Electrical & Computer ENGINEERING

Carnegie Mellon University

Graduate Seminar

Stories, not Words: Accelerating the Processing of Similarly Structured Data

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Thursday, September 21st 4:30 PM Scaife Hall 125

Abstract:
The failure of Dennard scaling and the rapid growth of data produced and consumed daily have made mitigating the dark silicon phenomena and providing fast computation for processing large volumes and expansive variety of data while consuming minimal energy the utmost important challenges for modern computer architecture. This talk will introduce the concept that grouping data structures that are previously defined in software and processing them through hardware specialization can significantly improve the application performance and energy efficiency. We target application domains where the common data structures are widely used and show that specializing both the compute and memory subsystem provides orders of magnitude improvements in performance and energy efficiencies. As case studies for regular and irregular data-access application domains, we present a database accelerator that processes tables and columns, and a graph accelerator that processes vertices and edges as similarly structure data. Creating specialized encapsulated data accesses and datapaths allows us to mitigate unnecessary data movement, take advantage of data and pipeline parallelism, and consequently provide substantial energy savings while obtaining significant performance gains.

Bio:
Lisa Wu is a postdoctoral research fellow at University of California Berkeley. Prior to joining UC Berkeley, she was a research scientist at Intel Labs.

Wu received her Ph.D. in computer science from Columbia University, a M.S. in computer science and engineering from University of Michigan Ann Arbor, and a B.S. in electrical and computer engineering from University of Illinois Urbana-Champaign. Her research interests include computer architecture and microarchitecture, accelerators, hardware-software co-designs, energy-efficient computing, and emerging applications related to healthcare such genomic analytics for precision medicine and big data such as database and graph analytics.

Prior to pursuing her doctorate, Lisa was a computer and performance architect at Intel for many years, architecting various Xeon and IPF server processors including leading the Xeon Phi Vector Processing Unit architecture.

SEMINAR NOTES: (REFRESHMENTS SERVED AT 4 PM)

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