmer can try to skip some user interaction from the original problem description and check if remaining actions are sufficient for bugs to appear. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Different programming languages support different styles of programming (called programming paradigms). Programs were mostly entered using punched cards or paper tape. For example, COBOL is still strong in corporate data centers often on large mainframe computers, Fortran in engineering applications, scripting languages in Web development, and C in embedded software. Their jobs usually involve: Although programming has been presented in the media as a somewhat mathematical subject, some research shows that good programmers have strong skills in natural human languages, and that learning to code is similar to learning a foreign language. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. However, readability is more than just programming style. 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. 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. 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. 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.