

In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. Whatever the approach to development may be, the final program must satisfy some fundamental properties. He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Programs were mostly entered using punched cards or paper tape. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. 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. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. 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. 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. 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. 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. The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination (debugging). Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. 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. They are the building blocks for all software, from the simplest applications to the most sophisticated ones. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. However, readability is more than just programming style. 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. 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.