

Unreadable code often leads to bugs, inefficiencies, and duplicated code. 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). In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in *A Manuscript on Deciphering Cryptographic Messages*. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. 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. 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. In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. Auxiliary tasks accompanying and related to programming include analyzing requirements, testing, debugging (investigating and fixing problems), implementation of build systems, and management of derived artifacts, such as programs' machine code. Ideally, the programming language best suited for the task at hand will be selected. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. 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. Some languages are very popular for particular kinds of applications, while some languages are regularly used to write many different kinds of applications. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. 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. 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. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. 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. It affects the aspects of quality above, including portability, usability and most importantly maintainability. It is usually easier to code in "high-level" languages than in "low-level" ones. Different programming languages support different styles of programming (called programming paradigms).