In the 9th century, the Arab mathematician Al-Kindi described a cryptographic algorithm for deciphering encrypted code, in A Manuscript on Deciphering Cryptographic Messages.  
Relatedly, software engineering combines engineering techniques and principles with software development.  
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).  
Many applications use a mix of several languages in their construction and use.  
Ideally, the programming language best suited for the task at hand will be selected.  
Trade-offs from this ideal involve finding enough programmers who know the language to build a team, the availability of compilers for that language, and the efficiency with which programs written in a given language execute.  
The purpose of programming is to find a sequence of instructions that will automate the performance of a task (which can be as complex as an operating system) on a computer, often for solving a given problem.  
He gave the first description of cryptanalysis by frequency analysis, the earliest code-breaking algorithm.  
To produce machine code, the source code must either be compiled or transpiled.  
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 Computer programmers are those who write computer software.  
 In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form.  
 Debugging is a very important task in the software development process since having defects in a program can have significant consequences for its users.  
 Different programming languages support different styles of programming (called programming paradigms).  
In 1206, the Arab engineer Al-Jazari invented a programmable drum machine where a musical mechanical automaton could be made to play different rhythms and drum patterns, via pegs and cams.