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Experience

Member of Technical Staff. Scalable Algorithms Department, Sandia National Labs, May 1998-present. Principle member 1998-2004, Distinguished member 2004-present. Conduct research and development of numerical methods for scientific and engineering applications on large-scale parallel computers. Participate on program and standards committees in areas of expertise. Lead the Trilinos libraries project and the Mantevo applications performance-modeling project.

Scientist in Residence and Adjunct Faculty Member. Department of Computer Science, Saint John's University, September 1998-present, Scientist in Residence 2004-present. Teach courses in Numerical Analysis, Parallel Computing, Computer Science Research Methodologies and Software Engineering. Direct undergraduate research theses in parallel computing and related areas. Participate in curriculum development.

Group Leader. Scalable Computing, Algorithms and Capability Prototyping Groups, SGI/Cray Research, March 1995-May 1998. Led a team of specialists in scientific computing. Directed activities and participated in development, porting and optimization of large-scale parallel applications for SGI/Cray systems. Participated in and led standardization efforts for scientific computing. Led efforts in development of new application capabilities. Provided applications analysis and requirements to future computer systems development including the Cray T3E, T90, J90, SV1 and SV2.

Numerical Analyst. CFD Group, Engineering Applications, Cray Research, September 1993-February 1995. Responsible for research and development of numerical methods for engineering applications in CFD, structural analysis, electronics and reservoir simulation. Worked with application developers on Cray vector multiprocessors and distributed memory machines. Particular areas of interest were the solution of sparse and dense linear systems, iterative methods, parallel algorithms and large-scale scientific computation. Served as consultant on numerical methods for Cray Research customers and application specialists.

Numerical Analyst. Mathematical Software Research Group, Cray Research, October 1988-September 1993. Conducted research and development of numerical linear algebra libraries. Served as consultant on numerical methods for Cray Research customers and application specialists. Developed libraries of high-performance software for Cray Research computer systems.

Education

Ph.D. Mathematics. May 1989, Colorado State University, Fort Collins, Colorado.

M.S. Mathematics. August 1986, Colorado State University, Fort Collins, Colorado.

B.A. Mathematics. December 1983, Saint John's University, Collegeville, Minnesota.

Professional Awards

- Best Poster Award, SC11 Conference, November 2011.
- Distinguished Member of the Association for Computing Machinery, October 2009.
- ASC Salutes Profile, NNSA/ASC profile, September 2007.
- R&D 100 Award for Trilinos 3.1, 2004.
- SC2004 HPC Software Challenge Award, 2004.
- Member of Cray Research Gordon Bell Prize Finalist Team, 1996.
- Sandia Employee Awards:
 - Winning X-caliber proposal for the DARPA/UHPC Program, 2011.
 - Educating the next generation of computational scientists, 2010.
 - IAA Algorithms Team, 2009.
 - Organizing Next-generation Applications Workshop, 2008.
 - Xyce/Charon/Algorithms Team, 2008.
 - Supercomputing Architecture & Programming Environment Team, 2008.
 - Leading Trilinos 7.0 Release, 2006.
 - Leadership of Trilinos Project, 2004.
 - Xyce Development, 2004.
 - Efforts in Nanosciences Initiative, 2003.
 - Algorithms for Circuit Simulation, 2001.
 - Parallel Circuit Simulation Code, 2000.

Professional Leadership

- Editor-in-Chief, ACM Transactions on Mathematical Software, 2010-present.
- Associate Editor, SIAM Journal on Scientific Computing, 2010-present.
- Subject Area Editor, Journal on Parallel and Distributed Computing, 2011-present.
- Chair of DOE Application readiness review for Titan 20PF computer system, 2010.
- Created Career and Junior Scientist Awards for SIAM SIAG/SC, 2009-2010.
- Led SIAG/SC committee to select Career/Junior Scientist winners, 2009-2010.
- Led SIAG/SC committee to select 2010-2011 officers, 2009.
- Wrote whitepaper for NSF on sustainable software engineering, 2009.
- Member, International Exascale Software Project (IESP), 2008-present.
- Sandia rep, DOE/ASCR Breakthroughs Report, 2009.
- Sandia PI, The Exascale Software Center (ESC), 2010-present.
- Sandia PI, The SciDAC-2 TOPS-2 project, 2005-present.
- Sandia PI, The Extreme-scale Algorithms & Software Institute (EASI), 2009-present.
- Sandia PI, Institute for Advanced Architectures & Algorithms, 2008-present.
- Associate Editor for SIAM Journal on Scientific Computing, Jan 2010-present.
- Chair of the SIAM Supercomputing Special Interest Group, 2008-2009.
- Program Director for SIAM Supercomputing Special Interest Group, 2000-2003.
- Program Chair for 2004 SIAM Parallel Processing Conference.

Professional Service

- Program committee member (past 3 year), IPDPS 2012, SCI 2012, SC 2011, HiPC 2011, PPAC 2011 SC 2010, IPDPS 2010, SECSE 2010, ICS 2010, PPAAC 2010, SOS13, SECSE 2009, SC 2009, PPAAC 2009.
- Reviewer for NSF in computational science and scalable computing, 2003-present.
- PhD committee, Sarah Knepper, Emory University, 2010-2011.
- PhD committee, Bryan Marker, University of Texas at Austin, 2010-2011.
- Referee for SIAM Journal of Scientific Computing, SIAM Review, ACM Transactions on Mathematical Software, IEEE Transactions on Parallel and Distributed Systems, 1999-present.

Professional Memberships

- The Society for Industrial and Applied Mathematics.
- Distinguished Member, The Association for Computing Machinery.

Publicly-available Software

- **The Trilinos Project (trilinos.sandia.gov):** Open Source (LGPL/BSD), Initiated and lead the project, 2001-present. ***Trilinos is a 2004 R&D 100 winner and the world's largest open source computational science and engineering libraries project.*** It is a collection of nearly sixty open source software packages supported by a common software engineering infrastructure and community development model. ***This year Trilinos had 5000 downloads (23% increase over last year) and has over 5000 registered users (26% increase). Trilinos is widely recognized as the leading library project for next-generation extreme-scale computing.***
 - **Trilinos package development:** Each Trilinos package is a self-contained software product with its own scope of development. These are the packages I have designed and developed:
 - **Epetra:** Principal designer and implementer. Epetra is the predecessor to Tpetra and is one of the two most popular scalable data class libraries on the planet (PETSc is the other). Epetra is used by thousands of application and library developers for constructing and using scalable sparse and dense linear algebra objects. ***Epetra is known to scale beyond 100,000 processors on a Cray XT6 computer.*** It is the most popular package in Trilinos.
 - **AztecOO:** Principal designer and implementer. An object-oriented version of the popular Aztec linear solver library. ***AztecOO is the most widely used iterative solver package in Trilinos, used by thousands of people, providing the core linear solver capabilities for many Sandia and DOE applications.***
 - **Tpetra and Kokkos:** Principal designer and core developer. Packages for constructing and using scalable linear algebra data objects on scalable manycore computers. Supports multi-precision data types, multiple node programming models and advanced compile-time polymorphic capabilities. ***Tpetra/Kokkos is the first general-purpose linear algebra library to support hybrid MPI/CPU/GPU execution.***
 - **Ifpack:** Principle designer and implementer. A collection of algebraic sparse preconditioners and smoothers. Widely used in Sandia and DOE applications.

- **Ifpack2:** Designer. Next-generation of Ifpack targeting scalable manycore architectures.
 - **Amesos:** Principal designer. A package of interfaces to common direct sparse solvers. Widely used at Sandia and other DOE labs.
 - **Amesos2:** Designer. Next-generation of Amesos targeting scalable manycore architectures.
 - **Belos:** Designer. Follow-on to AztecOO as a collection of scalable, state-of-the-art iterative methods.
 - **Komplex:** Principal designer and implementer. A package of solvers for complex-valued systems using equivalent real formulations.
 - **Teuchos:** Designer and developer. The core services package in Trilinos. Widely used.
- **The Mantevo Project (software.sandia.gov/mantevo):** Open Source (LGPL), Initiated and lead the project, 2006-present. ***Mantevo is the first project to concretely define the concept of a miniapplication as a co-design vehicle for next generation applications and computer systems.*** Mantevo is a collection of 6 open-source, stand-alone miniapplications that serve as performance proxies for Sandia's large-scale applications.
 - **Mantevo package development:** Each Mantevo miniapplication is a self-contained software product. These are the packages that I have designed and developed:
 - **HPCCG:** Principal designer and developer. Performance proxy for a scalable finite-volume/finite-difference single physics PDE application. ***HPCCG has been used in dozens of performance studies for new system design. Rewritten 6 times using new programming languages and programming models.***
 - **MiniFE:** Designer and developer. Follow-on to HPCCG as a proxy for unstructured finite element single physics applications. Used to prototype manycore algorithms and parallel pattern implementations that are now in production use in Trilinos. Used in numerous systems performance studies on mixed precision and hybrid MPI+threading programming environments.
- **Tramonto (software.sandia.gov/tramonto):** Open Source (LGPL), Lead scalable algorithms designer and developer, 2004-present. Tramonto is an open source application for modeling and simulation of inhomogeneous fluids using classical density functional theories. ***Tramonto has unique modeling capabilities for a wide variety of applications, including biophysics applications for new pharmaceuticals based on anti-microbial peptides. Tramonto scales to more than 16,000 processors of a Cray XT6 system. It has been downloaded 260 times since its release in 2007.***

- **Aztec (www.cs.sandia.gov/CRF/aztec1.html):** Open Source (Special license), Lead developer, 1998-2000. *Popular open source preconditioned iterative solver package that is still download frequently (250 downloads this year).*
- **Sparse BLAS (math.nist.gov/spblas):** Open Source (no license), Lead designer, 1999-2002. The sparse BLAS are a *de facto* standard for sparse kernel computations.
- **BPKIT (sourceforge.net/projects/bpkit):** Open Source (LGPL), Lead designer, 1995-1996. BPKIT was one of the first object-oriented math software packages, and it remains a popular prototyping environment for preconditioned iterative methods.
- **GEMMW (www.mgnet.org/~douglas/ccd-free-software.html):** Open Source (no license), Developer, 1994. GEMMW is a portable parallel implementation of Strassen-Winograd dense matrix-matrix multiplication.
- **Cray Sparse Solvers:** Distributed with Cray Scientific Libraries (LIBSCI), Principal designer and developers of the preconditioned sparse solvers, 1989-1993. *Provided optimized libraries for sparse linear systems on Cray vector multiprocessor and MPP machines.*
- **Cray Optimized BLAS/LAPACK:** Distributed with LIBSCI, developer of YMP/C90 kernels for vector multiprocessor systems, 1989-1993. *Developed unique hybrid implementation for single vector processor and multiple vector processors.*
- **Cray vectorized tridiagonal solvers:** Distributed with LIBSCI, principal developer, 1989-1993. *Developed 3:1 cyclic reduction and burn-at-both-ends algorithms for vector processors.*

Selected Invited Presentations

- **Invited: *TBD***, 2012 SIAM Annual Meeting, Minneapolis, MN, July 2012.
- **Invited: *TBD***, 2012 ESCO Conference, Pilsen, Czech Republic, June 2011.
- **Invited: *Numerical Libraries on Emerging Architectures***, 2011 Supercomputing Conference Tutorial, Seattle, WA, November 2011.
- **Invited: *Emerging Architectures and UQ: Implications and Opportunities***, IFIP Workshop on uncertainty quantification, Boulder, CO, August 2011.
- **Invited: *Building the Next Generation of Parallel Applications and Libraries***, INT Workshop on Exascale Computing, Seattle, WA, June 2011.
- **Invited: *Toward Portable Programming of numerical linear algebra on manycore nodes***, CEA-EDF-INRIA 2011 Summer School, Nice, France, June 2011.
- **Keynote: *Scalability of Trilinos: People, Processes, Parallelism***, 3rd International Conference on Computational Methods in Engineering and Science (FEMTEC 2011), South Lake Tahoe, NV, May 2011.
- **Invited: *Building the Next Generation of Parallel Applications***, Salishan Conference on High Speed Computing, April 2011.
- **Invited: *Miniapplications: Vehicles for Co-Design***, Engelberg, Switzerland, March 2011.
- **Invited: *Requirements on Next-Generation Programming Models***, U of Houston, January 2011.
- **Invited: *Trilinos for Extreme-scale for Computing***, U Texas, Austin, January 2011.
- **Invited: *Software Engineering for Computational Science and Engineering***, Cray, Inc., January 2011.
- **Invited: *Bi-modal MPI-only & MPI+threading***, Cray, Inc., December 2010.
- **Invited: *The Extreme-scale Algorithms & Software Institute***, Fall Creek Falls Conference, October 2010, Memphis, TN.
- **Invited: *Building the Next Generation of Scalable Applications***, Future of the Field Workshop, Snowbird, UT, July 2010.
- **Keynote: *Building the Next Generation of Parallel Applications***, Int'l Workshop on OpenMP, Tsukuba, Japan, June 2010.
- **Keynote: *Trilinos for Extreme-scale Computing***, SPEEDUP Workshop, ETH-Zurich, September 2010.
- **Invited: *Trilinos Overview and Tutorial***, Purdue University, September 2009.
- **Invited: *Software Needs for Next-generation systems***, SOS13, Hilton Head, SC, March 2009.

- **Invited: *Algorithms for 1M cores: What Might and Might not Work***, Simulating the Future Workshop, Paris, France, September 2008.
- **Organizer: *When MPI-only is not Enough: Building the Next Generation of Scalable Applications Workshop***, Santa Fe, NM, May 2008.
- **Invited: *Design Issues for Numerical Libraries on Multicore Systems***, SciDAC Conference, July 2008, Seattle, WA.
- **Invited: *An Overview of Trilinos***, Oak Ridge National Laboratory, TN, October 2007.
- **Keynote: *Optimal Kernels to Optimal Solutions: Algorithm and Software Issues in Solver Development***, PDP07, February 2007, Naples, Italy.

Mentoring Highlights

- **Richard Barrett, Ross Bartlett, Erik Boman, Russell Hooper, Jonathan Hu, Nicole Lemaster, Mike Parks, Roger Pawlowski, Denis Ridzal, Chris Siefert, Heidi Thornquist, Guglielmo Scovazzi:** Informal staff mentoring.
- **Mark Hoemmen:** Postdoctoral advisor, 2009-present.
Advisor: Jim Demmel, U of CA, Berkeley.
- **Siva Rajamanickam:** Postdoctoral advisor, 2009-present.
Advisor: Tim Davis, U of FL.
- **Michael Wolf:** Postdoctoral advisor, 2009-2011.
Advisor: Mike Heath, U of IL, Urbana-Champaign.
- **Sarah Knepper:** Undergraduate research advisor, summer intern advisor, PhD committee, 2004-2011.
Advisor: Jim Nagy, Emory University.
Present position: Intel Math Kernel Library.
- **Kurtis Nusbaum:** Undergraduate research advisor, Sandia intern mentor, 2008-2011.
Present position: Graduate student, U of Illinois, Urbana-Champaign.
- **Kelsey Larson:** Undergraduate research advisor, 2010-present.
- **Becca Simon:** Undergraduate research advisor, 2010-present.
- **Lee Buermann:** Undergraduate research advisor, 2010-present.
- **Christopher Baker:** Postdoctoral advisor, 2008-2009.
Advisor: Kyle Gallivan, U of FL.
Present position: Staff member, Oak Ridge National Laboratory.
- **Matthew Lietzke:** Undergraduate research advisor, 2007-2008.
Present position: Graduate student, U of CA, Davis.
- **Eric Bavier:** Undergraduate research advisor, 2008-2010.
Present position: Cray Math Libraries Group.
- **Vanja Paunic:** Undergraduate research advisor, 2007-2008.
Present position: Graduate student, U of Minnesota.
- **Kelly Fermoye:** Undergraduate research advisor, summer intern mentor, 2006-2010.
Present position: Firmware developer Seagate, Inc.
- **Michael Karp:** Undergraduate research advisor, 2006-2007.
Present position: Graduate student, U of Minnesota.
- **Jason Cross:** Undergraduate research advisor, summer intern mentor Sandia, 2002-2005.
Present position: Graduate student, Iowa State.

- **James Willenbring:** Undergraduate Research Advisor, St. John's, 2000-2001.
Present position: Staff member, Sandia National Labs.
- **Kristopher Kampshoff:** Undergraduate Research Advisor, St. John's, 1999-2001.
Present position: Staff scientist, BAe Systems.
- **Abdelkader Baggag:** Summer Research at Cray, 1997.
Advisor: Ahmed Sameh, U of Purdue.
Present position: Assistant Professor, McGill University.
- **Edmond Chow:** Summer Research at Cray, 1996-1997.
Advisor: Yousef Saad, U of Minnesota.
Present position: Associate Professor, Georgia Institute of Technology.
- **John Wu:** Summer Research at Cray, 1994-1995.
Advisor: Yousef Saad, U of Minnesota.
Present position: Staff scientist, Lawrence Berkeley Lab.
- **Keith Gremban:** Thesis committee, summer research, 1992-1995.
Advisor: Gary Miller, Carnegie-Mellon.
Present position: VP, SET Corporation.
- **Vivek Sarin:** Summer Research at Cray, 1992-1994.
Advisor: Ahmed Sameh, U of Minnesota.
Present position: Associate Professor, Texas A & M.

Publication Highlights (2010-2012)

- 12 journal articles & refereed proceedings, 3 SAND report.
- 1525 total citations, 918 since 2007.

Articles and Refereed Proceedings

- [1] M. Heroux and J. W. Thomas. TDFAC: A composite grid method for time dependent problems. In et. al. Jan Mandel, editor, *Proceedings of the Fourth Copper Mountain Conference on Multigrid Methods*, pages 273–285, Philadelphia, 1989. SIAM.
- [2] M. Heroux, S. McCormick, S. McKay, and J. W. Thomas. Applications of the fast adaptive composite grid method. In *Lecture Notes in Pure and Applied Mathematics*. Marcel–Decker, 1988.
- [3] Michael A. Heroux, Phuong Vu, and Chao Wu Yang. A Parallel Preconditioned Conjugate Gradient Package for Solving Sparse Linear Systems on a Cray Y-MP. *Applied Numerical Mathematics*, 8, 1991.
- [4] Michael A. Heroux and J. W. Thomas. A Comparison of FAC and PCG Methods for Solving Composite Grid Problems. *Communications in Applied Numerical Methods*, 8, 1992.
- [5] C. C. Douglas, M. Heroux, G. Slishman, and R. M. Smith. GEMMW: A portable Level 3 BLAS Winograd variant of Strassen’s matrix–matrix multiply algorithm. *J. Comput. Phys.*, 110:1–10, 1994.
- [6] Eugene L. Poole, Michael A. Heroux, Pravin Vaidya, and Anil Joshi. Performance of Iterative Methods in ANSYS on Cray Parallel/Vector Supercomputers. *Computing Systems in Engineering*, 6:251–259, 1995.
- [7] Edmond Chow and Michael A. Heroux. An Object-oriented Framework for Block Preconditioning. *ACM Trans. Math. Softw.*, 24(2):159–183, June 1998.
- [8] A. E. Koniges, D. C. Eder, and M. A. Heroux. Designing Industrial parallel applications. In A. E. Koniges, editor, *Industrial Strength Parallel Computing*, chapter 24. Morgan Kaufman, 2000.
- [9] M. A. Heroux, H. Simon, and A. E. Koniges. The Future of Industrial parallel Computing. In A. E. Koniges, editor, *Industrial Strength Parallel Computing*, chapter 25. Morgan Kaufman, 2000.
- [10] David E. Womble, Bruce A. Hendrickson, David S. Greenberg, James L. Tomkins, Sudip S. Dosanjh, Steve J. Plimpton, and Michael A. Heroux. An Overview of MP Computing and Applications, March 2000.
- [11] David Day and Michael A. Heroux. Solving Complex-Valued Linear Systems via Equivalent Real Formulations. *SIAM J. Sci. Comput.*, 23(2):480–498, 2001.
- [12] S. Blackford, J. Demmel, J. Dongarra, I. Duff, S. Hammarling, G. Henry, M. Heroux, L. Kaufman, A. Lumsdaine, A. Petitet, R. Pozo, K. Remington, and R. C. Whaley. An Updated Set of Basic Linear Algebra Subprograms (BLAS). *ACM Trans. Math. Softw.*, 28(2):135–151, June 2002.
- [13] I. Duff, M. Heroux, and R. Pozo. An Overview of the Sparse Basic Linear Algebra Subprograms: The New Standard from the BLAS Technical Forum. *ACM Trans. Math. Softw.*, 28(2):239–267, June 2002.
- [14] R. A. Bartlett, B. G. van Bloemen Waanders, and M. A. Heroux. Vector reduction/transformation operators. *ACM Trans. Math. Softw.*, 30(1):62–85, March 2004.
- [15] Michael A. Heroux, Roscoe A. Bartlett, Vicki E. Howle, Robert J. Hoekstra, Jonathan J. Hu, Tamara G. Kolda, Richard B. Lehoucq, Kevin R. Long, Roger P. Pawlowski, Eric T. Phipps, Andrew G. Salinger, Heidi K. Thornquist, Ray S. Tuminaro, James M. Willenbring, Alan Williams, and Kendall S. Stanley. An Overview of the Trilinos Project. *ACM Trans. Math. Softw.*, 31(3):397–423, 2005.
- [16] Michael A. Heroux and Marzio Sala. The Design of Trilinos. In *Proceedings of PARA’04*, 2005.

- [17] Michael A. Heroux, Padma Raghavan, and Horst D. Simon. *Parallel Processing for Scientific Computing*. SIAM, 2006.
- [18] Michael A. Heroux, Padma Raghavan, and Horst D. Simon. *Parallel Processing for Scientific Computing*, chapter Frontiers of Scientific Computing: An Overview. SIAM, 2006.
- [19] Michael A. Heroux, Padma Raghavan, and Horst D. Simon. *Parallel Processing for Scientific Computing*, chapter Opportunities and Challenges for Parallel Computing in Science and Engineering. SIAM, 2006.
- [20] Michael A. Heroux. A Solver-Independent API for multi-DOF Applications using Trilinos. *Int. J. of Computational Science and Engineering*, 2007.
- [21] Jonathan L. Brown, Sue Goudy, Mike Heroux, Shan Shan Huang, and Zhaofang Wen. An Evolutionary Path Towards Virtual Shared Memory with Random Access. In *SPAA '06: Proceedings of the eighteenth annual ACM symposium on Parallelism in algorithms and architectures*, pages 117–117, New York, NY, USA, 2006. ACM.
- [22] James M. Willenbring, Michael A. Heroux, and Robert T. Heaphy. The Trilinos Software Lifecycle Model. In *SE-HPC '07: Proceedings of the 3rd International Workshop on Software Engineering for High Performance Computing Applications*, page 6, Washington, DC, USA, 2007. IEEE Computer Society.
- [23] Michael A. Heroux. Some Thoughts on Multicore. In *Proceedings of the Manycore Workshop, ICS 2007*, 2007.
- [24] Michael A. Heroux, James M. Willenbring, and Michael N. Phenow. Improving the Development Process for CSE Software. In *Proceedings of PDP 2007*, 2007.
- [25] Michael A. Heroux, Andrew G. Salinger, and Laura J. D. Frink. Parallel Segregated Schur Complement Methods for Fluid Density Functional Theories. *SIAM J. Sci. Comput.*, 29(5):2059–2077, 2007.
- [26] Marzio Sala, W. F. Spitz, and M. A. Heroux. PyTrilinos: High-performance distributed-memory solvers for Python. *ACM Trans. Math. Softw.*, 34(2):1–33, 2008.
- [27] Marzio Sala, Kendall S. Stanley, and Michael A. Heroux. On the design of interfaces to sparse direct solvers. *ACM Trans. Math. Softw.*, 34(2):1–22, 2008.
- [28] M A Heroux. Design Issues for Numerical Libraries on Scalable Multicore Architectures. *Journal of Physics: Conference Series*, 125:012035 (11pp), 2008.
- [29] Michael A. Heroux, Zhaofang Wen, and Junfeng Wu. Initial Experiences with the BEC Parallel Programming Environment. In *The 7th International Symposium on Parallel and Distributed Computing*, 2008.
- [30] Michael A. Heroux and James M. Willenbring. Barely-Sufficient Software Engineering: 10 Practices to Improve Your CSE Software. In *SECSE '09: Proceedings of the Second International Workshop on Software Engineering for Computational Science and Engineering*, Washington, DC, USA, 2009. IEEE Computer Society.
- [31] Michael A. Heroux and Robert W. Numrich. A Performance Model with a Fixed Point for a Molecular Dynamics Kernel. In *ISC '09*, Washington, DC, USA, 2009. IEEE Computer Society. June 2009.
- [32] Michael A. Heroux. Software Challenges for Extreme Scale Computing: Going From Petascale to Exascale Systems. *Int. J. High Perform. Comput. Appl.*, 23(4):437–439, 2009.
- [33] Ron Brightwell, Mike Heroux, Zhaofang Wen, and Junfeng Wu. Parallel Phase Model: A Programming Model for High-end Parallel Machines with Manycores. In *Proceedings of the 2009 International Conference on Parallel Processing*, ICPP '09, pages 92–99, Washington, DC, USA, 2009. IEEE Computer Society.

- [34] Michael M. Wolf, Michael A. Heroux, and Erik G. Boman. Factors Impacting Performance of Multithreaded Sparse Triangular Solve. In *Proceedings of VECPAR 2010*, Berlin, 2010. Lecture Notes in Computer Science, Springer.
- [35] Christopher G. Baker, Michael A. Heroux, H. Carter Edwards, and Alan B. Williams. A Light-weight API for Portable Multicore Programming. In *Proceedings of PDP2010*. IEEE, 2010.
- [36] Ken Alvin, Brian Barrett, Ron Brightwell, Sudip Dosanjh, Al Geist, Scott Hemmert, Michael Heroux, Doug Kothe, Richard Murphy, Jeff Nichols, Ron Oldfield, Arun Rodrigues, and Jeff Vetter. On the Path to Exascale. *Intl J. of Distributed Systems and Technologies*, 1(2), May 2010.
- [37] Michael M. Wolf, Michael A. Heroux, and Erik G. Boman. Hybrid MPI/Multithreaded PCG: A Use Case for MPI Shared Memory Allocation. In *Proceedings of Supercomputing 2010*, New Orleans, LA, USA, 2010.
- [38] Chris Baker, Erik Boman, Michael A. Heroux, Eric Keiter, Siva Rajamanickam, Rich Schiek, and Heidi Thornquist. Enabling Next-Generation Parallel Circuit Simulation with Trilinos. In *Workshop on High-Performance Scientific Software (HPSS2011)*, Bordeaux, France, 2011.
- [39] Michael A. Heroux. Improving cse software through reproducibility requirements. In *Proceedings of the 4th International Workshop on Software Engineering for Computational Science and Engineering*, SECSE '11, pages 28–31, New York, NY, USA, 2011. ACM.
- [40] Robert W. Numrich and Michael A. Heroux. Self-similarity of parallel machines. *Parallel Comput.*, 37:69–84, February 2011.
- [41] Sudip Dosanjh, Richard Barrett, Mike Heroux, and Arun Rodrigues. Achieving exascale computing through hardware/software co-design. In *Proceedings of the 18th European MPI Users' Group conference on Recent advances in the message passing interface*, EuroMPI'11, pages 5–7, Berlin, Heidelberg, 2011. Springer-Verlag.
- [42] 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, Bill 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 Streitz, 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. *Int. J. High Perform. Comput. Appl.*, 25:3–60, February 2011.
- [43] L.J. Frink, A. Frischknecht, M. Heroux, M.L. Parks, and A. Salinger. Towards quantitative coarse-grained models of lipids with fluids density functional theory. *Journal of Chemical Theory and Computation*, 2011. Submitted.
- [44] Paul Lin Courtenay Vaughn Richard Barrett, Michael A. Heroux and Alan Williams. Mini-applications: Vehicles for co-design (poster presentation). In *Proceedings of Supercomputing 2011 (SC11)*, 2011. Best Conference Poster Award.

- [45] Siva Rajamanickam, Erik Boman, and Michael A. Heroux. Shylu: A hybrid-hybrid solver for multicore platforms. In *Proceedings of the 26th IEEE International Parallel & Distributed Processing Symposium (IPDPS)*, 2012. Accepted.

Contributed Proceedings

- [1] Michael A. Heroux. A Reverse Communication Interface for “Matrix-free” Preconditioned Iterative Solvers. In C.A. Brebbia, D. Howard, and A. Peters, editors, *Applications of Supercomputers in Engineering II*, pages 207–213, Boston, 1991. Computational Mechanics Publications.
- [2] Serge Kharchenko, Andy Nikishin, Alex Yerebin, Michael Heroux, and Qasim Sheikh. Iterative Solution Methods on the Cray YMP/C90. Part I. In *Proceedings of 5th Australian Supercomputing Conference*, pages 159–168, 1992.
- [3] Serge Kharchenko, Paul Kolesnikov, Andy Nikishin, Alex Yerebin, Michael Heroux, and Qasim Sheikh. Iterative Solution Methods on the Cray YMP/C90. Part II: Dense Linear Systems. In *Proceedings of the 1993 Simulation Multiconference*, 1993.
- [4] P. R. Schunk and M. A. Heroux. Iterative solver preconditioners for finite element formulations of multiphysics problems including incompressible fluid and solid mechanics. In *Proceedings of the International Conference on Computational Engineering and Sciences, ICES’01*, 2001.

Technical Reports

- [1] Michael A. Heroux. A Proposal for a Sparse BLAS Toolkit. Technical Report TR/PA/92/90, CERFACS, December 1992.
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