It involves designing and implementing algorithms, step-by-step specifications of procedures, by writing code in one or more programming languages..  
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.  
  
For example, when a bug in a compiler can make it crash when parsing some large source file, a simplification of the test case that results in only few lines from the original source file can be sufficient to reproduce the same crash.  
A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it.  
Unreadable code often leads to bugs, inefficiencies, and duplicated code.  
In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them.  
 In the 1880s, Herman Hollerith invented the concept of storing data in machine-readable form.  
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).  
 Popular modeling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA).  
The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA.  
 Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation.  
Normally the first step in debugging is to attempt to reproduce the problem.  
 High-level languages made the process of developing a program simpler and more understandable, and less bound to the underlying hardware.  
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.