

Declarative Networking: Present and Future



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Computer and
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11am
@ ADSC - Level 8,
Fusionopolis, Connexis North**

Abstract:

Declarative networking is a programming methodology that enables developers to concisely specify network protocols and services using a distributed recursive query language, which are directly compiled to a dataflow framework that executes the specifications. This approach provides ease and compactness of specification, and offers additional benefits such as optimizability and the potential for safety checks. The declarative networking agenda started in 2005 with an initial goal of enabling safe extensible routers. Researchers have expanded in multiple directions from our initial work on routing, to encompass low-level network issues at the wireless link layer, to higher-level logic including both overlay networks, robotics, distributed machine learning, and applications like code dissemination and content distribution.

This talk will first present an overview of declarative networking research, with a focus on an emerging domain that aims to synthesize safe network routing through the use of formal techniques. Our first use case integrates high performance constraint solver with a declarative networking engine, in order to perform policy-based routing and channel selection in multi-radio wireless mesh networks. The second use case combines the use of routing algebra, SMT solvers, theorem provers, and declarative networking to synthesize provably safe inter-domain routing protocol implementations. I will conclude with a discussion of open issues, as well as survey ongoing research work in our NetDB@Penn (<http://netdb.cis.upenn.edu>) research group.

Biosketch:

Boon Thau Loo is an Assistant Professor in the Computer and Information Science department at the University of Pennsylvania. He received his Ph.D. degree in Computer Science from the University of California at Berkeley in 2006. Prior to his Ph.D, he received his M.S. degree from Stanford University in 2000, and his B.S. degree with highest honors from UC Berkeley in 1999. His research focuses on distributed data management systems, Internet-scale query processing, and the application of data-centric techniques and formal methods to the design, analysis and implementation of networked systems. He was awarded the 2006 David J. Sakrison Memorial Prize for the most outstanding dissertation research in the Department of EECS at UC Berkeley, and the 2007 ACM SIGMOD Dissertation Award. He is a recipient of the NSF CAREER award (2009). He has served as the program co-chair for the CoNEXT 2008 Student Workshop, the NetDB 2009 workshop co-located with SOSp, and the Workshop on Rigorous Protocol Engineering (WRiPE 2011) co-located with ICNP.

Seats are limited, please RSVP to pauline.wee@adsc.com.sg by 24th June with your name and institution details.