Saeed Maleki

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Education

Ph.D. in Computer Science, Spring 2009 - Fall 2015
University of Illinois at Urbana-Champaign, Urbana, IL
Title: Communication Avoiding Parallel Algorithms for Amorphous Problems
Advisers: Professor David Padua and Research Associate Professor Maria Garzaran
GPA: 3.97/4.00

Double Major B.Sc. in Mathematics and Computer Science, Fall 2004 - Fall 2008
Sharif University of Technology, Tehran, Iran.
GPA: 18.0/20

Research Interest

- **Efficient parallel algorithms for seemingly sequential and amorphous problem**
- **Language design and implementation for parallel computation**
- **Compiler analysis and evaluation**

Awards and Honors

- *Invited to publish our work on "Parallelizing Dynamic Programming Through Rank Convergence" as a Communication of the ACM (CACM) Research Highlight (RH)* 2016
  - 12-24 papers are selected annually as the most significant result among all papers published in computing by the CACM-RH editorial board
  - Selected as the only SIGPLAN research highlight paper in 2015 by the SIGPLAN Research Highlight Committee
- Awarded Computer Science Annual Fund Scholarship by the Computer Science Department at University of Illinois at Urbana-Champaign, Urbana, IL 2015
- Awarded Parallel Architectures and Compilation Techniques (PACT) Conference travel grant, Galveston Island, TX 2011
- *Ranked 2^{nd} (Silver Medal) among more than 20,000 contestants in the 21^{st} National Mathematics Olympiad, Iran* 2003
- *Qualified to study two majors (Mathematics and Computer Science) simultaneously at Sharif University of Technology, Iran* 2006

Research Experience

- **Microsoft Research**
  Senior Research Software Development Engineer, at RiSE Research Group May 2017 - Present
  Working on designing and implementing parallel methods for inherently sequential machine learning algorithms.
- **Microsoft Research**
  Post-Doctoral Researcher, at RiSE Research Group November 2015 - May 2017
  Working on designing and optimizing parallel algorithms for a range of problems including big data analytics and machine learning algorithms.

- **University of Illinois at Urbana-Champaign**
  Graduate Research Assistant, Supervised by Professor David Padua and Research Associate Professor Maria Garzaran Spring 2009 - Fall 2015
  Worked on my PhD dissertation about communication avoiding parallel algorithms for amorphous problems.
- **Microsoft Research**
  Research Intern, Supervised by Madanlal Musuvathi at RiSE Research Group Spring 2014
  Worked on parallelizing high-dimension Hidden-Markov Model (HMM) solvers including voice recognition algorithms.
- **Microsoft Research**
  Research Intern, Supervised by Madanlal Musuvathi in RiSE Research Group Summer 2013
  Worked on parallelizing inherently sequential dynamic programming algorithms.
- **Microsoft**
  Intern, Supervised by Jim Radigan in Microsoft Visual Studio Summer 2012
  Worked on auto-vectorization for Visual C++ Dev.
- **Carnegie Mellon University, Spiral Project**
  Visiting Scholar, Supervised by Associate Research Professor Franz Franchetti Summer 2011
  Worked on highly optimized digital signal processing (DSP) code generator for ARM processor.

Publications

- Zhangxiaowen Gong, Zhi Chen, Justin Szaday, David Wong, Zehra Sura, Neftali Watkinson, **Saeed Maleki**, David Padua, Alexander Veidenbaum, Alexandru Nicolau, Josep Torrellas. An Empirical Study of the Effect of Source-level Loop Transformations on Compiler Stability. *Object-oriented Programming, Systems, Languages, and Applications (OOPSLA'18)*, Boston, MA, Nov 2018.
- **Saeed Maleki**, Madanlal Musuvathi, Todd Mytkowicz. Semantics-Preserving Parallelization of Stochastic Gradient Descent. *32nd IEEE International Parallel & Distributed Processing Symposium (IPDPS'18)*, Vancouver, British Columbia, Canada, May 2018.
- Zhi Chen, Zhangxiaowen Gong, Justin Josef Szaday, David C. Wong, David Padua, Alexandru Nicolau, Alexander V Veidenbaum, Neftali Watkinson, Zehra Sura, **Saeed Maleki**, Josep Torrellas, Gerald DeJong. LORE: A Loop Repository for the Evaluation of Compilers, *2017 IEEE International Symposium on Workload Characterization (IISWC 2017)*, Seattle, WA, October 2017.
- **Saeed Maleki**, Madanlal Musuvathi, Todd Mytkowicz. Efficient Parallelization Using Rank Convergence in Dynamic Programming Algorithms, *Communication of the ACM (CACM) Journal as a Research Highlight*, Vol. 59, No. 10, October 2016.
- **Saeed Maleki**, Donald Nguyen, Andrew Lenharth, David Padua, Keshav Pingali. DSMR: A Shared and Distributed Memory Algorithm for Single-Source Shortest Path Problem. *The 30th International Conference on Supercomputing (ICS'16)*, Istanbul, Turkey, June 2016.
- **Saeed Maleki**, Donald Nguyen, Andrew Lenharth, David Padua, Keshav Pingali. DSMR: A Shared and Distributed Memory Algorithm for Single-Source Shortest Path Problem. *The 19th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP'16) as a poster*, Barcelona, Spain, March 2016.
- Charith Mendis, Jasha Droppo, **Saeed Maleki**, Madanlal Musuvathi, Todd Mytkowicz, Geoffrey Zweig. Parallelizing WFST Speech Decoders, *To appear in the 41st International Conference on Acoustics, Speech and Signal Processing (ICASSP'16)*, Shanghai, China, March 2016.
- **Saeed Maleki**, Madanlal Musuvathi, Todd Mytkowicz. Low-Rank Methods for Parallelizing Dynamic Programming Algorithms, *ACM Transactions on Parallel Computing Journal (TOPC)*, Vol. 2, Issue 4, March 2016.

- **Saeed Maleki**, G. Carl Evans, David Padua. Tiled Linear Algebra: A System for Parallel Graph Algorithms, *The 27th International Workshop on Languages and Compilers for Parallel Computing (LCPC'14)*, Hillsboro, Oregon, September 2014.
- **Saeed Maleki**, Madanlal Musuvathi, Todd Mytkowicz. Parallelizing Dynamic Programming Through Rank Convergence, *The 19th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP'14)*, Orlando, Florida, February 2014. Selected as a SIGPLAN Research Highlight, May 2015.
- Albert Sidelnik, **Saeed Maleki**, Maria Garzaran, Brad Chamberlain, David Padua. Performance Portability with the Chapel Language, *26th IEEE International Parallel & Distributed Processing Symposium (IPDPS'12)*, Shanghai, China, May 2012.
- **Saeed Maleki**, Yaoqing Gao, Maria Garzaran, Tommy Wong, David Padua. An Evaluation of Vectorizing Compilers, *Parallel Architectures and Compilation Techniques (PACT'11)*, Galveston Island, Texas, October 2011.
- Maria Garzaran, **Saeed Maleki**, William Gropp, David Padua. Program Optimization through Loop Vectorization, Tutorial, Presented in *PLDI'11, CGO'11, SC'10*.

Patents

- **Parallel Dynamic Programming through Rank Convergence**, Todd Mytkowicz, Madanlal Musuvathi, Saeed Maleki.
  U.S. Patent No. 9,195,436 B2, 2015
- **Systems, Methods, and Computer-Readable Media for Parallel Stochastic Gradient Descent with Linear and Non-Linear Activation Functions**, Saeed Maleki, Madanlal S. Musuvathi, Todd D. Mytkowicz.
  Filed with the U.S. Patent and Trademark Office on 5/22/2017.
- **Implementing Network Security Measures in Response to a Detected Cyber Attack**, Saeed Maleki, Madanlal S. Musuvathi, Todd D. Mytkowicz.
  Filed with the U.S. Patent and Trademark Office on 6/15/2017.
- **Determining a Likelihood of a Resource Experiencing a Problem Based on Telemetry Data**, Saeed Maleki, Madanlal S. Musuvathi, Todd D. Mytkowicz.
  Filed with the U.S. Patent and Trademark Office on 6/15/2017.
- **Determining a Course of Action Based on Aggregated Data**, Saeed Maleki, Madanlal S. Musuvathi, Todd D. Mytkowicz.
  Filed with the U.S. Patent and Trademark Office on 6/15/2017.

Talks

- **Communication Avoiding Parallel Algorithms for Amorphous Problems**
  - Microsoft Research, Redmond, WA. Spring 2015
  - Intel Labs, Hillsboro, OR. Spring 2015
  - Final Defense at University of Illinois at Urbana-Champaign, Urbana, IL. Fall 2015
- **Tiled Linear Algebra: A System for Parallel Graph Algorithms**
  - LCPC'14 Workshop, Hillsboro, OR. Fall 2014
  - Compiler Seminar at University of Illinois at Urbana-Champaign, Urbana, IL. Fall 2014
- **Parallelizing Voice Recognition Algorithms**
  - Microsoft Research, Redmond, WA. Spring 2014
- **Parallelizing Dynamic Programming Through Rank Convergence**
  - PPoPP'14 Symposium, Orlando, FL. Spring 2014

  - Compiler Seminar at University of Illinois at Urbana-Champaign, Urbana, IL. Fall 2013
  - Microsoft Research, Redmond, WA. Summer 2013

- **DSMR: A Shared and Distributed Memory Algorithm for Single-Source Shortest Path Problem**
  - Microsoft Research, Redmond, WA. Summer 2013
- **Auto-Vectorization for Visual Studio C/C++ Compiler**
  - Microsoft, Redmond, WA. Summer 2012
- **An Evaluation of Vectorizing Compilers**
  - PACT'11 Compiler, Galveston Island, TX. Fall 2011
  - Intel, Champaign, IL. Spring 2012
  - UPCRC Symposium, Microsoft Research, Redmond, WA. Fall 2010
  - Carnegie Mellon University, Pittsburgh, PA. Summer 2011
- **Highly-Optimized Digital Signal Processing Code Generator for ARM**
  - Carnegie Mellon University, Pittsburgh, PA. Summer 2011

Professional Activities

- Program Committee member for SC'18 and PACT'17, External Review Committee member for PLDI'16. Artifact Evaluation Committee member for POPL'16 and PLDI'14, Reviewer for Euro-Par'17, ASPLOS'16, JPDC'16, IA^ 3'15, Euro-Par'15, SC'15, PACT'15, JPDC'15, PACT'15, SC'15, TPDS'15, PACT'14, CC'13, JPDC'12, JPDC'10.
- Member of Grad Student Admission Committee at UIUC, Department of Computer Science, 2012.

Skills

- **Programming:** C, C++, C#
- **Parallel Programming:** MPI, OpenMP, PThreads, Chapel, Vector Instructions for AltiVec, SSE/AVX and NEON
- **Operating Systems:** Linux, Windows, AIX
- **Mathematical Background:** Linear Algebra, Combinatorics, Abstract Algebra, Real Analysis