

# Arthur Bernard Maccabe

## Curriculum Vitae March 2022

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### BIOGRAPHY

Professor Arthur B. (Barney) Maccabe is the Executive Director of the Institute for the Future of Data and Computing (IFDC) at the University of Arizona. This newly created institute is focused on developing the infrastructure, from human capital (including workforce development) to the advanced computing infrastructure (including exploration of new computing and storage platforms) needed to support research focused on the creation and use of data and software artifacts. An important goal of the institute is to elevate the visibility and impact of the artifacts created by the UArizona research community and assist researchers in improving the quality of these artifacts. The institute is committed to building deep relationships with industry and the research communities that are advancing the foundations of data and computing (including library science, mathematics, computer science, and computer engineering). Dr Maccabe's faculty appointment is in the School of Information (iSchool) at the University of Arizona

From 2009 to 2022, Dr Maccabe served as the Director of the Computer Science and Mathematics Division (CSMD) at the Oak Ridge National Laboratory (ORNL). The division has about 150 staff focused on use-inspired, fundamental research in computer science and applied mathematics. The division is organized in three sections: Advanced Computing Systems Research, Data and AI Systems, and Mathematics in Computation. During this time, Dr. Maccabe also served as the ORNL Point of Contact for the research portion of the Advanced Scientific Computing Research (ASCR) program in the Department of Energy, Office of Science.

Prior to his appointment at ORNL in 2009, Dr. Maccabe spent over twenty-five years as a faculty member in the Computer Science Department at the University of New Mexico (UNM). He graduated eleven PhD students and nine students with Masters degrees. While at the University of New Mexico, Dr. Maccabe also served as the director of UNM's Center for High Performance Computing (now called the Center for Advanced Research Computing) and as the Interim Chief Information Officer (CIO) for the university.

His research has focused on the design and development of system software for massively parallel systems. He was an architect for a series of lightweight operating systems for massively parallel computing systems. Dr. Maccabe has also conducted sponsored research in a wide-range of areas, including: dependence representation for compilers, network intrusion detection, network protocol offload, lightweight file and I/O systems, system software for sensor networks, and virtualization in high end computing systems.

### EDUCATION

1982 PhD, Georgia Institute of Technology, Information and Computer Science

1980 MS, Georgia Institute of Technology, Information and Computer Science

1977 BS, University of Arizona, Mathematics

## **EMPLOYMENT HISTORY**

- 2022- Present** Executive Director, Institute for the Future of Data and Computing, University of Arizona, Tucson, AZ
- 2022- Present** Professor, School of Information (iSchool), University of Arizona, Tucson, AZ
- 2009–2022** Director, Computer Science and Mathematics Division, Oak Ridge National Laboratory (ORNL), Oak Ridge, TN
- 2009–2022** ORNL’s Program Relationship Manager for Department of Energy (DOE), Office of Science, Advanced Scientific Computing Research Program
- 2006–2008** Professor of Computer Science, University of New Mexico, Albuquerque, NM
- 2007–2008** Interim Chief Information Officer, University of New Mexico
- 2004–2007** Director, Center for High Performance Computing, University of New Mexico
- 2003** Associate Director, Center for High Performance Computing, University of New Mexico
- 1993–2006** Associate Professor of Computer Science, University of New Mexico
- 1982–1993** Assistant Professor of Computer Science, University of New Mexico

## **HONORS, PROFESSIONAL CONTRIBUTIONS, MEMBERSHIPS**

- 2006 Senior Research Award, School of Engineering, University of New Mexico
- 1997 Senior Teaching Award, School of Engineering, University of New Mexico
- 1991, 1996 Student’s Faculty Recognition Award, School of Engineering, University of New Mexico
- 1989–1992 Halliburton Lecturer, School of Engineering, University of New Mexico
- 1977 NIH/NLM Biomedical Trainee, Georgia Institute of Technology.

## **PROFESSIONAL CONTRIBUTIONS, MEMBERSHIPS**

- Program Committee Co-Chair; Driving Scientific and Engineering Discoveries Through the Convergence of HPC, Big Data and AI; The 18<sup>th</sup> Smoky Mountains Computational Sciences and Engineering Conference, SMC 2020; Oak Ridge, TN, October 18-20, 2021.
- Program Committee Co-Chair, Driving Scientific and Engineering Discoveries Through the Convergence of HPC, Big Data and AI; The 17<sup>th</sup> Smoky Mountains Computational Sciences and Engineering Conference, SMC 2020; Oak Ridge, TN, August 26-28, 2020
- Founding Member, The Computational Research Leadership Council (a council of computing organizations at 8 DOE National Laboratories), 2016–2021.
- Member, Steering Committee, Association for Computing Machinery (ACM) High-performance Parallel and Distributed Computing (HPDC) conferences, 2012–2021.
- Member, External Review Committee for Sandia National Laboratory’s CIS (Computing and Information Sciences) Center, 2002, 2005–2021.

- Co-lead, AI for Science Townhalls held at Argonne National Laboratory (July 2019), Oak Ridge National Laboratory (August 2019), and Lawrence Berkeley National Laboratory (September 2019). Final report available at <https://publications.anl.gov/anlpubs/2020/03/158802.pdf>.
- Member, Technical Program Committee, Association for Computing Machinery (ACM) High-performance Parallel and Distributed Computing (HPDC) conferences, 2010–2019.
- General Chair, ACM HPDC, June 8–11, 2011, San Jose, CA.
- Member, Technical Program Committee, ISC High Performance 2016 and 2017 (previously known as International Supercomputing Conference), June 19–23, 2016, Frankfurt, Germany; June 18–22, 2015, Frankfurt, Germany.
- Member, Technical Program Committee, Supercomputing conferences, 2006, 2008–2014, 2017, 2019, 2020, 2021.
- Member, Program Committee for DOE Office of Science, Advanced Scientific Computing Research Program Principle Investigator meeting, 2017, Rockville, MD.
- Member, Long-Range Planning Committee, DOE Office of Science, Advanced Scientific Computing Research Program, 2015–2016.
- Session Co-Moderator, “Software, Tools, and Techniques for Exascale”, Computing, US-India High Performance Computing Mini Symposium, US-India Workshop on High Performance Computing Systems and Applications, December 15, 2013, Bangalore, India.
- Member, External Review Panel for DOE Office of Science, High Energy Physics Program at Argonne National Laboratory, February 8–10, 2011, Argonne, IL.
- Member, External Review Panel for Computing, Environment, and Life Science Directorate, Argonne National Laboratory, September 18–20, 2012, Argonne, IL.
- Reviewer, National Science Foundation; Panel Reviews, 2012, 2014.
- Session Lead, “Research Challenges,” The ExaChallenge Symposium, October 16–18, 2012, Dublin, Ireland.
- Member, Exascale Operating Systems and Runtime (OS/R) Software Technical Council, Department of Energy, Office of Advanced Scientific Computing Research, 2012.
- Organizer, Poster Session, Industry-National Laboratory Workshop on Modeling and Simulation, March 7–8, 2012, Austin TX.
- Member, New Mexico Lambda Rail Board, 2007–2008.
- Member, External Review Committee for Los Alamos National Laboratory’s Computing, Communications, and Networking Division, 2002–2007.
- Chair, Technical Committee for FAST-OS (Forum to Address Scalable Technology for runtime and Operating Systems), a Department of Energy, Office of Science initiative to establish a research program for highly scalable operating systems, 2002–2007. Organizer FAST-OS Workshop, 2002, 2003.
- Vice-chair, Program Committee for IEEE International Conference on Cluster Computing, September 17–20, 2007, Austin, TX.
- Member, Program Committee for IEEE International Conferences on Cluster Computing, September 27–30, 2005, Burlington, MA and September 25–28, 2006, Barcelona, Spain.
- Member, Linux Cluster Institute International Conference on Cluster Computing, the HPC Revolution’s Steering Committee (April 25–28, 2005, Chapel Hill, NC; May 1–4, 2006, Norman, OK) and Program Committee (June 23–26, 2003, San Jose, CA; May 17–20, 2004, Austin, TX).
- Co-Editor (with Steve Chapin), special issue of *Software: Practice and Experience*, Multiprocessor Operation Systems, Vol 28(9), 899–1031, 1998.
- Co-Editor (with Steve Chapin), special issue of *IEEE Concurrency*, Multiprocessor Operation Systems, Vol 5(2), April–June, 1997.
- Co-Organizer (with Steve Chapin), Mini-track on Parallel and Distributed Operating Systems, Hawaii International Conference on Systems Sciences, January 3–6, 1996, Wailea, HI.
- Co-Chair, State of New Mexico Commission on Articulation in Computer Science, 1991–1992.
- Co-Organizer (with Bill Huntman), DOE Workshop on Future Directions in Computer Security, August 17–18, 1992, Albuquerque, NM.
- Member, Association for Computing Machinery (ACM), Institute of Electrical and Electronics Engineers (IEEE), Society for Industrial and Applied Mathematics (SIAM), and American Association for the Advancement of Science (AAAS)

## PUBLICATIONS

### Journal Articles

1. Arthur Maccabe, Hugo Falter, and William Kramer. Resource management. 2009. *International Journal of High Performance Computing Applications* 23, 4, 347–349. DOI: 10.1177/1094342009347498
2. Rolf Riesen, Ron Brightwell, Patrick G. Bridges, Trammell Hudson, Arthur B. Maccabe, Patrick M. Widener, and Kurt Ferreira. 2009. Designing and implementing lightweight kernels for capability computing. *Concurrency and Computation: Practice and Experience* 21, 6, 793–817.
3. Julie Wenbin Zhu, Patrick G. Bridges, Arthur B. Maccabe, Lightweight online performance monitoring and tuning with embedded gossip. 2009. *IEEE Transactions on Parallel and Distributed Systems* 20, 7, 1038–1049. DOI: 10.1109/TPDS.2008.126
4. Rolf Riesen, Ron Brightwell, Patrick G. Bridges, Trammell Hudson, Arthur B. Maccabe, Patrick M. Widener, and Kurt Ferreira. 2008. Designing and implementing lightweight kernels for capability computing, *Concurrency and Computation: Practice and Experience* 21, 6, 793–817. DOI: 10.1002/cpe.1361
5. Patrick G. Bridges, Arthur B. Maccabe, and O. Krieger. 2006. System software for high end computing (review). *Operating Systems Review* 40, 2, 6–7. DOI: 10.1145/1131322.1131327
6. J.C. Tournier, P. G. Bridges, A. B. Maccabe, P. M. Widener, Z. Abudayyeh, Ron Brightwell, Rolf Riesen, and T. Hudson. 2006. Towards a framework for dedicated operating systems development in high-end computing systems. *Operating Systems Review* 40, 2, 16–21. DOI: 10.1145/1131322.1131330
7. Ron Brightwell, William Camp, Benjamin Cole, Eric DeBenedictis, Robert Leland, James Tomkins, and Arthur Maccabe. 2005, Architectural specification for massively parallel computers: An experience and measurement-based approach. *Concurrency and Computation: Practice and Experience* 17, 10, 1271–1316. DOI: 10.1002/cpe.893
  - A. M. Mielke, S. M. Brennan, M. C. Smith, D. C. Torney, A. B. Maccabe, and J. F. Karlin, Independent sensor networks. 2005. *IEEE Instrumentation and Measurement Magazine* 8, 2, 33–37. DOI: 10.1109/MIM.2005.1438842
8. S. M. Brennan, A. M. Mielke, D. C. Torney, and A. B. Maccabe. 2004. Radiation detection with distributed sensor networks. *Computer* 37, 8, 57–59. DOI: 10.1109/MC.2004.103
9. Ron Brightwell, Rolf Riesen, and Arthur B. Maccabe, Design, implementation, and performance of MPI on Portals 3.0. 2003. *International Journal of High-Performance Computing Applications* 17, 1, 7–20. DOI: 10.1177/1094342003017001002
10. Stephen R. Wheat, Arthur Maccabe, Rolf Riesen, David van Dresser, and T. (Mac) Stallcup. 1994. PUMA: An Operating System for Massively Parallel Systems. *Scientific Programming* 3, 4, 275–288. DOI: 10.1155/1994/602764
11. Ron Brightwell, Arthur Maccabe, and Rolf Riesen. 2003. Design, implementation, and performance of MPI on Portals 3.0. *International Journal of High Performance Computing Applications* 17, 1, 7–19. DOI: 10.1177/1094342003017001002.
12. Ron Brightwell, L. A. Fisk, D. S. Greenberg, T. Hudson, M. Levenhage, Arthur B. Maccabe, and Rolf Riesen. 2000. Massively parallel computing using commodity components. *Parallel Computing* 26, 2–3, 243–266. DOI: 10.1016/S0167-8191(99)00104-0
13. S. Chapin and A. B. Maccabe. 1997. Multiprocessor operating systems: Harnessing the power. *IEEE Concurrency* 5, 2, 14–15. DOI: 10.1109/MCC.1997.588278
14. Stephen R. Wheat, Arthur. B. Maccabe, Rolf Riesen, David W. V. Dresser, and T. (Mac) Stallcup. 1994. Puma: An operating system for massively parallel systems. *Scientific Programming* 3, 4, 275–288. DOI: 10.3233/SPR-1994-3402
15. J. E. Sturtevant, P. M. Campbell, and A. B. Maccabe. 1992. Performance of a particle-in-cell plasma simulation code on the BBN TC2000, *Concurrency Practice and Experience* 4, 1, 1–18. DOI: 10.1002/cpe.4330040102

### Conference Proceedings

1. Jeffrey Nichols, Becky Verastegui, Arthur Barney Maccabe, Oscar Hernandez, Suzanne Parete-Koon, Theresa Ahearn: Driving Scientific and Engineering Discoveries Through the Convergence of HPC, Big Data and AI - 17th Smoky Mountains Computational Sciences and Engineering Conference, SMC 2020,

Oak Ridge, TN, USA, August 26-28, 2020, Revised Selected Papers. Communications in Computer and Information Science 1315, Springer 2020, ISBN 978-3-030-63392-9

1. Scott Klasky, Matthew Wolf, Mark Ainsworth, Chuck Atkins, Jong Choi, Greg Eisenhauer, Berk Geveci, William Godoy, Mark Kim, James Kress, Tahsin Kurc, Qing Liu, Jeremy Logan, Arthur B Maccabe, Kshitij Mehta, George Ostrouchov, Manish Parashar, Norbert Podhorszki, David Pugmire, Eric Suchyta, Lipeng Wan, Ruonan Wang. July 2018. A view from ORNL: Scientific data research opportunities in the big data age. *Proceedings of the IEEE 38th International Conference on Distributed Computing Systems (ICDCS)*.
2. Rolf Riesen, Arthur Maccabe, R. Gerofi, D. N. Lombard, J. Lange, K. Pedretti, K. Ferreira, M. Lang, P. Keppel, R.W. Wisniewski, R. Brightwell, T. Inglett, Y. Park, and Y. Ishikawa. June 2015. Panel: What is a Lightweight kernel. *Proceedings of the 5th International Workshop on Runtime and Operating Systems for Supercomputers, ROSS 2015 - In conjunction with HPDC 2015*, Portland, OR.
3. Ron Brightwell, R. Oldfield, A. B. Maccabe, and D. E. Bernholdt. June 2013. Hobbes: Composition and virtualization as the foundations of an extreme-scale OS/R, *Proceedings of the 3rd International Workshop on Runtime and Operating Systems for Supercomputers, ROSS 2013 - In conjunction with ICS 2013*. Eugene, OR. DOI: 10.1145/2481425.2481427
4. Edgar A. Leon, Rolf Riesen, Kurt B. Ferreira, and Arthur B. Maccabe. June 2011. Cache injection for parallel applications. *Proceedings ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC-20)*.
5. James Horey, Eric Nelson, and Arthur B. Maccabe. June 2010. Tables: A spreadsheet-inspired programming model for sensor networks. *Proceedings 6<sup>th</sup> IEEE International Conference on Distributed Computing in Sensor Systems*. Santa Barbara, CA.
6. Edgar A. Leon, Rolf Riesen, Arthur B. Maccabe, and Patrick G. Bridges. November 2009. Instruction-level simulation of a cluster at scale. *Proceedings of the Conference on High Performance Computing Networking, Storage and Analysis*. Portland, OR.
7. Patrick M. Widener, Matthew Barrick, Jack Pullikottil, Patrick G. Bridges, and Arthur B. Maccabe. September 2007. Metabots: A Framework for Out-of-Band Processing in Large-Scale Data Flows. *Proceedings 2007 International Conference on Grid Computing (Grid 2007)*, Austin, TX.
8. Edgar Leon, Arthur Maccabe, and Kurt Ferreira. August 2007. Reducing the impact of the memory wall for I/O using cache injection. *Proceedings 15th Annual IEEE Symposium on High Performance Interconnects (Hot Interconnects)*. Stanford, CA. DOI: 10.1109/HOTI.2007.8
9. W. Zhu, P. G. Bridges, and A. B. Maccabe. June 2009. Embedded gossip: Lightweight online measurement for large-scale applications. *Proceedings 27th International Conference on Distributed Computing Systems*. Toronto Canada. DOI: 10.1109/ICDCS.2007.107
10. Ron A. Oldfield, L. Ward, Rolf Riesen, Arthur B. Maccabe, Patrick Widener, and Todd Kordenbrock. September 2006. Lightweight I/O for scientific applications. *Proceedings of the IEEE International Conference on Cluster Computing*. Barcelona, Spain.
11. Arthur Maccabe. November 2016. FAST-OS: Forum to address scalable technology for runtime and operating systems. *Proceedings of the 2006 ACM/IEEE Conference on Supercomputing, SC'06*. Tampa, FL. DOI: 10.1145/1188455.1188495
12. G. Bresnahan, A. Maccabe, M. Williams, A. Sando, E. Brisson, and J. T. Hoffman. November 2006. New voices and new visions for engaging Native American students in computer science. *Proceedings of the 2006 ACM/IEEE Conference on Supercomputing, SC'06*. Tampa, FL, DOI: 10.1145/1188455.1188780
13. J. Horey, J. -C Tournier, A. B. Maccabe, Kaizen: Improving sensor network operating systems. October 2006. *Proceedings of the Fourth International Conference on Embedded Networked Sensor Systems*. Boulder, CO. DOI: 10.1145/1182807.1182882
14. Ron A. Oldfield, Arthur B. Maccabe, Patrick Widener, Lee Ward, and Todd Kordenbrock. September 2006. Efficient data-movement for lightweight I/O. *Proceedings of the IEEE International Conference on Cluster Computing*. Barcelona, Spain.
15. Galen Shipman, Timothy Woodall, Richard Graham, Arthur Maccabe, and Patrick Bridges. April 2006. Infiniband scalability in open MPI. *Proceedings 20th International Parallel and Distributed Processing*

- Symposium, IPDPS 2006*. Rhodes Island. Greece, 10.1109/IPDPS.2006.1639335
16. Wenbin Zhu, Patrick Bridges, and Arthur B. Maccabe. September 2005. Online critical path profiling for parallel applications. *Proceedings IEEE International Conference on Cluster Computing*. Burlington, MA. DOI: 10.1109/CLUSTR.2005.347048
  17. Patricia Gilfeather and Arthur B. Maccabe. September 2005. Modeling protocol offload for message-oriented communication. *Proceedings IEEE International Conference on Cluster Computing*. Burlington, MA. DOI: 10.1109/CLUSTR.2005.347069
  18. A. M. Mielke, S. M. Brennan, M. C. Smith, D. C. Torney, D. Jackson, J. F. Karlin, and A. B. Maccabe, Radiation detection with distributed sensor networks. 2005. *Proceedings of the Society of Photo-Optical Instrument Engineers (SPIE)*, 5778, 403–411. DOI: 10.1117/12.603498
  19. Patricia Gilfeather and Arthur B. Maccabe. April 2005. Connection-less TCP. *Proceedings 19th IEEE International Parallel and Distributed Processing Symposium, IPDPS 2005*. Denver, CO. DOI: 10.1109/IPDPS.2005.150
  20. P. G. Bridges and A. B. Maccabe. October 2004. IMPuLSE: Integrated monitoring and profiling for large-scale environments. *Proceedings 7th Workshop on Languages, Compilers, and Run-Time Support for Scalable Systems*. Houston, TX.
  21. Ron Brightwell, Rolf Riesen, K. Underwood, T. B. Hudson, P. Bridges, and A. B. Maccabe. December 2003. A performance comparison of Linux and a lightweight kernel. *Proceedings IEEE International Conference on Cluster Computing*. Hong Kong, China.
  22. Rolf Riesen and Arthur B. Maccabe. October 2003. Simple, scalable protocols for high-performance local networks. *Proceedings 28th Annual IEEE International Conference on Local Computer Networks*. Bonn, Germany.
  23. C. J. Jong and Arthur B. Maccabe. June 2003. A simulator for scalable performance tools in massively parallel systems, *Proceedings International Conference on Parallel and Distributed Processing Techniques and Applications*, Las Vegas, NV.
  24. Ron Brightwell, Arthur B. Maccabe, and Rolf Riesen. April 2003. On the appropriateness of commodity operating systems for large-scale, balanced computing systems. *Proceedings International Parallel and Distributed Processing Symposium, IPDPS 2003*. Nice, France. DOI: 10.1109/IPDPS.2003.1213164
  25. Patricia Gilfeather and Arthur B. Maccabe. October 2002. Splintering TCP. *Proceedings 17th International Symposium on Computer and Information Sciences*. Orlando, FL.
  26. Ron Brightwell, Michael Levenhagen, Rolf Riesen, and Arthur Maccabe. October 2003. A performance comparison of myrinet protocol stacks. *Proceedings 3rd Linux Clusters Institute Conference*. St. Petersburg, FL.
  27. Arthur B. Maccabe, W. B. Zhu, J. Otto, and Rolf Riesen. September 2002. Experience in offloading protocol processing to a programmable NIC. *Proceedings IEEE International Conference on Cluster Computing*. Chicago, IL. DOI: 10.1109/CLUSTR.2002.1137730
  28. William Lawry, C. Wilson, Arthur B. Maccabe, and Ron Brightwell. September 2002. COMB: A portable benchmark suite for assessing MPI overlap. *Proceedings IEEE International Conference on Cluster Computing*. Chicago, IL. DOI: 10.1109/CLUSTR.2002.1137785
  29. Ron Brightwell, William Lawry, Arthur B. Maccabe, and C. Wilson. November 2002. Improving processor availability in the MPI implementation for the ASCI/Red supercomputer. *Proceedings 27th Annual IEEE Conference on Local Computer Networks*. Tampa, FL.
  30. Edgar A. Leon, Arthur B. Maccabe, and Ron Brightwell. November 2002. Instrumenting LogP parameters in GM: Implementation and validation. *Proceedings, 27th Annual IEEE Conference on Local Computer Networks*. Tampa FL.
  31. Rolf Riesen and Arthur B. Maccabe. November 2002. RMPP: The reliable message passing protocol. *Proceedings, 27th Annual IEEE Conference on Local Computer Networks*. Tampa, FL. DOI: 10.1109/LCN.2002.1181843
  32. Ron Brightwell, Rolf Riesen, William Lawry, and Arthur B. Maccabe. April 2002. Portals 3.0: Protocol building blocks for low overhead communication. *Proceedings 16th International Parallel and Distributed Processing Symposium, IPDPS 2002*. Ft. Lauderdale, FL. DOI: 10.1109/IPDPS.2002.1016564



33. F. C. R. Reverbel and Arthur B. Maccabe. June 1997. Making CORBA objects persistent: The object database adapter approach. *Proceedings 3<sup>rd</sup> USENIX Conference on Object-oriented Technologies and Systems (COOTS)*. Portland, OR.
34. D. S. Greenberg, Ron Brightwell, L. A. Fisk, Arthur B. Maccabe, and Rof Riesen. November 1997. A system software architecture for high-end computing. *Proceedings International Conference on Supercomputing*. San Jose, CA. DOI: 10.1145/509593.509646
35. Stephen Wheat, Arthur Maccabe, Rolf Riesen, David van Dresser, and T. (Mac) Stallcup. January 1994. PUMA: An operating system for massively parallel systems. *Proceedings 27<sup>th</sup> Hawaii International Conference on Systems Sciences*. Maui, Hawaii.
36. Stephen Wheat, Karen Devine, and Arthur Maccabe. January 1994. Experience with automatic dynamic load balancing and adaptive finite element computation. *Proceedings 27<sup>th</sup> Hawaii International Conference on Systems Sciences*. Maui, Hawaii.
37. K. D. Devine, J. E. Flaherty, S. R. Wheat, and Arthur B. Maccabe. November 1993. A massively-parallel adaptive finite-element method with dynamic load balancing. *Proceedings Supercomputing 1993*, Portland, OR.
38. R. A. Ballance, Arthur B. Maccabe, and K. J. Ottenstein. June 1990. The Program Dependence Web: A representation supporting control-driven, data-driven, and demand-driven interpretation of imperative languages. *Proceedings Conference of the Special Interest Group on Programming Languages of the Association for Computing Machinery: Programming Language Design and Implementation*. White Plains, NY. DOI: 10.1145/93542.93578
39. Arthur Maccabe and Richard Leblanc. The design of a programming language based on connectivity specifications. *Proceedings 3<sup>rd</sup> International Conference on Distributed Processing Systems*.
40. Arthur Maccabe and Richard LeBlanc, A language model for fully distribute system, *Proceedings IEEE COMPCON*, September 1980.
41. Arthur Maccabe, William Underwood, and Shannon Brunjes. October 1979. Author support for the design of automated medical interviews. *Proceedings, 3<sup>rd</sup> Annual Symposium on Computer Applications in Medical Care (IEEE)*. Washington DC.

## Book

1. Maccabe, Arthur, *Computer Systems: Architecture, Organization, and Programming*, Richard D. Irwin, Inc. (now McGraw-Hill), 1993.

## Book Chapters

1. Ron Brightwell, Kurt Ferreira, Arthur B Maccabe, Kevin Pedretti, Rolf Riesen, “Sandia Line of LWKs,” in **Operating Systems for Supercomputers and High Performance Computing**, pp 23–46, 2019, Springer.
2. Rolf Riesen, Arthur B. Maccabe, “Job Scheduling,” in **Encyclopedia of Parallel Computing**, pp 997-1002, 2011, Springer.
3. Rolf Riesen, Arthur B. Maccabe, “MIMD (Multiple Instruction, Multiple Data) Machines,” in **Encyclopedia of Parallel Computing**, pp 1140-1149, 2011
4. Rolf Riesen, Arthur B. Maccabe, “Operating System Strategies,” in **Encyclopedia of Parallel Computing**, pp1391-1401, 2011, Springer.
5. Rolf Riesen, Arthur B. Maccabe, “Single System Image,” in **Encyclopedia of Parallel Computing**, pp 1820-1827, 2011, Springer.

## SELECTED INVITED PRESENTATIONS

1. “Operating and Runtime Systems Challenges for HPC Systems,” Keynote Presentation, International Workshop on Runtime and Operating System for Supercomputers, June 27, 2017, Washington DC
2. “Data Research in Computer Science and Mathematics at Oak Ridge National Laboratory,” 2014 International Workshop on BIG Data in Geo-Computing, November 10, 2014, Tsinghua University, Beijing, China

3. “Data Research in Computer Science and Mathematics at Oak Ridge National Laboratory,” Big Data Forum, China National Annual Conference in High Performance Computing, November 8, 2014, Tsinghua University, Beijing, China
4. “Interconnect Related Research at Oak Ridge National Laboratory,” ISC High Performance 2015, July 12–16, 2015, Frankfurt, Germany
5. “Critical Tools and Methods for Exascale Computing,” US-India High Performance Computing Mini Symposium, US-India Workshop on High Performance Computing Systems and Applications, December 15, 2013, Bangalore, India.
6. “Research Challenges,” The ExaChallenge Symposium, October 16–18, 2012, Dublin, Ireland.
7. “Research in Computer Science, Mathematics, and Computational Science at ORNL,” Front Range HPC Symposium, August 13–15, 2013, Laramie, WY.
8. “Foundations of Predictive Science on Extreme Scale Platforms,” Analysis, Simulation, and Test Forum Workshop, September 24, 2012, East Peoria, IL.
9. “Computing Research at ORNL,” US-Spain Bilateral Scientific Workshop on Information Science and Related Technologies, December 2–4, 2010, Santa Fe, NM.
10. “System Software,” HiPC 2010 Workshop: Reaching Exascale in this Decade, International Conference on High Performance Computing, December 19–22, 2010, Goa, India.
11. “System Software for Exascale Platforms,” Joint Workshop on Large-Scale Computer Simulation, March 8–11, 2011, Aachen, Germany.
12. “Experiences in Developing Lightweight Systems Software for Massively Parallel Systems,” First USENIX workshop on Large-Scale Computing (LASCO ’08), June 23, 2008, Boston, MA.
13. “Lightweight Systems” IEEE Supercomputing 2007 Panel, Supercomputer Operating System Kernels: A Weight Issue, November 15, 2007, Reno NV.
14. “Lightweight Operating Systems and I/O for HPC Systems,” keynote address, Brazilian Computer Society Workshop on Operating Systems, July 4, 2007, Rio de Janeiro, Brazil.

### PhD Dissertations Supervised

- 2009 Sean Brennan, “Reconfigurable Middleware Architectures for Large Scale Sensor Networks”
- 2009 Edgar Leon, “Improving the Performance of Scientific Applications Using Cache Injection”
- 2008 James Horey, “A Hierarchical Group Model for Programming Sensor Networks”
- 2005 Patricia Gilfeather, “Splintering Commodity Network Protocols in High-Performance Computing”
- 2004 Jared Dreicer, “High Performance Computing Spare Replacement Hardware Fault Tolerance”
- 2002 Rolf Riesen, “Message-Based, Error-Correcting Protocols for Scalable High-Performance Networks”
- 2001 Chu Jong, “Scalability Issues in the Development of Tools for Massively Parallel Systems”
- 1997 Philip L. Campbell, “Using Execution Discipline to Accelerate Computer Programs”
- 1996 Francisco R. Reverbel, “Persistence in Distributed Object Systems: ORB/ODBMS Integration”
- 1994 Ksheerabdh Krishna, “Representing and Extracting Program Dependences”
- 1992 Stephen R. Wheat, “A Fine-Grained Data Migration Approach to Application Load Balancing on MP MIMD Machines”

### MS Theses Supervised

- 2005 Galen Shipman, “Infiniband Scalability in Open MPI”
- 2004 Salish Sambasivan, “Design and Implementation of a Trouble Ticketing System”
- 2003 Sean Brennan, “Distributed Sensor Network Software Development Testing Through Simulation”
- 2003 Edgar Leon, “An MPI Tool to Measure Application Sensitivity to Variation in Communication Parameters”
- 2002 Wenbin Zhu, “OS Bypass Investigation and Experimentation”
- 2002 William Lawry, “COMB: A Portable MPI Benchmark to Assess Overlap”
- 2002 Dennis Lucero, “Transient Cplant”
- 2001 Todd Underwood, “Improving IP Performance by Offloading Fragmentation and Reassembly”



## Sponsored Research

2013–2016 “Hobbes: OS and Runtime Support for Application Composition,” Senior Personnel, US Department of Energy, Office of Science (\$2,500,000).

2011–2007 “CRI: Community Resource Development: An Open Source VMM,” Principle Investigator, National Science Foundation (\$300,000).

2009–2006 “Collaborative Research: Petascale I/O for High End Computing,” Principle Investigator, National Science Foundation, (\$400,000).

2009–2006 “A Framework for Dynamic Retasking and Redeployment Sensor Networks,” Principal, Investigator, US Department of Energy National Nuclear Security (\$750,000).

2009–2006 “STTR Phase I: Splintered Topologically Close-Packed (TCP) Offload Engine for Grid Computing and Bandwidth-Delay Product (BWDP),” Principle Investigator, National Science Foundation (\$150,000).

2008–2006 “Collaborative Research: BPC-DP New Voices and New Visions for Engaging Native Americans in Computer Science,” Co-Principle Investigator, National Science Foundation (\$225,000).

2008–2005 “A Framework for Adaptable Operating and Runtime Systems,” Principal Investigator, US Department of Energy, Office of Science (\$750,000).

2007–2006 “CI-TEAM Demonstration Project: Advancing Cyberinfrastructure-based Science through Education, Training, and Mentoring of Science Communities,” Co-Principle Investigator, National Science Foundation (\$250,000).

2007–2002 “Scalable Systems Software Research,” Principal Investigator, Sandia National Laboratories (\$950,000).

2007–2005 “Operating System and Networking for Distributed Sensor Networks,” Principal Investigator, Los Alamos National Laboratory (\$150,000).

2006–2003 “PERCS Productive, Easy-to-Use, Reliable Computing Systems,” Co-Principal Investigator, DARPA/IBM (\$600,000).

2006–2002 “Los Alamos Computer Science Institute,” co-Principal Investigator, Los Alamos National Laboratory (\$600,000).

2002–1996 “Continued Development of the Puma Operating System for Massively Parallel Systems,” Principal Investigator, Sandia National Laboratories (\$947,000).

2002 “High Performance Computing Fault-Tolerance,” Principal Investigator, Los Alamos National Laboratory (\$25,000).

2002–2001 “Benchmark for Measuring Operating System Bypass Performance,” Principal Investigator, Computer Science Research Institute, Sandia National Laboratories (\$43,000).

1995–1993 “Library Support for SUNMOS/PUMA,” Principal investigator, Sandia National Laboratories (\$215,197).

1993–1992 “Thread Annotations with Dataflow Semantics,” Principal Investigator, Sandia National Laboratories (\$63,000).

1993–1991 “Library Support for SUNMOS,” Principal investigator, Sandia National Laboratories (\$26,000)

1992–1991 “The Current Status of SUNMOS,” Principal investigator, Sandia National Laboratories (\$13,000).

1992–1991 “Leveled Monitoring,” Principal Investigator, Los Alamos National Laboratory (\$50,000).

1992–1991 “Leveled Monitoring and Analysis in Local Area Networks,” Principal Investigator, National Security Agency (\$57,000)

1991–1990 “Leveled Monitoring,” Principal Investigator, Los Alamos National Laboratory (\$50,000).

1990–1989 “Leveled monitoring in Intrusion Detection Systems,” Principal Investigator, Los Alamos National Laboratory (\$20,000).

1989 “Imperative Languages for the eps '88 Architecture,” Co-Principal Investigator, Sandia National Laboratories (\$20,000).

1985 “A Distributed Implementation of P&NS,” Principal Investigator, Sandia University Research Program (\$20,000).

1985 “Identification of Parallelism in Existing Software,” Principal Investigator, Sandia National Laboratories (\$30,000).

1985 “Micro Electronic Process Development,” Co-Principal Investigator, Sandia National Laboratories

1984 “Introducing Protocol Specifications into Pronet,” Principal Investigator, Sandia University Research Program (\$14,112).