

Zvonimir Rakamarić

CONTACT INFORMATION

Dept. of Computer Science
Univ. of British Columbia
201-2366 Main Mall
Vancouver, BC, V6T 1Z4 Canada

Voice: 604-822-4487
Fax: 604-822-5485
E-mail: zrakamar@cs.ubc.ca
WWW: www.zvonimir.info

RESEARCH INTERESTS

- Effective, automatic techniques for formal verification of complex systems
- Concurrency
- Verification of heap-manipulating programs
- Theorem provers and decision procedures for analysis of software
- Model checking and abstraction techniques
- Static program analysis and abstract interpretation

EDUCATION

University of British Columbia, Vancouver, BC, Canada

Ph.D. Candidate, Computer Science

- Thesis Topic: Modular Verification of Shared-Memory Concurrent System Software
- Supervisor: Alan J. Hu

University of British Columbia, Vancouver, BC, Canada

M.Sc. in Computer Science, August 2006

- Thesis Topic: A Logic and Decision Procedure for Verification of Heap-Manipulating Programs
- Brief Abstract: To verify many interesting HMP properties, one must be able to express the concept of unbounded reachability between nodes in a linked data structure. We propose a small, transitive closure logic and decision procedure, and demonstrate their potential by verifying, via predicate abstraction, a number of interesting HMPs.
- Supervisor: Alan J. Hu

Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia

Dipl. ing. (B.Sc.) in Computer Science, June 2002

- Thesis Topic: "Java Assembler"
- Supervisor: Danko Basch

OTHER EDUCATION Seminars and Summer Schools

- Schloss Dagstuhl Seminar "Interaction versus Automation: The two Faces of Deduction", 2009, Wadern, Germany
- The Calculemus Autumn School, 2002, Pisa, Italy

HONORS AND AWARDS

Pacific Century Graduate Scholarship, 2008/09 ¹
UBC University Graduate Fellowship, 2008/09 ¹
Microsoft Research Graduate Fellowship, 2008/09 – 2009/10
UBC University Graduate Fellowship, 2007/08
Student travel award for the 5th Intl. Workshop on Satisfiability Modulo Theories (SMT), 2007
Outstanding Student Paper Award sponsored by Microsoft Research Cambridge at the 13th Intl.

¹Declined in order to accept the Microsoft Research Graduate Fellowship

Conf. on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2007
UBC University Graduate Fellowship, 2006/07
UBC University Graduate Fellowship, 2005/06
Croatian Ministry of Science and Education Grant for Study Abroad, Oct 2004
Grant for The Calculemus Autumn School, Sep 2002
University of Zagreb Rector Award, May 2002
Croatian Ministry of Science and Education Scholarship, 1997/98 – 2001/02
Second place in Croatian Competition in Informatics, May 1997

JOURNAL
PUBLICATIONS

D. Babić, B. Cook, A. J. Hu, Z. Rakamarić, "Proving Termination of Non-Linear Command Sequences", invited paper for a special issue of *Formal Aspects of Computing*. In submission.
S. Chatterjee, S. Lahiri, S. Qadeer, Z. Rakamarić, "A Low-Level Memory Model and an Accompanying Reachability Predicate", *International Journal on Software Tools for Technology Transfer (STTT)*, 11(2), Springer, 2009, pp 105–116.

CONFERENCE
PUBLICATIONS

S. Lahiri, S. Qadeer, Z. Rakamarić, "Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers", *Proceedings of the 21st International Conference on Computer Aided Verification (CAV 2009)*, Lecture Notes in Computer Science, Springer, Vol. 5643, 2009, pp 509–524.
Z. Rakamarić, A. J. Hu, "A Scalable Memory Model for Low-Level Code", *Proceedings of the 10th International Conference on Verification, Model Checking and Abstract Interpretation (VMCAI 2009)*, Lecture Notes in Computer Science, Springer, Vol. 5403, 2009, pp 290–304.
Z. Rakamarić, A. J. Hu, "Automatic Inference of Frame Axioms Using Static Analysis", *Proceedings of the 23rd IEEE/ACM International Conference on Automated Software Engineering (ASE 2008)*, IEEE, 2008, pp 89–98.
Z. Rakamarić, R. Bruttomesso, A. J. Hu, A. Cimatti, "Verifying Heap-Manipulating Programs in an SMT Framework", *Proceedings of the 5th International Symposium on Automated Technology for Verification and Analysis (ATVA 2007)*, Lecture Notes in Computer Science, Springer, Vol. 4762, 2007, pp 237–252.
D. Babić, B. Cook, A. J. Hu, Z. Rakamarić, "Proving Termination by Divergence", *Proceedings of the 5th IEEE International Conference on Software Engineering and Formal Methods (SEFM 2007)*, IEEE Computer Society, 2007, pp 93–102.
Z. Rakamarić, R. Bruttomesso, A. J. Hu, A. Cimatti, "Deciding Unbounded Heaps in an SMT Framework", Presentation-only paper, *Proceedings of the 5th International Workshop on Satisfiability Modulo Theories (SMT 2007)*, 2007, page 60.
S. Chatterjee, S. Lahiri, S. Qadeer, Z. Rakamarić, "A Reachability Predicate for Analyzing Low-Level Software", *Proceedings of the 13th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2007)*, Lecture Notes in Computer Science, Springer, Vol. 4424, 2007, pp 19–33.
Note: Outstanding Student Paper Award. Invited for special section submission to the International Journal on Software Tools for Technology Transfer (STTT).
Z. Rakamarić, J. Bingham, A. J. Hu, "An Inference-Rule-Based Decision Procedure for Verification of Heap-Manipulating Programs with Mutable Data and Cyclic Data Structures", *Proceedings of the 8th International Conference on Verification, Model Checking and Abstract Interpretation (VMCAI 2007)*, Lecture Notes in Computer Science, Springer, Vol. 4349, 2007, pp 106–121.
J. Bingham, Z. Rakamarić, "A Logic and Decision Procedure for Predicate Abstraction of Heap-Manipulating Programs", *Proceedings of the 7th International Conference on Verification, Model Checking and Abstract Interpretation (VMCAI 2006)*, Lecture Notes in Computer Science, Springer, Vol. 3855, 2005, pp 207–221.
D. Babić, Z. Rakamarić, "Bytecode Optimization", *Proceedings of the 24th International Conference on Information Technology Interfaces (ITI 2002)*, 2002, pp 377–382.
G. Jakovljević, Z. Rakamarić, D. Babić, "Java simulator of real-time scheduling algorithms",

Proceedings of the 24th International Conference on Information Technology Interfaces (ITI 2002), 2002, pp 411–417.

OTHER
PUBLICATIONS

D. Babić, Z. Rakamarić, “Guidebook for Graduate Studies Abroad” (in Croatian), P.O.I.N.T., ISBN: 978-953-99805-1-9, Croatia, 2007.

S. Chatterjee, S. Lahiri, S. Qadeer, Z. Rakamarić, “A Reachability Predicate for Analyzing Low-Level Software”, *Microsoft Research Tech Report MSR-TR-2006-154*, November 22, 2006.

Z. Rakamarić, “A Logic and Decision Procedure for Verification of Heap-Manipulating Programs”, *M.Sc. thesis*, Department of Computer Science, The University of British Columbia, August, 2006.

Z. Rakamarić, J. Bingham, A. J. Hu, “A Better Logic and Decision Procedure for Predicate Abstraction of Heap-Manipulating Programs”, *UBC Department of Computer Science Tech Report TR-2006-02*, January 30, 2006.

J. Bingham, Z. Rakamarić, “A Logic and Decision Procedure for Predicate Abstraction of Heap-Manipulating Programs”, *UBC Department of Computer Science Tech Report TR-2005-19*, September 19, 2005.

INVITED TALKS

“Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers”, October 20th, 2009, Institute of Science and Technology (IST) Austria, Klosterneuburg, Austria

“Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers”, October 9th, 2009, Schloss Dagstuhl Seminar “Interaction versus Automation: The two Faces of Deduction”, Wadern, Germany

“Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers”, August 5th, 2009, Intel, Hillsboro, OR, USA

“Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers”, June 25th, 2009, Verimag, France

“Automatizing Modular Software Verification Using Static Analysis”, October 2nd, 2008, Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia

CONFERENCE TALKS

“Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers”, CAV 2009, June 29th, 2009, Grenoble, France

“A Scalable Memory Model for Low-Level Code”, VMCAI 2009, January 20th, 2009, Savannah, GA, USA

“Automatic Inference of Frame Axioms Using Static Analysis”, ASE 2008, September 17th, 2008, L’Aquila, Italy

“Verifying Heap-Manipulating Programs in an SMT Framework”, ATVA 2007, October 25th, 2007, Tokyo, Japan

“Deciding Unbounded Heaps in an SMT Framework”, SMT 2007, July 1st, 2007, Berlin, Germany

“A Reachability Predicate for Analyzing Low-Level Software”, TACAS 2007, March 24th, 2007, Braga, Portugal

“An Inference-Rule-Based Decision Procedure for Verification of Heap-Manipulating Programs with Mutable Data and Cyclic Data Structures”, VMCAI 2007, January 14th, 2007, Nice, France

PROFESSIONAL
EMPLOYMENT

Software Reliability Research Group, Microsoft Research, Redmond, WA, USA

Research Intern

October 2008 - January 2009

- Involved in starting *STORM* — a project on statically finding concurrency errors in systems code.

Software Reliability Research Group, Microsoft Research, Redmond, WA, USA

Research Intern

July 2006 - October 2006

- Worked on *HAVOC* (Heap-Aware Verifier Of C) — on defining suitable memory model, succinct annotation language, and translation of C source and annotations to *BoogiePL*.

TIS.kis, Zagreb, Croatia

Software Engineer/Developer

March 2003 - August 2004

- Member of the team that developed application for buying and downloading content (logos, pictures, melodies, movies, etc.) via SMS, MMS and WAP to mobile phones. The application is compliant with *Vodafone Live!*TM specification. [<http://ifun.simobil.net>, <http://fun.vip.hr>]
- Developed *Push Proxy Gateway* — application for sending WAP Push messages to mobile phones

PROFESSIONAL
SERVICE

Reviewer for conferences: DATE 06, DAC 06, PDPAR 06, TACAS 07, HAV 07, CAV 07, ATVA 07, HVC 07, DATE 08, CAV 08, ATVA 08, CAV 09, FASE 10

Reviewer for journals: TOPLAS

TEACHING
EXPERIENCE

University of British Columbia, Vancouver, BC, Canada

- CPSC 312 — Functional and Logic Programming, Fall 2004. Led review sessions, graded midterm and final exams, prepared and graded homework assignments, held office hours.
- CPSC 311 — Definition of Programming Languages, Spring 2005. Prepared and graded assignments and homework, graded midterm and final exams.

MEMBERSHIPS

ACM, IEEE, IEEE Computer Society

REFERENCES

Available upon request.