Curriculum Vitae

Greg S. Eisenhauer, Ph.D.

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Education

Ph.D. Computer Science: College of Computing, Georgia Institute of Technology. "*An Object Infrastructure for High-Performance Interactive Applications*," Thesis chairperson: Professor Karsten Schwan, June 1998.

M.S. Computer Science: College of Engineering, University of Illinois. June 1985.

B.S. Computer Science with high honors: College of Engineering, University of Illinois, December 1983.

Positions

January 1996 - present: Research Scientist
College of Computing, Georgia Institute of Technology, Atlanta, GA.

September 1990 - December 1995: Graduate Research Assistant
College of Computing, Georgia Institute of Technology, Atlanta, GA.

June 1995 - August 1995: Intern
Object Oriented Systems Group, IBM T.J. Watson Research Center, Hawthorne, NY.

July 1985 - August 1990: Senior Research Scientist
Computer Systems Group, Honeywell Systems and Research Center, Minneapolis, MN.

Research Interests / Professional Expertise

- Program monitoring and steering
- High performance systems
- Parallel and distributed systems
- Event-based systems
- Communications middleware
- Complex software systems

Publications

Book Chapters

"Opportunities and Tools for Highly Interactive Distributed and Parallel Computing," Greg Eisenhauer, Weiming Gu, Thomas Kindler, Karsten Schwan, Dilma Silva and Jeffrey Vetter, chapter in *Parallel Computer Systems: Performance Instrumentation and Visualization*, Rebecca Koskela and Margaret Simmons, editors, ACM Press, 1996.

"Honeywell Distributed Ada – Implementation," Greg Eisenhauer and Rakesh Jha, Distributed Ada - Developments and Experience, Cambridge University Press, January 1990.

Journal Articles

"Realizing Distributed Computational Laboratories," Beth Plale, Volker Elling, Greg Eisenhauer, Karsten Schwan, Davis King, and Vernard Martin, to appear in *The International Journal of Parallel and Distributed Systems and Networks.*

"Falcon: On-line Monitoring and Steering of Parallel Programs," Weiming Gu, Greg Eisenhauer and Karsten Schwan, *Concurrency: Practice and Experience*, Volume 10, Number 9, pp. 699-736, August 1998.

"From Interactive Applications to Distributed Laboratories," Beth Schroeder, Greg Eisenhauer, Jeremy Heiner, Vernard Martin, Karsten Schwan, and Jeffrey Vetter, *IEEE Concurrency*, Volume 6, Number 2, April 1998.

"DataExchange: High Performance Communication in Distributed Laboratories," Greg Eisenhauer, Beth Schroeder, and Karsten Schwan, *Journal of Parallel Computing*, Volume 24, pp. 1713-1733, 1998.

"Design and Analysis of a Parallel Molecular Dynamics Application," Greg Eisenhauer and Karsten Schwan, in *Journal of Parallel and Distributed Computing*, Volume 35, Number 1, pp. 76-90, May 25, 1996.

Newsletters

"Framework for Collaborative Steering of Scientific Applications," Beth Schroeder, Greg Eisenhauer, Karsten Schwan, Jeremy Heiner, Vernard Martin, Song Szou, Jeffrey Vetter, Ray Wang, Fred Alyea, Bill Ribarsky and Mary Trauner, Science Information Systems Newsletter, IV(40), pp. 19-23, 1997.

"A Machine Independent Interface for Lightweight Threads," Bodhisattwa Mukherjee, Greg Eisenhauer and Kaushik Ghosh, *Operating Systems Review of the ACM Special Interest Group in Operating Systems*, pages 33-47, January 1994.

"Targeting a Traditional Compiler to a Distributed Environment," Greg Eisenhauer, Rakesh Jha and Mike Kamrad, *Ada Letters*, Volume 9, No. 2, March 1989.

"An Implementation Supporting Distributed Execution of Partitioned Ada Programs," Rakesh Jha, Greg Eisenhauer and Mike Kamrad, *Ada Letters*, Volume 9, No. 1, January 1989.

Conference Papers

"An Object-Based Infrastructure for Program Monitoring and Steering," Greg Eisenhauer and Karsten Schwan, to appear in Proceedings of the 2nd SIGMETRICS Symposium on Parallel and Distributed Tools (SPDT'98), August 1998.

"Configurable Distributed Retrieval of Scientific Data," Dilma M. Silva and Karsten Schwan and Greg Eisenhauer, Proceedings of the 2nd International Conference on Configurable Distributed Systems (ICCDS), May 1998.

"DataExchange: High Performance Communication in Distributed Laboratories," Greg Eisenhauer, Beth Schroeder, Karsten Schwan, Vernard Martin and Jeff Vetter, in Proceedings of the Ninth International Conference on Parallel and Distributed Computing and Systems (PDCS'97), October 1997. (Highly condensed version of journal article above.)

"Online Displays of Parallel Programs: Problems and Solutions," Greg Eisenhauer, Weiming Gu, Eileen Kraemer, Karsten Schwan and John Stasko, Proceedings of the Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA'97).

"From Interactive High Performance Programs to Distributed Laboratories: A Research Agenda," Greg Eisenhauer, Beth Schroeder and Karsten Schwan, Proceedings of the

SPDP'96 Workshop on Program Visualization and Instrumentation, October 1996.

"Case Study: An Integrated Approach for Steering, Visualization, and Analysis of Atmospheric Simulations," Yves Jean, Thomas Kindler, William Ribarsky, Weiming Gu, Greg Eisenhauer, Karsten Schwan, and Fred Alyea, In Proceedings of IEEE Visualization 95.

"Opportunities and Tools for Highly Interactive Distributed and Parallel Computing," Greg Eisenhauer, Weiming Gu, Thomas Kindler, Karsten Schwan, Dilma Silva and Jeffrey Vetter, In Proceedings of The Workshop On Debugging and Tuning for Parallel Computing Systems, Chatham, MA, October, 1994.

"MD – A Flexible Framework for High-Speed Parallel Molecular Dynamics," Greg Eisenhauer and Karsten Schwan, In High Performance Computing, Proceedings of the 1994 SCS Simulation Multiconference, pages 70-75, April 1994, Society for Computer Simulation.

"Falcon – Toward Interactive Parallel Programs: The On-line Steering of a Molecular Dynamics Application," Greg Eisenhauer, Weiming Gu, Karsten Schwan and Niru Mallavarupu, In Proceedings of The Third International Symposium on High-Performance Distributed Computing (HPDC-3), San Francisco, August 1994. IEEE Computer Society.

"Falcon: On-line Monitoring and Steering of Large-Scale Parallel Programs," Weiming Gu, Greg Eisenhauer, Eileen Kraemer, Karsten Schwan, John Stasko, Jeffrey Vetter and Nirupama Mallavarupu, in Proceedings of Frontiers '95, April 1995.

"Distributed Ada – Approach and Implementation," Rakesh Jha and Greg Eisenhauer, Proceedings of TRI-Ada'89 Conference, ACM SIGAda, October 1989.

"Distributed Ada," Mike Kamrad, Greg Eisenhauer, Rakesh Jha and Dennis Cornhill, Proceedings of First International Workshop on Real-Time Ada Issues, ACM SIGAda, 1987.

"Distributed Ada: Methodology, Notation and Tools," Greg Eisenhauer, Rakesh Jha and Mike Kamrad, Proceedings of the First International Conference on Ada Programming Language Applications for the NASA Space Station, NASA Johnson Space Center, June 1986.

Technical Reports

"On the Implementation of CORBA Event Channels," Greg Eisenhauer, Bodhi Mukherjee and Chris Codella, Tech Report GIT-CC-97-04, College of Computing, Georgia Institute of Technology, Atlanta, GA 30332-0280.

"The DataExchange Library," Greg Eisenhauer and Beth Schroeder, Tech Report GIT-CC-96-17, College of Computing, Georgia Institute of Technology, Atlanta, GA 30332-0280.

"Portable Self-Describing Binary Data Streams," Greg Eisenhauer, Technical Report GIT-CC-94-45, College of Computing, Georgia Institute of Technology, Atlanta, GA 30332-0280.

Selected Experience in System Development

MOSS – Dr. Eisenhauer's thesis work involved building an object-based program monitoring and steering system. This system, called the Mirror Object Steering System (MOSS) allows remote multi-layer object-based interactions with running programs. The initial implementation of MOSS is based on a CORBA-style distributed object system which Dr. Eisenhauer developed, including an IDL stub generator and and object-layer runtime system.

ECho – ECho is an event delivery middleware system developed by Dr. Eisenhauer. ECho is distinguished by efficient and flexible support for event typing and the ability to assign event handlers to specific threads for transparent support of both inter- and intra-process communication. ECho also introduces the concept of a "derived event channel." ECho uses dynamic code generation to implement derived event channels and exploit their ability to move user-level processing to remote locations.

PBIO – Portable Binary I/O is a software library for creating and reading self-describing binary data streams. It provides a mechanism through which applications can efficiently exchange binary data despite differences in machine architecture and data structure layouts. PBIO shelters reader applications from inconsequential changes in binary file and stream formats and allows them to interpret data about which they have no compile-time knowledge. Dr. Eisenhauer was the sole designer and implementor for the PBIO library, which has become an important data transport mechanism in distributed monitoring and steering.

DataExchange – DataExchange is a unique communications infrastructure based on PBIO. It is essentially a connection manager with additional features for transmission control, record routing, and record processing in a process/socket dataflow system. DataExchange is designed as the communications infrastructure for the Georgia Tech Distributed Laboratories project and allows plug-and-play connection of clients and processing of data without *a priori* knowledge of data formats or contents.

MD – MD is a complete high-performance parallel molecular dynamics system. It offers abstractions with which programmers manage the control and dataflow required for the basic molecular dynamics calculations as well as for global statistics and scientific visualization. MD is also designed to support experimentation with alternative methods of domain decomposition, thread synchronization, and exploiting molecular locality. Dr. Eisenhauer implemented MD in collaboration with application scientists in Georgia Tech's School of Physics.

Distributed Ada – In this project at Honeywell, Dr. Eisenhauer modified a commercial Ada compiler to produce code for a distributed target environment. In addition to a normal Ada program, the compiler accepted an external specification that controlled the location of each Ada package, task, subroutine or variable. The compiler and the run-time system transparently provided normal language semantics for executing this program in the distributed target environment. Dr. Eisenhauer was responsible for design and implementation of all modifications to the compiler and linker and performed several ports of the distributed runtime system. Dr. Eisenhauer worked with the original Ada compiler vendor to commercialize this compilation system and make it available as the Distributed Ada Development System from Rational Software Corporation.