

He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. Code-breaking algorithms have also existed for centuries. Trade-offs from this ideal involve finding enough programmers who know the language to build a team, the availability of compilers for that language, and the efficiency with which programs written in a given language execute. Whatever the approach to development may be, the final program must satisfy some fundamental properties. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. Computer programmers are those who write computer software. As early as the 9th century, a programmable music sequencer was invented by the Persian Banu Musa brothers, who described an automated mechanical flute player in the Book of Ingenious Devices. 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 Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Programming languages are essential for software development. 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. Whatever the approach to development may be, the final program must satisfy some fundamental properties. It affects the aspects of quality above, including portability, usability and most importantly maintainability. 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. The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination (debugging). Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. 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. Integrated development environments (IDEs) aim to integrate all such help. 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. 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. Also, specific user environment and usage history can make it difficult to reproduce the problem. Some languages are very popular for particular kinds of applications, while some languages are regularly used to write many different kinds of applications.