

Techniques like Code refactoring can enhance readability. 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. 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. 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. A similar technique used for database design is Entity-Relationship Modeling (ER Modeling). 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. 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. Proficient programming usually requires expertise in several different subjects, including knowledge of the application domain, details of programming languages and generic code libraries, specialized algorithms, and formal logic. 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. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. A similar technique used for database design is Entity-Relationship Modeling (ER Modeling). 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. 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. 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. Computer programmers are those who write computer software. Programming languages are essential for software development. They are the building blocks for all software, from the simplest applications to the most sophisticated ones. 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. Use of a static code analysis tool can help detect some possible problems. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. There exist a lot of different approaches for each of those tasks. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. Many applications use a mix of several languages in their construction and use.