



Dr. Andreas Gerstlauer

Professor

University of Texas, Austin

Learning-Based System-Level Power and Performance Prediction

Abstract:

Next to performance, early power and energy estimation is a key challenge in the design of computer systems today. Traditional simulation-based methods are often too slow while existing analytical models are often not sufficiently accurate. In this talk, I will present our work on bridging this gap by providing fast yet accurate alternatives for power and performance modeling of software and hardware. In the past, we have pioneered so-called source-level and host-compiled simulation techniques that are based on back-annotation of source code with estimated target metrics, where annotated code is then further wrapped into abstract, lightweight operating system and platform simulation models to be natively executed on a simulation host. More recently, we have studied alternative approaches that employ advanced machine learning techniques to synthesize analytical proxy models that can accurately predict target power and performance purely from measurements obtained while executing the application on a different host. We have developed such learning-based approaches for both hardware and software. On the hardware side, learning-based models for white-box and black-box IPs reach simulation speeds of 1 Mcycles/s at 97% accuracy. On the software side, depending on the granularity at which prediction is performed, cross-platform prediction can achieve more than 95% accuracy at more than 1000 MIPS of equivalent simulation throughput.

Bio:

Andreas Gerstlauer is an Associate Professor in Electrical and Computer Engineering at The University of Texas at Austin. He received his Ph.D. in Information and Computer Science from the University of California, Irvine (UCI) in 2004. Prior to joining UT Austin in 2008, he was an Assistant Researcher in the Center for Embedded Computer Systems (CECS) at UC Irvine, leading a research group to develop electronic system-level (ESL) design tools. Commercial derivatives of such tools are in use at the Japanese Aerospace Exploration Agency (JAXA), NEC Toshiba Space Systems and others. Dr. Gerstlauer is co-author on 3 books and more than 100 publications. His work was recognized with the 2016 DAC Best Research Paper Award, the 2015 SAMOS Best Paper Award, and as one of the most influential contributions in 10 years at DATE in 2008. He received a 2016-2017 Humboldt Research Fellowship and has presented in numerous industry and conference tutorials. He currently serves as an Associate Editor for ACM TECS and TODAES journals, and he has served as Topic, Track or Program Chair of major international conferences such as DAC, DATE, ICCAD and CODES+ISSS. His research interests include system-level design automation, system modeling, design languages and methodologies, and embedded hardware and software synthesis.

Date: FR, March 10th, 2017

Time: 11:00 o'clock a.m.

Location: Gusshausstrasse 27-29, 3rd Floor, Seminar Room 121 (Room CA0322)

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