

Frances Allen Wins Turing Award

In February 2007, ACM, the Association of Computing Machinery named Frances E. Allen the recipient of the 2007 Turing award. The Turing award is perhaps the most prestigious one in computer science and is given for a body of work that has profoundly influenced the theory and practice of computer science. The award is named after Alan Turing, inventor of the Turing machine, articulator of the limits of computing, and a key player in the Allied breaking of the German Enigma cipher in World War II. The award this year was special, as it is the first time that it has been given to a woman. The citation is “For pioneering contributions to the theory and practice of optimizing compiler techniques that laid the foundations for modern optimizing compilers and automatic parallel execution.”



Allen, presently a Fellow Emerita at the IBM TJ Watson Research Center has made fundamental contributions to the theory of program optimizations. These are transformations on a program that make it run more efficiently on a machine. She wrote a seminal paper on the analysis of programs to discover opportunities for optimizations in 1966, formulating an elegant theory which has been widely used ever since. Two other papers in 1970 proposed program representations and techniques for efficient data flow analysis. Then in collaboration with John Cocke in 1971, she provided a systematic categorization of code improvement transformations. The effectiveness of the techniques was demonstrated on the IBM machines available at the time.

Allen has also made fundamental contributions to the area of program parallelization. This enables code that is written in a conventional programming language to be restructured so that it is capable of exploiting multiple processors or any resources that enable parallel computation. Programs that perform tasks like weather forecasting, or run algorithms in computational biology and computational fluid mechanics greatly benefit from such parallelization.

Allen joined IBM TJ Watson Center in 1957, and has actually been around for most of the history of compiler development. She was a contemporary of John Backus, featured in this issue of *Resonance*, and acknowledged his influence on her work. She was made IBM Fellow in 1989, and has held several visiting academic appointments over the last fifty years.

The award was presented to Allen in June 2007.

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