

Allen T. Goldberg

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Project Management: Extensive experience managing short and long-term projects with teams of up to 10 members. Deep understanding of software engineering methodologies, including requirement analysis, specification, design and test. Skilled at managing personnel and coordinating multiple projects.

Design and Problem Solving: Strong problem solving skills ranging from solving open research problems (over 30 published research papers), software design, to short-term problem analysis.

Communication: Numerous oral presentations to large audiences presenting technical results and tutorials. Effective university-level teacher. Skilled at managing meetings and finding consensus.

Technical skills: Java, JVM internals, Real Time Java, SmallTalk, SystemC, runtime verification, test case generation, programming theory and practice, program analysis, constraint solvers, compiler technology, web services, database optimization. Application to flight software and other embedded real time systems.

Research: Model-based software development, embedded systems, runtime monitoring, software fault protection, static analysis, program derivation, combining formal methods and traditional verification and validation, test case generation and Real Time Java.

Education

Ph.D. in Computer Science, Courant Institute, New York University, 1979.

M.S. in Mathematics, Courant Institute, New York University, 1974.

Work Experience

Chief Architect, Fusion Project, Cadence Design Systems, 2007 – Present.

- Fusion is an environment for model-based development of embedded systems:
 - Common semantic representation of multiple modeling frameworks
 - Integrated execution of imported SysML and Simulink models
 - Cycle-accurate execution of SysML models
 - SystemC code generator
 - Checking of execution against SysML sequence diagrams
 - System analysis framework enabling design choice representation, quantitative, constraint-based comparative analysis of design choices with design quantities informed by dynamic analysis
 - Server/client architecture for collaborative systems engineering enables sharing of models, analysis results, constraints and design structures.

Senior Research Computer Scientist, Kestrel Technologies/NASA Ames Research Center, 2001 – 2007.

- Managed NASA project to enable use of Java for flight software
- Managed and participated in research projects on software fault protection, model based development, runtime monitoring and program instrumentation.
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E-Business Consultant, Shoulders Corp. (<http://www.shoulderscorp.com>) 2000 – 2001

- Managed project to design and implement a text search capability for a client company that offers product catalog technology. This fielded system was implemented in Java.
- Managed a project to improve product catalog performance. By redesigning query and index structure I realized 12x improvements in the performance for both Oracle and MS SQL Server.

Founder and Vice President, Sylectics, developed advanced analysis methods for program re-engineering, 1998 – 2002.

Senior Research Computer Scientist, Kestrel Institute (<http://www.kestrel.edu>) Palo Alto, CA , 1985 to 2000.

- Designed and managed the development of advanced software tools for program specification, testing, and analysis in an UNIX environment.
- Managed a research group with a yearly research budget in excess of one million dollars.
- Obtained financial support to sustain group from funding agencies such as DARPA, NASA, NSA, and NSF.
- Hired research staff, negotiated sub-contracts, managed budget, coordinated with other projects, exercised active day-to-day management.
- My research contributions are in the following areas (published in high-end journals and conferences such as *OOPSLA* and *Transactions on Software Engineering, Theoretical Computer Science, VMCAI*):

Assistant Professor of Computer Science at University of California, Santa Cruz, 1979 – 1985.

Professional Activities

Board Member: Kestrel Technology, 2007 – present

Expert Group Member: Safety Critical Java Technology, Java Community Process, JSR 302, 2007 – present.

Organizer: ICAPS 2005 Workshop on Verification of Planning and Scheduling

Program Committee Member: *ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering, International Conference on Theorem Provers and Circuit Design, International Conference on Compiler Construction, Workshop on Verification and Validation of Model-Based Planning and Scheduling Systems, part of the 2005 International Conference on Automated Planning and Scheduling.*

Reviewer: NSF, *IEEE Transactions on Software Engineering, Computer Surveys, ACM Transactions on Programming Languages and Systems*, and *IEEE Software*.

Tutorials: Knowledge-Based Software Development, for IEEE tutorial program; Formal Software Development, PUCI, Rio De Janeiro, and IBM Brazil, Formal Software Development, University of Linköping, Linköping, Sweden

Affiliations: ACM, IEEE, IFIP Working Group 2.1

Personal

US citizen, clearance information available.

Selected Publications

Anton, J., E. Bush, A. Goldberg, K. Havelund, D. Smith, A. Venet, “Towards the Industrial Scale Development of Custom Static Analyzers,” *NIST Static Analysis Summit*, June, 2006.

Artho, C., D. Drusinsky, H. Barringer, A. Goldberg, K. Havelund, S. Khurshid, M. Lowry, C. Pasareanu, G. Rosu, K. Sen, W. Visser, R. Washington, “Combining test case generation and runtime verification,” *Theoretical Computer Science* 336 (2005), pp. 209-234.

K. Havelund and A. Goldberg, “Verify Your Runs”, Proceedings of the Grand Verification Challenge Workshop, Verified Software: Theories, Tools, Experiments”, Zurich, October 2005 (invited paper).

A. Goldberg K. and Havelund Automated Runtime Verification with Eagle”, paper and invited talk, Verification and Validation of Enterprise Information Systems (VVEIS '05), May, 2005.

- A. Goldberg, K. Havelund, C. McGann, "Runtime Verification for Autonomous Spacecraft Software", *2005 IEEE Aerospace Conference*.
- Barringer, H., A. Goldberg, K. Havelund and K. Sen, "Rule-Based Runtime Verification", *VMCAI'04, Fifth International Conference on Verification, Model Checking and Abstract Interpretation*, January 11-13, Venice, Italy, 2004.
- Goldberg, A., and K. Havelund, "Instrumentation of Java Bytecode for Runtime Analysis, *FTfJP'03, Fifth ECOOP Workshop on Formal Techniques for Java-like Programs*, Darmstadt, Germany, July 21, 2003.
- Brat, G., D. Giannakopoulou, A. Goldberg, K. Havelund, M. Lowry, C. Pasareanu, A. Venet, W. Visser, "Experimental Evaluation of Verification and Validation Tools on Martian Rover Software," *CMU/SEI Software Model Checking Workshop*, Pittsburg, USA, March 24, 2003.
- C. Artho, D. Drusinsky, A. Goldberg, K. Havelund, M. Lowry, C. Pasareanu, G. Rosu and W. Visser, Experiments with Test Case Generation and Runtime Analysis, *ASM'03, LNCS 2589*, March 3-7, 2003, Taormina, Italy, (conference version)
- Coglio, A., and Goldberg, A., "Type Safety in the JVM: Some Problems in Java 2 (SDK 1.2) and Proposed Solutions," *Concurrency and Computation: Practice and Experience*, 13(13):1153-1171, November 2001.
- Qian, Z., Goldberg, A., and Coglio, C., "A Formal Specification of Java Class Loading," in *Proceedings of the 15th ACM Conference on Object-Oriented Programming (OOPSLA' 00)*, pp. 325—336, Oct. 2000.
- Nyland, L., Prins, J., Goldberg, A., and Mills, P., "A Design Methodology for Data-Parallel Applications," *IEEE Transactions of Software Engineering*, Special Issue on Architecture-Independent Languages and Software Tools for Parallel Processing, Vol. 26, No. 4, April 2000, pp. 293-314.
- Goldberg, A. "A Formalization of Java Bytecode Verifier and Loader," In the *5th ACM Conference on Communication and Computer Security*, San Francisco, Nov. 1998.
- Goldberg, A. and T.C. Wang, "Integration of Linear Arithmetic and Goal-Oriented Resolution for Software Reasoning," In *Frontiers in Combining Systems, (FroCos '98)*, Amsterdam, Netherlands, Oct. 1998.
- Qian, X., Goldberg, A. "Bounds Analysis by Abstract Interpretation," *First Workshop on Automated Analysis of Programs*, Paris, France, Jan., 1997.
- Nyland, L. J. Prins, A. Goldberg, P. Mills, J. Reif, R. Wagner, "A Refinement Methodology for Data-Parallel Applications", in *Proc. EuroPar 96 Parallel Processing Conference*, Lyon, France, LNCS 1123, Springer-Verlag, 1996 (pp 145-151).
- Goldberg, A., Wang, T.C., Zimmerman, D. "Applications of Feasible Path Analysis to Program Testing," *Proceedings of the International Symposium on Software Testing and Analysis*, Seattle, WA, Aug. 1994.
- Wang T.C. and Goldberg, "KITP-93: An automated Inference System for Program Analysis," *Proceedings of 12th Conference on Automated Deduction, Lecture Notes in Artificial Intelligence*, ed. A. Bundy, vol. 814, pp. 831-836 (1994).
- Qian, X., Goldberg, A. "Referential Opacity in Non-Deterministic Data Refinement," *ACM Letters on Programming Languages and Systems*, Vol. 1-4, pp. 233-41, March 1993.
- Goldberg, A., "Reusing Software Developments," *Proceedings of the ACM SIGSOFT 4th Symposium on Software Development Environments*, December 1990.
- Goldberg, A., "Iteration in the Software Process," *Proceedings of the Third International Software Process Workshop*, Breckenridge, Colorado, Nov. 1986.
- Goldberg, A., "Knowledge-Based Programming: A Survey of Program Design and Construction Techniques," *IEEE Transactions on Software Engineering*, July 1986.

Goldberg, A., and Paige, R., "Stream Processing," *Proceedings of the 1984 Conference on LISP and Functional Programming*, Austin, Texas, pp. 53-62.

Goldberg, A., Purdom, P. and Brown, C., "Average Time Analysis of Simplified Davis-Putnam Procedures," *Information Processing Letters*, Volume 15, Number 12, 1982.

Goldberg, A., and Pohl, I., "Constraints of Complexity Computability," *Proceedings of the Second NATO Conference on Human and Artificial Thinking*, 1981.