

Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. It is very difficult to determine what are the most popular modern programming languages. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. 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. 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. 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. It is very difficult to determine what are the most popular modern programming languages. Also, specific user environment and usage history can make it difficult to reproduce the problem. Also, specific user environment and usage history can make it difficult to reproduce the problem. 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. 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. 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. Different programming languages support different styles of programming (called programming paradigms). Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. When debugging the problem in a GUI, the programmer can try to skip some user interaction from the original problem description and check if remaining actions are sufficient for bugs to appear. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. Languages form an approximate spectrum from "low-level" to "high-level"; "low-level" languages are typically more machine-oriented and faster to execute, whereas "high-level" languages are more abstract and easier to use but execute less quickly. Techniques like Code refactoring can enhance readability. New languages are generally designed around the syntax of a prior language with new functionality added, (for example C++ adds object-orientation to C, and Java adds memory management and bytecode to C++, but as a result, loses efficiency and the ability for low-level manipulation). By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. One approach popular for requirements analysis is Use Case analysis. It affects the aspects of quality above, including portability, usability and most importantly maintainability. The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA.