

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. Different programming languages support different styles of programming (called programming paradigms). Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them. The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination (debugging). They are the building blocks for all software, from the simplest applications to the most sophisticated ones. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. 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. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. 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. 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. Different programming languages support different styles of programming (called programming paradigms). 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. 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). In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form. By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers. 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. Techniques like Code refactoring can enhance readability. Scripting and breakpointing is also part of this process. However, readability is more than just programming style. Normally the first step in debugging is to attempt to reproduce the problem. 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).