

Also, specific user environment and usage history can make it difficult to reproduce the problem. 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. One approach popular for requirements analysis is Use Case analysis. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. Normally the first step in debugging is to attempt to reproduce the problem. Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm. One approach popular for requirements analysis is Use Case analysis. Following a consistent programming style often helps readability. 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. 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). Proficient programming usually requires expertise in several different subjects, including knowledge of the application domain, details of programming languages and generic code libraries, specialized algorithms, and formal logic. The academic field and the engineering practice of computer programming are both largely concerned with discovering and implementing the most efficient algorithms for a given class of problems. The academic field and the engineering practice of computer programming are both largely concerned with discovering and implementing the most efficient algorithms for a given class of problems. 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. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. 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. The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination (debugging). The first computer program is generally dated to 1843, when mathematician Ada Lovelace published an algorithm to calculate a sequence of Bernoulli numbers, intended to be carried out by Charles Babbage's Analytical Engine. It is usually easier to code in "high-level" languages than in "low-level" ones. There are many approaches to the Software development process. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. 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. Proficient programming usually requires expertise in several different subjects, including knowledge of the application domain, details of programming languages and generic code libraries, specialized algorithms, and formal logic. Normally the first step in debugging is to attempt to reproduce the problem.