

Victor Winter

Curriculum Vitae*

February 13, 2012

Current Position:

Associate Professor
Department of Computer Science
University of Nebraska at Omaha



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Education:

Degree	Area	Institution
Ph.D.	CS	University of New Mexico(1994)
M.S.	CS	University of New Mexico(1988)
B.S.	CS	University of New Mexico(1985)

*This document as well as most of my publications can be found in electronic form on my homepage.

Employment History

University of Nebraska at Omaha <i>Associate Professor in the Department of Computer Science</i> <i>Assistant Professor in the Department of Computer Science</i>	Omaha, Nebraska 8/2005—present 8/2001—8/2005
ETH <i>Guest Professor in the Department of Computer Science</i>	Zürich, Switzerland 7/2009—12/2009
Sandia National Laboratories <i>Principal Member of the Technical Staff (PMTS) in the High Assurance Software Systems Engineering Department</i> <i>Postdoctoral Position in the Intelligent Systems and Robotics Center</i>	Albuquerque, New Mexico 9/1996—7/2001 8/95—9/96
Arizona State University <i>Adjunct Faculty</i>	Tempe, Arizona 8/99—12/99
Department of Computer Science, University of New Mexico <i>Adjunct Faculty</i> <i>Adjunct Faculty</i> <i>Research Assistant</i> <i>Instructor</i>	Albuquerque, New Mexico 8/2000—5/2001 8/1994—5/1995 8/1989—9/1990 1/1989—5/1989
Argonne National Laboratory <i>Special Term Appointment in the Department of Mathematics and Computer Science</i> <i>Thesis Parts Appointment in the Department of Mathematics and Computer Science</i> <i>Thesis Parts Appointment in the Department of Mathematics and Computer Science</i>	Argonne, Illinois 5/1995—8/1995 6/1991—7/1994 6/1990—8/1990
Chapman University <i>Adjunct Faculty</i>	Albuquerque, New Mexico 8/94—10/94

Summary of Teaching Experience

Courses Taught at the University of Nebraska at Omaha (UNO)

Course Title	01	02	03	04	05	06	07	08	10
Introduction to the Theory of Computation					F			S, F	S
Principles of Programming Languages	F	F	F	F	F	F	F	F	
Special Topics in Program Transformation		S,F	S						
Automata, Computability, and Formal Languages				F	F	F			
Advanced Concepts in Programming Languages		S	S	S	S	S	S	S	S
Trusted Systems: Design, Analysis, and Development							F		
Type Systems Behind Programming Languages							S		
Rewriting and Program Transformation						S			

F = fall semester, S = spring semester

Course Title	11	12	13	14	15	16	17	18	19
Mathematical Foundations of Computer Science	S,F	S							
Introduction to the Theory of Computation		S							
Principles of Programming Languages	F								
Special Topics in Program Transformation									
Automata, Computability, and Formal Languages									
Advanced Concepts in Programming Languages	S								
Trusted Systems: Design, Analysis, and Development									
Type Systems Behind Programming Languages		S							
Rewriting and Program Transformation									

F = fall semester, S = spring semester

Courses Taught at Other Institutions

Course Title	Institution	Time Period
Types and Programming Languages	ETH	fall 2009
Software Engineering	Department of Computer Science University of New Mexico (UNM)	fall 2000 and spring 2001
Topics on Engineering of High Assurance Systems	Department of Computer Science Arizona State University (ASU)	fall 1999
Programming Languages	Department of Computer Science University of New Mexico (UNM)	spring 1995
Discrete Math	Department of Computer Science University of New Mexico (UNM)	spring 1995 and fall 1994
Artificial Intelligence	Department of Computer Science Chapman University	fall 1994
Introduction to Programming	University of New Mexico (UNM) Department of Computer Science	spring 1989

Grants

Source		Amount	Year
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$160,000	2012
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$212,000	2011
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$240,000	2010
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$70,000	2008 – 2009
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$65,000	2007 – 2008
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$44,000	2006 – 2007
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$25,000	2005 – 2006
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$20,000	2004 – 2005
<i>Sandia National Laboratories</i>	Victor Winter (PI)	\$80,000	2003 – 2004
<i>National Science Foundation (CCR-0313691)</i>	Victor Winter (co-PI)	\$2,128,000	2003 – 2007
<i>Sandia National Laboratories</i>	Victor Winter	\$55,000	2002 – 2003
<i>Sandia National Laboratories</i>	Victor Winter	\$61,000	2001 – 2002
<i>National Science Foundation (CCR-0209187)</i>	Victor Winter	\$90,000	2001 – 2003

Additional comments relating to grant activity.

- Sandia National Laboratories. All of the Sandia grants support research related to the development of the SCORE processor, a hardware implementation of the JVM developed at Sandia National Laboratories for use in high-consequence embedded systems.
- National Science Foundation (NSF)
 - Grant Number: CCR-0209187. Research related to this grant involves developing and enhancing the HATS transformation system.
 - Grant Number: 0313691. Burnham, B. W. (PI), Craiger, J. P. (co-PI), and Winter, V. (co-PI). Cyber Corp Scholarships for the University of Nebraska at Omaha Information Assurance Program. Award date: June 2003.

Additional Remarks

- Primary author of the BART Case Study. In his keynote address at ICSE 2000, Axel van Lamswerde stated that the BART case study was the benchmark for the formal methods community. In 2001, a week-long seminar on the BART case study was held at Dagstuhl (Seminar No. 01221). The topic of this seminar was “Can Formal Methods Cope with Software-Intensive Systems?”. This seminar focused on the BART Case Study. In 2003, Fabrice Kordon and Michael Lemoine were the Editors of a book published by Kluwer Academic Press. This book is titled “Formal Methods for Embedded Distributed Systems: How to Master the Complexity” and is devoted entirely to the BART case study.

- I am the creator and primary developer of Transformation system called HATS. HATS provides an integrated development environment (IDE) for strategic programming. The HATS interface is written in Java and the execution engine is written in SML. The Java interface provides support for file management, editors for various file types including text highlighting of keywords for the strategic programming language as well as term highlighting. The interface also provides control over execution of various portions of the execution engine (i.e., the parser, the interpreter, and the prettyprinter), and supports graphical display of term structures.

The HATS engine consists of three components: a parser, an interpreter, and a prettyprinter. A domain of discourse can be defined by defining a suitable grammar and lexer. The HATS parser supports an extended-BNF grammar and additionally supports precedence and associativity of operators and rules. The parser is an LR parser with the capability to do backtracking as needed in order to resolve local ambiguities. One can think of such a parser as an LR(K) parser for an arbitrary K. Backtracking brings the parser’s capability close to that of a scannerless generalized LR parser.

HATS is freely available and currently only on Windows systems.

Publications in Chronological Order

- [1] V. Winter. Filling the Cracks in the Dam - Shortcomings of Software Development and Analysis Tools in the High-Consequence Arena. In *Proceedings of the 13th IEEE International Symposium on High Assurance Systems Engineering (HASE)*, 2011. Position paper for panel titled “High Assurance Systems: State of the Art and Practice”.
- [2] V. Winter, J. Guerrero, C. Reinke, and J. Perry. Monarch: A High-Assurance Java-to-java (J2j) Source-code Migrator. In *Proceedings of the 13th IEEE International Symposium on High Assurance Systems Engineering (HASE)*, 2011.
- [3] V. Winter, J. Perry, H. Siy, S. Srinivasan, B. Farkas, and J. McCoy. The Tyranny of the Vital Few: The Pareto Principle in Language Design. In *Journal of Software Engineering and Applications (JSEA)*, volume 4, pages 146 – 155, March 2011.
- [4] Victor L. Winter, Harvey Siy, James McCoy, Ben Farkas, Greg Wickstrom, Doug Demming, James Perry, and Satish Srinivasan. Incorporating Standard Java Libraries into the Design of Embedded Systems. In Ke Cai, editor, *Java in Academia and Research*. iConcept Press, 2011.
- [5] A. Mametjanov, V. Winter, and R. Lämmel. More Precise Typing of Rewrite Strategies. In *Eleventh International Workshop on Language Descriptions, Tools, and Applications (LDTA 2011)*, March 2011.
- [6] James T. Perry, Victor Winter, Harvey Siy, Satish Srinivasan, Benjamin D. Farkas, and James A. McCoy. The Difficulties of Type Resolution Algorithms. Technical Report SAND2010-8745, Sandia National Laboratories, December 2010.
- [7] Victor Winter, Ralf Lämmel, and Chandrasekhar Ramakrishnan. The Fathom System. Technical Report 656, ETH Zürich, Computer Systems Institute, December 2009.
- [8] V. Winter, G. Kniesel, H. Siy, and M. Zand. Making Aspect-Orientation Accessible through Syntax-based Language Composition. *IET Software*, 3(3):291–237, 2009.
- [9] D. Resler and V. Winter. A Higher-Order Strategy for Eliminating Common Subexpressions. *Journal of Computer Languages, Systems and Structures*, 35:341–364, 2009.
- [10] Fares Fraij and Victor L. Winter. A Suggested Generic Intelligent Tutoring Framework. In *Proceedings of the International Conference on Modelling and Simulation (MS)*, pages 178–182, 2008.
- [11] Eric Lindahl and Victor L. Winter. Pattern Matching Information Flow using GADT. In *Proceedings of the 3rd International Conference on Information Warfare and Security (ICIW)*, pages 255–262. ACI, 2008.
- [12] V. Winter, Harvey Siy, Mansour Zand, and Günter Kniesel. A Prototype of a Generic Weaver. Technical Report UNO2007-10, Department of Computer Science, University of Nebraska at Omaha, August 2007.
- [13] Victor L. Winter, Azamat Mametjanov, S. E. Morrison, J. A. McCoy, and G. L. Wickstrom. Transformation-based Library Adaptation for Embedded Systems. In *Proceedings of the 10th IEEE International Symposium on High Assurance Systems Engineering (HASE)*, 2007.
- [14] Victor L. Winter and Azamat Mametjanov. Generative Programming Techniques for Java Library Migration. In *Proceedings of the Sixth International Conference on Generative Programming and Component Engineering (GPCE)*, October 2007.
- [15] V. L. Winter. Stack-based Strategic Control. In *Preproceedings of the Seventh International Workshop on Reduction Strategies in Rewriting and Programming*, June 2007.
- [16] Harvey Siy, Prasanna Aryal, Victor Winter, and Mansour Zand. Aspectual Support for Specifying Requirements in Software Product Lines. In *Proceedings of Early Aspects Workshop in Aspect-Oriented Requirements Engineering and Architecture Design*, May 2007.

- [17] Yan Wu, Mansour Zand, Harvey Siy, and Victor Winter. Construction of Ontology-Based Software Repositories by Text Mining. In *International Conference on Computational Science (ICCS)*, volume 4489 (Part III) of *LNCS*, 2007.
- [18] William L. Sousan, Victor L. Winter, Mansour Zand, and Harvey Siy. ERTSAL: A Prototype of a Domain-Specific Aspect Language for Analysis for Embedded Real-Time Systems. In *Second Workshop on Domain Specific Aspect Languages (DSAL)*, 2007.
- [19] Victor L. Winter and Deepak Kapur. Towards Dynamic Partitioning of States of a Reactive System: Train Controller Case Study. In Fabrice Kordon and Janos Sztipanovits, editors, *Reliable Systems on Unreliable Networked Platforms (12th Monterey Workshop)*, volume 4322 of *LNCS*, pages 47–69, 2007.
- [20] Victor L. Winter. Model-driven Transformation-based Generation of Java Stress Tests. *Electronic Notes in Theoretical Computer Science (ENTCS)*, 174(1):99–114, April 2007.
- [21] Victor L. Winter, Christopher Scalzo, Arpit Jain, Brent Kucera, and Azamatbek Mametjanov. Comprehension of Generative Techniques. In *Software Transformation Systems Workshop (STS)*, 2006.
- [22] Victor L. Winter, Harvey Siy, Mansour Zand, and Prasanna R. Aryal. Aspect Traceability through Invertible Weaving. In *Proceedings of Early Aspects Workshop: Traceability of Aspects in the Early Life Cycle*. IEEE, March 2006.
- [23] Victor L. Winter, Jason Beranek, Fares Fraij, Steve Roach, and Greg Wickstrom. A Transformational Perspective into the Core of an Abstract Class Loader for the SSP. *ACM Trans. on Embedded Computing Sys.*, 5(4):773–818, 2006.
- [24] Victor L. Winter. Program Transformation: What, How, Why? In *Encyclopedia of Computer Science and Engineering*. Wiley and Sons, 2006.
- [25] Victor L. Winter and Jason Beranek. Program Transformation Using HATS 1.84. In Ralf Lämmel, João Saraiva, and Joost Visser, editors, *Generative and Transformational Techniques in Software Engineering (GTTSE)*, volume 4143 of *LNCS*, pages 378–396, 2006.
- [26] Victor L. Winter, Jason Beranek, Azamatbek Mametjanov, Fares Fraij, Steve Roach, and Greg Wickstrom. A Transformational Overview of the Core Functionality of an Abstract Class Loader for the SSP. In *Proceedings of the Tenth IEEE International Workshop on Object-oriented Real-time Dependable Systems (WORDS)*, pages 344–358. IEEE, 2005.
- [27] Harvey Siy, Mansour Zand, and Victor Winter. The Role of Aspects in Domain Engineering. In *Aspects and Software Product Lines (An Early Aspects Workshop at SPLC-Europe)*, 2005.
- [28] Victor L. Winter. Strategy Construction in the Higher-Order Framework of TL. *Electronic Notes in Theoretical Computer Science (ENTCS)*, 124:149–170, March 2005.
- [29] Victor L. Winter, S. Roach, and F. Fraij. Higher-Order Strategic Programming: A Road to Software Assurance. In *The 8th IASTED International Conference on Software Engineering and Applications (SEA)*, pages 350–355, 2004.
- [30] Victor L. Winter and M. Subramaniam. The Transient Combinator, Higher-order Strategies, and the Distributed Data Problem. *Science of Computer Programming (Special Issue on Program Transformation)*, 52:165–212, 2004.
- [31] G. L. Wickstrom, J. Davis, S. E. Morrison, S. Roach, and V. L. Winter. The SSP: An Example of High-Assurance System Engineering. In *Proceedings of the 8th IEEE International Symposium on High Assurance Systems Engineering (HASE)*, pages 167–177. IEEE, 2004.
- [32] Victor L. Winter, F. Kordon, and M. Lemoine. The BART Case Study. In Fabrice Kordon and Michel Lemoine, editors, *Formal Methods for Embedded Distributed Systems: How to master the complexity*, pages 3–22. Kluwer Academic Publishers, 2004.

- [33] V. Winter, D. Kapur, and G. Fuehrer. Formal Specification and Refinement of a Safe Train Control Function. In Fabrice Kordon and Michel Lemonie, editors, *Formal Methods for Embedded Distributed Systems: How to master the complexity*, pages 25–64. Kluwer Academic Publishers, 2004.
- [34] V.L. Winter, S. Roach, and F. Fraij. Dependable Software through Higher-Order Strategic Programming. Technical Report SAND2004-0868, Sandia National Laboratories, March 2004.
- [35] Victor Winter. Strategy Application, Observability, and the Choice Combinator. Technical Report SAND2004-0871, Sandia National Laboratories, March 2004.
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- [38] V. Winter and M. Subramaniam. Higher-order Transformation and the Distributed Data Problem. Technical Report SAND2003-4587, Sandia National Laboratories, December 2003.
- [39] A. Azadmanesh, V. Winter, and B. Ghahramani. Authenticated Consensus with Diagnosis. In *The 34th Annual Symposium on Performance Evaluation of Computer and Telecommunication Systems (SCSC'02)*, 2002.
- [40] V. L. Winter. Artificial Intelligence. In Flynn and Roger, editors, *Computer Sciences (Macmillan Science Library)*. Macmillan Reference USA, 2002.
- [41] V. L. Winter. Virtual Reality. In Flynn and Roger, editors, *Computer Sciences (Macmillan Science Library)*. Macmillan Reference USA, 2002.
- [42] V. L. Winter, D. Desovski, and B. Cukic. Virtual Environment Modeling for Requirements Validation of High Consequence Systems. In *Proceedings of the Fifth International Symposium on Requirements Engineering*, 2001.
- [43] A. de Groot, J. Hooman, F. Kordon, E. Paviot-Adet, I. Mounier, M. Lemoine, G. Gaudiere, V. Winter, and D. Kapur. A Survey: Applying Formal Methods to a Software Intensive System. In *Proceedings of the 6th International Symposium on High Assurance Systems Engineering (HASE)*, pages 55–64, 2001.
- [44] D. Kapur, V. L. Winter, and R. S. Berg. Designing a Controller for a Multi-Train Multi-Track System. *Electronic Notes in Theoretical Computer Science*, 50(1):65–79, August 2001.
- [45] Deepak Kapur and Victor Winter. On the Construction of a Domain Language for a Class of Reactive Systems. In Winter and Bhattacharya, editors, *High Integrity Software*, pages 169–196, 2001.
- [46] Victor Winter, Deepak Kapur, and Ray Berg. A Refinement-based Approach for Developing Software Controllers for Train Systems. In Winter and Bhattacharya, editors, *High Integrity Software*, pages 197–240, 2001.
- [47] Victor Winter and Tom Caudell. Using Virtual Reality to Validate System Models. In Winter and Bhattacharya, editors, *High Integrity Software*, pages 301–320, 2001.
- [48] Victor Winter, Raymond Berg, and Jim Ringland. Bay Area Rapid Transit District Advance Automated Train Control System Case Study Description. In Winter and Bhattacharya, editors, *High Integrity Software*, pages 115–135, 2001.
- [49] Farokh B. Bastani, I-Ling Yen, John Linn Kashi Rao, and Victor Winter. Design for Independent Composition and Evaluation of High-Confidence Embedded Software Systems. In *Proceedings of the Monterey Workshop*, 2001.
- [50] V. L. Winter. Program Transformation in HATS. In *Proceedings of the Software Transformation Systems (STS) Workshop (part of ICSE)*, pages 26–32, 1999.

- [51] Victor L. Winter. An Overview of HATS: A Language Independent High Assurance Transformation System. In *Proceedings of the IEEE Symposium on Application-Specific Systems and Software Engineering Technology (ASSET)*, pages 222–229, 1999.
- [52] J. M. Boyle, R. D. Resler, and V. L. Winter. Do You Trust Your Compiler? *IEEE Computer*, 32(5):65–73, 1999.
- [53] Victor Winter. A Synchronous Paradigm for Modeling Stable Reactive Systems. In *Proceedings of the 4th International Symposium on High Assurance Systems Engineering (HASE)*, pages 257–265, 1999.
- [54] F. B. Bastani, V. Winter, and I-Ling Yen. Dependability of Relational Safety-Critical Programs. In *Proceedings of the 10th International Symposium on Software Reliability Engineering (ISSRE)*, pages 47–48, 1999. (fast abstract).
- [55] V. L. Winter, J. M. Covan, and L. J. Dalton. Passive Safety in High Consequence Systems. *IEEE Computer*, 31(4):35–36, 1998.
- [56] Victor L. Winter, R. S. Berg, and L. J. Dalton. Risk-based System Refinement. In *Proceedings of the 16th International System Safety Conference*, pages 61–69, 1998.
- [57] R. S. Berg and Victor L. Winter. Risk Assessment and Integrity in System Design. In *Proceedings of the 4th International Conference on Engineering of Complex Computer Systems (ICECCS)*, pages 115–120, 1998.
- [58] R. S. Berg and V. Winter. Use of Integrity Techniques and Risk Assessment in System Design. In *Proceedings of the IEEE Workshop on Application-Specific Software Engineering and Technology (ASSET)*, pages 60–62, Washington, DC, USA, 1998. IEEE Computer Society.
- [59] V. L. Winter. Software Construction via Abstraction, Synthesis, and Transformation (AST). In *Proceedings of the IEEE High Integrity Software Conference*, pages 30–39, 1997.
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- [61] V. L. Winter and J. M. Boyle. Proving Refinement Transformations Using Extended Denotational Semantics. In *Proceedings of the Durham Transformation Workshop*, 1996.
- [62] J. M. Boyle, Terence J. Harmer, and V. L. Winter. The TAMPR Program Transformation System: Design and Applications. In *Proceedings of the Durham Transformation Workshop*, 1996.
- [63] V. L. Winter and J. M. Boyle. Proving Refinement Transformations for Deriving High-Assurance Software. In *Proceedings of the IEEE High-Assurance Systems Engineering Workshop*, pages 68–77, 1996.
- [64] V. L. Winter. Visualization and Animation as a Technique to Assist in the Construction of High Assurance Software. In *CADE Workshop on Visual Reasoning*, pages 11–17, 1996.
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- [66] V. L. Winter. *Proving the Correctness of Program Transformations*. PhD thesis, University of New Mexico, 1994.
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