

In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. 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. 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. They are the building blocks for all software, from the simplest applications to the most sophisticated ones. Integrated development environments (IDEs) aim to integrate all such help. However, because an assembly language is little more than a different notation for a machine language, two machines with different instruction sets also have different assembly languages. 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. The first compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. It is very difficult to determine what are the most popular modern programming languages. 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. 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. One approach popular for requirements analysis is Use Case analysis. Various visual programming languages have also been developed with the intent to resolve readability concerns by adopting non-traditional approaches to code structure and display. Trial-and-error/divide-and-conquer is needed: the programmer will try to remove some parts of the original test case and check if the problem still exists. Normally the first step in debugging is to attempt to reproduce the problem. For example, when a bug in a compiler can make it crash when parsing some large source file, a simplification of the test case that results in only few lines from the original source file can be sufficient to reproduce the same crash. Ideally, the programming language best suited for the task at hand will be selected. The first compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. 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. Computer programmers are those who write computer software. High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware.