

William D. Gropp

Paul and Cynthia Saylor Professor
Department of Computer Science
Deputy Director for Research,
Institute for Advanced Computing Applications and Technologies
University of Illinois Urbana-Champaign
Urbana, IL 61801

Education:

Stanford University, Stanford, CA
Ph.D. in Computer Science (January 1982)
M.S. in Computer Science (June 1980)

University of Washington, Seattle, WA
M.S. in Physics (June 1978)

Case Western Reserve University, Cleveland, OH
B.S. in Mathematics (May 1977)

Professional Experience:

University of Illinois
Professor
October 2007 to present

Deputy Director for Research, Institute for Advanced Computing Application
Technologies
September 2008 to present

Argonne National Laboratory
Senior Computer Scientist
March 1996 to October 2007

Computer Scientist
March 1990 to March 1996

Fellow of the Argonne Accelerator Institute
February 2007 to October 2007

Associate Division Director
March 2000 to March 2006

Deputy Scientific Director of the High-Performance Computing Research Facility
September 1990 to April 1997

University of Chicago
Senior Scientist, Computer Science Department
2000 to 2007 (joint appointment with Argonne)

Senior Fellow, Computation Institute of Argonne National Laboratory
and the University of Chicago
1999 to 2007

Yale University
Associate Professor of Computer Science
July 1988 to February 1990
Assistant Professor of Computer Science
January 1982 to July 1988

Awards, Honors, and Patents:

R&D100 for PETSc in 2009
Sidney Fernbach Award, 2008
IEEE Senior Member
ACM Fellow
U.S. Patent 7076553, awarded July 11, 2006.
Euro PVMMPI 2009 Outstanding Papers (2)
ISC'09 Paper Award
Euro PVMMPI 2008 Outstanding Papers (1)
Euro PVMMPI 2007 Outstanding Papers (2)
Euro PVMMPI 2006 Best Papers (2)
R&D100 for MPICH2 in 2005
SC2003 Best Poster Award, with Suren Byna, Rajeev Thakur, and Xian-He Sun
IEEE Computer Society, Certificate of Appreciation, 2002
Beale-Orchard-Hays Honorable Mention, 2000, with Jorge Moré
Gordon Bell Prize, 1999, with Anderson, Kaushik, Keyes, and Smith

Recent Professional Activities:

Conference Organizing Committee Chair:
SIAM Parallel Processing 2006 (joint with Charbel Farhat)
Conference Technical Program Chair:
IEEE Cluster 2002, IEEE Cluster 2006, WoCo9 2006, ACM/IEEE SC2009
Conference Technical Program Vice Chair:
IEEE Cluster 2009
Conference Finance Chair:
ACM/IEEE SC2011
Conference Technical Program Papers Chair:
ACM/IEEE SC2006 (joint with Daniel Reed)
Conference Program Committees (since 2002):
IEEE Cluster 2003, 2004
ACM/IEEE Supercomputing 2002, 2003, 2004, 2005, 2008
EuroPVMMPI 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009
ISHPC02, WIMPS02, IWIA03, ICPP-2003, IPDPS 2004, SIAM PP04, SciDAC 2005,
Frontiers of Extreme Computing 2005, CESC2006, IWIA07, ParCo 2007, HPCC07, MHSN2007,
IPDPS08, PGAS2009
Series editor:
MIT Press Scientific and Engineering Computation

Editorial boards:

Concurrency and Computation
International Journal of High Performance Computing Applications
International Journal of Computational Science and Engineering

Advisory Panels:

Panel on Digitization and Communications Science, National Academies, (2008-current)
Scientific Advisory Board, Aachen Institute for Advanced Study in Computational Engineering Science (AICES) (2007-current)
Advisory Board, Argonne Leadership Computing Facility (ALCF) (2008-current)
Computation Directorate External Review Committee, Lawrence Livermore National Laboratory (2009-current)

Gordon Bell Prize Committee:

Member (2002,2006), Chair (2003,2004,2005)

IEEE Computer Society Seymour Cray Award Committee (2004)

IFIP Working Group 2.5 (Numerical Software), 2003-present

Membership in professional societies:

SIAM, ACM, IEEE

Chair, SIAM Activity group on Supercomputing 2003–2006

Teaching and Mentoring

Ph.D. Dissertation Committees:

John Ellis, Yale University, Department of Computer Science, 1985
Kai Li, Yale University, Department of Computer Science, 1986
Ye-Yang Sun, Yale University, Department of Engineering and Applied Science, 1987
Leslie Greengard, Yale University, Department of Computer Science, 1987
Elizabeth Jessup, Yale University, Department of Computer Science, 1989
Zhijing George Mou, Yale University, Department of Computer Science, 1990
Ali Eceder, Yale University, Department of Engineering and Applied Science, 1992
Nickolas S. Jovanovic, Yale University, Department of Engineering and Applied Science, 1997
Dinesh Kaushik, Old Dominion University, 2002
Jeffrey Evans, Illinois Institute of Technology, 2005
Pierre Lemarinier, Universite Paris Sud, 2006
Angelo Duarte, University Autonoma de Barcelona, 2007
Michael Wolf, University of Illinois at Urbana-Champaign, 2009
Abhinav Bhatele, University of Illinois at Urbana-Champaign

Post Doctoral Students Supervised:

David Keyes, Yale University
Barry Smith (Wilkinson Fellow), Argonne National Laboratory
Lois Curfman McInnes, Argonne National Laboratory
Rajeev Thakur, Argonne National Laboratory
Dinesh Kaushik, Argonne National Laboratory
Robert Ross, Argonne National Laboratory
Darius Buntinas, Argonne National Laboratory
Pavan Balaji, Argonne National Laboratory

Summer Students Supervised:

Erin Martin, Carrie Wilson, Thomas VanDrunen, Alison Baker, Jason Karlin, Suren Byna, Ernie Chan.

Classes Taught at the University of Illinois:

CS554 Parallel Numerical Algorithms (Spring 2008)

CS499 Senior Thesis (Spring 2008)

CS598 Architectures, Algorithms, and Programming Models (Fall 2008)

CS357 Numerical Analysis (Spring 2009)

Classes Taught at Yale Included:

Ordinary Differential Equations

Introduction to Applied Computation (Programming with FORTRAN)

Fortran for Scientists and Engineers

Computer Graphics

Time Dependent Partial Differential Equations

Scientific Computing with SIMD Parallel Computers

Reading Course in Numerical Analysis

Selected Tutorials Taught:

1. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2008, Austin, TX, November 2008.
2. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2007, Reno, NV, November 2007.
3. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2006, Tampa, FL, November 2006.
4. W. Gropp and R. Thakur, "MPI on the Grid," CCGrid 2006, Singapore, May, 2006.
5. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2005, Seattle, WA, November 2005.
6. W. Gropp and E. Lusk, "Using MPI-2: A Problem-Based Approach," PVMMPI 2005, Sorrento, Italy, 2005.
7. B. Smith, M. Knepley, D. Kaushik, W. Gropp, "Introduction to PETSc," DD16, New York, NY, January, 2005.
8. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2004, Pittsburgh, PA, November, 2004.
9. W. Gropp, E. Lusk, "Using MPI-2: A Problem-Based Approach," PVMMPI 2004, Budapest, Hungary, September, 2004.
10. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," SC2003, Phoenix, AZ, November, 2003.
11. W. Gropp, "Parallel Programming with MPI," Cluster School, Merida, Venezuela, October, 2003.
12. W. Gropp and E. Lusk, "High-Level Programming in MPI," PVMMPI 2003, Venice, Italy, September, 2003.

13. W. Gropp, "PETSc," ACTS Workshop 2003, Berkeley, CA, August, 2003.
14. W. Gropp, D. Keyes, "Introduction to Domain Decomposition with PETSc," Domain Decomposition 15, Berlin, Germany, July, 2003.
15. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," SC2002, Baltimore, MD, November, 2002.
16. W. Gropp, D. Keyes, "PETSc Tutorial," Peking University, Beijing, China, July 2002.
17. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," SC2001, Denver, CO, November, 2001.
18. W. Gropp, "Advanced Cluster Programming with MPI," Cluster 2001, Newport Beach, CA, October, 2001.
19. W. Gropp, E. Lusk, R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface," SC2000, Dallas, TX, November, 2000.
20. S. Balay, K. Buschelman, W. Gropp, L. Curfman McInnes, and B. Smith, "PETSc Tutorial: Numerical Software Libraries for the Scalable Solution of PDEs," Workshop on the ACTS Toolkit, Berkeley, CA, September, 2000.
21. S. Balay, W. Gropp, L. Curfman McInnes, B. Smith, "Tutorial on the Portable, Extensible Toolkit for Scientific computation (PETSc)," DD13, Lyon, France, October, 2000.
22. W. Gropp, "High Performance MPI," CASC, Lawrence Livermore National Laboratory, May, 2000.
23. W. Gropp, "Short Course on the Portable, Extensible Toolkit for Scientific computation (PETSc)," 4th Annual National Symposium on Computational Science and Engineering (AN-SCSE4), Bangkok, Thailand, March, 2000.
24. W. Gropp, E. Lusk, R. Thakur, "Tuning MPI Applications for Peak Performance," SC99, Portland, OR, November, 1999.
25. W. Gropp, MPI Portion of "How to Run A Beowulf Cluster," (Thomas Sterling organizer), SC99, Portland, OR, November, 1999.
26. W. Gropp, E. Lusk, R. Thakur, "Using MPI-1 and MPI-2," PVMMPI'99, Barcelona, Spain, September, 1999.
27. W. Gropp, "Introduction to the Message Passing Interface," Summer Institute for Advanced Computation, Wright State University, August, 1999.
28. S. Balay, W. Gropp, L. Curfman McInnes, "PETSc Tutorial", Parallel CFD'99, Williamsburg, VA, May, 1999.
29. W. Gropp, "Intermediate MPI," NRL, Monterey, CA, April, 1999.
30. W. Gropp, "PETSc Tutorial," SIAM Parallel Processing, San Antonio, TX, March 1999.
31. W. Gropp, "Introduction to MPI," as part of "High Performance Programming," Technical University of Denmark, Lyngby, Denmark, December 1998.

32. W. Gropp, E. Lusk, R. Thakur, “Tuning MPI Applications for Peak Performance,” SC98, Orlando, FL, November, 1998.
33. W. Gropp, “Portable High Performance Parallel I/O and MPI,” Utrecht, The Netherlands, February, 1998.
34. W. Gropp, E. Lusk, and R. Thakur, “Introduction to Performance Issues in Using MPI for Communication and I/O,” HPDC-7, Chicago, IL, July, 1998.
35. W. Gropp, “PETSc Tutorial,” SC97, November, 1997.

1 Books

- [1] William Gropp, Ewing Lusk, and Anthony Skjellum. *Using MPI: Portable Parallel Programming with the Message-Passing Interface*. MIT Press, Cambridge, MA, 1994.
- [2] B. F. Smith, P. E. Bjørstad, and W. D. Gropp. *Domain Decomposition: Parallel Multilevel Methods for Elliptic Partial Differential Equations*. Cambridge University Press, New York, 1996.
- [3] William Gropp, Steven Huss-Lederman, Andrew Lumsdaine, Ewing Lusk, Bill Nitzberg, William Saphir, and Marc Snir. *MPI - The Complete Reference: Volume 2, The MPI-2 Extensions*. MIT Press, Cambridge, MA, USA, 1998.
- [4] William Gropp, Ewing Lusk, and Anthony Skjellum. *Using MPI: Portable Parallel Programming with the Message Passing Interface*, 2nd edition. MIT Press, Cambridge, MA, 1999.
- [5] William Gropp, Ewing Lusk, and Rajeev Thakur. *Using MPI-2: Advanced Features of the Message-Passing Interface*. MIT Press, Cambridge, MA, 1999.
- [6] Jack Dongarra, Ian Foster, Geoffrey Fox, William Gropp, Ken Kennedy, Linda Torczon, and Andy White, editors. *Sourcebook of Parallel Computing*. Morgan Kaufmann, 2003.
- [7] William Gropp, Ewing Lusk, and Thomas Sterling, editors. *Beowulf Cluster Computing with Linux*. MIT Press, 2nd edition, 2003.

2 Book Chapters

- [1] William Gropp. *Sourcebook of Parallel Computing*, chapter Parallel Computer Architectures, pages 15–42. Morgan Kaufmann, 2003.
- [2] Ian Foster, William Gropp, and Carl Kesselman. *Sourcebook of Parallel Computing*, chapter Message Passing and Threads, pages 313–329. Morgan Kaufmann, 2003.
- [3] Rajeev Thakur and William Gropp. *Sourcebook of Parallel Computing*, chapter Parallel I/O, pages 331–355. Morgan Kaufmann, 2003.

- [4] William Gropp. *Sourcebook of Parallel Computing*, chapter The 2-D Poisson Problem, pages 469–480. Morgan Kaufmann, 2003.
- [5] Satish Balay, William Gropp, Lois Curfman McInnes, and Barry F. Smith. *Sourcebook of Parallel Computing*, chapter Software for the Scalable Solution of Partial Differential Equations, pages 621–647. Morgan Kaufmann, 2003.
- [6] William Gropp. *Beowulf Cluster Computing with Linux*, chapter So You Want to Use a Cluster, pages 1–17. MIT Press, 2003.
- [7] Ewing Lusk, William Gropp, and Ralph Butler. *Beowulf Cluster Computing with Linux*, chapter An Introduction to Writing Parallel Programs, pages 171–206. MIT Press, 2003.
- [8] William Gropp and Ewing Lusk. *Beowulf Cluster Computing with Linux*, chapter Parallel Programming with MPI, pages 207–243. MIT Press, 2003.
- [9] William Gropp and Ewing Lusk. *Beowulf Cluster Computing with Linux*, chapter Advanced Topics in MPI Programming, pages 245–278. MIT Press, 2003.
- [10] Rajeev Thakur, William Gropp, and Ewing Lusk. *Scalable Input/Output*, chapter ADIO: A Framework for High-Performance, Portable Parallel I/O, pages 111–134. MIT Press, 2004.
- [11] William D. Gropp. *Accuracy and Reliability in Scientific Computing*, chapter Issues in Accurate and Reliable Use of Parallel Computing in Numerical Programs. SIAM, 2005.
- [12] Ricky A. Kendall, Masha Sosonkina, William D. Gropp, Robert W. Numrich, and Thomas Sterling. *Numerical Solution of Partial Differential Equations on Parallel Computers*, chapter Parallel Programming Models Applicable to Cluster Computing and Beyond, pages 3–54. Number 51 in Lecture Notes in Computational Science and Engineering. Springer, 2006.
- [13] William D. Gropp and Andrew Lumsdaine. *Parallel Processing for Scientific Computing*, chapter Parallel Tools and Environments: A Survey, pages 223–232. SIAM, 2006.
- [14] Boyana Norris, Albert Hartono, and William Gropp. *Petascale Computing: Algorithms and Applications*, chapter Annotations for Productivity and Performance Portability. Computational Science. Chapman & Hall / CRC Press, Taylor and Francis Group, 2007. Preprint ANL/MCS-P1392-0107.

3 Workshop and Meeting Reports

- [1] David Keyes, Philip Colella, Thom H. Dunning, and William D. Gropp. A science-based case for large-scale simulation, volume 1, July 2003. Office of Science, U.S. Department of Energy.
- [2] Hans P. Zima, editor. Workshop on high-productivity programming languages and models, 2004. Report of the workshop.
- [3] Jennifer M. Schopf, editor. Grid performance workshop 2004 report, 2004.
- [4] International workshop on advanced computational materials science: Application to fusion and generation-IV fission reactors, 2004. Also ORNL/TM-2004/132.

- [5] David Keyes, Philip Colella, Thom H. Dunning, and William D. Gropp. A science-based case for large-scale simulation, volume 2, September 2004. Office of Science, U.S. Department of Energy.
- [6] David Brown, John Bell, Donald Estep, William Gropp, Bruce Hendrickson, Sallie Keller-McNulty, David Keyes, J. Tinsley Oden, Linda Petzold, and Margaret Wright. Applied Mathematics at the U.S. Department of Energy: Past, Present and a View to the Future, May 2008. Ed. by David Brown.

4 Journal Articles

- [1] William D. Gropp. A test of moving mesh refinement for 2-D scalar hyperbolic problems. *SIAM Journal on Scientific and Statistical Computing*, 1(2):191–197, June 1980.
- [2] William D. Gropp. Solving PDEs on loosely-coupled parallel processors. *Parallel Computing*, 5(1-2):165–173, July 1987. Proceedings of the international conference on vector and parallel computing—issues in applied research and development (Loen, 1986).
- [3] David E. Keyes and William D. Gropp. A comparison of domain decomposition techniques for elliptic partial differential equations and their parallel implementation. *SIAM Journal on Scientific and Statistical Computing*, 8(2):S166–S202, March 1987. Reprinted in Selected Papers from the Second Conference on Parallel Processing for Scientific Computing (C. W. Gear & R. G. Voigt, eds., SIAM, 1987).
- [4] William D. Gropp. Local uniform mesh refinement with moving grids. *SIAM Journal on Scientific and Statistical Computing*, 8(3):292–304, May 1987.
- [5] W. Gropp. Local uniform mesh refinement on loosely-coupled parallel processors. *I. J. Comp. Math. Appl.*, 15:375–389, 1988.
- [6] William D. Gropp and David E. Keyes. Complexity of parallel implementation of domain decomposition techniques for elliptic partial differential equations. *SIAM Journal on Scientific and Statistical Computing*, 9(2):312–326, March 1988.
- [7] William D. Gropp and I. C. F. Ipsen. Recursive mesh refinement on hypercubes. *Nordisk Tidskr. Informationsbehandling (BIT)*, 29:186–211, 1989.
- [8] William D. Gropp and David E. Keyes. Domain decomposition on parallel computers. *Impact Comput. Sci. Eng.*, 1:421–439, 1989.
- [9] David E. Keyes and William D. Gropp. Domain decomposition techniques for the parallel solution of nonsymmetric systems of elliptic boundary value problems. *Applied Numerical Mathematics: Transactions of IMACS*, 6(4):281–301, May 1990.
- [10] H. Berryman, J. Saltz, W. Gropp, and R. Mirchandaney. Krylov methods preconditioned with incompletely factored matrices on the CM-2. *Journal of Parallel and Distributed Computing*, 8(2):186–190, February 1990.
- [11] Leslie Greengard and William D. Gropp. A parallel version of the fast multipole method. *Computers and Mathematics with Applications*, 20:63–71, 1990.

- [12] William D. Gropp and Edward Smith. Computational fluid dynamics on parallel processors. *Computers and Fluids*, 18:289–304, 1990.
- [13] Xiao-Chuan Cai, William D. Gropp, and David E. Keyes. Convergence rate estimate for a domain decomposition method. *Numerische Mathematik*, 61(2):153–169, 1992.
- [14] W. D. Gropp and D. E. Keyes. Domain decomposition with local mesh refinement. *SIAM J. Sci. Stat. Comput.*, 13:967–993, 1992.
- [15] W. D. Gropp and D. E. Keyes. Parallel performance of domain-decomposed preconditioned Krylov methods for PDEs with locally uniform refinement. *SIAM Journal on Scientific and Statistical Computing*, 13:128–145, 1992.
- [16] W. D. Gropp and D. E. Keyes. Domain decomposition methods in computational fluid dynamics. *Int. J. Numer. Meth. Fluids*, 14:147–165, 1992.
- [17] I. Foster, W. Gropp, and R. Stevens. The parallel scalability of the spectral transform method. *Monthly Weather Review*, 120(5):835–850, 1992.
- [18] Xiao-Chuan Cai, William D. Gropp, and David E. Keyes. A comparison of some domain decomposition and *ILU* preconditioned iterative methods for nonsymmetric elliptic problems. *Numerical linear algebra with applications*, 1(5):477–504, 1994.
- [19] Message Passing Interface Forum. MPI: A message passing interface standard. *International Journal of Supercomputer Applications*, 8(3/4):159–416, 1994.
- [20] K. Forsman, W. Gropp, L. Kettunen, D. Levine, and J. Salonen. Solution of dense systems of linear equations arising from integral equation formulations. *IEEE Antennas and Propagation Magazine*, pages 96–100, December 1995.
- [21] W. D. Gropp and E. Lusk. Experiences with the IBM SP1. *IBM Systems Journal*, 34(2):249–262, 1995.
- [22] Anthony Skjellum, Ewing Lusk, and William Gropp. Early applications in the Message-Passing Interface (MPI). *International Journal of Supercomputer Applications and High Performance Computing*, 9(2):79–94, Summer 1995.
- [23] William D. Gropp, Hans Kaper, G. Leaf, D. Levine, V. Vinokur, and M. Palumbo. Numerical simulation of vortex dynamics in high- t_c superconductors. *J. Comp. Physics*, 123:254–266, 1996.
- [24] W. Gropp, E. Lusk, N. Doss, and A. Skjellum. A high-performance, portable implementation of the MPI message passing interface standard. *Parallel Computing*, 22(6):789–828, September 1996.
- [25] R. Thakur, W. Gropp, and E. Lusk. An experimental evaluation of the parallel I/O systems of the IBM SP and Intel Paragon using a production application. *Lecture Notes in Computer Science*, 1127, 1996.
- [26] Barry Smith and William Gropp. The design of data-structure-neutral libraries for the iterative solution of sparse linear systems. *Scientific Programming*, 5:329–336, 1996.
- [27] W. Gropp and E. Lusk. A high-performance MPI implementation on a shared-memory vector supercomputer. *Parallel Computing*, 22(11):1513–1526, January 1997.

- [28] W. Gropp and E. Lusk. Sowing MPICH: A case study in the dissemination of a portable environment for parallel scientific computing. *The International Journal of Supercomputer Applications and High Performance Computing*, 11(2):103–114, Summer 1997.
- [29] Message Passing Interface Forum. MPI2: A message passing interface standard. *High Performance Computing Applications*, 12(1–2):1–299, 1998.
- [30] Rajeev Thakur, Ewing Lusk, and William Gropp. I/O in parallel applications: The weakest link. *The International Journal of High Performance Computer Applications*, 12(4, part 2):389–395, 1998.
- [31] X-C Cai, William D. Gropp, David E. Keyes, R. G. Melvin, and D. P. Young. Parallel Newton-Krylov-Schwarz algorithms for the transonic full potential equation. *SIAM Journal of Scientific Computing*, 19:246–265, January 1998. Also ICASE report TR 96-39.
- [32] William Gropp and Ewing Lusk. PVM and MPI are completely different. *Future Generation Computer Systems*, 1999. Submitted as part of a PVMMPI special issue.
- [33] I. Foster, J. Geisler, W. Gropp, N. Karonis, E. Lusk, G. Thiruvathukal, and S. Tuecke. A wide-area implementation of the Message Passing Interface. *Parallel Computing*, 24(12–13):1735–1749, November 1998.
- [34] David Levine, William Gropp, Kimmo Forsman, and Lauri Kettunen. Parallel computation of three-dimensional nonlinear magnetostatic problems. *Concurrency Practice and Experience*, 11(2):109–120, February 1999.
- [35] Omer Zaki, Ewing Lusk, William Gropp, and Deborah Swider. Toward scalable performance visualization with Jumpshot. *High Performance Computing Applications*, 13(2):277–288, Fall 1999.
- [36] William Gropp, David E. Keyes, Lois C. McInnes, and M. D. Tidriri. Globalized Newton-Krylov-Schwarz algorithms and software for parallel implicit CFD. *High Performance Computing Applications*, 14(2):102–136, 2000.
- [37] W. D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. High-performance parallel implicit CFD. *Parallel Computing*, 27:337–362, 2001.
- [38] Ralph Butler, William Gropp, and Ewing Lusk. Components and interfaces of a process management system for parallel programs. *Parallel Computing*, 27(11):1417–1429, October 2001.
- [39] W. D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. High performance parallel implicit CFD. *Parallel Computing*, 27(4):337–362, 2001.
- [40] Rajeev Thakur, William Gropp, and Ewing Lusk. Optimizing noncontiguous accesses in MPI-IO. *Parallel Computing*, 28(1):83–105, January 2002.
- [41] Mark Baker, Daniel Katz, William Gropp, and Thomas Sterling. Special issue: Cluster 2001. *Concurrency and Computation: Practice and Experience*, 15(7–8):623–624, 2003.
- [42] William D. Gropp and Ewing Lusk. Fault tolerance in MPI programs. *International Journal of High Performance Computer Applications*, 18(3):363–372, 2004.

- [43] Rajeev Thakur, Rolf Rabenseifner, and William Gropp. Optimization of collective communication operations in MPICH. *International Journal of High Performance Computer Applications*, 19(1):49–66, 2005.
- [44] George Almási, Charles Archer, Jose G. Castanos, J. A. Gunnels, C. Chris Erway, Philip Heidelberger, Xavier Martorell, Jose E. Moreira, Kurt Pinnow, Joe Ratterman, Burkhard Steinmacher-Burow, William Gropp, and Brian Toonen. Design and implementation of message-passing services for the Blue Gene/L supercomputer. *IBM Journal of Research and Development*, 49(2/3):393–406, March/May 2005. Available at <http://www.research.ibm.com/journal/rd49-23.html>.
- [45] Rajeev Thakur, William Gropp, and Brian Toonen. Optimizing the synchronization operations in MPI one-sided communication. *High Performance Computing Applications*, 19(2):119–128, 2005.
- [46] Christopher Falzone, Anthony Chan, Ewing Lusk, and William Gropp. A portable method for finding user errors in the usage of mpi collective operations. *International Journal of High Performance Computing Applications*, 21(2):155–165, 2007.
- [47] Baifei Shen, Yuelin Li, Karoly Nemeth, Hairong Shang, Yongchul Chae, Robert Soliday, Robert Crowell, Edward Frank, William Gropp, and John Cary. Electron injection by a nanowire in the bubble regime. *Physics of Plasmas*, 14, 2007.
- [48] Anthony Chan, William Gropp, and Ewing Lusk. An efficient format for nearly constant-time access to arbitrary time intervals in large trace files. *Scientific Programming*, 16(2):155–165, 2008.
- [49] Salman Pervez, Ganesh Gopalakrishnan, Robert M. Kirby, Rajeev Thakur, and William Gropp. Formal methods applied to high performance computing software design: a case study of MPI one-sided communication based locking. *Software Practice and Experience*. In Press.

5 Proceedings

- [1] William Gropp. Parallel programming tools for distributed memory computers. In Adrian Tentner, editor, *High Performance Computing: Grand Challenges in Computer Simulation*, pages 166–169. The Society for Computer Simulation, 1993.
- [2] D. L. Boley, William D. Gropp, and M. M. Theimer. A method for constructing preprocessors. In *Conference on the Computing Environment for Mathematical Software*. JPL and ACM-SIGNUM, July 1981. JPL Publication 81-67.
- [3] W. D. Gropp. Numerical linear algebra on workstations. In *Proc. Army Research Office Workshop on Microcomputers in Scientific Computing*, 1985.
- [4] William D. Gropp. A system for numerical linear algebra. In A. Wouk, editor, *New Computing Environments: Microcomputers in Large-Scale Computing*, pages 26–38, Philadelphia, 1987. SIAM.
- [5] William D. Gropp. Local uniform mesh refinement on parallel processors. In P. Deuffhard and B. Enquist, editors, *Large Scale Scientific Computing*, Boston, 1987. Birkhäuser.

- [6] William D. Gropp. Adaptive methods for hyperbolic problems on local memory parallel processors. In M. H. Schultz, editor, *Numerical Algorithms for Modern Computer Architectures*, pages 77–84, New York, 1988. Springer-Verlag.
- [7] William Gropp and Edward Smith. Computational fluid dynamics on parallel processors. In *1st National Fluid Dynamics Congress, Part 1*, pages 612–619. AIAA/ASME/SIAM/APS, American Institute of Aeronautics and Astronautics, July 1988.
- [8] William D. Gropp and Martin Schultz. A highly parallel method for an underwater acoustics problem. In *Proceedings of the Fourth International Conference on Supercomputing, Santa Clara, California*, 1989.
- [9] H. S. Barryman, William D. Gropp, and J. Saltz. Krylov methods and the CM/2. In *Proceedings of the Fourth International Conference on Supercomputing, Santa Clara, California*, 1989.
- [10] William D. Gropp and David Foulser. CLAM: A programming language for interactive supercomputing and visualization. In *Proceedings of the Fourth International Conference on Supercomputing, Santa Clara, California*, 1989.
- [11] William D. Gropp. Dynamic grid manipulation for PDEs on hypercube parallel processors. In A. Wouk, editor, *Parallel Processing and Medium-Scale Multiprocessors*, pages 192–203, Philadelphia, 1989. SIAM.
- [12] Leslie Greengard and William D. Gropp. A parallel version of the fast multipole method. In Gary Rodrigue, editor, *Proceedings of the 3rd Conference on Parallel Processing for Scientific Computing*, pages 213–222, Philadelphia, PA, USA, December 1989. SIAM Publishers.
- [13] W. D. Gropp and I. C. F. Ipsen. A Gray code scheme for local uniform mesh refinement on hypercubes. In Garry Rodrigue, editor, *Parallel Processing for Scientific Computing: Proceedings of the Third SIAM Conference on Parallel Processing for Scientific Computing, Los Angeles, California, December 1–4, 1987*, pages 202–206, Philadelphia, 1987. SIAM Publ.
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7 Manuals

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8 Recent Invited Talks

HPC in 2029: Will the March to ZettaFLOPS Succeed, Coalition for Academic Scientific Computing 20th Anniversary Symposium, Panelist for “HPC: The Next 20 Years”.

Why Must We Have Hero Programmers, Advanced Computing Systems Research Program Workshop (www.ncsi.com/ascworkshop09), Annapolis, MD, September, 2009. Panelist for “Concurrency Driven Applications”.

MPI at Exascale: Challenges for Data Structures and Algorithms, EuroPVMMPI, Helsinki, Finland, September, 2009.

Computer Architecture, and Programming Models for Scientific Computing DOE CSGF Workshop, July, 2009.

Issues in Scaling Applications for Sustained Petaflops, Pathways to Blue Waters Workshop, Urbana, Illinois, October, 2008.

Applications on 1000000 Cores: Are We Ready?, Simulating the Future, France, 2008.

MPI and Hybrid Programming Models for Petascale Computing, EuroPVMMPI, Dublin, Ireland, 2008.

The Evolution of MPI, Lawrence Livermore National Laboratory, Livermore, California, August, 2008.

Hybrid Programming: Some Thoughts on Preparing for the Petascale Era, Petascale Summer Workshop, Las Vegas, Nevada, June, 2008.

The Evolution of MPI, 6th Annual Workshop on Charm++, Urbana, Illinois, May, 2008.

Challenges for the Message Passing Interface in the Petaflops Era, Louisiana State University, Baton Rouge, Louisiana, February, 2008.

Overcoming the Barriers to Sustained Petaflop Performance, ORAP Forum, Strasbourg, France, November, 2007.

Building a Successful Scalable Parallel Numerical Library: Lessons from the PETSc Library, keynote talk, Uppsala, Sweden, August, 2007.

Challenges for MPI in the Petaflops Era, invited talk at University Autonoma of Barcelona, June 2007.

Architecture Trends and Implications for Algorithms, invited talk at DOE ASCR PI meeting, Livermore, CA, May 2007.

MPI and High Productivity Programming, invited colloquia at Ohio State University, Columbus, OH, February 8, 2007.

MPI: The Last Large Scale Success, invited presentation at Workshop on Programming Languages for High Performance Computing (HPC WPL). Also presented A Realistic Future as part of a panel on parallel programming directions, and a Programming Models Summary providing a summary of the workshop.

Overcoming the Barriers to Sustained Petaflop Performance, invited presentation at RWTH Aachen University of Technology, December, 2006. Also presented at Research Center Juelich, December, 2006.

Half Full or Half Empty, invited panel presentation for Thomas Sterling's multicore panel at Supercomputing 2006, November 2006.

Overcoming the barriers to sustained Petaflop Performance, invited talk at the 2006 Fall Creek Falls Conference, October 23-24, 2006.

Where Does MPI Need to Grow, invited presentation at Euro PVMMPI 2006, Bonn, Germany, September 18-20, 2006.

Three Questions You Should Ask, invited panel presentation at Clusters and Computational Grids for Scientific Computing, Asheville, NC, September 10-13, 2006.

Issues in Developing a Thread-Safe MPI Implementation, invited colloquia at the University of Utah, Salt Lake City, August 28, 2006.

Can There Be a Common Communication Runtime System?, High Productivity Computer Systems Languages Workshop, Oak Ridge, Tennessee, July 12-13, 2006.

Opportunities at Argonne National Laboratory, presented in the Workshop "Opportunities for Computing Research with Government Labs", CRA Conference at Snowbird 2006, Snowbird, Utah, June 25-27, 2006.

System Software Issues for the Future, invited panel presentation at the 2006 BG/L Consortium System Software and Applications workshop, Tokyo, Japan, April 19-20, 2006.

Overcoming the Barriers to Sustained Petaflop Performance, Invited presentation, Computational Science and Engineering Research Symposium (UIUC CSE day)

Thoughts on Capacity Computing, Invited panel presentation on Capacity Computing at SOS 10, March 6-8, 2006.

Beware of What You Wish For, Invited panel presentation on Data at SOS 10, Maui, Hawaii, March 6-8, 2006.

Some Thoughts on Programming Languages for HPC, Invited panel presentation at Architectures and Algorithms for Petascale Computing, Dagstuhl, Germany, February 12-17, 2006

Overcoming the Barriers to Sustained Petaflop Performance, Presentation at Architectures and Algorithms for Petascale Computing, Dagstuhl, Germany, February 12-17, 2006

A Science-Based Case for Large Scale Computation, Invited Keynote at SARA SuperDay, Amsterdam, The Netherlands, November 29, 2005.

How to Replace MPI as the Programming Model of the Future, Invited talk at Workshop on the Frontiers of Extreme Computing, Santa Cruz, CA, October 24-27, 2005.

Improving the Usability of Clusters, Invited Keynote at IEEE Cluster 2005, Boston, MA, September 26-29, 2005.

Towards a Productive MPI Environment, Invited talk at Euro PVMMPI, Sorrento, Italy September 19-21, 2005.

Future Technologies that may Facilitate Science Breakthroughs Chair of Panel at SOS 9, Davos, Switzerland, March 21-23, 2005.

Some Myths in High Performance Computing, Invited dinner presentation at Northwest Indiana Computational Grid HPC Workshop, Purdue University, Indiana, March 8-9, 2005.

First Light with BlueGene/L At Argonne, Invited presentation at Northwest Indiana Computational Grid HPC Workshop, Purdue University, Indiana, March 8-9, 2005.

Is OpenMP for Users?, invited presentation at OpenMP BOF, Supercomputing 2004, Pittsburgh, November 7-12, 2004.

Grids and Clusters: Lessons for Deployment and Operation, Clusters and Computational Grids for Scientific Computing, Lyon, France, September 26-29, 2004.

MPI and High Productivity Programming, Invited talk at Euro PVMMPI, Budapest, Hungary, September 19-22, 2004.

Software for Exaflops Computing, Invited presentation at the Workshop on the Path to Extreme Supercomputing, LASCI 2004, October 12, Santa Fe, New Mexico.

How Not to Measure Performance: Lessons from Parallel Computing, presented at the Grid Performance Workshop 2004, London, UK, May 12-13, 2004.

The Triumph of Hope over Experience, invited panel presentation for visions of the future at SOS8, Charleston, SC, April 12-14, 2004.

MPICH2: A High-Performance, Portable Implementation of MPI, Invited presentation with Ewing Lusk at ClusterWorld Conference and Expo, April 5-8, 2004., San Jose, CA.

Algorithms and Architecture, invited presentation at the Advanced Computational Materials Science Workshop, Washington D.C., March 31-April 2, 2004.

Parallel Programming With MPI, invited guest lecture in APMA 4990 “Introduction to Parallel Scientific Computing”, Columbia University, March 10, 2004.

Expressing Fault Tolerant Algorithms with MPI-2, at the Workshop on Fault Tolerance for MPI Implementors, SIAM Parallel Processing Meeting, San Francisco, CA, February 24, 2004.

Computer Algorithms and Architectures, invited presentation at Computation Institute Fellows Meeting, January, 2004.