

Vincent W. Freeh

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Education

Ph.D., Computer Science, The University of Arizona, Tucson, Arizona, 1996
M.S., Computer Science, The University of Arizona, Tucson, Arizona, 1989
B.S., Engineering Mathematics, The University of Arizona, Tucson, Arizona, 1983

Professional Experience

August 2007 to present: Associate Professor, Department of Computer Science, North Carolina State University, Raleigh, North Carolina
January 2003 to August 2007: Assistant Professor, Department of Computer Science, North Carolina State University, Raleigh, North Carolina
August 1996 to December 2002: Assistant Professor, Computer Science and Engineering, University of Notre Dame, Notre Dame, Indiana
August 1992 to June 1996: Research Assistant, Department of Computer Science, University of Arizona, Tucson, Arizona
January 1992 to August 1992: Teaching Assistant, Department of Computer Science, University of Arizona, Tucson, Arizona
January 1990 to January 1992: Associate Programmer, IBM Storage Systems Division, Tucson, Arizona
January 1989 to December 1989: Company Officer, Strategy Support Systems, Inc., Tucson, Arizona
May 1988 to June 1989: Research Assistant, Optical Sciences Center, University of Arizona, Tucson, Arizona
May 1983 to May 1986: Captain, U.S. Army, 23d Engineer Battalion, Hanau, West Germany

Scholarly and Professional Honors

- IBM University Partnership Program Award, "Autonomic Power Management in Cloud Computing," 2008.
- IBM University Partnership Program Award, "Power Management in an SMP Cluster," 2007.
- IBM University Partnership Program Award, "Hypervisor-Based Autonomic Power Management," 2005.
- IBM University Partnership Program Award, "Power Management in Large Compute Centers," 2004.
- IBM University Partnership Program Award, "Boosting Web Server Performance," 2001.
- IBM Faculty Development Award, "Effectively Managing Transient Peak Loads in Web Servers," 2000.
- NSF CAREER Award, "Collaborative Memory," 1999.

Professional Service

- Program committee, 23rd IEEE International Parallel and Distributed Processing Symposium, 2009.
- Program committee, The Eighteenth International Conference on Parallel Architectures and Compilation Techniques, 2009.
- Program committee, IEEE Workshop on High-Performance, Power Aware Computing, 2009.
- Program committee, 14th International Workshop on High-Level Parallel Programming Models and Supportive Environments(HIPS), 2009.
- Program committee, IEEE Workshop on High-Performance, Power Aware Computing, 2008.
- Program committee, International Conference on Autonomic Computing, 2007.
- Program committee, IEEE Workshop on High-Performance, Power Aware Computing, 2007.
- Program committee, Latin American Autonomic Computing Symposium, 2006
- Program chair, 2d IEEE Workshop on High-Performance, Power Aware Computing, 2006.

- Program committee, 11th International Workshop on High-Level Parallel Programming Models and Supportive Environments(HIPS), 2006.
- Fellow, Shodor Education Foundation, 2005–present.
- Presenter, Dagstuhl Seminar on Power-Aware Computing, 2005.
- Program committee, International Conference on Autonomic Computing, 2005.
- Program chair, 1st IEEE Workshop on High-Performance, Power Aware Computing, 2005.
- Program committee, 10th International Workshop on High-Level Parallel Programming Models and Supportive Environments(HIPS), 2005.
- Program committee, Principles and Practices of Parallel Programming (PPoPP) 2001.

Publications

Refereed Journals — *submitted*

- [1] Vincent W. Freeh, Xiaosong Ma, Sudharshan S. Vazhkudai, and Jonathan W. Strickland. Controlling impact while aggressively scavenging idle resources. Submitted to *ACM Transactions on Autonomous and Adaptive Systems*.
- [2] Min Yeol Lim, Vincent W. Freeh and David K. Lowenthal. Adaptive, Transparent CPU Scaling Algorithms Leveraging MPI Communication Regions, Submitted to *Transactions on Parallel and Distributed Systems*

Refereed Journals

- [3] Vincent W. Freeh, Nandini Kappiah, David K. Lowenthal, and Tyler K. Bletsch. Just-in-time dynamic voltage scaling: Exploiting inter-node slack to save energy in MPI programs. *Journal of Parallel and Distributed Computing*, 68(9): 1175-1185 (2008).
- [4] Vincent W. Freeh, Feng Pan, David K. Lowenthal, Nandini Kappiah, Rob Springer, Barry L. Rountree, and Mark E. Femal. Analyzing the energy-time tradeoff in high-performance computing applications. *IEEE Transactions on Parallel and Distributed Systems*, 18(6): 835-848 (2007).
- [5] Sudharshan S. Vazhkudai, Xiaosong Ma, Vincent W. Freeh, Jonathan W. Strickland, Nandan Tammineedi, Tyler Simon, and Stephen L. Scott. Constructing collaborative desktop storage caches for large scientific datasets. *ACM Transactions on Storage*, 2(3): 221-154 (2006).
- [6] H. Richard Kendall, Vincent W. Freeh, Paul W. Schermerhorn, Peter W. Rijks, and Robert J. Minerick. Streaming extensibility in the modify-on-access file system. *J. of System Software*, 60(1):21–36, 2002.
- [7] H. Richard Kendall and Vincent W. Freeh. The design and implementation of the exported procedure call. *Software: Practice and Experience*, 32(1):83–98, January 2002.
- [8] Albert-László Barábasi, Vincent W. Freeh, Hawoong Jeong, and Jay B. Brockman. Parasitic computing. *Nature*, 412(6850):894–897, August 30 2001.
- [9] David K. Lowenthal and Vincent W. Freeh. Architecture-independent parallelism for both shared- and distributed-memory machines using the Filaments package. *Parallel Computing*, 26:1297–1323, 2000.
- [10] David K. Lowenthal, Vincent W. Freeh, and Gregory R. Andrews. Efficient fine-grain parallelism on shared-memory machines. *Concurrency—Practice and Experience*, 10(3):157–173, March 1998.
- [11] David K. Lowenthal, Vincent W. Freeh, and Gregory R. Andrews. Using fine-grain threads and run-time decision making in parallel computing. *Journal of Parallel and Distributed Computing*, 37(3):41–54, November 1996.
- [12] Vincent W. Freeh. A comparison of implicit and explicit parallel programming. *Journal of Parallel and Distributed Computing*, 34(1):50–65, April 1996.

Book Chapters

- [13] Gregory R. Madey, Vincent W. Freeh, and Renee O. Tynan. *Modeling the F/OSS Community: A Quantitative Investigation in Free/Open Source Software Development*, chapter IX, pages 203–220. Idea Publishing, 2005.

Refereed Conferences and Elite Workshops

- [14] Min Yeol Lim, Freeman Rawson, Tyler K. Bletsch, and Vincent W. Freeh. PADD: Power-Aware Domain Distribution, In *the 29th International Conference on Distributed Computing Systems (ICDCS 2009)*, Montreal, CA, June 2009.
- [15] Barry Rountree, David K. Lowenthal, Bronis R. de Supinski, Martin Schulz, Vincent W. Freeh, and Tyler K. Bletsch. Adagio: Making DVS Practical for Complex HPC Applications, In *23th ACM International Conference of Supercomputing*, New York, NY, June 2009.
- [16] Barry Rountree, David K. Lowenthal, Shelby Funk, Vincent W. Freeh, Bronis R. de Supinski, Martin Schulz. Bounding energy consumption in large-scale MPI programs. In *IEEE/ACM Supercomputing 2006 (SC '06)*, Reno, Nevada, November 2007.
(Acceptance rate: 20%, 54/268)
- [17] Min Yeol Lim, Vincent W. Freeh, and David K. Lowenthal. Adaptive, transparent frequency and voltage scaling of communication phases in MPI programs. In *IEEE/ACM Supercomputing 2006 (SC '06)*, Tampa Bay, FL, November 2006.
(Acceptance rate: 23%, 54/239)
- [18] Sudharshan Vazhkudai, Douglas Thain, Xiaosong Ma, and Vincent W. Freeh. Positioning Dynamic Storage Caches for Transient Data. The International Workshop on High Performance I/O Techniques and Deployment of Very Large Scale I/O Systems, (HiperIO '06), Barcelona, Spain, September, 2006.
- [19] Xiaosong Ma, Sudharshan S. Vazhkudai, Vincent W. Freeh, Tao Yang, Tyler A. Simon, and Stephen L. Scott. Coupling prefix caching and collective downloads for remote dataset access. In *20th ACM International Conference of Supercomputing*, page TBA, Queensland Australia, June 2006.
(Acceptance rate: 24%, 29/123)
- [20] Robert C. Springer IV, David K. Lowenthal, Barry Rountree, and Vincent W. Freeh. Minimizing execution time in MPI programs on an energy-constrained, power-scalable cluster. In *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, pages 230–8, New York, NY, April 2006.
(Acceptance rate: 27%, 25/91)
- [21] Sudharshan S. Vazhkudai, Xiaosong Ma, Vincent W. Freeh, Jonathan W. Strickland, Nandan Tammineedi, and Stephen L. Scott. FreeLoader: Scavenging desktop storage resources for scientific data. In *IEEE/ACM Supercomputing 2005 (SC '05)*, Seattle, WA, November 2005.
(Acceptance rate: 24%, 63/260)
- [22] Nandini Kappiah, Vincent W. Freeh, David K. Lowenthal, and Feng Pan. Exploiting slack time in power-aware, high-performance programs. In *IEEE/ACM Supercomputing 2005 (SC '05)*, Seattle, WA, November 2005.
(Acceptance rate: 24%, 63/260)
- [23] Mark E. Femal and Vincent W. Freeh. Boosting data center performance through non-uniform power allocation. In *Second International Conference on Autonomic Computing (ICAC)*, pages 250–262, Seattle, WA, June 2005.
(Acceptance rate: 18%, 25/142)
- [24] Jonathan W. Strickland, Vincent W. Freeh, Xiaosong Ma, and Sudharshan S. Vazhkudai. Governor: Autonomic throttling for aggressive idle resource scavenging. In *International Conference on Autonomic Computing*, pages 64–75, Seattle, WA, June 2005.
(Acceptance rate: 18%, 25/142)
- [25] Vincent W. Freeh, David K. Lowenthal, Feng Pan, and Nandani Kappiah. Using multiple energy gears in MPI programs on a power-scalable cluster. In *Principles and Practices of Parallel Programming (PPoPP)*, pages 164–173, Chicago, IL, June 2005.
(Acceptance rate: 31%, 27/87)

- [26] Vincent W. Freeh, David K. Lowenthal, Feng Pan, Nandini Kappiah, and Robert Springer. Exploring the energy-time tradeoff in MPI programs on a power-scalable cluster. In *19th IEEE International Parallel & Distributed Processing Symposium*, Denver, CO, April 2005.
(Acceptance rate: 34%, 116/338)
- [27] Vsevolod V. Panteleenko and Vincent W. Freeh. Web server performance in a WAN environment. In *International Conference on Computer Communications and Networks*, pages 364–9, Dallas, TX, October 2003.
(Acceptance rate: 30%, 79/260)
- [28] David K. Lowenthal, Vincent W. Freeh, and David W. Miller. Efficient support for two-dimensional data distributions in distributed shared memory systems. In *Proc. of the International Parallel and Distributed Processing Symposium*, Ft. Lauderdale, FL, April 2002.
(Acceptance rate: 38%, 98/258)
- [29] Vsevolod V. Panteleenko and Vincent W. Freeh. Instantaneous offloading of transient web server load. In *Proc. of the Sixth International Workshop on Web Caching and Content Distribution*, pages 131–146, Boston, MA, June 2001.
(Acceptance rate: 33%, 20/61)
- [30] Mary Hall, Peter Kogge, Jeff Koller, Pedro Diniz, Jacqueline Chame, Jeff Draper, Jeff LaCoss, John Granacki, Apoorv Srivastava, William Athas, Jay Brockman, Vincent Freeh, Joonseok Park, and Jaewook Shin. Mapping irregular applications to diva, a PIM-based data-intensive architecture. In *Proc. of SuperComputing 99*, November 1999.
- [31] H. Richard Kendall and Vincent W. Freeh. Magi: A system software model for intelligent devices. In *Proc. of the Second International Workshop on Compiler and Architecture Support for Embedded Systems*, pages 83–98, Washington, D.C., October 1999.
- [32] Jay B. Brockman, Peter M. Kogge, Vincent W. Freeh, Shannon K. Kuntz, and Thomas Sterling. Microservers: A new memory semantics for massively parallel computing. In *Proc. of the International Conference on Supercomputing*, Rhodes, Greece, June 1999.
- [33] Vincent W. Freeh and Gregory R. Andrews. Dynamically controlling false sharing in distributed shared memory. In *Proceedings of the 5th Symposium on High Performance Distributed Computing*, pages 403–10, Syracuse, NY, August 1996.
- [34] Vincent W. Freeh, David K. Lowenthal, and Gregory R. Andrews. Distributed Filaments: Efficient fine-grain parallelism on a cluster of workstations. In *First Symposium on Operating Systems Design and Implementation*, pages 201–213, Monterey, CA, November 1994.
(Acceptance rate: 12%, 21/178)

Other Referred Workshops and Conferences

- [35] Yaohang Li, Douglas Wardell, and Vincent Freeh. A Resource-Efficient Computing Paradigm for Computational Protein Modeling Applications, In *8th IEEE International Workshop on High Performance Computational Biology*, Rome, Italy, May 2009.
- [36] Min Yeol Lim and Vincent W. Freeh. Determining the Minimum Energy Consumption using Dynamic Voltage and Frequency Scaling. *IEEE Workshop on High-Performance, Power-Aware Computing*, March 26, 2007.
(Acceptance rate: 36%, 10/28)
- [37] Vincent W. Freeh, Tyler K. Bletsch, and Freeman L. Rawson, III. Scaling and Packing on a Chip Multiprocessor. To appear in *IEEE Workshop on High-Performance, Power-Aware Computing*, March 26, 2007.
(Acceptance rate: 36%, 10/28)

- [38] Yongqin Gao, Gregory R. Madey, and Vincent W. Freeh. Modeling and simulation of the open source software community. In *Agent-Directed Simulation Conference*, San Diego, CA, April 2005.
- [39] Feng Pan, Vincent W. Freeh, and Daniel M. Smith. Exploring the energy-time tradeoff in high-performance computing. In *The First IEEE Workshop on High-Performance, Power-Aware Computing*, Denver, CO, April 2005.
- [40] Mark E. Femal and Vincent W. Freeh. Safe overprovisioning: Using power limits to increase aggregate throughput. In *Workshop on Power-Aware Computer Systems*, Portland, OR, December 2004.
- [41] Gregory R. Madey, Vincent W. Freeh, Renee O. Tynan, Yongqin Gao, and Christopher Hoffman. Agent-based modeling and simulation of collaborative social network. In *Proceedings of the Americas Conference on Information Systems (AMCIS 2003)*, Tampa, FL, August 2003.
- [42] Yongqin Gao, Vincent W. Freeh, and Gregory R. Madey. Conceptual framework for agent-based modeling and simulation. In *Proceeding of NAACSOS Conference 2003*, Pittsburgh, PA, June 2003.
- [43] Yongqin Gao, Vincent W. Freeh, and Gregory R. Madey. Analysis and modeling of the open source software communit. In *Proceeding of NAACSOS Conference 2003*, Pittsburgh, PA, June 2003.
- [44] Yongqin Gao, Vincent W. Freeh, and Gregory R. Madey. Modeling and simulation of the OSS community. In *Seventh Annual Swarm Researchers Meeting (Swarm2003)*, Notre Dame, IN, April 2003.
- [45] Gregory R. Madey, Vincent W. Freeh, and Renee O. Tynan. An analysis of open source software development using social network theory and agent-based modeling. In *The 2nd Lake Arrowhead Conference on Human Complex Systems*, Lake Arrowhead, CA, 2003.
- [46] Robert J. Minerick, Vincent W. Freeh, and Peter M. Kogge. Dynamic power management using feedback. In *Workshop on Compilers and Operating Systems for Low Power*, pages 6–1–10, Charlottesville, Va, September 2002.
- [47] Gregory R. Madey, Vincent W. Freeh, and Renee O. Tynan. Agent-based modeling of open source using swarm. In *Proceedings of the Americas Conference on Information Systems (AMCIS 2002)*, Dallas, TX, August 2002.
- [48] Gregory R. Madey, Vincent W. Freeh, and Renee O. Tynan. The open source software development phenomenon: An analysis based on social network theory. In *Proceedings of the Americas Conference on Information Systems (AMCIS 2002)*, Dallas, TX, August 2002.
- [49] Gregory R. Madey, Vincent W. Freeh, and Renee O. Tynan. Understanding oss as a self-organizing process. In *Proc. of the 2nd Workshop on Open Source Software Engineering at the 24th International Conference on Software Engineering (ICSE 2002)*, Orlando, FL, May 2002.
- [50] Paul W. Schermerhorn, Robert J. Minerick, Peter W. Rijks, and Vincent W. Freeh. User-level extensibility in the mona file system. In *Proc. of the Freenix Track of the 2001 Usenix Annual Technical Conference*, pages 173–184, Boston, MA, June 2001.
- [51] Peter M. Kogge, Kanad Ghose, and Vincent W. Freeh. Morph: Adding an energy gear to a high-performance microarchitecture for embedded applications. In *Kool Chips Workshop, MICRO-33*, Monterey, CA, December 2000.
- [52] Peter M. Kogge, Jay B. Brockman, and Vincent W. Freeh. Pim architectures to support petaflops level computation in the htmt machine. In *Proceedings of 3rd Int. Workshop on Innovative Architectures (IWIA'99)*, pages 35–44, November 1999.
- [53] H. Richard Kendall and Vincent W. Freeh. The modify-on-access file system: An extensible Linux file system. In *Proc. of the International Linux Conference*, San Jose, CA, March 1999.

- [54] Peter M. Kogge, Jay B. Brockman, and Vincent W. Freeh. Processing-in-memory based systems: Performance evaluation considerations. In *Proc. of the Workshop on Performance Analysis and its Impact on Design, PAID'98*, Barcelona, Spain, June 1998.
- [55] Peter M. Kogge, Jay B. Brockman, Vincent W. Freeh, and Steven C. Bass. Petaflops, algorithms, and pims. In *Petaflops Algorithms Workshop*, April 1997.
- [56] Vincent W. Freeh and Gregory R. Andrews. `fsc`: a Sisal compiler for both distributed- and shared-memory machines. In A. P. W. Böhm and John T. Feo, editors, *Proceedings of the High-Performance Functional Computing Conference*, pages 164–172, Denver, CO, April 1995. Lawrence Livermore National Laboratory.

Magazine Articles

- [57] Vincent W. Freeh. Anatomy of a parasitic computer. *Dr. Dobb's Journal*, 332:63–67, January 2002.

Grants and Contracts

1. Department of Energy (via RENC/UNC-CH),
MAESTRO: Multicore Runtime System,
w/ Fowler (PI) from RENC, August 2008 to August 2009, \$50,000.
2. IBM University Partnership Program (UPP),
Autonomic Power Management in Cloud Computing,
Sole PI. August 2008 to August 2009, \$30,000.
3. IBM University Partnership Program (UPP),
Power Management in an SMP Cluster,
Sole PI, October 2007–September 2008, \$30,000.
4. Network Appliance Equipment Donation,
Co-PI w/ Vouk (PI), et al., July 2007, \$92,515.
5. National Oceanic and Atmospheric Administration (NOAA),
NOAA Interdisciplinary Scientific Environmental Technology (ISET) Cooperative Research and Education Center,
w/ Semazzi (PI), et al. from MEAS, September 2006 to August 2009, \$530,602.
6. NSF High-End Computing University Research Activity (HECURA), *Collaborative Research: Adaptive I/O Stack for High End Computing*,
Co-PI w/ Ma (PI), September 1, 2006–August 30, 2009, \$267,140.
7. IBM Sponsored University Research (SUR),
Next-Generation Computing in Research and Education,
Co-PI w/ Vouk (PI), et al., June 2006, \$75,000.
8. IBM University Partnership Program (UPP),
Hypervisor-Based Autonomic Power Management,
Sole PI, October, 2005–September, 2006, \$30,000.
9. IBM University Partnership Program (UPP),
Power Management in Large Compute Centers,
Sole PI, July 15, 2004–July 14, 2005, \$40,000.

10. NSF Distributed Systems (DS),
Runtime/Operating System Synergy to Exploit Simultaneous Multithreading,
PI w/ Mueller, July 1, 2004–June 30, 2007, \$380,000.
11. NSF Digital Societies and Technology (DST),
Understanding Open Source Software Development,
Co-PI w/ Madey (PI) and Tynan, September 1, 2002–August 30, 2005, \$310,529.
12. DARPA High-Productivity Computing System (HPCS),
Architectures for Trans-Petaflops Computers,
Co-PI w/ Kogge (PI), Brockman, and Schlaelicke. July 1, 2002–June 30, 2003, \$413,000.
13. IBM University Partnership Program (UPP),
Boosting Web Server Performance,
Sole PI. June 1, 2001 to May 31, 2002, \$10,000.
14. IBM University Partnership Program (UPP),
Effectively Managing Transient Peak Loads in Web Servers,
Sole PI. June 1, 2000 to May 31, 2001, \$40,000.
15. DARPA Power-Aware Computing and Communication (PAC/C),
Morphable Computer Architectures for Highly Energy Aware Systems,
Co-PI w/ Kogge (PI) and Brockman, June 1, 2000–May 31, 2003, \$1,119,220.
16. NSF CAREER,
Collaborative Memory,
Sole PI, June 1, 1999–May 31, 2003, \$200,000.
17. NASA Jet Propulsion Laboratory,
HTMT Simulator,
PI w/ Brockman, January 19, 1999–May 31, 2001, \$115,000.
18. NASA Jet Propulsion Laboratory,
Hybrid Technology, Multi-threaded Architecture,
Co-PI w/ Kogge (PI) and Brockman, April 1, 1998–March 31, 2001, \$1,145,000.
19. Lockheed-Martin,
System Concepts for Robust PIM-based Memory Accelerators,
PI w/ Kogge, September 1998–August 2000, \$25,000.
20. DARPA, NSA, & NASA,
Hybrid Technology, Multi-threaded Architecture,
Co-PI, w/ Kogge (PI) and Brockman, July 1, 1997–June 30, 2000, \$501,152.
21. Notre Dame Faculty Research Program,
Universal Memory,
Sole PI, April 1, 1997 to March 31, 1999, \$7,500.