SORS: Tomorrow?s Memory Systems, 2017 Edition

Presentation can be viewed following the link.

Speaker: Prof. Bruce Jacob, Electrical & Computer Engineering, University of Maryland

Abstract: I will discuss technologies our group helped develop, including Micron's Hybrid Memory Cube, flash-based main memories, and high-bandwidth/high-capacity memory; I will discuss the impact these will have on applications and operating systems.

Energy and power costs are the primary reasons that our system-wide execution throughput (OPS) is no better than it currently is … while one could staple together 100 Oak Ridge Titans to create an exascale system, not many could afford to pay the resulting electric bill. And yet, a significant amount of research is still focused on increasing processor performance, rather than decreasing power and energy-to-solution. Modern high-performance systems are not throughput-bound; they are power-bound. Processing is so cheap it is effectively free; shaving power and energy costs at every opportunity, and at every level of the system, is the trick.

Similarly, memory and communication are the primary reasons that our time-to-solution is no better than it currently is … the memory system is slow; the communication overhead is high; and yet a significant amount of research is still focused on increasing processor performance, rather than decreasing (the cost of) data movement. Modern high-performance systems are not compute-bound; they are data-bound. ALUs are so cheap that some propose to put them out in the memory … processing is free; getting the right data to the right place, cheaply, is the trick.

This talk will discuss recent technologies that our group has helped to develop in high-performance systems, including Micron's Hybrid Memory Cube, flash-based main memories, and high-bandwidth/high-capacity memory, and will discuss the impact of tomorrow's memory technologies on tomorrow's applications and operating systems.

Bio: Bruce Jacob is a Keystone Professor of Electrical and Computer Engineering and former Director of Computer Engineering at the University of Maryland in College Park. He received the AB degree in mathematics from Harvard University in 1988 and the MS and PhD degrees in CSE from the University of Michigan in Ann Arbor in 1995 and 1997, respectively. He holds several patents in the design of circuits for electric guitars and started a company around them. He also worked for two successful startup companies in the Boston area: Boston Technology and Priority Call Management. At Priority Call Management he was the initial system architect and chief engineer. He is a recipient of a US National Science Foundation CAREER award for his work on DRAM, and he is the lead author of an absurdly large book on the topic of memory systems. His research interests include system architectures, memory systems, operating systems, and electric guitars.

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

---