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Formal Aspects of Computing

John Warner Backus: 3 Dec 1924–17 March 2007

Dines Bjørner

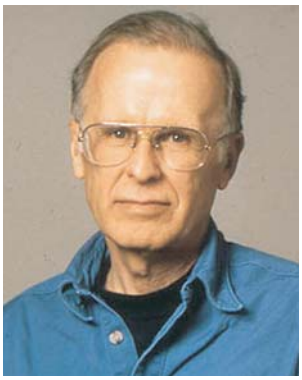

Photo by IBM Corporate Archives

John W. Backus, the main creator of Fortran, co-creator of Algol 60 and FP (a variable-free variant of functional programming), and the B "behind" BNF, died on March 17, 2007, 82-year-old, at Ashland, Oregon, near one of his two daughters. Born, 3 December 1924, in Philadelphia, to a well-to-do stockbroker and his wife, John Backus became, from 1954, one of the most influential people in computing.

John Backus in many senses was beyond 'pedagogical reach' and thank goodness for that!

John Backus dropped in and out of schools, studied chemistry for one year (Univ. of Virginia), joined the army in 1943 but was soon rerouted to a pre-engineering programme at Univ. of Pittsburgh, then studied medicine at Haverford College and worked at the Atlantic City hospital. He fell ill with a brain tumour, was operated on, but the inserted plate did not fit so John Backus invented a better one. He then quit the medical field and moved to New York not knowing what he wanted — except that he wanted a hi-fi set — liking music — but could not get a good set so he built one himself after having learned radio basics at a technician's school. There he helped a teacher doing some mathematical calculation, liked it, and then went to Columbia Univ. from where he got a BA and a Masters, and visited the IBM World HQ (and computer center) in New York. That led to his first, and only employment. From September 1950 until his retirement in 1991 John Backus worked all his life at IBM, more than 40 years — surely, and in no small measure due to John Backus's work, the most condensed period of scientific and technological achievements of any technology.

Within four short years John Backus was engaged in (1) the programming of the IBM SSEC ('Selective Sequence Electronic Calculator') for, amongst many things, the calculation of lunar orbit tables later used in the US Apollo project; (2) for the IBM 701 (the "Defense Calculator" used during the Korean War), with Harlan Herrick, inventing (and implementing an interpreter for) the 'Speedcoding' language simulating floating point numbers on an integer machine; and (3) designing, later, the first hardware floating point unit for the IBM 704 and persuaded IBM to let the IBM 704 provide for indexing. All this led up to John Backus proposing, in December 1953, and persuading IBM to start, contrary to the advice of John von Neumann, the "automatic programming" project that lead to the November 1954 report 'The IBM Mathematical FORmulaTRANslating system FORTRAN' for which the Fortran I compiler was available early 1957 — the result of more than three years of work by John Backus, Robert Nelson, Harlan Herrick, Lois Haibt, Roy Nutt, Irving Ziller, Sheldon Best, David Sayre, Richard Goldberg and Peter Sheridan.

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After the Fortran years followed years where John Backus was engaged in the committee work for the IAL ('International Algebraic Language'), a joint effort of GAMM ('Gesellschaft für Angewandte Mathematik') and ACM — started at Zürich 27 May – 1 June 1958. The work led to Algol 60. Backus' involvement with Algol 60 ended sometime in 1963. Up till this time John Backus had worked "out of" New York. Two years as visiting professor at UC Berkeley (Calif. 1963–1965) saw Backus move from the US East to the US West Coast. He spent the rest of his IBM career at IBM Research in San Jose, Calif. In the sixties Backus, now as one of the first IBM Fellows, pottered around studying the four color problem, participating actively in the anti-war and the anti-Star Wars movements, etc.

From around 1969 (maybe even earlier) John Backus got interested in what he first called *closed applicative languages*. For a short while the author of this obituary worked for John Backus, implementing the first versions of these, the *reduction* languages which later evolved into 'FP' and 'FFP'. During John Backus' last years at IBM, mid 1970s to 1991 (with a group of people, including Alexander S. Aiken, Peter G. Lucas, John H. Williams and Edward L. Wimmers) FP evolved into FL: Function level programming.

A unique rainbow spanned the professional life of John Backus: from programming the very low level SSEC to FL there seems, to me, to be a clear, direct line: FL "arches" back to fundamentals of the SSEC.

John Backus was honoured several times: 1967: The IEEE W. Wallace McDowell Award; 1975: The [US] President's National Medal of Science; 1977: The ACM Turing Award; 1993: The Charles Stark Draper (US $375,000) Prize — to mention a few.

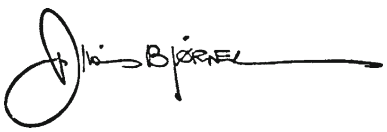
When John Backus retired, he retired completely from the field of computing. For a little more than 10 years he stayed on in his spectacular San Francisco home before he, after his second wife's passing away, after 35 years of marriage, moved to Ashland, Oregon in 2004. Here he spent a few years, close to one of his daughters, Paula, and a grandchild, Ally, and also, more often, met his other daughter Karen of New York. In his later years he studied the writings of Krishnamurti and Eva Pierrakos and practiced meditation. When he experienced loss of other than very short term memory he ended his own life.

John Backus is quoted as having said: *Most scientists are scientists because they are afraid of life. It is most wonderful to be creative in science because you can do it, and — without clashing with people and suffering the pain of relationships — make your way into the world. It is a wonderful 'out' — it is sort of an aseptic world where you can use the very exciting faculties you have and not encounter any pain, The pain in solving a [scientific] problem is 'small potatoes' compared with the pain in living. . . . It's strange that by looking into yourself you really get an appreciation of the mystery of the universe.*[1]

John Backus was a peaceful man, almost "ruthlessly" direct; interested, in a very kind way, in the personal lives of his collaborators; shunned "Corporation Speak" and let those who spoke so, know in no uncertain terms. He did not care about other people's opinion about him, John Backus.

His indefatigable search for understanding, his ways of expressing how he worked, his consistency in the matters we, his collaborators, knew him — all appears to attest to a man who must have thought about all these things and much much more ever since his childhood.

He not only left a clear mark on our profession, but he also left an indelible mark on all those he touched.



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[1] D.E. Sasha and C.A. Lazere: John Backus, A Restless Inventor, in 'Out of Their Minds: The Lives and Discoveries of 15 Great Computer Scientists', Chap. 1, pp 5–20, Copernicus, An Imprint of Springer, New York, Inc. 175 Fifth Avenue, New York, New York 10010, September 1995.