

Normally the first step in debugging is to attempt to reproduce the problem. Use of a static code analysis tool can help detect some possible problems. 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. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. 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. 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). 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. However, readability is more than just programming style. 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. Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. Scripting and breakpointing is also part of this process. 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. For example, COBOL is still strong in corporate data centers often on large mainframe computers, Fortran in engineering applications, scripting languages in Web development, and C in embedded software. A similar technique used for database design is Entity-Relationship Modeling (ER Modeling). 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. FORTRAN, the first widely used high-level language to have a functional implementation, came out in 1957, and many other languages were soon developed—in particular, COBOL aimed at commercial data processing, and Lisp for computer research. Use of a static code analysis tool can help detect some possible problems. Different programming languages support different styles of programming (called programming paradigms). It is very difficult to determine what are the most popular modern programming languages. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Computer programmers are those who write computer software. Expert programmers are familiar with a variety of well-established algorithms and their respective complexities and use this knowledge to choose algorithms that are best suited to the circumstances. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA. 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.