BINGHAMTON UNIVERSITY | Computer Science
STATE UNIVERSITY OF NEW YORK

COMPUTER SCIENCE RESEARCH SEMINAR

Application-Level Energy Accounting with Chappie

Anthony Canino, PhD Student
Department of Computer Science, Binghamton University

Friday, March 8, 2019 at noon in room R15, Engineering Building

Abstract: Energy accounting is a fundamental problem in energy management, defined as attributing global energy consumption to individual components of interest. The problem has been extensively studied at the hardware and OS levels. In this talk, I tackle the problem of *application-level energy accounting*, with the primary goal as determining the energy consumption at the finer-grained level of application logical units, such as methods, classes, and modules. The solutions to this problem are essential for application-level energy management, ranging from energy-aware programming languages and energy-adaptive software frameworks. As another source of motivation, energy accounting at the level of programming abstractions is essential for energy testing and debugging.

In energy management, energy optimization and energy accounting go hand in hand. As application-level energy optimization increasingly plays a pivotal role in energy-efficient computing, it is unfortunate that application-level energy accounting has not been systematically investigated. I introduce Chappie, a novel, general, and customizable runtime design for the energy accounting of Java applications. Given an application, Chappie is capable of attributing the global energy consumption to its logical units --- such as a method --- with a unique concurrency-aware, cross-layer, and sampling-based design. As a result, Chappie can effectively perform fine-grained application-level energy accounting in the presence of multi-threading in an application, co-running applications, foreign applications, system daemons, and thread migration. Our experiments demonstrate that Chappie enjoys a strong notion of *energy accounting isolation*, in that the normalized energy consumption for all methods in an application stays stable regardless of deployment scenarios.

Bio: Anthony Canino is a 5th year PhD candidate at Binghamton University, advised by Prof. Yu David Liu. His work focuses on bringing traditional programming language and software engineering techniques into the realm of application-level energy management.

Refreshments will be provided!