

It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages. However, Charles Babbage had already written his first program for the Analytical Engine in 1837. A similar technique used for database design is Entity-Relationship Modeling (ER Modeling). 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. They are the building blocks for all software, from the simplest applications to the most sophisticated ones. Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. Programmers typically use high-level programming languages that are more easily intelligible to humans than machine code, which is directly executed by the central processing unit. Programs were mostly entered using punched cards or paper tape. In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability. It is very difficult to determine what are the most popular modern programming languages. FORTRAN, the first widely used high-level language to have a functional implementation, came out in 1957, and many other languages were soon developed—in particular, COBOL aimed at commercial data processing, and Lisp for computer research. 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). However, Charles Babbage had already written his first program for the Analytical Engine in 1837. 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. 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 applications use a mix of several languages in their construction and use. However, because an assembly language is little more than a different notation for a machine language, two machines with different instruction sets also have different assembly languages. There exist a lot of different approaches for each of those tasks. 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. Methods of measuring programming language popularity include: counting the number of job advertisements that mention the language, the number of books sold and courses teaching the language (this overestimates the importance of newer languages), and estimates of the number of existing lines of code written in the language (this underestimates the number of users of business languages such as COBOL). They are the building blocks for all software, from the simplest applications to the most sophisticated ones. 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. 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. Their jobs usually involve: Although programming has been presented in the media as a somewhat mathematical subject, some research shows that good programmers have strong skills in natural human languages, and that learning to code is similar to learning a foreign language.