

Aydın Buluç

CONTACT INFORMATION

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RESEARCH INTERESTS

Sparse Matrices, Parallel Computing, Combinatorial Scientific Computing, High Performance Graph Algorithms, Computational Aspects of Power Grid Analysis.

EDUCATION

University of California, Santa Barbara, CA, USA

Ph.D. in Computer Science, 2010.

Thesis: [Linear Algebraic Primitives for Parallel Computing on Large Graphs](#)

Advisor: John R. Gilbert.

M.S. in Computer Science, 2009.

Massachusetts Institute of Technology, Cambridge, MA, USA

Visiting Student at the Department of Mathematics, 2008

Sabancı University, Istanbul, Turkey

B.S. in Computer Science, 2005.

Minor Degree in Mathematics

PROFESSIONAL EXPERIENCE

CRD, Lawrence Berkeley National Laboratory, Berkeley, CA

[Luis W. Alvarez Postdoctoral Fellow](#), April 2010 - Present.

ParLab Affiliate, EECS Department, University of California, Berkeley

(a) Parallel algorithms and software for graph computations.

(b) Communication-avoiding algorithms and autotuning for sparse-matrix kernels.

(c) Scalable algorithms for contingency analysis of the electric power grid.

CSRI, Sandia National Laboratory, Albuquerque, NM

Graduate Research Intern, June 2008 - August 2008.

Citrix Online, Santa Barbara, CA

Software Engineer Intern, June 2006 - September 2006.

Garanti Technology, Istanbul, Turkey

Software Engineer Intern, July 2004 - September 2004.

SCHOLARSHIPS & AWARDS

- *Luis W. Alvarez Postdoctoral Fellowship in Computational Science* by Lawrence Berkeley National Laboratory, 2010
- NSF Teragrid research allocation for 285000 compute hours (SUs), 2009-2010
- TCPP Travel Grant award to attend the IPDPS conference, 2009
- Full financial support (tuition, fees, monthly stipend) for graduate studies, Computer Science Department, UCSB, 2005-2010
- Merit scholarship support (tuition, fees, accommodation) for undergraduate studies, Sabancı University, 2001-2005.

SELECTED
PUBLICATIONS

1. Adam Lugowski, David Alber, Aydın Buluç, John Gilbert, Steve Reinhardt, Yun Teng, and Andrew Waranis. A flexible open-source toolbox for scalable complex graph analysis. In *SIAM Conference on Data Mining (SDM)*, 2012.
2. Aydın Buluç and Kamesh Madduri. Parallel breadth-first search on distributed memory systems. In *Supercomputing (SC)*, 2011.
3. Aydın Buluç, Samuel Williams, Leonid Oliker, and James Demmel. Reduced-bandwidth multithreaded algorithms for sparse matrix-vector multiplication. In *Proceedings of the IPDPS*, pages 721–733. IEEE Computer Society, 2011.
4. Aydın Buluç and John R. Gilbert. The Combinatorial BLAS: Design, implementation, and applications. *International Journal of High Performance Computing Applications (IJHPCA)*, 25(4):496–509, 2011.
5. Aydın Buluç, John R. Gilbert, and Viral B. Shah. Implementing sparse matrices for graph algorithms. In J. Kepner and J. Gilbert, editors, *Graph Algorithms in the Language of Linear Algebra*. SIAM, Philadelphia, 2011.
6. Aydın Buluç and John R. Gilbert. New ideas in sparse matrix-matrix multiplication. In J. Kepner and J. Gilbert, editors, *Graph Algorithms in the Language of Linear Algebra*. SIAM, Philadelphia, 2011.
7. Aydın Buluç, John R. Gilbert, and Ceren Budak. Solving path problems on the GPU. *Parallel Computing*, 36(5-6):241 – 253, 2010. **3rd Most Downloaded Paper, Q3 2010**.
8. Aydın Buluç, Jeremy T. Fineman, Matteo Frigo, John R. Gilbert, and Charles E. Leiserson. Parallel sparse matrix-vector and matrix-transpose-vector multiplication using compressed sparse blocks. In *SPAA '09: Proceedings of the 21st Annual ACM Symposium on Parallel Algorithms and Architectures*, pages 233–244, 2009.
9. Aydın Buluç and John R. Gilbert. Challenges and advances in parallel sparse matrix-matrix multiplication. In *ICPP'08: Proc. of the 37th Intl. Conf. on Parallel Processing*, pages 503–510, Portland, Oregon, USA, 2008. IEEE Computer Society.
10. Aydın Buluç and John R. Gilbert. On the representation and multiplication of hyper-sparse matrices. In *Proceedings of the IPDPS*, pages 1–11. IEEE Computer Society, 2008.

SOFTWARE

- *The Combinatorial BLAS*
- *Knowledge Discovery Toolbox (KDT)*
- *Compressed Sparse Blocks (CSB)*
- *APSP on GPU*

SERVICES AND
LEADERSHIP SKILLS

- *Minisymposia Co-organizer*, “Reducing Communication in Linear Algebra” at SIAM Conference on Applied Linear Algebra, 2012. “Optimization Challenges in the Energy Sector” at SIAM Conference on Optimization, 2011.
- *Program Committee Member*, UCSB CS Graduate Student Workshop on Computing (2009), International Conference on Contemporary Computing (IC3, 2011)
- *Reviewer*:
 - *Journals*: SIAM Review, IJHPCA, SIAM SISC, ACM Journal on Experimental Algorithmics, Parallel Computing, ACM TACO, Concurrency and Computation: Practice and Experience
 - *Conferences*: IPDPS 2010, Euro-Par 2011, ICPP 2011, Supercomputing 2011
- *Founding President*, Mathematics Club, Sabancı University

ACADEMIC
EMPLOYMENT

- *Graduate Research Assistant*, Computer Science Department, UCSB, 2007-2010
- *Teaching Assistant*, Computer Science Department, UCSB, 2005-2007
- *Student Peer Assistant*, **Academic Support Program**, Sabancı University, 2002-2004
- *Undergraduate Researcher*, Sabancı University, 2003-2004