



香港中文大學
The Chinese University of Hong Kong

Institute of Theoretical Computer Science and Communications

ITCSC Colloquium

Global Solutions with Local Information: Optimizing Large-Scale Networks Based on Local Information

By

Prof. Thomas Moscibroda

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4 January 2012, Wednesday

2:30 pm – 3:30 pm

Rm. 121, 1/F., Ho Sin Hang Engineering Building, CUHK

Abstract:

Some of the most fascinating computer systems are complex and dynamic networks. In such systems, each individual entity only has a small partial view of the entirety of the network, yet collectively, the system as a whole is supposed to perform some global task or maintain an equilibrium. This talk investigates the fundamental possibilities and limitations of local computation for solving global tasks in large-scale networks. I describe which global structures can be computed locally and present upper and lower bounds on the trade-off between the amount of local knowledge and the quality of the resulting global solution. In particular, I will present upper and lower bounds on the achievable approximation ratio for fundamental global network optimization problems such as minimum vertex cover, if every node has to take its decision on the information available locally in its vicinity. I will also discuss applications, of similar trade-offs found in large-scale multi-core systems.

Biography:

Thomas Moscibroda is a Lead Researcher in the Mobile & Sensing Systems Research Group (MASS) at Microsoft Research Asia. He is also an Adjunct Professor at the Institute for Interdisciplinary Information Sciences (IIIS) at Tsinghua University. Before moving to China, he was a member of the Distributed Systems Research group at Microsoft Research in Redmond for 5 years, and he was also an affiliate member of the Networking Research Group and the Computer Architecture Research group at MSR Redmond, respectively.

Thomas' research interests are in (wireless) networking, computer architecture and distributed systems, with ongoing projects in each of these areas. He has a particular focus on algorithmic and mathematical approaches to practical system design. He obtained his PhD in 2006 from ETH Zurich, and was awarded the ETH Medal for his doctoral thesis. His research is documented in more than 50 research papers, and he has received Best Paper Awards at several top-tier conferences, including PODC 2004, IPSN 2007, SIGCOMM 2009, NSDI 2009, and ASPLOS 2010. His articles on DRAM scheduling and on-chip networking in multi-core systems were selected as IEEE Micro Top-Pick Computer Architecture papers in 2008 and 2010, respectively. Among other projects, Thomas is currently co-leading Microsoft's White-Fi initiative on White Space networking.

***** ALL ARE WELCOME *****