Managing Shared Resources in the Data Center Era
Computer Architecture Meets Game Theory

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Abstract

Resource sharing is vital to improving efficiency and amortizing cost in high-performance computer systems. Within modern data centers, users selfishly pursue individual performance without regard for others or the system. To address this challenge and study the strategic behaviors of self-interested users, we turn to algorithmic economics and game theory. In this talk, we rethink resource management in computer architecture and systems, constructing mechanisms that are robust to strategic behavior. First, we describe novel methods to manage shared power supplies in modern data centers. Second, we introduce a processor bidding mechanism that operationalizes Amdahl's Law to guarantee proportional shares. Finally, we demonstrate dynamic mechanisms that allocate shared resources across time.

Biography

Seyed Majid Zahedi is an Assistant Professor in the Department of Electrical and Computer Engineering at the University of Waterloo. He received his Ph.D. in Computer Science from Duke University and his M.S. and B.S. from the University of Tehran. His research focuses on the intersection of computer architecture, computer systems, and economic game theory. His work has been acclaimed by the computer architecture community. His paper on the Amdahl bidding mechanism received the Best Paper Award at HPCA'18, his paper on computational sprinting received the Best Paper Award at ASPLOS'16, was selected as a CACM Research Highlight, and was distinguished as one of the IEEE Micro Top Picks Honorable Mentions, and his paper on multi-resource allocation was recognized as one of the IEEE Micro Top Picks from Computer Architecture Conferences in 2014.

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