HCW Keynote Address
Holistic Design of Multi-Core Architectures

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Abstract

Several forces are driving the market to put multiple execution cores on a single processor chip. But we cannot view (or design) those cores (and the connections between them) in the same way we did when we lived in a uniprocessor world. Previously, we expected each core to provide good performance on virtually any application, with energy efficiency, and without error or failure. Now that the level of interface with the user and the system is a multi-core chip, those requirements need only be met at the chip level -- no single core need meet them. This provides the opportunity to think about processor architecture in whole new ways. This talk will describe holistic design of a multi-core architecture -- designing cores, caches, interconnect so that the chip as a whole provides maximum performance, high energy efficiency, and high performance per area. We will discuss, in particular, on-chip heterogeneous multiprocessing and conjoined core architectures.

Speaker biography: Dean Tullsen is a professor in the computer science and engineering department at UCSD. He received his PhD from the University of Washington in 1996, where he introduced the concept of simultaneous multithreading (hyper-threading). He has continued to work in the area of computer architecture and back-end compilation, where with various co-authors he has introduced many new ideas to the research community, including threaded multipath execution, symbiotic job scheduling for multithreaded processors, dynamic critical path prediction, speculative precomputation, heterogeneous multi-core architectures, conjoined core architectures, and event-driven simultaneous code optimization.

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