Ehsan Totoni

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Employment

Research Scientist, Programming Systems Lab, Intel (Santa Clara, CA), Apr 2015- present.

Postdoctoral Research Associate, University of Illinois at Urbana-Champaign, Jan 2015- Apr 2015.

Research Intern, Walt Disney Animation Studios, Jun 2012- Sep 2012.

Research Assistant, University of Illinois at Urbana-Champaign, Aug 2010 - Dec 2014.

Education

Ph.D., Computer Science, Research Area: Parallel Computing, 2010-2014.
University of Illinois at Urbana-Champaign
Advisor: Prof. Laxmikant V. Kale
GPA: 3.91/4.00
Internship: Walt Disney Animation Studios, summer 2012.
(research on large-scale parallel algorithms for cloth simulation)

M.Sc., Computer Science, 2010-2011.
University of Illinois at Urbana-Champaign
Advisor: Prof. Laxmikant V. Kale
GPA: 3.95/4.00

B.Sc., Computer Engineering, Focus on Software, 2006-2010.
Sharif University of Technology, Tehran, Iran
GPA: 18.66/20 (3.99/4.0)

Research Interests

- Parallel Programming
- Power and Energy Efficiency
- Simulation, Modeling, and Performance Analysis
- Scientific Computing

Programming Skills

- Proficient in C, C++, Java, MPI, Charm++, OpenMP, OpenCL, CUDA (GPU). Familiar with Fortran, C#, Cell BE Programming, Assembly, Prolog, Verilog, MATLAB, Python, Shell Script, System Programming.

Honors and Awards

- Selected for Doctoral Showcase at SC'14.
- Andrew and Shana Laursen Fellowship, Department of Computer Science, University of Illinois, Fall 2014.
- 3rd Place, ACM Student Research Competition Grand Finals, 2014.
- 1st Place, ACM Student Research Competition at SC'13 (invited to ACM SRC Grand Finals), "Structure-Aware Parallel Algorithm for Solution of Sparse Triangular Linear Systems", 2013.

- HPC Challenge Class II Finalist (Charm++ submission) at SC'12.
- 3rd Place, ACM Student Research Competition at SC'11 (invited to ACM SRC Grand Finals), "Optimizing All-to-all Algorithm for PERCS Network", 2011
- Submitted a complete solution to MEMOCODE 2010 Design Contest (GPGPU solution for intrusion detection), 2010.
- Honorary Admission for Graduate Study in Sharif Computer Engineering Department, 2009.
- Ranked 2nd Among about 120 Computer Eng. students based on overall GPA, 2010.
- Ranked 196th Among more than 350,000 participants in National University Entrance Exam, 2006.
- Selected for study in schools of National Organization for Development of Exceptional Talents (NODET) through an exam with less than 1% acceptance rate.

Studies In Progress

- E. Totoni, A. Langer, J. Torrellas, L. V. Kale, "Scheduling for HPC Systems with Process Variation Heterogeneity," 2014.

Publications

- A. Langer, E. Totoni, U. S. Palekar, L. V. Kale, "Energy-efficient computing for HPC workloads on heterogeneous manycore chips," *PMAM@PPoPP*, 2015.
- R. Gran, A. Shi, E. Totoni, M. Garzaran, "Evaluation of a Feature Tracking Vision Application on a Heterogeneous Chip," *SBAC-PAD*, 2014.
- E. Totoni, J. Torrellas, L. V. Kale, "Using an Adaptive HPC Runtime System to Reconfigure the Cache Hierarchy," *SC'14*.
- B. Acun et al., "Parallel Programming with Migratable Objects: Charm++ in Practice," *SC'14*.
- E. Totoni, N. Jain, L. V. Kale, "Power Management of Extreme-scale Networks with On/off Links in Runtime Systems," *to appear in ACM Transactions on Parallel Computing (TOPC)*, 2014.
- R. Gran Tejero, A. Shi, E Totoni, M. Garzaran, "Evaluation of a Feature Tracking Vision Application on a Heterogeneous Chip," *SBAC-PAD'14*.
- E. Totoni, M. T. Heath, L. V. Kale, "Structure-Adaptive Parallel Solution of Sparse Triangular Linear Systems," *Parallel Computing (ParCo), 40 (9)*, October 2014.
- E. Totoni, M. Dikmen, M. J. Garzaran, "Easy, Fast and Energy Efficient Object Detection on Heterogeneous On-Chip Architectures," *ACM Transactions on Architecture and Code Optimization (TACO),10 (4)*, December 2013.
- E. Totoni, M. Heath, L. V. Kale, "Structure-Aware Parallel Algorithm for Solution of Sparse Triangular Linear Systems," *Extended abstract, SC'13*.
- L. V. Kale, N. Jain, A. Langer, E. Meneses, P. Miller, O. Sarood and E. Totoni, "A Multi-resolution Emulation + Simulation Methodology," *MODSIM*, 2013.
- E. Totoni, N. Jain, L. V. Kale, "Toward Runtime Power Management of Exascale Networks by On/Off Control of Links," *HPPAC (in conjunction with IPDPS)*, 2013.
- E. Totoni, M. Heath, L. V. Kale, "Structure-Adaptive Parallel Solution of Sparse Triangular Linear Systems," *PPL Technical Report*, 2012.
- O. Sarood, P. Miller, E. Totoni, L. V. Kale, "'Cool' Load Balancing for High Performance Computing Data Centers," *IEEE Transactions on Computers (TC)*, 2012.
- E. Totoni, B. Behzad, S. Ghike, J. Torrellas, "Comparing the Power and Performance of Intels SCC to State-of-the-Art CPUs and GPUs," *ISPASS 2012*.
- E. Totoni, "Simulation-based Performance Analysis and Tuning for Future Supercomputers," *M.Sc. Thesis*, Department of Computer Science, University of Illinois at Urbana-Champaign, 2011.

- E. Totoni, L. V. Kale, “Optimizing All-to-All Algorithm for PERCS Network Using Simulation,” *Extended abstract, SC’11*.
- E. Totoni, A. Bhatele, E. J. Bohm, N. Jain, C. Mendes, R. Mokos, G. Zheng, L. V. Kale, “Simulation-based Performance Analysis and Tuning for a Two-level Directly Connected System,” *ICPADS 2011*.
- E. Totoni, A. Tavakol, G. B. Khosrovshahi, A. Khonsari, H. S. Azad, “Techniques for Utilizing Capabilities of Emerging Chip Multiprocessors in Enumerative Combinatorial Problems,” *IPM Technical Report*, 2010.
- E. Totoni, “Solving the problem of intersection numbers of Steiner Triple Systems of order 15 using a cluster based on Cell processor,” *B.Sc. Thesis*, Department of Computer Engineering, Sharif University of Technology, 2010.
- M. H. Khabbazian, H. Eslami, E. Totoni and A. Khadem, “High-throughput Stream Categorization and Intrusion Detection on GPU,” *MEMOCODE 2010*.

Presentations and activities

- SC’14 Paper Presentation,“Using an Adaptive HPC Runtime System to Reconfigure the Cache Hierarchy”, November 2014.
- Doctoral Showcase at SC’14,“Power and Energy Management of Modern Architectures in Adaptive HPC Runtime Systems”, November 2014.
- Invited Talk at Intel Labs,“Power and Energy Management of Modern Architectures using Adaptive Runtime Systems”, May 2014
- Charm++ Annual Workshop, “Cache Hierarchy Reconfiguration in Adaptive Runtime Systems”, 2014
- Invited Talk at Intel Labs,“Performance-energy Aware Mapping of Streaming Applications on Heterogeneous Chips”, April 2014
- Compiler Group’s Seminar Series at Illinois, “Easy, Fast and Energy Efficient Object Detection on Heterogeneous On-Chip Architectures”, Spring 2014
- CS598 lecture, “Parallel Sparse Triangular Linear Solve”, Fall 2013.
- Poster Reception and ACM Student Research Competition, “Structure-Aware Parallel Algorithm for Solution of Sparse Triangular Linear Systems”, SC’13.
- Illinois Symposium on Parallelism poster session, “Easy, Fast and Energy Efficient Object Detection on Heterogeneous On-Chip Architectures”, 2013.
- Reviewer for ParCo, 2013.
- Charm++ workshop, “Toward Runtime Power Management of Exascale Networks by On/Off Control of Links”, 2013
- Reviewer for IPDPS, 2013
- Disney Animation Studios Science Fair Poster session, “Accelerating Cloth Simulation on Clusters”, 2012
- Intel-Illinois Parallelism Center (I2PC) seminars, “Comparing the Power and Performance of Intels SCC to State-of-the-Art CPUs and GPUs”, 2012.
- Charm++ Annual Workshop, “Structure-Adaptive Parallel Solution of Sparse Triangular Linear Systems”, 2012.
- “Comparing the Power and Performance of Intels SCC to State-of-the-Art CPUs and GPUs”, *ISPASS 2012*.
- Poster Reception and ACM Student Research Competition, “Optimizing All-to-All Algorithm for PERCS Network Using Simulation”, SC 2011
- Advanced Compilers Course, “Coarse-Grain Parallelism”, 2011

- Charm++ Annual Workshop, “Large Scale Simulations Enabled by BigSim” with Dr. Gengbin Zheng, 2011
- CS Department Grad Expo Poster Session, “Tune up for Blue Waters Before it Arrives! BigSim: Performance Analysis for a Future System”, 2011
- Teaching Assistance: Computer Simulation and Theory of Machines and Languages, Digital Electronics
- Organizing Committee Member and Lecturer for two sessions of IPM Workshop on GPGPU Programming, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran, 2010.
- Organizing Committee Member and Lecturer for two sessions of IPM Workshop on Cell/BE Programming, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran, 2010.
- Multicore Programming an Overview, Parallel Algorithms graduate course, Computer Engineering Department, Sharif University of Technology, Tehran, Iran, 2009.
- New high performance Architectures for Scientific Computing, IPM Vision Group, School of Mathematics, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran, 2009.
- An Introduction to Cell BE Processor, Scientific and Engineering Presentation course, Sharif University of Technology, Tehran, Iran, 2009.

Selected Projects

Past Projects in Parallel Programming Lab:

- Performance and energy of heterogeneous on-chip architectures (in collaboration with I2PC), Parallel solution of sparse triangular systems, Power management of HPC networks, performance and portability of Adaptive MPI (AMPI), Climate simulation, Charm++ on Intel’s Single-Chip Cloud Computer (SCC), Exascale Studies, BigSim, performance prediction of parallel 3D FFT on Blue Waters

Projects at Institute for Research in Fundamental Sciences (IPM):

- Porting Minuit routines (physics of particles) to clusters of Cell BE Processor, High-Performance solution of intersection problem of Steiner Triple Systems of order 15 (Design Theory) on chip-multiprocessor clusters, Parallel Enumeration of cospectral graphs of order 12 (Algebraic Graph Theory), High-Performance enumeration of all connected graphs up to order 11 for testing conjectures involving colorful paths, High-performance solution of non-linear algebraic equations on GPU-based clusters