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RESEARCH INTERESTS	Parallel Computing, Combinatorial Scientific Computing, Sparse Matrices, Computational Biology, High-Performance Computing, Graph Algorithms, Machine Learning	
EDUCATION AND TRAINING	UC Center for Executive Education , Berkeley, CA, USA LBNL Leadership Development Program for Emerging Leaders, 2015-16 University of California , Santa Barbara, CA, USA Ph.D. in Computer Science, 2010 <i>Thesis: Linear Algebraic Primitives for Parallel Computing on Large Graphs</i> <i>Advisor: John R. Gilbert</i> 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 (with Minors in Mathematics)	
RESEARCH AND PROFESSIONAL EXPERIENCE	CRD, Lawrence Berkeley National Laboratory , Berkeley, CA - Computational Staff Scientist (Career), <i>March 2016 - Present</i> - Computational Research Scientist (Career), <i>April 2014 - March 2016</i> - Computational Research Scientist (Career-track), <i>April 2012 - March 2014</i> - Luis W. Alvarez Postdoctoral Fellow , <i>April 2010 - April 2012</i> EECS Department, University of California , Berkeley, CA - Adjunct Assistant Professor, <i>January 2017 - Present</i> - Affiliated Researcher, <i>April 2010 - Present</i> Bebop (BERkeley Benchmarking and OPTimization) group Simons Institute for the Theory of Computing , Berkeley, CA Visiting Scientist (Long Term Participant), <i>August 2013 - December 2013</i> Program on Theoretical Foundations of Big Data Analysis CSRI, Sandia National Laboratory , Albuquerque, NM Graduate Research Intern, <i>June 2008 - August 2008</i> Citrix Online , Santa Barbara, CA Software Engineer Intern, <i>June 2006 - September 2006</i> Garanti Technology , Istanbul, Turkey Software Engineer Intern, <i>July 2004 - September 2004</i> Computer Science Department, University of California , Santa Barbara, CA Research Assistant, Combinatorial Scientific Computing Laboratory , <i>2007-2010</i> Teaching Assistant, <i>2005-2007</i>	

SCHOLARSHIPS &
AWARDS

- Distinguished Paper, 24th International European Conference on Parallel and Distributed Computing (Euro-Par 2018)
- *IEEE TCSC Award for Excellence for Early Career Research* by the IEEE Technical Committee on Scalable Computing, 2015
- *Best Use of HPC Application in Life Sciences* (as part of HipMer team) for boosting the assembly of the human genome on the Cray XC30 'Edison' supercomputer by the HPCWire Magazine (Readers' Choice), 2015
- *DOE Early Career Award* by Office of Science, Department of Energy, 2013
- *Luis W. Alvarez Postdoctoral Fellowship in Computational Science* by Lawrence Berkeley National Laboratory, 2010
- *Lawrence Berkeley National Laboratory Spot Award* For keeping NERSC at the top 2 of Graph500 list for three consecutive terms, 2012.
- SIAM Travel Grant award to attend SIAM ALA 2012
- 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.

CONFERENCE
PUBLICATIONS
(REFEREED)

1. Alok Tripathy, Katherine Yelick, and **Aydın Buluç**. Reducing communication in graph neural network training. In *Proceedings of the 2020 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, SC'20, 2020*.
2. Oguz Selvitopi, Saliya Ekanayake, Giulia Guidi, Georgios Pavlopoulos, Ariful Azad, and **Aydın Buluç**. Distributed many-to-many protein sequence alignment using sparse matrices. In *Proceedings of the 2020 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, SC'20, 2020*.
3. Yu-Hang Tang, Oguz Selvitopi, Doru Popovici, and **Aydın Buluç**. A high-throughput solver for marginalized graph kernels on GPU. In *Proceedings of the IPDPS, 2020*.
4. Oguz Selvitopi, Md Taufique Hussain, Ariful Azad, and **Aydın Buluç**. Optimizing high performance Markov clustering for pre-exascale architectures. In *Proceedings of the IPDPS, 2020*.
5. Alberto Zeni, Giulia Guidi, Marquita Ellis, Nan Ding, Marco D. Santambrogio, Steven Hofmeyr, **Aydın Buluç**, Leonid Oliker, and Katherine Yelick. LOGAN: High-performance GPU-based x-drop long-read alignment. In *Proceedings of the IPDPS, 2020*.
6. Santosh Pandey, Xiaoye Sherry Li, **Aydın Buluç**, Jiejun Xu, and Hang Liu. H-index: Hash-indexing for parallel triangle counting on GPUs. In *2019 IEEE High Performance Extreme Computing Conference (HPEC)*, pages 1–7. IEEE, 2019. Graph Challenge Champion.
7. Ben Brock, **Aydın Buluç**, and Katherine Yelick. BCL: A cross-platform distributed data structures library. In *48th International Conference on Parallel Processing (ICPP)*, Kyoto, Japan, 2019.
8. Marquita Ellis, Giulia Guidi, **Aydın Buluç**, Leonid Oliker, and Katherine Yelick. di-BELLA: Distributed long read to long read alignment. In *48th International Conference on Parallel Processing (ICPP)*, Kyoto, Japan, 2019.
9. Ariful Azad and **Aydın Buluç**. LACC: a linear-algebraic algorithm for finding connected components in distributed memory. In *Proceedings of the IPDPS, 2019*.

10. Evangelos Georganas, Rob Egan, Steven Hofmeyr, Eugene Goltsman, Bill Arndt, Andrew Tritt, **Aydın Buluç**, Leonid Oliker, and Katherine Yelick. Extreme scale de novo metagenome assembly. In *International Conference for High Performance Computing, Networking, Storage and Analysis (SC'18)*, 2018. Best Paper Nominee.
11. Amir Gholami, Ariful Azad, Peter Jin, Kurt Keutzer, and **Aydın Buluç**. Integrated model, batch, and domain parallelism in training neural networks. In *The 30th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, 2018.
12. Carl Yang, **Aydın Buluç**, and John D Owens. Implementing push-pull efficiently in GraphBLAS. In *47th International Conference on Parallel Processing (ICPP)*, 2018.
13. Carl Yang, **Aydın Buluç**, and John D Owens. Design principles for sparse matrix multiplication on the GPU. In *24th International European Conference on Parallel and Distributed Computing (Euro-Par)*, 2018. Distinguished Paper.
14. Penporn Koanantakool, Alnur Ali, Ariful Azad, **Aydın Buluç**, Dmitriy Morozov, Leonid Oliker, Katherine Yelick, and Sang-Yun Oh. Communication-avoiding optimization methods for distributed massive-scale sparse inverse covariance estimation. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, pages 1376–1386, 2018.
15. Yang You, **Aydın Buluç**, and James Demmel. Scaling deep learning on GPU and Knights Landing clusters. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC'17)*, 2017.
16. Timothy G Mattson, Carl Yang, Scott McMillan, **Aydın Buluç**, and José E Moreira. GraphBLAS C API: Ideas for future versions of the specification. In *High Performance Extreme Computing Conference (HPEC), 2017 IEEE*, pages 1–6. IEEE, 2017.
17. Ariful Azad and **Aydın Buluç**. A work-efficient parallel sparse matrix-sparse vector multiplication algorithm. In *Proceedings of the IPDPS*, 2017.
18. Ariful Azad, Mathias Jacquelin, **Aydın Buluç**, and Esmond G. Ng. The reverse Cuthill-McKee algorithm in distributed-memory. In *Proceedings of the IPDPS*, 2017.
19. Marquita Ellis, Evangelos Georganas, Rob Egan, Steven Hofmeyr, **Aydın Buluç**, Brandon Cook, Leonid Oliker, and Katherine Yelick. Performance characterization of de novo genome assembly on leading parallel systems. In *23rd International European Conference on Parallel and Distributed Computing (Euro-Par)*, 2017.
20. Jeremy Kepner, Peter Aaltonen, David Bader, **Aydın Buluç**, Franz Franchetti, John Gilbert, Dylan Hutchison, Manoj Kumar, Andrew Lumsdaine, Henning Meyerhenke, Scott McMillan, José Moreira, John Owens, Carl Yang, Marcin Zalewski, and Timothy Mattson. Mathematical foundations of the GraphBLAS. In *IEEE High Performance Extreme Computing (HPEC)*, 2016.
21. Ariful Azad and **Aydın Buluç**. Distributed-memory algorithms for maximum cardinality matching in bipartite graphs. In *Proceedings of the IPDPS*, 2016.
22. Penporn Koanantakool, Ariful Azad, **Aydın Buluç**, Dmitriy Morozov, Sang-Yun Oh, Leonid Oliker, and Katherine Yelick. Communication-avoiding parallel sparse-dense matrix-matrix multiplication. In *Proceedings of the IPDPS*, 2016.
23. Evangelos Georganas, **Aydın Buluç**, Jarrod Chapman, Steven Hofmeyr, Chaitanya Aluru, Rob Egan, Leonid Oliker, Daniel Rokhsar, and Katherine Yelick. HiPMer: An extreme-scale de novo genome assembler. In *International Conference for High Performance Computing, Networking, Storage and Analysis (SC'15)*, 2015.
24. Ariful Azad and **Aydın Buluç**. Distributed-memory algorithms for maximal cardinality matching using matrix algebra. In *IEEE International Conference on Cluster Computing (CLUSTER)*, 2015.

25. Veronika Strnadova, **Aydın Buluç**, Joseph Gonzalez, Jarrod Chapman, John Gilbert, and Leonid Olikier. Efficient data reduction for large-scale genetic mapping. In *ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM BCB)*, 2015.
26. Ariful Azad, **Aydın Buluç**, and Alex Pothén. A parallel tree grafting algorithm for maximum cardinality matching in bipartite graphs. In *Proceedings of the IPDPS*, 2015.
27. Evangelos Georganas, **Aydın Buluç**, Jarrod Chapman, Leonid Olikier, Daniel Rokhsar, and Katherine Yelick. meraligner: A fully parallel sequence aligner. In *Proceedings of the IPDPS*, 2015.
28. V. Strnadova, **A. Buluç**, J. Gonzalez, S. Jegelka, J. Chapman, J. Gilbert, D. Rokhsar, and L. Olikier. Efficient and accurate clustering for large-scale genetic mapping. In *The IEEE International Conference on Bioinformatics and Biomedicine (BIBM'14)*, 2014.
29. Evangelos Georganas, **Aydın Buluç**, Jarrod Chapman, Leonid Olikier, Daniel Rokhsar, and Katherine Yelick. Parallel de bruijn graph construction and traversal for de novo genome assembly. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC'14)*, 2014.
30. H. Metin Aktulga, **Aydın Buluç**, Samuel Williams, and Chao Yang. Optimizing sparse matrix-multiple vectors multiplication for nuclear configuration interaction calculations. In *Proceedings of the IPDPS*. IEEE Computer Society, 2014.
31. Grey Ballard, **Aydın Buluç**, James Demmel, Laura Grigori, Benjamin Lipshitz, Oded Schwartz, and Sivan Toledo. Communication optimal parallel multiplication of sparse random matrices. In *SPAA 2013: The 25th ACM Symposium on Parallelism in Algorithms and Architectures*, Montreal, Canada, 2013.
32. **Aydın Buluç**, Erika Duriakova, Armando Fox, John Gilbert, Shoaib Kamil, Adam Lugowski, Leonid Olikier, and Samuel Williams. High-productivity and high-performance analysis of filtered semantic graphs. In *Proceedings of the IPDPS*. IEEE Computer Society, 2013.
33. Edgar Solomonik, **Aydın Buluç**, and James Demmel. Minimizing communication in all-pairs shortest paths. In *Proceedings of the IPDPS*. IEEE Computer Society, 2013.
34. **Aydın Buluç** and Kamesh Madduri. Graph partitioning for scalable distributed graph computations. In *Graph Partitioning and Graph Clustering (Proc. 10th DIMACS Implementation Challenge)*, volume 588 of *Contemporary Mathematics*, pages 83–101. AMS, 2013.
35. 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.
36. **Aydın Buluç** and Kamesh Madduri. Parallel breadth-first search on distributed memory systems. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC'11)*, pages 65:1–65:12, 2011.
37. **Aydın Buluç**, Samuel Williams, Leonid Olikier, and James Demmel. Reduced-bandwidth multithreaded algorithms for sparse matrix-vector multiplication. In *IPDPS'11: Proceedings of the 25th IEEE International Symposium on Parallel & Distributed Processing*, pages 721–733. IEEE Computer Society, 2011.
38. **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.

39. **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.
40. **Aydın Buluç** and John R. Gilbert. On the representation and multiplication of hyper-sparse matrices. In *IPDPS'08: Proceedings of the 22nd IEEE International Symposium on Parallel & Distributed Processing*, pages 1–11. IEEE Computer Society, 2008.
1. Ariful Azad, **Aydın Buluç**, Xiaoye S Li, Xinliang Wang, and Johannes Langguth. A distributed-memory algorithm for computing a heavy-weight perfect matching on bipartite graphs. *SIAM Journal on Scientific Computing*, 42(4):C143–C168, 2020.
2. Steven Hofmeyr, Rob Egan, Evangelos Georganas, Alex Copeland, Robert Riley, Alicia Clum, Emiley Eloë-Fadrosh, Simon Roux, Eugene Goltsman, **Aydın Buluç**, Daniel Rokhsar, Leonid Oliker, and Katherine Yelick. Terabase-scale metagenome coassembly with MetaHipMer. *Scientific reports*, 2020.
3. Yongzhe Zhang, Ariful Azad, and **Aydın Buluç**. Parallel algorithms for finding connected components using linear algebra. *Journal of Parallel and Distributed Computing*, 2020.
4. Katherine Yelick, **Aydın Buluç**, Muaaz Awan, Ariful Azad, Benjamin Brock, Rob Egan, Saliya Ekanayake, Marquita Ellis, Evangelos Georganas, Giulia Guidi, et al. The parallelism motifs of genomic data analysis. *Philosophical Transactions of the Royal Society A*, 378(2166):20190394, 2020.
5. Yusuke Nagasaka, Satoshi Matsuoka, Ariful Azad, and **Aydın Buluç**. Performance optimization, modeling and analysis of sparse matrix-matrix products on multi-core and many-core processors. *Parallel Computing*, page 102545, 2019.
6. Ariful Azad, Georgios A. Pavlopoulos, Christos A. Ouzounis, Nikos C. Kyrpidis, and **Aydın Buluç**. HipMCL: A high-performance parallel implementation of the Markov clustering algorithm for large-scale networks. *Nucleic Acids Research (NAR)*, 2018.
7. Ariful Azad, **Aydın Buluç**, and Alex Pothén. Computing maximum cardinality matchings in parallel on bipartite graphs via tree-grafting. *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, 28(1):44–59, 2017.
8. Hasan Metin Aktulga, Md. Afibuzzaman, Samuel Williams, **Aydın Buluç**, Meiyue Shao, Chao Yang, Esmond G. Ng, Pieter Maris, and James P. Vary. A high performance block eigensolver for nuclear configuration interaction calculations. *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, 28(6):1550–1563, 2017.
9. Ariful Azad, Grey Ballard, **Aydın Buluç**, James Demmel, Laura Grigori, Oded Schwartz, Sivan Toledo, and Samuel Williams. Exploiting multiple levels of parallelism in sparse matrix-matrix multiplication. *SIAM Journal on Scientific Computing (SISC)*, 38(6):C624–C651, 2016.
10. Ariful Azad and **Aydın Buluç**. A matrix-algebraic formulation of distributed-memory maximal cardinality matching algorithms in bipartite graphs. *Parallel Computing*, 2016.
11. Jarrod Chapman, Martin Mascher, **Aydın Buluç**, Kerrie Barry, Evangelos Georganas, Adam Session, Veronika Strnadova, Jerry Jenkins, Sunish Sehgal, Leonid Oliker, Jeremy Schmutz, Katherine Yelick, Uwe Scholz, Robbie Waugh, Jesse Poland, Gary Muehlbauer, Nils Stein, and Daniel Rokhsar. A whole-genome shotgun approach for assembling and anchoring the hexaploid bread wheat genome. *Genome Biology*, 16(26), 2015.

12. Adam Lugowski, Shoaib Kamil, **Aydm Buluç**, Samuel Williams, Erika Duriakova, Leonid Oliker, Armando Fox, and John Gilbert. Parallel processing of filtered queries in attributed semantic graphs. *Journal of Parallel and Distributed Computing (JPDC)*, 79-80:115–131, 2015.
13. **Aydm Buluç** and John R. Gilbert. Parallel sparse matrix-matrix multiplication and indexing: Implementation and experiments. *SIAM Journal of Scientific Computing*, 34(4):170 – 191, 2012.
14. **Aydm 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.
15. **Aydm Buluç**, John R. Gilbert, and Ceren Budak. Solving path problems on the GPU. *Parallel Computing*, 36(5-6):241 – 253, 2010.

WORKSHOP AND
SHORT PAPERS WITH
PROCEEDINGS
(REFEREED)

1. Francesco Peverelli, Lorenzo Di Tucci, Marco D. Santambrogio, Nan Ding, Steven Hofmeyr, **Aydm Buluç**, Leonid Oliker, and Katherine Yelick. GPU accelerated partial order multiple sequence alignment for long reads self-correction. In *Intl. Parallel & Distributed Processing Symposium Workshop (IPDPSW)*, 2020.
2. Benjamin Brock, **Aydm Buluç**, Timothy G Mattson, Scott McMillan, José E Moreira, Roger Pearce, Oguz Selvitopi, and Trevor Steil. Considerations for a distributed GraphBLAS API. In *Intl. Parallel & Distributed Processing Symposium Workshop (IPDPSW)*, 2020.
3. Benjamin Brock, **Aydm Buluç**, Timothy G Mattson, Scott McMillan, and José E Moreira. A roadmap for the GraphBLAS C++ API. In *Intl. Parallel & Distributed Processing Symposium Workshop (IPDPSW)*, 2020.
4. Benjamin A Brock, Yuxin Chen, Jiakun Yan, John Owens, **Aydm Buluç**, and Katherine Yelick. RDMA vs. RPC for implementing distributed data structures. In *9th IEEE/ACM Workshop on Irregular Applications: Architectures and Algorithms (IA3)*, pages 17–22. IEEE, 2019.
5. Timothy Mattson, Timothy A. Davis, Manoj Kumar, **Aydm Buluç**, Scott McMillan, José Moreira, and Carl Yang. LAGraph: A community effort to collect graph algorithms built on top of the GraphBLAS. In *GrAPL: Workshop on Graphs, Architectures, Programming, and Learning (IPDPSW)*, 2019.
6. Muhammad Osama, Minh Truong, Carl Yang, **Aydm Buluç**, and John D Owens. Graph coloring on the GPU. In *GrAPL: Workshop on Graphs, Architectures, Programming, and Learning (IPDPSW)*, 2019.
7. Yusuke Nagasaka, Satoshi Matsuoka, Ariful Azad, and **Aydm Buluç**. High-performance sparse matrix-matrix products on Intel KNL and multicore architectures. In *47th International Conference on Parallel Processing Workshops (ICPPW)*, 2018.
8. **Aydm Buluç**, Timothy Mattson, Scott McMillan, Jose Moreira, and Carl Yang. Design of the GraphBLAS API for C. In *IEEE Workshop on Graph Algorithm Building Blocks, IPDPSW*, 2017.
9. Ariful Azad and **Aydm Buluç**. Towards a GraphBLAS library in Chapel. In *Intl. Parallel & Distributed Processing Symposium Workshop (IPDPSW)*, 2017.
10. Ariful Azad, **Aydm Buluç**, and John R Gilbert. Parallel triangle counting and enumeration using matrix algebra. In *Proceedings of the IPDPSW, Workshop on Graph Algorithm Building Blocks (GABB)*, 2015.

11. Scott Beamer, **Aydm Buluç**, Krste Asanović, and David Patterson. Distributed memory breadth-first search revisited: Enabling bottom-up search. In *Workshop on Multi-threaded Architectures and Applications (MTAAP), in conjunction with IPDPS*. IEEE Computer Society, 2013.
12. Adam Lugowski, **Aydm Buluç**, John R. Gilbert, and Steve Reinhardt. Scalable complex graph analysis with the knowledge discovery toolbox. In *ICASSP, Special session on "Big Data"*, 2012.
13. K. Kandalla, **A. Buluç**, H. Subramoni, K. Tomko, J. Vienne, L. Oliker, and D. K. Panda. Can network-offload based non-blocking neighborhood mpi collectives improve communication overheads of irregular graph algorithms? In *International Workshop on Parallel Algorithms and Parallel Software (IWPAPS 2012), held in Conjunction with IEEE Cluster*, 2012.

BOOK CHAPTERS

1. Evangelos Georganas, Steven Hofmeyr, Rob Egan, **Aydm Buluç**, Leonid Oliker, Daniel Rokhsar, and Katherine Yelick. Extreme-scale de novo genome assembly. In T. Straatsma, K. Antypas, and T. Williams, editors, *Exascale Scientific Applications: Programming Approaches for Scalability, Performance, and Portability*. CRC Press, 2017 (to appear).
2. **Aydm Buluç**, Scott Beamer, Kamesh Madduri, Krste Asanović, and David Patterson. Distributed-memory breadth-first search on massive graphs. In D. Bader, editor, *Parallel Graph Algorithms*. CRC Press / Taylor-Francis, 2017 (to appear).
3. **A. Buluç**, H. Meyerhenke, I. Safro, P. Sanders, and C. Schulz. Recent advances in graph partitioning. In *Algorithm Engineering - Selected Results and Surveys*, volume 9220. Lecture Notes in Computer Science, 2016.
4. **Aydm 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.
5. **Aydm 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.

EXTENDED ABSTRACTS WITHOUT PROCEEDINGS (REFEREED)

1. Amir Gholami, Ariful Azad, Kurt Keutzer, and **Aydm Buluç**. Communication analysis of hybrid model and data parallelism in training neural networks. In *NIPS Workshop: Deep Learning At Supercomputer Scale*, 2017.
2. Veronika Strnadova-Neeley, Aydin Buluc, John R Gilbert, Leonid Oliker, and Weimin Ouyang. LiRa: A new likelihood-based similarity score for collaborative filtering. In *The Workshop on Large Scale Recommendation Systems (LSRS'16), in conjunction with RecSys*, 2016.
3. D. Bader, **A. Buluç**, J. Gilbert, J. Gonzalez, J. Kepner, and T. Mattson. The Graph BLAS effort and its implications for Exascale. In *SIAM Workshop on Exascale Applied Mathematics Challenges and Opportunities (EX14)*, 2014.
4. **Aydm Buluç**, John Gilbert, and Sivan Toledo. Computing shortest paths using sparse gaussian elimination. In *SIAM Workshop on Network Science (NS14)*, 2014. (Poster presentation).
5. **Aydm Buluç**, Armando Fox, John Gilbert, Shoaib Kamil, Adam Lugowski, Leonid Oliker, and Samuel Williams. High-performance analysis of filtered semantic graphs. In *International Conference on Parallel Architectures and Compilation Techniques, PACT 2012, Minneapolis, MN*, 2012.

6. **Aydın Buluç** and John R. Gilbert. Parallel sparse matrix indexing and assignment. In *CSC'11: The 5th SIAM Workshop on Combinatorial Scientific Computing*, Darmstadt, Germany.
7. Steve Reinhardt, Adam Lugowski, John R. Gilbert, and **Aydın Buluç**. Enabling non-graph-expert use of very-large-scale graph analysis. In *CSC'11: The 5th SIAM Workshop on Combinatorial Scientific Computing*, Darmstadt, Germany.
8. **Aydın Buluç**. Parallel primitives for computation with large graphs. In *TCPD PhD Forum at the IEEE International Parallel and Distributed Processing Symposium*, Rome, Italy, 2009. (Doctoral Colloquium Poster Presentation).

TECH REPORTS AND
NON-REFEREED
PUBLICATIONS

1. Giulia Guidi, Marquita Ellis, Daniel Rokhsar, Katherine Yelick, and **Aydın Buluç**. BELLA: Berkeley efficient long-read to long-read aligner and overlapper. *bioRxiv*, page 464420, 2018.
2. Evangelos Georganas, Marquita Ellis, Rob Egan, Steven Hofmeyr, **Aydın Buluç**, Brandon Cook, Leonid Olikier, and Katherine Yelick. Merbench: PGAS benchmarks for high performance genome assembly. In *Proceedings of the Second Annual PGAS Applications Workshop (PAW17), in conjunction with SC'17*, 2017.
3. **Aydın Buluç**, Timothy Mattson, Scott McMillan, José Moreira, and Carl Yang. The GraphBLAS C API Specification, version 1.3.0. Technical report, The GraphBLAS Signatures Subgroup, Sept 2019. http://people.eecs.berkeley.edu/aydin/GraphBLAS_API_C_v13.pdf.
4. J. Kepner, D. Bader, **A. Buluç**, J. Gilbert, T. Mattson, and H. Meyerhenke. Graphs, matrices, and the GraphBLAS: Seven good reasons. In *The International Conference on Computational Science (ICCS)*, 2015.
5. T. Mattson, D. Bader, J. Berry, **A. Buluç**, J. Dongarra, C. Faloutsos, J. Feo, J. Gilbert, J. Gonzalez, B. Hendrickson, J. Kepner, C. Leiserson, A. Lumsdaine, D. Padua, S. Poole, S. Reinhardt, M. Stonebraker, S. Wallach, and A. Yoo. Standards for graph algorithm primitives. In *High Performance Extreme Computing Conference (HPEC '13)*. IEEE, September 2013. (position paper).
6. **Aydın Buluç** and John R. Gilbert. Highly parallel sparse matrix-matrix multiplication. Technical Report UCSB-CS-2010-10, Computer Science Department, University of California, Santa Barbara, 2010.
7. **Aydın Buluç** and Erik G. Boman. Towards scalable parallel hypergraph partitioning. In *CSRI Summer Proceedings*, Albuquerque, NM and Livermore, CA, 2008.

CITATION INFO

According to Google Scholar
 - Total: 3716
 - H-Index: 29

FUNDING AND
OTHER GRANTS

- External Funding (Active)
 - *PI: Parallel Primitives for Randomized Algorithms on Sparse Data*
DOE ASCR Applied Math Base Program, Sep 2018-2021, \$1.5M
 - *Inst. PI: ExaGraph: Combinatorial Methods for Enabling Exascale Applications*
DOE ECP Co-Design Center, FY17-20: \$2.3M for LBNL. (Lead PI: Halappanavar)
 - *Co-I: Exascale Solutions for Microbiome Analysis*
DOE ECP Application, FY17-22: \$11.5M. (PI: Yelick)
 - *Co-PI: Global Address Programming with Accelerators*
NSF SPX Program, October 2018-2021, \$465K for UC Berkeley. (Lead PI: Owens)

- *Co-PI: Dynamic Runtime Fusion of Parallel Operators for Graph Analytics and Machine Learning in GraphBLAS*
ARO, September 2019-2022, \$1.25M (PI: Iancu)

- External Funding (Past)
 - *PI: Energy-efficient Parallel Graph and Data Mining Algorithms*
DOE Early Career Research Award, July 2013-2018, \$2.5M
 - *Co-I: Scalable Statistics and Machine Learning for Data-Centric Science*
DOE Applied Math Grant, Oct 2013-2016, \$2M (PI: Prabhat)
 - *Co-PI: THOR: Throughput-Oriented Runtimes*
DOD, FY16-17: \$450K, FY19: \$250K (PI: Iancu)
- Internal Funding
 - *PI: Graph-based analysis and visualization of multi-modal multi-resolution large-scale neuroimaging data*
LBNL LDRD, October 2013-2015, \$543K (unburdened)
 - *Co-PI: High-Performance Parallel Analysis for Key Genomics Computations*
LBNL LDRD, October 2012-2015, \$665K (unburdened)
- Compute Time
 - NERSC production allocation for 4.05M compute hours, 2020
 - NERSC production allocation for 4.35M compute hours, 2019
 - NERSC production allocation for 3.35M compute hours, 2018
 - NERSC production allocation for 3.25M compute hours, 2017
 - NERSC production allocation for 1.9M compute hours, 2016
 - NERSC production allocation for 1.4M compute hours, 2015
 - NSF Teragrid research allocation for 285K compute hours, 2009-2010

ADVISING

Current

- Ben Brock (UC Berkeley, EECS, Ph.D.), co-advisor, 2017- (w/ Kathy Yelick)
- Giulia Guidi (UC Berkeley, EECS, Ph.D.), co-advisor, 2018- (w/ Kathy Yelick)
- Alok Tripathy (UC Berkeley, EECS, Ph.D.), co-advisor, 2019- (w/ Kathy Yelick)
- Vivek Bharadwaj (UC Berkeley, EECS, Ph.D.), co-advisor (temp), 2020- (w/ Jim Demmel)
- Oguz Selvitopi (LBNL), Postdoctoral Fellow, 2018-
- Can Kizilkale (LBNL), Postdoctoral Fellow, 2019-
- Prashant Pandey (LBNL), Postdoctoral Fellow, 2019- (w/ Kathy Yelick)
- Israt Nisa (LBNL), Postdoctoral Fellow, 2020- (w/ Costin Iancu)

Past

- Saliya Ekanayake (LBNL), Postdoctoral Fellow, 2018-2020 (now at Microsoft)
- Carl Yang (UC Davis, ECE, Ph.D.), co-advisor, 2015-2019 (with John Owens)
Dissertation: [High-Performance Linear Algebra-based Graph Framework on the GPU](#)
(now at Waymo, Inc).
- Caitlin Whitter (Purdue), CSGF Summer Intern, 2019
- Sureyya Emre Kurt (Utah), Graduate Summer Intern, 2019
- Yusuke Nagasaka (Tokyo Institute of Technology), Graduate Summer Intern, 2017 (w/ John Shalf) (now at Fujitsu Laboratories)
- Veronika Strnadova-Neeley (UCSB), GSRA, 2013-2016 (w/ Lenny Oliker, campus advisor: John Gilbert) (now at Montana State University)
- Ariful Azad, Postdoctoral Fellow, 2014-2016 (now at Indiana University)
- Patrick Flick (Georgia Tech), Graduate Summer Intern, 2016
- Sang-Yun Oh, Simons Postdoctoral Fellow, 2013-15 (w/ Lenny Oliker) (now at UC Santa Barbara)
- Harsha Vardhan Simhadri, Postdoctoral Fellow, 2013-14 (w/ Kathy Yelick)
- Chaitanya Aluru (UC Berkeley), Undergraduate Research Assistant, 2014-15

- Adam Sealfon (MIT), CSGF Summer Intern, 2015
- Eric Lee (UC Berkeley), Undergraduate Summer Intern, 2014
- Adam Lugowski (UCSB), Graduate Summer Intern, 2012 (w/ L. Oliner & S. Williams)

Ph.D. Committee Membership

- Marquita Ellis (EECS, UC Berkeley), 2017-2020 (advisor: Kathy Yelick)
- Fazle Sadi (ECE, CMU), 2017-2019 (advisors: Larry Pileggi and Franz Franchetti)

Masters Students

- Nick Swenson, Jiali Chen, Jude Fernandes (MEng Capstone Advisor, EECS, UC Berkeley), 2019-2020 (w/ Kathy Yelick)
- Richard Barnes (M.S. Reader, EECS, UC Berkeley), 2017-2019 (advisor: Kathy Yelick)

TEACHING

- [Applications of Parallel Computers \(CS267\), Spring 2020](#) (w/ J. Demmel & K. Yelick)
- [Applications of Parallel Computers \(CS267\), Spring 2019](#) (w/ J. Demmel & K. Yelick)
- [Applications of Parallel Computers \(CS267\), Spring 2018](#) (w/ J. Demmel & K. Yelick)
- [Applications of Parallel Computers \(CS267\), Spring 2017](#) (w/ K. Yelick)

SOFTWARE

The Combinatorial BLAS

A parallel library for running large-scale graph algorithms on distributed-memory architectures. The library consists of a growing set of optimized primitives such as sparse matrix-sparse matrix multiplication and sparse matrix-sparse vector multiplication.

HipMCL

A high-performance parallel implementation of the Markov Cluster (MCL) algorithm for large-scale network clustering. It can easily cluster a network of 75 million nodes with 68 billion edges in 2.4 hours using 2000 nodes of Cori supercomputer at NERSC.

(Meta)HipMer

An extreme-scale de novo genome assembler for large complex genomes and metagenomes. Primarily written in UPC with some MPI/C++ pieces. Scales over O(10,000) processors.

CAGNET

A family of parallel algorithms for training GNNs that can asymptotically reduce communication compared to previous parallel GNN training methods. CAGNET algorithms are based on 1D, 1.5D, 2D, and 3D sparse-dense matrix multiplication, and are implemented with torch.distributed on GPU-equipped clusters.

PASTIS

A distributed-memory parallel many-to-many protein sequence aligner that uses sparse matrices.

mergeSpMM

Sparse matrix multi-vector (aka tall-skinny dense matrix) products on the GPU, also used in [PyTorch Geometric](#).

BELLA

A computationally-efficient and highly-accurate long-read to long-read aligner and overlap for DNA sequences.

GraphBLAST

A high-performance linear algebra-based graph framework on the GPU, which closely approximates the [GraphBLAS API](#).

MS-BFS-Graft

Multithreaded OpenMP code for computing maximum cardinality matching on bipartite graphs. Performs multi-source breadth-first search with tree-grafting for exploiting parallelism.

HP-CONCORD and SpDM³

SpDM³ does communication-avoiding Sparse-Dense Matrix-Matrix Multiplication on distributed-memory parallel computers and HP-CONCORD is high-performance inverse covariance matrix estimation using the CONCORD-ISTA algorithm.

Compressed Sparse Blocks

Shared memory Cilk++ implementation of sparse matrix-vector and sparse matrix-transpose-vector multiplication using compressed sparse blocks.

BubbleCluster and MarkerReduce

Tools for large-scale genetic mapping. BubbleCluster is an algorithm used to efficiently cluster genetic markers into linkage groups. MarkerReduce is an algorithm for efficient data reduction of genetic marker data. Both codes are written in C++.

Knowledge Discovery Toolbox (KDT)

High-performance parallel graph analysis and mining in a very-high-level language (Python), based on the Combinatorial BLAS.

GPU-APSP

A CUDA program that computes the distances for all-pairs shortest paths in a dense directed graph using the R-Kleene algorithm.

INVITED TALKS AND SEMINARS

1. Sparse Matrices Beyond Solvers: Graphs, Biology and Machine Learning. In *EECS, MIT*, Cambridge, MA, June 2020. (Invited Seminar, Online due to COVID-19, Host: Julian Shun).
2. Sparse Matrices Beyond Solvers: Graphs, Biology and Machine Learning. In *SIAM Conference on Mathematics of Data Science*, Cincinnati, OH, May 2020. (Invited Minisymposium Talk, Online due to COVID-19).
3. Sparse Matrices Beyond Solvers: Graphs, Biology and Machine Learning. In *EECS, University of California*, Irvine, CA, March 2020. (Invited Departmental Seminar, Cancelled due to COVID-19).
4. GraphBLAST: A high-performance linear algebra-based graph framework on the GPU. In *ACS HPC and Data Analytics Workshop*, Baltimore, MD, 2019. (Invited talk).
5. GraphBLAS: Concepts, algorithms, and applications. In *The 14th Scheduling for Large Scale Systems Workshop*, Bordeaux, France, June 2019. (Invited Workshop Talk).
6. Communication-avoiding sparse matrix algorithms for large graph and machine learning problems. In *SIAM Conference on Computational Science and Engineering*, Spokane, WA, 2019. (Invited Minisymposium Talk).
7. Large-scale parallel computing for computational genomics. In *Hellenic Bioinformatics 11*, Thessaloniki, Greece, November 2018. (Invited Conference Talk).
8. Communication-avoiding sparse matrix algorithms for large graph and machine learning problems. In *Workshop on New Architectures and Algorithms, IPAM (UCLA)*, Los Angeles, CA, November 2018. (Invited Workshop Talk).

9. The GraphBLAS effort and its software ecosystem. In *OpenSuCo Workshop at SC'18*, Dallas, TX, November 2018. (Invited Workshop Talk).
10. Scaling parallel graph analysis & machine learning using sparse matrix operations. In *NERSC Data Seminar*, Berkeley, CA, May 2018. Invited Seminar.
11. Scaling parallel graph analysis & machine learning using sparse matrix operations. In *Michigan State University*, East Lansing, MI, April 2018. Invited Departmental Seminar (Host: H. Metin Aktulga).
12. Genomics, graphs and the GraphBLAS. In *Graphs Across Domains (GraphXD) Workshop*, Berkeley Institute for Data Science (BIDS), Berkeley, CA, March 2018. (Invited Workshop Talk).
13. Parallel algorithms across the GraphBLAS stack. In *ACS HPC and Data Analytics Workshop*, Baltimore, MD, 2017. (Invited talk).
14. Faster parallel GraphBLAS kernels and new graph algorithms in matrix algebra. In *Google Inc.*, Mountain View, CA, November 2016. (Invited Talk).
15. Faster parallel GraphBLAS kernels and new graph algorithms in matrix algebra. In *EECS, University of California*, Berkeley, CA, October 2016. (Invited Departmental Seminar).
16. A tour of contemporary genome assembly algorithms and software. In *Workshop on Parallel Software Libraries for Sequence Analysis (pSALSA)*, at *ACM BCB*, Seattle, WA, October 2016. (Invited Keynote Talk).
17. Parallel de novo assembly of complex genomes via HipMer. In *IEEE International Workshop on High Performance Computational Biology (HiCOMB)*, at *IPDPS*, Chicago, IL, May 2016. (Invited Talk).
18. The GraphBLAS effort: Kernels, API, and parallel implementations. In *SIAM Conference on Parallel Processing for Scientific Computing*, Paris, France, 2016. (Invited Minisymposium Talk).
19. Faster parallel GraphBLAS kernels and new graph algorithms in matrix algebra. In *High-Performance Extreme Computing (HPEC)*, Waltham, MA, September 2015. (Invited Conference Talk).
20. Faster parallel GraphBLAS kernels and new graph algorithms in matrix algebra. In *HP Labs*, Palo Alto, CA, August 2015. (Invited Seminar).
21. Scalable parallel algorithms for de novo assembly of complex (meta)genomes. In *DOE Joint Genome Institute*, Walnut Creek, CA, August 2015.
22. Parallel graph algorithms & primitives. In *Swift Navigation Inc.*, San Francisco, CA, May 2015. Invited Talk (Host: Timothy Harris).
23. Scalable algorithms for complex genome assembly, alignment, and genetic mapping. In *School of CSE, Georgia Tech*, Atlanta, GA, January 2015. (Invited Departmental Seminar, Host: Srinivas Aluru).
24. Distributed-memory parallel algorithms for graph traversal & genome assembly. In *Dept. CS&E, University at Buffalo (SUNY)*, Buffalo, NY, December 2014. (Departmental Seminar, Host: Murat Demirbas).
25. Distributed-memory parallel algorithms for graph traversal & genome assembly. In *Dept. CS, University at Albany (SUNY)*, Buffalo, NY, December 2014. (Departmental Seminar, Host: Petko Bogdanov).
26. Distributed-memory parallel algorithms for graph traversal & genome assembly. In *Dept. CS, Stony Brook University (SUNY)*, Buffalo, NY, December 2014. (Departmental Seminar, Host: Leman Akoglu).

27. Reducing communication in parallel graph computations. In *Workshop on Algorithms for Modern Massive Data Sets (MMDS)*, Berkeley, CA, 2014. (Invited talk).
28. Three goals in parallel graph computations: High performance, high productivity, and reduced communication. In *College of Engineering, Montana State University*, Bozeman, MT, September 2013. (Invited Departmental Seminar, Host: Mike Wittie).
29. Three goals in parallel graph computations: High performance, high productivity, and reduced communication. In *Workshop on Parallel and Distributed Algorithms for Inference and Optimization*, Simons Institute, Berkeley, CA, 2013. (Invited talk).
30. Parallel software for high-performance and high-productivity graph analysis. In *CS Dept., Stanford University*, Stanford, CA, February 2013. (Invited Seminar at Prof. Widom's group meeting, Host: Semih Salihoglu).
31. High-performance analysis of filtered semantic graphs (in a high-productivity language). In *ICIS Workshop on Graph and Hypergraph Problems in Computational Science*, Park City, UT, 2012. (Invited talk).
32. A sustainable software stack for parallel graph analysis. In *School of CSE, Georgia Tech*, Atlanta, GA, March 2012. (Invited Departmental Seminar, Host: David Bader).
33. A sustainable software stack for parallel graph analysis. In *Discovery 2015: HPC and Cloud Computing Workshop*, Berkeley, CA, 2012. (Invited talk).
34. Parallel graph libraries: Where do we go from here? In *KDT Spring Mind Meld*, Santa Barbara, CA, 2012. (Invited Talk).
35. Scalable parallel primitives for massive graph computation. In *EECS, İstanbul Şehir University*, İstanbul, Turkey, March 2011. (Invited Departmental Seminar, Host: Ahmet Bulut).
36. Scalable parallel primitives for massive graph computation. In *Dept. CS, Purdue University*, West Lafayette, IN, April 2010. (Invited Departmental Seminar, Host: Alex Pothen).
37. Scalable parallel primitives for massive graph computation. In *MCS Division, Argonne National Laboratory*, Argonne, IL, January 2010. (Invited Seminar, Host: Mihai Aniteşcu).
38. Scalable parallel primitives for massive graph computation. In *CSRI, Sandia Labs*, Albuquerque, NM, January 2010. (Invited Seminar, Host: Danny Rintoul).
39. Scalable parallel primitives for massive graph computation. In *CRD, Lawrence Berkeley National Laboratory*, Berkeley, CA, January 2010. (Invited Seminar, Host: Juan Meza).
40. Scalable parallel primitives for massive graph computation. In *Sandia Labs*, Livermore, CA, November 2009. (Invited Seminar, Host: Tammy Kolda).

SERVICES AND
LEADERSHIP SKILLS

- *Founding Associate Editor (2013-)*: ACM Transactions on Parallel Computing
- *Guest Editor (2015)*: Parallel Computing (Elsevier), Special issue on ‘Graph Analysis for Scientific Discovery’
- *Organizing Committee Leadership*:
 - *Co-Chair (2019)*: ASCR Applied Mathematics Principal Investigators Meeting
 - 2019: **1st Applied Math Visioning Workshop**: The Future of Machine Learning and Data Analytics Across the Department of Energy
- *Program Committee Leadership*
 - *Chair, Algorithms Track (2018)*: ACM/IEEE Intl. Conf. for High Performance Computing, Networking, Storage and Analysis (SC)
 - *Vice-chair, Applications Track (2017)*: ACM/IEEE Intl. Conf. for High Performance Computing, Networking, Storage and Analysis (SC)

- *Co-chair (2017)*: IEEE Graph Algorithms Building Blocks (GABB) workshop at IPDPS
- *Publications Chair (2018)*: SIAM Workshop on Combinatorial Scientific Computing (CSC).
- *Organizing Committee Member*:
 - SIAM Conference on Parallel Processing for Scientific Computing, 2020
- *Program Committee Member*:
 - SIAM Conference on Parallel Processing for Scientific Computing, 2020
 - The 21st Meeting on Algorithm Engineering and Experiments (ALENEX), 2019
 - IEEE Intl. Parallel & Dist. Processing Symp. (IPDPS), 2013-2019
 - ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2018
 - ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC), 2018
 - ACM/IEEE Intl. Conf. for High Perf. Computing, Networking, Storage and Analysis (SC), 2013-14, 2016, 2020
 - International Conference on Parallel Processing (ICPP), 2013, 2020
 - Workshop on Irregular Applications, Architectures & Algorithms (IA³), 2017-19
 - IEEE Intl. Conf. on High Performance Comp., Data, & Analytics (HiPC), 2019
 - Workshop on Graphs, Architectures, Programming, and Learning (GrAPL), 2019-20
 - IEEE High Performance Extreme Computing Conference (HPEC), 2016, 2019
 - ACM Conf. on Bioinformatics, Comp. Biology, & Health Informatics (BCB), 2017
 - IEEE Cluster, 2017
 - PLDI ARRAY Workshop on Libraries, Languages & Compilers for Prog., 2017
 - ACM International Conference on Supercomputing (ICS), 2015
 - IEEE Graph Algorithms Building Blocks (GABB) workshop at IPDPS, 2015-16.
 - High Performance Graph Processing (HPGP) workshop at HPDC, 2016
 - SIAM Workshop on Combinatorial Scientific Computing (CSC), 2016
 - IEEE Workshop on High Performance Computational Biology (HICOMB), 2016, 2020
 - Intl. Symposium on Computer Architecture and HPC (SBAC-PAD), 2015
 - WWW Workshop on Big Graph Mining, 2014
 - Workshop on High Perf Big Graph Data Mgmt, Analysis & Mining (at BigData'14)
 - BAŞARIM, Ankara, Turkey, 2012, 2015
 - International Conference on Contemporary Computing (IC3), 2011
 - Graduate Student Workshop on Computing, UCSB, 2009.
- *Steering Committee*:
 - IEEE Workshop on Graph Algorithms Building Blocks (GABB) at IPDPS, 2014-2018.
 - Workshop on Graphs, Architectures, Programming, and Learning (GrAPL) at IPDPS, 2019-
- *Grant Review Panels*: NSF CISE (many times).
- *Minisymposia (Co-)organizer*:
 - “Combinatorial Scientific Computing” at International Congress on Industrial and Applied Mathematics (ICIAM), 2019.
 - “GraphBLAS: Graph Algorithms in the Language of Linear Algebra” at SIAM Annual Meeting, 2016
 - “Combinatorial Scientific Computing” at SIAM Conference on Parallel Processing for Scientific Computing, 2016.
 - “Graph Analysis for Scientific Discovery” at SIAM Conference on Parallel Processing for Scientific Computing, 2014.
 - “Minimizing Communication in Scientific Computing” at SIAM Conference on Computational Science and Engineering, 2013.
 - “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.
 - *Poster Committee Member:*
 - ACM/IEEE Intl. Conf. for High Performance Computing, Networking, Storage and Analysis (SC), 2016
 - *Reviewer:*
 - *Books:* MIT Press.
 - *Journals:* Communications of the ACM (2), SIAM Review, SIAM Journal of Scientific Computing (5), Bioinformatics (3), SIAM Journal on Matrix Analysis and Applications, IEEE Transactions on Parallel and Distributed Systems (4), The International Journal of High Performance Computing Applications (2), SIAM Journal on Mathematics of Data Science (SIMODS), Parallel Computing (11+), ACM Transactions on Mathematical Software, ACM Transactions on Parallel Computing, Computers & Electrical Engineering, ACM Transactions on Knowledge Discovery from Data (TKDD), Journal of Parallel and Distributed Computing (2), IEEE Transactions on Knowledge and Data Engineering (2), ACM Journal on Experimental Algorithmics (2), ACM Transactions on Architecture and Code Optimization, Concurrency and Computation: Practice and Experience, Computers and Electrical Engineering, Current Genomics
 - *Conferences:* SPAA 2014/2016/2019, IPDPS 2010/2012, Euro-Par 2011/2013, ICPP 2011, SC 2011/2012, ICS 2012.
 - *Grants:* DOE Office of Science (ASCR) 2013-2017
 - *Founding President*, Mathematics Club, Sabancı University
 - *LBNL Service:*
 - Luis W. Alvarez Postdoctoral Fellowship selection committee, 2014-16, 2018-19
 - *DOE Service:*
 - *2019 Round Table on Data for Artificial Intelligence Workshop*, Rockville, MD, June 2019
 - *Scientific Machine Learning Workshop*, North Bethesda, MD, January 2018
 - *Exascale Requirements Review for Biological and Environmental Research*, Rockville, MD, March 2016
 - *ASCR Data Management, Visualization, and Analysis of Experimental and Observational Data (EOD) Workshop*, Bethesda, MD, September 2015.
 - *DOE Data Council Meeting*, Rockville, MD, September 2014

CONTRIBUTED ORAL PRESENTATIONS

1. GraphBLAST: A high-performance C++ GPU library implementing GraphBLAS. In *Exascale Computing Project (ECP) 4th Annual Meeting*, Houston, TX, 2020. Exagraph Tutorial Session.
2. GraphBLAS on various problem domains. In *International Congress on Industrial and Applied Mathematics (ICIAM)*, Valencia, Spain, 2019. (Minisymposium Talk).
3. Graph algorithms, computational motifs, and GraphBLAS. In *Exascale Computing Project (ECP) 3rd Annual Meeting*, Houston, TX, 2019. Exagraph Tutorial Session.
4. Communication-avoiding sparse-matrix primitives for parallel machine learning. In *Sparse Days Meeting*, Toulouse, France, 2018.
5. Matrices are all you need. In *NECSTLab/LBNL/UCB Workshop*, Berkeley, CA, 2018.
6. Graph algorithms, computational motifs, and GraphBLAS. In *Exascale Computing Project (ECP) 2nd Annual Meeting*, Knoxville, TN, 2018. Exagraph Tutorial Session.

7. The reverse Cuthill-McKee algorithm in distributed-memory. In *The IEEE International Symposium on Parallel and Distributed Processing*, Orlando, FL, 2017. (Conference Talk).
8. Developing a PGAS graph library using GraphBLAS primitives. In *SIAM Annual Meeting*, Boston, MA, 2016. (Minisymposium Talk).
9. Faster and more scalable sparse matrix-matrix multiplication. In *SIAM Conference on Parallel Processing for Scientific Computing*, Paris, France, 2016. (Minisymposium Talk).
10. Scalable parallel algorithms for de novo assembly of complex genomes. In *The Resurgence of Reference Quality Genome Sequence, Plant & Animal Genome (PAG) Conference*, San Diego, CA, 2016.
11. The GraphBLAS effort and new parallel algorithms for bipartite graph matching. In *LBNL-Tsukuba Joint Meeting*, Berkeley, CA, 2015.
12. Scalable parallel algorithms for de novo assembly of complex (meta)genomes. In *MANTISSA Day*, Berkeley, CA, 2015.
13. The Graph BLAS: building blocks for graph algorithms in the language of linear algebra. In *Seminar on High-performance Graph Algorithms and Applications in Computational Science*, Dagstuhl, Germany, 2014.
14. Libraries and algorithms for graph analytics at scale. In *ACS Productivity Workshop*, Baltimore, MD, 2014.
15. The Graph BLAS effort and its implications for Exascale. In *SIAM Workshop on Exascale Applied Mathematics Challenges and Opportunities (EX14)*, Chicago, IL, 2014.
16. Communication-avoiding linear-algebraic primitives for graph analytics. In *Graph Algorithms Building Blocks (GABB'2014), IPDPS Workshops*, Phoenix, AZ, 2014.
17. High-productivity and high- performance analysis of filtered semantic graphs. In *SIAM Conference on Parallel Processing for Scientific Computing*, Portland, OR, 2014. (Minisymposium Talk).
18. High-productivity and high- performance analysis of filtered semantic graphs. In *Seminar on Automatic Application Tuning for HPC Architectures*, Dagstuhl, Germany, 2013.
19. Reducing communication in parallel graph computations. In *DOE ASCR Applied Math PI Meeting*, Albuquerque, NM, 2013.
20. High-performance filtered queries in attributed semantic graphs. In *SIAM Conference on Computational Science and Engineering*, Boston, MA, 2013. (Minisymposium Talk).
21. Communication-avoiding sparse matrix-matrix multiplication. In *SIAM Conference on Applied Linear Algebra*, Valencia, Spain, 2012. (Minisymposium Talk).
22. Parallel algorithms for sparse matrix product, indexing, and assignment. In *Scientific Computing and Matrix Computations (LAPACK) Seminar*, UC Berkeley, CA, 2012.
23. Parallel breadth-first search on distributed memory systems. In *SC'11: The 24th International Conference for High Performance Computing, Networking, Storage and Analysis*, Seattle, WA. (Conference Talk).
24. Tuning and communication reduction for graph and sparse matrix computations. In *CScADS Workshop on Libraries and Autotuning for Extreme Scale Applications*, Tahoe City, CA, 2011.

25. High-performance combinatorial algorithms for the analysis of the electric power grid. In *ICIAM 2011: 7th International Congress on Industrial and Applied Mathematics*, Vancouver, BC, Canada, 2011. (Invited Minisymposium Talk).
26. Parallel sparse matrix indexing and assignment. In *CSC'11: The 5th SIAM Workshop on Combinatorial Scientific Computing*, Darmstadt, Germany. (Contributed Lecture).
27. A parallel framework for identifying vulnerabilities in the electric power grid. In *SIAM Conference on Optimization*, Darmstadt, Germany, 2011. (Minisymposium Talk).
28. Building blocks for scalable graph and data mining software. In *SIAM Conference on Parallel Processing for Scientific Computing*, Seattle, WA, 2010. (Minisymposium Talk).
29. Parallel sparse matrix-vector and matrix-transpose-vector multiplication using compressed sparse blocks. In *SPAA 2009: The 21st ACM Symposium on Parallelism in Algorithms and Architectures*, Calgary, Canada. (Conference Talk).
30. Parallel Combinatorial BLAS and applications in graph computation. In *SIAM Annual Meeting*, Denver, CO, 2009. (Minisymposium Talk).
31. Parallel primitives for computation with large graphs. In *TCPD PhD Forum at the IEEE International Parallel and Distributed Processing Symposium*, Rome, Italy, 2009. (Refereed Doctoral Colloquium Poster Presentation).
32. Sparse matrix-matrix multiplication for accelerating parallel graph computations. In *SIAM Conference on Computational Science and Engineering*, Miami, FL, 2009. (Invited Minisymposium Talk).
33. Challenges and advances in parallel sparse matrix-matrix multiplication. In *International Conference on Parallel Processing*, Portland, OR, 2008. (Conference Talk).
34. Gaussian elimination based algorithms on the GPU. In *PMAA'08: The 5th International Workshop on Parallel Matrix Algorithms and Applications*, Neuchatel, Switzerland. (Contributed Talk).
35. On the representation and multiplication of hypersparse matrices. In *The IEEE International Symposium on Parallel and Distributed Processing*, Miami, FL, 2008. (Conference Talk).
36. Parallel primitives for computation with large graphs. In *SIAM Conference on Parallel Processing for Scientific Computing*, Atlanta, GA, 2008. (Minisymposium Talk).

GUEST LECTURING

- Software Engineering for Scientific Comp. (CS294-73), UC Berkeley, Fall 2017
 - Graph algorithms, motifs, and a little bit of parallelism
- Applications of Parallel Computers (CS267), UC Berkeley, Spring 2012-16
 - Parallel Graph Algorithms
- Communication Avoiding Algorithms (CS294), UC Berkeley, Fall 2011
 - Communication in sequential and parallel BFS
- Parallel Scientific Computing (CS140), UC Santa Barbara, Winter 2009-10
 - Parallel matrix multiplication
 - Shared-memory and multicore programming
 - Divide and conquer examples in Cilk Plus
 - Numerical examples and hyperobjects in Cilk Plus
- Sparse Matrix Algorithms (CS219), UC Santa Barbara, Fall 2009.
 - Parallel matrix-vector multiplication
 - Parallel sparse matrix and graph computation
- Applied Parallel Computing (CS240), UC Santa Barbara, Spring 2009
 - Shared-memory and multicore programming

- Breadth-first search in Cilk Plus
- Divide and conquer examples using Cilk Plus
- Numerical examples using Cilk Plus
- Programming Methods (CS20), UC Santa Barbara, Fall 2006.
 - Heapsort and Mergesort

COMPUTER SKILLS **Programming Languages**

C, C++ (preferred), C#, Java, Prolog, Scheme

Parallel Programming

MPI, UPC, Intel Cilk Plus, Chapel, OpenMP, Pthreads, CUDA.

Scripting Languages

MATLAB, Perl, Python, Javascript, PHP.

TEACHING Graduate: Advanced Operating Systems
 ASSISTANTSHIP Upper Division: Programming Languages, Formal Languages and Automata
 Lower Division: Discrete Mathematics, Programming Methods

UNDERGRADUATE EMPLOYMENT

- *Student Peer Assistant, Academic Support Program*, Sabancı University
 - Lead Coordinator for the Linear Algebra course.
 - Assistant for Calculus and Science of Nature courses.
- *Undergraduate Researcher*, Sabancı University
 - Human Language and Speech Technologies Laboratory, 2003
Building morphological and statistical models for Turkic languages
 - Computer Vision and Pattern Analysis Laboratory, 2004
Optical character recognition using decision trees

PROFESSIONAL SOCIETY MEMBERSHIPS

- Society of Industrial and Applied Mathematics (SIAM)
 - SIAG on Supercomputing
 - SIAG on Computational Science and Engineering
 - SIAG on Data Mining and Analytics
 - SIAG on Linear Algebra
- Association of Computing Machinery (ACM)
 - SIGHPC: Special Interest Group on High-Performance Computing
- Institute of Electrical and Electronics Engineers (IEEE)

SELECTED OTHER PARTICIPATIONS

- *Early Career Panel at SIAM CSE'19*, Panelist, Spokane, WA, 2019
- *IA³ Workshop at SC'18*, Panelist, Dallas, TX, 2018
- *HPC for Undergrads at SC'18*, Panelist, Dallas, TX, 2018
- *CCC Workshop: Digital Computing Beyond Moore's Law*, San Francisco, CA, 2018
- *BOF on HPC Graph Toolkits and GraphBLAS Forum*, Co-organizer, SC, 2017-18.
- *Partitioned Global Address Space (PGAS) BOF*, Panelist, SC, 2016
- *Panel discussion moderator*, GABB@IPDPS, 2016.
- *BOF (birds of a feather) session leader of GraphBLAS forum*, HPEC, 2014-15.
- *High-Performance Computing on Graphs*, Panelist, SIAM PP, 2014
- *Intel workshop on parallel algorithms for non-numeric computing*, Invited participant, Santa Clara, CA, 2011/2012.
- *Workshop on scalable graph libraries*, Invited participant, Atlanta, GA, 2011
- *Workshop on optimization in energy systems, Institute for computing in science*, Invited participant, Snowbird, UT, 2010.

- *CSCAPES workshop*, Invited participant, Santa Fe, NM, 2008.
- Summer School of Turkish Mathematical Society, Amasra, Turkey, 2005.
- Civic involvement project: Kayisdagi elderly people project, 2002-2003

LANGUAGES

Turkish (native), English (fluent), Spanish (intermediate)