

# Ewing L. (“Rusty”) Lusk

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## Education

- Ph.D. (Mathematics), University of Maryland, 1970
- M.S. (Mathematics), University of Maryland, 1969
- B.A. (Mathematics), University of Notre Dame, 1965

## Areas of Specialization

Parallel Computing, Program Visualization, Automated Theorem Proving, Logic Programming, Database Technology, Systems Software

## Professional Experience

- Director, Mathematics and Computer Science Division, Argonne National Laboratory, 2006–present
- Acting Division Director, Mathematics and Computer Science Division, Argonne National Laboratory, 2005–2006.
- Senior Fellow, Computation Institute, University of Chicago, 1999–present
- Argonne Distinguished Fellow, 2000–present
- Senior Computer Scientist, Argonne National Laboratory, 1989–2000
- Adjunct Professor, University of Chicago, 1997–present
- Computer Scientist, Argonne National Laboratory, 1982–1989
- Scientific Director, Advanced Computing Research Facility, 1989–1997
- Professor, Northern Illinois University (on leave), 1982–1983
- Scientist-in-Residence, Argonne National Laboratory, 1980–1981
- Associate Professor, Northern Illinois University, 1978–1982
- Acting Director, Northern Illinois University, Division of Computer Science, 1979
- Assistant Professor, Northern Illinois University, 1970–1978

## Awards

- R&D 100 Magazine Award for “MPICH2 1.0: Bringing Advanced New Capabilities to Parallel Computing,” 2005
- University of Chicago Medal for Distinguished Performance, 2000

## Professional Activities (External)

- Editor, Journal of Automated Reasoning, 1987–2003.
- Co-Chair, 9th International Conf. on Automated Deduction, Argonne National Laboratory, May 23-26, 1988.
- Co-Chair, North American Conference on Logic Programming, Cleveland, OH, October 16-20, 1989.

- Co-Chairman: 9th International Conf. on Automated Deduction, Argonne National Laboratory, May 23-26. 1989
- External Review Committee, "Fonds zur Förderung der Wissenschaftlichen Forschung," the National Science Foundation of Austria, 1990.
- Chair, MPI-2 Forum, 1995-1997.
- External Review Committee, ACSys Center for Advanced Computing, Australian National University, Canberra, Australia, July 1997.
- Gordon Bell Prize Committee 1997-2001 (Chair, 2000-2001).
- Member, University of Chicago Computation Institute Executive Committee, 1999–present.
- Series editor for the MIT Press Science and Engineering Computation series, 2003–present
- Chair, High-Productivity Language Systems Workshop, Oak Ridge National Laboratory, July 2006.
- Co-Chair, Nuclear Physics and Related Computational Science R&D for Advanced Fuel Cycles Workshop, Washington, D.C., August 2006.
- Member, Advanced Scientific Computing Advisory Committee subcommittee on the Fusion Energy Project, 2008.

## Books

1. L. Wos, R. Overbeek, E. Lusk, and J. Boyle, *Automated Reasoning: Introduction and Applications*, Prentice-Hall, Englewood Cliffs, New Jersey, 1984. (2<sup>nd</sup> ed. McGraw-Hill, New York, 1992) (Japanese Edition, McGraw-Hill, New York, 1987).
2. R. Overbeek, B. Parrello, and E. Lusk, *Designing IMS Data Bases from Entity-Relationship Models*, Auerback Publishers, 1985.
3. J. Boyle, R. Butler, T. Disz, B. Glickfeld, E. Lusk, R. Overbeek, J. Patterson, and R. Stevens, *Portable Programs for Parallel Processors*, Holt, Rinehart, and Winston, New York, 1987.
4. W. Gropp, E. Lusk, and A. Skjellum, *Using MPI: Portable Parallel Programming with the Message-Passing Interface*, MIT Press, Cambridge, Massachusetts, 1994. (2<sup>nd</sup> ed. 1999).
5. W. Gropp, S. Huss-Lederman, E. Lusk, A. Lumsdaine, B. Nitzberg, W. Saphir, and M. Snir, *MPI - The Complete Reference: Volume 2, the MPI-2 Extensions*, MIT Press, Cambridge, Massachusetts, 1998.
6. W. Gropp, E. Lusk, and R. Thakur, *Using MPI-2: Advanced Features of the Message-Passing Interface*, MIT Press, Cambridge, Massachusetts, 1999. (Japanese edition, Pearson Education, Japan, 2002).

## Books Edited

1. E. Lusk and R. Overbeek, eds., *Proceedings of the 9th Conference on Automated Deduction*, Lecture Notes in Computer Science, vol. 310, Springer-Verlag, 1988.
2. E. Lusk and R. Overbeek, eds., *Logic Programming, Proceedings of the 1989 North American Conference*, MIT Press, 1989.

3. T. Sterling, W. Gropp, and E. Lusk, eds., *Beowulf Cluster Computing with Unix (2nd edition)*, MIT Press, Cambridge, Massachusetts, 2003.

## Book Chapters

1. E. Lusk and R. Overbeek. "Wos and Automated Deduction at Argonne: The Ethos." *Automated Reasoning and its Applications: Essays in Honor of Larry Wos*, Robert Veroff (ed.), MIT Press, Cambridge, Massachusetts, 1997.
2. W. Gropp and E. Lusk. "Parallel Programming with MPI." *Beowulf Cluster Computing with Linux*. Ed. Thomas Sterling. MIT Press, 2002.
3. W. Gropp and E. Lusk. "Beowulf Cluster Computing with Windows." Ed. Thomas Sterling. MIT Press, 2002.
4. W. Gropp and E. Lusk, "Advanced Topics in MPI Programming." *Beowulf Cluster Computing with Linux*. Ed. Thomas Sterling, MIT Press, 2002.
5. W. Gropp and E. Lusk, "Advanced Topics in MPI Programming." *Beowulf Cluster Computing with Windows*. Ed. Thomas Sterling. MIT Press, 2002.
6. R. Butler, W. Gropp, and E. Lusk. "Introduction to Parallel Programming." *Beowulf Cluster Computing with Unix (2<sup>nd</sup> edition)*. Eds. T. Sterling, W. Gropp, and E. Lusk. MIT Press, Cambridge, Massachusetts, 2003.

## Articles in Refereed Journals and Conference Proceedings

1. E. Lusk and J. Dancis, "Embeddings of bounded topological manifolds," *Ill. J. Math.*, 17, 1973, pp. 489-504.
2. E. Lusk, "Level-preserving approximations and isotopies, and homotopy groups of embeddings," *Ill. J. Math.*, 18, 1974, pp. 147-159.
3. E. Lusk, "An obstruction to extending isotopies of PL manifolds," *Pac. J. Math.*, 56, 1975, pp. 575-579.
4. E. Lusk, "A spectral sequence approach to embedding spaces," *Ill. J. Math.*, 18, 1975, pp. 438-490.
5. F. Cohen and E. Lusk, "Coincidence point results for spaces with free  $Z_p$  - actions," *Proceedings of the Amer. Math. Soc.*, 49, 1975, pp. 245-252.
6. E. Lusk, "The mod  $p$  Smith index and a generalized Borsuk-Ulam theorem," *Michigan J. Math.*, 22, 1975, pp. 151-160.
7. E. Lusk and F. Cohen, "Configuration-like spaces and the Borsuk-Ulam theorem," *Proceedings of the Amer. Math. Soc.*, 56, 1976, pp. 313-317.
8. E. Lusk, "An advanced undergraduate course in applied computer science," *SIGCSE Bulletin*, 9, 1977, pp. 28-39.

9. E. Lusk and R. A. Overbeek, "A practical design methodology for the implementation of IMS databases using the entity-relationship model," *Proceedings of the ACM-SIGMOD*, pp. 9-21, May 1980.
10. E. Lusk and R.A. Overbeek, "Data structures and control architecture for the implementation of theorem-proving programs," *Proceedings of the Fifth Conference on Automated Deduction*, Les Arcs, France, Lecture Notes in Computer Science, vol. 87, ed. Robert Kowalski and Wolfgang Bibel, Springer-Verlag, New York, 1980, pp. 232-249.
11. E. Lusk and R. A. Overbeek, "A DML for entity relationship models," *Proceedings of the International Conference on Entity-Relationship Approach to Systems Analysis and Design*, ed. P. P. Chen, North-Holland, Amsterdam, 1980, pp. 484-500.
12. L. Wos, S. Winker, and E. Lusk, "Semigroups, antiautomorphisms, and involutions: A computer solution to an open problem I," *Mathematics of Computation*, 37, no. 156, 1981, pp. 533-545.
13. L. Wos, S. K. Winker, and E. Lusk, "An automated reasoning system," *Proceedings of the National Computer Conference*, 50, 1981, pp. 697-702.
14. E. Lusk, W. McCune, and R. A. Overbeek, "Logic machine architecture: Inference mechanisms," *Proceedings of the Sixth Conference on Automated Deduction*, Lecture Notes in Computer Science, vol. 138, ed. D. W. Loveland, Springer-Verlag, New York, 1982, pp. 85-108.
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16. E. Lusk and R. A. Overbeek, "Experiments with resolution-based theorem-proving algorithms," *Computers and Mathematics with Applications*, 8, no. 3, 1982, pp. 141-152.
17. E. Lusk, Geoffrey Margrave, and R. A. Overbeek, "Tools for the creation of IMS database designs from entity-relationship diagrams," *Entity-Relationship Approach to Software Engineering*, ed. Carl G. Davis, Sushil Jajodia, Peter A. Ng, and Raymond T. Yeh, North-Holland, New York, 1983, pp. 501-515.
18. E. Lusk and R.A. Overbeek, "Multiprocessing using macro packages that implement monitors," *Proceedings for the Argonne Workshop on Programming the Next Generation of Supercomputers*, Mathematics and Computer Science Division, Argonne National Laboratory, October 1984, pp. 91-108.
19. E. Lusk, R.A. Overbeek, and G. Petrie, "Item tracking entity-relationship models," *Proceedings of the Second Conference on the Entity-Relationship Approach to Information Modeling and Analysis*, ed. Peter P. Chen, North-Holland, Amsterdam, 1983, pp. 215-236.
20. E. Lusk and R. Stratton, "Automated reasoning in man-machine control systems," *Learning Systems and Pattern Recognition in Industrial Control*, *Proceedings of the Ninth Annual Advanced Control Conference*, ed. E. J. Kompass and T. J. Williams, Technical Publishing Company, 1983, pp. 41-47.
21. E. Lusk and R.A. Overbeek, "A portable environment for research in automated reasoning," *Proceedings of the 7th International Conference on Automated Deduction*, Lecture Notes in Computer Science, vol. 170, ed. R. E. Shostak, Springer-Verlag, New York, 1984, pp. 43-52.

22. E. Lusk and R.A. Overbeek, "Comment atteindre le milliard d'inferences par seconde," *Intelligence Artificielle et Productique*, November 1984, pp. 5-7.
23. R. Colley, S. Seeman, D. Smith, J. Gabriel, E. Lusk, and R.A. Overbeek, "An entity-relationship model for nuclear power plants," *Proceedings of the 1985 International Topical Meeting on Computer Applications for Nuclear Power Plant Operation and Control*, Tri-Cities, Washington, 1985, pp. 765-770.
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25. E. Lusk and R.A. Overbeek, "Databases and automated reasoning," *Proceedings of the 1985 International Topical Meeting on Computer Applications for Nuclear Power Plant Operation and Control*, Tri-Cities, Washington, 1985, pp. 604-610.
26. E. Lusk and R.A. Overbeek, "The tradeoffs among portability, complexity, and efficiency in multiprocessing environments," *Proceedings of the Workshop on Parallel Processing Using the Heterogeneous Element Processor*, Norman, Oklahoma, March 1985, pp. 245-260.
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29. E. Lusk and R.A. Overbeek, "Non-Horn problems," *Journal of Automated Reasoning*, 1, no. 1, 1985, pp. 103-114.
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31. E. Lusk, R.A. Overbeek, and Bruce Parrello, "General ledger systems and the design of entity-relationship models," *Journal of Data and Knowledge Engineering*, 1, North-Holland, 1985, pp. 155-180.
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33. R. Boyer, W. McCune, R.A. Overbeek, E. Lusk, M. Stickel, and L. Wos, "Set theory in first-order logic: clauses for Goedel's axioms," *Journal of Automated Reasoning*, 2, no. 3, 1986, pp. 277-327.
34. R. Butler, E. Lusk, W. McCune, and R.A. Overbeek, "Parallel logic programming for numeric applications," *Proceedings of the Third Conference on Logic Programming*, Lecture Notes in Computer Science, vol. 225, ed. Ehud Shapiro, Springer-Verlag, New York, 1986, pp. 375-388.
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*Deduction*, Lecture Notes in Computer Science, vol. 230, ed. J. H. Siekmann, Springer-Verlag, New York, 1986, pp. 588-597.

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37. E. Lusk and R.A. Overbeek, "A minimalist approach to portable, parallel programming," *The Characteristics of Parallel Algorithms*, ed. Leah H. Jamieson, Dennis B. Gannon, and Robert J. Douglass, The MIT Press, Cambridge, Massachusetts, 1987, pp. 351-362.
38. E. Lusk and R. McFadden, "Using automated reasoning tools: A study of the semigroup  $F_2 B_2$ ," *Semigroup Forum*, 36, no. 1, 1987, pp. 75-88.
39. E. Lusk and J. Dongarra, "Advanced computing research and algorithm design for different computers," *Parallel Computations and Their Impact on Mechanics*, ed. A.K. Noor, AMD 86, 1987, pp. 49-55.
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41. E. Lusk and R.A. Overbeek, "Automated reasoning and knowledge base design in the scientific programming environment," *Problem Solving Environments for Scientific Computing*, ed. B. Ford and F. Chatelin, North Holland, New York, 1987, pp. 83-96.
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49. L. Wos, E. Lusk, and R.A. Overbeek, "Subsumption, a sometimes undervalued procedure," *Computational Logic: Essays in Honor of Alan Robinson*, ed. Jean-Louis Lassez and Gordon Plotkin, MIT Press, Cambridge, Massachusetts, 1991, pp. 3–40.
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52. L. Wos and E. Lusk, "Benchmark problems in which equality plays the major role," *Automated Deduction—CADE-11*, Lecture Notes in Computer Science, vol. 605, Springer-Verlag, New York, 1992, pp. 781–785.
53. E. Lusk, W. McCune, and J. Slaney, "ROO: A parallel theorem prover," *Proceedings of CADE-11*, edited by Deepak Kapur, Lecture Notes in Artificial Intelligence, vol. 607, Springer-Verlag, New York, 1992, pp. 731–734.
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55. E. Lusk and W. McCune, "Experiments with ROO, a parallel automated deduction system," *Proceedings of Parallelization in Inference Systems*, Lecture Notes in Computer Science, vol. 590, Springer-Verlag, New York, 1992, pp. 139–162.
56. E. Lusk, "Performance visualization for parallel programs," *Theoretica Chimica Acta*, 84, 1993, pp. 377–384.
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58. J. Kimbel, E. Lusk, and C. Renolet, "Concurrent replicated simulation of anti-air warfare," *Simulation in Military and Government*, ed. M. Chinni, 1993, pp. 27–31.
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61. W. Gropp and E. Lusk, "Scalable Unix tools on parallel processors," *Proceedings of the Scalable High-Performance Computing Conference*, IEEE, 1994, pp. 56–62.
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  99. N. Desai, R. Bradshaw, and E. Lusk, "MPI cluster system software," ed. Dieter Kranzlmuller, Peter Kacsuk, and Jack Dongarra, *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, Lecture Notes in Computer Science, vol. 3241, Springer, September 2004, pp. 277-286.
  100. N. Desai, R. Bradshaw, E. Lusk, and R. Butler, "Component-based cluster system software architecture: A case study," *Proceedings of the 2004 International Conference on Cluster Computing*, IEEE Press, September, 2004.
  101. N. Desai, R. Bradshaw, and E. Lusk, "MPISH: A parallel shell for MPI programs," *Proceedings of the First Workshop on System Management Tools for LargeScale Parallel Systems*, 2004.
  102. N. Desai, R. Bradshaw, and E. Lusk, "MPISH2: Unix integration for MPI Programs, ed. Beniamino De Martino, Dieter Kranzlmuller, and Jack Dongarra, *Proceedings of the 12th European PVM/MPI Users' Group meeting, Recent Advances in Parallel Virtual Machine and Message Passing Interface*, Lecture Notes in Computer Science, vol. 3666, Springer, 2005, pp. 333-342.
  103. C. Falzone, A. Chan, E. Lusk, and W. Gropp, "Collective error detection for MPI collective operations," *Proceedings of the 12th European PVM/MPI Users' Group meeting, Recent*

*Advances in Parallel Virtual Machine and Message Passing Interface*, Lecture Notes in Computer Science 3666, Springer, 2005, pp. 138-147.

104. N. Desai, R. Bradshaw, E. Lusk, and R. Butler, "An interoperability approach to system software, tools, and libraries for clusters," *International Journal of High Performance Computing Applications*, 20, no. 3, 2006, pp. 401-407.
105. Christopher Gottbrath, Brian Barrett, William Gropp, Ewing Lusk, and Jeff Squyres, "An interface to support the identification of dynamic MPI 2 processes for scalable parallel debugging," *Recent Advances in Parallel Virtual Machine and Message Passing Interface*, 13th European PVM/MPI User's Group Meeting, Lecture Notes in Computer Science, vol. 4192, 2006, pp. 115-122.
106. Christopher Falzone, Anthony Chan, Ewing Lusk, and William Gropp, "A portable method for finding user errors in the usage of MPI collective operations," *International Journal of High Performance Computing Applications*, 21, no. 2, 2007, pp. 155-165.
107. Narayan Desai, Ewing Lusk, and Rick Bradshaw, "A composition environment for MPI programs," *International Journal of High Performance Computing Applications*, 21, no. 2, 2007, pp. 166-173.
108. Narayan Desai, Ewing Lusk, Andrew Cherry, and Theron Voran, "The computer as software component: A mechanism for developing and testing resource management software," *Proceedings of the 9<sup>th</sup> IEEE International Conference on Cluster Computing*, 2007 (CD).
109. Christopher Falzone, Anthony Chan, E. Lusk, and William Gropp, "An interoperability approach to system software, tools, and libraries for clusters," *International Journal of High Performance Computing Applications*, 21, no. 2, 2007, pp. 155-165.
110. N. Desai, E. Lusk, and R. Bradshaw, "A composition environment for MPI programs," *International Journal of High Performance Computing Applications*, 21, no. 2, 2007, pp. 166-173.
111. E. Lusk and K. Yelick, "Languages for high-productivity computing: The DARPA HPCS Language Project," *Parallel Processing Letters*, 17, no. 1, 2007, pp. 89-102.
112. Ewing Lusk and Anthony Chan, "Early experiments with the OpenMP/MPI hybrid programming model," *Proceedings OpenMP in a new Era of Parallelism*, 4th International Workshop, IWOMP 2008, May 2008, pp. 36-47.
113. Anthony Chan, William Gropp, and Ewing Lusk, "An efficient format for nearly constant-time access to arbitrary time intervals in large trace files," *Scientific Programming*, 16, no. 2, 2008, pp. 155-165.
114. P. Balaji, A. Chan, W. Gropp, R. Thakur, and E. Lusk, "Non-data-communication overheads in MPI: Analysis on BlueGene/P," ed. Alexey Lastovetsky, Tahr Kechadi, Jack Dongarra, *Recent advanced in Parallel Virtual Machine and Message Passing Interface*, 15<sup>th</sup> European PVM/MPI Users' Group Meeting, Dublin, Ireland, Sept. 2008, pp. 13-22.
115. Narayan Desai, Ewing Lusk, Daniel Buettner, Andrew Cherry, and Theron Voran, "Simulating failures on large-scale systems," *First International Workshop on Parallel Programming Models and Systems Software for High-End Computing*, IEEE Computer Society, 2008, pp. 103-108.

116. Narayan Desai, Rick Bradshaw, and Ewing Lusk, "Disparity: Scalable anomaly detection for clusters," *First International Workshop on Parallel Programming Models and Systems Software for High-End Computing*, IEEE Computer Society, 2008, pp. 116-120.
117. P. Balaji, A. Chan, R. Thakur, W. Gropp, and E. Lusk, "Toward message passing for a million processes: Characterizing MPI on a massive-scale Blue Gene/P," *Proceedings of the International Supercomputing Conference*, 2009 (best paper award).
118. P. Balaji, D. Buntinas, D. Goodell, W. Gropp, S. Kumar, E. Lusk, R. Thakur, and J.L. Traff, "MPI on a Million Processors," *Proceedings of EuroPVM/MPI*, 2009 (to appear).
119. E. Lusk, "Slouching Towards Exascale," *International Journal of High Performance Computing*, 2009 (to appear).

## Invited Talks

1. "Introduction to automated reasoning," Ninth Annual Mathematics Conference, Idaho State University, April 25, 1985.
2. "Research in mathematics with an automated assistant," Ninth Annual Mathematics Conference, Idaho State University, April 25, 1985.
3. "Portable programs for parallel processors," IBM-sponsored workshop, Peaceful Valley, Colorado, October 1985.
4. "Automated reasoning and knowledge base design in the scientific programming environment," IFIP WG 2.5 Conference on Problem Solving Environment, Sophia Antipolis, France, June 17-21, 1986.
5. "Standards in Message Passing, Shared Memory, and I/O: the MPI Approach" Brown University, Providence, Rhode Island, October 25, 1996.
6. "Programming Models for Parallel Computing," DARPA-NSF Workshop on Optimized Portable Application Libraries, Washington, D.C., October 31, 1996.
7. "Tuning MPI Applications for Peak Performance," tutorial with W. Gropp, Supercomputing '96, Pittsburgh, Pennsylvania, December 12, 1996.
8. "MPI-2," Euro-MPI Workshop, Edinburgh, Scotland, February 13, 1997.
9. "Standards in Message-Passing, shared-memory, and I/O, the MPI approach," University of Illinois, Champagne, Illinois, February 17, 1997.
10. "Tuning MPI Applications for Peak Performance," tutorial with W. Gropp, Supercomputing '97, San Jose, California, November 17, 1997.
11. "MPI and MPI-2," NPACI, La Jolla, California, August 19, 1997.
12. "I/O for Parallel Computing," "MPI-2: Standards Beyond the Message-Passing Model," Workshop on Massively, August 20, 1997.
13. "Advanced Use of MPI," European PVM-MPI User's Group meeting, Crakow, Poland, November 1997.

14. "Advanced Use of MPI," Cracow, Poland, November 1997.
15. "Recent Developments in MPI: Extending the Message Passing Interface for Scalable Parallel Computing," Microsoft Research, Redmond, WA, January 19, 1998.
16. "Recent Developments in MPI: Extending the Message Passing Interface for Scalable Parallel Computing," University of Notre Dame, Notre Dame, Indiana, January 22, 1998.
17. "MPI: A Standards-Based Approach to Scalable Parallel Computing," keynote lecture at The Second Annual National Symposium on Computational Science and Engineering, NECTEC, Bangkok, Thailand, March 26, 1998.
18. "MPI-2 Update," Ptools Annual Meeting, NCAR, Boulder, Colorado, May 4, 1998.
19. "Computer Science and Enabling Technology for Advanced Simulation," SPWorld, Toronto, Canada, August 1998.
20. "Scalable Performance Visualization with Jumpshot," NSF-INRIA Workshop on Clusters and Computational Grids for Scientific Computing, Blackberry Farm, Tennessee, September 9, 1998.
21. "Parallel I/O in MPI," SIO - ASCI workshop, Livermore, California, January 12, 1999.
22. "Why and How to Distribute Portable Software," University of Chicago Computer Science Department seminar, January 23, 1999.
23. "MPI and MPICH implementation issues," Workshop on MPI Implementation, Los Alamos, New Mexico, March 15, 1999.
24. "Scalable Performance Visualization," Ptools annual meeting, Boulder, Colorado, April 20, 1999.
25. "MPI - A State of the Universe Report," Keynote talk at European PVM/MPI Conference, September 27, 1999.
26. "MPI and MPICH on Clusters," JPDC4, Oct. 7, 1999, Oak Ridge, Tennessee.
27. "Tools for Parallel Computing," Central States Universities, Inc. Conference at Argonne, March 31, 2000.
28. "Isolating and Interfacing the Components of a Parallel Computing Environment," 7th European PVM/MPI Conference, Balatonfured, Hungary, September 13, 2000.
29. "Scalable Process Management on Clusters," Workshop on Clusters and Grids for Scientific Computing, Lyon, France, September 25, 2000.
30. "Scalable Process Management and Interfaces for Clusters," University of Notre Dame, October 13, 2000.
31. "Scalable Unix Tools," Ptools Workshop, San Diego Supercomputer Center, May 16, 2001.
32. "Fun with Parallel Process Management," San Diego Supercomputer Center, May 18, 2001.

33. "Parallel Programming with MPI on Clusters," Cluster 2001, Newport Beach, October 2001.
34. "Parallel Programming with MPI," HP/CompaqWorkshop at SC'01, Denver, November 2001.
35. "FLASH Computer Science," Lawrence Livermore National Laboratory, Livermore, February 2002.
36. "Process Management for BG/L," at ASCI Blue GeneWorkshop, Lake Tahoe, August 2002.
37. "Process Management and MPI," Workshop on Communication for Advanced Programming Models, Fort Lauderdale, August 2002.
38. "Process Management for Scalable Parallel Programs," 9th European PVM/MPI Users Group Meeting, Linz, Austria, September 2002.
39. "MPI in 2002: Has it Really Been Ten Years Already?," Cluster 2002, Chicago, September 2002.
40. "Parallel Programming and MPI," Student ACM Midwest Conference, University of Illinois, October 19, 2002.
41. "MPI: Emergence of a Community Standard," University of Chicago guest graduate class, December 5, 2002.
42. "Parallel Programming with MPI in 2003," University of Illinois Computer Science Department seminar, February 17, 2003.
43. "A Testbed Approach for Operating systems Research," FASTOS meeting, Washington, D.C., July 2003.
44. "Programming Models and Productivity," DARPA HPCS Workshop, University of Maryland, August 2003.
45. "MPI on BG/L," BlueGene Workshop, Reno, Nevada, October 14, 2003.
46. "A Curmudgeon's Outlook on Petaflops Programming," Supercomputing 2003 Panel talk, Nov. 19, 2003.
47. "Problems in the Cluster Software Programming Environment," IEEE Cluster 2003 Workshop, Hong Kong, December 2, 2003.
48. "An Open Cluster System Software Stack," EuroPVM/MPI, Budapest, Hungary, September 22, 2004.
49. "Programming Models for High Performance Computing," DARPA Workshop on High Productivity Computing Systems, Marina del Rey, California, January 2004.
50. "MPI and OpenMP," Workshop on OpenMP Programming and Tools, Houston, May 17, 2004.
51. "Programming Models and Development Environments for Parallel Computing," Committee on the future of Supercomputing, Computer Science and

- Telecommunications Board, National Research Council, Argonne, March 3, 2004.
52. "The Scalable Systems Software SciDAC Project," SciDAC PI meeting, Charleston, SC, March 22, 2004.
  53. "An Interoperability Approach to Systems Software, Tools, and Libraries," Workshop on Computational Clusters and Grids, Lyon, France, September 28, 2004.
  54. "Hardware Is Soft, Software Is Hard," Fall Creek Falls Workshop, Fall Creek, TN, October 18, 2004.
  55. "HPCS Languages," PMUA (Programming Models for HPCS Ultra-scale Applications) Workshop, Cambridge, MA, June 21, 2005.
  56. "High Productivity Language Systems—The Path Forward," keynote talk at PGAS (Partitioned Global Address Space) Workshop, Minneapolis, Minnesota, September 13, 2005.
  57. "Components of System Software for Parallel Systems," EuroPVM/MPI Workshop, September 21, 2005.
  58. "Computer Science in FLASH," FLASH Center Site Review, Chicago, IL, October 17, 2005.
  59. "Xtreme Parallel Programming," Panel at Supercomputing '05, Seattle, WA, November, 2005.
  60. "Nuclear Physics, Computer Science, and SciDAC," Physics Division, Argonne National Laboratory, December 2005.
  61. "Supercomputing Is Easier Than It Used to Be," Lawrence Livermore National Laboratory, December 12, 2005.
  62. "Nuclear Physics, Computer Science, and SciDAC," Nuclear Physics SciDAC organizational meeting, Argonne, IL, December 12, 2005.
  63. "Supercomputing Isn't as Hard as It Used to Be," GNEP Organizational Workshop, Livermore, CA, December 15, 2005.
  64. "High Productivity Language Systems: Programming Models for HPC," High Productivity Computing Systems Productivity Team Meeting, Marina del Rey, CA, January 10, 2006.
  65. "The Path Forward for HPCS Languages," HPCS Language Workshop, Oak Ridge, TN, July 21, 2006.
  66. "One Language to Rule Them All or ADA Strikes Back—An Update on the DARPA HPCS Languages," Workshop on Computational Grids, Asheville, NC, September 20, 2006.
  67. "HPCS Language Workshop Report: Findings and Plans for HPCS Language Development," Washington, DC, October 3, 2006.
  68. "ADLIB: Early experiments with the Asynchronous Dynamic Load Balancing Library," UNEDF *Ab Initio* Workshop, Argonne, January 18, 2007.
  69. "Tools and Approaches for Large-Scale Parallel Computing," University of Delaware, March 5, 2007.

70. "Exploiting the MPI Profiling Interface," Dagstuhl, Germany, August 22, 2007.
71. "Computer Science in UNEDF," UNEDF Collaboration Meeting, Pack Forest, Washington, August 2007.
72. "New and Old Tools and Programming Models for High-Performance Computing," EuroPVM/MPI07, Paris, France, Oct. 1, 2007.
73. "Is OpenMP irrelevant for HPC?" Panel presentation at International Workshop on OpenMP, Purdue University, May 2008.
74. "MPI on a Hundred Million Processors: Why Not?" Clusters and Computational Grids for Scientific Computing, Asheville, NC, September 15, 2008.
75. "MPI on a Hundred Million Processors: Why? How?" Workshop on Simulating the Future: One Million Cores and Beyond, Paris, France, September 24, 2008.
76. "HPC Survivor: Storage" ("best of panel"), Supercomputing 2008, Nov. 2008.

## Tutorials

1. "Tuning MPI Programs for Peak Performance," half-day tutorial with W. Gropp and R. Thakur, SC'97, November 1997.
2. "Tuning MPI Applications for Peak Performance," full-day tutorial with W. Gropp and R. Thakur, SC'98, December 1998.
3. "An MPI Tutorial," Kasetsart University, Bangkok, Thailand, March 25, 1998.
4. "Introduction to Performance Issues in Using MPI for Communication and I/O," tutorial with W. Gropp, and R. Thakur, Seventh IEEE International Symposium on High Performance Distributed Computing (HPDC 98), July 1998.
5. "Tuning MPI Programs for Peak Performance," half-day tutorial with W. Gropp and R. Thakur, SC'99, November 1999.
6. "Using MPI-2," half-day tutorial, 7th European PVM/MPI Conference, Balatonfured, Hungary, September 10, 2000.
7. "Using MPI-2," half-day tutorial with W. Gropp and R. Thakur, SC'00, November, 2000.
8. "Using MPI-2," full-day tutorial with W. Gropp, R. Ross, and R. Thakur, SC'01, November 2001.
9. "MPI Programming," half-day tutorial, 8th European PVM/MPI Conference, Santorini/Thera, Greece, April 2002.
10. "Using MPI-2," full-day tutorial with W. Gropp, R. Ross, and R. Thakur, SC'02, November 2002.
11. "Advanced Programming with MPI-2," full-day tutorial with W. Gropp, R. Ross, and R. Thakur, SC'03, November 2003.

12. "Advanced MPI: I/O and One-sided Operations," full day tutorial with W. Gropp, R. Thakur, and R. Ross, November 2004.
13. "Using MPI-2—A Problem Based Approach," with W. Gropp, 12th EuroPVM/MPI Workshop, Sorrento, Italy, September 2005.
14. "Advanced MPI: I/O and One-Sided Operations," full-day tutorial with W. Gropp, R. Thakur, and R. Ross, November 2005.
15. "Application Supercomputing and Multiscale Simulation Technology," full-day tutorial with Alice Koniges, David Eder, David Jefferson, and William Gropp, SC'05, Nov. 13, 2005.
16. "Using MPI-2: a Problem-Based Approach," tutorial with W. Gropp on Advanced MPI-2 at EuroPVM, Bonn, September 17, 2006.
17. "Advanced MPI: I/O and One-Sided Operations," full-day tutorial with William Gropp, Rob Ross, and Rajeev Thakur, SC'06, Tampa, Florida, Nov. 12, 2006.
18. "Application Supercomputing and Multiscale Simulation Technology," full-day tutorial with Alice Koniges, David Eder, David Jefferson, and William Gropp, SC'06, Tampa, Florida, Nov. 13, 2006.
19. "MPI: Portable Scalable Programming for High Performance Computing," half-day tutorial at HiPC, Bangalore, India, December 18, 2006.
20. "Programming in MPI for Performance," full-day tutorial with William Gropp at CScADS SciDAC Workshop, Snowbird, Utah, July 2007.
21. "MPI-2: A Problem-Based Approach," full-day tutorial with William Gropp at EuroPVM, Paris, France September 30, 2007.
22. "Application Supercomputing and Multiscale Simulation Technology," full-day tutorial with Alice Koniges, David Eder, David Jefferson, and William Gropp, SC'07, Reno, Nevada, Nov. 12, 2007.
23. "MPI-2: A Problem-Based Approach," full-day tutorial with William Gropp, EuroPVM, Dublin, Ireland, September 7, 2008.
24. "Programming in MPI for Performance, half-day tutorial, Snowbird, Utah, July 2008.

## Technical Reports

1. *An LMA-Based Theorem Power*, with R.A. Overbeek, Technical Report ANL-82-75, Argonne National Laboratory, December 1982.
2. *An Approach to Programming Multiprocessing Algorithms on the Denelcor HEP*, Technical Report ANL-83-96, Argonne National Laboratory, December 1983.
3. *Implementation of Monitors with Macros: A Programming Aid for the HEP and Other Parallel Processors*, with R. A. Overbeek, Technical Report ANL-83-97, Argonne National Laboratory, December 1983.
4. *The Automated Reasoning System ITP*, with R. A. Overbeek, Technical Report ANL-84-27, Argonne National Laboratory, April 1984.

5. *Logic Machine Architecture Inference Mechanisms - Layer 2 User Reference Manual - Release 2.0*, with R. A. Overbeek, Technical Report ANL-82-84, Argonne National Laboratory, April 1984.
6. *Research Topics: Multiprocessing Algorithms for Computational Logic*, with R. A. Overbeek, Technical Report ANL/MCS-TM-31, MCS, Argonne National Laboratory, July 1984.
7. Implementing multiprocessing algorithms now, with R. A. Overbeek, *New Directions in Software for Advanced Computer Architectures*, Technical Report ANL/MCS-TM-32, MCS, Argonne National Laboratory, August 1984, pp. 5-10.
8. Stalking the ggalip, with R. A. Overbeek, *New Directions in Software for Advanced Computer Architectures*, Technical Report ANL/MCS-TM-32, MCS, Argonne National Laboratory, August 1984, pp. 15-24.
9. Parallelism in automated reasoning systems, with R. A. Overbeek, *New Directions in Software for Advanced Computer Architectures*, Technical Report ANL/MCS-TM-32, MCS, Argonne National Laboratory, August 1984, pp. 25-34.
10. *Use of Monitors in Pascal on the Lemur: A Tutorial on the Barrier, Self-Scheduling DO-Loop, and Askfor Monitors*, with J. Clausing, R. Hagstrom, and R. A. Overbeek, Technical Report ANL-84-53, Argonne National Laboratory, July 1984.
11. *A Short Note on Achievable LIP rates Using the Warren Abstract Prolog Machine*, with J. Gabriel, T. Lindholm, and R. Overbeek, Technical Report ANL/MCS-TM-36, MCS, Argonne National Laboratory, September 1984.
12. *A Tutorial on the Warren Abstract Machine*, with J. Gabriel, T. Lindholm, and R.A. Overbeek, Technical Report ANL-84-84, Argonne National Laboratory, Argonne, Illinois, October 1984.
13. *A Tutorial on the Use of Monitors in C: Writing Portable Code for Multiprocessors*, with R.A. Overbeek and R. Olson, Technical Report ANL-85-2, Argonne National Laboratory, January 1985.
14. *Parallel Logic Programming for Numeric Applications*, with R. Butler, W. McCune, and R.A. Overbeek, Technical Report ANL/MCS-TM-72, MCS, Argonne National Laboratory, November 1985.
15. *Effective utilization of OR-parallelism: A modest proposal*, with R.A. Overbeek and L. Sterling, Technical Report ANL/MCS-TM-124, MCS, Argonne National Laboratory, June 1988.
16. *Parallelizing the Closure Computation in Automated Deduction*, with John Slaney, Technical Report MCS-P123-0190, MCS, Argonne National Laboratory, January 1990.
17. *Otter experiments pertinent to CADE-10*, with L. Wos, S. Winker, W. McCune, R. Overbeek, R. Stevens, and R. Butler, Technical Report ANL-89/39, Argonne National Laboratory, 1991.
18. *Studying Parallel Program Behavior with upshot*, with Virginia Herrarte, Technical Report ANL-91/15, Argonne National Laboratory, April 1991.

19. *R00-a parallel theorem prover*, with J. Slaney and W. McCune. Technical Report ANL/MCS-TM-149, Mathematics and Computer Science Division, Argonne National Laboratory, 1991.
20. *User's Guide to the p4 Parallel Programming System*, with Ralph Butler, ANL Tech. Report ANL-92/17.
21. *An Abstract Device Definition to Support the Implementation of a High-Level Point-to-Point Message-Passing Interface*, with W. Gropp, Preprint MCS-P342-1193, Mathematics and Computer Science Division, Argonne National Laboratory, Argonne, IL, 1993.
22. *A Test Implementation of the MPI Draft Message-Passing Standard*, with W. Gropp, ANL Tech. Report ANL-92/47.
23. *Installation guide for MPICH, a portable implementation of MPI*, with W. Gropp, Technical Report ANL-96/5, Argonne National Laboratory, 1994.
24. *User's guide for MPICH, a portable implementation of MPI*, with W. Gropp, Technical Report ANL-96/6, Argonne National Laboratory, 1994.
25. *I/O characterization of a portable astrophysics application on the IBM SP and Intel Paragon*, with R. Thakur and W. Gropp, Technical Report MCS-P534-0895, Argonne National Laboratory, October 1995.
26. *MPICH working note: Creating a new MPICH device using the channel interface*, with W. Gropp, Technical Report ANL/MCS-TM-213, Argonne National Laboratory, January 1996.
27. *User's Guide for ROMIO: a high-performance, portable MPI-IO implementation*, with R. Thakur and W. Gropp, ANL/MCS-TN-234, 1997.
28. *Users Guide for ROMIO: A High-Performance, Portable MPI-Implementation*, ANL/MCS-TM-234, July 1998.
29. *Data Sieving and Collective I/O in ROMIO*, with R. Thakur and W. Gropp, Technical Report ANL/MCS-P723-0898, August 1998.
30. *Methods to Model-Check Parallel systems Software*, O. Matlin and W. McCune, Technical Report ANL/MCS-P921-1201, 2003.
31. *HPCS Language Evaluation Preliminary Report*, Ewing Lusk, Robert Harrison, John Mellor-Crummy, Katherine Yelick, David Bernholdt, Nathan Froyd, William Gropp, Parry Husbands, Guohua Jin, Mackale Joyer, and John Shalf, March 29, 2006.
32. *Programming Models for HPCS: Calendar '05 Activities*, Ewing Lusk, David Bernholdt, Alok Choudhary, Wael Elwasif, Nathan Froyd, William Gropp, Roger Harrison, Parry Husbands, Guohua Jin, Mackale Joyner, Wei-keng Liao, John Mellor-Crummey, Boyana Norris, John Shalf, and Katherine Yelick, March 29, 2006.
33. *HPCS Language Workshop Report*, Ewing Lusk, William Gropp, Robert Harrison, John Mellor-Crummey, Katherine Yelick, and Parry Husbands, August 14, 2006.
34. *Report of the Nuclear Physics and Related Computational Science R&D for Advanced Fuel Cycles Workshop*, Lee Schroeder and Ewing Lusk, September 2006.

## Seminars and Colloquia

1. Automated reasoning in man-machine control systems, Ninth Annual Advanced Control Conference, Purdue University, September 19, 1983.
2. The Argonne Experimental Computing Facility, Northern Illinois University, March 7, 1984.
3. Applied logic and expert systems, Moraine Valley Community College, March 29, 1984.
4. The Argonne Experimental Computing Facility, Illinois Institute of Technology, March 30, 1984.
5. The Argonne Experimental Computing Facility, Fermilab, April 3, 1984.
6. Multiprocessing on the Denelcor HEP, Workshop on Implementation of Concurrent Prolog, Rehovot, Israel, April 24, 1984.
7. The Advanced Computing Research Facility, High Performance Computing Seminar Series, Argonne, July 22, 1984.
8. Techniques for writing portable code for multiprocessors, NASIG Meeting, Argonne, September 17, 1984.
9. Automated reasoning, Carnegie-Mellon University, January 20, 1985.
10. Automated reasoning, Bell Laboratories (Indian Hill), February 20, 1985.
11. Logic programming, CTD Seminar, Argonne, February 22, 1985.
12. Parallelism and logic programming, HEP Seminar, Argonne, February 27, 1985.
13. The Argonne automated reasoning system, Computer Science Department, Universitaet Kaiserslautern, June 1985.
14. Automated reasoning, Computer Science Department, DePaul University, September 1985.
15. The Argonne Advanced Computing Research Facility, CSUI, October 1985.
16. Automated reasoning, Fermilab, February 1986.
17. Portability issues in parallel programming, Northern Illinois University, September 1986.
18. Advanced implementation directions in automated theorem proving, Department of Mathematics, Australian National University, Canberra, June 1987.
19. Parallel logic programming, Department of Computer Science, Australian National University, Canberra, June 1987.
20. A portable approach to programming parallel computers, United Technology Corporation, Hartford, Connecticut, October 1987.
21. Portability issues in parallel programming, Department of Computer Science, University of Iowa, October 1987.

22. Multiprocessing and logic programming, Department of Computer Science, University of Chicago, March 1988.
23. Parallel programming in logic, University of Maryland, March 1988.
24. High performance automated reasoning, University of Texas, April 1988.
25. Providing research resources for high-performance computing: The Advanced Computing Research Facility at Argonne National Laboratory, Australian National University, July 1988.
26. A three-day course in parallel computation, Australian National University, July 1988.
27. Parallel programming in logic, University of Sidney, July 1988.
28. Parallel programming in logic, University of Wollongong, July 1988.
29. Parallel programming in logic, Melbourne University, August 1988.
30. More oxen or a bigger ox: The challenge of parallel computation in the 90's, Australian National University, August 1988.

### **Other Presentations (selected)**

1. Dominos problem, First Annual Workshop on Automated Reasoning, Argonne National Laboratory, May 18, 1982.
2. Abstract algebra and Kaplansky's problem, First Annual Workshop on Automated Reasoning, Argonne National Laboratory, May 18, 1982.
3. Annunciator and nuclear reactor safety, First Annual Workshop on Automated Reasoning, Argonne National Laboratory, May 19, 1982.
4. Demonstration of an automated reasoning program, Second Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 14, 1983.
5. Logic circuit design, Second Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 15, 1983.
6. Good and bad choices in automated reasoning, Second Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 16, 1983.
7. Control systems, Second Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 16, 1983.
8. Our existing automated reasoning software, Second Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 16, 1983.
9. An approach to programming the Denelcor HEP, Los Alamos National Laboratory, October 18, 1983.
10. The implementation of portable code for multiprocessors, with R. Overbeek, Taxonomy of Parallel Algorithms Workshop, Santa Fe, November 30, 1983.

11. Multiprocessing using macro packages that implement monitors, with R. Overbeek, Argonne Workshop on Programming the Next Generation of Supercomputers, Albuquerque, February 27, 1984.
12. Choices of strategies and inferences rules, DEP Workshop on Automated Reasoning, Argonne, March 8, 1984.
13. Circuit design by automated reasoning, DEP Workshop on Automated Reasoning, Argonne, March 9, 1984.
14. Our automated reasoning software, DEP Workshop on Automated Reasoning, Argonne, March 9, 1984.
15. Implementation of portable code for multiprocessors, R. Overbeek, Conference on Experiences in Applying Parallel Processors to Scientific Computation, Gleneden Beach, Oregon, March 13, 1984.
16. Circuit design by automated reasoning, Third Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 13, 1984.
17. Our automated reasoning software, Third Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 13, 1984.
18. Choices of strategies and inferences rules, Fourth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 4, 1985.
19. An introduction to Prolog, Fourth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 4, 1985.
20. State-space problems, Fourth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 5, 1985.
21. Open problems in mathematics and logic, Fourth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 5, 1985.
22. Our automated reasoning software, Fourth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 5, 1985.
23. Databases and automated reasoning, American Nuclear Society International Topical Meeting on Artificial Intelligence, September 8, 1985.
24. Portable programs for parallel processors, First RIMSIG meeting, Lawrence Livermore National Laboratory, October 1985.
25. The Argonne Advanced Computing Research Facility, ACM SIGUCCS tutorial, Argonne, May 1986.
26. Portable programs for parallel processors, ACRF Symposium on Language Issues, Argonne, June 1986.
27. Choices of strategies and inference rules, Fifth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 24, 1986.
28. Introduction to Prolog, Fifth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 25, 1986.

29. State-space problems, Fifth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 25, 1986.
30. Open problems in mathematics and logic, Fifth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 25, 1986.
31. Our automated reasoning software, Fifth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 25, 1986.
32. Watching parallel logic programs in action, Workshop on Future Directions in Logic Programming, Austin, Texas, April 1987.
33. Choices of strategies and inference rules, Sixth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 23, 1987.
34. Introduction to Prolog, Sixth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 24, 1987.
35. Open problems in mathematics and logic, Sixth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 24, 1987.
36. Our automated reasoning software, Sixth Annual Workshop on Automated Reasoning, Argonne National Laboratory, June 24, 1987.
37. Programming multiprocessors, Sequent Users Group Meeting, Oak Brook, Illinois, September, 1987
38. The Argonne scheduler for AURORA, Manchester Workshop on Parallel Logic Programming, March 1988.
39. Choices of strategies and inference rules, Automated Reasoning Workshop 1988, Argonne National Laboratory, June 9, 1988.
40. Introduction to Prolog, Automated Reasoning Workshop 1988, Argonne National Laboratory, June 10, 1988.
41. Open problems in mathematics and logic, Automated Reasoning Workshop 1988, Argonne National Laboratory, June 10, 1988.
42. Our automated reasoning software, Automated Reasoning Workshop, Argonne National Laboratory, June 10, 1988.
43. Programming parallel computers, Technology Seminar, Rockwell International, Downers Grove, Illinois, November 17, 1988.
44. HPCS language workshop report: Findings and plans for HPCS language development, Washington, D.C., October 3, 2006.
45. ADLIB: Early experiments with the Asynchronous Dynamic Load Balancing Library, UNEDF *Ab Initio* Workshop, Argonne, January 18, 2007.
46. Exploiting the MPI profiling interface, Dagstuhl, Germany, August 22, 2007.
47. Computer science in UNEDF," UNEDF Collaboration Meeting, Pack Forest, Washington, August 2007.

48. New and old tools and programming models for high-performance computing.” EuroPVM/MPI07: Paris, France, Oct. 1, 2007.
49. “Tools and Approaches for Large-Scale Parallel Computing” (invited seminar), University of Delaware, March 5, 2007.
50. Is OpenMP irrelevant for HPC? International Workshop on OpenMP, Purdue University, May 2008.