

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. 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. 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. 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. Use of a static code analysis tool can help detect some possible problems. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. Later a control panel (plug board) added to his 1906 Type I Tabulator allowed it to be programmed for different jobs, and by the late 1940s, unit record equipment such as the IBM 602 and IBM 604, were programmed by control panels in a similar way, as were the first electronic computers. Unreadable code often leads to bugs, inefficiencies, and duplicated code. Many applications use a mix of several languages in their construction and use. Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. Provided the functions in a library follow the appropriate run-time conventions (e.g., method of passing arguments), then these functions may be written in any other language. 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. Ideally, the programming language best suited for the task at hand will be selected. In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. Some of these factors include: The presentation aspects of this (such as indents, line breaks, color highlighting, and so on) are often handled by the source code editor, but the content aspects reflect the programmer's talent and skills. 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. These compiled languages allow the programmer to write programs in terms that are syntactically richer, and more capable of abstracting the code, making it easy to target varying machine instruction sets via compilation declarations and heuristics. Many programmers use forms of Agile software development where the various stages of formal software development are more integrated together into short cycles that take a few weeks rather than years. Use of a static code analysis tool can help detect some possible problems. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages.