

In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. Unreadable code often leads to bugs, inefficiencies, and duplicated code. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. 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. Expert programmers are familiar with a variety of well-established algorithms and their respective complexities and use this knowledge to choose algorithms that are best suited to the circumstances. Programmable devices have existed for centuries. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. Normally the first step in debugging is to attempt to reproduce the problem. Following a consistent programming style often helps readability. Computer programmers are those who write computer software. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. The first compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. 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). 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. There exist a lot of different approaches for each of those tasks. Techniques like Code refactoring can enhance readability. The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination (debugging). By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. Following a consistent programming style often helps readability. Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users. They are the building blocks for all software, from the simplest applications to the most sophisticated ones.