

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. Unreadable code often leads to bugs, inefficiencies, and duplicated code. They are the building blocks for all software, from the simplest applications to the most sophisticated ones. The first compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. Programs were mostly entered using punched cards or paper tape. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. Auxiliary tasks accompanying and related to programming include analyzing requirements, testing, debugging (investigating and fixing problems), implementation of build systems, and management of derived artifacts, such as programs' machine code. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. Ideally, the programming language best suited for the task at hand will be selected. Different programming languages support different styles of programming (called programming paradigms). 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. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Auxiliary tasks accompanying and related to programming include analyzing requirements, testing, debugging (investigating and fixing problems), implementation of build systems, and management of derived artifacts, such as programs' machine code. Also, specific user environment and usage history can make it difficult to reproduce the problem. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Programs were mostly entered using punched cards or paper tape. They are the building blocks for all software, from the simplest applications to the most sophisticated ones. 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. The first compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. 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. 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. Scripting and breakpointing is also part of this process. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation.