PHYLLIS E. GUSTAFSON
(AKA Phyllis E. Crandall)

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ACADEMIC BACKGROUND

Ph.D. Computer Science.
Dissertation: Data Decomposition and Load Balancing for Networked Data-Parallel Processing, Michael J. Quinn, advisor.
Oregon State University, Corvallis, Oregon.

M.S. Computer Science: Artificial Intelligence, Computational Linguistics.
University of Idaho, Moscow, Idaho.

B.S. Mathematics: Applied Mathematics.
Boise State University, Boise, Idaho.

B.A. English Literature. Minors in German and Education.
Grove City College, Grove City, Pennsylvania.

Additional studies in Physics at University of New Mexico and Electrical Engineering and Computer Science at Stanford University.

EMPLOYMENT HISTORY

3/2008–present
Senior Software Engineer, Sensis Corporation. Member of 3D PAM project developing traffic control software. Project sponsored by the FAA and NASA.

12/2006–3/2008
Staff Engineer, PayPal (eBay). Restructured portions of the core financial engine code to enhance performance and scalability. Designed and implemented automation fixtures to validate correct execution flows and results.

10/2004–11/2006
Staff Engineer (Software), Sun Microsystems Laboratory, Menlo Park, CA. High Productivity Computer Systems, DARPA HPCS Phase II Program NBCH3039002. Devised methods for using dynamic automatic parallelization capabilities in the dynamic compilation system for the proposed petascale computer. Developed and ran experiments that tested the expected performance of those methods.

9/2003–10/2004
Staff Engineer (Software), Sun Microsystems Laboratory, Mountain View, CA. High Productivity Computer Systems, DARPA HPCS Phase II Program NBCH3039002. Modeled the performance of various applications for the proposed architectures and configurations for high productivity computing prescribed by DARPA.

8/2000–9/2003
Staff Engineer (Software), Sun Microsystems, Menlo Park, CA. Forte Development Tools, C++ compiler. Added OpenMP parallel processing functionality to Sun's C++ compiler front end. Served in the Working Group of the OpenMP Architecture Review Board that defined the OpenMP 2.0 and 2.5 standards.

4/2000–8/2000
Staff Engineer (Software), Sun Microsystems, Menlo Park, CA. HPC developer for ClusterTools parallel performance tools.

1997–3/2000
Member of Technical Staff, Los Alamos National Laboratory, Los Alamos, NM. Identified bottlenecks in scientific codes and optimized performance. Designed and implemented the Memory Utilization Tracking Tool (MUTT) that allowed the user to see NUMA effects on memory accesses in a distributed shared memory architecture. The Jet Propulsion Laboratory (JPL) User's Guide for my tool can be seen at http://sc.jpl.nasa.gov/hardware/origin2000/using/mutt.html. Funded by the Accelerated Strategic Computing Initiative (ASCI) of the Department of Energy.

1995–1997
Assistant Professor (tenure-track), Department of Science and Engineering, University of Connecticut.
Courses taught: Compiler Technology, Parallel and High Performance Computing.
Achieved the highest teaching evaluations in the department for each semester.
Research funded by the National Science Foundation and the University of Connecticut Research Foundation.

1994–1995
Postdoctoral Research Associate under Andrew Chien and Dan Reed, Department of Computer Science, University of Illinois at Urbana-Champaign.
Member of the Performance Evaluation Working Group of the Scalable I/O Initiative. Measured and improved the I/O performance of parallel technical and scientific applications targeted by DARPA.

1992–1994
Research Assistant to Prof. Michael J. Quinn, Department of Computer Science, Oregon State University. Projects included porting the Dataparallel C compiler to various architectures, and improving and optimizing the cluster version of the compiler. Funded by NSF.

1990–1992
Teaching Assistant, Department of Computer Science, Oregon State University.
Courses taught: Introduction to Computer Science, Introduction to Data Structures, Fundamentals of Programming Languages.
Guest Lecturer for: Parallel Processing, Operating Systems, Advanced Operating Systems. Achieved the highest teaching evaluation ever recorded in the department.

COMPUTER SKILLS

Computing Platforms:

Workstations: Sun, SGI, HP, IBM RS/6000.
Personal Computers: IBM and PC-compatibles, Macintosh.
Parallel/Distributed Computers: Clusters, grids, Cray/SGI Origin 2000, Intel Paragon, Meiko CS-2, nCUBE, Sequent.

Languages and Libraries:

C, C++, Fortran, MPI, PVM, OpenMP, Pthreads, various assembly languages (Intel x86, MIPS, SPARC), scripting languages, and the message-passing and shared-memory formalisms native to the previously listed machines.

Operating Systems Used:

Unix (BSD and SVR4) including SunOS, Solaris, OS X, HP-UX, AIX and Linux. DOS, Windows-95, Windows XP. Operating systems native to the parallel machines previously listed.

Miscellaneous:

GNU compilers and tools, ClearCase, SCCS, lex, yacc, sockets programming.

PATENTS

Method and Apparatus For Accuracy-Aware Analysis (2004 pending)
Method and System for Memory Protection by Processor Carrier Based Access Control (2005 pending)
Metadata Management for Scalable Process Location and Migration (2005 pending)
Using a Concurrent Partial Inspector Loop with Speculative Parallelism (2005 pending)
NUMA Physical Memory Allocation via Nearest-First Search (2006 pending)
Check on Writes: Enabling a Synchronization-Free and Parallel Commit Phase (2006 pending)
Dynamic Selection of the Memory Virtualization Mechanism (2006 pending)
Hybrid Mechanism for Memory Virtualization (2006 pending)
Reserved Local Contiguous Address Space and Memory Hole Elimination (2006 pending)
Memory Protection in a Computer System Employing Memory Hole Elimination (2006 pending)
A Method for Function Based Page Mapping (2006 pending)
Using Police Threads to Detect Dependence Violations to Reduce Speculative Parallelization Overhead (2006 pending)

CONSULTING

1996-2000: United Technologies, Pratt and Whitney, East Hartford, CT. Expert advisor on existing technology for workstation cluster parallel computing.

SYSTEMS DESIGNED/IMPLEMENTED

2004–2006 Prototype framework to study various speculative parallelization techniques for use with dynamic compilation.

2003–2004 Prototype software system for an accuracy-aware debugging environment for numerical applications (patent pending).

2000–2003
OpenMP layer in the Forte Tools C++ compiler. Design and implementation of the compiler front-end to recognize OpenMP directives.

1997–2000
The Memory Utilization Tracking Tool (MUTT) that tracks the physical location of virtual memory for processes in the ASCI "Blue Mountain" machine.

1996–1997
A Software Advisory System for Parallel Processing on Workstation Clusters. Funded by University of Connecticut Research Foundation 9601A100.

1996–1997
A Software Support System for Parallel Processing in Multiprocessor Clusters. Funded by NSF CCR-9625959.

MANAGEMENT EXPERIENCE

INDUSTRY MANAGEMENT 2000–2003

C++ OpenMP: Acted as coordinator for all aspects of implementing OpenMP in the C++ compiler front-end. Got commitment from and coordinated with other internal directorates, aided in contract negotiations to obtain external testing, oversaw the work of geographically dispersed contract programmers, designed and wrote the majority of the code, analyzed test results and directed changes in design when needed, assigned and tracked the status of filed bugs, and brought the project to code freeze deadline on time.

RESEARCH MANAGEMENT 1995–1997

M.S. Students: Advised and directed the research of two candidates for the Master of Science degree.
Independent: Directed the independent research of six graduate students and one senior design project.

GRANTS AND AWARDS

NSF Research Planning Grant: A Software Support System for Parallel Processing in Multiprocessor Clusters. NSF CCR-9625959, $18,000. Funded effective 6/15/96.

Faculty Research Grant: A Software Advisory System for Parallel Processing on Workstation Clusters. University of Connecticut Research Foundation 9601A100, $10,220. Funded effective 6/1/96.

NSF Travel Grant: CRA Workshop on Academic Careers for Women in Computer Science, Washington, D.C., November, 1994.

Outstanding GRA: Outstanding Graduate Research Assistant Award, School of Engineering, Oregon State University, 1994.

Best Paper: Graduate Congress 93, Computer Science, Mathematics, and Statistics session. Oregon State University, April 1993.

Predoctoral Award: Association for Women in Science Educational Foundation (12 awarded nationwide), 1993.

NSF Sponsored Participant: Windows of Opportunity Symposium for Female Students in Computing, co-hosted by Computing Research Association (CRA) and The George Washington University. Washington, D.C., May 1993.

INVITED PRESENTATIONS

April 2006: Run-Time Speculative Parallelization. Co-presenter with Mikel Lujan. Intellectual Dessert Seminar Series, Sun Microsystems.

April 2005: Automatic Parallelization in Hero. HPCS System Exploration Meeting, Sun Microsystems.

January 2002: Transfer of Information presentation on OpenMP for internal software engineers and support staff. Sun Microsystems.

March 1999: Toward a Theory of Parallel Programming in Hierarchical Memory Systems. Iowa State University.

September 1997: The Metacomputer: Industrial Strength Cluster Computing. Booth Research Center.

April 1997: Networked Multi-Level Parallel Processing: Issues and Challenges. Booth Research Center.

April 1997: Efficient Multi-Level Parallel Processing in a Networked Environment. Los Alamos National Laboratory.

September 1996: Tutorial on Networked Distributed Computing Using PVM. Eighth Booth Research Center Symposium.

October 1995: High Performance Cluster Computing: An Emerging Computational Paradigm, Hartford Graduate Center.

February 1995: Scalable I/O for High Performance Computing, BrighamYoung University.

September 1993: Network Parallel Programming: A New Paradigm in High Performance Computing, Association for Women in Science.

February 1993: A Block Data Decomposition Method for Grid Problems on Distributed Heterogeneous Processors, Oregon State University.

October 1992: Hyperweave, a Fault Tolerant Network, Oregon State University.

September 1990: Computer Noun-Noun Interpretation, University of Idaho.

PROFESSIONAL SERVICE

Committee Member, *OpenMP Architecture Review Board working group*. 2001-2003.

Judge, *Los Alamos Science Fair, IEEE awards*, 1999, 2000.

Program Committee, *Sixth International Symposium on High Performance Distributed Computing*, 1996–1997.

Session Chair, *Sixth International Symposium on High Performance Distributed Computing*, August 5-8, 1997.

Session Chair, *Sixth Symposium on the Frontiers of Massively Parallel Computation, Annapolis*, MD, October 27–31, 1996.

PUBLICATIONS

REFEREED PUBLICATIONS

Lujan, M., Gustafson, P., Paleczny, M., and Vick, C, "Speculative Parallelization – Eliminating the Overhead of Failure," *High Performance Computation Conference 2007*, September 2007.

Qui, S., Zhou, F. and Crandall, P. E., "Discrete Gabor Transforms with Complexity O(N log N)," *Signal Processing*, vol. 77, no. 2, pp. 159–170, Sept 1999.

Crandall, P. E. and Leichtl, J., "Performance of Distributed Memory Methods in Multiprocessing Clusters," *Proceedings of the 31st Hawaii Conference on System Sciences*, January, 1998.

Leichtl, J., Crandall, P. E., and Clement, M. J., "Parallel Programming in Multi-Paradigm Clusters," *Sixth International Symposium on High Performance Distributed Computing*, August 1997.

Clement, M. J., Morse, B. S., Flanagan, J. K., Wei, W. and Crandall, P. E., "The Chordal Spoke ATM Interconnection Network," *International Conference on Parallel and Distributed Processing Techniques and Applications*, July, 1997.

Clement, M. J., Steed, M. R., and Crandall, P. E., "Network Media Selection for PVM Clusters," *Supercomputing '96*, November 1996.

Crandall, P. E., Sumithasri, E. V., and Clement, M. J., "Performance Comparison of Desktop Multiprocessing and Workstation Cluster Computing," *Fifth IEEE International Symposium on High Performance Distributed Computing*, pp. 272–281, August, 1996.

Crandall, P. E. and Quinn, M. J., "A Partitioning Advisory System for Networked Data-Parallel Processing," *Concurrency: Practice and Experience*, vol. 7 no. 5, pp. 479-495. August 1995.

Crandall, P. E. and Quinn, M. J., "Problem Decomposition for Non-Uniformity and Processor Heterogeneity," *Journal of the Brazilian Computer Society*, vol. 2, no. 1, pp. 13–23. July 1995.

Crandall, P. E., Aydt, R. A., Chien, A. A., and Reed, D. A., "Input/Output Characteristics of Scalable Parallel Applications," *Supercomputing '95*, December, 1995.

Crandall, P. E., "The Limited Applicability of Block Decomposition in Cluster Computing," *Fourth IEEE International Symposium on High Performance Distributed Computing*, pp. 102–109, August, 1995.

Crandall, P. E. and Quinn, M. J., "Non-uniform 2-D Grid Partitioning for Heterogeneous Parallel Architectures," *Ninth International Parallel Processing Symposium*, pp. 428–435, April, 1995.

Crandall, P. E. and Quinn, M. J., "A Decomposition Advisory System for Heterogeneous Data-Parallel Processing," *Third International Symposium on High Performance Distributed Computing*, pp. 114-121, August 1994.

Crandall, P. E. and Quinn, M. J., "Three-Dimensional Grid Partitioning for Network Parallel Processing," *1994 ACM Computer Science Conference*, pp. 210–217, March 1994.

Crandall, P. E. and Quinn, M. J., "Block Data Decomposition for Partial-Homogeneous Parallel Networks," *27th Hawaii International Conference on System Sciences*, pp. 415–424, January 1994.

Crandall, P. E. and Quinn, M. J., "Data Partitioning for Networked Parallel Processing," *Fifth IEEE Symposium on Parallel and Distributed Processing*, pp. 376–379, December 1993.

Crandall, P. E. and Quinn, M. J., "Block Data Decomposition for Data-Parallel Programming on a Heterogeneous Workstation Network," *Second International Symposium on High Performance Distributed Computing*, pp. 42–49, July 1993.

Crandall, P. E. and Quinn, M. J., "Parallel Computing in a Non-Parallel Instructional Environment," *26th Small College Computing Symposium*, pp. 174-183, April 16–17 1993.

Ramanathan, G., Clement, M., and Crandall, P., "Hyperweave: A Fault-Tolerant Expandable Interconnection Network," *Fourth IEEE Symposium on Parallel and Distributed Processing*, pp. 479–482, December 1–4 1992.

INVITED PUBLICATIONS

Crandall, P. E., "Supercomputing '93 Addresses Today's Complex Scientific Problems," *IEEE Computer*, vol. 27, pp. 100–101, January 1994.

Crandall, P. E., Review of"Distributed Operating Systems" by Andrew S. Tanenbaum, in *Computer Science Education*, vol. 7, No. 1, pp. 133–134, 1996.

UNREFEREED PUBLICATIONS

Crandall, P. E., "A Metacomputing Taxonomy," *Tech. Rep. CSE-TR-97-2*, University of Connecticut, 1997.

Crandall, P. E., Sumithasri, E. V., Leichtl, Johann, and Clement, M. J., "Toward Massive Dual-Level Parallelism," *Tech. Rep. CSE-TR-96-12*, University of Connecticut, 1996.

Crandall, P. E., Sumithasri, E. V. and Clement, M. J., "Initial Comparisons of Workstation Cluster Computing and Desktop Multiprocessing," *Tech. Rep. CSE-TR-96-11*, University of Connecticut, 1996.

Crandall, P. E. and Quinn, M. J., "Non-Uniform Grid Partitioning for Heterogeneous Parallel Computing," *Tech. Rep. 94-80-9*, Oregon State University, 1994.

Crandall, P. E., Clement, M., and Quinn, M. J., "Using the ParaGraph Visualization Tool on the Meiko CS-2," *Tech. Rep. 94-80-8*, Oregon State University, 1994.

Crandall, P. E. and Quinn, M. J., "Communication Cost Analysis for Parallel Networks," *Tech. Rep. 94-80-4*, Oregon State University, 1994.

Crandall, P. E., Nedeljkovic, N., and Quinn, M. J., "A Performance Monitoring System for Networked Parallel Computing," *Tech. Rep. 93-80-12*, Oregon State University, 1993.

Crandall, P. E. and Quinn, M. J., "Parallel File I/O in a Heterogeneous Network of Workstations for Simulation Applications," *Tech. Rep. 93-80-06*, Oregon State University, 1993.

Crandall, P. E. and Quinn, M. J., "Problem Decomposition in Parallel Networks," *Tech. Rep. 93-80-05*, Oregon State University, 1993.

Crandall, P. E., "Block Data Decomposition for Data-Parallel Processing of Scientific Grid Problems," in *Proceedings of Graduate Congress*, Oregon State University, April 1993.

MISCELLANEOUS

USA citizen
"Q" security clearance 1997–2000
Member of Mensa and Intertel
Native English speaker; multilingual
Member of ACM

REFERENCES ON REQUEST