

Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. Some text editors such as Emacs allow GDB to be invoked through them, to provide a visual environment. 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. One approach popular for requirements analysis is Use Case analysis. Later a control panel (plug board) added to his 1906 Type I Tabulator allowed it to be programmed for different jobs, and by the late 1940s, unit record equipment such as the IBM 602 and IBM 604, were programmed by control panels in a similar way, as were the first electronic computers. 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. The choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages, or individual preference. 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. Programmers typically use high-level programming languages that are more easily intelligible to humans than machine code, which is directly executed by the central processing unit. Scripting and breakpointing is also part of this process. Programmable devices have existed for centuries. Debugging is often done with IDEs. Standalone debuggers like GDB are also used, and these often provide less of a visual environment, usually using a command line. Programs were mostly entered using punched cards or paper tape. Integrated development environments (IDEs) aim to integrate all such help. 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. Sometimes software development is known as software engineering, especially when it employs formal methods or follows an engineering design process. Some languages are very popular for particular kinds of applications, while some languages are regularly used to write many different kinds of applications. 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. Some of these factors include: The presentation aspects of this (such as indents, line breaks, color highlighting, and so on) are often handled by the source code editor, but the content aspects reflect the programmer's talent and skills. 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. 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. Text editors were also developed that allowed changes and corrections to be made much more easily than with punched cards. 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. 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.