Joseph A. (Josh) Fisher Receives the 2012 IEEE B. Ramakrishna Rau Award

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Bob Rau passed away in December 2002 at the age of 51, many years before his time. Bob was an incredible human being: brilliant researcher, caring mentor, and good friend. In 2011, to honor his memory, the IEEE Computer Society established the B. Ramakrishna Rau Award, to be presented annually for “outstanding innovative contributions to microarchitecture, use of novel microarchitecture techniques or compiler/architecture interfacing.” The nomination criteria also state: “It is hoped, but not required, that the winner will have also contributed to the computer microarchitecture community through teaching, mentoring, or community service.”

On 4 December 2012, at the 45th Annual ACM/IEEE Microarchitecture Conference (MICRO-45) in Vancouver, B.C., I presented Joseph A. (Josh) Fisher with the Bob Rau Award. Josh received the Bob Rau Award for his pioneering contributions in both compilers and computer architecture—specifically, for the development of trace scheduling compilation and pioneering work in very long instruction word (VLIW) architectures.

An outstanding career

Josh Fisher is one of a handful of researchers who have made pioneering contributions in both compilers and computer architecture. Josh developed the idea of trace scheduling while a graduate student at NYU, and, along with the namesake of the award, Bob Rau, Josh is recognized as one of the fathers of VLIW. Josh introduced VLIW as a computer architecture design approach and an ideal target for trace scheduling in 1981 when he was a faculty member at Yale University.

In 1984, Josh left Yale to cofound Multiflow Computer, a start-up company. Multiflow closed in 1990, and Josh went to Hewlett-Packard and made contributions to the Wide-Word architecture, which in turn led to the Intel Itanium architecture. From 1995 to 2003, he worked on custom-fit VLIW embedded processors and on runtime translation. He retired from HP as a senior fellow in 2006. Josh is now an HP Senior Fellow (Emeritus).

Outstanding innovative technical contributions

Josh has made significant contributions in several areas.

Compilers and trace scheduling

Josh introduced trace scheduling as a global instruction-scheduling technique that exploits instruction-level parallelism beyond the basic block boundary. His trace scheduling concept was the basis for several later efforts in region scheduling, which is a major component of modern optimizing compilers.

Josh authored three seminal papers on trace scheduling in the early 1980s.1-3

Computer architecture and VLIW

Josh introduced the idea of a VLIW architecture in recognition of the spectrum of hardware/software trade-offs that can be made in a computer architecture, and he argued for placing much of the burden of discovering and exploiting instruction-level parallelism on the compiler. This was an important insight for computer architecture but was considered a radical idea at the time. VLIW was the basis for three landmark efforts in which Josh participated: the Multiflow Trace architecture, the HP Wide-Word architecture, and the Intel Itanium architecture. VLIW is now the basis of numerous computer architectures, especially for DSPs, media-processing units, and other embedded processors.

Josh has published several papers and a book on VLIW.4-10

Additional techniques

Josh has also published papers on additional compiler techniques11 and runtime techniques.12,13

Stature among peers

Josh was named an HP Senior Fellow in 2002 and was awarded the IEEE/ACM Eckert-Mauchly Award in 2003. Josh has been invited to give more than a half-dozen keynote talks at international conferences, and he has given dozens of other invited talks and lectures as well as participating in numerous invited conference panels. He is recognized for introducing and popularizing the terms instruction-level parallelism (ILP), memory disambiguation, trace scheduling, and very long instruction word (VLIW).
Josh coauthored a prominent discussion of instruction-level parallelism with Bob Rau in the journal *Science* in 1991, and an important history of instruction-level parallelism for the *Journal of Supercomputing* in 1993. He and Bob served as guest editors for the special issue of that journal, which was published in book form by Kluwer in 1993.

In addition to the presentation of the Award plaque and the check, I also presented Josh with one of the few remaining MICRO-15 coffee mugs from 1982. That should give Josh his third such mug, having previously received one as program chairman of MICRO-15, and one as winner of the first (and last) Annual Microprogramming Bowl. Weird.

References


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