

Normally the first step in debugging is to attempt to reproduce the problem. 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. In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. Assembly languages were soon developed that let the programmer specify instruction in a text format (e.g., ADD X, TOTAL), with abbreviations for each operation code and meaningful names for specifying addresses. 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. 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. 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. Programs were mostly entered using punched cards or paper tape. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. 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). After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. 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. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. There are many approaches to the Software development process. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. 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). Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. A similar technique used for database design is Entity-Relationship Modeling (ER Modeling). Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Computer programmers are those who write computer software. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users.