Towards a Scalable, High Performance, and Secure Many-Core Programming System

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Abstract

Many-core computing architectures such as GPUs are becoming first-class computing engines for accelerating important workloads including machine learning, genome analysis, graph processing, databases, and scientific simulation. Unfortunately, existing programming models deployed on many-core architecture are designed and optimized largely based on the assumptions for single-core/multi-core architectures. This talk focuses on the unique challenges that arise when programming many-core and how these challenges affect the design principles of a programming system. Specifically, I will talk about three fundamental components that are critical to the performance and the secure execution of programs running on a many-core processor: 1) enabling communication-aware program development and transformation, (2) integrating concurrency optimization into program tuning framework, and (3) supporting dynamic information flow tracking for data protection during program execution.

Bio

Zheng (Eddy) Zhang is an assistant professor in the Department of Computer Science at Rutgers University. She received the B.S. degree in Electronic Engineering from Shanghai Jiao Tong University, in 2004, and the M.S. and Ph.D. degrees in Computer Science from the College of William & Mary, in 2007 and 2012, respectively. Her research is generally in the area of compilers and programming systems, with a focus on development, compilation, and execution of large-scale application on many-core parallel architecture. She is the recipient of Google Faculty Research Award 2014, the Best Paper Award at PPoPP 2010, and the Best Student Paper Award at QEST 2008.

Faculty Host: Thu Nguyen