Eduardo D'Azevedo

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Eduardo D'Azevedo has developed and optimized algorithms and application software for advanced high performance computing systems for over 25 years. He is currently the task lead for optimizing the XGC fusion application code for GPU as part of the Center for Accelerated Application Readiness (CAAR) program for ORNL Summit system and for Intel Xeon Phi as part of NERSC Exascale Science Applications Program (NESAP). He has developed efficient block update algorithms for QMCPACK, DCA++, and Kronecker product methods in DMRG++. He developed the parallel external memory algorithms for dense matrix computations that take advantage of GPU acceleration. Previously, he has developed mathematical libraries and solvers such as the out-of-core and compact storage in ScaLAPACK library in support of the DOE fusion and materials program. His activities include parallel algorithm design and implementation, application performance optimization, algorithms development, and application performance modeling and prediction.

Education

Ph.D. Computer Science, Faculty of Mathematics, University of Waterloo, 1989.
M. Math, Computer Science, Faculty of Mathematics, University of Waterloo, 1985.
B. Math, Computer Science, Combinatorics & Optimization, University of Waterloo, 1984.

Employment

Research Mathematician, ORNL, Oak Ridge, TN, 6/1991–present
Postdoctoral Fellow, ORNL, Oak Ridge, TN, 4/1990–6/1991
Postdoctoral Fellow, University of Waterloo, 1989–3/1990

Awards and Synergistic Activities

ORNL Significant Event Award, Simulation of Superconductivity , 2009
Gordon Bell Award, SC08
ORNL Significant Event Award, Numerical Formulation of the Hirsch-Fey Quantum Monte Algorithm, 2006
ORNL Awards Night, Recognition of Scientific Research by a Team, 2003

Selected Publications

B. Messer, E. D'Azevedo, J. Hill, W. Joubert, M. Berrill, C. Zimmer, "MiniApps Derived from Production HPC Applications Using Multiple Programming Models", *The International Journal of High Performance Computing Applications*, accepted.

E. D'Azevedo, K. Chan, S. Su, K. Wong, "Scalable Out-of-Core Solvers on a Cluster" in *High Performance Parallelism Pearls*, J. Reinders, J. Jeffers editors pp. 443-455, 2015, Morgan Kaufmann publishers

E. D'Azevedo, J. Hill, "Parallel LU Factorization on GPU Cluster", Procedia Computer Science, Volume 9, 2012, Pages 67-75, 2012

E. D'Azevedo, S. Fata, "On the effective implementation of a boundary element code on graphics processing units using an out-of-core LU algorithm", Engineering Analysis with Boundary Elements 36(8):12461255, 2012

R. F. Barrett, T. Chan, E. D'Azevedo, R. Wong, "Complex version of high performance computing LINPACK benchmark (HPL)", Concurrency and Computation Practice and Experience 22(5):573-587, 2010

S. Yang, H. Fotso, et al., "Parquet approximation for the 4x4 Hubbard cluster", Phys. Rev. E, 80, 046706, (2009)

G. Alvarez, M. S. Summers, D. E. Maxwell, M. Eisenbach, J. S. Meredith, J. M. Larkin, J. Levesque, T. A. Maier, P. R. C. Kent, E. F. D'Azevedo, T. C. Schulthess, "New algorithm to enable 400+ TFlop/s sustained performance in simulations of disorder effects in high-T_c superconductors", Proceedings of the 2008 ACM/IEEE conference on Supercomputing, **Gordon Bell Award**

G. Alvarez, P.K. Nukala, and E. D'Azevedo, "Diagonalization of Evolving Matrices: Application to Spin-Fermion Systems", Journal of Statistical Mechanics: Theory and Experiment (JSTAT), volume 2007, P08007, (2007)

A. Macridin, M. Jarrell, T. Maier, P. R. C. Kent, E. D'Azevedo, "Pseudogap and Antiferromagnetic Correlations in the Hubbard Model", Phys. Rev. Lett. 97, 036401, 2006.

E. D'Azevedo, M. R. Fahey, R. T. Mills, "Vectorized Sparse Matrix Multiply for Compressed Row Storage Format", Lecture Notes in Computer Science Volume 3514, 2005, pp 99-106

Recent Collaborators and Other Affiliations

S. Abbott (ORNL), M. Berrill (ORNL), J. Candy (GA), C. Chang (PPPL), J. Choi (ORNL), N. Podhorszki (ORNL), S. Ethier (PPPL), M. Gorentla Venkata (ORNL), R. Hager (PPPL), J. Hill (ORNL), C. Hsu (ORNL), Y. Idomura (JAEA), N. Imam (ORNL), W. Joubert (ORNL), S. Klasky (ORNL), P. Kent (ORNL), T. Koskela (LBNL), S. Ku (PPPL), J. Lang (Intel), Y. Li (ORNL), T. McDaniel (UTenn), M. B. Messer (ORNL), T. Mintz (ORNL), M. Parashar (Rutgers), B. Philip (ORNL), S. Pophale (ORNL), S. Powers (ORNL), M. Shephard (RPI), S. Sreepathi (ORNL), P. Wang (Nvidia), K. Wong (UT), P. Worley (ORNL), E. Yoon (RPI), C. Zimmer (ORNL)

Graduate and Postdoctoral Advisors and Advisees

Postdoctoral Advisor: M. Heath (University of Illinois at Urbana-Champaign)

Thesis Advisor: R. B. Simpson (University of Waterloo, Ontario, Canada)

Postdoctoral Advisee: none

Graduate Student Advisees: none