The Unified Modeling Language (UML) is a notation used for both the OOAD and MDA..  
Ideally, the programming language best suited for the task at hand will be selected.  
 After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug.  
 A similar technique used for database design is Entity-Relationship Modeling (ER Modeling).  
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.  
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).  
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.  
Compilers harnessed the power of computers to make programming easier by allowing programmers to specify calculations by entering a formula using infix notation.  
In 1801, the Jacquard loom could produce entirely different weaves by changing the "program" – a series of pasteboard cards with holes punched in them.  
 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.  
 Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation.  
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.  
Trial-and-error/divide-and-conquer is needed: the programmer will try to remove some parts of the original test case and check if the problem still exists.  
Also, specific user environment and usage history can make it difficult to reproduce the problem.  
By the late 1960s, data storage devices and computer terminals became inexpensive enough that programs could be created by typing directly into the computers.