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History of Fortran

Beginning in 1954, John W. Backus led the team he assembled at IBM in the creation of a system initially called Speedcoding, drawing from his programmers’ diverse backgrounds and fields to optimize the language’s efficiency in problem solving. Notable among the team included Sheldon F. Best Robert Nelson, Roy Nutt, and Irving Ziller. In 1957, the team published its creation after presenting it for the first time at the Western Join Computer Conference in Los Angeles. Fortran (short for Formula Translation) would become the “progenitor of software” (IBM).

Formally, though not always followed, Fortran was denoted in all uppercase before Fortran 90; furthermore, IBM suggested using a slash through the letter “o” (“FØRTRAN”) to differentiate it from the number zero. Before the invention of Fortran, the first high-level programming language, the only way to program was through assembly language. Though the team at IBM was not the first to think of high level languages to communicate more efficiently with computers, they were the first to successfully create one, producing an optimizing compiler so effective that the FORTRAN I compiler was unsurpassed for approximately 20 years. This first compiler gave rise to the branch of computer science called “compiler theory” and influenced future compilers. The language itself, having been updated over time, is still in use today for mostly scientific and mathematical applications. Fortran is geared toward scientific numerical computing. Its major benefits for such included its high optimization and therefore fast runtime, as well as its large mathematical library, but it also has many failings which make it impractical for non-mathematical applications, including greatly limited namespacing capabilities and difficulties handling strings, among many.

Aside from assisting programmers to code much faster, another important objective included machine independence: whereas assembly language was specific to a corresponding computer, Fortran programs can run on any computer with the Fortran compiler, allowing for universality, and is thus considered “the first computer language standard” (IBM), able to be used across different operating platforms. Yet another importance impact of Fortran is opening programming up to non-computer scientists. Assembly language had been complicated enough that it restricted usage to those who specialized in the field of computer science. In addition to its contributions to scientific and military fields, Fortran was utilized to increase productivity in many different industries, especially banking, insurance, and even video games.

Over the years, Fortran has evolved to become gradually more efficient. FORTRAN II, released in 1958, allowed for the separate compilation of program modules and the “link loading” of assembly language modules with FORTRAN modules. FORTRAN III was never released to the public, but allowed users to switch between FORTRAN and assembly in the middle of the code, trading the ability to transfer FORTRAN between machines, it’s “portability,” for increased efficiency. FORTRAN IV, released 1961, improved various aspects of FORTRAN II, for example fixing some machine-dependent irregularities; a translator was used for backward compatibility. FORTRAN was recognized as a national standard language when, beginning in 1962 and released in 1966, the American Standard Association (later known as the ANSA) released a version labeled FORTRAN 66, in response to the various “dialects” of FORTRAN which were springing up; it then became a globally recognized standard. Among the additions of FORTRAN 77 are DO loops, block if statements, the CHARACTER data type (characters had been stored as INTEGERs), and main program termination without a STOP. Finally, the last major version of Fortran (no longer notated in all upper case) is unofficially called the Fortran 90 standard, though it was followed by minorly updated versions. It introduced column indepence, modern control structures, powerful array notation, dynamic memory allocation, keyword argument passing, and control of numeric precision and range, to name several examples. During this thirteen year gap between the last two major standards, however, other languages had the chance to overtake Fortran’s usage in the scientific spheres. Fortran remains, however, the language with the greatest amount of code written in it.

For their contributions to computer science, the developers of Fortran (specifically Backus) received various significant awards, including the National Medal of Science, the Turing Award from the Association for Computing Machinery, and the Charles Stark Draper Prize by the National Academy of Engineering.

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