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The University of California, Riverside, CA, USA
Electrical & Computer Engineering

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Engineering Building II (ENB) Room 109

Power Management in Multi-Tenant Data Centers and Beyond

Abstract

Power-hungry data centers have been quickly expanding to satisfy the exploding information technology demands, placing an unprecedented pressure on scaling up energy efficiency across the data center industry. Nonetheless, the existing efforts have been dominantly focused on owner-operated/single-tenant data centers (e.g., Google), where operators centrally manage both IT computing and non-IT facility resources. Another distinct yet very common type of data center --- multi-tenant data center (e.g., Equinix) --- consumes nearly 40% of energy by all data centers, but it has been rarely studied. Furthermore, in a multi-tenant data center, operator is mainly responsible for non-IT facility support (e.g., power and cooling) while tenants independently manage their own physical servers, thus resulting in "uncoordinated" power management and invalidating many of the existing power-saving solutions for owner-operated data centers.

In this talk, I will present my recent research on exploiting market mechanisms to enable a shift from uncoordinated to coordinated power management in multi-tenant data centers. First, I will focus on reducing data center's capital cost via power budget oversubscription and show how to handle a power emergency through coordinating tenants' power management when power budget is exceeded. Then, I will discuss how to shave peak power demand for reducing operating costs. Finally, I will talk about our other research that maximizes the values of data centers by integrating them with different systems, such as buildings and smart grid, aiming at breaking the traditional negative view that data centers are purely energy hogs built in isolated facilities.

Biography

Dr. Shaolei Ren is an Assistant Professor of Electrical and Computer Engineering at University of California, Riverside. Previously, he was an Assistant Professor at Florida International University from 2012 to 2015. He received his B.E. from Tsinghua University in 2006, M.Phil. from Hong Kong University of Science and Technology in 2008, and Ph.D. from University of California, Los Angeles in 2012, all in electrical and computer engineering. His research interests include power-aware computing and systems, and smart grid, and network economics. He was a recipient of NSF Faculty Early Career Development (CAREER) Award in 2015.