

One approach popular for requirements analysis is Use Case analysis. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. Normally the first step in debugging is to attempt to reproduce the problem. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Debugging is often done with IDEs. Standalone debuggers like GDB are also used, and these often provide less of a visual environment, usually using a command line. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Use of a static code analysis tool can help detect some possible problems. Readability is important because programmers spend the majority of their time reading, trying to understand, reusing and modifying existing source code, rather than writing new source code. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. 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. 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. Also, specific user environment and usage history can make it difficult to reproduce the problem. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. Debugging is often done with IDEs. Standalone debuggers like GDB are also used, and these often provide less of a visual environment, usually using a command line. The following properties are among the most important: In computer programming, readability refers to the ease with which a human reader can comprehend the purpose, control flow, and operation of source code. 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. Following a consistent programming style often helps readability. 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). Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. 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. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. 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. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages.