



Gene M. Amdahl

GENE M. AMDAHL

1922–2015

Elected in 1967

“Development of large computer systems.”

BY MARK D. HILL

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GENE MYRON AMDAHL, known for seminal work on the design of mainframe computers, deft business and entrepreneurial leadership, and the eponymous Amdahl’s law, died November 10, 2015, at the age of 92 in Palo Alto, California.

He was born November 16, 1922, in Flandreau, South Dakota (about 50 miles from Sioux Falls), to a farm family with Norwegian and Swedish roots. His early educational roots were modest: as a child he attended a one-room school without electricity. Rural electrification reached him only in high school, he noted in a 1992 interview with *Computerworld*.

He attempted to join the military after the attack on Pearl Harbor in 1941, but was turned down because his farming skills were considered more important at the time. A few years later, in 1944, he joined the Navy and taught radar at naval training centers around the United States.

He earned his bachelor’s degree in engineering physics from South Dakota State University in 1948, and master’s and doctoral degrees in theoretical physics from the University of Wisconsin–Madison in 1949 and 1952. In 1979 the University of Wisconsin–Madison awarded him an honorary doctorate in science.

It was during his graduate school years that his interest in digital computing bloomed. His doctoral dissertation, “The

Logical Design of an Intermediate Speed Digital Computer,” was a draft for a computer design called the Wisconsin Integrally Synchronized Computer (WISC). WISC is now in the collection of the Computer History Museum in Mountain View, CA.

International Business Machines Corporation (IBM) recruited Amdahl directly out of graduate school. He worked on simulation studies and machine design for character recognition, and was project engineer and chief designer for the IBM 704, initial planner for the IBM 709 and 7030, and manager of architecture for the hugely influential IBM System/360. The Computer History Museum has called the System/360 family of computers “a daring business and technical gamble that became one of the greatest success stories in the history of computing.”¹ Its architecture shaped the field for years to come, and even today IBM mainframes can still run some System/360 applications.

What made the System/360 computers revolutionary was that they were a family, all running the same software. Up until that point, a new machine meant new software, a situation that rapidly became unsustainable for businesses as both hardware and software grew in power and complexity. With this new approach, companies could upgrade to more powerful machines without having to master new software—and later, at his own company, Amdahl extended this principle to designing non-IBM computers that could also run IBM software.

He left IBM in 1955 to pursue other endeavors for several years. In 1956 he joined Ramo Woolridge in Los Angeles, where he prepared military and internal proposals in data processing and did the system planning for what became the RW440 process control computer.

Amdahl returned to IBM in 1960 and was selected as an IBM Fellow in 1965 at a time when few held that distinction. The five-year fellowship gave the recipient freedom to engage in the work of his choice. During that time Amdahl was named

¹<https://www.computerhistory.org/fellowawards/hall/gene-amdahl>.

director of IBM's Advanced Computing Systems Laboratory (which he helped found) in Menlo Park.

In fall 1970 he left IBM to embark on an entrepreneurial phase of his career, forming the Sunnyvale-based Amdahl Corporation, which made computers that ran IBM software but at a lower cost. The company was a success, known for its Amdahl 470 family of computers—many people considered the Amdahl 470V/6 the world's highest-performing, highest-capacity business computer of its time. By 1979 Amdahl Corporation had proven itself a formidable competitor, having cornered 22 percent of the mainframe market.

In 1979 Amdahl's role at the company shifted to that of chair emeritus and consultant. He retired in 1980 and turned his attentions to his next endeavor, Trilogy Systems Corporation, which acquired Elxsi in 1985. In 1987 he founded the computer systems company Andor International Ltd.

He was the author or coauthor of many publications and patents—on developments such as recognition of recorded intelligence, an analog-to-digital conversion device, message display and transmission system, stored logic computer, memory protection system, storage protection system, and the IBM System/360. In addition, he lectured at the NATO Summer School in France in 1969 and 1976.

His influence on computer science teaching and practice will extend through the foreseeable future thanks to Amdahl's law. Although he proposed the law in 1967 for parallel computing, it has been generalized to relate the maximum overall improvement in speed that can flow from improving a component's speed. Amdahl's law is simple, elegant, and amazingly useful.

Among his many honors, Amdahl was elected to the National Academy of Engineering in 1967. He served on the Academies' Committee on Materials for High-Density Electronic Packaging (1987–90) and the NAE's Electrical Engineering–Communications/Computers/Control Peer Committee (1984–87). He received the Data Processing Management Association's Computer Sciences Man of the Year Award in 1976 and in 1980 was elected a member of the Quadrato della Radio (the Marconi Society) in Italy.

He was named a fellow of the Institute of Electrical and Electronics Engineers (IEEE) in 1970 and in 1976 received the IEEE Computer Society's W. Wallace McDowell Award "for his contributions to the architecture and design of computer systems, and for his achievements in promoting advancements in the computer state of the art through business enterprise." In 1987 he received the ACM-IEEE Computer Society Eckert-Mauchly Award, given for contributions to computer and digital systems architecture, and in 1989 the IEEE Computer Entrepreneur Award "in recognition of his entrepreneurial efforts in the development of a strong and competitive main-frame industry."

In 1973 he was cited in *Business Week* and *Fortune* magazines as one of the "brightest new stars rising to challenge the computer giant – IBM." In 1979 he was elected a distinguished fellow of the British Computer Society in recognition of his work in computer design, and in 1998 he was named a fellow of the Computer History Museum "for his fundamental work in computer architecture and design, project management, and leadership." In 1991 the London *Times* included him in its list of "The 1,000 Makers of the 20th Century."

Amdahl's personal life was shared with his wife Marian (née Quissell), who also hailed from rural South Dakota; they married in 1946. She survives him, as do their three children: daughters Delaine and Andrea and son Carlton; five grandchildren; and one great-grandchild.

On a personal note, I am the Gene M. Amdahl Professor of Computer Sciences at the University of Wisconsin–Madison. In 2013 I received a prestigious "named" professor title that I was encouraged to name after a luminary in my field. I chose Amdahl for his influence on my work and his Wisconsin connections, and he was pleased.

