Curriculum Vitae

Shoaib Akram
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Education

Ph.D. Computer Science and Engineering, Ghent University, 2012-Present.
Advisor: Lieven Eeckhout

M.S. Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, 2009.
Advisor: Deming Chen

B.Sc. Electrical Engineering, University of Engineering & Technology, Lahore, Pakistan, 2006.
Advisor: Shahid H. Bokhari

Research Interests

Keywords: Performance analysis; Analytical modeling; Energy efficiency; Runtime scheduling; Managed runtimes; Heterogeneous multicores; Workload evaluation

Summary of Ph.D. Research: Making modern computer systems energy-efficient is of paramount importance. In recent times, a number of power and energy management techniques have made their way in modern devices. On the software side, modern applications are increasingly written using managed languages. The focus of my Ph.D. research is to enable energy-efficient execution of managed applications on modern hardware. Specifically my Ph.D. thesis makes two new contributions. First, my thesis proposes mechanisms to allow the managed runtime and the underlying architecture to cooperate in achieving a more energy-efficient execution. This resulted in new schedulers for running managed language applications on heterogeneous multicore processors. Second, my thesis proposes analytical modeling techniques to estimate the performance impact of different energy management techniques for managed multithreaded applications. This resulted in new analytical models for predicting the performance impact of DVFS for multithreaded managed applications.

Contributions of Previous Research: Before starting my Ph.D., I explored the sources of inefficiency in the software stack of a large-scale distributed application used for data streaming. My research shows that it is possible to gain several orders of magnitude in efficiency by rewriting the software stacks of modern streaming engines. My previous research has also proposed a novel metric for quantifying

Research Experience

June,2012 - Present
Doctoral student at Ghent University
Ph.D. Thesis Topic: Scheduling Managed Language Applications in Power-Constrained Environments
March,2010 - June,2012
Junior Researcher (Marie Curie Fellowship) at FORTH-ICS, Greece
Research Topic: Understanding and improving the scalability and efficiency of data-centric applications on modern servers

August,2007 - August,2009
Research Assistant (Fulbright Fellowship) at Coordinated Science Laboratory, University of Illinois
MS Thesis Topic: Workload adaptive shared memory multicore processors with reconfigurable interconnects
March,2006 - May,2007
Research Associate, Al-Khwarizmi Institute of Computer Science (KICS), Lahore
Development work: I worked on FPGA-based development using Xilinx CAD tools on a software-defined radio. I wrote VHDL code of the order of 1000+ lines of code.

Refereed Publications

Journals

1. **S.Akram**, J. Sartor, and L. Eeckhout, "DEP+BURST: Online DVFS Performance Prediction for Energy-Efficient Managed Language Execution," IEEE Transactions on Computers (TC), Submitted.

2. **S.Akram**, J. Sartor, K. Craeynest, W. Heirman, and L. Eeckhout, "Boosting the Priority of Garbage: Scheduling Collection on Heterogeneous Multicore Processors," ACM Transactions on Architecture and Code Optimization (TACO), 2016, Accepted.

3. **S.Akram**, A. Papakonstantinou, R. Kumar, D. Chen, "S. Akram, A. Papakonstantinou, R. Kumar, D. Chen, "A Workload-adaptive and Reconfigurable Bus Architecture for Multicore Processors," International Journal of Reconfigurable Computing (IJRC), Vol. 2010, 22 pages.

Conferences

4. **S.Akram**, J. Sartor, and L. Eeckhout, "DVFS Performance Prediction for Managed Multi-Threaded Applications," IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2016, **[Best paper nominee]**.

5. K. Craeynest, **S.Akram**, W. Heirman, A. Jaleel, and L. Eeckhout, "Fairness-aware scheduling on single-ISA heterogeneous multicores," International Conference on Parallel Architectures and Compilation Techniques (PACT), pp. 177-187, 2013.

6. **S.Akram**, M. Marazakis, and A. Bilas, "Understanding scalability and performance requirements of I/O-intensive applications on future multicore servers," IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS), pp. 171-180, 2012.

7. **S.Akram**, M. Marazakis, and A. Bilas, "Understanding and improving the cost of scaling distributed event processing," ACM International Conference on Distributed Event-Based Systems (DEBS), pp. 290-301, 2012.

8. **S.Akram**, R. Kumar, D. Chen, "Workload Adaptive Shared Memory Multicore Processors with Reconfigurable Interconnects," IEEE Symposium on Application Specific Processors (SASP), pp. 7-14, 2009.

9. **S. Akram**, S. Cromar, G. Lucas, A. Papakonstantinou, and D. Chen, "VEBoC: Variation and Error-Aware Design for Billions of Devices on a Chip," IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC), pp. 803-808, 2008.**(Invited)**

Workshops

10. **S.Akram** and A. Bilas, "A Sleep-based Communication Mechanism to Save Processor Utilization in Distributed Streaming Systems," Second Workshop on Computer Architecture and Operating System Co-design (CAOS), 2011.

11. **S.Akram**, M. Marazakis, and A. Bilas, "NUMA Implications for Storage I/O Throughput in Modern Servers," Third Workshop on Computer Architecture and Operating System Co-design (CAOS), 2012.

12. **S.Akram**, M. Marazakis, and A. Bilas, "Energy Inefficiency of Operating System Layers for Data-centric Infrastructures," 2nd workshop on Systems for Future Multi-core Architectures (SFMA), 2012.

Achievements and Honors

- Nominated for Best Paper Award at ISPASS 2016
- Marie Curie Initial Training Networks Fellowship (2010-2012)
- Fulbright Scholarship (2007-2009)
- Graduated from University of Engineering and Technology with Honors (2006)
- First Position from Crescent Model Higher Secondary School, Lahore, Pakistan (2001)

Reviewer Activities

Reviewed papers for several conferences including SLIP 2009, ICCAD 2009, CF 2011, ASPLOS 2015, CGO 2015, HPCA 2015; Also reviewer for Journal of Parallel and Distributed Computing

Teaching

Teaching Assistant for Computer Architecture [E034110] at Ghent University during Spring 2014, 2015, 2016

Relevant Skills

- Computer Architecture Simulators: SimpleScalar, M5, Sniper, McPAT
- EDA Tools: Altera/Xilinx FPGA Development tools, Synopsys Design Tools
- HDLs: Verilog, VHDL, SystemC
- Good experience with Linux scripting, basic utilities and system monitoring tools
- Programming Languages: C, C++, Java, Python
- Kernel and User level networking APIs: Sockets, Myrinet
- Moderate experience with parallel programming libraries: OpenMP, MPI
- Moderate experience with modifying the Jikes RVM MMTk

References

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