

## Nathaniel J. Nystrom

580 Bedford Rd Apt 20  
Pleasantville, New York 10570 USA

Mobile: +1 (845) 553-5464  
Email: [nate@nanocow.com](mailto:nate@nanocow.com)

## Research Interests

My research focuses on developing programming language techniques for building safe, correct, and efficient systems. I am particularly interested in designing language features to address problems manifest in real-world applications such as extensibility, concurrency, distribution, and security.

## Education

### Cornell University, Ithaca, New York

- Ph.D. Computer Science, January 2007  
Thesis: *Programming Languages for Scalable Extensibility and Composition*  
Advisor: Andrew C. Myers  
Minor field: Electrical and Computer Engineering
- M.S. Computer Science, January 2004  
Advisor: Andrew C. Myers

### Purdue University, West Lafayette, Indiana

- M.S. Computer Science, August 1998  
Thesis: *Bytecode-Level Analysis and Optimization of Java Classes*  
Advisor: Antony L. Hosking
- B.S. Computer Science (Honors), with Distinction, December 1995
- B.S. Mathematics, December 1995

## Awards

- Award Paper, Symposium on Operating Systems Principles, 2001
- Intel Foundation Ph.D. Fellowship, 2003–2004
- HPC Bravo Award for contributions to the design and implementation of X10 1.7, given by VP for IBM Software Research, 2008

## Research Experience

### IBM T.J. Watson Research Center, Hawthorne, New York

Postdoctoral researcher, October 2006–present

- Worked on X10, a concurrent, distributed, object-oriented language for high-performance computing. Designed and implemented dependent types and generics for X10 1.7, a major redesign of the programming language. Designed and implemented an annotation and compiler plugin system for X10.
- Worked on Thorn, a gradually typed, extensible scripting language.

### Cornell University, Ithaca, New York

Research assistant (Advisor: Prof. Andrew C. Myers), June 2000–October 2007

- Designed and implemented J&, an extension of Java that supports scalable extensibility and composition.
- Co-designed and implemented Polyglot, an extensible compiler framework for Java.
- With colleagues, implemented Jif, a Java extension that enforces security policies through information flow control.

### **Sun Microsystems Laboratories, Mountain View, California**

Research intern (Advisor: Dr. Grzegorz Czajkowski), Summer 2001

- Co-designed and implemented ShMVM, a multi-tasking Java virtual machine based on HotSpot.

### **Purdue University, West Lafayette, Indiana**

Research assistant (Advisor: Prof. Antony L. Hosking), Spring 1997–Spring 1998

- Designed and implemented a Java bytecode analysis and optimization toolkit.
- Extended bytecode optimizer with instructions for supporting orthogonal persistence for Java.

### **Purdue University, West Lafayette, Indiana**

Undergraduate research assistant (Advisor: Prof. Aditya P. Mathur), Fall 1993–Fall 1996.

- With colleagues, implemented compiler and run-time system of Listen, a specification language for instrumenting C programs with sound.

## **Teaching Experience**

### **Cornell University, Ithaca, New York**

Instructor for CS 114, a four-week short course on Unix, Fall 2004

### **Cornell University, Ithaca, New York**

Teaching assistant/recitation instructor for CS 501, grad-level Software Engineering, Fall 1999

Teaching assistant for CS 412/413, undergrad-level Compilers, Spring 2000

Teaching assistant for CS 611, grad-level Programming Languages Semantics, Fall 2001

Teaching assistant/substitute lecturer for CS 412/413, undergrad-level Compilers, Spring 2005

### **Purdue University, West Lafayette, Indiana**

Teaching assistant for CS 406, undergraduate-level Software Engineering, Fall 1996

Teaching assistant for CS 490W, undergraduate-level Web Programming, Spring 1997

## **Industry Experience**

### **Hewlett-Packard Company, Cupertino, California**

Software engineer, June 1998–August 1999

- Worked in PA-RISC low-level optimizer group and Java VM group.

### **Tektronix, Inc., Beaverton, Oregon**

Software engineer intern, Summers 1993–1996

- Worked in logic analyzer group.

## **Publications**

### **Journal Articles**

- Steve Zdancewic, Lantian Zheng, Nathaniel Nystrom, and Andrew C. Myers. Secure program partitioning. *ACM Transactions on Computer Systems*, 20(3):283–328, August 2002.
- Antony L. Hosking, Nathaniel Nystrom, David Whitlock, Quintin Cutts, and Amer Diwan. Partial redundancy elimination for access path expressions. *Software–Practice and Experience*, 31(6):577–600, May 2001.

### **Refereed Conference Papers**

- Nathaniel Nystrom Vijay Saraswat, Jens Palsberg, and Christian Grothoff. Constrained types for object-oriented languages. In *Proceedings of the 2008 ACM Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA)*, October 2008.

- Martin Hirzel, Nathaniel Nystrom, Bard Bloom, and Jan Vitek. Matchete: Paths through the pattern matching jungle. In *Practical Aspects of Declarative Languages (PADL 2008)*, pages 150–166, January 2008.
- Nathaniel Nystrom, Xin Qi, and Andrew C. Myers. J&: Nested intersection for scalable software extension. In *Proceedings of the 2006 ACM Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA)*, pages 21–36, Portland, Oregon, October 2006.
- Nathaniel Nystrom, Stephen Chong, and Andrew C. Myers. Scalable extensibility via nested inheritance. In *Proceedings of the 19th ACM Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA)*, pages 99–115, October 2004.
- Nathaniel Nystrom, Michael Clarkson, and Andrew C. Myers. Polyglot: An extensible compiler framework for Java. In Görel Hedin, editor, *12th International Conference on Compiler Construction (CC 2003)*, number 2622 in Lecture Notes in Computer Science, pages 128–152, Warsaw, Poland, April 2003. Springer-Verlag.
- Grzegorz Czajkowski, Laurent Daynès, and Nathaniel Nystrom. Code sharing among virtual machines. In Boris Magnusson, editor, *Proceedings of the 16th European Conference on Object-Oriented Programming (ECOOP 2002)*, number 2374 in Lecture Notes in Computer Science, pages 155–177, Málaga, Spain, June 2002. Springer-Verlag.
- Steve Zdancewic, Lantian Zheng, Nathaniel Nystrom, and Andrew C. Myers. Untrusted hosts and confidentiality: Secure program partitioning. In *Proceedings of the 18th ACM Symposium on Operating System Principles (SOSP)*, pages 1–14, Chateau Lake Louise, Banff, Canada, October 2001.
- Kumar Brahmamath, Nathaniel Nystrom, Antony L. Hosking, and Quintin Cutts. Swizzle barrier optimizations for orthogonal persistence in Java. In R. Morrison, M. Jordan, and M. Atkinson, editors, *Proceedings of the Third International Workshop on Persistence and Java*, pages 268–278, Tiburon, California, September 1998. Morgan Kaufmann.
- Antony L. Hosking, Nathaniel Nystrom, Quintin Cutts, and Kumar Brahmamath. Optimizing the read and write barrier for orthogonal persistence. In R. Morrison, M. Jordan, and M. Atkinson, editors, *Eighth International Workshop on Persistent Object Systems*, pages 149–159, Tiburon, California, September 1998. Morgan Kaufmann.
- Nathaniel Nystrom, Antony L. Hosking, David Whitlock, Quintin Cutts, and Amer Diwan. Partial redundancy elimination for access path expressions. In *Proceedings of the International Workshop on Aliasing in Object-Oriented Systems*, Lisbon, Portugal, June 1999.

### Other Papers

- Vijay Saraswat, Nathaniel Nystrom, et al. The X10 language specification, version 1.7. <http://x10.sf.net/docs/x10-170.pdf>, September 2008.
- Nathaniel Nystrom and Vijay Saraswat. An annotation and compiler plugin system for X10. Technical Report RC24198, IBM T.J. Watson Research Center, 2007.
- Nathaniel Nystrom. *Programming Languages for Scalable Software Extension and Composition*. PhD thesis, Cornell University, Ithaca, New York, USA, January 2007.
- Nathaniel Nystrom, Stephen Chong, , and Andrew C. Myers. Scalable extensibility via nested inheritance. Technical Report 2004–1840, Computer Science Dept., Cornell University, 2004.
- Nathaniel Nystrom, Michael Clarkson, and Andrew C. Myers. Polyglot: An extensible compiler framework for Java. Technical Report 2002–1883, Computer Science Dept., Cornell University, 2002.
- Steve Zdancewic, Lantian Zheng, Nathaniel Nystrom, and Andrew C. Myers. Secure program partitioning. Technical Report 2001–1846, Computer Science Dept., Cornell University, 2001.
- Nathaniel Nystrom. Bytecode-level analysis and optimization of Java classes. Master’s thesis, Purdue University, August 1998.

### Presentations

- “Constrained types for object-oriented languages”, OOPSLA 2008.

- “X10: Concurrent Programming in the Multicore Era”, ECOOP Summer School 2008, Paphos, Cyprus, July 2008.
- “X10: Concurrent Programming in the Multicore Era”, PLDI 2007, San Diego, CA, USA, June 2007.
- “User-extensible types in X10”, Purdue University, West Lafayette, IN, USA, August 2007.
- “Nested intersection”, OOPSLA 2006.
- “Scalable Extensibility”, IBM T.J. Watson Research Center, August 2005.
- “The Ibex Extensible Parser Generator”, New England Programming Languages Seminar, February 2005.
- “Scalable Extensibility via Nested Inheritance”, OOPSLA 2004.
- “Polyglot: An Extensible Compiler Framework for Java”, CC 2003.

## Patents

- “Method and apparatus for sharing code containing references to non-shared objects”, Patent No. 6,799,173, Grzegorz J. Czajkowski, Laurent Daynès, and Nathaniel J. Nystrom, September 28, 2004.

## Service

Organizer:

- Workshop on Script to Program Evolution (STOP), colocated with ECOOP 2009

Programme committee member:

- Workshop on Script to Program Evolution (STOP), colocated with ECOOP 2009
- 22nd European Conference on Object-Oriented Programming (ECOOP 2008)
- 23rd European Conference on Object-Oriented Programming (ECOOP 2009)

Referee or external reviewer for:

- *ACM Transactions on Programming Languages, Applications and Systems (TOPLAS)*
- *Information and Computation*
- Object-oriented Programming Systems, Languages, and Applications (OOPSLA’07, OOPSLA’08)
- Principles and Practice of Programming in Java (PPPJ’08)
- Operating Systems Design and Implementation (OSDI’00, OSDI’04)
- Symposium on Operating Systems Principles (SOSP’01)
- Programming Language Design and Implementation (PLDI’02, PLDI’08)
- European Wireless Conference (EW’04)
- Computing and Communications Security (CCS’04)
- Principles of Programming Languages (POPL’05, POPL’08)
- European Symposium on Programming (ESOP’05)
- Database and Programming Languages (DBPL’05)
- Compiler Construction (CC’06)

## Personal Information

US citizen.

## References

### **Andrew C. Myers**

Associate Professor  
Department of Computer Science  
Cornell University  
4130 Upson Hall  
Ithaca, NY 14853 USA  
607-255-8597, fax: 607-255-4428  
andru@cs.cornell.edu

### **Vijay Saraswat**

Research Staff Member  
IBM T.J. Watson Research Center  
P.O. Box 704  
Yorktown Heights, NY 10598 USA  
914-784-7147, fax: 914-784-7455  
vijay@saraswat.org

### **Jan Vitek**

Associate Professor  
Department of Computer Science  
Purdue University  
250 N. University Street  
West Lafayette, IN 47907 USA  
765-494-6531, fax: 765-494-0739  
jv@cs.purdue.edu

### **Antony L. Hosking**

Associate Professor  
Department of Computer Sciences  
Purdue University  
250 N. University Street  
West Lafayette, IN 47907 USA  
765-494-6001, fax: 765-494-0739  
hosking@cs.purdue.edu

### **Jens Palsberg**

Professor  
Department of Computer Science  
University of California–Los Angeles  
4531K Boelter Hall  
Los Angeles, CA 90095 USA  
310-825-6320, fax: 301-794-5057  
palsberg@cs.ucla.edu