BIRTH:

January 10, 1938, in Milwaukee, Wisconsin.

EDUCATION:

Graduated from Milwaukee Lutheran High School (1956); BS in mathematics from the Case Institute of Technology (1960), his undergraduate work was so distinguished that he was awarded a simultaneous MS by special vote of the faculty; Ph.D. in mathematics from the California Institute of Technology (1963).

EXPERIENCE:

Assistant and then Associate Professor, California Institute of Technology (1963-1968); A series of full and named professorships, Stanford University (1968-1992); Professor of the Art of Computer Programming, Emeritus, Stanford University (from 1993).

HONORS AND AWARDS:

Knuth has received over 100 awards and honors. Among these are: Fellow, American Academy of Arts and Sciences (1973); Alan M. Turing Award (1974); Member, National Academy of Science (1975); American Mathematical Society Gibbs Lecture (1978); National Medal of Science (1979, awarded by President Carter); Member, National Academy of Engineering (1981); IEEE Computer Society Computer Pioneer

DONALD ("DON") ERVIN KNUTH

United States – 1974

CITATION

For his major contributions to the analysis of algorithms and the design of programming languages, and in particular for his contributions to the "art of computer programming" through his well-known books in a continuous series by this title.

SHORT ANNOTATED BIBLIOGRAPHY

ACM DL AUTHOR PROFILE

ACM TURING AWARD LECTURE

RESEARCH SUBJECTS

ADDITIONAL MATERIALS

Birth and Education

Donald Ervin "Don" Knuth was born January 10, 1938, in Milwaukee, Wisconsin. His father was a teacher in a Lutheran high school and a church organist. Don Knuth attended Lutheran high school and, in later life, also became a church organist.

In the 7th and 8th grades Knuth was very interested in the structure of English grammar. In high school he was interested in physics and was good at mathematics. Heading for college, he wondered whether to major in physics or music, but chose the former because he got a scholarship to the Case Institute of Technology in Cleveland, Ohio. In his sophomore year of college he switched his major from physics to mathematics, partly because he had trouble with science labs.

During the summer between his freshman and sophomore years, Knuth worked in the statistics lab drawing graphs, key punching tabulating cards, and using a card sorter. While there, he spotted the newly installed IBM 650 computer across the hall. The 650 intrigued him, and he learned to program using it. He wrote a variety of interesting programs during his undergraduate years, including one to rate the performance of members of the basketball team he managed.

Knuth was so good at mathematical studies at Case that the faculty awarded him an M.S. in mathematics when he finished his B.S. work.

The Art of Computer Programming

While working on his PhD in mathematics at the California Institute of Technology, Knuth also did private consulting, and wrote compilers for various computers. The word got around that he knew a lot about compilers, and in January 1962, in his second year at Cal Tech, Addison-Wesley asked him to write a book on compilers. He sketched 12 chapters and signed a contract.

After receiving his PhD in 1963, Knuth began working on a chapter on sorting, a topic related to some compilers. He read many technical articles, and noticed the spotty and sometimes unreliable nature of the literature in the, then new, field of computer science. He saw the need for someone to write a book which organized and reliably presented what was then known about the field. Knuth was a good writer and had an instinct for trying to organize things, so he decided to tackle it. He used a quantitative rather than qualitative approach, and emphasized aesthetics—the creation of programs that are beautiful. The book grew longer as he wrote it, reaching 3,000 hand-written pages (the equivalent of 2,000 printed pages) by the time he finished the first draft of the 12 chapters in June 1965.

Addison-Wesley decided that the 12 chapters should be reorganized into 7 volumes, with a chapter or two per volume. The first four volumes [1] were to be on basic concepts and information structures (volume 1, chapters 1 and 2), random numbers and arithmetic (volume 2, chapters 3 and 4), sorting and searching (volume 3, chapters 5 and 6), and combinatorial algorithms (volume 4, now scheduled to be divided into at least two volumes). Volumes 5-7 were to be the more compiler specific chapters (lexical scanning and parsing, context free languages, and compiler techniques).

Volume 1 of *The Art of Computer Programming* was published in 1968. That same year Knuth moved from Cal Tech to Stanford University, a move motivated partly by the fact Stanford also agreed to hire his colleague Robert Floyd, the 1978 Turing Award winner.