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THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

How Can Multi-Tenant Data Center Become Sustainable?

by

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The Chinese University of Hong Kong

Abstract
As critical assets supporting our growing digital economy, data centers are embarrassingly notorious for their huge energy appetites, stirring serious sustainability concerns. While the progress towards data center sustainability is encouraging, the existing multifaceted efforts have been dominantly focused on centrally-managed data centers, where operators manage both IT computing resources and data center facilities. Nonetheless, a large data center is typically multi-tenant and houses multiple tenants or business units that independently manage their IT computing resources in shared space, while the data center operator is only responsible for facility management (e.g., cooling). The "distributed" operation model rooted in multi-tenant data centers invalidates many of the existing centralized approaches for data center sustainability. Even worse, combined with the prevailing power-based and/or flat-rate pricing model between data center operator and tenants, it creates a "split incentive" hurdle: data center operator desires sustainability, but tenants may not.

In this talk, I will present a first-of-its-kind study on making multi-tenant data center sustainable. In particular, I will focus on breaking the "split incentive" hurdle and propose a new operation framework, called GreenColo, which includes an online incentive mechanism as its core and unifies the divergent interests of data center operator and tenants for sustainability. I will demonstrate both analytically and empirically that GreenColo can effectively reduce data center energy consumption as well as carbon footprint while incurring no additional cost compared to the no-incentive baseline case. Finally, I will turn to a smart grid environment and extend GreenColo to engage multi-tenant data center into demand response, unleashing its potential to achieve sustainability for the entire power grid.

Biography
Shaolei Ren 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 engineering. Since 2012, he has been an Assistant Professor in the School of Computing and Information Sciences, Florida International University, where he also holds a joint appointment with Department of Electrical and Computer Engineering. His research interests include sustainable computing, data center resource management, and network economics. He received the Best Paper Award at International Workshop on Feedback Computing (co-located with USENIX ICAC) in 2013 and the Best Paper Award at IEEE International Conference on Communications in 2009.

**** ALL ARE WELCOME ****

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