**Katherine A. Yelick**
Vice Chancellor for Research
Robert S. Pepper Distinguished Professor of Electrical Engineering and Computer Sciences
University of California, Berkeley

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**Education**
1985    B.S. and M.S. in Computer Science, Massachusetts Institute of Technology
1991    Ph.D. in Computer Science, Massachusetts Institute of Technology

**Experience**

**University of California, Berkeley (1991-present)**
Vice Chancellor for Research (2022-present)
Robert S. Pepper Distinguished Professor, Electrical Engineering and Computer Sciences (2019-present)
Executive Associate Dean, Division of Computing, Data Science and Society (2021)
Associate Dean for Research, Division of Computing, Data Science, and Society (2020-2021)
Professor, Electrical Engineering and Computer Sciences (2002-present)
Associate Professor, Electrical Engineering and Computer Sciences (1996-2002)
Assistant Professor, Electrical Engineering and Computer Sciences (1991-1996)

**Lawrence Berkeley National Laboratory (1996-present)**
Senior Faculty Scientist (2008-present)
Senior Advisor on Computing (2020-2021)
Associate Laboratory Director for Computing Sciences (2010-2019)
National Energy Research Scientific Computing (NERSC) Division Director (2008-2012)
Future Technologies Group Lead (2005-2007)
Faculty Research Scientist (1996-2005)

**ETH, Zurich, Switzerland (Summer, 1996)**
Visiting Researcher

**Massachusetts Institute of Technology (Fall, 1996)**
Visiting Associate Professor

**Clark University (Spring, 1985)**
Visiting Instructor

**Awards and Honors**

- CRA Distinguished Service Award, 2022
- Lifetime Achievement Award, Lawrence Berkeley National Laboratory, 2020

- HPCWire Editors' Choice for Outstanding Leadership in HPC, 2019
- Fellow of the American Association for the Advancement of Science, 2018
- Provided Congressional Testimony (details below), 2018
- American Academy of Arts and Sciences, 2017
- National Academy of Engineering, 2017
- Ken Kennedy Award, Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineers (IEEE), 2015
- Athena Award, Association of Computing Machinery Committee on Women (ACM-W), 2013-2014
- ACM Fellow, Association of Computing Machinery, 2012
- Senior Member, IEEE, 2012
- Best Paper Award, International Parallel and Distributed Processing Symposium, 2008
- Okawa Foundation Research Grant 2005
- Best Paper Award, International Conference on Parallel Processing, 2004
- Best Student Paper Award, ICS 2002:  Workshop on Performance Optimization via High-Level Languages and Libraries
- Computer Science Division Diane S. McEntyre Award for Excellence in Teaching, U.C. Berkeley, 2001
- Army Research Office (ARO) Young Investigator Award, 1996
- George M. Sprowls Award for Best PhD Dissertation, EECS Department at MIT, 1991
- Teaching award with promotion to Instructor ``G'' from EECS Department at MIT, 1987
- Best Student Paper Award, Rewriting Techniques and Applications, 1985

## National and International Technical Leadership

- Chair of the National Academies Committee on "Post-Exascale Computing for the National Nuclear Security Administration," (2021-present)
- SLAC Science Program Committee (2021-present)
- ACM representative on Heidelberg Laureate Forum Scientific Committee, 2020-present
- Co-Lead of the DOE Data and Computing for COVID-19 Tiger Team, (DCT)^2, 2020-2021
- AI for Science Town Halls, co-led with Jeff Nichols and Rick Stevens for the Advanced Scientific Computing Research Office in the Office of Science. Over 1300 attendees across 4 meetings (2019)
- National Nuclear Security Administration's Defense Programs Advisory Committee Study Group on options for future High Performance Computing (2019)
- External review team for the Department of Information and Computer Sciences in the College of Natural Sciences at the University of Hawai'i at Mānoa (2019)
- Advisory Council for RIKEN Center for Computational Science (R-CCS), Kobe, Japan (2019)
- CSCS Swiss National Supercomputing Centre Advisory Board, 2017-2019
- Rice University Department of Computer Science Review Committee, 2019
- Institute for Defense Analysis, Center for Computing Sciences, Program Review Committee, 2012-present
- Department of Energy's Exascale Computing Project Laboratory Operations Task Force, 2016-2019
- Department of Energy, Exascale ("E8") Executive Committee, 2011-2019
- Provided congressional testimony on "Big Data Challenges and Advanced Computing Solutions," U.S. House of Representatives' Committee on Science, Space and Technology, July 12, 2018.
- Computing Community Consortium (CCC), a subcommittee within the Computing Research Associated (CRA) that identifies and communicates computing research challenges, 2015-2018

- Massachusetts Institute of Technology, Electrical Engineering and Computer Sciences Visiting Committee, 2011-2015 and 2016-2019
- Computer Science and Telecommunications Board (CSTB), an advisory board of the National Academies, 2011-2017
- National Academies Committee to Review Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017-2020, committee 2014-2016
- IEEE Computer Society Special Technical Community on MultiCore, Steering Committee, 2013-2017
- Joint Genome Institute, Informatic Advisory Committee, 2010-2017
- Review of the Helmoltz program on "Supercomputing and Big Data," March 10-12, 2014, Forschungszentrum Jülich (FZJ), Jülich, Germany. https://www.helmholtz.de/en/research/key_technologies/supercomputing_big_data/
- Predictive Science Panel at Lawrence Livermore and Los Alamos National Laboratories, 2014-2015
- California Council for Science and Technology (CCST), an advisory council to the state of California that performs studies for matters of interest to California, 2012-2015
- Advanced Light Source, Scientific Advisory Committee, 2012-2014
- Science and Technology Committee for the LLNS and LANS Board of Governors, overseeing research at Lawrence Livermore and Los Alamos National Laboratories, 2014
- NSF Division of Advanced Cyberinfrastructure (ACI) Director External Search Committee Co-Chair, 2013
- National Academies Committee to Review the Quality of the Management and of the Science and Engineering Research at the Department of Energy's National Security Laboratories - Phase 2, 2012-2013
- U.S. Congressional Briefing on "Supercomputing for Science and Competitiveness," 2011 http://www.acs.org/content/acs/en/policy/acsonthehill/briefings/exascalecomputing.html
- Blue Ribbon Panel for Computing Science (BRPCS) in Qatar, advising Qatar Foundation, 2011
- Defense Research and Engineering (DDRE) Computer Science research planning workshop, May 2011
- DARPA High Productivity Computing Systems program review team, 2010-2011
- NSF Task Force on Critical Cyberinfrastructure for Advancing Science and Engineering, 2009
- National Academies panel on "Sustaining the Growth in Computing Performance", 2007-2011
- DARPA Exascale Study Group: Technology Challenges in Achieving Exascale Systems, 2007-2008
- WTEC Committee on the Assessment of High-End Computing Research and Development in Japan, report sponsored by NSF and DOE, 2004

## Publications
### Advisory Reports

[1]  "AI for Science," Rick Stevens, Valerie Taylor, Jeff Nichols, Arthur Barney Maccabe, Katherine Yelick, David Brown, Published by Argonne National Lab (ANL), Argonne, IL (United States), February, 2020, DOI: 10.2172/1604756.
[2]  "2019 Computing Sciences Strategic Plan," Kathy Yelick, Deb Agarwal, Debbie Bard, John Shalf, Ann Almgren, Wahid Bhimji, Ben Brown, Jonathan Carter, Bert De Jong, Doug Doerfler, David Donofrio, Chin Guok, Costin Iancu, Mariam Kiran, Sherry Li, Peter Nugent, M Prabhat, Lavanya Ramakrishnan, Dilip Vasudevan, Nick Wright, Helen Cademartori, Katie Antypas, Kathy Kincade, Lawrence Berkeley National Laboratory, 2019.
[3]  "NNSA DPAC HPC Subcommittee Report," October 2019.

[4]  "Future Directions of Parallel and Distributed Computing: SPX 2019 Workshop Report," Scott Stoller, Scott, Michael Carbin (co-chairs), Sarita Adve, Kunal Agrawal, Guy Blelloch, Dan Stanzione, Katherine Yelick, Matei Zaharia, NSF Workshop Reports, October 2019. (Available from workshop site.  NSF public access release October 2020.)

[5]  "Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017-2020," Committee on Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017-2020, Computer Science and Telecommunication Board Division on Engineering and Physical Sciences, National Research Council of the National Academies. The National Academies Press, Washington, D.C., May 2016. Committee members: William D. Gropp and Robert Harrison, Co-Chairs; Mark R. Abbott; David Arnett; Robert L. Grossman; Peter M. Kogge; Padma Raghavan; Daniel A. Reed; Valerie Taylor; Katherine A. Yelick; Jon Eisenberg; Shenae Bradley.

[6]  "Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017-2020, Interim Report," Committee on Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science and Engineering in 2017-2020, Computer Science and Telecommunication Board Division on Engineering and Physical Sciences, National Research Council of the National Academies. The National Academies Press, Washington, D.C., 2014.  Committee members: William D. Gropp and Robert Harrison, Co-Chairs; Mark R. Abbott; David Arnett; Robert L. Grossman; Peter M. Kogge; Padma Raghavan; Daniel A. Reed; Valerie Taylor; Katherine A. Yelick; Jon Eisenberg; Shenae Bradley.

[7]  "The Quality of Science and Engineering at the NNSA National Security Laboratories," National Research Council, Washington, DC: The National Academies Press, 2013.  Committee members: Charles Shank and C. Kumar N. Patel, Co-Chairs, John F. Ahearne, Christina Back, Phillip Colella, Jill Dahlberg, Roger Falcone, Yogendra Gupta, Wick Haxton, Michael D. Hopkins, Raymond Jeanloz, John Kammerdiener, William Martin, Margaret Murnane, Robert E. Nickell, Kenneth Peddicord, Paul S. Peercy, Anthony Rollett, Robert Rosner, Rober Seldon, Kenneth Shea, Francis Sullivan, Gary Was, Katherine Yelick.

[8]  "The Magellan Report on Cloud Computing for Science," Katherine Yelick, Susan Coghlan, Brent Draney, Richard Shane Canon, Lavanya Ramakrishnan, Adam Scovel, Iwona Sakrejda, Anping Liu, Scott Campbell, Piotr T. Zbiegiel, Tina Declerck, Paul Rich, *U.S. Department of Energy Office of Science, Office of Advanced Scientific Computing Research (ASCR),* December 2011.

[9]  "Sustaining the Growth in Computing Performance: Game Over or Next Level?" Committee on Sustaining Growth in Computing Performance, Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences, National Research Council, 2011.  Committee members: Samuel H. Fuller and Lynette I. Millett, Editors; Shenae Bradley, Senior Program Assistant; Luiz Andre Barrosa, Robert P. Colwell, William J. Dally, Dan Dobberpuhl, Pradeep Dubey, Mark D. Hill, Mark Horowitz, David Kirk, Monia Lam, Kathryn S. McKinley, Charles Moore, Katherine Yelick.

[10] "ExaScale Computing Study: Technology Challenges in Achieving Exascale Systems," Peter Kogge (Editor & Study Lead), Keren Bergman, Shekhar Borkar, Dan Campbell, William Carlson, William Dally, Monty Denneau, Paul Franzon, William Harrod, Kerry Hill, Jon Hiller, Sherman Karp, Stephen Keckler, Dean Klein, Robert Lucas, Mark Richards, Al Scarpelli, Steven Scott, Allan Snavely, Thomas Sterling, R. Stanley Williams, Katherine Yelick, September 28, 2008.  Published by the Air Force Research Laboratory. Available from http://users.ece.gatech.edu/~mrichard/ExascaleComputingStudyReports/ECS_reports.htm.

[11] "Assessment of High-End Computing Research and Development in Japan," Al Trivelpiece, Rupak Biswas, Jack Dongarra, Peter Paul, Katherine Yelick, World Technology Evaluation Center, Inc., 2004.  Available from http://www.wtec.org/reports.htm.

**Books and Book Chapters**

[12]  Evangelos Georganas, Steven Hofmeyr, Leonid Oliker, Rob Egan, Daniel Rokhsar, Aydın Buluç, Katherine Yelick, "Extreme-Scale De Novo Genome Assembly," in Exascale Scientific Applications: Scalability and Performance Portability, CRC Press, November 13, 2017.

[13]  James Demmel, Sam Williams, and Katherine Yelick, "Automatic Performance Tuning (Autotuning)" in "The Berkeley Par Lab: Progress in the Parallel Computing Landscape," Microsoft, ISBN 978-0-9825442-3-5, 2013.

[14]  James Demmel and Katherine Yelick "Communication Avoiding (CA) and Other Innovative Algorithms," in "The Berkeley Par Lab: Progress in the Parallel Computing Landscape," Microsoft, ISBN 978-0-9825442-3-5, 2013.

[15]  Katherine Yelick, Susan Graham, Paul Hilfinger, Dan Bonachea, Jimmy Su, Amir Kamil, Kaushik Datta, Phillip Colella, and Tong Wen, "Titanium," Encyclopedia of Parallel Computing, Springer US, 2011, pp 2049—2055.

[16]  K. Datta, S. Williams, V. Volkov, J. Carter, L. Oliker, J. Shalf, K. Yelick, "Auto-tuning Stencil Computations on Diverse Multicore Architectures", Chapter in Scientific Computing with Multicore and Accelerators; Editors Jack Dongarra, David A. Bader, Jakub Kurzak, CRC Press 2010.

[17]  S. Williams, K. Datta, L. Oliker, J. Carter, J. Shalf, Y. Yelick, "Auto-Tuning Memory-Intensive Kernels for Multicore", Chapter in Performance Tuning of Scientific Applications, Editors D. H. Bailey, R. F. Lucas, S. W. Williams, CRC Press, November 2010.

[18]  Tarek El-Ghazawi, William Carlson, Thomas Sterling, and Katherine Yelick, "UPC: Distributed Shared-Memory Programming," Wiley-Interscience, May 2005.

## Refereed Journal and Conference Papers

[19]  Hunter McCoy, Steven Hofmeyr, Katherine Yelick, Prashant Pandey, "High-Performance Filters for GPUs," *Principles and Practice of Parallel Programming* (PPoPP 2023), February/March 2023, Montreal, Canada, arXiv preprint arXiv:2212.090052022.

[20]  Yuxin Chen, Benjamin Brock, Serban Porumbescu, Aydın Buluç, John D. Owens, "Scalable irregular parallelism with GPUs: getting CPUs out of the way," SC22: *The International Conference for High Performance Computing, Networking, Storage, and Analysis*, November 13–18, 2022, Dallas, Texas, IEEE Computer Society, pages 708-723.

[21]  Giulia Guidi, Gabriel Raulet, Daniel Rokhsar, Leonid Oliker, Katherine Yelick, Aydın Buluç, "Distributed-Memory Parallel Contig Generation for De Novo Long-Read Genome Assembly," *51st International Conference on Parallel Processing* (ICPP '22), August/September 2022, arXiv preprint arXiv:2207.0435012022.

[22]  Yuxin Chen, Benjamin Brock, Serban Porumbescu, Aydın Buluç, John D. Owens, "Atos: A task-parallel GPU dynamic scheduling framework for dynamic irregular computations," In *Proceedings of the International Conference on Parallel Processing* (ICPP 2022), August/September 2022. arXiv preprint arXiv:2112.0013212021

[23]  Fernando Meyer, Adrian Fritz, Zhi-Luo Deng, David Koslicki, Till Robin Lesker, Alexey Gurevich, Gary Robertson, Mohammed Alser, Dmitry Antipov, Francesco Beghini, Denis Bertrand, Jaqueline J. Brito, C. Titus Brown, Jan Buchmann, Aydin Buluç, Bo Chen, Rayan Chikhi, Philip T. L. C. Clausen, Alexandru Cristian, Piotr Wojciech Dabrowski, Aaron E. Darling, Rob Egan, Eleazar Eskin, Evangelos Georganas, Eugene Goltsman, Melissa A. Gray, Lars Hestbjerg Hansen, Steven Hofmeyr, Pingqin Huang, Luiz Irber, Huijue Jia, Tue Sparholt Jørgensen, Silas D. Kieser, Terje Klemetsen, Axel Kola, Mikhail Kolmogorov, Anton Korobeynikov, Jason Kwan, Nathan LaPierre, Claire Lemaitre, Chenhao Li, Antoine Limasset, Fabio Malcher-Miranda, Serghei Mangul, Vanessa R. Marcelino, Camille Marchet, Pierre Marijon, Dmitry Meleshko, Daniel R. Mende, Alessio Milanese, Niranjan Nagarajan, Jakob Nissen, Sergey Nurk, Leonid Oliker, Lucas Paoli, Pierre

Peterlongo, Vitor C. Piro, Jacob S. Porter, Simon Rasmussen, Evan R. Rees, Knut Reinert, Bernhard Renard, Espen Mikal Robertsen, Gail L. Rosen, Hans-Joachim Ruscheweyh, Varuni Sarwal, Nicola Segata, Enrico Seiler, Lizhen Shi, Fengzhu Sun, Shinichi Sunagawa, Søren Johannes Sørensen, Ashleigh Thomas, Chengxuan Tong, Mirko Trajkovski, Julien Tremblay, Gherman Uritskiy, Riccardo Vicedomini, Zhengyang Wang, Ziye Wang, Zhong Wang, Andrew Warren, Nils Peder Willassen, Katherine Yelick, Ronghui You, Georg Zeller, Zhengqiao Zhao, Shanfeng Zhu, Jie Zhu, Ruben Garrido-Oter, Petra Gastmeier, Stephane Hacquard, Susanne Häußler, Ariane Khaledi, Friederike Maechler, Fantin Mesny, Simona Radutoiu, Paul Schulze-Lefert, Nathiana Smit, Till Strowig, Andreas Bremges, Alexander Sczyrba & Alice Carolyn McHardy, "Critical Assessment of Metagenome Interpretation: the second round of challenges," *Nature methods* 19 (4), 429-440, April 8, 2022. https://doi.org/10.1038/s41592-022-01431-4

[26] Muaaz Awan, Jack Deslippe, Steven Hofmeyr, Rob Egan, Aydın Buluç, Leonid Oliker, Katherine Yelick, "Accelerating Large-Scale Genome Assembly with GPUs." ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC21), November, 2021. **Best paper finalist.**

[27] Ed Younis, Koushik Sen, Katherine Yelick, Costin Iancu, "QFAST: Conflating Search and Numerical Optimization for Scalable Quantum Circuit Synthesis," 2021 IEEE International Conference on Quantum Computing and Engineering (QCE), October 17-22, 2021. **Best paper award.** DOI: 10.1109/QCE52317.2021.00041

[28] Marquita Ellis, Aydin Buluc, Katherine Yelick, "Scaling Generalized N-Body Problems, A Case Study from Genomics," 50th International Conference on Parallel Processing, August 9, 2021, pages 1-9.

[29] Michael Norman, Vince Kellen, Shava Smallen, Brian DeMeulle, Shawn Strande, Ed Lazowska, Naomi Alterman, Rob Fatland, Sarah Stone, Amanda Tan, Katherine Yelick, Eric Van Dusen, James Mitchel, "CloudBank: Managed Services to Simplify Cloud Access for Computer Science Research and Education," Practice and Experience in Advanced Research Computing, July 1, 2021.

[30] Oguz Selvitopi, Benjamin Brock, Israt Nisa, Alok Tripathy, Katherine Yelick, Aydın Buluç, "Distributed-memory parallel algorithms for sparse times tall-skinny-dense matrix multiplication," Proceedings of the ACM International Conference on Supercomputing, June 3, 2021, pages 431-442.

[31] Giulia Guidi, Oguz Selvitopi, Marquita Ellis, Leonid Oliker, Katherine Yelick, Aydin Buluç. "Parallel String Graph Construction and Transitive Reduction for De Novo Genome Assembly." In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS)*, 2021.

[32] Israt Nisa, Prashant Pandey, Marquita Ellis, Leonid Oliker, Aydın Buluç, Katherine Yelick. "Distributed-Memory k-mer Counting on GPUs." *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS)*, 2021.

[33] Giulia Guidi, Marquita Ellis, Aydın Buluç, Katherine Yelick, David Culler. "10 Years Later: Cloud Computing is Closing the Performance Gap," Hot Topics in Cloud Computing Performance (HotCloudPerf 2021), France virtual conference, 2021. arXiv preprint arXiv:2011.00656.

[34] Ed Younis, Koushik Sen, Katherine Yelick, Costin Iancu, "QFAST: Quantum Synthesis Using a Hierarchical Continuous Circuit Space," *Bulletin of the American Physical Society,* March 2021.

[35] Nicolas Swenson, Aditi S Krishnapriyan, Aydın Buluç, Dmitriy Morozov, Katherine Yelick, "PersGNN: Applying Topological Data Analysis and Geometric Deep Learning to Structure-Based Protein Function Prediction," NeurIPS Workshop, 2021. arXiv preprint arXiv:2010.16027, 2020/10/30.

[36] A Tripathy, K Yelick, A Buluc, "Reducing Communication in Graph Neural Network Training," ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC20), November 18, 2020. arXiv preprint arXiv:2005.033002020Q

[37] Muaaz Awan, Jack Deslippe, Aydın Buluç, Oguz Selvitopi, Steven Hofmeyr, Leonid Oliker, Katherine Yelick, "ADEPT: a domain independent sequence alignment strategy for GPU architectures," BMC Bioinformatics 21 (1), 1-29, September 2020.

[38] Giulia Guidi, Oguz Selvitopi, Marquita Ellis, Leonid Oliker, Kathering Yelick, Aydın Buluç. "Parallel String Graph Construction and Transitive Reduction for De Novo Genome Assembly," arXiv:2010.10055, 2020. (Submitted for publication.)

[39] Alberto Zeni, Giulia Guidi, Marquita Ellis, Nan Ding, Marco D Santambrogio, Steven Hofmeyr, Aydın Buluç, Leonid Oliker, Katherine Yelick, "LOGAN: High-Performance GPU-Based X-Drop Long-Read Alignment" 2020

[40] Francesco Peverelli, Lorenzo Di Tucci, Marco D Santambrogio, Nan Ding, Steven Hofmeyr, Aydın Buluç, Leonid Oliker, Katherine Yelick, "GPU accelerated partial order multiple sequence alignment for long reads self-correction," 2020/1/1, bioRxiv2020.

[41] Giulia Guidi, Marquita Ellis, Daniel Rokhsar, Katherine Yelick, Aydın Buluç, "BELLA: Berkeley Efficient Long-Read to Long-Read Aligner and Overlapper." 2020/1/1, bioRxiv2020.
doi: https://doi.org/10.1101/464420.

[44] Steven Hofmeyr, Rob Egan, Evangelos Georganas, Alex C. Copeland, Robert Riley, Alicia Clum, Emiley Eloe-Fadrosh, Simon Roux, Eugene Goltsman, Aydın Buluç, Daniel Rokhsar, Leonid Oliker, Katherine Yelick, Terabase-scale metagenome coassembly with MetaHipMer, Scientific reports, Nature Publishing Group (10:1), pp. 1-11. July 1, 2020.

[45] Katherine Yelick, Aydın Buluç, Muaaz Awan, Ariful Azad, Benjamin Brock, Rob Egan, Saliya Ekanayake, Marquita Ellis, Evangelos Georganas, Giulia Guidi, Steven Hofmeyr, Oguz Selvitopi, Cristina Teodoropol, and Leonid Oliker, "The Parallelism Motifs of Genomic Data Analysis," Philosophical Transactions of the Royal Society A, January 20, 2020, 378:20190394. doi: 10.1098/rsta.2019.0394

[46] Francis Alexander, Ann Almgren, John Bell, Amitava Bhattacharjee, Jacqueline Chen, Phil Colella, David Daniel, Jack DeSlippe, Lori Diachin, Erik Draeger, Anshu Dubey, Thom Dunning, Thomas Evans, Ian Foster, Marianne Francois, Tim Germann, Mark Gordon, Salman Habib, Mahantesh Halappanavar, Steven Hamilton, William Hart, Zhenyu (Henry) Huang, Aimee Hungerford, Daniel Kasen, Paul R. C. Kent, Tzanio Kolev, Douglas B. Kothe, Andreas Kronfeld, Ye Luo, Paul Mackenzie, David McCallen, Bronson Messer, Sue Mniszewski, Chris Oehmen, Amedeo Perazzo, Danny Perez, David Richards,William J. Rider, Rob Rieben, Kenneth Roche, Andrew Siege, Michael Sprague, Carl Steefel, Rick Stevens, Madhava Syamlal, Mark Taylor, John Turner, Jean-Luc Vay, Artur F. Voter, Theresa L.Windus, and Katherine Yelick, "Exascale Applications: Skin in the Game," Philosophical Transactions of the Royal Society A, January 20, 2020, 378:20190056. doi: 10.1098/rsta.2019.0056

[47] Benjamin Brock, Benjamin, Yuxin Chen, Jiakun Yan, John Owens, Aydın Buluç, and Katherine Yelick. "RDMA vs. RPC for Implementing Distributed Data Structures." In *2019 IEEE/ACM 9th Workshop on Irregular Applications: Architectures and Algorithms (IA3)*, pp. 17-22. IEEE, 2019.

[48] Marquita Ellis, Giulia Guidi, Aydın Buluç, Leonid Oliker, and Katherine Yelick, "diBELLA: Distributed Long Read to Long Read Alignment," International Conference on Parallel Processing, Kyoto, Japan, August 5-8, 2019.

[49] Benjamin Brock, Aydın Buluç, and Katherine Yelick, "BCL: A Cross-Platform Distributed Data Structures Library," International Conference on Parallel Processing, Kyoto, Japan, August 5-8, 2019.

[50] Evangelos Georganas, Steven Hofmeyr, Leonid Oliker, Rob Egan, Daniel Rokhsar, Aydın Buluç, Katherine Yelick, "Extreme Scale de Novo Metagenome Assembly," *International Conference for High Performance Computing, Networking, Storage and Analysis ("Supercomputing", SC'18)*, Dallas, Texas, November 2018. **Best Paper Finalist.**

[51] Penporn Koanantakool, Alnur Ali, Ariful Azad, Aydın Buluç, Dmitriy Morozov, Leonid Oliker, Katherine Yelick, and Sang-Yun Oh, "Communication-Avoiding Optimization Methods for Massive-Scale Graphical Model Structure Learning," 21st International Conference on Artificial Intelligence and Statistics (AISTATS 2018).

[52] Michael Driscoll, Benjamin Brock, Frank Ong, Jonathan Tamir, Hsiou-Yuan Liu, Michael Lustig, Armando Fox, Katherine Yelick, "Indigo: A Domain-Specific Language for Fast, Portable Image

Reconstruction," International Parallel and Distributed Processing Symposium (IPDPS), May 2018.

[53] Evangelos Georganas, Marquita Ellis, Rob Egan, Steven Hofmeyr, Aydin Buluç, Brandon Cook, Leonid Oliker, Katherine Yelick, "MerBench: PGAS Benchmarks for High Performance Genome Assembly," Proceedings of the Second Annual PGAS Applications Workshop, November 12, 2017.

[54] 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," Euro-Par'17, August 2017.

[55] David Ozog, Amir Kamil, Yili Zheng, Paul Hargrove, Jeff R. Hammond, Allen Malony, Wibe de Jong, Katherine Yelick, "A Hartree-Fock Application using UPC++ and the New DArray Library," International Parallel and Distributed Processing Symposium (IPDPS), Chicago, IL, June 2016.

[56] Penporn Koanantakool, Ariful Azad, Aydın Buluç, Dmitriy Morozov, Sang-Yun Oh , Leonid Oliker, Katherine Yelick, "Communication-Avoiding Parallel Sparse-Dense Matrix-Matrix Multiplication," International Parallel and Distributed Processing Symposium (IPDPS), Chicago, IL, June 2016.

[57] Evangelos Georganas, Aydın Buluç, Jarrod Chapman, Steven Hofmeyr, Chaitanya Aluru, Rob Egan, Leonid Oliker, Daniel Rokhsar, Katherine Yelick, "HiPMer: An extreme-scale de novo genome assembler," *International Conference for High Performance Computing, Networking, Storage and Analysis ("Supercomputing", SC'15)*, Austin, Texas, November 2015.

[58] Hongzhang Shan, Samuel Williams, Yili Zheng, Amir Kamil, Katherine Yelick, "Implementing High-Performance Geometric Multigrid Solver with Naturally Grained Messages," 9th International Conference on Partitioned Global Address Space Programming Models (PGAS), IEEE, Washington, DC, September 2015, pages 38-46.

[59] Evangelos Georganas, Aydın Buluç, Jarrod Chapman, Leonid Oliker, Daniel Rokhsar, Katherine Yelick , "MerAligner: A Fully Parallel Sequence Aligner," *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS),* Hyderabad, India, May 25, 2015.

[60] Scott French, Yili Zheng, Barbara Romanowicz, Katherine Yelick, "Parallel Hessian Assembly for Seismic Waveform Inversion Using Global Updates," *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS),* Hyderabad, India, May 25, 2015, pages 753-762.

[61] Jarrod A Chapman, Martin Mascher, Aydın Buluç, Kerrie Barry, Evangelos Georganas, Adam Session, Veronika Strnadova, Jerry Jenkins, Sunish Sehgal, Leonid Oliker, Jeremy Schmutz, Katherine A Yelick, Uwe Scholz, Robbie Waugh, Jesse A Poland, Gary J Muehlbauer, Nils Stein and Daniel S Rokhsar, "A whole-genome shotgun approach for assembling and anchoring the hexaploid bread wheat genome", Genome Biology, January 31, 2015.

[62] Evangelos Georganas, Aydın Buluç, Jarrod Chapman, Leonid Oliker, Daniel Rokhsar and Katherine Yelick, "Parallel De Bruijn Graph Construction and Traversal for De Novo Genome Assembly". *26th ACM/IEEE International Conference on High Performance Computing, Networking, Storage and Analysis ("Supercomputing", SC 2014),* New Orleans, LA, USA, November 2014.

[63] Penporn Koanantakool and Katherine Yelick; A Computation- And Communication-Optimal Parallel Direct 3-Body Algorithm, *26th ACM/IEEE International Conference on High Performance Computing, Networking, Storage and Analysis ("Supercomputing", SC 2014),* New Orleans, LA, USA, November 2014.

[64] Hongzhang Shan, Amir Kamil, Samuel Williams, Yili Zheng, Katherine Yelick, "Evaluation of PGAS Communication Paradigms with Geometric Multigrid", 8th International Conference on Partitioned Global Address Space Programming Models (PGAS), October 2014.

[65] Ibrahim, Khaled Z., Paul H. Hargrove, Costin Iancu, Katherine Yelick "An Evaluation of One-Sided and Two-Sided Communication Paradigms on Relaxed-Ordering Interconnect." *Parallel and Distributed Processing Symposium, 2014 IEEE 28th International*. IEEE, 2014.

[66] Ibrahim, Khaled Z., and Katherine Yelick. "On the conditions for efficient interoperability with threads: an experience with PGAS languages using Cray communication domains." *Proceedings of the 28th ACM international conference on Supercomputing*. ACM, 2014.

[67] A Local-View Array Library for Partitioned Global Address Space C++ Programs ⌊SEP⌋Amir Kamil,

Yili Zheng, and Katherine Yelick. *ACM SIGPLAN International Workshop on Libraries, Languages, and Compilers for Array Programming*, Edinburgh, United Kingdom, June 2014.

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## Professional Activities

### Program Chair and Co-Chair

- General Co-Chair, The 24th International Conference on Parallel Architectures and Compilation Techniques, San Francisco, California, October 18-21, 2015.
- Compiler Program Co-Chair, International Parallel and Distributed Processing Symposium (IPDPS), Shanghai, China, May 2012.
- Program Co-Chair, Workshop on Automatic Tuning for Petascale Systems, Center for Scalable Application Development Systems (CScADS), 2007, 2008.
- General Chair, ACM Conference on Principles and Practice of Parallel Programming (PPoPP), 2007
- Program Co-Chair, Workshop on programming models for HPCS ultra-scale applications, in conjuction with the International Conference on Supercomputing, 2005
- Program Co-Chair, ACM Conference on Principles and Practice of Parallel Programming (PPoPP), 2005
- Program Co-Chair, SIAM Conference on Parallel Processing for Scientific Computing, 1999

### DOE Lab Review Committees

- Data Science Review, Lawrence Livermore National Laboratory, July 23-24, 2014.
- External Review Committee, Computational Science Review, Lawrence Livermore National Laboratory, August 29-September 1, 2011.
- Independent Project Review (Lehman Review) Committee, Oak Ridge Leadership Computing Center, December 14-15, 2010.
- Independent Project Review (Lehman Review) Committee, Argonne Leadership Computing Center, July 28-29, 2009.
- Independent Project Review (Lehman Review) Committee, Oak Ridge Leadership Computing Center, February 19-21, 2008.
- Independent Project Review (Lehman Review) Committee, Argonne Leadership Computing Center, February 13-14, 2008.

### Editorial Boards, Program Committees, and Award Committees

- ACM Transactions on Parallel Computing (TOPC) Editorial Board, 2013-2019
- Molecular Sciences Software Institute (MolSSI), Advisory Board, 2017-2018 (Vice Chair 2017, Chair 2018)
- IEEE Computer Society Computer Pioneer Award committee, 2011-2017
- Panels Program Committee, SC16.
- Test of Time Awards Committee, SC13 and (Chair) SC14
- Program Committee, Programming Language Design and Implementation (PLDI), 1998, 2008, 2013
- Computer Entrepreneur Award Committee, 2011
- Program Committee, SC09 Workshop, "Curricula for Concurrency and Parallelism," IEEE/ACM Conference on Supercomputing (SC09), Portland, Oregon, November 2009.
- Partitioned Global Address Space (PGAS) Workshop, Program Committee, 2009.

- SciDAC PI Meeting, Program Committee, 2009.
- SciDAC Review (editorial) Board Member, 2008, 2009.
- Program Committee, International Workshop on Multicore and Hybrid Systems for Numerically Intensive Computations, 2007.
- Program Committee, Conference on Parallel Processing for Scientific Computing, 2004
- Program Committee, International Conference on Supercomputing (ICS), 2005
- Program Committee, Irregular conference, 1997, 2000, 2001
- Program Committee, ACM Java Grande 2000, 2001
- Program Committee, Supercomputing 1999 (SC99), 2000 (SC2000), 2003 (SC03)  (Officially renamed to High Performance Computing, Networking, Storage and Analysis, but still uses the SC Acronym and Supercomputing Proceedings.)
- Invited Speakers Chair and Masterworks Co-Chair, SC2002 ("Supercomputing")
- Program Committee, International Symposium on Computing in Object-oriented Parallel Environments (ISCOPE), 1999, 2001
- Program Committee, Workshop on Languages, Compilers and Runtime Systems for Scalable Computers, 1998
- Program Committee, Symposium on Parallel Algorithms and Architectures (SPAA), 1996, 1998, 2006
- Program Committee, Principles of Programming Languages (POPL), 1998
- Program Committee, International Parallel Processing Symposium and Symposium on Parallel and Distributed Computation (IPPS/SPDP), 1998
- Program Committee, Principles and Practice of Parallel Programming (PPoPP), 1995, 2006
- Program Committee, International Conference on Parallel Programming (ICPP), 1995
- Program Committee, Workshop on Solving Irregular Problems on Distributed Memory Machines, 1995
- Selection Committee, NSF CAREER program, 1994 and 1995
- Program Committee, Object-Oriented Programming Systems, Languages, and Applications (OOPLSA), 1994 and 1995
- Program Committee, Parallel Symbolic Computation,1994
- Organizational Committee of the Signum User Interface Workshop on Parallel Programming Software, 1995.
- Program Committee, Scalable High Performance Computing and Communication, 1994.
- Treasurer, Principles and Practice of Parallel Programming, 1993
- Registration Chair, International Symposium on Symbolic and Algebraic Computation, 1992
- Secretary, SIAM Activity Group on Supercomputing, 1997-1999.

## Software Releases

**HipMer and MetaHipMer:** The High Performance Meraculous genome assembler uses a de Bruijn graph algorithm that performs K-mer analysis to remove errors, contig generation on the graph, alignment and scaffolding.  It is built on the UPC language and uses the global address space in place of hardware shared memory, allowing genomes that scale with the aggregate memory of an HPC system, rather than being limited by hardware shared memory sizes.  HipMer performs well to tens of thousands of cores and

completes a de novo assembly of a human genome in less than 4 minutes, whereas previous the implementation took hours. The software first released in early 2016. A newer version of the software (first released in 2017) supports metagenome assemblies, which take raw sequencing data from data sets human or environmental microbiome samples and assembly the data, which may contain hundreds of individuals microbial species. MetaHipMer has been used to assembly multi-terbayte data sets for the first time, including 16 TB from an environmental study in 2021. Built as part of the ExaBiome Project. Available from: https://sourceforge.net/projects/hipmer/

**BELLA and diBELLA:** The Berkeley Long-read to Long-read Aligner and overlapper takes 3$^{rd}$ generation (e.g., PacBio or Oxford Nanopore) data, which can be over 10,000 base pairs long (two orders of magnitude larger than the Illumina data supported by HipMer) and finds read pairs that align; the eventual goal is to produce a long read assembler. The long read technology currently has much higher error rates, as high as 15-20%, and requires an algorithmic approach to address those errors. The BELLA code is available from: https://github.com/giuliaguidi/bella. BELLA was developed primarily by Guilia Guidi, a PhD student co-advised by Aydın Buluç. diBELLA is a parallel distributed memory version, which was developed primarily by my PhD student, Marquita Ellis.

**BCL:** The Berkeley Container Library is a distributed memory data structure library based on one-sided communication, built by my graduate student, Benjamin Brock (co-advised by Aydın Buluç). It has some of the key data structures from the genomics applications, queues for work distribution, sparse matrices, and others. Available from: https://github.com/berkeley-container-library/

**CAGNET:** CAGNET is a family of parallel algorithms for training Graph Neural Networks (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 Pytorch (torch.distributed) on GPU-equipped clusters. GASNET was developed primarily by PhD student, Alok Tripathy (co-advised by Aydın Buluç).

**Indigo:** A Domain-Specific Language for image reconstruction based on structured linear operators. Built by my PhD student Michael Driscoll, his PhD thesis also shows several examples of image reconstruction algorithms from Miki Lustig's group that use Indigo for GPU and multicore implementations. The code is available from: https://github.com/mbdriscoll/indigo.

**HP-CONCORD:** Massively Parallel Graphical Model Structure Learning. Build by my graduate student, Penporn Koanantakool, using communication-avoiding sparse matrix operations and based on the serial CONCORD algorithm from Sang Oh.
Available from: https://bitbucket.org/penpornk/spdm3-hpconcord/src/master/

**MerBench:** A communication benchmark suite reflecting the kinds of fine-grained remote memory accesses (put, get, enqueue, atomics) that appear in the genomics applications and especially (Meta)HipMer. Built by my graduate students, Evangelos Georganas and Marquita Ellis with LBNL engineer, Rob Egan. Available from: https://sourceforge.net/projects/merbench/

**Berkeley UPC Compiler:** The Berkeley UPC compiler is an Open Source translator for the UPC language, which runs on most supercomputers (in particular Cray XT, IBM BlueGene, IBM Power machines), Linux clusters with Infiniband, Myrinet, or Ethernet networks, shared memory multiprocessors, as well as personal computers. The compiler and runtime package is released annually and is used by the research community, in parallel programming classes, and in a production setting by government agencies. Multiple companies have used the Berkeley compiler when bidding on large procurements that require a UPC compiler. UPC as a language is popular within the defense community

and there are several commercial and open source implementations. The translator has also been used as a research platform for studying compiler and runtime optimizations for explicitly parallel code.

**GASNet Communication Layer:**  GASNet is the Global Address Space Networking layer that was originally developed for the Berkeley Titanium and UPC runtime systems.  It provides fast one-sided communication (put/get) as well as active messages, locks, and collective communication.  GASNet has become a pseudo standard for one-sided communication, and is used now in the commercial Cray UPC and Co-Array Fortran compilers for the XT platforms, by the Cray Chapel project, by the Intrepid gcc-based implementation, and by several research efforts in parallel libraries.  It has also influenced the development MPI's one-sided communication—demonstrating some of the limitations of that original one-sided specification in MPI—and the group is often consulted on what type of hardware support high speed interconnects need to support these languages.

**Titanium Compiler and Runtime:** The Titanium language is a Java dialect with extensions for parallel scientific programming.  Like UPC, it is an example of a class of languages now known as Partitioned Global Address Space (PGAS) language.  The Titanium compiler had several public releases, and was used by groups internationally for experimenting with parallel languages. (Titanium is a joint project with Susan Graham, Paul Hilfinger, and Alex Aiken, along with several students.)

**Sparsity Library:**  Sparsity was the first library that used autotuning for sparse matrices.   The optimizations include filling in zeros to create uniform register blocks, cache blocking and serial optimizations to improve scheduling by the backend C compiler.  Sparsity uses offline search over dense matrix in various sparse formats to instantiate a performance model that is used for online selection of matrix format an associated algorithm.  Sparsity was written by my PhD student, Eun-Jin Im.

**OSKI Library:** The OSKI library was done jointly with Jim Demmel and our student, Rich Vuduc (now on the faculty at Georgia Tech).  OSKI builds on the ideas on Sparsity but was a complete redesign that contains an extensible code generation framework, new performance models, optimization across multiple functional calls, and support for preserving history information across library uses.

## Selected Presentations and Invited Talks

"Genomic Analysis at Scale: Mapping Irregular Computations to Advanced Architectures," SIAG-ACDA Online Seminar Series: Inaugural Lecture, December 16, 2021.

"Machine Learning in Science: Applications, Algorithms and Architectures," Institute for Applied Computational Science, Harvard University, **Distinguished Lecturer Series,** October 14, 2021.

"Genomic Analysis at Scale: Mapping Irregular Computations to Advanced Architectures," 20th IEEE International Workshop on High Performance Computational Biology (HiCOMB), May 17, 2021. Virtual conference. **Invited Keynote.**

"Machine Learning for Science," LBNL's 90th Anniversary Panel Series, June 25, 2021.  Virtual event.

"Machine Learning in Science: Applications, Algorithms and Architectures, MLSys, April 8, 2021. Virtual event.  **Invited Talk.**

"Computing and Data Challenges in Climate Change," International Conference on High Performance Computing, Data, and Analytics (HiPC '20), virtual conference in India, December 16, 2020. **Invited Keynote.**

"UPC++: An Asynchronous RMA/RPC Library for Distributed C++ Applications," SC20 Tutorial, November 10, 2020.  Joint presentation with Amir Kamil, Dan Bonachea, and Paul H. Hargrove.

"AI for Science," HPC-AI Australia Conference, virtual conference in Australia, September 02, 2020. **Invited Keynote.**

"Computing and Data in COVID-19," Privacy & Pandemics: Responsible Uses of Technology & Health Data, Future of Privacy Forum, October 2020. **Invited talk.**

"Computing, Data and COVID-19," Chesapeake Large-Scale Analytics Conference, virtual conference in Annapolis, MD, October 6, 2020. **Invited keynote.**

"Computing, Data and COVID-19," Proceedings of the 34th ACM International Conference on Supercomputing (ICS '20), June 2020, virtual conference in Barcelona, Spain, June 2020. https://doi.org/10.1145/3392717.3401882. **Invited keynote.**

"Genomic Analysis and Learning at Scale: Mapping Irregular Computations to Advanced Architectures," International Conference on Parallel Processing (ICPP), virtual conference in Edmonton, Canada, August 18, 2020. **Invited Keynote.**

"Heterogeneity in High Performance Scientific Computing," ISAT The Heterogeneity Crisis Workshop, Chicago, IL, January 28, 2020.

"AI for Science," DOE ASCR Town Hall on AI for Science, Lawrence Berkeley National Laboratory, October 22, 2019. Joint talk with Rick Stevens and Jeff Nichols.

"AI for Science," DOE ASCR Town Hall on AI for Science, Lawrence Berkeley National Laboratory, September 11, 2019

"The Convergence of Data and HPC," Korea Supercomputing Conference (KSC), Seoul, Korea, September 5, 2019.

"Machine Learning for Science," Monterey Data Conference, Monterey, CA August 6, 2019

"Machine Learning for Science," Computing Research Association (CRA) Snowbird Meeting, Snowbird, UT, July 17, 2018. **Invited talk.**

"HPC for Genomic Analytics at Scale", DOE BER Genomics PI Meeting, Washington, DC, February 28, 2018. **Invited Keynote.**

"Why Languages Matter More than Ever," The 5th Annual Chapel Implementers and Users Workshop, May 25, 2018. Vancouver, Canada. **Invited Keynote.**

"Antisocial Parallelism: Avoiding, Hiding and Managing Communication (in Biological Data Analysis)," Royal Society, April 8, 2019, **Invited talk.**

"Applications and Systems for Science," DARPA ISAT Workshop, Washington, DC, March 5, 2018.

"Machine Learning for Science," Silicon Valley Community Foundation visit to LBNL, February 14, 2018.

"Breakthrough Science at the Exascale," ScalA Workshhop, Salt Lake City, UT, November 13, 2017. **Invited Keynote**

"Antisocial Parallelism: Avoiding, Hiding and Managing Communication," University of Utah, Organick Lecture, Salt Lake City, October 18, 2017. Invited Talk

"More Data, More Science and ... Moore's Law?" University of Utah, Organick Lecture, Salt Lake City, October 17, 2017. **Invited Talk**

"A Superfacility Model for Science", TechX, San Francisco, October 16, 2017. **Invited Keynote**

"Languages and Compilers for Exascale Science", Workshop on Languages and Compilers for Parallel Computing (LCPC), College Station, Texas, October 10, 2017. **Invited Keynote**

"Science Breakthroughs at the Exascale", ACM Europe, Barcelona, Spain, September 8, 2017. **Invited Keynote**

"Communication Avoiding, Hiding and Managing at the Exascale", Wuxi Supercomputing Center, June 10, 2017 and Guangzhou University, June 14, 2017.

"Exascale Solutions for Microbiome Analysis," Exascale Computing Project Annual Meeting, Knoxville, TN, February 1, 2017.

"Science Enabled by DOE Computing", DOE/VA Workshop Exascale Computing Project (ECP) Annual Meeting January 31, 2017.

"PGAS Applications: What, Where and Why?" PGAS Applications Workshop at SC16, Salt Lake City, UT, November 14, 2016. **Invited Keynote.**

"A Superfacility Model for Data Intensive Science," The Networking and Information Technology Research and Development (NITRD) Program, November 6, 2016. **Invited Talk.**

"Communication Avoiding, Hiding and Managing at the Exascale," HPC China, Xi'an, China, October 28, 2016. **Invited Keynote.**

"The End Game for Moore's Law," SBAC-PAC, Marina del Rey, CA, October 26, 2016. **Invited Keynote.**

"More Data, Moore Science,... and Moore's Law?" Michigan State University, East Lansing, MI, October 3, 2016. **Invited Talk.**

"How to Teach your Exascale Computer to do the Data Dance," Rice University, Houston, TX, September 21, 2016. **Invited Talk.**

"A Superfacility for Data Intensive Science," Advanced Scientific Computing Research (ASCR) Advisory Committee, Washington, DC, September 20, 2016. **Invited Talk.**

"Antisocial Parallelism: Avoiding, Hiding and Managing Communication," ARITH'16, Santa Clara, CA, July 11, 2016. **Invited Keynote**.

"HPC and Biomedicine," The Secretary of Energy's Advisory Board (SEAB) Task Force on Biomedicine, New York, NY, March 13, 2016. Invited Talk.

"How to Teach Your Exascale Computer to do the Data Dance," **Ken Kennedy Award Talk**, SC 15, Austin, Texas, November 18, 2015.

"Thinking Strategically" invited speaker at the Early Career Program at SC15, Austin, Texas, November 16, 2015. **Invited talk.**

"Saving the World with Computing," High School Student Outreach program, SC15, Austin, Texas, November 18, 2015. **Invited talk.**

"The Faculty Search Process" at the Rising Stars Workshop, MIT, November 10, 2015. **Invited talk.**

"More Data, More Science, and … Moore's Law?" White House National Strategic Computing Initiative Workshop, October 21, 2015. **Invited keynote.**

"Programming Models for SOCs in HPC" PACT 2015 workshop on System-On-Chip for High Performance Computing, San Franciso, CA, October 29, 2015. **Invited talk.**

"Exascale Programming Models and Environments Research," IXPUG (Intel Xeon Phi User's Group meeting), Berkeley, CA, October 1, 2015. **Invited talk.**

"Supporting Irregular Applications with Partitioned Global Address Space Languages: UPC and UPC++", Argonne Training Program on Extreme-Scale Computing (ATPESC), August 5, 2015. **Invited**

**talk.**

"Programming Models and Environments Workshop Report," Advanced Scientific Computing Research (ASCR) Advisory Committee (ASCAC), Washington, DC, July 27, 2015. **Invited talk.**

"PGAS: UPC/UPC++" NVIDIA, Santa Clara, CA, July 24, 2015. **Invited talk.**

"The Endgame for Moore's Law: Architecture, Algorithm, and Application Challenges," Federated Computer Research Conference (FCRC), June 18, 2015. **Invited Keynote** for the federation of 15 computer science conferences, including the top conferences in theory (STOC), architecture (ISCA), compilers (PLDI), performance (SIGMETRICS), parallel algorithms (SPAA), and others.

"Growing your research program," panel at the CRA-W Early Career Mentoring Workshop (at FCRC), Portland, Oregon, June 13-14, 2015. **Invited panelist.**

"Building Collaborations, Advocates, Cohort, Mentors, Peer Network," panel at the CRA-W Mid-Career Mentoring Workshop (at FCRC), Portland, Oregon, June 13-14, 2015. **Invited panelist.**

"Leading Initiatives, Building New Programs, Negotiating Skills," panel at the CRA-W Mid-Career Mentoring Workshop (at FCRC), Portland, Oregon, June 13-14, 2015. **Invited panelist.**

"More Data, More Science, and … Moore's Law?" National Science Foundation, Washington DC, May 20, 2015. **Invited talk.**

"Saving the World with Computing," National Science Bowl, Washington, DC, May 1, 2015. **Invited Talk.**

"ARTS: Adaptive RunTime System," DOE OS/R PI Meeting, Rockville, MD, March 11, 2015.

"DEGAS: Dynamic Exascale Global Address Space," DOE XStack PI Meeting, Rockville, MD, March 10, 2015.

"NERSC Roadmap and Exascale Plans," ACME-Exascale Study Group (Summit), January 23, 2015.

"Supporting Irregular Applications with Partitioned Global Address Space Languages: UPC and UPC++", Argonne Training Program on Extreme-Scale Computing (ATPESC), August 7, 2014. **Invited talk.**

"Supporting Irregular Applications with Partitioned Global Address Space Languages: UPC and UPC++", Lawrence Livermore National Laboratory, July 14, 2014. **Invited talk.**

"More Data, More Science, and … Moore's Law?" Discovery Workshop, June 2, 2014. **Invited talk.**

"More Data, More Science, and … Moore's Law?" St. Olaf College, April 11, 2014. **Invited talk.**

"Getting Started With Big Data: A Conversation with Four Innovators," St. Olaf College, April 10, 2014. **Invited panelist.**

"More Data, More Science, and … Moore's Law?" King Abdul's University of Science and Technology (KAUST), March 31, 2014. **Invited talk.**

"More Data, More Science, and … Moore's Law?" Virginia Tech **Distinguished Lecture Series**, March 2, 2014. **Invited talk.**

"Extreme Data for Science at Berkeley Lab," DOE Data meeting, Chicago, IL, Feb 18, 2014.

"A Strategy in Extreme Data for Science," February 2014, Lab Advisory Board, Lawrence Berkeley National Laboratory.

"Advanced PGAS Programming in UPC," Tutorial at SC13, Joint with Yili Zheng.

"Big Computing: From the Exa-Scale to the Sensor-Scale," panel at Supercomputing (SC13), Denver,

Colorado, November 22, 2013. **Invited panelist.**

"More Data, More Science and Moore's Law," Athena Award Talk, Supercomputing (SC13), Denver, Colorado, November 21, 2013. **Award talk.**

"Big Data Meets Exascale," DOE Booth talk, Supercomputing (SC13), Denver, Colorado, November 19, 2013.

"Exascale Runtimes," panel at Supercomputing (SC13), Denver, Colorado, November 19, 2013. **Invited panelist.**

"NERSC: The Primary Computing Facility for the Office of Science," 2013 Annual Research Meeting of the DOE Office of Science Graduate Fellowship program (DOE SCGF), July 31, 2013, Stanford, California. **Invited talk.**

"DEGAS: Dynamic Exascale Global Address Space," ASCR Exascale PI Meeting, March 20, 2013.

"Avoiding, Hiding and Managing Communication," University of Wisconsin at La Crosse, Monday, October 21, 2013. **Distinguished Lecture Series.**

"More Data, More Science, and Moore's Law," University of Wisconsin at La Crosse, Monday, October 21, 2013. **Distinguished Lecture Series.**

"Avoiding Hiding and Managing Communication," Languages and Compiler for Parallel Computing (LCPC), San Jose, California, September 25, 2013. **Invited talk.**

"Saving the World with Computing," CS Kickstart Program, University of California, Berkeley, California, August 18, 2013.

"Partitioned Global Address Space Programming with Unified Parallel C," Argonne Training Program on Extreme Scale Computing, St. Charles, Illinois, August 1, 2013. **Invited talk.**

"More Data and More Science from DOE User Facilities," National User Facility Organization (NUFO) Annual meeting, Berkeley, California, June 19, 2013. **Invited talk.**

"Beyond UPC" and "Antisocial Parallelism: Avoiding, hiding, and managing communication," Keynotes in HPC Languages, Lyon, France, June 29, 2013. **Invited talk.**

"Intro to PGAS (UPC and CAF) and Hybrid for Multicore Programming," Tutorial at SC12. Joint with Alice Koniges, Rolf Rabenseifner, Reinhold Bader, and David Eder. November 2012.

"Compiling to Avoid Communication," the International Conference on Parallel Architectures and Compilation Techniques (PACT), Minneapolis, Minnesota, September 21, 2012. **Keynote.**

"Open Problems, Closed Problems and Non-Problems in DOE's Big Data," Salishan Conference, Gleneden Beach, April 23, 2013. **Invited talk.**

"Exascale Programming Model Challenges," JASON Exascale Study, June 28, 2012. **Invited talk.**

"Magellan: A Study in Cloud Computing for Science" Systems Software and Technology Conference, Salt Lake City, Utah, April 24, 2012. **Invited talk.**

"Software Stack and Co-Design," Exascale Research Meeting, Portland, Oregon, April 16, 2012. **Invited talk.**

"Antisocial Parallelism: Avoiding Hiding and Managing Communication," Combined keynote for High Performance Computer Architecture (HPCA), Principles and Practice of Parallel Programming (PPoPP), and Code Generation and Optimization (CGO), Shenzhen, China, February 26, 2013. **Invited Keynote.**

"Are there Exascale Algorithms?" SIAM Conference on Parallel Processing for Scientific Computing," Savannah, Georgia, February 17, 2012. **Invited talk.**

"More and Moore: Growing Computing Performance for Scientific Discovery," NITRD Symposium, Washington, D.C., February 16, 2012. **Invited talk.**

"Algorithmic Challenges of Exascale Computing," ICERM workshop on Synchronization-reducing and Communication-reducing Algorithms and Programming Models for Large-scale Simulations, Providence, Rhode Island, January 9-13, 2012. **Invited talk.**

"Introduction to PGAS Languages," Tutorial at SC11. Joint with Alice Koniges, Rolf Rabenseifner, Reinhold Bader, and David Eder. November 2012.

"NERSC Role in Basic Energy Research," ASCR/BER NERSC Requirements Workshop, Bethesda, Maryland, October 9, 2011.

"Data Intensive Computing meets High Performance Computing," California Council on Science and Technology. October 13, 2011.

"To Virtualize or Not to Virtualize," ASCR Workshop on Exascale Programming Challenges, Marina del Rey, California, August 2011.

"Exascale Opportunities and Challenges," Society of Exploration Geophysics Workshop on High Performance Computing in the Geosciences, Berkeley, California, July 2011. **Invited Talk.**

"Exascale Computing: Opportunities and Challenges," The 20th International ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC), San Jose, California, June 8-11, 2011. **Keynote.**

"Autotuning in the Exascale Era," International Workshop on Adaptive Self-Tuning Computing Systems for the Exaflop Era, San Jose, California, June 5, 2011. **Keynote.**

"Center Challenges 2021," Panel on New Challenges in the Next Decade, SciDAC PI Meeting, Denver, Colorado, July 2011. **Invited Panelist.**

"NERSC Role in Nuclear Physics Research," ASCR/NP NERSC Requirements Workshop, Bethesda, Maryland, May 2011.

"Exascale Computing: More and Moore?" ACM International Conference on Computing Frontiers, Ischia, Italy, May 4, 2011. **Keynote.**

"Exascale Computing: More and Moore?" University of Southern California (USC), Ming Hsieh Department of Electrical Engineering, Los Angeles, California, April 6, 2011. **Distinguished Lecture Series.**

"The Future of Computing Performance," Department of Energy, Office of Science, Advanced Scientific Computing Advisory Committee (ASCAC), Washington, D.C., March 22, 2011. **Invited talk.**

"Programming Model Challenges," National Research Council Symposium on Computing Performance, Washington, D.C., March 22, 2011. **Invited talk.**

"Exascale Technical Challenges," American Chemical Society **Congressional Briefing** on Supercomputing for Science and Competitiveness, Washington, D.C., March 17, 2011. http://www.acs.org/content/acs/en/policy/acsonthehill/briefings/exascalecomputing.html

"Hardware and Software Trends in Computational Systems for Biology," Joint Genome Institute Users Meeting, Walnut Creek, California, March 2011. **Invited talk.**

"Exascale Computing: More and Moore?" International Center for Computational Science Workshop on Manycore and Accelerator-based High-performance Scientific Computing, Berkeley, California, March 2011. **Keynote.**

"Software and Algorithms for Exascale: Ten Ways to Waste an Exascale Computer," Oil and Gas High

Performance Computing Workshop, Rice University, Houston, Texas, March 3, 2011. **Invited talk.**

 "NERSC Role in Advanced Scientific Computing Research," ASCR NERSC Requirements Workshop, Oakland, California, January 2011.

"Saving the World with Computing (and Other Reasons to Study Computer Science)," guest lecture in CS10, "The Joy and Beauty of Computing" course in Fall 2010 at UC Berkeley and each semester through 2015.

"Toward Exascale Computing with Heterogeneous Architecture" Invited panel speaker at SC10 ("Supercomputing"), New Orleans, LA, November 16, 2010.  **Invited panelist.**

"Partitioned Global Address Space (PGAS)" Birds-of-a-Feathers session at SC10, New Orleans, November 16, 2010.

"Science in the Clouds," Workshop on Petascale Data Analytics on Clouds: Trends, Challenges, and Opportunities, at SC10 ("Supercomputing"), November 14, 2010.  **Invited talk.**

"Introduction to PGAS (UPC and CAF) and Hybrid for Multicore Programming."  Joint tutorial with Alice E. Koniges, Rolf Rabenseifner, Reinhold Bader, David Eder, SC10 ("Supercomputing"), November 14, 2010, New Orleans, LA.

"Exascale Computing: More and Moore?"   MIT EECS Dertouzos Distinguished Lecture Series, Massachusetts Institute of Technology, Cambridge, MA, November 4, 2010.  **Distinguished Lecture Invited Talk.**

"Science in the Clouds: A View from Berkeley," ISC Cloud '10, Frankfurt, Germany, October 29, 2010. **Keynote.**

"Cloud Debate: Cloud or Not Cloud, That is the Question," ISC Cloud '10, Frankfurt, Germany, October 28, 2010.  **Invited Panelist.**

"NERSC Overview and Plans," NERSC User Group Meeting.  Oakland, CA, October 21, 2010.

"How can the partitioned global address space model be relevant to mainstream computing?" Partitioned Global Address Space Conference, October 17, 2010.  **Invited panelist.**

"Paving the Road to Exascale," International Conference on Parallel Programming (ICPP), September 16, 2010, San Diego, CA. **Keynote.**

"Support for Hierarchical Machines" UPCRC workshop, Redmond WA, August 12-13, 2010.

"NERSC Overview and Strategic Directions" Department of Energy, Office of Advanced Scientific Computing Research, August 2010.

"RAMP for Exascale", RAMP Wrap, Stanford, CA, August 2010. **Invited talk.**

"NERSC Role in Fusion Energy Research Research," FES Requirements Workshop for NERSC, Washington DC, August 2010.

"Bringing Users Along the Road to Billion Way Concurrency,"  SciDAC PI Meeting, Chattanooga, TN, July 15, 2010.  **Invited Talk.**

"Saving the World with Computing (and Other Reasons to Study Computer Science," Workshop on Computer Science for High School Teachers, Berkeley, CA, June 2010.  (Also given to Bay Area high school students at LBNL.)

 "Autotuning: Past, Present and Future", ParLab Retreat, June 2010, Tahoe City, CA.

"Energy Efficiency at Extreme Scales," Santa Barbara Energy Efficiency Summit, May 12, 2010, Santa Barbara, CA.  **Invited Talk.**

"Programming Models and Communication Libraries," The Global Arrays Technical Meeting, May 6-7, 2010, Seattle, Washington. **Invited Talk.**

"Programming 100,000 Processors," 16th Meeting of the IBM HPC Systems Scientific Computing User Group (SciCOMP/SPXXL), San Francisco, CA, May 11, 2010. **Invited Talk.**

"Programming Models from Petascale to Exascale," University of Washington, Computer Science Department, Seattle, WA, May 7, 2010. **Invited talk.**

"DOE Exascale Initiative Technical RoadMap," DOE Architectures and Technology Workshop, San Diego, CA, December 8, 2009.

"Scientific Computing with Accelerators: What, Why and How?" Workshop on Manycore and Accelerator-based Computing for Physics and Astronomy Applications. SLAC National Accelerator Laboratory/ Lawrence Berkeley National Laboratory, Stanford, CA, USA, November 30, 2009. **Keynote.**

"Beyond UPC", Workshop on User Experience and Advances in Bridging Multicore's Programmability Gap at SC09 ("Supercomputing"), November 16, 2009. **Invited talk.**

"Programming Models from Petascale to Exascale," UCLA Computer Science Department Distinguished Lecture Series, UCLA, November 12, 2009. **Invited talk.**

"NERSC Role in High Energy Physics Research," HEP Requirements Workshop for NERSC, Washington DC, November 2009.

"NERSC Overview and Plans," NERSC User Group Meeting, Boulder, Colorado, October 7-8, 2009.

"Beyond UPC", 3$^{rd}$ Annual Conference on Partitioned Global Address Space (PGAS) Programming Models, Ashburn, Virginia, October 5-8, 2009. **Invited keynote.**

"Hardware and Software in the Multicore Era," HEPiX Meeting, Berkeley California, October 26, 2009.

"Unified Parallel C (UPC)", Programming Models for Multicore, Lausanne Switzerland, September 7, 2009. **Invited talk**.

"HPC Trends in Software," International Computational Accelerator Physics Conference (ICAP'09), San Francisco, California, September 2009. **Invited talk.**

"Multicore Meets Exascale: Catalyst for a Software Revolution," NVIDIA, July 2009. **Invited talk.**

"An Approach to Productivity," ParLab Retreat, Santa Cruz, California, June 2009.

"Multicore/Manycore: What Can We Expect from the Software?" International Conference on Supercomputing (ICS'09), Hamburg, Germany, June 2009. **Invited talk.**

"Ten Ways to Waste a Parallel Computer," International Symposium on Computer Architecture (ISCA'09**),** June 22, 2009. **Invited keynote.**

"Multicore/Manycore: What can we Expect from Software?" International Supercomputing Conference, Hamburg Germany, June 25, 2009, **Invited talk.**

"NERSC Role in Biological and Environmental Research," BER Requirements Workshop for NERSC, Washington DC, May 2009.

"Center for Scalable Application Development Software (CScADS): Libraries and Compilers," CScADS Review, April 2009.

"Programming Models for Manycore," University of British Columbia **Distinguished Lecture Series**, Vancouver, Canada, February 2009.

"The Role of Compilers in Manycore Programming," University of Illinois at Urbana Champagne (UIUC) Workshop, February 2009.

"Overview of the PGAS Programming Model and the Berkeley UPC Project," UPC Project Review, Berkeley, CA, February 2009.

"Programming Model Challenges for Managing Massive Concurrency," Workshop, Supercomputing 2008 (SC08), Austin TX, November 2008.

"To Virtualize or Not to Virtualize," Workshop, Supercomputing 2008 (SC08), Austin TX, November 2008.

"Compiler and Runtime Issues at Exascale," Exascale Birds-of-a-Feather Session (BoF), Supercomputing 2008 (SC08), Austin TX, November 2008.

"Titanium Overview," Partitioned Global Address Space (PGAS) Birds-of-a-Features Sesssion (BoF), Supercomputing 2008 (SC08), Austin TX, November 2008.

"Programming Models for Parallel Machines," UCB Bootcamp on Parallel Computing, Berkeley, California, August 25-36, 2008.

"Multicore: Fallout from a Hardware Revolution," South Dakota School of Mining and Technology, Rapid City, South Dakota, September 24, 2008. **Invited talk.**

"Scheduling UPC Threads on GPUs and Multicore," UPC Developers Workshop, Washington, DC, September 22-23, 2008.

"Programming Models for Manycore Processors," Intel UPCRC Programming Languages Workshop, August 23, 2008, Santa Clara, CA.

"PERI, Tuning for Multicore," SciDAC PI Meeting, Seattle, WA, July 14-17, 2008. (Filling in for scheduled speaker Sam Williams. Invited talk.)

"Programming Models: Opportunities and Challenges for Scalable Applications," Next Generation Scalable Applications: When MPI Only is Not Enough. June 3-5, 2008.

"Programming Models for Manycore Systems," Intel Corp., Santa Clara, CA, April 23, 2008. **Keynote.**

"Multicore Meets Exascale: The Catalyst for a Software Revolution," 2008 Salishan Conference on High Speed Computing, Salishan, OR, April 21-22, 2008. **Keynote.**

"Programming Models for Petascale to Exascale," IPDPS 2008, Miami, FL, April 15-16, 2008. **Keynote.**

"Programming Models for Petascale," North Carolina State University, Raleigh, NC, Feb 10-12, 2008. Research Triangle **Distinguished Lecture Series, Invited Talk**.

"Multicore Meets Petascale: The Catalyst for a Software Revolution," Princeton University, Princeton, NJ, February 25-26, 2008. **Invited Talk.**

"Programming Techniques to Harness Exaflops," Frontiers of Extreme Scale Computing: From Nanoscale to Zettascale, Santa Cruz, California. October 21-25, 2007.

"Programming Model Issues in Petascale Computing," Symposium on Turbulence & Dynamos at Petaspeed, Boulder, Colorado, October 15-19, 2007.

"Productivity and Performance using Partitioned Global Address Space Languages," Parallel Symbolic Computation (PASCO '07), London, Canada, July 27-28, 2007. **Invited talk.**

"Partitioned Global Address Space Languages for Multilevel Parallelism," Center for Scalable Application Development Systems (CScADS) Workshop on Petascale Architectures. Snowbird, Utah, July 23-26, 2007. **Invited talk.**

"Automatic Performance Tuning Workshop,"Center for Scalable Application Development Systems (CScADS) Workshop on Automatic Performance Tuning. Snowbird, Utah, July 9-12, 2007. (Overview talk as program co-chair.)

"Partitioned Global Address Space Languages for Multilevel Parallelism," Petascale Applications Symposium: Multilevel Parallelism and Locality-Aware Algorithms Pittsburgh Supercomputing Center, Pittsburgh, Pennsylvania, June 22-23, 2007. **Invited talk.**

"Tools and Libraries for Manycore Computing," Manycore Computing Workshop, Seattle, Washington, June 20-21, 2007. **Invited panel speaker.**

"Parallel Languages: Past, Present and Future," History of Programming Languages (HOPL-III), San Diego, California, June 9-10, 2007. **Invited panel speaker.**

"The Tenure Process," CRA-W Career Mentoring Workshop, San Diego, California, June 9-10, 2007. Sponsored by the Computer Research Association's Committee on the Status of Women in Computing Research (CRA-W). **Invited panel speaker.**

"How to Write a Bad Proposal," CRA-W Career Mentoring Workshop, San Diego, California, June 9-10, 2007. Sponsored by the Computer Research Association's Committee on the Status of Women in Computing Research (CRA-W). **Invited panel speaker.**

"The Berkeley View: Applications-Driven Research in Parallel Programming Models and Architectures," Multicore-the New Face of Computing-Promises and Challenges, 8th IEEE/NATEA Annual Conference on New Frontiers in Computing Technology, June 2, 2007, Stanford University. **Keynote.**

"Compilation Techniques for PGAS Languages," 5th Annual Workshop on Charm++ and its Applications, Parallel Programming Lab, University of Illinois at Urbana-Champaign April 18th-20th, 2007. **Keynote.**

"Architectural Trends and Programming Model Strategies for Large-Scale Machines," MSRI Symposium on Climate Change, "From Global Models to Local Action." April 11-13, 2007. Invited talk.

"Overview of Titanium and the HPLS Program," The Second Geoscience Application Requirements for Petascale Architectures, Feb 21-22, 2007, San Diego, California. Invited talk.

"Programming Models for Parallel Computing," Interactive Parallel Computation in Support of Research in Algebra, Geometry and Number Theory, Berkeley, California, January 29-February 2, 2007. **Invited talk.**

"Compilation Techniques for Partitioned Global Address Space Languages," The 19th International Workshop on Languages and Compilers for Parallel Computing, New Orleans, Louisiana, November 2-4, 2006. **Keynote.**

"Performance and Productivity Opportunities Using Global Address Space Programming Models," PetaScale Computation for the Geosciences Workshop, PMaC at SDSC, 2006.

"Performance Advantages of Partitioned Global Address Space Languages," EuroPVM/MPI '06, Bonn, Germany, September 17-20, 2006. **Invited talk.**

"Use of a high-level language in high performance biomechanics simulations." Abstract appeared in the Journal of Biomechanics, "Abstracts of the 5th World Congress on Biomechanics," July 29-August 4, 2006, Munich, Germany, p. S435.

"Optimizations for Partitioned Global Address Space Languages," Thirteenth AURORA Plenary Meeting, Workshop on High Productivity Programming Language Systems, Strobl/Wolfgangsee, Austria, June 9-11, 2006. **Invited talk.**

"Using Meshes, Matrices, and Particles in Partitioned Global Address Space (PGAS) Languages," Scientific Discovery through Advanced Computing (SciDAC), Denver, Colorado, June 25-29, 2006. **Invited talk.**

"Performance and Productivity Opportunities Using Global Address Space Programming Models," PetaScale Computation for the Geosciences Workshop, San Diego Supercomputing Center, April 5, 2006. **Invited talk.**

"Using High Level Languages in Computational Frameworks," Computational Frameworks (CompFrame) '05,Atlanta, Georgia, June 22-23, 2005. **Invited talk.**

"Finding a Research Topic," CRA-W Graduate Cohort Program, San Francisco, California, February 25-26, 2005.

"Towards a Digital Human: Scalable Simulation of the Heart and Other Organs," EECS Joint Colloquium Distinguished Lecture Series, University of California at Berkeley, September 15, 2004. Invited talk.

"Towards a Digital Human: Simulation of the Heart and Other Organs," Distinguished Lecture Series, University of California at Davis, April 2004. **Invited talk.**

"Programmability, Performance, and Portability of Global Address Space Languages," High Performance Computing User Forum, Tucson, Arizona, September 21-22, 2004. **Invited talk.**

"Report on High-End Computing Research and Development in Japan," Meeting of the Coalition for Academic Scientific Computation, July 14-15, 2004. **Invited talk.**

"Latency vs. Bandwidth: Which Matters More?" Workshop on Software for Processor-In-Memory Based Parallel Systems, at the Second Annual IEEE/ACM International Symposium on Code Generation and Optimization, San Jose, California, March 21, 2004.  **Invited talk.**

"High Performance Programming in the Partitioned Global Address Space Model," Short course co-taught with Tarek El-Ghazawi and Robert Numrich at the SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, February 25-27, 2004.

"Titanium: A Java Dialect for High Performance Computing," given as part of a tutorial on "UPC, Co-Array Fortran, and Titanium: Programming with the Partitioned Global Address Space Model." Supercomputing (SC03), November, 2003.

"Optimizing Java-Like Languages for Parallel and Distributed Environments," Programming Language Design and Implementation, June 2001. Invited tutorial.

"Language and Compiler Support for Adaptive Mesh Refinement," Caltech, Spring 2000. **Invited talk.**

"Exploiting On-Chip Memory Bandwidth in the VIRAM Compiler," 2nd Workshop on Intelligent Memory

Systems. In conjunction with Architectural Support for Programming Languages and Operating Systems, Boston, Massachusetts, November 12, 2000.

"System Support for Data-Intensive Applications," University of Washington, CRAW-Lucent Invited Lecture, Spring 2000.

"Titanium: A High Performance Java Dialect," SIAM Conference on Parallel Processing for Scientific Computing, 1999.

"Compiling Explicitly Parallel Programs," SIAM conference on Parallel Processing for Scientific Computing, 1997.

"Systems Support for Irregular Parallel Applications," Irregular '96, Santa Barbara, California, August 19-21, 1996. **Invited talk.**

**Co-authored Posters and Presentations**

Marquita Ellis, Aydin Buluç, Katherine Yelick, "Asynchrony versus bulk-synchrony for a generalized N-body problem from genomics," Proceedings of the 26th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, 2021.

Yili Zheng, Costin Iancu, Paul H Hargrove, Seung-Jai Min, Katherine Yelick, "Extending unified parallel C for GPU computing," SIAM Conference on Parallel Processing for Scientific Computing (SIAMPP), San Francisco, CA, February 2010.

Dan Bonachea, Rajesh Nishtala, Paul Hargrove, Mike Welcome, Katherin Yelick, "Optimized Collectives for PGAS Languages with One-Sided Communication," Supercomputing (SC06), November 2006
Dan Bonachea, Rajesh Nishtala, Paul Hargrove, Katherine Yelick.

"Efficient Point-to-Point Synchronization in UPC," 2nd Conf. on Partitioned Global Address Space Programming Models (PGAS06), October 2006

Dan O Bonachea, Christian Bell, Rajesh Nishtala, Kaushik Datta, Parry Husbands, Paul Hargrove, Katherine Yelick, "The Performance and Productivity Benefits of Global Address Space Languages," Supercomputing, November 2005.

Rajesh Nishtala, Richard Vuduc, James Demmel, and Katherine Yelick, "When Cache Blocking Sparse Matrix Multiply Works and Why." PARA'04 Workshop on State-of-the-art in Scientific Computing, Copenhagen, Denmark, June 2004.

Eun-Jin Im, I. Bustany, C. Ashcraft, J. Demmel, K. Yelick, "Toward automatic performance tuning of matrix triple products based on matrix structure." PARA'04 Workshop on State-of-the-art in Scientific Computing, Lyngby, Denmark, June 20-23, 2004. Full paper in Applied Parallel Computing: State of the Art in Scientific Computing.

Eun-Jin Im, Cleve Ashcraft, Ismail Bustany, Katherine Yelick, "A Computationally Efficient Matrix Product for a Class of Sparse Schur-Complement Matrices," SIAM Conference on Parallel Processing for Scientific Computing. San Francisco, California, February 2004.

**Advising**

**Postdoctoral Researchers**

- Prashant Pandey (co-advised), large scale parallel graph analysis, 2019-present.
- Marquita Ellis, high performance computing, 2020.
- Israt Nisra (co-advised), high performance genome analysis, 2019-present.
- Evangelos Georganas, high performance metagenome assembly, 2016.
- Harsha Simhadri, parallel algorithms and runtime systems, 2013-2015.
- Amir Kamil, parallel programming models, 2013-2015.
- Karl Fuerlinger, performance tools for parallel machines, 2008-2010.
- Ed Givelberg, an immersed boundary method framework in Titanium, used for simulating the inner ear, 2002-2005.
- Greg Balls, computational fluid dynamics in Titanium, 2001.
- Eun-Jin Im, autotuning of sparse matrix kernels, June 2000-2001.

**PhD Students**

- Alok Tripathy, 2019-present. Co-Advised with Aydın Buluç. Distributed Memory Graph Neural Networks.
- Giulia Guidi, 2018-present, co-advised by Aydın Buluç. Scalable Long Read Genome Assembly.
- Benjamin Brock, 2017-present, co-advised by Aydın Buluç. Distributed Data Structures for Irregular Applications.
- Marquita Ellis, 2014-2020. Title: "Parallelizing Irregular Applications for Distributed Memory Scalability: Case Studies from Genomics"
- Phitchaya (Mangpo) Phothilimthana, co-advised with Ras Bodik, 2015-2018. Title: "Programming Abstractions and Synthesis-Aided Compilation for Emerging Computing Platforms."
- Michael Driscoll, co-advised with Armando Fox, 2011-2018.Thesis title: "Domain-Specific Techniques for High-Performance Computational Image Reconstruction."
- Penporn Koanantakool. 2011-2017. Thesis topic: "Communication-Optimal Algorithms for All-to-All Computations."
- Evangelos Georganas, 2011-2016. Thesis topic: "Scalable Genome Analysis," August 2016.
- Shoaib Kamil. Thesis title: "Productive High Performance Parallel Programming with Auto-tuned Domain-Specific Embedded Languages," December 2012.
- Amir Kamil. Thesis topic: "Single program, Multiple Data Programming for Hierarchical Computations," August 2012.
- Jimmy Su. PhD thesis title: "Optimizing Irregular Data Accesses for Cluster and Multicore Architectures," December 2010.
- Kaushik Datta. PhD thesis title: "Auto-tuning Stencil Codes for Cache-Based Multicore Platforms." December 2009.
- Rajesh Nishtala. PhD thesis title: "Automatically Tuning Collective Communication for One-Sided Programming Models," December 2009.
- Wei Chen. PhD thesis title, "Optimizing Partitioned Global Address Space Programs for Cluster Architectures," August 2007.
- Eun-Jin Im, PhD thesis title, "Optimizing the Performance of Sparse Matrix-Vector Multiplication," May 2000.
- Deborah Weisser. PhD thesis title, "Interacting Agents for Local Search," May 1999.

- Arvind Krishnamurthy. PhD thesis title, "Compiler Analyses and System Support for Optimizing Shared Address Space Programs," December 1998.
- Soumen Chakrabarti. PhD thesis title, "Efficient Resource Scheduling in Multiprocessors," June 1996.
- Chih-Po Wen. PhD thesis title, "Portable Library Support for Irregular Applications," December 1995.

## Master's Students

- Cristina Teodoropol, "Applying the Four Russians Technique to Banded Extension and X-Drop Sequence Alignment," December 2020.
- Richard Barnes. "A Review of the Smith-Waterman GPU Landscape," August 2020.
- Ed Younis, "QFAST: Quantum Synthesis Using a Hierarchical Continuous Circuit Space," May 2020. Co-Advised with Koushik Sen.
- Jiali Chen, 2019-present, Co-Advised with Aydın Buluç.
- Nicholas Swensen, 2019-present, Co-Advised with Aydın Buluç.
- Jude Fernandez, 2019-present, Co-Advised with Aydın Buluç.
- Michael Driscoll, "Subdivision Surface Evaluation as Sparse Matrix-Vector Multiplication," December 2014.
- Brian Kazian, "Performance Study for Contributing Area Estimation in Parallel with UPC," December 2009.
- Jason Duell, Master's report, "Pthreads or Processes: Which is Better for Implementing Global Address Space languages?" June 2007.
- Rajesh Nishtala. Master's report title, "Architectural Probes for Measuring Communication Overlap Potential," May 2006.
- Amir Kamil. Master's report title, "Analysis of Partitioned Global Address Space Programs," December 2006.
- Kaushik Datta. Master's report title, "The NAS Parallel Benchmarks in Titanium," December 2005.
- Jimmy Su. Master's report title, "Automatic Support for Irregular Computations in a High Level Languages," May 2005.
- Christian Bell, "Design and Implementation of a Distributed Memory DMA Registration Strategy for Pinning –based High Performance Networks," May 2005.
- Wei Chen. Master's report, "Building a Source to Source UPC Translator," Dec. 2004.
- Sabrina Merchant, "Analysis of a Contractile Torus Simulation in Titanium," Plan II, December 2003.
- Manikandan Narayanan, "Compiling Communication Access Patterns for a Vector Processor, June 2003.
- Daniel Hettena, "Networking in the ISTORE Cluster," Plan II, December 2002.
- Siu Man Yau, "Experiences in Using Titanium for Simulation of Immersed Boundary Biological Systems," Plan II, August 2002.
- Dan Bonachea. Master's report title, "Bulk File I/O Extensions to Java," May 2000.
- Noah Treuhaft. "Enhancing Graduated Declustering for Better Performance Availability on Clusters," December 2000.
- Chang-Sun Lin Master's report title, "The Performance Limitations of SPMD Programs on Clusters of Multiprocessors," May 2000.
- Elaine Randi Thomas. Master's Report title, ``An Architectural Performance Study of the Fast Fourier Transform on Vector IRAM," May 2000.
- Ngeci Bowman. ``Random Projection: A Data Compression Algorithm for EM" December 1999.

- Arvind Krishnamurthy. Master's report, "Compiling Explicitly Parallel Programs," May 1994.
- Steve Steinberg. Master's report, "Parallelizing a Cell Simulation: Analysis, Abstraction, and Portability," December 1994.
- Ruth Hinkins. Master's report, "Parallel Computation of Automatic Differentiation Applied to Magnetic Field Calculations," September 1994.
- Jeff Jones. Master's report, ``Parallelizing the Phylogeny Problem,'' December 1994.
- Soumen Chakrabarti. Master's report, "Computing Grobner Bases on a Distributed Memory Multiprocessor," December 1992.
- Chih-Po Wen. Master's report, ``Timing Simulation on Distributed Memory Multiprocessor,'' December 1992.

**Undergraduate Research Students**

| | | |
|---|---|---|
| Shiv Sundram, 2015 | Andy Hung Ng, 1999 | Eric Liu, 1994 |
| Ankit Jain, 2005-2007 | Sumeet Shendrikar, 1999 | Matthew Thorn, 1994 |
| Wei Tu, 2004 | Anthony Lai, 1999 | Kevin Gong, 1992 |
| Benjamin Lee, 2002-2004 | Steve Benting, 1997-1998 | Dindo Siasoyco, 1992 |
| Omair Kamil, 2004 | Karl Czajkowski, 1995-96 | Nathan Zhang, 2015-2016 |
| Meling Ng, 2004 | Daniel Yu, 1996 | Jiakun Yan, 2019 |
| Siu Man Yau, 1999 | Ronald Yong, 1996 | Eric Wimsatt, 2021 |
| Kar Ming Tang, 1999 | David Yan, 1996 | Hunter McCoy, 2021 |
| Eric Reeber, 1999 | Jun Yang, 1995-1996 | Richard Lettich, 2021 |
| Glen Jeh, 1999 | Jenny Ng, 1994 | Benjamin Driscoll, 2019-2021 |
| Stanley H Yue, 1999 | Boon-Yuen Ng, 1994 | Ujjaini Mukhopadhyay, 2022 |

**Research Funding**

Project: BINOCULARS (Berkeley Institute for Programming Support for Irregular Applications)
Investigators: Katherine Yelick (PI), Costin Iancu (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: June 1, 2020 – September 30, 2022
Total Funding: $1,400,000

Project: GASNet
Investigators: Katherine Yelick (PI), Paul Hargrove (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: February 1, 2010 – September 30, 2022
Total Funding: $800,000

Project: Exascale Solutions to Microbiome Analysis (ExaBiome)
Investigators: Katherine Yelick (PI), Leonid Oliker (co-PI), Patrick Chain (LANL PI)
Source of Support: DOE (through ORNL)
Location of Project: LBNL
Duration: October 2016 – June 2023
Total Funding: $13,742,500,000 (est)

Project: SPX Collaborator Research: Global Address Programming with Accelerators
Investigators: John Owens (UC Davis, Coordinating PI), Katherine Yelick (UCB PI), Aydın Buluç (UCB Co-PI)
Source: National Science Foundation
Duration: August 1, 2017 – July 30, 2022
Total UCB Funding: $465,000

## Recent Prior Projects:

Project: BINOCULARS (Berkeley Institute for Programming Support for Irregular Applications)
Investigators: Katherine Yelick (PI), Costin Iancu (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: February 15, 2019 - June 30, 2020
Total Funding: $1,000,000

Project: GASNet
Investigators: Katherine Yelick (PI), Paul Hargrove (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: February 12, 2019 – January 31, 2020
Total Funding: $200,000

Project: Feature discovery through large-scale unsupervised deep learning: a pilot study for suicide prevention using MVP data collection
Investigators: Katherine Yelick (PI), Silvia Crivelli and J. Ben Brown (Senior Personnel)
Source of Support: Department of Energy via Brookhaven National Laboratory

Location for Project: LBNL
Duration: January 26, 2018 – December 31, 2018
Total Funding: $63,000

Project: BINOCULARS
Investigators: Katherine Yelick (PI), Costin Iancu (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: December 1, 2017 - October 31, 2018
Total Funding: $1,000,000

Project: GASNet
Investigators: Katherine Yelick (PI), Paul Hargrove (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: December 1, 2017 - October 31, 2018
Total Funding: $400,000

Project: BINOCULARS
Investigators: Katherine Yelick (PI), Costin Iancu (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: December 22, 2016 - October 31 2017
Total Funding: $500,000

Project: BINOCULARS + AMD
Investigators: Katherine Yelick (PI), Jonathan Carter (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: July 18, 2016 – September 30, 2017
Total Funding: $2,000,000 (including subcontracts)

Project: BINOCULARS
Investigators: Katherine Yelick (PI), Costin Iancu (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: November 2015 - October 31 2016
Total Funding: $1,750,000 (including subcontracts)

Project: DEGAS: Dynamic Exascale Global Address Space programming environments
Investigators: K. Yelick (coordinating PI, LBNL)
Source: Department of Energy
Amount: $8,900,500 (at LBNL)
Location of Project: LBNL
Period: September 1, 2012 – August 31, 2016

Project: BINOCULARS
Investigators: Katherine Yelick (PI), Costin Iancu (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: October 2014 - December 31, 2015

Total Funding: $1,166,664 (including subcontracts)

Project: BINOCULARS
Investigators: Katherine Yelick (PI), Costin Iancu (co-PI)
Source of Support: Department of Defense
Location for Project: LBNL
Duration: March 2013-February 2014
Total Funding: $1,529,158 (including subcontracts)

Project: BINOCULARS
Investigators: K. Yelick (PI), C. Iancu (Co-PI)
Source: Department of Defense
Amount: $475,000 (including subcontracts)
Location of Project: LBNL
Period:  September 1, 2012 – March 31, 2013

Project: BINOCULARS
Investigators: K. Yelick (PI), C. Iancu (Co-PI)
Source: Department of Defense
Amount: $1,721,900 (including subcontracts)
Location of Project: LBNL
Period:  April 1, 2011 – September 30, 2012

Project: Center for Programming Models for Scalable Parallel Computing
Investigators: Katherine Yelick (PI)
Source of Support: Department of Energy
Location of Project: U.C. Berkeley
Duration: 9/15/06-9/14/2012
Total Funding: $2,116,480

Project: Center for Scalable-Performance Application Development Software
Investigators: Katherine Yelick (UCB PI), John Mellor-Crummey (Coordinating PI at Rice)
Source of Support: DOE
Location of Project: U.C. Berkeley
Duration: 11/15/2006-11/14/2012
Total Funding: $675,000

Project: CRI:IAD: Development of a Research Infrastructure for the Multithreaded Computing
Community Using the Cray Eldorado Platform
Investigators:  Katherine Yelick (UCB PI), Jay Brockman (Lead PI at Notre Dame)
Source of Support:  National Science Foundation
Location of Project:  U.C. Berkeley
Duration:  8/1/2007-7/1/2013
Total Funding:  $50,000

Project:  Parallel Laboratory
Investigators: David Patterson (PI), Ras Bodik (co-PI), James Demmel (co-PI), Kurt Keutzer (co-PI),
Koushik Sen (co-PI), Kathy Yelick (co-PI), Krste Asanovic (co-PI)
Source of Support:  Intel and Microsoft
Location of Project:  UC. Berkeley
Duration:  12/31/07-12/30/12

Total Funding:  $6,000,000

Project:  Parallel Laboratory
Investigators: David Patterson (PI), Ras Bodik (co-PI), James Demmel (co-PI), Kurt Keutzer (co-PI), Koushik Sen (co-PI), Kathy Yelick (co-PI), Krste Asanovic (co-PI)
Source of Support:  UC Discovery Funds
Location of Project:  UC. Berkeley
Duration:  5/01/08-4/30/12
Total Funding:  $2,125,000

Project: Unified Parallel C
Investigators: K. Yelick (PI)
Source: Department of Defense
Amount: $1,343,000 (including subcontracts)
Location of Project: LBNL
Period: April 1, 2010 – September 30, 2011

Project:  SDCI:  IPM – a Performance Monitoring Environment for Petascale HPC
Investigators:  Katherine Yelick (UCB PI), Allan Snavely (Lead PI at UCSD)
Source of Support:  National Science Foundation
Location of Project:  U.C. Berkeley
Duration:  10/01/2007-9/30/2011
Total funding:  $753,357

Project:  PetaApps: New Coupling Strategies and Capabilities for Petascale Climate Modeling
Investigators: William Collins (UCB PI), Katherine Yelick (co-PI), Jim Kinter (Coordinating PI, COLA), and others
Source of Support:  NSF
Location of Project:  UC Berkeley
Duration:  3/01/2008-2/28/12
Total funding: $391,130

Project: Unified Parallel C on Scalable Shared Memory
Investigators: K. Yelick (PI)
Source: Department of Defense
Amount: $1,002,663 (including subcontracts)
Location of Project: LBNL
Period:  July 28, 2010 – September 30, 2011

Project: Applications and Runtime Systems Using Fast One-Sided Communication
Investigators: Katherine Yelick
Source of Support: DOE
Annual Amount: $530,000
Location of Project: LBNL
Period: October 1, 2010 – September 30, 2011