

Curriculum Vitae: E. Jason Riedy

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- Education** – Ph.D., Computer Science, University of California at Berkeley, expected 2009, 3.8 GPA.
Adviser: Dr. James Demmel. Thesis: *Making Static Pivoting Scalable and Dependable*.
– B.S. with Honors, Computer Science and Mathematics, University of Florida, 1995, 3.8 GPA.
- Interesting Open Problems** – Which applications benefit from computing precise results with targeted software arithmetic?
– How can parallel symbolic matrix analysis incorporate latency-avoiding factorization techniques?
– Can formal semantics enable faster, safer floating-point compiler optimizations?
– Is a linear-time ($O(\text{vertices} + \text{edges})$) bipartite matching algorithm possible?
– Are Sturm count calculations on factored tridiagonal matrices monotonic in floating-point arithmetic?
– How do we evolve programming languages to support multicore computing’s huge design space?
- Research Experience** *2002–Present* LAPACK, ScaLAPACK, and XBLAS (dense linear algebra): Extra-precise linear system refinement algorithms, eigenvalue routines, and optimization.
1999–Present SuperLU (sparse linear algebra): Parallel combinatorial preprocessing, numerical stability analysis, iterative solver preconditioning.
2001–2006 IEEE-754 revision (floating-point arithmetic): Programming language interactions, exceptional behavior, decimal formats and arithmetic.
1996–1999 Image Algebra (image analysis): SIMD parallel optimization, edge detection, geometric hashing.
- Technical Experience** *2002–Present* Sca/LAPACK project: Development of coding standards, integration of C routines, multiplatform testing and debugging, code and design review.
1994–1999 Systems administration: Maintenance of servers and file systems for CISE Department, Univ. of Florida, including performance tuning, troubleshooting, file system backups, and end-user support.
1995 Visualization: Animations of molecular dynamics simulations.
- Teaching Experience** *Fall 2008* Adjunct faculty in mathematics at Virginia Intermont College. Teaching Concepts of Modern Mathematics I (focused on elementary education majors) and Discrete Mathematics I (required mathematics class for most majors).
Fall 2006, Spring 2007 Mentor for Intel Undergraduate Research program. Introduced undergraduates into our research group on both mathematical and technical levels.
Spring 2000, 2004 Assistant for Applications of Parallel Computing: Multidisciplinary, graduate level class focused on introducing scientists to practical aspects of high-performance computers, tools, and programming.
- Software** – Prototypes for LAPACK’s extra-precise refinement codes; XBLAS Fortran/C integration.
– Optimized Sturm count routines and debugged eigenvalue drivers in LAPACK 3.1.
– Enhanced and optimized Householder reflection generation and application in LAPACK.
– Recursive matrix factorizations and a simple database interface for GNU Octave.
– A doubled-native arithmetic library, enabling high-precision sparse matrix factorization with TAUCS.
– Contributions and bug fixes to git, GNU Octave, the R Project, GNU Emacs, *etc.*
- Professional Service** – IEEE-754 revision committee member, website and email archive maintenance.
– Referee/technical reviewer for ACM Trans. on Math. Soft., IEEE Arith 16 and 17, IEEE Int’l Parallel & Distributed Processing Symposium 2004, Computers and Mathematics with Applications, O’Reilly.

- Refereed Publications**
- with James W. Demmel, Yozo Hida, and Mark Hoemmen. Non-Negative Diagonals and High Performance on Low-Profile Matrices from Householder QR . *SIAM Journal on Scientific Computing*. (to appear).
 - with James W. Demmel, Yozo Hida, and Xiaoye S. Li. Extra-precise Iterative Refinement for Overdetermined Least Squares Problems. *ACM Transactions on Mathematical Software*, 35(4):1–32, February 2009. ISSN 0098-3500. doi: 10.1145/1462173.1462177.
 - with Osni A. Marques and Christof Vömel. Benefits of IEEE-754 Features in Modern Symmetric Tridiagonal Eigensolvers. *SIAM Journal on Scientific Computing*, 28(5):1613–1633, 2006. ISSN 1064-8275. doi: 10.1137/050641624.
 - with James W. Demmel, Yozo Hida, W. Kahan, Xiaoye S. Li, and Sonil Mukherjee. Error bounds from extra-precise iterative refinement. *ACM Transactions on Mathematical Software*, 32(2):325–351, June 2006. ISSN 0098-3500. doi: 10.1145/1141885.1141894.
- Book Chapters**
- with Joseph N. Wilson, Gerhard X. Ritter, and Hongchi Shi. An Image Algebra Based SIMD Image Processing Environment. In C. W. Chen and Y. Q. Zhang, editors, *Visual Information Representation, Communication, and Image Processing*, pages 523–542. Marcel Dekker, New York, 1999. ISBN 082471928X. CiteSeer: wilson97image.html.
- Conference Proceedings**
- with James W. Demmel, Jack Dongarra, Beresford Parlett, W. Kahan, Ming Gu, David Bindel, Yozo Hida, Xiaoye S. Li, Osni A. Marques, Christof Vömel, Julien Langou, Piotr Luszczek, Jakub Kurzak, Alfredo Buttari, Julie Langou, and Stanimire Tomov. Prospectus for the Next LAPACK and ScaLAPACK Libraries. In *PARA'06: State-of-the-Art in Scientific and Parallel Computing*, Umeå, Sweden, June 2006. High Performance Computing Center North (HPC2N) and the Department of Computing Science, Umeå University, Springer. doi: 10.1007/978-3-540-75755-9_2.
 - with David Hough, Bill Hay, Jeff Kidder, Guy L. Steele Jr., and Jim Thomas. Arithmetic Interactions: From Hardware to Applications. In *17th IEEE Symposium on Computer Arithmetic (ARITH'05)*, 2005. ISBN 0-7695-2366-8. doi: 10.1109/ARITH.2005.10. See related presentation.
 - with Joseph N. Wilson. Efficient SIMD evaluation of image processing programs. In Hongchi Shi and Patrick C. Coffield, editors, *Parallel and Distributed Methods for Image Processing*, volume 3166, pages 199–210, San Diego, CA, 1997. SPIE. doi: 10.1117/12.279618.
- Technical Reports**
- with James W. Demmel, Mark Frederick Hoemmen, and Yozo Hida. Non-Negative Diagonals and High Performance on Low-Profile Matrices from Householder QR . LAPACK Working Note 203, May 2008. Also issued as UCB/EECS-2008-76; to appear in SISC.
 - with James W. Demmel, Jack Dongarra, Beresford Parlett, W. Kahan, Ming Gu, David Bindel, Yozo Hida, Xiaoye S. Li, Osni A. Marques, Christof Vömel, Julien Langou, Piotr Luszczek, Jakub Kurzak, Alfredo Buttari, Julie Langou, and Stanimire Tomov. Prospectus for the Next LAPACK and ScaLAPACK Libraries. LAPACK Working Note 181, February 2007. Also issued as UT-CS-07-592.
 - with Osni A. Marques and Christof Vömel. Benefits of IEEE-754 Features in Modern Symmetric Tridiagonal Eigensolvers. LAPACK Working Note 172, September 2005. Also issued as UCB//CSD-05-1414; edited in SISC version.
 - with James W. Demmel, Yozo Hida, W. Kahan, Xiaoye S. Li, and Sonil Mukherjee. Error bounds from extra-precise iterative refinement. LAPACK Working Note 165, February 2005. Also issued as UCB//CSD-05-1414, UT-CS-05-547, and LBNL-56965; expanded from TOMS version.
 - with James W. Demmel, Yozo Hida, and Xiaoye S. Li. Extra-precise iterative refinement for overdetermined least squares problems. LAPACK Working Note 188, May 2007. Also issued as UCB/EECS-2007-77; edited in TOMS version.
- Presentations**
- Auctions for Distributed (and Possibly Parallel) Matchings. Visit to CERFACS courtesy of the Franco-Berkeley Fund, December 2008, (presentation).
 - with James W. Demmel, Yozo Hida, Xiaoye S. Li, Meghana Vishvanath, and David Vu. Precise Solutions for Overdetermined Least Squares Problems. Stanford 50 – Eighth Bay Area Scientific

Computing Day, March 2007, (poster).
 – Making Static Pivoting Dependable. Seventh Bay Area Scientific Computing Day, March 2006, (poster).
 – with Yozo Hida and James W. Demmel. The Future of LAPACK and ScaLAPACK. Robert C. Thompson Matrix Meeting, November 2005, (presentation).
 – Modern Language Tools and 754R. ARITH’05, 2005, (panel participant).
 – Parallel Combinatorial Computing and Sparse Matrices. SIAM Conference on Computational Science and Engineering, feb 2005, (minisymposium speaker).
 – Sparse Data Structures for Weighted Bipartite Matching. SIAM Workshop on Combinatorial Scientific Computing, feb 2004, (presentation).
 – Parallel Weighted Bipartite Matching and Applications. SIAM Parallel Processing for Scientific Computing, feb 2004, (minisymposium speaker).
 – Practical Alternatives for Parallel Pivoting. SIAM Annual Meeting, June 2003, (presentation).
 – Parallel Bipartite Matching for Sparse Matrix Computations. SIAM Conference on Computational Science and Engineering, February 2003, (poster).
 – with David Bindel. Exception Handling Interfaces, Implementations, and Evaluation. IEEE-754r revision meeting, August 2002, (presentation).
 – Parallel Bipartite Matching for Sparse Matrix Computation. Third Bay Area Scientific Computing Day, March 2002, (poster).

Other Documents
 – with Jack Dongarra and Julien Langou. Sca/LAPACK Program Style. August 2006.
 – Type System Support for Floating-Point Computation. May 2001.
 – with Robert Szewczyk. Power and Control in Networked Sensors. May 2000. CiteSeer: riedy00power.html. Cited.
 – with Rich Vuduc. Microbenchmarking the Tera MTA. May 1999. Cited, presentation version available.

Selected Classes
 Floating point support (Kahan), project “Type System Support for Floating-Point Computation.” Statistical learning theory (Jordan), projects “Statistical Guidance for Program Tuning” and “Sparsifying Kernel Regression.” Software quality (Aiken), project “Floating-Point Types and Expressions.” Optimization (El Ghaoui), project “Bounding the Minimum Vertex Separator.” Networked sensors (Culler, Katz), project “Power and Control in Networked Sensors.”

Professional Societies
 – Association for Computing Machinery: Member since 1992. Univ. of Florida secretary 1995-1997.
 – Society for Industrial and Applied Mathematics: Member since 2000.
 – Society of Physics Students: Member 1993-1996. Univ. of Florida local officer 1994-1996.

Skill Keywords
Languages/Libraries C, Fortran, C++, Perl, Python, Lisp, R, Octave (Matlab), UPC, SQL, LAPACK.
Parallel styles/APIs MPI, OpenMP, pthreads, shmemp, UPC/PGAS, LAPI, ScaLAPACK/BLACS.
Tools autoconf, automake, cmake, Bourne shell, bash, SQLite, Emacs, rdfproc.
Platforms Debian and Fedora GNU/Linux on x86, x86-64; Solaris on x86, UltraSPARC; AIX on Power.
System Administration Debian and Fedora GNU/Linux, Solaris.
Contributions/bug fixes In GNU Octave, GNU Emacs, Linux kernel, cmake, R, git, and others.
 I support and contribute to freedom in software and network services.