

Patrick Lam

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Research Interests

Software engineering, static program analysis, programming language design.

Education

Massachusetts Institute of Technology.

Ph.D., Computer Science, February 2007.

Thesis: “The Hob System for Verifying Software Design Properties.”

Advisor: Professor Martin C. Rinard.

McGill University.

M.Sc., Computer Science, August 2000.

Thesis: “A General Framework for the Flow Analysis of Concurrent Programs.”

Advisor: Professor Prakash Panangaden.

McGill University.

B.Sc., Joint Honours Mathematics & Computer Science, June 1999.

Academic Experience

- 01/2008–present **Assistant Professor**, University of Waterloo.
Department of Electrical and Computer Engineering. Cross-appointed to the
Cheriton School of Computer Science.
- 01/2007–12/2007 **Postdoctoral Fellow**, McGill University.
Supported by an NSERC PDF award.
- 09/2000–12/2006 **Research Assistant**, Massachusetts Institute of Technology.
Designer and implementer of the **Hob** infrastructure for statically verifying
software design properties. Hob certifies that implementations conform to
design properties, expressed in terms of developer-provided specifications, us-
ing assume-guarantee reasoning on a per-module basis. For each module, Hob
uses arbitrarily detailed static analyses to establish consistency properties; this
approach scales because the expensive analyses are only applied to a small
part of a program. Also designed and implemented a Java extension, **tokens**,
which allows the specification and analysis of heap-mediated communication
between the different subsystems of a program.

Grants and Scholarships

NSERC Research Tools and Instruments Grant, 2010-2011, PI, with S. Fischmeister and H. D. Patel, C\$66,779.

NSERC Discovery Grant, 2008–2012, C\$18,700/yr.

NSERC Postdoctoral Fellowship, 2007–2008 (held 2007). C\$40,000/yr.

FQRNT Bourse de recherche postdoctorale (postdoctoral fellowship), 2007–2009 (declined). C\$30,000/yr.

IBM Eclipse Innovation Grant, 2003 (held by Martin Rinard): Automatic Extraction and Presentation of Design Information, US\$28,000.

NSERC Postgraduate Scholarship, 1999–2003. Approved for Tenure Abroad between 2000 and 2003. C\$17,300 – \$19,100/yr.

Bourse FCAR (now FQRNT), 1999–2004, declined for 1999-2003, C\$20,000 in the academic year 2003-2004.

Journal Publications

Brian Demsky and Patrick Lam. Views: Synthesizing Fine-Grained Concurrency Control. 40 single-column pages. To appear in *ACM Transactions on Software Engineering Methodology*. Accepted September 2011.

Sebastian Fischmeister and Patrick Lam. Time-Aware Instrumentation of Embedded Software. 11 double-column pages. *IEEE Transactions on Industrial Informatics*, pp. 652–663, volume 6, number 4, November 2010.

- (Journal version of:) Sebastian Fischmeister and Patrick Lam. “On Time-Aware Instrumentation of Programs.” Fifteenth IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), 2009.

Eric Bodden, Laurie Hendren, Patrick Lam, Ondřej Lhoták, Nomair A. Naeem. “Collaborative runtime verification with tracematches.” *Journal of Logic and Computation*, pp. 707–723, volume 20 number 3, June 2010 (published online November 2008).

- (Journal version of:) Eric Bodden, Laurie Hendren, Patrick Lam, Ondřej Lhoták, Nomair A. Naeem. “Collaborative runtime verification with tracematches.” Seventh International Workshop on *Runtime Verification*, 2007.

Viktor Kuncak, Patrick Lam, Karen Zee and Martin Rinard. “Modular Plug-gable Analyses for Data Structure Consistency.” *Transactions on Software Engineering*, pp. 988–1005, volume 32 number 12, December 2006.

Refereed Conference and Workshop Publications

Patrick Lam, Eric Bodden, Ondřej Lhoták, and Laurie Hendren. “The Soot framework for Java program analysis: a retrospective.” 7 double-column

pages. To appear at the Cetus Users and Compiler Infrastructure Workshop, held in conjunction with PACT 2011, Galveston Island, Texas, October 2011.

Jon Eyolfson, Lin Tan and Patrick Lam. “Do Time of Day and Developer Experience Affect Commit Bugginess?” Proceedings of the 8th Working Conference on Mining Software Repositories, 2011.

Eric Bodden, Patrick Lam and Laurie Hendren. “Clara: a Framework for Statically Evaluating Finite-state Runtime Monitors.” First International Conference on Runtime Verification (RV), 2010.

Jeff Zarnett, Mahesh Tripunitara and Patrick Lam. “Role-Based Access Control (RBAC) in Java via Proxy Objects using Annotations.” Fifteenth ACM Symposium on Access Control Models and Technologies (SACMAT), 2010.

Brian Demsky and Patrick Lam. “Views: Object-Inspired Concurrency Control”. Thirty-Second International Conference on Software Engineering (ICSE), 2010.

Jeff Zarnett, Patrick Lam and Mahesh Tripunitara. “Method-Specific Java Access Control via RMI Proxy Objects using Annotations (Short Paper).” Fifth International Conference on Information Systems Security (ICISS), 2009. Lecture Notes in Computer Science, volume 5905.

Eric Bodden, Patrick Lam, and Laurie Hendren. “Object Representatives: a uniform abstraction for pointer information.” First BCS Visions of Computer Science Conference, 2008.

Eric Bodden, Patrick Lam, and Laurie Hendren. “Finding Programming Errors Earlier by Evaluating Runtime Monitors Ahead-of-Time.” Sixteenth ACM SIGSOFT International Symposium on the *Foundations of Software Engineering* (FSE) 2008.

Patrick Lam and Martin Rinard. “Static Verification of Design Constraints and Software Correctness Properties in the Hob System.” *The Next Generation Software Workshop* (NGS) at IPDPS 2007.

Thomas Wies, Viktor Kuncak, Patrick Lam, Andreas Podelski and Martin Rinard. “Field Constraint Analysis.” Seventh International Conference on *Verification, Model Checking and Abstract Interpretation* (VMCAI) 2006.

Viktor Kuncak, Patrick Lam, Karen Zee and Martin Rinard. “Implications of a Data Structure Consistency Checking System.” IFIP Working Conference on *Verified Software: Theories, Tools, and Experiments* (VSTTE) 2005. Published in LNCS 4171/2008, pages 214–226.

Patrick Lam, Viktor Kuncak and Martin Rinard. “Hob: A Tool for Verifying Data Structure Consistency.” Tool Demonstration at the Fourteenth International Conference on *Compiler Construction* (CC) 2005.

Patrick Lam, Viktor Kuncak and Martin Rinard. “Cross-cutting Techniques

in Program Specification and Analysis.” Fourth International Conference on *Aspect-Oriented Software Development (AOSD)* 2005.

Patrick Lam, Viktor Kuncak and Martin Rinard. “Generalized Typestate Checking for Data Structure Consistency.” Sixth International Conference on *Verification, Model Checking and Abstract Interpretation (VMCAI)* 2005.

Karen Zee, Patrick Lam, Viktor Kuncak and Martin Rinard. “Combining Theorem Proving with Static Analysis for Data Structure Consistency.” Second International Workshop on *Software Verification and Validation (SVV)* 2004.

Patrick Lam and Martin Rinard. “A Type System and Analysis for the Automatic Extraction and Enforcement of Design Information.” Seventeenth *European Conference on Object-Oriented Programming (ECOOP)* 2003.

Viktor Kuncak, Patrick Lam and Martin Rinard. “Role Analysis.” Twenty-Ninth Symposium on *Principles of Programming Languages (POPL)* 2002.

Viktor Kuncak, Patrick Lam and Martin Rinard. “A Language for Role Specifications.” Fourteenth Annual Workshop on *Languages and Compilers for Parallel Computing (LCPC)* 2001.

Vijay Sundaresan, Laurie Hendren, Chrislain Razafimahefa, Raja Vallée-Rai, Patrick Lam, Etienne Gagnon and Charles Godin. “Practical Virtual Method Resolution for Java.” Fifteenth Conference on *Object-Oriented Programming Systems, Languages and Applications (OOPSLA)* 2000.

Raja Vallée-Rai, Etienne Gagnon, Laurie Hendren, Patrick Lam, Patrice Pomerville, and Vijay Sundaresan. “Optimizing Java Bytecode using the Soot Framework: Is it Feasible?.” Ninth International Conference on *Compiler Construction (CC)* 2000.

Raja Vallée-Rai, Laurie Hendren, Vijay Sundaresan, Patrick Lam, Etienne Gagnon and Phong Co. “Soot - A Java Optimization Framework.” IBM Center for Advanced Studies Conference (CASCON) 1999. Awarded the **First Decade High Impact Paper** in 2010.

Non-Refereed Publications

Patrick Lam. Soot: Analyze, Transform and Optimize Java Bytecodes. *Dr. Dobbs's Journal*, May 31, 2011. <http://drdobbs.com/java/229700038>

Presentations

Patrick Lam. Panel, Cetus Users and Compiler Infrastructure Workshop, held in conjunction with PACT 2011, Galveston Island, Texas, October 2011: “Compiler Infrastructures: The Good, The Bad and The Ugly”.

Eric Bodden and Patrick Lam. Tutorial, Runtime Verification, November 2010: “Clara: Partially Evaluating Runtime Monitors at Compile Time (Tutorial Supplement)”. First International Conference on *Runtime Verification (RV)* 2010, pp. 74–89.

Patrick Lam. Invited seminar, Oxford University, October 2010: “Data Structures and Modularity in Practice”.

Patrick Lam. Invited seminar, Technical University Darmstadt, December 2009: “Implementation and Use of Data Structures in Java Programs.”

Patrick Lam. Invited seminar, Massachusetts Institute of Technology, November 2009: “Implementation and Use of Data Structures in Java Programs.”

Patrick Lam. Invited seminar, McGill University, October 2009: “Implementation and Use of Data Structures in Java Programs.”

Patrick Lam. Invited seminar, University of Waterloo, Department of Electrical and Computer Engineering Gradtalk, September 2009: “Implementation and Use of Data Structures in Java Programs.”

Patrick Lam. Invited seminar, University of Calgary, September 2009: “Implementation and Use of Data Structures in Java Programs.”

Patrick Lam. BCS 2008: “Object Representatives: a uniform abstraction for pointer information.”

Patrick Lam. Invited seminar, AMD Canada, January 2008: “Verifying Lightweight Specifications”.

Patrick Lam. Invited seminar, University of Michigan, October 2007: “Flow-Sensitive Static Optimizations for Tracematches”.

Patrick Lam. Invited seminar, Pennsylvania State University, September 2007: “Flow-Sensitive Static Optimizations for Tracematches”.

Patrick Lam. Invited seminar, University of California, Irvine, July 2007: “Flow-Sensitive Static Optimizations for Tracematches”.

Patrick Lam. Invited seminar, Ecole Polytechnique Fédérale de Lausanne, May 2007: “Statically Verifying Software Safety Properties with Tracematches”.

Patrick Lam. Invited seminar, Université du Québec à Montréal, May 2007: “Vérification statique des propriétés de conception”.

Patrick Lam. Invited seminar, University of Delaware, April 2007: “The Hob System for Verifying Software Design Properties”.

Patrick Lam. Invited seminar, University of Waterloo, April 2007. “The Hob System for Verifying Software Design Properties”.

Patrick Lam. Invited seminar, Ecole Polytechnique de Montréal, April 2007: “Vérification statique des propriétés de conception”.

Patrick Lam. Invited seminar, Microsoft Research, March 2007. “The Hob System for Verifying Software Design Properties”.

Patrick Lam. Invited seminar, National University of Singapore, July 2006: “The Hob System for Verifying Data Structure Consistency Properties”.

Patrick Lam. Invited seminar, NASA Jet Propulsion Laboratory, April 2006: “The Hob System for Verifying Data Structure Consistency Properties”.

Patrick Lam. Invited seminar, Oxford University Computing Laboratory, October 2005: “The Hob System for Verifying Data Structure Consistency Properties”.

Viktor Kuncak, Patrick Lam, Karen Zee and Martin Rinard. IFIP Working Conference on *Verified Software: Theories, Tools, and Experiments* (VSTTE) 2005. “Implications of a Data Structure Consistency Checking System.”

Patrick Lam. Invited seminar, Ecole Polytechnique (France), May 2005: “The Hob System for Verifying Data Structure Consistency Properties”.

Patrick Lam. Colloque du Département d’Informatique et recherche opérationnelle, Université de Montreal, February 2005: “The Hob System for Verifying Data Structure Consistency Properties”.

Patrick Lam. Québec Programming Languages Séminaire, Fall 2004: “The Hob System for Verifying Data Structure Consistency Properties.”

Patrick Lam, Viktor Kuncak and Martin Rinard. IBM Programming Languages Day, 2004: “Modular Pluggable Analysis.”

Patrick Lam, Jennifer Lhoták and Ondřej Lhoták. Tutorial at CASCON 2003: “Soot, a Tool for Analyzing and Transforming Java Bytecode.”

Laurie Hendren, Patrick Lam, Jennifer Lhoták, Ondřej Lhoták and Feng Qian. Tutorial at PLDI 2003: “Soot, a Tool for Analyzing and Transforming Java Bytecode.”

Patrick Lam and Martin Rinard. ECOOP 2003: “A Typestate System for Simultaneous and Changing Data Structure Participation.”

Raja Vallée-Rai, Etienne Gagnon, Laurie Hendren, Patrick Lam, Patrice Pomerville, and Vijay Sundaresan. Compiler Construction (CC) 2000: “Optimizing Java Bytecode using the Soot Framework: Is it Feasible?.”

Reviewing

Programme committee member for OOPSLA 2010 and ESOP 2012.

Programme committee member for Bytecode, an ETAPS workshop, in 2008 and 2010.

External Review Committee member for OOPSLA 2011.

Citizenship

Canadian

References

Available upon request.