

Keynote talk: Heterogeneous Memory Software Management and Challenges

Sudarsun Kannan (Rutgers University)



Abstract

Heterogeneous memory technologies such as die-stacked DRAM and persistent memory technologies promise better performance, energy efficiency, and cost trade-offs in emerging systems. But delivering on this promise requires efficient OS mechanisms that provide efficient OS mechanisms and policies that reduce optimal data placement and reduce data migration. In this talk, I will show that state-of-the-art data placement and tiering policies are focused on application data placement but ignore the management of kernel objects, presenting a performance challenge for I/O-intensive workloads. As a first step towards addressing this challenge, I will introduce a new OS abstraction, kernel-level object contexts (KLOCs), to enable efficient tiering of kernel objects by grouping kernel objects with similar hotness, reuse, and liveness. Our analysis of the KLOCs prototype shows that efficient kernel object placement and reducing migrations can substantially accelerate I/O and application performance. I will also discuss other open challenges, such as capacity management, the need for a better application-level interface, and mechanisms hotness scanning.

Bio

Sudarsun is an assistant professor at Rutgers University, where he leads the Rutgers Systems Lab. His research group works at the intersection of hardware and software, building operating systems and system software for next-generation memory and storage technologies. Results from his work have appeared at premier operating systems and architecture venues, including OSDI, EuroSys, FAST, ISCA, HPCA, SPAA, and others. Sudarsun's work has also resulted in patents related to nonvolatile memory and resource management. Before joining Rutgers, he was a postdoctoral research associate at Wisconsin-Madison and graduated with an M.S. and Ph.D. from Georgia Tech.