

Normally the first step in debugging is to attempt to reproduce the problem. Different programming languages support different styles of programming (called programming paradigms). Normally the first step in debugging is to attempt to reproduce the problem. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Integrated development environments (IDEs) aim to integrate all such help. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. 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. When debugging the problem in a GUI, the programmer can try to skip some user interaction from the original problem description and check if remaining actions are sufficient for bugs to appear. 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. Integrated development environments (IDEs) aim to integrate all such help. 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). It is usually easier to code in "high-level" languages than in "low-level" ones. Programs were mostly entered using punched cards or paper tape. Also, specific user environment and usage history can make it difficult to reproduce the problem. There are many approaches to the Software development process. There are many approaches to the Software development process. While these are sometimes considered programming, often the term software development is used for this larger overall process – with the terms programming, implementation, and coding reserved for the writing and editing of code per se. Programmable devices have existed for centuries. The first compiler related tool, the A-0 System, was developed in 1952 by Grace Hopper, who also coined the term 'compiler'. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. Languages form an approximate spectrum from "low-level" to "high-level"; "low-level" languages are typically more machine-oriented and faster to execute, whereas "high-level" languages are more abstract and easier to use but execute less quickly. Many applications use a mix of several languages in their construction and use. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Also, specific user environment and usage history can make it difficult to reproduce the problem.