Jonathan W. Berry

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Education

Ph.D. in Computer Science, Rensselaer Polytechnic Institute, 1995.
M.S. in Computer Science, Rensselaer Polytechnic Institute, 1989.
B.S. in Computer Science and Economics, The American University, 1987.

Professional Experience

Principal Member of Technical Staff, Sandia National Laboratories, 2004-present.
Associate Professor of Computer Science, Lafayette College, 2002-2004.
Assistant Professor of Computing Sciences, Elon University, 1996-2002.
Postdoctoral Fellow DIMACS Center, Rutgers University, 1995-1996.
Visiting Assistant Professor of Computer Science, DePauw University, spring 1995.
Instructor, Rensselaer Polytechnic Institute, 1993-1994.
Graduate Research Assistant, Los Alamos National Lab, summers 1993, 1994.
Teaching Assistant, Rensselaer Polytechnic Institute, 1990 and 1992.
Software Engineer, General Electric Company, Schenectady, NY, summer 1989.
Computer Scientist National Bureau of Standards, Gaithersburg, MD, 1987-1988.

Dissertation *Path Optimization for Graph Partitioning Problems: A Case Study of Near Greedy Analysis*: advisor: Dr. Mark K. Goldberg

Technical Program Committees

NSF/IEEE EduHPC Workshop on Education for High-Performance Computing (2017)
IEEE HPEC Graph Challenge (2017)
IEEE Workshop on Graph Algorithm Building Blocks & Applications (GABB) (2014-2017)
IEEE Workshop on MultiThreaded Architectures & Applications

(MTAAP) (2008-2012)
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) (2010)
IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing (CCGrid) (2010)
IEEE International Parallel & Distributed Computing Symposium (IPDPS) (2009)

Book Chapters

1. K. Madduri, D.A. Bader, J.R. Crobak, B. Hendrickson, J. Berry. Multithreaded Algorithms for Processing Massive Graphs in *Petascale Computing: Algorithms and Applications* Chapman and Hall/Crc Computational Science Series, 2007.

Refereed Journal Publications

2. M.A. Bender, J. Berry, S.D. Hammond, et al. Two-level Main Memory Co-Design: Multi-Threaded Algorithmic Primitives, Analysis, and Simulation. *Journal of Parallel and Distributed Comptuing* (special issue for best papers from IPDPS 2015), 102(C), 2017.
3. J.W. Berry, L.K. Fostvedt, D.J. Nordman, C.A. Phillips, C. Seshadhri, A.G. Wilson. Why do Simple Algorithms for Triangle Enumeration Work in the Real World? *Internet Mathematics*, 11, 6 (2015).
4. J. Berry, B. Hendrickson, R.A. LaViolette, C.A. Phillips. Tolerating the community detection resolution limit with edge weighting. *Physical Review E*, 83, 056199(2011).
5. R. Murray, W. E. Hart, J. Berry, et al. US Environmental Protection Agency Uses Operations Research to Reduce Contamination Risks in Drinking Water. *Interfaces* 39(1): 57-68(2009).
6. J. Berry, R.D. Carr, W. E. Hart, V.J. Leung, C.A. Phillips. Designing Contaminant Warning Systems for Municipal Water Networks Using Imperfect Sensors. *J. Water Resources Planning & Management*, 135, 253(2009).
7. B. Hendrickson, J. Berry. Graph Analysis with High-Performance Computing. *Computers in Science & Engineering*, 10(2), 2008.
8. A. Ostfeld, J. G. Uber, E. Salomons, J. Berry, W.E. Hart, et al. The Battle of the Water Sensor Networks (BWSN) *J. Water Resources Planning & Management*, 134, 6(2008).

9. R. Murray, R. Janke, W.E. Hart, J. Berry, T. Taxon, J. Uber. Sensor Network Design for Contaminant Warning Systems: a decision framework. *Journal of the American Water Works Association*, 100, 11-2008.
10. A. Lumsdaine, D. Gregor, B. Hendrickson, J. Berry. Challenges in Parallel Graph Processing *Parallel Processing Letters*, 17(1), 2007.
11. J. Berry, W. Hart, C. Phillips, J. Uber, J. Watson. Sensor Placement in Municipal Water Networks with Temporal Integer Programming Models *J. Water Planning and Resources Management*, 132(4), July/Aug. 2006.
12. J. Berry, L. Fleischer, W. Hart, C. Phillips, J. Watson. Sensor Placement in Municipal Water Networks *J. Water Planning and Resources Management*, 131(3), May/June 2005.
13. J. Berry, Nathaniel Dean, Mark K. Goldberg, Gregory E. Shannon, and Steven Skiena. LINK: a system for graph computation. *Software - Practice and Experience*, 30(11):1285–1302, 2000.
14. J. Berry and M. Goldberg. Path optimization for graph partitioning problems. *Discrete Applied Mathematics*, 90(1999) 27-50.

Refereed Conference and Workshop Publications

15. M.A. Bender, J. Berry, R. Johnson, et al. Anti-Persistence on Persistent Storage: History-Independent Sparse Tables and Dictionaries. *Proceedings of the 35th ACM SOGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems*, 2016.
16. M.A. Bender, J. Berry, S.D. Hammond, et al. Two-level Main Memory Co-Design: Multi-Threaded Algorithmic Primitives, Analysis, and Simulation. *IEEE International Parallel & Distributed Processing Symposium (IPDPS)*, 2015.
17. M.A. Bender, J. Berry, S.D. Hammond, et al. k-means Clustering on Two-Level Memory Systems *ACM Proceedings of the 2015 International Symposium on Memory Systems (MEMSYS)*, 2015.
18. J. Berry, M. Collins, A. Kearns, C.A. Phillips, J. Saia, R. Smith. Cooperative Computing for Autonomous Data Centers. *IEEE International Parallel & Distributed Processing Symposium (IPDPS)*, 2015.
19. M. Wolf, J. Berry, D. Stark. A Task-Based Linear Algebra Building Blocks Approach for Scalable Graph Analytics. *IEEE High Performance Extreme Computing Conference (HPEC)*, 2015.
20. J.W. Berry, L.K. Fostvedt, D.J. Nordman, C.A. Phillips, C. Seshadhri, A.G. Wilson. Why do Simple Algorithms for Triangle Enumeration Work in the Real World? *Proceedings of the 5th conference on Innovations in Theoretical Computer Science (ITCS)*, 2014.

21. J. Berry, M. Oster, C.A. Phillips, S. Plimpton, T.A. Shead. Maintaining Connected Components for Infinite Graph Streams. *Proceedings of the 2nd International Workshop on Big Data, Streams and Heterogeneous Source Mining: Algorithms, Systems, Programming Models and Applicaitons (BigMine)*, 2013.
22. T. Mattson, D. Bader, J. Berry, et al. Standards for Graph Algorithm Primitives *IEEE High Performance Extreme Computing Conference*, 2013.
23. B.W. Barrett, J. Berry, R.C. Murphy, K.B. Wheeler. Implementing a portable Multi-threaded Graph Library: the MTGL on Qthreads. *IEEE International Parallel and Distributed Processing Symposium*, Rome, Italy, 2009. *Workshop on Multithreaded Architectures and Applications*, Rome, Italy, 2009.
24. W. Hart, J. Berry, R. Heaphy, C. Phillips. EXACT: The EXperimental Algorithmics Computational Toolkit *Workshop on Experimental Computer Science*, San Diega, CA, Jun., 2007.
25. W. Hart, J. Berry, E. Boman, C.A. Phillips, L.A. Riesen, J.P. Watson. Limited-Memory Techniques for Sensor Placement in Water Distribution Networks. *Learning and Intelligent Optimization*, Trento, Italy., 2007.
26. J. Berry, B. Hendrickson, P. Konecny, S. Kahan. Software and Algorithms for Graph Queries on Multithreaded Architectures *Workshop on Multithreaded Architectures and Applications*, Long Beach, CA, Mar., 2007.
27. K. Underwood, M. Vance, J. Berry, B. Hendrickson. Analyzing the Scalability of Eldorado. *Workshop on Multithreaded Architectures and Applications*, Long Beach, CA, Mar., 2007.
28. J. Crobak, J. Berry, K. Madduri, D. Bader. Advanced Shortest Paths Algorithms on a Massively-Multithreaded Architecture. *Workshop on Multithreaded Architectures and Applications*, Long Beach, CA, Mar., 2007.
29. K. Madduri, D. Bader, J. Berry, J. Crobak "An Experimental Study of a Parallel Shortest Path Algorithm for Solving Large-Scale Graph Instances" ALENEX07: Workshop on Algorithm Engineering & Experimentation, New Orleans, LA, Jan. 2007.
30. J. Cieslewicz, J. Berry, B. Hendrickson, K. Ross "Unlocking Parallelism in Database Operations: Insights from a Massively Multithreaded Architecture" Second International Workshop on Data Management on New Hardware, Chicago, IL., Jun. 2006.
31. J. Berry, D. Hrozencik, S. Rao, Z. Shen. "Finding Median Sets of Tree Structures in Synchronous Distributed Systems." 20th International Conference on Computers and Their Applications (CATA), 2005.

32. J. Berry, D. Hrozencik, S. Rao, Z. Shen. " Finding Central Sets of Tree Structures in Synchronous Distributed Systems." 17th International Conference on Parallel and Distributed Computing Systems, September, 2004.
33. E. Asgeirsson, J. Berry, C. Phillips, D. Phillips, C. Stein, J. Wein. "Scheduling an Industrial Production Facility." (IPCO X), *Lecture Notes in Computer Science*, Springer, Verlag, 2004.
34. J. Berry. Improving discrete mathematics and algorithms curricula with LINK. In *SIGCSE Bulletin: Integrating Technology into Computer Science Education*, Vol. 29, Number 3, September, 1997.
35. J. Berry and N. Dean. LINK: Exploring Combinatorial Objects. *Congressus Numerantium*, 124:5–13, 1997.
36. J. Berry and M. Goldberg. Path optimization and near-greedy analysis for graph partitioning: Am empirical study. In *Proceedings of the Sixth Annual ACM-SIAM Symposium on Discrete Algorithms*, pages 223–232, 1995.

Other Publications

37. J. Berry, W. Hart, C. Laird, J. Uber. A Morphing Technique to Disquise Water Networks To appear in *Proceedings of the 2007 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2007.
38. C. Phillips, J. Berry, R. Carr, W. Hart, J. Watson. Scalable Water Network Sensor Placement via Aggregation To appear in *Proceedings of the 2007 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2007.
39. W. Hart, J. Berry, R. Murray, C. Phillips, L.A. Riesen, and J.P. Watson. SPOT: A Sensor Placement Optimization Toolkit for Drinking Water Contaminant Warning System Design To appear in *Proceedings of the 2007 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2007.
40. K. Madduri, D. Bader, J. Berry, J. Crobak. Parallel Shortest Path Algorithms for Solving Large-Scale Instances. accepted to *9th DIMACS Implementation Challenge*, Nov., 2006.
41. R. Murray, W.E. Hart, J. Berry. Sensor Network Design for Contaminant Warning Systems: Tools and Applications. *American Water Works Association, Water Security Congress*, Sep., 2006.
42. J. Berry, R. Carr, W.E. Carr, V.J. Leung, C. Phillips, J. Watson. On the Placement of Imperfect Sensors in Municipal Water Networks. *8th Annual International Symposium on Water Distribution Systems Analyze*, Cincinnati, OH, Aug. 2006.

43. J. Berry, R. Carr, W.E. Carr, V.J. Leung, C. Phillips, J. Watson. On the Placement of Imperfect Sensors in Municipal Water Networks. *8th Annual International Symposium on Water Distribution Systems Analyze*, Cincinnati, OH, Aug. 2006.

44. J. Berry, B. Hendrickson, P. Konecny, S Kahan. Graph Software Development and Performance on the MTA-2 and Eldorado. *Cray User Group Meeting*, Lugano, Switzerland, May., 2006.

45. K. Underwood, M. Vance, J. Berry, B. Hendrickson. Analyzing the Scalability of Eldorado. *Cray User Group Meeting*, Lugano, Switzerland, May., 2006.

46. J. Berry, W. Hart, C. Phillips, J. Uber, and T. Walski. Water Quality Sensor Placement in Water Networks with Budget Constraints. To appear in *Proceedings of the 2005 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2005.

47. J. Berry, W. Hart, C. Phillips, J. Uber, and J. Watson. Validation and Assessment of Integer Programming Sensor Placement Models. To appear in *Proceedings of the 2005 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2005.

48. J. Berry, W. Hart, C. Phillips. Scalability of Integer Programming Computations for Sensor Placement in Water Networks. To appear in *Proceedings of the 2005 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2005.

49. J. Watson, W. Hart, J. Berry. Scalable High-Performance Heuristics for Sensor Placement in Water Distribution Networks. To appear in *Proceedings of the 2005 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2005.

50. J. Berry, W. Hart, C. Phillips, and J. Uber. A general integer-programming-based framework for sensor placement in municipal water networks. To appear in *Proceedings of the 2004 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2004.

51. J. Berry Considerations for future designers of general purpose graph software. *Graphs and Discovery* American Mathematical Society Publications - DIMACS Volume Series, 2004.

52. J. Berry, L. Fleischer, C. Phillips, and W. Hart. Sensor placement in municipal water networks. In *Proceedings of the 2003 World Water and Environmental Resources Congress*. Environmental & Water Resources Institute, 2003.

53. J. Berry. LINK: A software system for experimentation with graphs and hypergraphs. *SIAM Activity Group on Discrete Mathematics Newsletter*, 7(2), 1997.

54. J. Berry, N. Dean, P. Fasel, M. Goldberg, E. Johnson, J. MacCuish, G. Shannon, and S. Skiena. LINK: A combinatorics and graph theory workbench for applications and research. Technical Report 95-15, Center for Discrete Mathematics and Theoretical Computer Science, Piscataway, NJ, 1995.

Invited Talks

Stateful Streaming in Distributed Memory Supercomputers (with Alexandra Porter). Chesapeake Large-Scale Analytics Conference, 2016.

Graph Analysis with High-Performance Computing, plenary at SIAM Parallel Processing, Feb., 2010.

Experience with a Graph Software Infrastructure on Massively Multithreaded Supercomputers, Lawrence Berkeley Labs., Jan., 2006.

Prototyping a Graph Infrastructure for Eldorado, Cray, Inc., Seattle, July, 2005.

LINK, *Sandia National Laboratories*, June, 2002.

The Future of General Purpose Discrete Mathematics Software, *Computer-Generated Conjectures from Graph Theoretic and Chemical Databases I*, DIMACS, November, 2001.

LINK, *DIMACS Research & Education Institute, plenary lecture*, August, 1998.

LINK, *AT&T Bell Laboratories*, November, 1995.

Contributed Talks

Practical Heuristics for Inexact Subgraph Isomorphism *SIAM Annual Meeting*, Pittsburgh, PA, July., 2010.

High Performance Computing for Large Graph Problems *SIAM Annual Meeting*, Denver, CO, July, 2009.

Generating Customized PICO Applications *INFORMS Annual Meeting*, Pittsburgh, PA, Nov., 2006.

Graph Software Development and Performance on the MTA-2 and Eldorado *Cray User Group Meeting*, Lugano, Switzerland May., 2006.

Analyzing the Scalability of Eldorado *Cray User Group Meeting*, Lugano, Switzerland May., 2006.

On the Placement of Imperfect Sensors in Muncipal Water Networks, *8th Symposium on Water Distribution Systems Analysis*, Cincinnati, Aug., 2006.

A Graph Infrastructure for Multithreaded Architectures, *SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, Feb., 2006.

Water Quality Sensor Placement in Water Networks with Budget Constraints, *World Water and Environmental Resources Congress*, Anchorage, May, 2005.

Non-Temporal and Temporal Models for Sensor Placement in Municipal Water Networks, *Informs Computing Society*, Annapolis, January, 2005.

Finding Central Sets of Tree Structures in Synchronous Distributed Systems, *17th International Conference on Parallel and Distributed Computing Systems*, San Francisco, September, 2004.

A General Integer Programming-Based Framework for Sensor Placement in Municipal Water Networks, *World Water & Environmental Resources Congress*, Salt Lake City, June, 2004.

Graph Drawing and Manipulation with LINK, *The Fifth Symposium on Graph Drawing*, Rome, Italy, September, 1997.

Improving discrete mathematics and algorithms curricula with LINK, *SIGCSE/SIGCUE Conference on Integrating Technology into Computer Science Education*, Uppsala, Sweden, June, 1997.

Path optimization and near-greedy analysis for graph partitioning: an empirical study, *The Sixth Annual ACM-SIAM Symposium on Discrete Algorithms*, San Francisco, January, 1995.

Statistical properties of the MAX-CUT problem, *The 25th Southeastern International Conference on Combinatorics, Graph Theory, and Computing*, Florida Atlantic University, March, 1994.

Student Research Supervised

Alexandra Porter, Year-Round Intern, Sandia National Laboratories, 2016-2017.

Matthew Oster, Summer Intern, Sandia National Laboratories, 2010.

Joseph Crobak, Kamesh Madduri, Summer Interns, Sandia National Laboratories, 2006.

Kamesh Madduri, Summer Intern, Sandia National Laboratories, 2005.

Joseph Crobak, Excel Scholar, Lafayette College, 2004, and Summer Intern, Sandia National Laboratories, 2005.

Kojo Adams, Undergraduate Research Assistant, Sandia National Laboratories, 2003; Thesis student, Lafayette, 2003.

Ana Kupresanin, Graduate Research Assistant, Sandia National Laboratories, 2003.

Ruth Brown, Summer Undergraduate Research Experience (S U R E), Elon, 2001.

John Marshall, Summer Undergraduate Research Experience (S U R E), Elon, 1999.

Damon DeSonier, Summer Undergraduate Research Experience (S U R E), Elon, 1997.

Christopher Burrows, NSF Research Experience for Undergraduates, Rutgers, 1996.

Service

Nominating Committee, SIAM Data Mining Group officers, 2017.
CERL/CSRI Distinguished Lecture Coordinator, Sandia, 2015-2017.
CERI/DIMACS Workshop on Streaming Graph Algorithms, organizer 2014.
Paper Referee, ACM Journal on Experimental Algorithmics
Paper Referee, ACM Transactions on Parallel Computing
Paper Referee, IEEE Transactions on Parallel and Distributed Systems
Paper Referee, SIAM Journal on Scientific Computing
Paper Referee, Journal on Parallel and Distributed Computing
Paper Referee, Computer Generated Conjectures from Graph Theoretic and Chemical Databases I
Paper Referee, Journal of Operations Research
Paper Referee, Journal of Algorithms
Paper Referee, SIAM Journal of Computing
Paper Referee, Journal of Water Distribution Resources Planning & Management
Paper Referee, Environmental Science & Technology
Paper Referee, Midwest Small College Computing Conference
Go Figure mathematics contest site coordinator, Albuquerque, 2004,2005.
Programming Contest Coach Lafayette College, 2002-2003.
Library Advisory Committee Lafayette College, 2003-2004.
Curriculum Committee Elon University, 2001.
Faculty Research and Development Committee Elon College, 1999, Chair 2000.

Academic Standing Committee Elon College, 1997, Chair 1998.
Science Fellows Selection Committee Elon College, 1997-2002.
DIMACS Reconnect Conference – primary lecturer Rutgers University, 1998.
Editor *National Information Center for Undergraduate Research, Math/Computer Science Undergraduate Research Directory*, 1997.

Awards and Honors

Publication # 16 above named Best Paper of the algorithms track at *IPDPS 2015 (IEEE International Parallel and Distributed Processing Symposium).*
Publication # 5 above named *2009 Franz Edelment Award Finalist*
Publication # 9 above named *2009 American Water Work Association (AWWA) Management Division Best Paper*
Publication # 30 above named Best Paper at *DaMoN 2006 (Workshop of ACM SIGMOD/PODS 2006).*
Publication # 14 above included in *Discrete Applied Mathematics, Editor's Choice, Edition 1999.*
Two-time recipient of Team Employee Recognition Award, Sandia National Laboratories
SIAM Student Travel Award, Symposium on Discrete Algorithms, 1995.
Teaching Incentive Award, RPI School of Science, 1992.