Curriculum Vitae

BENJAMIN F. GOLDBERG

Courant Institute of Mathematical Sciences
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Personal

Born January 31, 1961, Las Cruces, New Mexico.

U.S. Citizen.

Education

Ph.D. in Computer Science, Yale University, 1988. Dissertation: "Multiprocessor Execution of Functional Programs."

M.S. and M.Phil in Computer Science, Yale University, 1984.

B.A. with Highest Honors in Mathematical Sciences, Williams College, Cum Laude, Phi Beta Kappa, Sigma Xi, June 1982. Honors Thesis: "Theory and Implementation of an Automatic Program Verifier."

Employment

Associate Professor (Tenured), Courant Institute of Mathematical Sciences, Department of Computer Science, New York University. September 1994 – Present.

Invited Professor, Ecole Normale Supérieur, Paris, France. June 2003 – July 2003 and June 2007 – July 2007.

Director of Graduate Studies (for the MS programs), Department of Computer Science, New York University. September 2009 – August 2012 and September 2014 – present.

Director of Undergraduate Studies, Department of Computer Science, New York University. September 1995 – August 1998 and September 2003 – August 2006.

Visiting Professor, Institute National de Recherche en Informatique et en Automatique (INRIA), Rocquencourt, France. September 1994 – August 1995.

Assistant Professor, Courant Institute of Mathematical Sciences, Department of Computer Science, New York University. September 1987 - August 1993.

Teaching Awards

New York University "Golden Dozen" Award, 1992. Awarded to twelve faculty members in the entire College of Arts and Sciences for excellence in teaching.

Professional Activities

External Review Committee: 2013 Symposium on Principles of Programming Languages (POPL)

Co-chair, Safety and Verification Track of the 12th International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS 2010).

Editorial Board, *The Computer Journal*. Published by Oxford University Press on behalf of the British Computer Society. 2007-2009.

Program Committee member: 2007 Symposium on Principles of Programming Languages (POPL)

Program Committee member: 2007 Symposium on Trends in Functional Programming (TFP)

Program Committee member: 2001 Workshop on Practical Applications of Declarative Languages (PADL'01), ACM SIGPLAN'95 Conference on Programming Language Design and Implementation, 1995 ACM SIGPLAN Symposium on Partial Evaluation and Semantics-Based Program Manipulation (PEPM '95), 1995 International Workshop on Memory Management (IWMM'95), ACM SIGPLAN'93 Conference on Programming Language Design and Implementation.

Review Panel Member, National Science Foundation, January 1998 and January 2000.

Official Collaborator, Los Alamos National Laboratory, Computing and Communications Division.

Member, Association for Computing Machinery and ACM Special Interest Group on Programming Languages (SIGPLAN).

Referee for: ACM TOPLAS, IEEE Computer, International Journal of Parallel Programming, Software Practice and Experience, Computational Intelligence, ACM TOCS, ACM Computing Surveys, etc.

Referee for a variety of ACM and IEEE conferences.

Journal Papers

"Translation and Run Time Validation of Optimized Code", with L. Zuck, A. Pnueli, C. Barrett, Y. Fang, and Y. Hu, *Formal Methods in System Design*. 27(3): 335-360, November 2005

"VOC: A Methodology for Translation Validaton of Optimizing Compilers", with L. Zuck, A. Pnueli, and Y. Fang. *Journal of Universal Computer Science*, March 2003.

"A Syntactic Method for Finding Least Fixed Points of Higher-Order Functions over Finite Domains", with Tyng-Ruey Chuang. *Journal of Functional Programming*. Vol. 7, No. 4, pp. 357-394, July 1997

"Functional Programming Languages", in ACM 50th Anniversary Issue of Computing Surveys. March 1996.

"Order-of-demand analysis for lazy languages", with Young-Gil Park. Information Processing Letters, Vol. 55, 1995, pp. 343-348.

"Static Analysis for Optimizing Reference Counting", with Young-Gil Park. Information Processing Letters, Vol. 55, 1995, pp. 229-234.

"Multiprocessor Execution of Functional Programs", International Journal of Parallel Programming, Vol. 17, No. 5, October 1988.

"Distributed Execution of Functional Programs Using Serial Combinators," with P. Hudak, IEEE Transactions on Computers, Vol. C-34, No. 10, October 1985, pp. 881-891.

Books or Chapters in Books

"Functional Programming Languages", in Handbook of Computer Science and Engineering, CRC Press, Inc. 1996.

Publications in Proceedings of Refereed Symposia

“Translation Validation of Loop Optimizations and Software Pipelining in the TVOC Framework”. Proceedings of the 17th International Static Analysis Symposium (SAS 2010), September 2010.

“TVOC: A translation validator for optimizing compilers”, with C. Barrett, Y. Fang, Y. Hu, A. Pnueli, and L. Zuck. Proceedings of the 17th International Conference on Computer Aided Verification (CAV '05), July 2005.

"Theory and algorithms for the generation and validation of speculative loop optimizations", with Y. Hu and C. Barrett. Proceedings of the 2nd IEEE International Conference on Software Engineering and Formal Methods (SEFM), September 2004.

"Into the Loops: Practical Issues in Translation Validation for Optimizing Compilers", with L. Zuck and C. Barrett. Proceedings of the Third International Workshop on Compiler Optimization meets Compiler Verification (COCV). April 2004.

"Run-Time Validation of Speculative Optimizations using CVC", with C. Barrett and L. Zuck. Proceedings of the Workshop on Runtime Verification 2003, ENTCS 89(2). July 2003.

"Software Bubbles: Using Predication to Compensate for Aliasing in Software Pipelines", with E. Chapman, C. Huneycutt, and K. Palem. Proceedings of the PACT-2002 International Conference on Parallel Architectures and Compilation Techniques, September 2002.

"Translation and Run-Time Validation of Optimized code", with L. Zuck, A. Pnueli, Y. Fang, and Y. Hu. Proceedings of the Workshop on Runtime Verification 2002, ENTCS 70(4). July 2002.

"VOC: A Translation Validator for Optimizing Compilers". Proceedings of the Workshop on Compiler Optimization Meets Compiler Verification (COCV) 2002, ENTCS 65(2). April 2002.

"Formal Models of Distributed Memory Management", with Cristian Ungureanu. Proceedings of the ACM International Conference on Functional Programming, June 1997.

"Partial Evaluation of Concurrent Programs", with Mihnea Marinescu. Proceedings of the ACM Symposium on Partial Evaluation and Program Manipulation, June 1997.

"Real-Time Deques, Multihead Turing Machines, and Purely Functional Programming", with T-R. Chuang. Proceedings of the 1993 ACM Conference on Functional Programming Languages and Computer Architecture, June 1993.

"Polymorphic Type Reconstruction for Garbage Collection without Tags", with M. Gloger. Proceedings of the 1992 ACM Conference on LISP and Functional Programming, June 1992.

"A Syntactic Approach to Fixed Point Computation on Finite Domains", with T.R. Chuang. Proceedings of the 1992 ACM Conference on LISP and Functional Programming, June 1992.

"Escape Analysis on Lists", with Y.G. Park. Proceedings of the 1992 ACM SIGPLAN Conference on Programming Language Design and Implementation, June 1992.

"Incremental Garbage Collection without Tags", Proceedings of the 1992 European Symposium on Programming, February 1992.

"Reference Escape Analysis: Optimizing Reference Counting based on the Lifetime of References", with Y.G. Park. Proceedings of the 1991 ACM/IFIP Conference on Partial Evaluation and Program Manipulation, June 1991.

"Tag-Free Garbage Collection for Strongly Typed Programming Languages", Proceedings of the ACM SIGPLAN'91 Conference on Programming Language Design and Implementation, June 1991.

"Higher Order Escape Analysis: Optimizing Stack Allocation in Functional Program Implementations", Proceedings of the 1990 European Symposium on Programming, May 1990. Springer-Verlag LNCS 432, pp. 152-160.

"Generational Reference Counting: A Reduced-Communication Distributed Storage Reclamation Scheme", Proceedings of the SIGPLAN'89 Conference on Programming Language Design and Implementation, June 1989.

“A Reduced-Communication Storage Reclamation Scheme for Distributed Memory Multiprocessors", Proceedings of the Fourth Conference on Hypercubes, Concurrent Computers, and Applications, January 1989.

"Buckwheat: Graph Reduction on a Shared Memory Multiprocessor", Proceedings of the 1988 ACM Symposium on Lisp and Functional Programming, July 1988, pp. 40-51.

"Executing Functional Programs on a Hypercube Multiprocessor", Proceedings of the Third Conference on Hypercube Concurrent Computers and Applications, January 1988.

"Detecting Sharing of Partial Applications in Functional Programs", Proceedings of the Conference on Functional Programming Languages and Computer Architecture, September 1987. Published in the Springer-Verlag Lecture Notes in Computer Science, Vol. 274, pp. 408-425.

"Serial Combinators: "Optimal" Grains of Parallelism", with P. Hudak, Proceedings of the IFIP Conference on Functional Programming Languages and Computer Architecture, September 1985. Published in the Springer-Verlag Lecture Notes in Computer Science, Vol. 201, pp. 382-389.

"Experiments in Diffused Combinator Reduction," with P. Hudak, Proceedings of the ACM Symposium on Lisp and Functional Programming, August 1984, pp. 167-176.

Keynote Addresses, Invited Talks and Tutorials

Invited Talk, “Translation Validation of Loop Optimizations and Software Pipelining (In memory of Amir Pnueli)”. 17th International Static Analysis Symposium (SAS 2010), Perpignan, France. September 2010.

Keynote Address, "Software Pipelining and Loop Optimizations in the Presence of Memory Aliasing", 8th Workshop on Compiler Techniques for High Performance Computing, Hualien, Taiwan, March 2002.

Invited Talk, "Translation Validation of Loop Optimizations", Ecole Normale Supérieur, Paris. July 2003.

Invited tutorial, "The Trimaran Compiler Research Infrastructure", given at at the following conferences:

- IEEE Symposium on Parallel Architectures and Compiler Techniques (PACT'98), Paris, October 1998.
- IEEE Symposium on Microarchitecture (MICRO-31), Dallas, December 1998.
- 1999 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'99), Atlanta, June 1999.

Tutorial, "Functional Programming", 1994 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'94). Orlando, June 1994.

Research Grants and Contracts

“Property-Based Development of reactive and Embedded Systems”, with A. Pnueli and L. Zuck. National Science Foundation, August 2007 – May 2009.

“PTV: Translation Vaiidation in the Phoenix Compiler Framework”, with A. Pnueli (coordinated proposal with L. Zuck of U. Illinois-Chicago). Microsoft, April 2006.

"A Methodology for Establishing the Dependability and Security of Telecommunication Protocols", with A. Pnueli and L. Zuck. Office of Naval Research, July 2003 – June 2005.

"Towards a Seamless Process for the Development of Embedded Systems", with A. Pnueli and L. Zuck. National Science Foundation, September 2002 - August 2005.

"Translation Validation of Advanced Compiler Optimizations", with L. Zuck and A. Pnueli. National Science Foundation, June 2001 – May 2006.

"Algorithmic Techniques for Compiler Controlled Caches", with K. Palem. Air Force, July 1999 - June 2002.

"Parallel Extensions of the MSTAR System", with E. Freudenthal. AFOSR, August 1999 - July, 2001.

"A Computational Laboratory for Automatic Target Recognition", with D. Geiger and E. Freudenthal. AFOSR, March 1998 - March 1999.

"Mobile and Stationary Target Acquisition and Recognition", DARPA/Air Force, June 1997-March 2000.

"An Integrated Parallel Programming Environment for High Performance Parallel Computing on Workstation Clusters", Department of Energy. May 1994. With Los Alamos National Laboratory and IBM.

"GRIFFIN - A Common Prototyping Language: Design, Implementation, and Assessment", with R. Dewar, M. Harrison, E. Schonberg and D. Shasha. DARPA/Office of Naval Research, May 1992 - April 1995.

"Research Training in Software Prototyping Languages and Environments". DARPA/ONR May 1992 - April 1995.

"Studies in Automatic Dynamic Load Balancing on Large Loosely-Coupled Multiprocessors", National Science Foundation Research Initiation Award. September 1989 - June 1992.

"GRIFFIN: a Common Prototyping Language", with R.Dewar, E. Schonberg, M. Harrison, and D. Shasha. DARPA/ONR September 1989 - April 1992.

New Courses Developed

“Object Oriented Programming”. An undergraduate course covering Java, C++, UML, and object oriented programming techniques.

"The Design and Programming of Embedded Systems". A graduate course addressing the hardware architecture and software design process for computing systems embedded in handheld devices, cell phones, appliances, etc.

"Compilers for Advanced Computer Architectures". A graduate course in optimization techniques for emerging microprocessors.

"Honors Programming Languages". A Ph.D. course in Programming Language Design and theory.