

Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. However, readability is more than just programming style. 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 compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. Allen Downey, in his book *How To Think Like A Computer Scientist*, writes: Many computer languages provide a mechanism to call functions provided by shared libraries. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. 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. 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. Also, specific user environment and usage history can make it difficult to reproduce the problem. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. 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. Normally the first step in debugging is to attempt to reproduce the problem. Techniques like Code refactoring can enhance readability. 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. 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. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. Scripting and breakpointing is also part of this process. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. 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 choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages, or individual preference.