

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. 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. The following properties are among the most important: In computer programming, readability refers to the ease with which a human reader can comprehend the purpose, control flow, and operation of source code. For example, COBOL is still strong in corporate data centers often on large mainframe computers, Fortran in engineering applications, scripting languages in Web development, and C in embedded software. 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. Techniques like Code refactoring can enhance readability. Normally the first step in debugging is to attempt to reproduce the problem. A study found that a few simple readability transformations made code shorter and drastically reduced the time to understand it. Code-breaking algorithms have also existed for centuries. Sometimes software development is known as software engineering, especially when it employs formal methods or follows an engineering design process. 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. 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. Following a consistent programming style often helps readability. 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. There exist a lot of different approaches for each of those tasks. Normally the first step in debugging is to attempt to reproduce the problem. 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. Machine code was the language of early programs, written in the instruction set of the particular machine, often in binary notation. For example, COBOL is still strong in corporate data centers often on large mainframe computers, Fortran in engineering applications, scripting languages in Web development, and C in embedded software. This can be a non-trivial task, for example as with parallel processes or some unusual software bugs. Use of a static code analysis tool can help detect some possible problems. Programming languages are essential for software development. Many programmers use forms of Agile software development where the various stages of formal software development are more integrated together into short cycles that take a few weeks rather than years. Use of a static code analysis tool can help detect some possible problems.