

William D. Gropp

Director and Chief Scientist, National Center for Supercomputing Applications
Thomas M. Siebel Chair in Computer Science
Department of Computer Science
University of Illinois at 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 Applications
and Technologies
September 2008 to June 2014

Director, Parallel Computing Institute
March 2011–May 2017

Interim Chair, NCSA Technology Council
September 2011 to March 2012

Chief Scientist, NCSA
May 2015 to present

Acting Director, NCSA
August 2016–April 2017

Interim Director, NCSA
April 2017–July 2017

Director, NCSA
July 2017–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:

Elected Member, National Academy of Engineering

SIAM Fellow

IEEE Fellow

ACM Fellow

ACM/IEEE-CS Ken Kennedy Award, 2016

SIAM/ACM Prize in Computational Science and Engineering, to PETSc Core Development Group,
2015

SIAM Activity Group on Supercomputing (SIAG/SC) Career Prize, 2014

IEEE TCSC Medal for Excellence in Scalable Computing, 2010

IEEE-CS Sidney Fernbach Award, 2008

R&D100 for PETSc in 2009

R&D100 for MPICH2 in 2005

U.S. Patent 7076553, awarded July 11, 2006.

Beale-Orchard-Hays Honorable Mention, 2000, with Jorge Moré

Gordon Bell Prize, 1999, with Anderson, Kaushik, Keyes, and Smith

IEEE Computer Society Golden Core Award, 2017

ACM Recognition of Service Award, 2009

IEEE Computer Society, Certificate of Appreciation, 2002

HPCWire People To Watch 2013

Tau Beta Pi Daniel C. Drucker Eminent Faculty Award, 2013

EuroMPI16 Best Paper, with V. Dang and M. Snir, 2016

ISPA'16 Best Paper, with Y. Chen et al, 2016

EuroMPI'15 Best Paper, with Tarun Prabhu, 2015

PPoPP'12 Best Paper, with Paul Sack, 2012
ISC'09 Paper Award
Euro PVMMPI 2009 Outstanding Papers (2)
Euro PVMMPI 2008 Outstanding Papers (1)
Euro PVMMPI 2007 Outstanding Papers (2)
Euro PVMMPI 2006 Best Papers (2)
SC2003 Best Poster Award, with Suren Byna, Rajeev Thakur, and Xian-He Sun

Recent Professional Activities:

Conference General Chair:

ACM ICS 2017 (joint with Peter Beckman), ACM/IEEE SC2013, IWOMP 2011 (joint with Kalyan Kumaran)

Conference Deputy General Chair:

ACM/IEEE SC2012

Conference Vice Chair:

ACM/IEEE SC2017

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, IWOMP 2011

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), EuroMPI 2017 (joint with Rajeev Thakur)

Conference Technical Program Papers Area Chair:

CCGrid 2012

Conference Technical Program Invited Speakers Chair:

ACM/IEEE SC2016

Conference Program Committees (since 2002):

ACM/IEEE SC 2002, 2003, 2004, 2005, 2008, 2010, 2011

BDSE-2014, BigSystem 2014, BigSystem 2015, IEEE CCGrid 2011, 2012, 2013, 2014, 2016

EuroPVMMPI 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009

EuroMPI 2010, 2011, 2012, 2013, 2014, 2015

ICS 2010, 2011

IEEE Cluster 2003, 2004, 2014, 2015, 2016

IPDPS 2004, 2008, 2014, 2015

SIAM Parallel Processing 2004, 2014

ISHPC02, WIMPS02, IWIA03, IWIA07, ICPP 2003, ICPP 2015, SciDAC 2005, Frontiers of Extreme Computing 2005, CESC2006, ParCo 2007, HPCC07, MHSN2007, PGAS2009, PPoPP'11, IWOMP 2012, EASC 2014, EASC 2015, EASC 2016, EuroPar15, ICPP 2015, PACT 2015, PACT 2016, ParCo2015,

Conference Tutorials Committee Chair:

ISC 2016

Conference Tutorials Committee:

ISC 2012, 2013, 2014, 2015 Conference Workshops Committee:
SC 2018

Series editor:

MIT Press Scientific and Engineering Computation

Editorial boards:

Concurrency and Computation

International Journal of High Performance Computing Applications

Advisory Panels:

ISC Steering Committee (2016–)

External Advisory Panel, Comprehensive Digital Transformation (CDT), NASA Langley Research Center (2015–)

SC Conference Steering Committee (2011–2015), chair (2014)

PCAST NITRD Review Working Group (2010)

Institute for Computing in Science www.icis.anl.gov (Steering committee) (2010–2012)

Panel on Digitization and Communications Science, National Academies, (2008–2010)

Scientific Advisory Board, Aachen Institute for Advanced Study in Computational Engineering Science (AICES) (2007–current)

Advisory Board, Argonne Leadership Computing Facility (ALCF) (2008)

Computation Directorate External Review Committee, Lawrence Livermore National Laboratory (2009–2012)

ACM/IEEE-CS Ken Kennedy Award Committee (2017–current)

Gordon Bell Prize Committee:

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

IEEE Computer Society Seymour Cray Award Committee (2004, 2009)

IEEE Computer Society Sidney Fernbach Award Committee (2009)

IFIP Working Group 2.5 (Numerical Software), 2003–2012

Membership in professional societies:

AAAS, ACM, IEEE, SIAM

Offices held in professional societies:

AAAS Member-at-large for Section T (Information, Computing and Communication) (2013–2017)

Chair, SIAM Activity group on Supercomputing (2003–2006)

ACM SIGHPC:

Cofounder of SIGHPC (Established 2011)

Newsletter editor (2011–2015)

SC Steering committee liason (2015)

IEEE-CS Board of Governors (2017–2019)

Teaching and Mentoring

Ph.D. Students Graduated:

Paul Sack, University of Illinois at Urbana-Champaign, 2011

Hormozd Gahvari, University of Illinois at Urbana-Champaign, 2014

Vivek Kale, University of Illinois at Urbana-Champaign, 2015

Xin Zhao, University of Illinois at Urbana-Champaign, 2016

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 Ecdar, 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
Jacob Schroder, University of Illinois at Urbana-Champaign, 2010
Abhinav Bhatele, University of Illinois at Urbana-Champaign, 2010
Filippo Gioachin, University of Illinois at Urbana-Champaign, 2010
James Brodman, University of Illinois at Urbana-Champaign, 2010
Sara Bagsorskhi, University of Illinois at Urbana-Champaign, 2011
Adam Reichert, University of Illinois at Urbana-Champaign, 2011
Mark Gates, University of Illinois at Urbana-Champaign, 2011
Jehanzeb Hameed, University of Illinois at Urbana-Champaign, 2011
Ramon Calderer, University of Illinois at Urbana-Champaign, 2012
James Lai, University of Illinois at Urbana-Champaign, 2012
David Kunzman, University of Illinois at Urbana-Champaign, 2012
Nana Arizumi, University of Illinois at Urbana-Champaign, 2012
Minh Ngoc Dinh, Monash University, 2012
Abhishek Verma, University of Illinois at Urbana-Champaign, 2012
Joseph Sloan, University of Illinois at Urbana-Champaign, 2013
Xing Zhou, University of Illinois at Urbana-Champaign, 2013
I-Jui Sung, University of Illinois at Urbana-Champaign, 2013
Steven Dalton, University of Illinois at Urbana-Champaign, 2014
Lukasz Wesolowski, University of Illinois at Urbana-Champaign, 2014
Houng Luu, University of Illinois at Urbana-Champaign, 2015
Babak Behzad, University of Illinois at Urbana-Champaign, 2015
Ana Gainaru, University of Illinois at Urbana-Champaign, 2015
Yanhua Sun, University of Illinois at Urbana-Champaign, 2015
Wooil Kim, University of Illinois at Urbana-Champaign, 2015
Nikhil Jain, University of Illinois at Urbana-Champaign, 2016
Jon Calhoun, University of Illinois at Urbana-Champaign, 2017
Chih-Chieh Yang, University of Illinois at Urbana-Champaign, 2017

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
Paul Sack, University of Illinois at Urbana-Champaign
Gopalakrishnan Santhanaraman, University of Illinois at Urbana-Champaign
Abhinav Bhatele, University of Illinois at Urbana-Champaign
Vivek Kale, University of Illinois at Urbana-Champaign

Classes Taught at the University of Illinois:

CS554 Parallel Numerical Algorithms (Spring 2008)
CS499 Senior Thesis (Spring 2008, Fall 2009, Spring 2011)
CS598 Architectures, Algorithms, and Programming Models (Fall 2008)
CS357 Numerical Analysis (Spring 2009, 2010)
CS457 Numerical Analysis II (Spring 2011)
CS598 Designing and Building Applications for Extreme Scale Systems (Spring 2015, Spring 2016)

Selected Tutorials Taught:

1. P. Balaji, W. Gropp, T. Hoefler, and R. Thakur, “Advanced MPI Programming,” SC2017, Denver, Colorado, November 2017.
2. P. Balaji, W. Gropp, T. Hoefler, and R. Thakur, “Advanced MPI Programming,” SC2016, Salt Lake City, Utah, November 2016.
3. P. Balaji, W. Gropp, T. Hoefler, and R. Thakur, “Advanced MPI Programming,” SC2015, Austin, Texas, November 2015.
4. W. Gropp, R. Lusk, and R. Thakur, “MPI for Scalable Computing,” Argonne Training Program in Extreme Scale Computing, St. Charles, IL, August 3–4, 2015.
5. W. Gropp, “MPI and Hybrid Programming Models,” Argonne Training Program in Extreme Scale Computing, St. Charles, IL, August 5, 2015.
6. P. Balaji, W. Gropp, T. Hoefler, and R. Thakur, “Advanced MPI Programming,” SC2014, New Orleans, Louisiana, November 2014.
7. W. Gropp, R. Lusk, and R. Thakur, “MPI for Scalable Computing,” Argonne Training Program in Extreme Scale Computing, St. Charles, IL, August 4–5, 2014.
8. W. Gropp, “MPI and Hybrid Programming Models,” Argonne Training Program in Extreme Scale Computing, St. Charles, IL, August 6, 2014.
9. W. Gropp, R. Lusk, and R. Thakur, “MPI for Scalable Computing,” Argonne Training Program in Extreme Scale Computing, St. Charles, IL, July 29–30, 2013.
10. W. Gropp, “MPI and Hybrid Programming Models,” Argonne Training Program in Extreme Scale Computing, St. Charles, IL, August 2, 2013.
11. E. Lusk, W. Gropp, R. Ross, and R. Thakur, “Advanced MPI: I/O and One-Sided Communication,” SC2012, Salt Lake City, Utah, November 2012.
12. W-M Hwu, D. Kirk, W. Gropp, and I. Gelado, “Programming Heterogeneous Parallel Computing Systems,” VSCSE, July 2012.

13. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2011, Seattle, WA, November 2011.
14. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2010, New Orleans, LA, November 2010.
15. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2009, Portland, OR, November 2009.
16. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2008, Austin, TX, November 2008.
17. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2007, Reno, NV, November 2007.
18. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2006, Tampa, FL, November 2006.
19. W. Gropp and R. Thakur, "MPI on the Grid," CCGrid 2006, Singapore, May, 2006.
20. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2005, Seattle, WA, November 2005.
21. W. Gropp and E. Lusk, "Using MPI-2: A Problem-Based Approach," PVMMPI 2005, Sorrento, Italy, 2005.
22. B. Smith, M. Knepley, D. Kaushik, W. Gropp, "Introduction to PETSc," DD16, New York, NY, January, 2005.
23. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2004, Pittsburgh, PA, November, 2004.
24. W. Gropp, E. Lusk, "Using MPI-2: A Problem-Based Approach," PVMMPI 2004, Budapest, Hungary, September, 2004.
25. 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.
26. W. Gropp, "Parallel Programming with MPI," Cluster School, Merida, Venezuela, October, 2003.
27. W. Gropp and E. Lusk, "High-Level Programming in MPI," PVMMPI 2003, Venice, Italy, September, 2003.
28. W. Gropp, "PETSc," ACTS Workshop 2003, Berkeley, CA, August, 2003.
29. W. Gropp, D. Keyes, "Introduction to Domain Decomposition with PETSc," Domain Decomposition 15, Berlin, Germany, July, 2003.
30. 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.
31. W. Gropp, D. Keyes, "PETSc Tutorial," Peking University, Beijing, China, July 2002.

32. 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.
33. W. Gropp, "Advanced Cluster Programming with MPI," Cluster 2001, Newport Beach, CA, October, 2001.
34. W. Gropp, E. Lusk, R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface," SC2000, Dallas, TX, November, 2000.
35. 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.
36. S. Balay, W. Gropp, L. Curfman McInnes, B. Smith, "Tutorial on the Portable, Extensible Toolkit for Scientific computation (PETSc)," DD13, Lyon, France, October, 2000.
37. W. Gropp, "High Performance MPI," CASC, Lawrence Livermore National Laboratory, May, 2000.
38. 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.
39. W. Gropp, E. Lusk, R. Thakur, "Tuning MPI Applications for Peak Performance," SC99, Portland, OR, November, 1999.
40. W. Gropp, MPI Portion of "How to Run A Beowulf Cluster," (Thomas Sterling organizer), SC99, Portland, OR, November, 1999.
41. W. Gropp, E. Lusk, R. Thakur, "Using MPI-1 and MPI-2," PVMMPI'99, Barcelona, Spain, September, 1999.
42. W. Gropp, "Introduction to the Message Passing Interface," Summer Institute for Advanced Computation, Wright State University, August, 1999.
43. S. Balay, W. Gropp, L. Curfman McInnes, "PETSc Tutorial", Parallel CFD'99, Williamsburg, VA, May, 1999.
44. W. Gropp, "Intermediate MPI," NRL, Monterey, CA, April, 1999.
45. W. Gropp, "PETSc Tutorial," SIAM Parallel Processing, San Antonio, TX, March 1999.
46. W. Gropp, "Introduction to MPI," as part of "High Performance Programming," Technical University of Denmark, Lyngby, Denmark, December 1998.
47. W. Gropp, E. Lusk, R. Thakur, "Tuning MPI Applications for Peak Performance," SC98, Orlando, FL, November, 1998.
48. W. Gropp, "Portable High Performance Parallel I/O and MPI," Utrecht, The Netherlands, February, 1998.
49. 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.

50. W. Gropp, “PETSc Tutorial,” SC97, November, 1997.

Webinars:

1. *Changing How Programmers Think about Parallel Computing*, ACM Webinar, July 2013.

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.
- [8] Barbara M. Chapman, William D. Gropp, Kalyan Kumaran, and Matthias S. Müller, editors. *OpenMP in the Petascale Era – 7th International Workshop on OpenMP, IWOMP 2011, Chicago, IL, USA, June 13-15, 2011. Proceedings*, volume 6665 of *Lecture Notes in Computer Science*. Springer, 2011.
- [9] William Gropp, Torsten Hoefler, Rajeev Thakur, and Ewing Lusk. *Using Advanced MPI: Modern Features of the Message-Passing Interface*. MIT Press, Nov. 2014.
- [10] William Gropp, Ewing Lusk, and Anthony Skjellum. *Using MPI: Portable Parallel Programming with the Message-Passing Interface*, 3rd edition. MIT Press, Nov. 2014.
- [11] National Research Council. *Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017–2020: Interim Report*. The National Academies Press, Washington, DC, 2014.
- [12] National Academies of Sciences, Engineering, and Medicine. *Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017–2020*. The National Academies Press, Washington, DC, 2016.

2 Book Chapters

- [1] William Gropp and Rajeev Thakur. MPI. In Pavan Balaji, editor, *Programming Models for Parallel Computing*. MIT Press, 2015.
- [2] Brett Bode, Michelle Butler, Thom Dunning, Torsten Hoefler, William Kramer, William Gropp, and Wen-mei Hwu. The Blue Waters super-system for super-science. In Jeffrey S. Vetter, editor, *Contemporary High Performance Computing: From Petascale Toward Exascale*, volume 1 of *CRC Computational Science Series*, pages 339–366. Taylor and Francis, Boca Raton, 1 edition, 2013.
- [3] William Gropp. Parallel computer architectures. In Jack Dongarra, Ian Foster, Geoffrey Fox, William Gropp, Ken Kennedy, Linda Torczon, and Andy White, editors, *Sourcebook of Parallel Computing*, pages 15–42. Morgan Kaufmann, 2003.
- [4] Ian Foster, William Gropp, and Carl Kesselman. Message passing and threads. In Jack Dongarra, Ian Foster, Geoffrey Fox, William Gropp, Ken Kennedy, Linda Torczon, and Andy White, editors, *Sourcebook of Parallel Computing*, pages 313–329. Morgan Kaufmann, 2003.
- [5] Rajeev Thakur and William Gropp. Parallel I/O. In Jack Dongarra, Ian Foster, Geoffrey Fox, William Gropp, Ken Kennedy, Linda Torczon, and Andy White, editors, *Sourcebook of Parallel Computing*, pages 331–355. Morgan Kaufmann, 2003.
- [6] William Gropp. The 2-d Poisson problem. In Jack Dongarra, Ian Foster, Geoffrey Fox, William Gropp, Ken Kennedy, Linda Torczon, and Andy White, editors, *Sourcebook of Parallel Computing*, pages 469–480. Morgan Kaufmann, 2003.
- [7] Satish Balay, William Gropp, Lois Curfman McInnes, and Barry F. Smith. Software for the scalable solution of partial differential equations. In Jack Dongarra, Ian Foster, Geoffrey Fox, William Gropp, Ken Kennedy, Linda Torczon, and Andy White, editors, *Sourcebook of Parallel Computing*, pages 621–647. Morgan Kaufmann, 2003.
- [8] William Gropp. So you want to use a cluster. In William Gropp, Ewing Lusk, and Thomas Sterling, editors, *Beowulf Cluster Computing with Linux*, pages 1–17. MIT Press, 2003.
- [9] Ewing Lusk, William Gropp, and Ralph Butler. An introduction to writing parallel programs. In William Gropp, Ewing Lusk, and Thomas Sterling, editors, *Beowulf Cluster Computing with Linux*, pages 171–206. MIT Press, 2003.
- [10] William Gropp and Ewing Lusk. Parallel programming with MPI. In William Gropp, Ewing Lusk, and Thomas Sterling, editors, *Beowulf Cluster Computing with Linux*, pages 207–243. MIT Press, 2003.
- [11] William Gropp and Ewing Lusk. Advanced topics in MPI programming. In William Gropp, Ewing Lusk, and Thomas Sterling, editors, *Beowulf Cluster Computing with Linux*, pages 245–278. MIT Press, 2003.
- [12] Rajeev Thakur, William Gropp, and Ewing Lusk. ADIO: A framework for high-performance, portable parallel I/O. In Daniel A. Reed, editor, *Scalable Input/Output*, pages 111–134. MIT Press, 2004.

- [13] William D. Gropp. Issues in accurate and reliable use of parallel computing in numerical programs. In Bo Einarsson, editor, *Accuracy and Reliability in Scientific Computing*. SIAM, 2005.
- [14] Ricky A. Kendall, Masha Sosonkina, William D. Gropp, Robert W. Numrich, and Thomas Sterling. Parallel programming models applicable to cluster computing and beyond. In Are Magnus Bruaset and Aslak Tveito, editors, *Numerical Solution of Partial Differential Equations on Parallel Computers*, number 51 in Lecture Notes in Computational Science and Engineering, pages 3–54. Springer, 2006.
- [15] William D. Gropp and Andrew Lumsdaine. Parallel tools and environments: A survey. In Michael A. Heroux, Padma Raghavan, and Horst D. Simon, editors, *Parallel Processing for Scientific Computing*, pages 223–232. SIAM, 2006.
- [16] Boyana Norris, Albert Hartono, and William Gropp. Annotations for productivity and performance portability. In *Petascale Computing: Algorithms and Applications*, Computational Science. Chapman & Hall / CRC Press, Taylor and Francis Group, 2007. Preprint ANL/MCS-P1392-0107.
- [17] W. D. Gropp and D. E. Keyes. Domain decomposition on parallel computers. In T. F. Chan, R. Glowinski, J. Périaux, and O. B. Widlund, editors, *Domain Decomposition Methods*, pages 260–288. SIAM, Philadelphia, 1989.
- [18] D. E. Keyes and W. D. Gropp. Domain decomposition techniques for nonsymmetric systems of equations: examples from computational fluid dynamics. In T. F. Chan, R. Glowinski, J. Périaux, and O. B. Widlund, editors, *Domain Decomposition Methods*, pages 321–339. SIAM, Philadelphia, 1989.
- [19] William D. Gropp and Martin H. Schultz. High performance parabolic equation solvers. In D. Lee, A. Cakmak, and R. Vichnevetsky, editors, *Computational Acoustics*, volume 1. Elsevier Science Pub., 1990.
- [20] William D. Gropp and David E. Keyes. Domain decomposition as a mechanism for using asymptotic methods. In H. G. Kaper and M. Garbey, editors, *Asymptotic and Numerical Methods for Partial Differential Equations with Critical Parameters*, pages 93–106. Kluwer, Dordrecht, 1992.
- [21] William D. Gropp and David E. Keyes. Semi-structured refinement and parallel domain decomposition methods. In P. Mehrotra et al., editor, *Unstructured Scientific Computation on Multiprocessors*, pages 187–203. MIT Press, 1992.
- [22] W. D. Gropp, D. E. Keyes, and M. D. Tidriri. Parallel implicit solvers for steady, compressible aerodynamics. In *Parallel Computational Fluid Dynamics*, pages 391–399. Elsevier Science Publishers B.V. (North-Holland), Amsterdam, 1995.
- [23] William D. Gropp and Barry Smith. Parallel domain decomposition software. In D. E. Keyes, Youcef Saad, and Donald G. Truhlar, editors, *Domain-Based Parallelism and Problem Decomposition Methods in Computational Science and Engineering*. SIAM, Philadelphia, 1995.
- [24] S. Balay, W. D. Gropp, L. C. McInnes, and B. F. Smith. Efficient management of parallelism in object-oriented numerical software libraries. In E. Arge, A. M. Bruaset, and H. P. Langtangen, editors, *Modern Software Tools in Scientific Computing*, pages 163–202. Birkhauser Press, 1997.

- [25] William D. Gropp. An introduction to performance debugging for parallel computers. In D. Keyes, A. Sameh, and V. Venkatakrisnan, editors, *Parallel Numerical Algorithms*, pages 369–382. Kluwer Academic Publishers, 1997.

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.
- [7] David Keyes and Valerie Taylor. NSF-ACCI task force on software for science and engineering, December 2010.

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] 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.
- [33] 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.
- [34] 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.
- [35] 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.

- [36] 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.
- [37] 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.
- [38] Rajeev Thakur, William Gropp, and Ewing Lusk. Optimizing noncontiguous accesses in MPI-IO. *Parallel Computing*, 28(1):83–105, January 2002.
- [39] 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.
- [40] William D. Gropp and Ewing Lusk. Fault tolerance in MPI programs. *International Journal of High Performance Computer Applications*, 18(3):363–372, 2004.
- [41] Avery Ching, Alok N. Choudhary, Wei-keng Liao, Robert B. Ross, and William Gropp. Evaluating structured I/O methods for parallel file systems. *International Journal of High Performance Computing and Networking*, 2(2/3/4):133–145, 2004.
- [42] 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.
- [43] 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>.
- [44] 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.
- [45] 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.
- [46] Baifei Shen, Yuelin Li, Karoly Nemeth, Hairong Shang, Yong chul 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.
- [47] 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.
- [48] Rajeev Thakur and William Gropp. Test suite for evaluating performance of multithreaded MPI communication. *Parallel Computing*, 35:608–617, 2009.
- [49] Franck Cappello, Al Geist, Bill Gropp, Laxmikant Kale, Bill Kramer, and Marc Snir. Toward exascale resilience. *International Journal of High Performance Computing Applications*, 23(4):374–388, 2009.

- [50] William Gropp and Marc Snir. On the need for a consortium of capability centers. *International Journal of High Performance Computing Applications*, 23(4):413–420, 2009.
- [51] Pavan Balaji, Anthony Chan, Rajeev Thakur, William Gropp, and Ewing L. Lusk. Toward message passing for a million processes: characterizing MPI on a massive scale Blue Gene/P. *Computer Science - R&D*, 24(1-2):11–19, 2009.
- [52] William D. Gropp. Software for petascale computing systems. *IEEE Computing in Science and Engineering*, 11(5):17–21, 2009.
- [53] Jesper Larsson Träff, William D. Gropp, and Rajeev Thakur. Self-consistent MPI performance guidelines. *IEEE Transactions on Parallel and Distributed Systems*, 21(5):698–709, 2009.
- [54] 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*, 40(1):23–42, 2010.
- [55] Pavan Balaji, Darius Buntinas, David Goodell, William Gropp, and Rajeev Thakur. Fine-grained multithreading support for hybrid threaded MPI programming. *International Journal of High Performance Computing Applications*, 24(1):49–57, 2010.
- [56] J. Mellor-Crummey, W. Gropp, and M. Herlihy. Teaching parallel programming: a roundtable discussion. *XRDS: Crossroads, The ACM Magazine for Students*, 17(1):28–30, 2010.
- [57] Pavan Balaji, Anthony Chan, William Gropp, Rajeev Thakur, and Ewing Lusk. The importance of non-data-communication overheads in MPI. *International Journal of High Performance Computing Applications*, 24(1):5–15, 2010.
- [58] Jesper Larsson Träff, Andreas Ripke, Christian Siebert, Pavan Balaji, Rajeev Thakur, and William Gropp. A pipelined algorithm for large, irregular all-gather problems. *International Journal of High Performance Computing Applications*, 24(1):58–68, 2010.
- [59] Dahai Guo and William Gropp. Optimizing sparse data structures for matrix-vector multiply. *International Journal of High Performance Computing Applications*, 25(1):115–131, 2011.
- [60] Jack Dongarra, Pete Beckman, Terry Moore, Patrick Aerts, Giovanni Aloisio, Jean-Claude Andre, David Barkai, Jean-Yves Berthou, Taisuke Boku, Bertrand Braunschweig, Franck Cappello, Barbara Chapman, Xuebin Chi, Alok Choudhary, Sudip Dosanjh, Thom Dunning, Sandro Fiore, Al Geist, William Gropp, Robert Harrison, Mark Hereld, Michael Heroux, Adolfo Hoisie, Koh Hotta, Zhong Jin, Yutaka Ishikawa, Fred Johnson, Sanjay Kale, Richard Kenway, David Keyes, Bill Kramer, Jesus Labarta, Alain Lichnewsky, Thomas Lippert, Bob Lucas, Barney Maccabe, Satoshi Matsuoka, Paul Messina, Peter Michielse, Bernd Mohr, Matthias S. Mueller, Wolfgang E. Nagel, Hiroshi Nakashima, Michael E Papka, Dan Reed, Mitsuhisa Sato, Ed Seidel, John Shalf, David Skinner, Marc Snir, Thomas Sterling, Rick Stevens, Fred Streitzi, Bob Sugar, Shinji Sumimoto, William Tang, John Taylor, Rajeev Thakur, Anne Trefethen, Mateo Valero, Aad van der Steen, Jeffrey Vetter, Peg Williams, Robert Wisniewski, and Kathy Yelick. The international exascale software project roadmap. *International Journal of High Performance Computing Applications*, 25(1):3–60, 2011.
- [61] M. Showerman, J. Enos, C. Steffen, S. Treichler, W. Gropp, and W.-m.W. Hwu. EcoG: A power-efficient GPU cluster architecture for scientific computing. *Computing in Science Engineering*, 13(2):83–87, March-April 2011.

- [62] Pavan Balaji, Darius Buntinas, David Goodell, William Gropp, Torsten Hoefler, Sameer Kumar, Ewing Lusk, Rajeev Thakur, and Jesper Larsson Träff. MPI on millions of cores. *Parallel Processing Letters*, 21(1):45–60, 2011.
- [63] Ganesh Gopalakrishnan, Robert M. Kirby, Stephen F. Siegel, Rajeev Thakur, William Gropp, Ewing L. Lusk, Bronis R. de Supinski, Martin Schulz, and Greg Bronevetsky. Formal analysis of MPI-based parallel programs. *Commun. ACM*, 54(12):82–91, 2011.
- [64] William Gropp. Best algorithms + best computers = powerful match. *Commun. ACM*, 55(5):100–100, May 2012.
- [65] D. Guo and W. Gropp. Applications of the streamed storage format for sparse matrix operations. *International Journal of High Performance Computing Applications*, 2013.
- [66] David E Keyes, Lois C McInnes, Carol Woodward, William Gropp, Eric Myra, Michael Pernice, John Bell, Jed Brown, Alain Clo, Jeffrey Connors, Emil Constantinescu, Don Estep, Kate Evans, Charbel Farhat, Ammar Hakim, Glenn Hammond, Glen Hansen, Judith Hill, Tobin Isaac, Xiangmin Jiao, Kirk Jordan, Dinesh Kaushik, Efthimios Kaxiras, Alice Koniges, Kihwan Lee, Aaron Lott, Qiming Lu, John Magerlein, Reed Maxwell, Michael McCourt, Miriam Mehl, Roger Pawlowski, Amanda P Randles, Daniel Reynolds, Beatrice Rivière, Ulrich Rüde, Tim Scheibe, John Shadid, Brendan Sheehan, Mark Shephard, Andrew Siegel, Barry Smith, Xi-anzhu Tang, Cian Wilson, and Barbara Wohlmuth. Multiphysics simulations: Challenges and opportunities. *International Journal of High Performance Computing Applications*, 27(1):4–83, 2013.
- [67] T. Hoefler, J. Dinan, D. Buntinas, P. Balaji, B. Barrett, R. Brightwell, W. Gropp, V. Kale, and R. Thakur. MPI + MPI: a new hybrid approach to parallel programming with MPI plus shared memory. *Journal of Computing*, 05 2013. doi: 10.1007/s00607-013-0324-2.
- [68] W. Gropp and M. Snir. Programming for exascale computers. *Computing in Science and Engineering*, PP(99), 2013.
- [69] Dahai Guo and William Gropp. Applications of the streamed storage format for sparse matrix operations. *International Journal of High Performance Computing Applications*, 28(1):3–12, 2014.
- [70] William Gropp and Satoshi Matsuoka. Special issue: SC13 - The International Conference for High Performance Computing, Networking, Storage and Analysis. *Scientific Programming*, pages 57–58, 2014.
- [71] Franck Cappello, Al Geist, William Gropp, Sanjay Kale, Bill Kramer, and Marc Snir. Toward exascale resilience: 2014 update. *Supercomputing frontiers and innovations*, 1(1), 2014. Open Access, <http://superfri.org/superfri/article/view/14>.
- [72] Jeffrey P Slotnick, Abdollah Khodadoust, Juan J Alonso, David L Darmofal, William D Gropp, Elizabeth A Lurie, Dimitri J Mavriplis, and Venkat Venkatakrishnan. Enabling the environmentally clean air transportation of the future: a vision of computational fluid dynamics in 2030. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 372(2022):20130317, 2014.
- [73] Paul Sack and William Gropp. Collective algorithms for multiported torus networks. *ACM Trans. Parallel Comput.*, 1(2):12:1–12:33, February 2015.

- [74] Torsten Hoefler, James Dinan, Rajeev Thakur, Brian Barrett, Pavan Balaji, William Gropp, and Keith D. Underwood. Remote memory access programming in MPI-3. *ACM Trans. Parallel Comput.*, 2(2):9:1–9:26, 2015.
- [75] Dahai Guo, William Gropp, and Luke N Olson. A hybrid format for better performance of sparse matrix-vector multiplication on a GPU. *International Journal of High Performance Computing Applications*, 30(1):103–120, 2016.
- [76] Amanda Bienz, Robert D. Falgout, William Gropp, Luke N. Olson, and Jacob B. Schroder. Reducing parallel communication in algebraic multigrid through sparsification. *SIAM Journal on Scientific Computing*, 38(5):S332–S357, 2016.
- [77] James Dinan, Pavan Balaji, Darius Buntinas, David Goodell, William Gropp, and Rajeev Thakur. An implementation and evaluation of the MPI 3.0 one-sided communication interface. *Concurrency and Computation: Practice and Experience*, 28(17):4385–4404, 2016. cpe.3758.
- [78] Anthony Kougkas, Hassan Eslami, Xian-He Sun, Rajeev Thakur, and William Gropp. Re-thinking key-value store for parallel I/O optimization. *The International Journal of High Performance Computing Applications*, 31(4):335–356, 2017.
- [79] Hoang-Vu Dang, Marc Snir, and William Gropp. Eliminating contention bottlenecks in multithreaded MPI. *Parallel Computing*, 69:1–23, 2017.
- [80] Jon Calhoun, Franck Cappello, Luke N Olson, Marc Snir, and William D Gropp. Exploring the feasibility of lossy compression for PDE simulations. *The International Journal of High Performance Computing Applications*, 0(0):1094342018762036, 0. Published online and awaiting print publication date.

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.
- [14] William D. Gropp and David E. Keyes. Parallel domain decomposition with local mesh refinement. In Danny C. Sorensen, Jack Dongarra, Paul Messina, and Robert G. Voigt, editors, *Proceedings of the 4th Conference on Parallel Processing for Scientific Computing*, pages 295–296, Philadelphia, PA, USA, December 1989. SIAM Publishers.
- [15] D. E. Keyes, W. D. Gropp, and A. Ecker. Domain decomposition techniques for large sparse nonsymmetric systems arising from elliptic problems with first-order terms. In J. H. Kane and A. D. Carlson, editors, *Proceedings of a Symposium on the Solution of Super Large Problems in Computational Mechanics*, New York, 1989. Plenum.
- [16] Z. George Mou, David E. Keyes, and William D. Gropp. Balanced divide-and-conquer algorithms for the fine-grained parallel direct solution of dense and banded triangular linear systems and their connection machine implementation. In Danny C. Sorensen, Jack Dongarra, Paul Messina, and Robert G. Voigt, editors, *Proceedings of the 4th Conference on Parallel Processing for Scientific Computing*, pages 386–387, Philadelphia, PA, USA, December 1989. SIAM Publishers.
- [17] D. E. Foulser and W. D. Gropp. CLAM and CLAMShell: An interactive front-end for parallel computing and visualization. In Pen-Chung Yew, editor, *Proceedings of the 1990 International Conference on Parallel Processing. Volume 3: Algorithms and Architectures*, pages 35–43, Urbana-Champaign, IL, August 1990. Pennsylvania State University Press.

- [18] W. D. Gropp and D. E. Keyes. A domain decomposition method with locally uniform mesh refinement. In T. F. Chan, R. Glowinski, J. Périaux, and O. B. Widlund, editors, *Third International Symposium on Domain Decomposition Methods for Partial Differential Equations*, pages 115–129, Philadelphia, 1990. SIAM.
- [19] William Gropp. Parallel computing and the solution of partial differential equations (abstract). In Irene O. Macke, editor, *Transactions of the American Nuclear Society*, volume 62, page 269. American Nuclear Society, November 1990. Invited Paper.
- [20] William Gropp. Visual artifacts in boundary conditions. In A. Louise Perkins and Jeffrey S. Scroggs, editors, *Proceedings for the ICASE Workshop on Heterogeneous Boundary Conditions*, number NASA Contractor Report 187630, pages 1–3. ICASE, August 1991.
- [21] Tony F. Chan, William Gropp, and David E. Keyes. Domain decomposed preconditionings for transport operators. In A. Louise Perkins and Jeffrey S. Scroggs, editors, *Proceedings for the ICASE Workshop on Heterogeneous Boundary Conditions*, number NASA Contractor Report 187630, pages 12–30. ICASE, August 1991.
- [22] I. Foster, W. Gropp, and R. Stevens. Parallel scalability of the spectral transform method. In Jack Dongarra, Ken Kennedy, Paul Messina, Danny C. Sorensen, and Robert G. Voigt, editors, *Proceedings of the 5th SIAM Conference on Parallel Processing for Scientific Computing*, pages 307–314, Houston, TX, March 1991. SIAM.
- [23] W. D. Gropp and D. E. Keyes. Parallel domain decomposition and the solution of nonlinear systems of equations. In R. Glowinski, Yu. A. Kuznetsov, G. A. Meurant, J. Périaux, and O. B. Widlund, editors, *Fourth International Symposium on Domain Decomposition Methods for Partial Differential Equations*, pages 373–381, Philadelphia, 1991. SIAM.
- [24] D. E. Keyes and W. D. Gropp. Domain-decomposable preconditioners for second-order upwind discretizations of multicomponent systems. In R. Glowinski, Yu. A. Kuznetsov, G. A. Meurant, J. Périaux, and O. B. Widlund, editors, *Fourth International Symposium on Domain Decomposition Methods for Partial Differential Equations*, pages 129–139, Philadelphia, 1991. SIAM.
- [25] Xiao-Chuan Cai, William D. Gropp, and David E. Keyes. A comparison of some domain decomposition algorithms for nonsymmetric elliptic problems. In Tony F. Chan, David E. Keyes, Gérard A. Meurant, Jeffrey S. Scroggs, and Robert G. Voigt, editors, *Fifth International Symposium on Domain Decomposition Methods for Partial Differential Equations*, Philadelphia, PA, USA, 1992. SIAM.
- [26] William D. Gropp. Parallel computing and domain decomposition. In Tony F. Chan, David E. Keyes, Gérard A. Meurant, Jeffrey S. Scroggs, and Robert G. Voigt, editors, *Fifth International Symposium on Domain Decomposition Methods for Partial Differential Equations*, Philadelphia, PA, USA, 1992. SIAM.
- [27] Ralph Butler, William D. Gropp, and Ewing Lusk. Developing applications for a heterogeneous computing environment. In *Proc. Workshop on Heterogeneous Processing*, pages 77–83, Los Alamitos, California, 1993. IEEE.
- [28] William Gropp. Parallel programming tools for distributed-memory computers. In *Proc. of the 1993 SCS Simulation Multiconference*, March 1993.

- [29] N. Galbreath, W. Gropp, D. Gunter, D. Leaf, and D. Levine. Parallel solution of the three-dimensional, time-dependent Ginzburg-Landau equation. In Linda R. Petzold, Richard F. Sincovec, David E. Keyes, Michael R. Leuze, and Daniel A. Reed, editors, *Proceedings of the 6th SIAM Conference on Parallel Processing for Scientific Computing*, pages 160–164, Norfolk, VI, March 1993. SIAM Press.
- [30] N. Galbreath, W. Gropp, and D. Levine. Applications-driven parallel I/O. In *Proceedings of Supercomputing '93*, pages 462–471. IEEE Computer Society Press, 1993. Reprinted in the book “High Performance Storage and Parallel I/O” (<http://www.buyya.com/superstorage/>, 2001, pages 539–547).
- [31] L. Kettunen, K. Forsman, D. Levine, and W. Gropp. Solutions of team problem #13 using integral equations in a sequential and parallel computing environment. In *Proceedings of the Miami TEAM Workshop*. Florida International University, Department of Electrical Engineering and Computing Science, December 1993.
- [32] X.-C. Cai, W. D. Gropp, D. E. Keyes, and M. D. Tidriri. Parallel implicit methods for aerodynamics. In *Domain Decomposition Methods in Scientific and Engineering Computing: Proceedings of the Seventh International Conference on Domain Decomposition*, volume 180 of *Contemporary Mathematics*, pages 465–470, Providence, Rhode Island, 1994. American Mathematical Society.
- [33] X.-C. Cai, William D. Gropp, David E. Keyes, and M. D. Tidriri. Newton-Krylov-Schwarz methods in CFD. In F. Hebekker and R. Rannacher, editors, *Proceedings of the International Workshop on Numerical Methods for the Navier-Stokes Equations*, Notes in Numerical Fluid Mechanics, pages 17–30, Braunschweig, 1994. Vieweg Verlag.
- [34] W. D. Gropp, D. E. Keyes, and J. S. Mounts. Implicit domain decomposition algorithms for steady, compressible aerodynamics. In *Domain Decomposition Methods in Science and Engineering: The Sixth International Conference on Domain Decomposition*, volume 157 of *Contemporary Mathematics*, pages 203–213, Providence, Rhode Island, 1994. American Mathematical Society.
- [35] W. Gropp and B. Smith. Scalable, extensible, and portable numerical libraries. In *Proceedings of the Scalable Parallel Libraries Conference, October 6–8, 1993, Mississippi State, Mississippi*, pages 87–93, 1109 Spring Street, Suite 300, Silver Spring, MD 20910, USA, 1994. IEEE Computer Society Press.
- [36] W. Gropp and E. Lusk. The MPI communication library: its design and a portable implementation. In *Proceedings of the Scalable Parallel Libraries Conference, October 6–8, 1993, Mississippi State, Mississippi*, pages 160–165, 1109 Spring Street, Suite 300, Silver Spring, MD 20910, USA, 1994. IEEE Computer Society Press.
- [37] W. Gropp and E. Lusk. Scalable Unix tools on parallel processors. In *Proceedings of the Scalable High-Performance Computing Conference, May 23–25, 1994, Knoxville, Tennessee*, pages 56–62, 1109 Spring Street, Suite 300, Silver Spring, MD 20910, USA, 1994. IEEE Computer Society Press.
- [38] W. D. Gropp and B. F. Smith. Experiences with domain decomposition in three dimensions: overlapping Schwarz methods. In *Domain Decomposition Methods in Science and Engineering: The Sixth International Conference on Domain Decomposition*, volume 157

- of *Contemporary Mathematics*, pages 323–333, Providence, Rhode Island, 1994. American Mathematical Society.
- [39] L. Kettunen, K. Forsman, D. Levine, and William D. Gropp. Solutions of TEAM problems 13 and 20 using a volume integral formulation. In *Proceedings of Aix-les-Bains TEAM workshop*, 1994.
- [40] Kimmo Forsman, William Gropp, Lauri Kettunen, and David Levine. Computational electromagnetics and parallel dense matrix computations. In Bailey, David H., Bjørstad, Petter E., Gilbert, John E., Mascagni, Michael V., Schreiber, Robert S., Simon, Horst D., Torczon, Virginia J. and Layne T. Watson, editors, *Proceedings of the 27th Conference on Parallel Processing for Scientific Computing*, pages 225–230, Philadelphia, PA, USA, February 15–17 1995. SIAM Press.
- [41] W. Gropp and E. Lusk. Dynamic process management in an MPI setting. In *Proceedings / Seventh IEEE Symposium on Parallel and Distributed Processing, October 25–28, 1995, San Antonio, Texas*, pages 530–534, 1109 Spring Street, Suite 300, Silver Spring, MD 20910, USA, 1995. IEEE Computer Society Press. IEEE catalog number 95TB8131.
- [42] W. Gropp and E. Lusk. Implementing MPI: the 1994 MPI Implementors’ Workshop. In *Proceedings of the 1994 Scalable Parallel Libraries Conference: October 12–14, 1994, Mississippi State University, Mississippi*, pages 55–59, 1109 Spring Street, Suite 300, Silver Spring, MD 20910, USA, 1995. IEEE Computer Society Press.
- [43] W. Gropp, E. Karrels, and E. Lusk. MPE graphics: scalable X11 graphics in MPI. In *Proceedings of the 1994 Scalable Parallel Libraries Conference: October 12–14, 1994, Mississippi State University, Mississippi*, pages 49–54, 1109 Spring Street, Suite 300, Silver Spring, MD 20910, USA, 1995. IEEE Computer Society Press.
- [44] William D. Gropp and Ewing L. Lusk. A taxonomy of programming models for symmetric multiprocessors and SMP clusters. In W. K. Giloi, S. Jahnichen, and B. D. Shriver, editors, *Programming Models for Massively Parallel Computers*, pages 2–7. IEEE Computer Society Press, October 1995.
- [45] William D. Gropp, Lois Curfman McInnes, and Barry Smith. Scalable libraries for solving systems of nonlinear equations and unconstrained minimization problems. In *Proceedings of the 1994 Scalable Parallel Libraries Conference: October 12–14, 1994, Mississippi State University, Mississippi*, pages 60–67, 1109 Spring Street, Suite 300, Silver Spring, MD 20910, USA, 1995. IEEE Computer Society Press.
- [46] W. Gropp and E. Lusk. The MPI message-passing interface standard: Overview and status. In Grandinetti et al, editor, *High performance computing: technology, methods, and applications (Advanced workshop, June 1994, Cetraro, Italy)*, volume 10 of *Advances in Parallel Computing*, pages 265–270, Amsterdam, The Netherlands, 1995. Elsevier.
- [47] Rajeev Thakur, William Gropp, and Ewing Lusk. An abstract-device interface for implementing portable parallel-I/O interfaces. In *Proceedings of Frontiers ’96: The Sixth Symposium on the Frontiers of Massively Parallel Computation*, pages 180–187, Annapolis, Maryland, October 27–31, 1996. IEEE Computer Society.

- [48] A. Geist, W. Gropp, S. Huss-Lederman, A. Lumsdaine, E. Lusk, W. Saphir, T. Skjellum, and M. Snir. MPI-2: extending the Message-Passing Interface. In Luc Bouge, P. Fraigniaud, A. Mignotte, and Y. Robert, editors, *Euro-Par '96 parallel processing: second International Euro-Par Conference, Lyon, France, August 26–29, 1996: proceedings*, volume 1123–1124 of *Lecture notes in computer science*, pages 128–135, Berlin, Germany / Heidelberg, Germany / London, UK / etc., 1996. Springer-Verlag.
- [49] William D. Gropp. Why we couldn't use numerical libraries for PETSc. In Ronald F. Boisvert, editor, *Proceedings of the IFIP TC2/WG2.5 Working Conference on the Quality of Numerical Software, Assessment and Enhancement*, pages 249–254. Chapman & Hall, 1997.
- [50] Rajeev Thakur, William Gropp, and Ewing Lusk. An experimental evaluation of the parallel I/O systems of the IBM SP and Intel Paragon using a production application. In *Proceedings of the Third International Conference of the Austrian Center for Parallel Computation (ACPC)*, volume 1127 of *Lecture Notes in Computer Science*, pages 24–35. Springer-Verlag, September 1996.
- [51] W. Gropp and Jorge Morè. Optimization environments and the NEOS server. In M. D. Buhmann and A. Iserles, editors, *Approximation Theory and Optimization: Tributes to M. J. D. Powell*, pages 167–182. Cambridge University Press, 1997.
- [52] William D. Gropp, D.E. Keyes, L.C. McInnes, and M.D. Tidriri. Parallel implicit PDE computations: Algorithms and software. In *Proceedings of Parallel CFD'97*, pages 333–344. Elsevier, 1997.
- [53] William D. Gropp and Ewing Lusk. Why are PVM and MPI so different? In Marian Bubak, Jack Dongarra, and Jerzy Waśniewski, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, volume 1332 of *Lecture Notes in Computer Science*, pages 3–10. Springer Verlag, 1997. 4th European PVM/MPI Users' Group Meeting, Cracow, Poland, November 1997.
- [54] William D. Gropp. Performance driven programming models. In *Massively Parallel Programming Models (MPPM-97)*, pages 61–67. IEEE Computer Society Press, 1997. November 12-14, 1997; London; Third working conference.
- [55] William D. Gropp. Which comes first: The architecture or the algorithm? (abstract). In A. Veidenbaum and K. Joe, editors, *Innovative Architectures for Future Generation High-Performance Processors and Systems*, page 13. IEEE Computer Society, 1998.
- [56] Rajeev Thakur, William Gropp, and Ewing Lusk. Data sieving and collective I/O in ROMIO. In *Proceedings of the 7th Symposium on the Frontiers of Massively Parallel Computation*, pages 182–189. IEEE Computer Society Press, February 1999.
- [57] William Gropp. Exploiting existing software in libraries: Successes, failures, and reasons why. In Michael Henderson, Christopher Anderson, and Stephen L. Lyons, editors, *Object Oriented Methods for Interoperable Scientific and Engineering Computing*, pages 21–29. SIAM, SIAM, 1999.
- [58] Satish Balay, William Gropp, Lois Curfman McInnes, and Barry Smith. A microkernel design for component-based numerical software systems. In Michael Henderson, Christopher Anderson, and Stephen L. Lyons, editors, *Object Oriented Methods for Interoperable Scientific and Engineering Computing*, pages 60–69. SIAM, SIAM, 1998. Also ANL/MCS-P727-0998.

- [59] Rajeev Thakur, Ewing Lusk, and William Gropp. A case for using MPI's derived datatypes to improve I/O performance. In *Proceedings of SC98: High Performance Networking and Computing*, November 1998.
- [60] William Gropp, Ewing Lusk, and Debbie Swider. Improving the performance of MPI derived datatypes. In Anthony Skjellum, Purushotham V. Bangalore, and Yoginder S. Dandass, editors, *Proceedings of the Third MPI Developer's and User's Conference*, pages 25–30, Starkville, MS, 1999. MPI Software Technology Press.
- [61] Rajeev Thakur, William Gropp, and Ewing Lusk. On implementing MPI-IO portably and with high performance. In *Proceedings of the 6th Workshop on I/O in Parallel and Distributed Systems*, pages 23–32. ACM Press, May 1999.
- [62] W. D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. Towards realistic performance bounds for implicit CFD codes. In *Proceedings of Parallel CFD'99*, pages 241–248, 1999.
- [63] William D. Gropp and Ewing Lusk. Reproducible measurements of MPI performance characteristics. In Jack Dongarra, Emilio Luque, and Tomàs Margalef, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, volume 1697 of *Lecture Notes in Computer Science*, pages 11–18. Springer Verlag, 1999. 6th European PVM/MPI Users' Group Meeting, Barcelona, Spain, September 1999.
- [64] James Cownie and William Gropp. A standard interface for debugger access to message queue information in MPI. In Jack Dongarra, Emilio Luque, and Tomàs Margalef, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, volume 1697 of *Lecture Notes in Computer Science*, pages 51–58. Springer Verlag, 1999. 6th European PVM/MPI Users' Group Meeting, Barcelona, Spain, September 1999.
- [65] W. K. Anderson, William D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. Achieving high sustained performance in an unstructured mesh CFD application. In *Proceedings of the ACM/IEEE SC99 Conference on High Performance Networking and Computing*. IEEE Computer Society, 1999. CDROM. Also at <http://portal.acm.org> and ICASE Report No. 2000-2.
- [66] Lori A. Freitag, William Gropp, Paul D. Hovland, Lois C. McInnes, and Barry F. Smith. Infrastructure and interfaces for large-scale numerical software. In *Proceedings of PDPTA 1999*, pages 2657–2664, 1999.
- [67] Nicholas T. Karonis, Bronis R. de Supinski, Ian Foster, William Gropp, Ewing Lusk, and John Bresnahan. Exploiting hierarchy in parallel computer networks to optimize collective operation performance. In *Fourteenth International Parallel and Distributed Processing Symposium*, pages 377–384, May 2000.
- [68] R. Butler, W. Gropp, and E. Lusk. A scalable process-management environment for parallel programs. In Jack Dongarra, Peter Kacsuk, and Norbert Podhorszki, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number 1908 in Springer Lecture Notes in Computer Science, pages 168–175, September 2000.
- [69] William D. Gropp. Runtime checking of datatype signatures in MPI. In Jack Dongarra, Peter Kacsuk, and Norbert Podhorszki, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number 1908 in Springer Lecture Notes in Computer Science, pages 160–167, September 2000. 7th European PVM/MPI Users' Group Meeting.

- [70] W. D. Gropp, D. K. Kaushik, B. F. Smith, and D. E. Keyes. Analyzing the parallel scalability of an implicit unstructured mesh CFD code. In Mateo Valero, Viktor K. Prasanna, and Sriram Vajapeyam, editors, *High Performance Computing – HiPC2000*, number 1970 in Lecture Notes in Computer Science, pages 395–404. Springer Verlag, 2000.
- [71] William Gropp. Solving CFD problems with open source parallel libraries. In Tor Sorevik, Fredrik Manne, Randi Moe, and Assefaw Hadish Gebremedhin, editors, *Applied Parallel Computing: New Paradigms for HPC in Industry and Academia*, number 1947 in Lecture Notes in Computer Science, page 52. Springer Verlag, 2000. (Abstract).
- [72] C. Eric Wu, Anthony Bolmarcich, Marc Snir, David Wootton, Farid Parpia, Anthony Chan, Ewing L. Lusk, and William Gropp. From trace generation to visualization: A performance framework for distributed parallel systems. In *Proceedings of SC2000*, 2000.
- [73] Kristopher R. Buschelman, William Gropp, Lois C. McInnes, and Barry F. Smith. PETSc and Overture: Lessons learned developing an interface between components. In *The Architecture of Scientific Software 2000*, pages 57–68, 2000.
- [74] Alain Roy, Ian Foster, William Gropp, Nicholas Karonis, Volker Sander, and Brian Toonen. MPICH-GQ: Quality of service for message passing programs. In *Proceedings of SC2000*, 2000.
- [75] William D. Gropp, Dinesh K. Kaushik, David E. Keyes, and Barry F. Smith. Performance modeling and tuning of an unstructured mesh CFD application. In *Proceedings of SC2000*, 2000.
- [76] Rajkumar Vinkat, Philip M. Dickens, and William Gropp. Efficient communication across the Internet in wide-area MPI. In *Proceedings of Parallel and Distributed Processing Techniques and Applications*, 2001.
- [77] Brian Toonen, David Ashton, Ewing Lusk, Ian Foster, William Gropp, Edgar Gabriel, Ralph Butler, and Nicholas Karonis. Interfacing parallel jobs to process managers. In *Proceedings of the 10th IEEE International Symposium on High Performance Distributed Computing*, pages 431–432. IEEE Computer Society Press, August 2001.
- [78] Eric Webb, Jay Alameda, William Gropp, Joshua Gray, and Richard Alkire. Performance of tightly coupled Linux cluster simulation using PETSc of reaction and transport processes during corrosion pit initiation. In *Proceedings of Linux Clusters: the HPC Revolution*, 2001. Urbana, IL.
- [79] William Gropp. Advanced cluster programming with MPI. In *2001 IEEE International Conference on Cluster Computing (CLUSTER 2001), 8-11 October 2001, Newport Beach, CA, USA*, page 453. IEEE Computer Society, 2001.
- [80] Emil Ong, Ewing Lusk, and William Gropp. Scalable Unix commands for parallel processors: A high-performance implementation. In Y. Cotronis and J. Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, volume 2131 of *Lecture Notes in Computer Science*, pages 410–418. Springer-Verlag, September 2001. 8th European PVM/MPI Users’ Group Meeting.
- [81] William Gropp. Challenges and successes in achieving the potential of MPI. In Y. Cotronis and J. Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, volume 2131 of *Lecture Notes in Computer Science*, page 7, September 2001.

- [82] W. D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. Latency, bandwidth, and concurrent issue limitations in high-performance CFD. In *Proceedings of the First MIT Conference on Computational Fluid and Solid Mechanics*, June 2001.
- [83] William D. Gropp. Learning from the success of MPI. In Burkhard Monien, Viktor K. Prasanna, and Sriram Vajapeyam, editors, *High Performance Computing – HiPC 2001*, number 2228 in Lecture Notes in Computer Science, pages 81–92. Springer, December 2001. 8th International Conference.
- [84] Philip M. Dickens and William D. Gropp. An evaluation of a user-level data transfer mechanism for high-performance networks. In *Proceedings of HPDC’02*, pages 255–264, 2002.
- [85] Philip M. Dickens, William Gropp, and Paul R. Woodward. High performance wide area data transfers over high performance networks. In *Proceedings of IPDPS 2002*, 2002.
- [86] William D. Gropp and Ewing Lusk. Goals guiding design: PVM and MPI. In William Gropp, Rob Pennington, Dan Reed, Mark Baker, Maxine Brown, and Rajkumar Buyya, editors, *Proceedings of IEEE Cluster*, pages 257–265. IEEE Computer Society, 2002.
- [87] Seongbok Baik, Cynthia S. Hood, and William D. Gropp. Prototype of AM3: Active mapper and monitoring module for Myrinet environment. In *HSLN (High-Speed Local Networks) workshop*, pages 703–707, 2002.
- [88] A. Ching, A. Choudhary, W.-K. Liao, R. Ross, and W. Gropp. Noncontiguous I/O through PVFS. In William Gropp, Rob Pennington, Dan Reed, Mark Baker, Maxine Brown, and Rajkumar Buyya, editors, *Proceedings of IEEE Cluster*, pages 405–414. IEEE Computer Society, 2002.
- [89] William D. Gropp. Building library components that can use any MPI implementation. In Dieter Kranzlmüller, Peter Kacsuk, Jack Dongarra, and Jens Volkert, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2474 in Lecture Notes in Computer Science, pages 280–287. Springer Verlag, 2002. 9th European PVM/MPI Users’ Group Meeting, Linz, Austria.
- [90] William Gropp and Ewing L. Lusk. MPI on the grid. In Dieter Kranzlmüller, Peter Kacsuk, Jack Dongarra, and Jens Volkert, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2474 in Lecture Notes in Computer Science, page 12. Springer Verlag, 2002.
- [91] William Gropp. MPICH2: A new start for MPI implementations. In Dieter Kranzlmüller, Peter Kacsuk, Jack Dongarra, and Jens Volkert, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2474 in Lecture Notes in Computer Science, page 7. Springer Verlag, 2002.
- [92] Jeffrey J. Evans, Seongbok Baik, Cynthia S. Hood, and William Gropp. Toward understanding soft faults in high performance cluster networks. In *Proceedings of the 8th IFIP/IEEE International Symposium on Integrated Network Management*, pages 117–120, March 2003.
- [93] William Gropp. Trends in high performance computing. In *High Performance Computing with QCDOC and BlueGene*, volume 50, pages 91–97. RIKEN BNL Research Center, February 2003. Abstract and six major slides from the presentation.

- [94] A. Ching, A. Choudhary, K. Coloma, W.-K. Liao, R. Ross, and W. Gropp. Noncontiguous I/O accesses through MPI-IO. In *Proceedings of the 3rd IEEE/ACM International Symposium on Cluster Computing and the Grid (CCGrid2003)*, pages 104–111, May 2003.
- [95] William Gropp. Future developments in MPI. In Jack Dongarra, Domenico Laforenza, and Salvatore Orlando, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2840 in Lecture Notes in Computer Science, pages 15–15. Springer Verlag, 2003. 10th European PVM/MPI User’s Group Meeting, Venice, Italy.
- [96] Rajeev Thakur and William Gropp. Improving the performance of collective operations in MPICH. In Jack Dongarra, Domenico Laforenza, and Salvatore Orlando, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2840 in Lecture Notes in Computer Science, pages 257–267. Springer Verlag, 2003. 10th European PVM/MPI User’s Group Meeting, Venice, Italy.
- [97] G. Almási, C. Archer, J. G. Castanos, M. Gupta, X. Martorell, J. E. Moreira, W. D. Gropp, S. Rus, and B. Toonen. MPI on BlueGene/L: Designing an efficient general purpose messaging solution for a large cellular system. In Jack Dongarra, Domenico Laforenza, and Salvatore Orlando, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2840 in Lecture Notes in Computer Science, pages 352–361. Springer Verlag, 2003. 10th European PVM/MPI User’s Group Meeting, Venice, Italy.
- [98] R. Ross, N. Miller, and W. D. Gropp. Implementing fast and reusable datatype processing. In Jack Dongarra, Domenico Laforenza, and Salvatore Orlando, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2840 in Lecture Notes in Computer Science, pages 404–413. Springer Verlag, 2003. 10th European PVM/MPI User’s Group Meeting, Venice, Italy.
- [99] William Gropp and Ewing L. Lusk. High-level programming in MPI. In Jack Dongarra, Domenico Laforenza, and Salvatore Orlando, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS2840 in Lecture Notes in Computer Science, page 27. Springer Verlag, 2003.
- [100] Jeffrey Evans, Cynthia Hood, and William Gropp. Exploring the relationship between parallel application run-time variability and network performance. In *Workshop on High-Speed Local Networks (HSLN), IEEE Conference on Local Computer Networks (LCN)*, pages 538–547, October 2003.
- [101] J. Li, W. Liao, A. Choudhary, R. Ross, R. Thakur, W. Gropp, R. Latham, A. Siegel, B. Gallagher, and M. Zingale. Parallel netCDF: A high-performance scientific I/O interface. In *Proceedings of SC2003*, November 2003.
- [102] A. Ching, A. Choudhary, W.-K. Liao, R. Ross, and W. Gropp. Efficient structured data access in parallel file systems. In *Proceedings of IEEE Cluster*. IEEE Computer Society, November 2003.
- [103] George Almasi, Charles Archer, Jose G. Castanos, C. Chris Erway, Philip Heidelberger, Xavier Martorell, Jose E. Moreira, Kurt Pinnow, Joe Ratterman, Nils Smeds, Burkhard Steinmacher-Burow, William Gropp, and Brian Toonen. Implementing MPI on the BlueGene/L supercomputer. In *Proceedings of EuroPar2004*, pages 833–845, 2004. Selected as distinguished paper.

- [104] William Gropp. MPI and high productivity programming. In Dieter Kranzlmüller, Peter Kacsuk, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS3241 in Lecture Notes in Computer Science, page 7. Springer Verlag, 2004. 11th European PVM/MPI User’s Group Meeting, Budapest, Hungary.
- [105] Rajeev Thakur, William Gropp, and Brian Toonen. Minimizing synchronization overhead in the implementation of MPI one-sided communication. In Dieter Kranzlmüller, Peter Kacsuk, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS3241 in Lecture Notes in Computer Science, pages 57–67. Springer Verlag, 2004. 11th European PVM/MPI User’s Group Meeting, Budapest, Hungary.
- [106] W. Jiang, J. Liu, H.-W. Jin, D. K. Panda, D. Buntinas, Rajeev Thakur, and William Gropp. Efficient implementation of MPI-2 passive one-sided communication on InfiniBand clusters. In Dieter Kranzlmüller, Peter Kacsuk, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS3241 in Lecture Notes in Computer Science, pages 68–76. Springer Verlag, 2004. 11th European PVM/MPI User’s Group Meeting, Budapest, Hungary.
- [107] Jiuxing Liu, Weihang Jiang, Pete Wyckoff, Dhabaleswar K. Panda, David Ashton, Darius Buntinas, William Gropp, and Brian Toonen. Design and implementation of MPICH2 over Infiniband with RDMA support. In *Proceedings of IPDPS 2004*, 2004.
- [108] William Gropp, Robert Ross, and Neill Miller. Providing efficient I/O redundancy in MPI environments. In Dieter Kranzlmüller, Peter Kacsuk, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS3241 in Lecture Notes in Computer Science, pages 77–86. Springer Verlag, 2004. 11th European PVM/MPI User’s Group Meeting, Budapest, Hungary.
- [109] William D. Gropp. MPI and high productivity programming. In Dieter Kranzlmüller, Peter Kacsuk, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS3241 in Lecture Notes in Computer Science, page 7. Springer Verlag, 2004. 11th European PVM/MPI User’s Group Meeting, Budapest, Hungary.
- [110] Chris Falzone, Anthony Chan, Ewing Lusk, and William Gropp. Collective error detection for MPI collective operations. In Beniamino Di Martino, Dieter Kranzluüller, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 3666 in Lecture Notes in Computer Science, pages 138–147. Springer Verlag, September 2005. 12th European PVM/MPI User’s Group Meeting, Sorrento, Italy.
- [111] Darius Buntinas and William Gropp. Designing a common communication subsystem. In Beniamino Di Martino, Dieter Kranzluüller, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 3666 in Lecture Notes in Computer Science, pages 156–166. Springer Verlag, September 2005. 12th European PVM/MPI User’s Group Meeting, Sorrento, Italy.
- [112] William Gropp and Rajeev Thakur. An evaluation of implementation options for MPI one-sided communication. In Beniamino Di Martino, Dieter Kranzluüller, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 3666 in Lecture Notes in Computer Science, pages 415–424. Springer Verlag, September 2005. 12th European PVM/MPI User’s Group Meeting, Sorrento, Italy.

- [113] William Gropp. Towards a productive MPI environment (abstract). In Beniamino Di Martino, Dieter Kranzluüller, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 3666 in Lecture Notes in Computer Science, page 4. Springer Verlag, September 2005. 12th European PVM/MPI User’s Group Meeting, Sorrento, Italy.
- [114] H. Yu, R.K. Sahoo, C. Howson, G. Almasi, J.G. Castanos, M. Gupta, J.E. Moreira, J.J. Parker, T.E. Engelsiepen, R.B. Ross, R. Thakur, R. Latham, and W.D. Gropp. High performance file I/O for the Blue Gene/L supercomputer. In *High-Performance Computer Architecture, 2006. The Twelfth International Symposium on*, pages 187–196, feb. 2006.
- [115] Ernie Chan, William Gropp, Rajeev Thakur, and Robert van de Geijn. Collective communication on architectures that support simultaneous communication over multiple links. In *Proceedings of the 2006 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, pages 2–11, New York, New York, USA, March 29-31 2006. ACM.
- [116] Darius Buntinas, Guillaume Mercier, and William Gropp. Design and evaluation of Nemesis, a scalable, low-latency, message-passing communication subsystem. In Stephen John Turner, Bu Sung Lee, and Wentong Cai, editors, *Proceedings of the 6th IEEE International Symposium on Cluster Computing and the Grid (CCGrid2006)*, pages 521–530, May 2006.
- [117] William D. Gropp and Rajeev Thakur. Issues in developing a thread-safe MPI implementation. In Bernd Mohr, Jesper Larsson Träff, Joachim Worringen, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 4192 in Springer Lecture Notes in Computer Science, pages 12–21. Springer, September 2006.
- [118] Salman Pervez, Ganesh Gopalakrishnan, Robert M. Kirby, Rajeev Thakur, and William D. Gropp. Formal verification of programs that use MPI one-sided communication. In Bernd Mohr, Jesper Larsson Träff, Joachim Worringen, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 4192 in Springer Lecture Notes in Computer Science, pages 30–39. Springer, September 2006.
- [119] Darius Buntinas, Guillaume Mercier, and William D. Gropp. Implementation and shared-memory evaluation of MPICH2 over the Nemesis communication subsystem. In Bernd Mohr, Jesper Larsson Träff, Joachim Worringen, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 4192 in Springer Lecture Notes in Computer Science, pages 86–95. Springer, September 2006.
- [120] Christopher Gottbrath, Brian Barrett, William D. Gropp, Ewing “Rusty” Lusk, and Jeff Squyres. An interface to support the identification of dynamic MPI 2 processes for scalable parallel debugging. In Bernd Mohr, Jesper Larsson Träff, Joachim Worringen, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 4192 in Springer Lecture Notes in Computer Science, pages 115–122. Springer, September 2006.
- [121] Surendra Byna, Xian-He Sun, Rajeev Thakur, and William D. Gropp. Automatic memory optimization for improving MPI derived datatype performance. In Bernd Mohr, Jesper Larsson Träff, Joachim Worringen, and Jack Dongarra, editors, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, number LNCS 4192 in Springer Lecture Notes in Computer Science, pages 238–246. Springer, September 2006.

- [122] William D. Gropp, Dinesh K. Kaushik, David E. Keyes, and Barry F. Smith. Parallel implicit solution of diffusion-limited radiation transport. In Olof B. Widlund and David E. Keyes, editors, *Domain Decomposition Methods in Science and Engineering XVI*, volume 55 of *Lecture Notes in Computational Science and Engineering*, pages 579–586. Springer-Verlag, 2006.
- [123] William Gropp, Eldad Haber, Stefen Heldmann, David Keyes, Neill Miller, Jennifer Schopf, and Tianzhi Yang. Grid-based image registration. In Patrick W. Gaffney and James C. T. Pool, editors, *Grid-Based Problem Solving Environments*, pages 435–448. Springer, 2007. IFIP International Federation for Information Processing, Volume 239.
- [124] William Gropp. Observations on WoCo9. In Patrick W. Gaffney and James C. T. Pool, editors, *Grid-Based Problem Solving Environments*, pages 451–453. Springer, 2007. IFIP International Federation for Information Processing, Volume 239.
- [125] Jesper Larsson Träff, William Gropp, and Rajeev Thakur. Self-consistent MPI performance requirements. In Cappello et al. [205], pages 36–45.
- [126] Rajeev Thakur and William Gropp. Test suite for evaluating performance of MPI implementations that support MPI_THREAD_MULTIPLE. In Cappello et al. [205], pages 46–55.
- [127] Robert Latham, William Gropp, Robert Ross, and Rajeev Thakur. Extending the MPI-2 generalized request interface. In Cappello et al. [205], pages 223–232.
- [128] William D. Gropp and Rajeev Thakur. Revealing the performance of MPI RMA implementations. In Cappello et al. [205], pages 272–280.
- [129] Salman Pervez, Ganesh Gopalakrishnan, Robert M. Kirby, Robert Palmer, Rajeev Thakur, and William Gropp. Practical model-checking method for verifying correctness of MPI programs. In Cappello et al. [205], pages 344–353.
- [130] Pavan Balaji, Darius Buntinas, S. Balay, B. Smith, Rajeev Thakur, and William Gropp. Nonuniformly communicating noncontiguous data: A case study with PETSc and MPI. In *IPDPS*, pages 1–10. IEEE, 2007.
- [131] Pavan Balaji, S. Bhagvat, Dhabaleswar K. Panda, Rajeev Thakur, and William Gropp. Advanced flow-control mechanisms for the sockets direct protocol over Infiniband. In *ICPP*, page 73. IEEE Computer Society, 2007.
- [132] Rajeev Thakur and William Gropp. Open issues in MPI implementation. In Lynn Choi, Yunheung Paek, and Sangyeun Cho, editors, *Advances in Computer Systems Architecture, 12th Asia-Pacific Conference, ACSAC 2007, Seoul, Korea, August 23-25, 2007, Proceedings*, volume 4697 of *Lecture Notes in Computer Science*, pages 327–338. Springer, 2007.
- [133] William D. Gropp, Wolfgang Frings, Marc-André Hermanns, Ed Jedlicka, Kirk E. Jordan, Fred Mintzer, and Boris Orth. Scaling science applications on Blue Gene. In Christian Bischof, Martin Bückner, Paul Gibbon, Gerhard Joubert, Thomas Lippert, Bernd Mohr, and Frans Peters, editors, *Parallel Computing: Architectures, Algorithms, and Applications*, volume 38 of *NIC*, pages 583–584. NIC-Directors, 2007. Summary of the Mini-Symposium.
- [134] Suren Byna, Yong Chen, W. D. Gropp, Xian-He Sun, and Rajeev Thakur. Parallel I/O prefetching using MPI file caching and I/O signatures. In *Proceedings of SC08*. IEEE and ACM, 2008.

- [135] Suren Byna, Yong Chen, W. D. Gropp, Xian-He Sun, and Rajeev Thakur. Hiding I/O latency with pre-execution prefetching for parallel applications. In *Proceedings of SC08*. IEEE and ACM, 2008. Finalist for Best Paper and Best Student Paper.
- [136] Anthony Chan, Pavan Balaji, William Gropp, and Rajeev Thakur. Communication analysis of parallel 3D FFT for flat Cartesian meshes on large Blue Gene systems. In *15th IEEE International Conference on High Performance Computing*, pages 422–429, 2008.
- [137] Dinesh Kaushik, William Gropp, Michael Minkoff, and Barry Smith. Improving the performance of tensor matrix vector multiplication in cumulative reaction probability based quantum chemistry codes. In *15th IEEE International Conference on High Performance Computing*, pages 120–130, 2008.
- [138] William D. Gropp. MPI and hybrid programming models for petascale computing. In Lastovetsky et al. [206], pages 6–7.
- [139] Pavan Balaji, Anthony Chan, William Gropp, Rajeev Thakur, and Ewing L. Lusk. Non-data-communication overheads in MPI: Analysis on Blue Gene/P. In Lastovetsky et al. [206], pages 13–22.
- [140] Jesper Larsson Träff, Andreas Ripke, Christian Siebert, Pavan Balaji, Rajeev Thakur, and William Gropp. A simple, pipelined algorithm for large, irregular all-gather problems. In Lastovetsky et al. [206], pages 84–93.
- [141] Pavan Balaji, Darius Buntinas, David Goodell, William Gropp, and Rajeev Thakur. Toward efficient support for multithreaded MPI communication. In Lastovetsky et al. [206], pages 120–129.
- [142] William D. Gropp, Dries Kimpe, Robert Ross, Rajeev Thakur, and Jesper Larsson Träff. Self-consistent MPI-IO performance requirements and expectations. In Lastovetsky et al. [206], pages 167–176.
- [143] Sarvani S. Vakkalanka, Michael Delisi, Ganesh Gopalakrishnan, Robert M. Kirby, Rajeev Thakur, and William Gropp. Implementing efficient dynamic formal verification methods for MPI programs. In Lastovetsky et al. [206], pages 248–256.
- [144] Subodh Sharma, Sarvani S. Vakkalanka, Ganesh Gopalakrishnan, Robert M. Kirby, Rajeev Thakur, and William Gropp. A formal approach to detect functionally irrelevant barriers in MPI programs. In Lastovetsky et al. [206], pages 265–273.
- [145] Pavan Balaji, Darius Buntinas, David Goodell, William Gropp, Sameer Kumar, Ewing Lusk, Rajeev Thakur, and Jesper Larsson Träff. MPI on a million processors. In *Proceedings of the 16th European PVM/MPI Users’ Group Meeting on Recent Advances in Parallel Virtual Machine and Message Passing Interface*, pages 20–30, Berlin, Heidelberg, 2009. Springer-Verlag.
- [146] William Gropp. MPI at Exascale: Challenges for data structures and algorithms. In *Proceedings of the 16th European PVM/MPI Users’ Group Meeting on Recent Advances in Parallel Virtual Machine and Message Passing Interface*, page 3, Berlin, Heidelberg, 2009. Springer-Verlag.

- [147] Robert Ross, Robert Latham, William Gropp, Ewing Lusk, and Rajeev Thakur. Processing MPI datatypes outside MPI. In *Proceedings of the 16th European PVM/MPI Users' Group Meeting on Recent Advances in Parallel Virtual Machine and Message Passing Interface*, pages 42–53, Berlin, Heidelberg, 2009. Springer-Verlag.
- [148] Hao Zhu, David Goodell, William Gropp, and Rajeev Thakur. Hierarchical collectives in MPICH2. In *Proceedings of the 16th European PVM/MPI Users' Group Meeting on Recent Advances in Parallel Virtual Machine and Message Passing Interface*, pages 325–326, Berlin, Heidelberg, 2009. Springer-Verlag.
- [149] G. Santhanaraman, P. Balaji, K. Gopalakrishnan, R. Thakur, W. Gropp, and D. K. Panda. Natively supporting true one-sided communication in MPI on multi-core systems with Infini-band. In *CCGRID '09: Proceedings of the 2009 9th IEEE/ACM International Symposium on Cluster Computing and the Grid*, pages 380–387, Washington, DC, USA, 2009. IEEE Computer Society.
- [150] Vinod Tipparaju, William Gropp, Hubert Ritzdorf, Rajeev Thakur, and Jesper L. Träff. Investigating high performance RMA interfaces for the MPI-3 standard. In *ICPP '09: Proceedings of the 2009 International Conference on Parallel Processing*, pages 293–300, Washington, DC, USA, 2009. IEEE Computer Society.
- [151] Sara S. Baghsorkhi, Matthieu Delahaye, Sanjay J. Patel, William D. Gropp, and Wen-mei W. Hwu. An adaptive performance modeling tool for GPU architectures. In R. Govindarajan, David A. Padua, and Mary W. Hall, editors, *Proceedings of the 15th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, PPOPP 2010, Bangalore, India, January 9-14, 2010*, pages 105–114. ACM, 2010.
- [152] H. Gahvari and W. Gropp. An introductory exascale feasibility study for FFTs and multigrid. In *Parallel Distributed Processing (IPDPS), 2010 IEEE International Symposium on*, pages 1–9, 2010.
- [153] Paul Sack and William Gropp. A scalable MPI_Comm_split algorithm for exascale computing. In Rainer Keller, Edgar Gabriel, Michael Resch, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 6305 of *Lecture Notes in Computer Science*, pages 1–10. Springer Berlin / Heidelberg, 2010.
- [154] Torsten Hoefler, William Gropp, Rajeev Thakur, and Jesper Träff. Toward performance models of MPI implementations for understanding application scaling issues. In Rainer Keller, Edgar Gabriel, Michael Resch, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 6305 of *Lecture Notes in Computer Science*, pages 21–30. Springer Berlin / Heidelberg, 2010.
- [155] Gábor Dózsa, Sameer Kumar, Pavan Balaji, Darius Buntinas, David Goodell, William Gropp, Joe Ratterman, and Rajeev Thakur. Enabling concurrent multithreaded MPI communication on multicore petascale systems. In Rainer Keller, Edgar Gabriel, Michael Resch, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 6305 of *Lecture Notes in Computer Science*, pages 11–20. Springer Berlin / Heidelberg, 2010.
- [156] Pavan Balaji, Darius Buntinas, David Goodell, William Gropp, Jayesh Krishna, Ewing Lusk, and Rajeev Thakur. PMI: A scalable parallel process-management interface for extreme-scale systems. In Rainer Keller, Edgar Gabriel, Michael Resch, and Jack Dongarra, editors,

- Recent Advances in the Message Passing Interface*, volume 6305 of *Lecture Notes in Computer Science*, pages 31–41. Springer Berlin / Heidelberg, 2010.
- [157] Vivek Kale and William Gropp. Load balancing for regular meshes on SMPs with MPI. In Rainer Keller, Edgar Gabriel, Michael Resch, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 6305 of *Lecture Notes in Computer Science*, pages 229–238. Springer Berlin / Heidelberg, 2010.
- [158] David Goodell, Pavan Balaji, Darius Buntinas, Gabor Dozsa, William Gropp, Sameer Kumar, Bronis R. de Supinski, and Rajeev Thakur. Minimizing MPI resource contention in multi-threaded multicore environments. In *IEEE International Conference on Cluster Computing*, pages 1–8, Los Alamitos, CA, USA, 2010. IEEE Computer Society.
- [159] William D. Gropp. Performance modeling as the key to extreme scale computing. In David K. Lowenthal, Bronis R. de Supinski, and Sally A. McKee, editors, *Proceedings of the 25th International Conference on Supercomputing, 2011, Tucson, AZ, USA, May 31 - June 04, 2011*, page 213. ACM, 2011.
- [160] David Goodell, William Gropp, Xin Zhao, and Rajeev Thakur. Scalable memory use in MPI: A case study with MPICH2. In Yiannis Cotronis, Anthony Danalis, Dimitrios S. Nikolopoulos, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface - 18th European MPI Users' Group Meeting, EuroMPI 2011, Santorini, Greece, September 18-21, 2011. Proceedings*, volume 6960 of *Lecture Notes in Computer Science*, pages 140–149. Springer, 2011.
- [161] Mohammad J. Rashti, Jonathan Green, Pavan Balaji, Ahmad Afsahi, and William Gropp. Multi-core and network aware MPI topology functions. In Yiannis Cotronis, Anthony Danalis, Dimitrios S. Nikolopoulos, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface - 18th European MPI Users' Group Meeting, EuroMPI 2011, Santorini, Greece, September 18-21, 2011. Proceedings*, volume 6960 of *Lecture Notes in Computer Science*, pages 50–60. Springer, 2011.
- [162] William Gropp, Torsten Hoefler, Rajeev Thakur, and Jesper Larsson Träff. Performance expectations and guidelines for MPI derived datatypes. In Yiannis Cotronis, Anthony Danalis, Dimitrios S. Nikolopoulos, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface - 18th European MPI Users' Group Meeting, EuroMPI 2011, Santorini, Greece, September 18-21, 2011. Proceedings*, volume 6960 of *Lecture Notes in Computer Science*, pages 150–159. Springer, 2011.
- [163] Yong Chen, Xian-He Sun, Rajeev Thakur, Philip C. Roth, and William D. Gropp. LACIO: A new collective I/O strategy for parallel I/O systems. In *IPDPS*, pages 794–804. IEEE, 2011.
- [164] Abhinav Bhatele, Pritish Jetley, Hormozd Gahvari, Lukasz Wesolowski, William D. Gropp, and Laxmikant V. Kalé. Architectural constraints to attain 1 exaflop/s for three scientific application classes. In *IPDPS*, pages 80–91. IEEE, 2011.
- [165] Hormozd Gahvari, Allison H. Baker, Martin Schulz, Ulrike Meier Yang, Kirk E. Jordan, and William Gropp. Modeling the performance of an algebraic multigrid cycle on HPC platforms. In David K. Lowenthal, Bronis R. de Supinski, and Sally A. McKee, editors, *Proceedings of the 25th International Conference on Supercomputing, 2011, Tucson, AZ, USA, May 31 - June 04, 2011*, pages 172–181. ACM, 2011.

- [166] Abhinav Bhatele, Nikhil Jain, William D. Gropp, and Laxmikant V. Kalé. Avoiding hot-spots on two-level direct networks. In Scott Lathrop, Jim Costa, and William Kramer, editors, *Conference on High Performance Computing Networking, Storage and Analysis, SC 2011, Seattle, WA, USA, November 12-18, 2011*, page 76. ACM, 2011.
- [167] Torsten Hoefler, William Gropp, William Kramer, and Marc Snir. Performance modeling for systematic performance tuning. In *State of the Practice Reports, SC '11*, pages 6:1–6:12, New York, NY, USA, 2011. ACM.
- [168] V. Kale, A. Bhatele, and W.D. Gropp. Weighted locality-sensitive scheduling for mitigating noise on multi-core clusters. In *High Performance Computing (HiPC), 2011 18th International Conference on*, pages 1–10. IEEE, 2011.
- [169] Paul Sack and William Gropp. Faster topology-aware collective algorithms through non-minimal communication. In *Proceedings of the 17th ACM SIGPLAN symposium on Principles and Practice of Parallel Programming, PPOPP '12*, pages 45–54, New York, NY, USA, 2012. ACM. Best Paper.
- [170] Simplicio Donfack, Laura Grigori, William D. Gropp, and Vivek Kale. Hybrid static/dynamic scheduling for already optimized dense matrix factorization. In *Proceedings of the 2012 IEEE 26th International Parallel and Distributed Processing Symposium, IPDPS '12*, pages 496–507, Washington, DC, USA, 2012. IEEE Computer Society.
- [171] Torsten Hoefler, James Dinan, Darius Buntinas, Pavan Balaji, Brian Barrett, Ron Brightwell, William Gropp, Vivek Kale, and Rajeev Thakur. Leveraging MPI's one-sided communication interface for shared-memory programming. In Jesper Träff, Siegfried Benkner, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 7490 of *Lecture Notes in Computer Science*, pages 132–141. Springer Berlin / Heidelberg, 2012.
- [172] William Gropp. MPI 3 and beyond: Why MPI is successful and what challenges it faces. In Jesper Träff, Siegfried Benkner, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 7490 of *Lecture Notes in Computer Science*, pages 1–9. Springer Berlin / Heidelberg, 2012.
- [173] James Dinan, David Goodell, William Gropp, Rajeev Thakur, and Pavan Balaji. Efficient multithreaded context ID allocation in MPI. In Jesper Träff, Siegfried Benkner, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 7490 of *Lecture Notes in Computer Science*, pages 57–66. Springer Berlin / Heidelberg, 2012.
- [174] Xin Zhao, Gopalakrishnan Santhanaraman, and William Gropp. Adaptive strategy for one-sided communication in MPICH2. In Jesper Träff, Siegfried Benkner, and Jack Dongarra, editors, *Recent Advances in the Message Passing Interface*, volume 7490 of *Lecture Notes in Computer Science*, pages 16–26. Springer Berlin / Heidelberg, 2012.
- [175] Hormozd Gahvari, William Gropp, Kirk E. Jordan, Martin Schulz, and Ulrike Meier Yang. Modeling the performance of an algebraic multigrid cycle using hybrid MPI/OpenMP. In *ICPP*, pages 128–137. IEEE Computer Society, 2012.
- [176] Y. Chen, C. Chen, X.H. Sun, W.D. Gropp, and R. Thakur. A decoupled execution paradigm for data-intensive high-end computing. In *Cluster Computing (CLUSTER), 2012 IEEE International Conference on*, pages 200–208. IEEE, 2012.

- [177] Philip Carns, Kevin Harms, Dries Kimpe, Robert Ross, Justin Wozniak, Lee Ward, Matthew Curry, Ruth Klundt, Geoff Danielson, Cengiz Karakoyunlu, John Chandy, Bradley Settlemyer, and William Gropp. A case for optimistic coordination in HPC storage systems. In *High Performance Computing, Networking Storage and Analysis, SC Companion*., pages 48–53, Los Alamitos, CA, USA, 2012. IEEE Computer Society.
- [178] Xin Zhao, D. Buntinas, J. Zounmevo, J. Dinan, D. Goodell, P. Balaji, R. Thakur, A. Afsahi, and W. Gropp. Toward asynchronous and MPI-interoperable active messages. In *Cluster, Cloud and Grid Computing (CCGrid), 2013 13th IEEE/ACM International Symposium on*, pages 87–94, 2013.
- [179] Xin Zhao, Pavan Balaji, William Gropp, and Rajeev Thakur. Optimization strategies for MPI-interoperable active messages. In *Dependable, Autonomic and Secure Computing (DASC), 2013 IEEE 11th International Conference on*, pages 508–515, Dec 2013.
- [180] Xin Zhao, P. Balaji, W. Gropp, and R. Thakur. MPI-interoperable generalized active messages. In *Parallel and Distributed Systems (ICPADS), 2013 International Conference on*, pages 200–207, Dec 2013.
- [181] Désiré Nuentisa Wakam, Jocelyne Erhel, and William D. Gropp. Parallel adaptive deflated GMRES. In Randolph Bank, Michael Holst, Olof Widlund, and Jinchao Xu, editors, *Domain Decomposition Methods in Science and Engineering XX*, volume 91 of *Lecture Notes in Computational Science and Engineering*, pages 631–638. Springer Berlin Heidelberg, 2013.
- [182] Kun Feng, Yanlong Yin, Chao Chen, Hassan Eslami, Xian-He Sun, Yong Chen, Rajeev Thakur, and William Gropp. Runtime system design of decoupled execution paradigm for data-intensive high-end computing. In *Cluster Computing (CLUSTER), 2013 IEEE International Conference on*, page 1, 2013.
- [183] Antonio J. Peña, Ralf G. Correa Carvalho, James Dinan, Pavan Balaji, Rajeev Thakur, and William Gropp. Analysis of topology-dependent MPI performance on Gemini networks. In Jack Dongarra, Javier García Blas, and Jesús Carretero, editors, *20th European MPI Users’s Group Meeting, EuroMPI ’13, Madrid, Spain - September 15 - 18, 2013*, pages 61–66. ACM, 2013.
- [184] Amanda Peters Randles, Vivek Kale, Jeff Hammond, William Gropp, and Efthimios Kaxiras. Performance analysis of the lattice Boltzmann model beyond Navier-Stokes. In *IPDPS*, pages 1063–1074. IEEE Computer Society, 2013.
- [185] Hormozd Gahvari, William Gropp, Kirk E. Jordan, Martin Schulz, and Ulrike Meier Yang. Systematic reduction of data movement in algebraic multigrid solvers. In *IPDPS Workshops*, pages 1675–1682. IEEE, 2013.
- [186] Vivek Kale, Amanda Peters Randles, and William D. Gropp. Locality-optimized mixed static/dynamic scheduling for improving load balancing on SMPs. In Jack Dongarra, Yutaka Ishikawa, and Atsushi Hori, editors, *EuroMPI/ASIA*, page 115. ACM, 2014.
- [187] Yanlong Yin, Antonios Kougkas, Kun Feng, Hassan Eslami, Yin Lu, Xian-He Sun, Rajeev Thakur, and William Gropp. Rethinking key-value store for parallel I/O optimization. In *Proceedings of the 2014 International Workshop on Data Intensive Scalable Computing Systems, DISCS ’14*, pages 33–40, Piscataway, NJ, USA, 2014. IEEE Press.

- [188] Judicael A. Zounmevo, Xin Zhao, Pavan Balaji, William Gropp, and Ahmad Afsahi. Non-blocking epochs in MPI one-sided communication. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, SC '14, pages 475–486, Piscataway, NJ, USA, 2014. IEEE Press. Best paper finalist.
- [189] Hormozd Gahvari, William Gropp, Kirk E. Jordan, Martin Schulz, and Ulrike Meier Yang. Algebraic multigrid on a Dragonfly network: First experiences on a Cray XC30. In Stephen A. Jarvis, Steven A. Wright, and Simon D. Hammond, editors, *High Performance Computing Systems. Performance Modeling, Benchmarking, and Simulation*, volume 8966 of *Lecture Notes in Computer Science*, pages 3–23. Springer International Publishing, 2015.
- [190] Jon Calhoun, Luke Olson, Marc Snir, and William D. Gropp. Towards a more fault resilient multigrid solver. In *Proceedings of the High Performance Computing Symposium*, HPC '15, San Diego, CA, USA, 2015. Society for Computer Simulation International.
- [191] Xin Zhao, Pavan Balaji, and William Gropp. Runtime support for irregular computation in MPI-based applications. In *CCGrid*, pages 701–704. IEEE, 2015.
- [192] Huong Luu, Marianne Winslett, William Gropp, Robert B. Ross, Philip H. Carns, Kevin Harms, Prabhat, Surendra Byna, and Yushu Yao. A multiplatform study of I/O behavior on petascale supercomputers. In Thilo Kielmann, Dean Hildebrand, and Michela Taufer, editors, *HPDC*, pages 33–44. ACM, 2015.
- [193] Tarun Prabhu and William Gropp. DAME: A runtime-compiled engine for derived datatypes. In Jack J. Dongarra, Alexandre Denis, Brice Goglin, Emmanuel Jeannot, and Guillaume Mercier, editors, *EuroMPI*, pages 4:1–4:10. ACM, 2015.
- [194] Vivek Kale and William D. Gropp. Composing low-overhead scheduling strategies for improving performance of scientific applications. In Christian Terboven, Bronis R. de Supinski, Pablo Reble, Barbara M. Chapman, and Matthias S. Müller, editors, *IWOMP*, volume 9342 of *Lecture Notes in Computer Science*, pages 18–29. Springer, 2015.
- [195] Hassan Eslami, Anthony Kougkas, Maria Kotsifakou, Theodoros Kasampalis, Kun Feng, Yin Lu, William Gropp, Xian-He Sun, Yong Chen, and Rajeev Thakur. Efficient disk-to-disk sorting: A case study in the decoupled execution paradigm. In *Proceedings of the 2015 International Workshop on Data-Intensive Scalable Computing Systems*, DISCS '15, pages 2:1–2:8, New York, NY, USA, 2015. ACM.
- [196] Satish Balay, Jed Brown, William Gropp, Matthew Knepley, Lois Curfman McInnes, Barry F. Smith, and Hong Zhang. An overview of PETSc. In *2015 SIAM Conference on Computational Science and Engineering*, page 274, Salt Lake City, Utah, March 2015. SIAM. Poster in Minisymposium 103: Frameworks, Algorithms, and Scalable Technologies for Mathematics (FASTMath).
- [197] William Gropp. Building performance transportable codes for extreme scale. In *2015 SIAM Conference on Computational Science and Engineering*, page 287, Salt Lake City, Utah, March 2015. SIAM. Poster in Minisymposium 204: CSE Software.
- [198] Hoang-Vu Dang, Marc Snir, and William Gropp. Towards millions of communicating threads. In *Proceedings of the 23rd European MPI Users' Group Meeting*, EuroMPI 2016, pages 1–14, New York, NY, USA, 2016. ACM.

- [199] William Gropp, Luke N. Olson, and Philipp Samfass. Modeling MPI communication performance on SMP nodes: Is it time to retire the ping pong test. In *Proceedings of the 23rd European MPI Users' Group Meeting, EuroMPI 2016*, pages 41–50, New York, NY, USA, 2016. ACM.
- [200] Paul R. Eller and William Gropp. Scalable non-blocking preconditioned conjugate gradient methods. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, SC '16*, pages 18:1–18:12, Piscataway, NJ, USA, 2016. IEEE Press.
- [201] Xin Zhao, Pavan Balaji, and William Gropp. Scalability challenges in current MPI one-sided implementations. In Riqing Chen, Chunming Rong, and Dan Grigoras, editors, *15th International Symposium on Parallel and Distributed Computing, ISPDC 2016, Fuzhou, China, July 8-10, 2016*, pages 38–47. IEEE Computer Society, 2016.
- [202] Yong Chen, Chao Chen, Yanlong Yin, Xian-He Sun, Rajeev Thakur, and William Gropp. Rethinking high performance computing system architecture for scientific big data applications. In *Trustcom/BigDataSE/ISPA*, pages 1605–1612. IEEE, 2016.
- [203] Jon Calhoun, Marc Snir, Luke N. Olson, and William D. Gropp. Towards a more complete understanding of SDC propagation. In H. Howie Huang, Jon B. Weissman, Adriana Iamnitchi, and Alexandru Iosup, editors, *Proceedings of the 26th International Symposium on High-Performance Parallel and Distributed Computing, HPDC 2017, Washington, DC, USA, June 26-30, 2017*, pages 131–142. ACM, 2017.
- [204] Thiago Santos Faria Xavier Teixeira, David Padua, and William Gropp. A DSL for performance orchestration. In *26th International Conference on Parallel Architectures and Compilation Techniques, PACT 2017, Portland, OR, USA, September 9-13, 2017*, page 372, 2017.
- [205] Franck Cappello, Thomas Héroult, and Jack Dongarra, editors. *Recent Advances in Parallel Virtual Machine and Message Passing Interface, 14th European PVM/MPI User's Group Meeting, Paris, France, September 30 - October 3, 2007, Proceedings*, volume 4757 of *Lecture Notes in Computer Science*. Springer, 2007.
- [206] Alexey L. Lastovetsky, Tahar Kechadi, and Jack Dongarra, editors. *Recent Advances in Parallel Virtual Machine and Message Passing Interface, 15th European PVM/MPI Users' Group Meeting, Dublin, Ireland, September 7-10, 2008. Proceedings*, volume 5205 of *Lecture Notes in Computer Science*. Springer, 2008.

6 Technical Reports

- [1] J. H. Bolstad, T. F. Chan, W. M. Coughran, Jr., W. D. Gropp, E. H. Grosse, M. T. Heath, R. J. LeVeque, F. T. Luk, S. G. Nash, and L. N. Trefethen. Numerical analysis program library user's guide (NAPLUG). User Note 82, SLAC Computing Services, 1979. First issued in 1976 by Chan, Coughran, Heath, and Luk.
- [2] William D. Gropp. Numerical solution of transport equations. Technical Report STAN-CS-81-888, Stanford University, December 1981. Ph.D. Thesis.

- [3] William D. Gropp. Local uniform mesh refinement for elliptic partial differential equations. Technical Report YALE/DCS/RR-278, Yale University, Department of Computer Science, July 1983.
- [4] G. W. Hedstrom and William D. Gropp. The computer as an aid in the asymptotic estimation of integrals. Technical Report UCRL-87297, Lawrence Livermore National Laboratory, August 1983.
- [5] W. D. Gropp, J. J. O'Donnell, S. T. O'Donnell, M. H. Schultz, and B. Weston. A high performance bulk memory system. Technical Report YALE/DCS/RR-311, Yale University, Department of Computer Science, March 1984.
- [6] W. D. Gropp. Local uniform mesh refinement with moving grids. Technical Report YALEU/DCS/RR-313, Yale University, April 1984.
- [7] W. D. Gropp. Local uniform mesh refinement on loosely-coupled parallel processors. Technical Report YALEU/DCS/RR-352, Yale University, December 1984.
- [8] D. E. Keyes and W. D. Gropp. A comparison of domain decomposition techniques for elliptic partial differential equations and their parallel implementation. Technical Report YALEU/DCS/RR-448, Comput. Sci. Dept., Yale Univ., December 1985.
- [9] W. Gropp. Dynamic grid manipulation for PDE's on hypercube parallel processors. Technical Report YALEU/DCS/RR-458, Department of Computer Science, Yale University, March 1986.
- [10] W. D. Gropp and E. B. Smith. Computational fluid dynamics on parallel processors. Technical Report YALEU/DCS/RR-570, Department of Computer Science, Yale University, December 1987.
- [11] R. H. Herbin, W. D. Gropp, D. E. Keyes, and V. Sonnad. A domain decomposition technique on a loosely coupled array of processors. Technical Report KGN-124, IBM Kingston, 1987.
- [12] W. Gropp and I. Ipsen. Recursive mesh refinement on hypercubes. Technical Report YALE/DCS/RR-616, Department of Computer Science, Yale University, March 1988.
- [13] L. Greengard and W. Gropp. A parallel version of the fast multipole method. Technical Report YALE/DCS/RR-640, Yale University, Department of Computer Science, August 1988.
- [14] H. Berryman, J. Saltz, W. Gropp, and R. Mirchandaney. Krylov methods preconditioned with incompletely factored matrices on the CM-2. Technical Report 89-54, NASA Langley Research Center, ICASE, Hampton, VA, December 1989. Also Yale University YALE/DCS/RR-685, March 1989.
- [15] William D. Gropp and David Keyes. Domain decomposition on parallel computers. Technical Report YALE/DCS/RR-723, Yale University, Department of Computer Science, August 1989.
- [16] David E. Keyes and William D. Gropp. Domain decomposition with local mesh refinement. Technical Report YALEU/DCS/RR-726, Yale University, August 1989.
- [17] William D. Gropp and David Keyes. Parallel performance of domain-decomposed preconditioned Krylov methods for PDEs with adaptive refinement. Technical Report YALE/DCS/RR-773, Yale University, Department of Computer Science, April 1990. Also ANL Preprint MCS-P147-0490, May 1990.

- [18] William D. Gropp and David E. Keyes. Parallel domain decomposition and the solution of non-linear systems of equations. Technical Report MCS-P186-1090, Mathematics and Computer Science Division, Argonne National Laboratory, November 1990.
- [19] David E. Keyes and William D. Gropp. Domain-decomposable preconditioners for second-order upwind discretizations of multicomponent systems. Technical Report MCS-187-1090, Mathematics and Computer Science Division, Argonne National Laboratory, November 1990.
- [20] X.-C. Cai, William D. Gropp, and David E. Keyes. Convergence rate estimate for a domain decomposition method. Technical Report YALE/DCS/RR-827, Yale University, Department of Computer Science, January 1991. also ANL Preprint MCS-P202-1290, January 1991.
- [21] William D. Gropp and David E. Keyes. Domain decomposition with local mesh refinement. Technical Report 91-19, ICASE, February 1991.
- [22] William D. Gropp and David E. Keyes. Domain decomposition methods in computational fluid dynamics. Technical Report 91-20, ICASE, February 1991. Also ANL Preprint MCS-P210-0191, April 1991.
- [23] William D. Gropp. Parallel computing and domain decomposition. Technical Report MCS-P257-0891, Mathematics and Computer Science Division, Argonne National Laboratory, September 1991.
- [24] William Gropp and Ewing Lusk. A test implementation of the MPI draft message-passing standard. Technical Report ANL-92/47, Mathematics and Computer Science Division, Argonne National Laboratory, December 1992.
- [25] William D. Gropp and Barry F. Smith. Experiences with domain decomposition in three dimensions: Overlapping Schwarz methods. Technical report, Mathematics and Computer Science Division, Argonne National Laboratory, 1992. Appeared in the Proceedings of the Sixth International Symposium on Domain Decomposition Methods.
- [26] David E. Keyes and William D. Gropp. Domain decomposition as a mechanism for using asymptotic methods. Technical Report MCS-P322-0892, Mathematics and Computer Science Division, Argonne National Laboratory, September 1992.
- [27] William Gropp (ed.). Early experiences with the IBM SP-1. Technical Report ANL-MCS-TM-177, Mathematics and Computer Science Division, Argonne National Laboratory, May 1993.
- [28] William Gropp. Early experiences with the IBM SP1 and the high-performance switch. Technical Report ANL-93/41, Mathematics and Computer Science Division, Argonne National Laboratory, November 1993.
- [29] William D. Gropp and Barry F. Smith. The design of data-structure-neutral libraries for the iterative solution of sparse linear systems. Technical Report MCS-P356-0393, Argonne National Laboratory, Argonne, IL, USA, March 1993.
- [30] William D. Gropp, Hans Kaper, G. Leaf, D. Levine, V. Vinokur, and M. Palumbo. Numerical simulation of vortex dynamics in high- t_c superconductors. Technical Report MCS-P476-1094, Mathematics and Computer Science Division, Argonne National Laboratory, November 1994.

- [31] L. Kettunen, K. Forsman, D. Levine, and W. Gropp. Integral equations in nonlinear 3d magnetostatics. Technical Report MCS-P460-0894, Mathematics and Computer Science Division, Argonne National Laboratory, August 1994.
- [32] Anthony Skjellum, Ewing Lusk, and William Gropp. Early applications in the message passing interface (MPI). Technical report, Department of Computer Science, Mississippi State University, June 1994.
- [33] William Gropp. An introduction to performance debugging for parallel computers. Technical Report MCS-P500-0295, Argonne National Lab, April 1995.
- [34] William D. Gropp, Lois Curfman McInnes, and Barry F. Smith. Using the scalable nonlinear equations solvers package. Technical Memorandum ANL/MCS-TM-193, Argonne National Lab, February 1995.
- [35] K. Forsman, W. Gropp, L. Kettunen, D. Levine, and J. Salonen. Solution of dense systems of linear equations arising from integral equation formulations. Technical Report MCS-P538-0895, Mathematics and Computer Science Division, Argonne National Laboratory, October 1995.
- [36] Rajeev Thakur, Ewing Lusk, and William Gropp. I/O characterization of a portable astrophysics application on the IBM SP and Intel Paragon. Technical Report MCS-P534-0895, Mathematics and Computer Science Division, Argonne National Laboratory, August 1995. Revised October 1995.
- [37] Rajeev Thakur, William Gropp, and Ewing Lusk. An experimental evaluation of the parallel I/O systems of the IBM SP and Intel Paragon using a production application. Technical Report MCS-P569-0296, Argonne National Laboratory, February 1996.
- [38] Rajeev Thakur, William Gropp, and Ewing Lusk. An abstract-device interface for implementing portable parallel-I/O interfaces. Technical Report MCS-P592-0596, Argonne National Laboratory, Mathematics and Computer Science Division, May 1996.
- [39] William D. Gropp and Jorge Moré. Optimization environments and the NEOS server. Technical Report ANL/MCS-P654-0397, Mathematics and Computer Science Division, Argonne National Laboratory, March 1997. Also CRPC-TR97708 and available at http://www.crpc.rice.edu/softlib/TRs_online.html.
- [40] William D. Gropp and Ewing Lusk. Why are PVM and MPI so different? Technical Report ANL/MCS-P667-0697, Mathematics and Computer Science Division, Argonne National Laboratory, June 1997.
- [41] Rajeev Thakur, Ewing Lusk, and William Gropp. I/O in parallel applications: The weakest link. Technical Report ANL/MCS-P700-1197, Mathematics and Computer Science Division, Argonne National Laboratory, November 1997. Appeared in IJSA.
- [42] Rajeev Thakur, Ewing Lusk, and William Gropp. A case for using MPI's derived datatypes to improve I/O performance. Technical Report ANL/MCS-P717-0598, Mathematics and Computer Science Division, Argonne National Laboratory, May 1998. Appeared at Supercomputing'98.

- [43] Rajeev Thakur, William Gropp, and Ewing Lusk. Data sieving and collective I/O in ROMIO. Technical Report ANL/MCS-P723-0898, Mathematics and Computer Science Division, Argonne National Laboratory, August 1998. Submitted to Frontiers'99.
- [44] Satish Balay, William Gropp, Lois Curfman McInnes, and Barry Smith. A microkernel design for component-based numerical software systems. Technical Report ANL/MCS-P727-0998, Mathematics and Computer Science Division, Argonne National Laboratory, September 1998.
- [45] William Gropp, David E. Keyes, Lois C. McInnes, and M. D. Tidriri. Globalized Newton-Krylov-Schwarz algorithms and software for parallel implicit CFD. Technical Report 98-24, ICASE, August 1998. Also NASA/CR-1998-208435.
- [46] Rajeev Thakur, William Gropp, and Ewing Lusk. Achieving high performance with MPI-IO. Technical Report ANL/MCS-P742-0299, Mathematics and Computer Science Division, Argonne National Laboratory, September 1999.
- [47] Lori Freitag, William Gropp, Paul Hovland, Lois Curfman McInnes, and Barry Smith. Infrastructure and interfaces for large-scale numerical software. Technical Report ANL/MCS-P751-0599, Mathematics and Computer Science Division, Argonne National Laboratory, May 1999.
- [48] William Gropp and Ewing Lusk. Reproducible measurements of MPI performance characteristics. Technical Report ANL/MCS-P755-0699, Mathematics and Computer Science Division, Argonne National Laboratory, June 1999.
- [49] James Cownie and William Gropp. A standard interface for debugger access to message queue information in MPI. Technical Report ANL/MCS-P754-0699, Mathematics and Computer Science Division, Argonne National Laboratory, June 1999.
- [50] Omer Zaki, Ewing Lusk, William Gropp, and Deborah Swider. Toward scalable performance visualization with Jumpshot. Technical Report ANL/MCS-P763-0699, Mathematics and Computer Science Division, Argonne National Laboratory, June 1999.
- [51] W. Kyle Anderson, William D. Gropp, Dinesh Kaushik, David E. Keyes, and Barry F. Smith. Achieving high sustained performance in an unstructured mesh CFD application. Technical Report ANL/MCS-P776-0899, Mathematics and Computer Science Division, Argonne National Laboratory, August 1999. Appeared in Proceedings of SC99.
- [52] William Gropp, David Keyes, Lois McInnes, and M. D. Tidiri. Globalized Newton-Krylov-Schwarz algorithms and software for parallel implicit CFD. Technical Report ANL/MCS-P788-0100, Mathematics and Computer Science Division, Argonne National Laboratory, January 2000. Appeared in High Performance Computing Applications.
- [53] N. T. Karonis, B. R. de Supinski, I. Foster, W. Gropp, E. Lusk, and J. Bresnahan. Exploiting hierarchy in parallel computer networks to optimize collective operation performance. Technical Report ANL/MCS-P788-0200, Mathematics and Computer Science Division, Argonne National Laboratory, February 2000.
- [54] William D. Gropp. Runtime checking of datatype signatures in MPI. Technical Report ANL/MCS-P826-0500, Mathematics and Computer Science Division, Argonne National Laboratory, May 2000.

- [55] Ralph Butler, William Gropp, and Ewing Lusk. A scalable process-management environment for parallel programs. Technical Report ANL/MCS-P812-0400, Mathematics and Computer Science Division, Argonne National Laboratory, April 2000.
- [56] William D. Gropp, Dinesh K. Kaushik, David E. Keyes, and Barry F. Smith. Performance modeling and tuning of an unstructured mesh CFD application. Technical Report ANL/MCS-P833-0700, Mathematics and Computer Science Division, Argonne National Laboratory, July 2000.
- [57] Satish Balay, William Gropp, Lois Curfman McInnes, and Barry F. Smith. Software for the scalable solution of PDEs. Technical Report ANL/MCS-P834-0700, Mathematics and Computer Science Division, Argonne National Laboratory, July 2000.
- [58] Rajeev Thakur and William Gropp. Parallel I/O. Technical Report ANL/MCS-P837-0700, Mathematics and Computer Science Division, Argonne National Laboratory, July 2000.
- [59] Alain Roy, Ian Foster, William Gropp, Nicholas Karonis, Volker Sander, and Brian Toonen. MPICH-GQ: Quality of service for message passing programs. Technical Report ANL/MCS-P838-0700, Mathematics and Computer Science Division, Argonne National Laboratory, July 2000.
- [60] W. D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. Understanding the parallel scalability of an implicit unstructured mesh CFD code. Technical Report ANL/MCS-P845-0900, Mathematics and Computer Science Division, Argonne National Laboratory, September 2000.
- [61] W. D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. Latency, bandwidth, and concurrent issue limitations in high-performance CFD. Technical Report ANL/MCS-P850-1000, Mathematics and Computer Science Division, Argonne National Laboratory, October 2000.
- [62] W. D. Gropp, D. K. Kaushik, D. E. Keyes, and B. F. Smith. High performance parallel implicit CFD. Technical Report ANL/MCS-P863-1200, Mathematics and Computer Science Division, Argonne National Laboratory, December 2000.
- [63] Ralph Butler, William Gropp, and Ewing Lusk. Components and interfaces of a process management system for parallel programs. Technical Report ANL/MCS-P872-0201, Mathematics and Computer Science Division, Argonne National Laboratory, 2001.
- [64] Emil Ong, Ewing Lusk, and William Gropp. Scalable Unix commands for parallel processors: A high-performance implementation. Technical Report ANL/MCS-P885-0601, Mathematics and Computer Science Division, Argonne National Laboratory, 2001.
- [65] William Gropp. Learning from the success of MPI. Technical Report ANL/MCS-P903-0801, Mathematics and Computer Science Division, Argonne National Laboratory, 2001.
- [66] William Gropp. Building library components that can use any MPI implementation. Technical Report ANL/MCS-P956-0502, Mathematics and Computer Science Division, Argonne National Laboratory, 2002.
- [67] Anthony Chan, William Gropp, and Ewing Lusk. Scalable log files for parallel program trace data. Technical Report ANL/MCS-TM-256, Mathematics and Computer Science Division, Argonne National Laboratory, 2002.

- [68] Nicholas T. Karonis, Bronis de Supinski, Ian Foster, William Gropp, Ewing Lusk, and Sebastien Lacour. A multilevel approach to topology-aware collective operations in computational grids. Technical Report ANL/MCS-P948-0402, Mathematics and Computer Science Division, Argonne National Laboratory, April 2002.
- [69] Surendra Byna, William Gropp, Xian-He Sun, and Rajeev Thakur. Improving the performance of MPI derived datatypes by optimizing memory-access cost. Technical Report ANL/MCS-P1045-0403, Mathematics and Computer Science Division, Argonne National Laboratory, 2003.
- [70] A. S. Bland, J. J. Dongarra, J. B. Drake, Jr. T. H. Dunigan, Jr. T. H. Dunning, A. Geist, B. Gorda, W. D. Gropp, R. J. Harrison, R. Kendall, D. Keyes, J. A. Nichols, L. Oliker, H. Simon, R. Stevens, III J. B. White, P. H. Worley, and T. Zacharia. Cray X1 evaluation. Technical Report ORNL/TM-2003/67, Oak Ridge National Laboratory, March 2003.
- [71] Rajeev Thakur and William Gropp. Improving the performance of collective operations in MPICH. Technical Report ANL/MCS-P1038-0403, Mathematics and Computer Science Division, Argonne National Laboratory, 2003. Appeared in Euro PVMMPI'03.
- [72] R. Ross, N. Miller, and W. D. Gropp. Implementing fast and reusable datatype processing. Technical Report ANL/MCS-P1068-0703, Mathematics and Computer Science Division, Argonne National Laboratory, July 2003. Appeared in Euro PVMMPI'03.
- [73] Jiuxing Liu, Weihang Jiang, Pete Wyckoff, Dhabaleswar K. Panda, David Ashton, Darius Buntinas, William Gropp, and Brian Toonen. Design and implementation of MPICH2 over Infiniband with RDMA support. Technical Report ANL/MCS-P1103-1003, Mathematics and Computer Science Division, Argonne National Laboratory, 2003.
- [74] Weihang Jiang, Jiuxing Liu, Hyun-Wook Jin, Dhabaleswar K. Panda, William Gropp, and Rajeev Thakur. High performance MPI-2 one-sided communication over InfiniBand. Technical Report ANL/MCS-P1119-0104, Mathematics and Computer Science Division, Argonne National Laboratory, 2004.
- [75] Avery Ching, Alok Choudhary, Wei keng Liao, Robert Ross, and William Gropp. Evaluating structured I/O methods for parallel file systems. Technical Report ANL/MCS-P1125-0204, Mathematics and Computer Science Division, Argonne National Laboratory, 2004. To appear in IJHPCN.
- [76] Rajeev Thakur, Rolf Rabenseifner, and William Gropp. Optimization of collective communication operations in MPICH. Technical Report ANL/MCS-P1140-0304, Mathematics and Computer Science Division, Argonne National Laboratory, March 2004.
- [77] William Gropp and Ewing Lusk. Fault tolerance in MPI programs. Technical Report ANL/MCS-P1154-0404, Mathematics and Computer Science Division, Argonne National Laboratory, 2004.
- [78] Rajeev Thakur, William Gropp, and Brian Toonen. Minimizing synchronization overhead in the implementation of MPI one-sided communication. Technical Report ANL/MCS-P1158-0504, Mathematics and Computer Science Division, Argonne National Laboratory, May 2004.

- [79] Weihang Jiang, Kiuxing Liu, Hyun-Wook Jin, Dhabaleswar K. Panda, Darius Buntinas, Rajeev Thakur, and William Gropp. Efficient implementation of MPI-2 passive one-sided communication on InfiniBand clusters. Technical Report ANL/MCS-P1164-0504, Mathematics and Computer Science Division, Argonne National Laboratory, May 2004.
- [80] William Gropp, Robert Ross, and Neill Miller. Providing efficient I/O redundancy in MPI environments. Technical Report ANL/MCS-P1178-0604, Mathematics and Computer Science Division, Argonne National Laboratory, June 2004.
- [81] George Almási, Charles Archer, José G. Casta nos, John Gunnels, Chris Erway, Philip Heidelberger, Xavier Martorell, José E. Moreira, Kurt Pinnow, Joe Ratterman, Burkhard Steinmacher-burow, William Gropp, and Brian Toonen. The design and implementation of message passing services for the BlueGene/L supercomputer. Technical Report ANL/MCS-P1183-0604, Mathematics and Computer Science Division, Argonne National Laboratory, June 2004.
- [82] William D. Gropp. Issues in accurate and reliable use of parallel computing in numerical programs. Technical Report ANL/MCS-P1193-0804, Mathematics and Computer Science Division, Argonne National Laboratory, August 2004.
- [83] Rajeev Thakur, William Gropp, and Brian Toonen. Optimizing the synchronization operations in MPI one-sided communication. Technical Report ANL/MCS-P1232-0205, Mathematics and Computer Science Division, Argonne National Laboratory, February 2005.
- [84] Robert Ross, Robert Latham, William Gropp, Rajeev Thakur, and Brian Toonen. Implementing MPI-IO atomic mode without file system support. Technical Report ANL/MCS-P1235-0305, Mathematics and Computer Science Division, Argonne National Laboratory, March 2005.
- [85] Darius Buntinas and William Gropp. Understanding the requirements imposed by programming model middleware on a common communication subsystem. Technical Report ANL/MCS-TM-284, Argonne National Laboratory, 2005.
- [86] Darius Buntinas, Guillaume Mercier, and William Gropp. The design and evaluation of Nemesis, a scalable low-latency message-passing communication subsystem. Technical Report ANL/MCS-TM-292, Argonne National Laboratory, 2005.
- [87] Darius Buntinas, Guillaume Mercier, and William Gropp. Data transfers between processes in an SMP system: Performance study and application to MPI. Technical Report ANL/MCS-P1306-1105, Argonne National Laboratory, 2005. Submitted to International Conference on Parallel and Processing (ICPP) 2006.
- [88] William Gropp and Andrew Lumsdaine. Parallel tools and environments: A survey. Technical Report ANL/MCS-P1342-0406, Argonne National Laboratory, 2006. To appear in a SIAM volume of work presented at the SIAM Parallel Processing Conference in 2004.
- [89] Boyana Norris, Albert Hartono, and William Gropp. Annotations for productivity and performance portability. Technical Report ANL/MCS-P1392-0107, Argonne National Laboratory, February 2007.
- [90] Satish Balay, Kris Buschelman, Victor Eijkhout, William D. Gropp, Dinesh Kaushik, Matthew G. Knepley, Lois Curfman McInnes, Barry F. Smith, and Hong Zhang. PETSc

users manual. Technical Report ANL-95/11 - Revision 3.0.0, Argonne National Laboratory, 2008.

- [91] David E. Keyes, Lois Curfman McInnes, Carol Woodward, William D. Gropp, Eric Myra, Michael Pernice, John Bell, Jed Brown, Alain Clo, Jeffrey Connors, Emil Constantinescu, Don Estep, Kate Evans, Charbel Farhat, Ammar Hakim, Glenn Hammond, Glen Hansen, Judith Hill, Tobin Isaac, Xiangmin Jiao, Kirk Jordan, Dinesh Kaushik, Efthimios Kaxiras, Alice Koniges, Kihwan Lee, Aaron Lott, Qiming Lu, John Magerlein, Reed Maxwell, Michael McCourt, Miriam Mehl, Roger Pawlowski, Amanda Peters, Daniel Reynolds, Beatrice Riviere, Ulrich Rüde, Tim Scheibe, John Shadid, Brendan Sheehan, Mark Shephard, Andrew Siegel, Barry Smith, Xianzhu Tang, Cian Wilson, and Barbara Wohlmuth. Multiphysics simulations: Challenges and opportunities. Technical Report ANL/MCS-TM-321, Argonne National Laboratory, Jan 2012. Workshop Report, Park City, Utah, July 30 - August 6, 2011, sponsored by the Institute for Computing in Science (ICiS).
- [92] P. Carns, K. Harms, D. Kimpe, J.M. Wozniak, R. Ross, L. Ward, M. Curry, R. Klundt, G. Danielson, C. Karakoyunlu, J. Chandy, B. Settlemeyer, and W. Gropp. A case for optimistic coordination in HPC storage systems. Technical report, Oak Ridge National Laboratory (ORNL), 2012.
- [93] Jeffrey Slotnick, Abdollah Khodadoust, Juan Alonso, David Darmofal, William Gropp, Elizabeth Lurie, and Dimitri Mavriplis. CFD Vision 2030 study: A path to revolutionary computational aerosciences. Technical Report NASA/CR-2014-218178, NASA, March 2014.
- [94] Satish Balay, Shrirang Abhyankar, Mark F. Adams, Jed Brown, Peter Brune, Kris Buschelman, Lisandro Dalcin, Victor Eijkhout, William D. Gropp, Dinesh Kaushik, Matthew G. Knepley, Lois Curfman McInnes, Karl Rupp, Barry F. Smith, Stefano Zampini, and Hong Zhang. PETSc users manual. Technical Report ANL-95/11 - Revision 3.6, Argonne National Laboratory, 2015.
- [95] BDEC pathways to convergence: Toward a shaping strategy for a future software and data ecosystem for scientific inquiry. Technical Report ICL-UT-17-08, University of Tennessee, 11 2017.

7 Manuals

- [1] William D. Gropp and Barry Smith. *Simplified Linear Equation Solvers Users' Manual*. Argonne, IL, February 1993. ANL/MCS-93/8.
- [2] William D. Gropp and Barry Smith. *Users Manual for the Chameleon Parallel Programming Tools*. Mathematics and Computer Science Division, Argonne National Laboratory, June 1993. ANL-93/23.
- [3] William D. Gropp and Barry Smith. *Users Manual for KSP: Data-Structure-Neutral Codes Implementing Krylov Space Methods*. Mathematics and Computer Science Division, Argonne National Laboratory, August 1993. ANL-93/30.
- [4] William D. Gropp, Ewing Lusk, and Steven Pieper. *Users Guide for the ANL IBM SP1*. Mathematics and Computer Science Division, Argonne National Laboratory, October 1994. ANL/MCS-TM-198.

- [5] William D. Gropp and Ewing Lusk. *Users Guide for the ANL IBM SPx*. Mathematics and Computer Science Division, Argonne National Laboratory, December 1994. ANL/MCS-TM-199.
- [6] William D. Gropp. *Users Manual for doctext: Producing Documentation from C Source Code*. Mathematics and Computer Science Division, Argonne National Laboratory, March 1995. ANL/MCS-TM 206.
- [7] William D. Gropp. *Users Manual for tohtml: Producing True Hypertext Documents from LaTeX*. Mathematics and Computer Science Division, Argonne National Laboratory, March 1995. ANL/MCS-TM 207.
- [8] William D. Gropp. *Users Manual for bfort: Producing Fortran Interfaces to C Source Code*. Mathematics and Computer Science Division, Argonne National Laboratory, March 1995. ANL/MCS-TM 208.
- [9] William D. Gropp and Ewing Lusk. *Installation Guide for mpich, a Portable Implementation of MPI*. Mathematics and Computer Science Division, Argonne National Laboratory, 1996. ANL-96/5.
- [10] William D. Gropp and Ewing Lusk. *User's Guide for mpich, a Portable Implementation of MPI*. Mathematics and Computer Science Division, Argonne National Laboratory, 1996. ANL-96/6.
- [11] Satish Balay, William Gropp, Lois Curfman McInnes, and Barry Smith. *PETSc 2.0 Users Manual*. Mathematics and Computer Science Division, Argonne National Laboratory, 1997. ANL-95/11.
- [12] Rajeev Thakur, William Gropp, and Ewing Lusk. *Users Guide for ROMIO: A High-Performance, Portable MPI-IO Implementation*. Mathematics and Computer Science Division, Argonne National Laboratory, October 1997. ANL/MCS-TM-234.