BINGHAMTON UNIVERSITY | Computer Science
STATE UNIVERSITY OF NEW YORK

COMPUTER SCIENCE RESEARCH SEMINAR

Rate Types for Stream Programs

Dr. Thomas Bartenstein
Department of Computer Science, Binghamton University

Friday, February 9th at noon in room R15, Engineering Building

Abstract: RATE TYPES is a novel type system to reason about and optimize data-intensive programs. Built around stream languages, RATE TYPES performs static quantitative reasoning about stream rates—the frequency of data items in a stream being consumed, processed, and produced. Despite the fact that streams are fundamentally dynamic, there are two essential concepts of stream rate control—throughput ratio and natural rate—which are intimately related to the program structure itself and can be effectively reasoned about by a type system. RATE TYPES is proven to correspond with a time aware operational semantics which supports parallelism. The strong correspondence result tolerates arbitrary schedules, and does not require any synchronization between stream filters. RATE TYPES is implemented on stream programs, demonstrating its effectiveness in predicting stream data rates in real-world stream programs. Applications of RATE TYPES are discussed, including an application of RATE TYPES to optimize energy consumption.

Bio: Tom Bartenstein graduated with a B.A. in Mathematics from Swarthmore College in 1979, and worked at IBM in Endicott as a computer programmer and software architect involved in Computer Aided Design for both printed circuit boards and microprocessor chips until 2001. Tom then worked for Cadence Design Inc, a Silicon Valley CAD group, specializing in software to test and diagnose manufacturing defects in computer chips until 2010, publishing several papers, and authoring over half a dozen patents in the field. In 2010, Tom quit his industry job to pursue his lifelong dream of teaching. Tom earned his PhD at Binghamton University in 2017, and is currently an Adjunct Lecturer at Binghamton University.

Pizza will be provided!