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International Symposium on Computer Architecture Honors Scientists for Paper's Lasting Impact

Recent honor marks the record-breaking third time CSE Chair Dean Tullsen has won the "Influential Paper Award"

The International Symposium on Computer Architecture (ISCA) is honoring a paper by UC San Diego Computer Science and Engineering Department Chair Dean Tullsen — along with Rakesh Kumar, then a PhD student at UC San Diego and first author on the paper, and Victor Zyuban — with the 2020 Influential Paper Award for its lasting impact.

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Entitled *Interconnections in Multi-Core Architectures: Understanding Mechanisms, Overheads and Scaling,* the paper examines how interconnections on multiprocessor chips can affect power, performance and design. Prior to this study, the community did not fully understand the significant impact interconnect architectures could have on performance and power usage in this environment. The research also offered new ways to model these issues, findings that proved tremendously helpful for researchers over the years.

The paper was first presented at the 32nd International Symposium on Computer Architecture in June 2005. Fellow authors were Rakesh Kumar, who is now an associate professor of Electrical and Computer Engineering at the University of Illinois, and Victor Zyuban, who spent 15 years at IBM and is now with Apple.

Each year, the Influential Paper Award recognizes one paper from the ISCA conference held 15 years previously with the greatest impact on the field. In addition to this award, the paper has been cited more often than any other from the 2005 conference.

“We are quite honored to receive this Influential Paper Award,” said Tullsen. “ISCA is the flagship conference in computer architecture, making this perhaps the highest distinction for a paper in our field.”

When the study was first presented, dual core architectures were just emerging on the market, and computer scientists were still investigating how they should be designed. While there was a rich literature in the theory of inter-processor and even multicore interconnects, this was the first paper to extensively measure real multicore designs and evaluate the global tradeoffs of interconnect design decisions. A partnership with IBM, and access to the company’s Power processor hardware, were key to the study’s success.

The paper illuminates how the interconnects on chips create unique challenges, which differ significantly from connected chips. To develop the best multi-core design, the core, cache and interconnect architectures must be codeveloped. Designs that provided the best interconnect performance were not optimal in a resource-limited, single-chip processor.

“We pointed out that a naive implementation or what was state-of-the-art then, that kind of interconnection won’t cut it,” said Kumar. “So, people did a lot of innovation subsequently on reducing the overhead of interconnection.”

This is the third time one of Tullsen’s papers has received this award, making him the first to reach that milestone. *Simultaneous multithreading: maximizing on-chip parallelism* and *Exploiting choice: instruction fetch and issue on an implementable simultaneous multithreading processor* were honored in 2010 and 2011.

ISCA is the premier forum for computer architecture ideas and research. To safeguard participants, this year’s conference was held virtually.

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