Phil Miller

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Education

Ph.D. Computer Science, University of Illinois at Urbana-Champaign
Thesis: "Reducing Synchronization in Distributed Parallel Programs"
Parallel Programming Laboratory under Professor Laxmikant Kalé
B.S. Computer Science, Harvey Mudd College

Experience

Research and Development

Chief Technology Officer
August 2016 – Present
Charmworks Inc.

- Principal Investigator (PI) on awarded $130k phase 1 SBIR grant from US Department of Energy for development of Adaptive MPI
- Lead Charm++ and Adaptive MPI development in support of future application needs
- Recruited new Charm++ developers from academia, national laboratories, and industry for pilot projects and production applications

Senior Engineer
April 2014 – August 2016
Charmworks Inc.

- Contributed to awarded $1MM phase 2 SBIR grant from US Department of Energy for continued Charm++ development, as lead author for the commercialization plan and secondary author on technical proposal
- Sustain Charm++ development across several releases (6.7.0, 6.7.1), and support growing adoption by new users

Research Assistant
Fall 2008 – Summer 2016
Parallel Programming Laboratory
Department of Computer Science
University of Illinois at Urbana-Champaign

- Studying how to ease writing parallel software with higher performance than prevalent models
- Port the Chombo distributed parallel AMR framework from MPI to Charm++ with minimal necessary modifications to overlying application code
- Add new capabilities to the BigSim parallel machine emulator and simulator for MPI and AMPI applications
- Implement message-driven interaction with and type-checked mode enforcement for Multiphase Shared Arrays library, and demonstrate application utility
- Implement an asynchronous parallel output library, and apply it in the NAMD biomolecular simulation application.
- Improve the scalability of the ISAM climatic land-surface model and increase absolute performance by 20× through parallel-in-time input and data-parallel output.

- Maintain Charm++ runtime system, including fixing bugs, answering user questions, and preparing stable releases (6.1.2, 6.2.0–6.2.2, 6.3.0–6.3.2, 6.4.0, 6.5.0–6.5.1, 6.6.0).

Student Intern
Summer 2011
Lawrence Livermore National Laboratory

- Participate in developing a general-purpose dataflow analysis infrastructure for the ROSE compiler framework aimed at source transformations of MPI applications
- Help staff improve the build system and version control usage

Software Engineering Intern
Summer 2008
Green Hills Software

Port the μVelosity embedded operating system to the ARC ISA, including support for compiling with a non-GHS tool chain

Computer Science Clinic Team Member and Spring Project Manager
Fall 2007 – Spring 2008
Harvey Mudd College and Fair Isaac

Develop an interactive debugging and visualization environment for the external sponsor's research work on automated theorem provers.

REU Research Scholar
Summer 2007
Department of Computer Science
Harvey Mudd College

- Research specializing garbage collection algorithms to complicated data structures
- Develop a range of algorithms applicable to the Driscoll-Tarjan split-node persistence structure

REU Research Scholar
Summer 2006
Department of Electrical and Computer Engineering
New Jersey Institute of Technology

Research high-bandwidth applications in mobile ad-hoc Wi-Fi networks using the NS-2 network simulator

Undergraduate Technical Intern
Summer 2005
Information Assurance Technology Department
The Aerospace Corporation

- Design and develop email-based proof-of-concept for Adaptive Security Infrastructure R&D project
- Work with a team of three other developers to assemble a real-time demonstration of Adaptive Security Infrastructure system in an Emulab-based simulated network environment

Anti-Spam Research Group
June 2003 – October 2004
Internet Engineering Task Force

- Contributed to draft proposal "Lightweight MTA Authentication Protocol" to ensure continued interoperability between large and small mail systems. This evolved into the present-day SPF standard.
- Authored "Email Processing Header" draft to standardize spam filtering headers
- Participant in Filtering and SMTP Verification subgroups

Teaching

Tutorial Presentations

"Advanced Topics in Charm++ Programming". 15th Workshop on Charm++ and its Applications, 2017.
"Parallel Programming with Charm++". University of Utah Scientific Computing Institute, 2016.
"Parallel Programming with Charm++". Lawrence Berkeley National Laboratory, 2013.
"Parallel Programming with Charm++". 25th International Conference on Supercomputing, 2011.
"Parallel Programming with Charm++ and AMPI". Lawrence Livermore National Laboratory, August 2011.

Grader and Tutor
Department of Computer Science
Harvey Mudd College

- Courses: Computability and Logic, Algorithms
- Hold regular tutoring hours for students to receive help with coursework
- Grade homework and some exams, including development of answer keys and scoring rubrics
- Help instructors identify sections of course material requiring reinforcement

Publications

Journal Papers

Osman Sarood, **Phil Miller**, Ehsan Totoni, Laxmikant Kale. "'Cool' Load Balancing for High Performance Computing Data Centers". *IEEE Transactions on Computers*. 2012.

Phil Miller, Aaron Becker, Laxmikant V. Kalé. "Using Shared Arrays in Message-Driven Parallel Programs". *Parallel Computing* (ParCo). Revised from "Composing Message-Driven Execution and Distributed Shared-Array Parallel Programs", presented at HIPS 2011 (below).

Conference Papers

Bilge Acun, **Phil Miller**, Laxmikant Kale. "Variation Among Processors Under Turbo Boost in HPC Systems". In proceedecings of ACM International Conference on Supercomputing (ICS). 2016.

Phil Miller, Michael Robson, Bassil El-Masri, Rahul Barman, Gengbin Zheng, Atul Jain, Laxmikant Kale. "Scaling the ISAM Land Surface Model Through Parallelization of Inter-Component Data Transfer". In proceedings of the International Conference on Parallel Processing (ICPP). 2014.

Jonathan Lifflander, Esteban Meneses, Harshitha Menon, **Phil Miller**, Sriram Krishnamoorthy, Laxmikant Kale. "Scalable Replay with Partial-Order Dependencies for Message-Logging Fault Tolerance". In proceedings of IEEE Cluster. 2014.

Jonathan Lifflander, **Phil Miller**, Laxmikant Kale. "Adoption Protocols for Fanout-Optimal Fault-Tolerant Termination Detection". Proceedings of ACM Conference on Principles and Practices of Parallel Programming (PPoPP). 2013.

Akhil Langer, Jonathan Lifflander, **Phil Miller**, Kuo-Chuan Pan, Laxmikant Kale, Paul Ricker. "Scalable Algorithms for Distributed-Memory Adaptive Mesh Refinement". In proceedings of *SBAC-PAD 2012*.

Jonathan Lifflander, **Phil Miller**, Ramprasad Venkataraman, Anshu Arya, Terry Jones, Laxmikant Kale. "Mapping Dense LU Factorization on Multicore Supercomputer Nodes". Proceedings of IEEE International Parallel and Distributed Processing Symposium (IPDPS) 2012.

Workshop Papers

Laxmikant Kale, Nikhil Jain, Akhil Langer, Esteban Meneses, **Phil Miller**, Osman Sarood, Ehsan Totoni. "Position Paper: A Multi-resolution Emulation + Simulation Methodology". DOE Workshop on Modeling and Simulation of Exascale Systems and Applications (MODSIM) 2013.

Phil Miller, Shen Li, Chao Mei. "Asynchronous Collective Output With Non-Dedicated Cores". Workshop on Interfaces and Architectures for Scientific Data Storage (IASDS), in conjunction with IEEE Cluster, 2011.

Phil Miller, Aaron Becker, Laxmikant V. Kalé. "Composing Message-Driven Execution and Distributed Shared-Array Parallel Programs". 16th International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS 2011), in conjunction with IPDPS 2011.

Aaron Becker, **Phil Miller**, Laxmikant V. Kalé. "PGAS in the Message-Driven Execution Model". Presented at the 1st Workshop on Asynchrony in the PGAS Programming Model (APGAS), 2009, in conjunction with ICS 2009.

John Byrnes, Michael Buchanan, Michael Ernst, **Philip Miller**, Chris Roberts, Robert Keller. "Visualizing Proof Search for Theorem Prover Development". Proceedings of the 8th International Workshop on User Interfaces for Theorem Provers (UITP 2008). ENTCS Volume 226.

Technical Reports

L.V. Kalé et al. "Charm++ for Productivity and Performance: A Submission to the 2011 HPC Class II Challenge". Parallel Programming Laboratory Technical Report 11-49, 2011.

Jonathan Lifflander, **Phil Miller**, Ramprasad Venkataraman, Anshu Arya, Terry Jones, Laxmikant Kale. "Exploring Partial Synchrony in an Asynchronous Environment Using Dense LU". Parallel Programming Laboratory Technical Report 11-34, 2011.

Presentations

"New Paradigms in Parallel Programming". 7th Annual Workshop on Charm++ and its Applications, 2009.
"Debugging Large Scale Applications in a Virtualized Environment". Presented at Languages and Compilers for Parallel Computing (LCPC), 2010, on behalf of Filippo Gioachin.
"Using distributed shared-array abstractions in a virtualized message-driven execution environment". 9th Annual Workshop on Charm++ and its Applications, 2011.
"Composable Libraries for Parallel Programming". SIAM Conference on Parallel Processing for Scientific Computing (PP) 2012.
"The Need for Well-Factored Dynamic Parallel Programming Systems, and Why Charm++ is a Good Choice". Invited talk at Los Alamos National Laboratory, 2014.