

J. Nathan Foster

University of Pennsylvania
Department of Computer & Information Science
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Research Interests

Programming languages, data management, and security.

Specific topics include bidirectional languages, domain-specific languages, data synchronization, updatable views, view maintenance, security views, information-flow, confidentiality, integrity, provenance, XML, regular types, dependent types, hybrid type checking, logic, formal methods, mechanized proof, model transformations, software engineering.

Education

- Doctor of Philosophy**, Computer & Information Science, University of Pennsylvania expected May 2009
Award: Morris and Dorothy Rubinoff Prize
Dissertation: *Bidirectional Programming Languages*
Adviser: Benjamin C. Pierce
Committee: Zachary Ives, Val Tannen, Philip Wadler (external), Stephan A. Zdancewic (chair)
- Master of Philosophy**, History and Philosophy of Science, University of Cambridge May 2008
Award: First class distinction
Dissertation: *Indexicals and Belief Reports*
Adviser: Martin Kusch
- Tripas Part II**, Computer Science, University of Cambridge June 2002
Awards: Data Connections Outstanding Dissertation Prize, Senior Exhibition
Dissertation: *Model Checking for a Functional Hardware Description Language*
Adviser: Michael J. C. Gordon
- Bachelor of Arts**, Computer Science, Williams College June 2001
Awards: *magna cum laude*, highest departmental honors, Phi Beta Kappa, Sigma Xi, Sam Goldberg Colloquium Prize
Thesis: *Rupiah: Towards an Expressive Static Type System for Java*
Adviser: Kim B. Bruce

Awards

- Graduate Research Fellowship, National Science Foundation, 2004-2007
Teaching Practicum Award, Department of Computer & Information Science, University of Pennsylvania, 2004-2005
Herchel Smith Fellowship, Williams College, 2001-2003
Provided tuition and stipend for two years of graduate study at Emmanuel College, University of Cambridge.

Journal Articles

- Foster, J. N., M. B. Greenwald, J. T. Moore, B. C. Pierce, and A. Schmitt. Combinators for Bidirectional Tree Transformations: A Linguistic Approach to the View Update Problem. May 2007. *ACM Transactions on Programming Languages and Systems*, 27(3):17.
- Foster, J. N., M. B. Greenwald, C. Kirkegaard, B. C. Pierce, and A. Schmitt. Exploiting Schemas in Data Synchronization. January 2007. *Journal of Computer and System Sciences*, 73(4):669-689.

Peer-Reviewed Conference and Workshop Papers

- Foster, J. N., B. C. Pierce, and S. Zdancewic. Updatable Security Views. July 2009. *IEEE Computer Security Foundations Symposium (CSF, acceptance rate 24%)*, Port Jefferson, NY. To appear after revision.
- Foster, J. N., A. Pilkiewicz, and B. C. Pierce. Quotient Lenses. September 2008. *ACM SIGPLAN International Conference on Functional Programming (ICFP, acceptance rate 29%)*, Victoria, BC, pp. 383–395.
- Foster, J. N., T. J. Green, and V. Tannen. Annotated XML: Queries and Provenance. June 2008. *ACM SIGMOD Symposium on Principles of Database Systems (PODS, acceptance rate 18%)*, Vancouver, BC, pp. 271–280.
- Bohannon, A., J. N. Foster, B. C. Pierce, A. Pilkiewicz, and A. Schmitt. Boomerang: Resourceful Lenses for String Data. January 2008. *ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL, acceptance rate 17%)*, San Francisco, CA, pp. 407–419.
- Fernandez, M., K. Fisher, J. N. Foster, M. Greenberg, and Y. Mandelbaum. A Generic Programming Toolkit for PADS/ML: First-Class Upgrades for Third-Party Developers. January 2008. *International Symposium on Practical Aspects of Declarative Languages (PADL, acceptance rate 44%)*, San Francisco, CA, pp. 133–149.
- Foster, J. N., Konuru, R., Simeon, J., Villard, L., An Algebraic Approach to XQuery View Maintenance. January 2008. *ACM SIGPLAN Workshop on Programming Language Technologies for XML (PLAN-X)*, San Francisco, CA.
- Foster, J. N., B. C. Pierce, and A. Schmitt. A Logic Your Typechecker Can Count On: Unordered Tree Types in Practice. January 2007. *ACM SIGPLAN Workshop on Programming Language Technologies for XML (PLAN-X)*, Nice, France, pp. 80–90.
- Aydemir, B. E., A. Bohannon, M. Fairbairn, J. N. Foster, B. C. Pierce, P. Sewell, D. Vytiniotis, G. Washburn, S. Weirich, and S. Zdancewic. Mechanized Metatheory for the Masses: The POPLMark Challenge. August 2005. *International Conference on Theorem Proving in Higher Order Logics (TPHOLs, acceptance rate 49%)*, Oxford, UK, pp. 50–65.
- Foster, J. N., M. B. Greenwald, C. Kirkegaard, B. C. Pierce, and A. Schmitt. Exploiting Schemas in Data Synchronization. August 2005. *Symposium on Database Programming Languages (DBPL, acceptance rate 27%)*, Trondheim, Norway, pp. 42–57.
- Foster, J. N., M. B. Greenwald, J. T. Moore, B. C. Pierce, and A. Schmitt. Combinators for Bi-Directional Tree Transformations: A Linguistic Approach to the View Update Problem. January 2005. *ACM SIGPLAN-SIGACT Symposium on Principles of Programming Language (POPL, acceptance rate 18%)*, Long Beach, CA, pp. 233–246.
- Bruce, K. B. and J. N. Foster. LOOJ: Weaving LOOM into Java. June 2004. *European Conference on Object-Oriented Programming (ECOOP, acceptance rate 19%)*, Oslo, Norway, pp. 389-413.

Other Publications

- Foster, J. N. and Karvounarakis G. Provenance and Data Synchronization. December 2007. *IEEE Data Engineering Bulletin Special Issue on Provenance*, 30(4):13–21.
- Foster, J. N. and D. Vytiniotis. A Theory of Featherweight Java in Isabelle/HOL. April 2006. *The Archive of Formal Proofs*.

Research Experience

- Research Assistant**, University of Pennsylvania Fall 2003-present
Developed bidirectional programming languages and data synchronizers as part of the Harmony project.
Adviser: Benjamin C. Pierce
- Intern**, IBM TJ Watson Research Center Summer 2007
Developed a view maintenance system for XQuery.
Mentors: Ravi Konuru, Jerome Simeon, Lionel Villard
- Visitor**, INRIA Rhône-Alpes Spring 2006
Implemented an efficient tree automata library.
Host: Alan Schmitt

Teaching Experience

- Teaching Assistant**, University of Pennsylvania
CSE 121, “Programming Languages and Techniques II”, Spring 2005
CIS 500, “Software Foundations”, Fall 2004
- Supervisor**, University of Cambridge
CST Part II, “Optimising Compilers”, Fall 2003
CST Part II, “Specification and Verification”, Fall 2003.
- Teaching Assistant**, Williams College
CSCI 334 “Principles of Programming Languages”, Spring 2001
MATH 316 “Protecting Information”, Spring 2001
CSCI 134, “Introduction to Programming in Java”, Fall 2000
- Research Supervisor**, University of Pennsylvania
Co-supervised undergraduate research projects by Hui Du (Penn ’09), Daniel Puller (Penn ’09), Adam Magee (Penn ’09), Ravi Chugh (Penn ’07), Alexandre Pilkiewicz (Polytechnique ’07), Stéphane Lescuyer (Polytechnique ’05), Kim Thang Nyugen (Polytechnique ’05), and Malo Denielou (ENS Cachan ’04).

Service

- Program Committee**, ASIAN Symposium on Programming Languages and Systems (APLAS), 2009
- Program Committee**, Symposium on Database Programming Languages (DBPL), 2009
- Program Committee**, Workshop on Programming Language Technologies for XML (PLAN-X), 2009
- Co-organizer**, GRACE Workshop on Bidirectional Transformations (GRACE-BX), December 2008
- Selection Committee**, Herchel Smith and Donovan Moody Fellowships, November 2008
- Co-organizer**, Workshop on Principles of Provenance (PrOPr), June 2007
- Coordinator**, PLClub Seminar, Department of Computer & Information Science, University of Pennsylvania, 2007–2008
- Office Committee**, Department of Computer and Information Science, University of Pennsylvania 2005-2007
- Reviewer** Higher-Order and Symbolic Computation, Information Systems, Theoretical Computer Science, Science of Computer Programming, DBPL, ICFP, ESOP, POPL, PEPN, and PLAN-X

References

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