Zvonimir Rakamarić **December, 2025**

CONTACT INFORMATION

Email: zrakamar@gmail.com
Homepage: https://zvonimir.github.io

PROFESSIONAL APPOINTMENTS

Amazon Web Services (AWS), Seattle, WA, USA
Principal Applied Scientist *May 2021 – present*

School of Computing, University of Utah, Salt Lake City, UT, USA
Associate Professor *Jul 2018 – Aug 2023*

School of Computing, University of Utah, Salt Lake City, UT, USA
Assistant Professor *Jun 2012 – Jun 2018*

Carnegie Mellon University, Silicon Valley Campus, NASA Ames Research Park, CA, USA
Postdoctoral Fellow *Mar 2011 – Mar 2012*

Dept. of Computer Science, University of British Columbia, Vancouver, BC, Canada
Research Assistant *Sep 2006 – Mar 2011*

Software Reliability Research Group, Microsoft Research, Redmond, WA, USA
Research Intern *Jul 2006 – Oct 2006, Oct 2008 – Jan 2009, Nov 2009 – Feb 2010*

Dept. of Computer Science, University of British Columbia, Vancouver, BC, Canada
Research Assistant *May 2005 – Aug 2006*

TIS.kis, Zagreb, Croatia
Software Engineer *Mar 2003 – Aug 2004*

EDUCATION

University of British Columbia, Vancouver, BC, Canada

Ph.D. in Computer Science, Mar 2011

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

M.Sc. in Computer Science, Aug 2006

- Thesis: A Logic and Decision Procedure for Verification of Heap-Manipulating Programs
- Supervisor: Alan J. Hu

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

Dipl. ing. (5-year degree) in Computer Science, Jun 2002

- Thesis: Java Assembler
- Supervisor: Danko Basch

HONORS AND AWARDS

Elevation to the grade of IEEE Senior Member, 2021

PRUNERS software project (includes Archer tool) launched in collaboration with Lawrence Livermore National Laboratory and RWTH Aachen has been named a finalist in the R&D 100 Awards, 2017

SMACK verifier wins 3 gold and 1 silver medal in the 6th International Competition on Software Verification (SV-COMP), 2017

NSF Faculty Early Career Development (CAREER) Award, 2016

SMACK verifier wins 2 silver and 2 bronze medals in the 5th International Competition on Software Verification (SV-COMP), 2016

SMACK verifier wins 2 gold, 1 silver, and 1 bronze medal in the 4th International Competition

on Software Verification (SV-COMP), 2015

NSF/IEEE Technical Committee on Parallel Processing (TCPP) Center for Parallel and Distributed Computing Curriculum Development and Educational Resources (CDER) Early Adopter Award [includes $1,000 in gift money], 2013

Microsoft Research Software Engineering Innovation Foundation (SEIF) Award [includes $25,000 in gift money], 2012

Silver Medal in the ACM Student Research Competition at the 32nd ACM/IEEE International Conference on Software Engineering (ICSE), 2010

Microsoft Research Graduate Fellowship, 2008/09 – 2009/10

UBC Four Year Doctoral Fellowship, 2009/10 [1]

Pacific Century Graduate Scholarship, 2008/09 [1]

UBC University Graduate Fellowship (4 times), 2005/06, 2006/07, 2007/08, 2008/09 [1]

Student travel award for the 5th Intl. Workshop on Satisfiability Modulo Theories (SMT), 2007

Outstanding Student Paper Award sponsored by Microsoft Research Cambridge, 13th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2007

Croatian Ministry of Science and Education Grant for Study Abroad, 2004

Grant for The Calculemus Autumn School, 2002

University of Zagreb Rector Award, 2002

Croatian Ministry of Science and Education Scholarship, 1997/98 – 2001/02

Second Place in Croatian Competition in Informatics, 1997

Peer-Reviewed Journal Publications [2]

I. Briggs, A. Das, *M. Baranowski*, V. Sharma, S. Krishnamoorthy, Z. Rakamarić, G. Gopalakrishnan, "FailAmp: Relativization Transformation for Soft Error Detection in Structured Address Generation", *ACM Transactions on Architecture and Code Optimimization (TACO)*, 16(4), ACM, Dec 2019.

K. Sato, I. Laguna, G. L. Lee, M. Schulz, C. M. Chambreau, *S. Atzeni*, M. Bentley, G. Gopalakrishnan, Z. Rakamarić, G. Sawaya, J. Protze, D. H. Ahn, "PRUNERS: Providing Reproducibility for Uncovering Non-Deterministic Errors in Runs on Supercomputers", *International Journal of High Performance Computing Applications (IJHPCA)*, 33(5), SAGE, Sep 2019.

A. Solovyev, *M. Baranowski*, I. Briggs, C. Jacobsen, Z. Rakamarić, G. Gopalakrishnan, "Rigorous Estimation of Floating-Point Round-off Errors with Symbolic Taylor Expansions", *ACM Transactions on Programming Languages and Systems (TOPLAS)*, 41(1), ACM, Dec 2018, pp 2:1–2:39.

S. He, S. Lahiri, Z. Rakamarić, "Verifying Relative Safety, Accuracy, and Termination for Program Approximations", *Journal of Automated Reasoning (JAR)*, 60(1), Springer, Jan 2018, pp 23–42. Invited paper.

A. Balasubramanian, *M. Baranowski*, A. Burtsev, A. Panda, Z. Rakamarić, L. Ryzhyk, "System Programming in Rust: Beyond Safety", *ACM SIGOPS Operating Systems Review*, 51(1), ACM, Sep 2017, pp 94–99. Special Topics: VMware Research.

A. Humphrey, Q. Meng, M. Berzins, D. C. B. de Oliveira, Z. Rakamarić, G. Gopalakrishnan, "Systematic Debugging Methods for Large Scale HPC Computational Frameworks", *Computing in Science and Engineering (CiSE)*, 16(3), IEEE, May 2014, pp 48–56.

D. Babić, B. Cook, A. J. Hu, Z. Rakamarić, "Proving Termination of Nonlinear Command Se-

[1] Declined in order to accept the Microsoft Research Graduate Fellowship.

[2] Underlined names indicate School of Computing students. Italicized names indicate students (co-)advised by me.

quences", *Formal Aspects of Computing (FAC)*, 25(3), Springer, May 2013, pp 389–403. Invited paper.

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, Feb 2009, pp 105–116. Invited paper.

Peer-Reviewed Conference Publications [2]

M. Baranowski, Z. Rakamarić, G. Gopalakrishnan, "Equivalence Checking of a libm Port", *Proceedings of the 31st International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, Lecture Notes in Computer Science, Springer, Vol. 15697, 2025, pp 239–256.

A. Fedchin, T. Dean, J. S. Foster, E. Mercer, Z. Rakamarić, G. Reger, N. Rungta, R. Salkeld, L. G. Wagner, C. Waldrip, "A Toolkit for Automated Testing of Dafny", *Proceedings of the 15th NASA Formal Methods Symposium (NFM)*, Lecture Notes in Computer Science, Springer, Vol. 13903, 2023, pp 397–413.

A. Irfan, S. Porncharoenwase, Z. Rakamarić, N. Rungta, E. Torlak, "Testing Dafny (experience paper)", *Proceedings of the 31st ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)*, ACM, 2022, pp 556–567.

T. S. Richard, E. S. Wiese, Z. Rakamarić, "An LGBTQ-Inclusive Problem Set in Discrete Mathematics", *Proceedings of the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE)*, ACM, 2022, pp 682–688.

T. S. Nguyen, B. Jones, Z. Rakamarić, "Synthesis of Rigorous Floating-Point Predicates", *Proceedings of the 28th International Symposium on Model Checking of Software (SPIN)*, Lecture Notes in Computer Science, Springer, Vol. 13255, 2022, pp 44–60.

A. Chakarov, A. Fedchin, Z. Rakamarić, N. Rungta, "Better Counterexamples for Dafny", *Proceedings of the 28th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, Lecture Notes in Computer Science, Springer, Vol. 13243, 2022, pp 404–411.

G. A. Constantinides, F. Dahlqvist, Z. Rakamarić, *R. Salvia*, "Rigorous Roundoff Error Analysis of Probabilistic Floating-Point Computations", *Proceedings of the 33rd International Conference on Computer Aided Verification (CAV)*, Lecture Notes in Computer Science, Springer, Vol. 12760, 2021, pp 626–650.

M. Baranowski, *S. He*, M. Lechner, *T. S. Nguyen*, Z. Rakamarić, "An SMT Theory of Fixed-Point Arithmetic", *Proceedings of the 10th International Joint Conference on Automated Reasoning (IJCAR)*, Lecture Notes in Computer Science, Springer, Vol. 12166, 2020, pp 13–31.

J. Garzella, *M. Baranowski*, *S. He*, Z. Rakamarić, "Leveraging Compiler Intermediate Representation for Multi- and Cross-Language Verification", *Proceedings of the 21st International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)*, Lecture Notes in Computer Science, Springer, Vol. 11990, 2020, pp 90–111.

M. Dabaghchian, Z. Rakamarić, "A Timeless Model for The Verification of Quasi-Periodic Distributed Systems", *Proceedings of the 17th ACM/IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE)*, ACM, 2019, pp 4:1–4:11.

R. Salvia, L. Titolo, M. A. Feliú, M. M. Moscato, C. A. Muñoz, Z. Rakamarić, "A Mixed Real and Floating-Point Solver", *Proceedings of the 11th NASA Formal Methods Symposium (NFM)*, Lecture Notes in Computer Science, Springer, Vol. 11460, 2019, pp 363–370.

M. Baranowski, *S. He*, Z. Rakamarić, "Verifying Rust Programs with SMACK", *Proceedings of the 16th International Symposium on Automated Technology for Verification and Analysis (ATVA)*, Lecture

Notes in Computer Science, Springer, Vol. 11138, 2018, pp 528–535.

M. Dimjašević, F. Howar, K. Luckow, Z. Rakamarić, "Study of Integrating Random and Symbolic Testing for Object-Oriented Software", *Proceedings of the 14th International Conference on Integrated Formal Methods (IFM)*, Lecture Notes in Computer Science, Springer, Vol. 11023, 2018, pp 89–109.

S. Atzeni, G. Gopalakrishnan, Z. Rakamarić, I. Laguna, G. L. Lee, D. H. Ahn, "Sword: A Bounded Memory-Overhead Detector of OpenMP Data Races in Production Runs", *Proceedings of the 32nd IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, IEEE Computer Society, 2018, pp 845–854.
LLNL Deputy Director's 2019 S&T Excellence in Publication Award.

S. He, Z. Rakamarić, "Counterexample-Guided Bit-Precision Selection", *Proceedings of the 15th Asian Symposium on Programming Languages and Systems (APLAS)*, Lecture Notes in Computer Science, Springer, Vol. 10695, 2017, pp 534–553.

W. Chiang, *M. Baranowski*, I. Briggs, A. Solovyev, G. Gopalakrishnan, Z. Rakamarić, "Rigorous Floating-Point Mixed-Precision Tuning", *Proceedings of the 44th ACM SIGPLAN Symposium on Principles of Programming Languages (POPL)*, ACM, 2017, pp 300–315.

T. Sorensen, A. F. Donaldson, M. Batty, G. Gopalakrishnan, Z. Rakamarić, "Portable Inter-workgroup Barrier Synchronisation for GPUs", *Proceedings of the ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, ACM, 2016, pp 39–58.

S. He, S. Lahiri, Z. Rakamarić, "Verifying Relative Safety, Accuracy, and Termination for Program Approximations", *Proceedings of the 8th NASA Formal Methods Symposium (NFM)*, Lecture Notes in Computer Science, Springer, Vol. 9690, 2016, pp 237–254.
Invited for special section submission to the Journal of Automated Reasoning (JAR).

S. Atzeni, G. Gopalakrishnan, Z. Rakamarić, D. H. Ahn, I. Laguna, M. Schulz, G. L. Lee, J. Protze, M. S. Müller, "Archer: Effectively Spotting Data Races in Large OpenMP Applications", *Proceedings of the 30th IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, IEEE Computer Society, 2016, pp 53–62.

K. Luckow, *M. Dimjašević*, D. Giannakopoulou, F. Howar, M. Isberner, T. Kahsai, Z. Rakamarić, V. Raman, "JDart: A Dynamic Symbolic Analysis Framework", *Proceedings of the 22nd International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, Lecture Notes in Computer Science, Springer, Vol. 9636, 2016, pp 442–459.

P. Deligiannis, A. F. Donaldson, Z. Rakamarić, "Fast and Precise Symbolic Analysis of Concurrency Bugs in Device Drivers", *Proceedings of the 30th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, IEEE, 2015, pp 166–177.

A. Solovyev, C. Jacobsen, Z. Rakamarić, G. Gopalakrishnan, "Rigorous Estimation of Floating-Point Round-off Errors with Symbolic Taylor Expansions", *Proceedings of the 20th International Symposium on Formal Methods (FM)*, Lecture Notes in Computer Science, Springer, Vol. 9109, 2015, pp 532–550.

D. Giannakopoulou, F. Howar, M. Isberner, T. Lauderdale, Z. Rakamarić, V. Raman, "Taming Test Inputs for Separation Assurance", *Proceedings of the 29th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, ACM, 2014, pp 373–384.

Z. Rakamarić, M. Emmi, "SMACK: Decoupling Source Language Details from Verifier Implementations", *Proceedings of the 26th International Conference on Computer Aided Verification (CAV)*, Lecture Notes in Computer Science, Springer, Vol. 8559, 2014, pp 106–113. Short paper.

W. Chiang, G. Gopalakrishnan, Z. Rakamarić, A. Solovyev, "Efficient Search for Inputs Causing High Floating-point Errors", *Proceedings of the ACM SIGPLAN Symposium on Principles and*

Practice of Parallel Programming (PPoPP), ACM, 2014, pp 43–52.

V. C. Sharma, *A. Haran*, Z. Rakamarić, G. Gopalakrishnan, "Towards Formal Approaches to System Resilience", *Proceedings of the 19th IEEE Pacific Rim International Symposium on Dependable Computing (PRDC)*, 2013, pp 41–50.

F. Howar, D. Giannakopoulou, Z. Rakamarić, "Hybrid Learning: Interface Generation through Static, Dynamic, and Symbolic Analysis", *Proceedings of the International Symposium on Software Testing and Analysis (ISSTA)*, ACM, 2013, pp 268–279.

D. Babić, Z. Rakamarić, "Asynchronously Communicating Visibly Pushdown Systems", *Proceedings of the 2013 IFIP Joint International Conference on Formal Techniques for Distributed Systems (33rd FORTE/15th FMOODS)*, Lecture Notes in Computer Science, Springer, Vol. 7892, 2013, pp 225–241.

W. Chiang, G. Gopalakrishnan, G. Li, Z. Rakamarić, "Formal Analysis of GPU Programs with Atomics via Conflict-Directed Delay-Bounding", *Proceedings of the 5th NASA Formal Methods Symposium (NFM)*, Lecture Notes in Computer Science, Springer, Vol. 7871, 2013, pp 213–228.

D. Giannakopoulou, Z. Rakamarić, V. Raman, "Symbolic Learning of Component Interfaces", *Proceedings of the 19th International Static Analysis Symposium (SAS)*, Lecture Notes in Computer Science, Springer, Vol. 7460, 2012, pp 248–264.

M. Emmi, S. Qadeer, Z. Rakamarić, "Delay-Bounded Scheduling", *Proceedings of the 38th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL)*, ACM, 2011, pp 411–422.

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)*, 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)*, 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)*, 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)*, 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)*, IEEE Computer Society, 2007, pp 93–102.
Invited for special section submission to the Formal Aspects of Computing (FAC).

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)*, Lecture Notes in Computer Science, Springer, Vol. 4424, 2007, pp 19–33.
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), 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 ,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, pp 411–417.

Peer-Reviewed Workshop Publications [2]

S. He, *M. Baranowski*, Z. Rakamarić, "Stochastic Local Search for Solving Floating-Point Constraints", *Proceedings of the 12th International Workshop on Numerical Software Verification (NSV)*, Lecture Notes in Computer Science, Springer, Vol. 11652, 2019, pp 76–84.

V. Narayanan, *M. Baranowski*, L. Ryzhyk, Z. Rakamarić, A. Burtsev, "RedLeaf: Towards An Operating System for Safe and Verified Firmware", *Proceedings of the 18th Workshop on Hot Topics in Operating Systems (HotOS)*, ACM, 2019, pp 37–44.

R. Salvia, Z. Rakamarić, "Exploring Floating-Point Trade-Offs in ML", *Informal Proceedings of the Workshop on Approximate Computing Across the Stack (WAX)*, 2018. Position paper.

M. Dabaghchian, Z. Rakamarić, B. K. Ozkan, E. Mutlu, S. Tasiran, "Consistency-Aware Scheduling for Weakly Consistent Programs", *Proceedings of the 2017 Java Pathfinder Workshop (JPF)*, *ACM SIGSOFT Software Engineering Notes*, 42(4), ACM, Oct 2017, pp 1–5.

M. Baranowski, I. Briggs, *W. Chiang*, G. Gopalakrishnan, Z. Rakamarić, A. Solovyev, "Moving the Needle on Rigorous Floating-point Precision Tuning", *Proceedings of the 6th Automated Formal Methods Workshop (AFM 2017)*, *Kalpa Publications in Computing*, 5, EasyChair, 2018, pp 19–30.

A. Balasubramanian, *M. Baranowski*, A. Burtsev, A. Panda, Z. Rakamarić, L. Ryzhyk, "System Programming in Rust: Beyond Safety", *Proceedings of the 16th Workshop on Hot Topics in Operating Systems (HotOS)*, ACM, 2017, pp 156–161.

M. Mues, F. Howar, T. Kahsai, K. Luckow, Z. Rakamarić, "Releasing the PSYCO: Using Symbolic Search in Interface Generation for Java", *Proceedings of the 2016 Java Pathfinder Workshop (JPF)*, *ACM SIGSOFT Software Engineering Notes*, 41(6), ACM, Jan 2017, pp 1–5.

M. Dimjašević, *S. Atzeni*, I. Ugrina, Z. Rakamarić, "Evaluation of Android Malware Detection Based on System Calls", *Proceedings of the 2nd ACM International Workshop on Security and Privacy Analytics (IWSPA)*, ACM, 2016, pp 1–8.

W. Chiang, G. Gopalakrishnan, Z. Rakamarić, "Practical Floating-point Divergence Detection", *Proceedings of the 28th International Workshop on Languages and Compilers for Parallel Computing (LCPC)*, Lecture Notes in Computer Science, Springer, Vol. 9519, 2015, pp 271–286.

S. Atzeni, G. Gopalakrishnan, Z. Rakamarić, D. H. Ahn, I. Laguna, M. Schulz, G. L. Lee, J. Protze, M. S. Müller, "Archer: Effectively Spotting Data Races in Large OpenMP Applications", *Informal Proceedings of the 8th International Workshop on Exploiting Concurrency Efficiently and Correctly (EC2)*, 2015. Position paper.

S. Lahiri, Z. Rakamarić, "Towards Automated Differential Program Verification for Approximate Computing", *Informal Proceedings of the Workshop on Approximate Computing Across the Stack (WAX)*, 2015. Position paper.

W. Chiang, G. Gopalakrishnan, Z. Rakamarić, "Unsafe Floating-point to Unsigned Integer Casting Check for GPU Programs", *Proceedings of the 8th International Workshop on Numerical Software*

Verification (NSV), Electronic Notes in Theoretical Computer Science, Elsevier, Vol. 317, 2015, pp 33–45.

J. Protze, *S. Atzeni*, D. H. Ahn, M. Schulz, G. Gopalakrishnan, M. S. Müller, I. Laguna, Z. Rakamarić, G. L. Lee, "Towards Providing Low-Overhead Data Race Detection for Large OpenMP Applications", *Proceedings of the LLVM Compiler Infrastructure in HPC Workshop (LLVM-HPC)*, IEEE, 2014, pp 40–47.

D. C. B. de Oliveira, Z. Rakamarić, G. Gopalakrishnan, A. Humphrey, Q. Meng, M. Berzins, "Systematic Debugging of Concurrent Systems Using Coalesced Stack Trace Graphs", *Proceedings of the 27th International Workshop on Languages and Compilers for Parallel Computing (LCPC)*, Lecture Notes in Computer Science, Springer, Vol. 8967, 2014, pp 317–331.

M. Dimjašević, D. Giannakopoulou, F. Howar, M. Isberner, Z. Rakamarić, V. Raman, "The Dart, the Psyco, and the Doop: Concolic Execution in Java PathFinder and its Applications", *Proceedings of the 2014 Java Pathfinder Workshop (JPF)*, *ACM SIGSOFT Software Engineering Notes*, 40(1), ACM, Jan 2015, pp 1–5.

V. C. Sharma, Z. Rakamarić, G. Gopalakrishnan, "FUSED: A Low-cost Online Soft-Error Detector", *10th IEEE Workshop on Silicon Errors in Logic—System Effects (SELSE)*, 2014. Poster paper.

D. H. Ahn, G. L. Lee, G. Gopalakrishnan, Z. Rakamarić, M. Schulz, I. Laguna, "Overcoming Extreme-Scale Reproducibility Challenges Through a Unified, Targeted, and Multilevel Toolset", *Proceedings of the 1st International Workshop on Software Engineering for High Performance Computing in Computational Science and Engineering (SE-HPCCSE)*, ACM, 2013, pp 41–44.

D. C. B. de Oliveira, Z. Rakamarić, G. Gopalakrishnan, A. Humphrey, Q. Meng, M. Berzins, "Practical Formal Correctness Checking of Million-core Problem Solving Environments for HPC", *Proceedings of the 5th International Workshop on Software Engineering for Computational Science and Engineering (SE-CSE)*, ACM, 2013, pp 75–83.

W. Chiang, G. Gopalakrishnan, Z. Rakamarić, D. H. Ahn, G. L. Lee, "Determinism and Reproducibility in Large-Scale HPC Systems", *Informal Proceedings of the 4th Workshop on Determinism and Correctness in Parallel Programming (WoDet)*, 2013.

N. Ghafari, A. J. Hu, Z. Rakamarić, "Context-Bounded Translations for Concurrent Software: An Empirical Evaluation", *Proceedings of the 17th International SPIN Workshop on Model Checking Software (SPIN)*, Lecture Notes in Computer Science, Springer, Vol. 6349, 2010, pp 227–244.

Other Peer-Reviewed Publications [2]

K. Sato, I. Laguna, G. L. Lee, M. Schulz, C. M. Chambreau, D. H. Ahn, *S. Atzeni*, M. Bentley, G. Gopalakrishnan, Z. Rakamarić, G. Sawaya, J. Protze, "PRUNERS: Providing Reproducibility for Uncovering Non-Deterministic Errors in Runs on Supercomputers", *Computational Reproducibility at Exascale Workshop (CRE)*, 2017. Extended abstract.

S. He, S. Lahiri, A. Lal, Z. Rakamarić, "Static Assertion Checking of Production Software with Angelic Verification", *8th Workshop on Tools for Automatic Program Analysis (TAPAS)*, 2017. Extended abstract.

C. Zhou, K. Luckow, F. Howar, Z. Rakamarić, "Visualization Support for JDart", *Java Pathfinder Workshop (JPF)*, 2016. Extended abstract.

M. Carter, *S. He*, *J. Whitaker*, Z. Rakamarić, M. Emmi, "SMACK Software Verification Toolchain", *Proceedings of the 38th IEEE/ACM International Conference on Software Engineering (ICSE) Companion*, ACM, 2016, pp 589–592. Demonstrations Track.

A. Haran, *M. Carter*, M. Emmi, A. Lal, S. Qadeer, Z. Rakamarić, "SMACK+Corral: A Modular Verifier", *Proceedings of the 21st International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, Lecture Notes in Computer Science, Springer, Vol. 9035, 2015,

pp 450–453. Competition contribution.

M. Dimjašević, Z. Rakamarić, "JPF-Doop: Combining Concolic and Random Testing for Java", *Java Pathfinder Workshop (JPF)*, 2013. Extended abstract.

Z. Rakamarić, "STORM: Static Unit Checking of Concurrent Programs", *Proceedings of the 32nd ACM/IEEE International Conference on Software Engineering (ICSE)*, ACM, Vol. 2, 2010, pp 519–520. ACM Student Research Competition.
Silver Medal Winner in the Competition.

Z. Rakamarić, R. Bruttomesso, A. J. Hu, A. Cimatti, "Deciding Unbounded Heaps in an SMT Framework", *Proceedings of the 5th International Workshop on Satisfiability Modulo Theories (SMT)*, 2007, page 60. Presentation-only paper.

THESES

Z. Rakamarić, "Modular Verification of Shared-Memory Concurrent System Software", *Ph.D. Thesis*, Department of Computer Science, The University of British Columbia, Mar 2011.

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, Aug 2006.

TECHNICAL REPORTS AND ARXIV [2]

S. Bayless, S. Buliani, D. Cassel, B. Cook, D. Clough, R. Delmas, N. Diallo, F. Erata, N. Feng, D. Giannakopoulou, A. Goel, A. Gokhale, J. Hendrix, M. Hudak, D. Jovanović, A. M. Kent, B. Kiesl-Reiter, J. J. Kuna, N. Labai, J. Lilien, D. Raghunathan, Z. Rakamarić, N. Razavi, M. Tautschnig, A. Torkamani, N. Weir, M. W. Whalen, J. Yao, "A Neurosymbolic Approach to Natural Language Formalization and Verification", *CoRR*, abs/2511.09008, 2025.

G. A. Constantinides, F. Dahlqvist, Z. Rakamarić, *R. Salvia*, "Rigorous Roundoff Error Analysis of Probabilistic Floating-Point Computations", *CoRR*, abs/2105.13217, 2021.

M. Dabaghchian, Z. Rakamarić, B. K. Ozkan, E. Mutlu, S. Tasiran, "Consistency-Aware Scheduling for Weakly Consistent Programs", *School of Computing, University of Utah, Tech Report UUCS-17-002*, Nov 2017.

S. He, S. Lahiri, Z. Rakamarić, "Verifying Relative Safety, Accuracy, and Termination for Program Approximations", *Microsoft Research Tech Report*, Apr 2016.

M. Dimjašević, *S. Atzeni*, I. Ugrina, Z. Rakamarić, "Android Malware Detection Based on System Calls", *School of Computing, University of Utah, Tech Report UUCS-15-003*, May 2015.

A. Solovyev, C. Jacobsen, Z. Rakamarić, G. Gopalakrishnan, "Rigorous Estimation of Floating-Point Round-off Errors with Symbolic Taylor Expansions", *School of Computing, University of Utah, Tech Report UUCS-15-001*, Apr 2015.

D. Babić, Z. Rakamarić, "Asynchronously Communicating Visibly Pushdown Systems", *EECS Department, University of California, Berkeley Tech Report UCB/EECS-2011-108*, Oct 2011.

M. Emmi, S. Qadeer, Z. Rakamarić, "Delay-Bounded Scheduling: A Canonical Characterization of Scheduler Nondeterminism", *Microsoft Research Tech Report MSR-TR-2010-123*, Sep 2010.

S. Chatterjee, S. Lahiri, S. Qadeer, Z. Rakamarić, "A Reachability Predicate for Analyzing Low-Level Software", *Microsoft Research Tech Report MSR-TR-2006-154*, Nov 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*, Jan 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*, Sep 2005.

Books and Reports

E. Darulova, A. F. Donaldson, Z. Rakamarić, C. Rubio-González, "Analysis and Synthesis of Floating-point Programs (Dagstuhl Seminar 17352)", *Dagstuhl Reports*, 7(8), Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2018, pp 74–101.

D. Babić, Z. Rakamarić, J. Lorincz, "Guidebook for Graduate Studies Abroad" (in Croatian), 2nd edition, P.O.I.N.T., ISBN: 978-953-99805-3-3, Croatia, 2012.

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

Invited Talks

"SMACK Software Verification Toolchain", Amazon, virtual, Nov 18, 2020

"Analysis and Synthesis of Floating-point Routines", Workshop on Dependable and Secure Software Systems, ETH, Zurich, Switzerland, Oct 19, 2019

"Data Race Detection for Industry-Scale OpenMP Applications", Vienna University of Technology (TU Wien), Vienna, Austria, Jan 22, 2019

"Analysis and Synthesis of Floating-point Routines", Imperial College London, London, UK, Nov 27, 2018

"Analysis and Synthesis of Floating-point Routines", Vienna University of Technology (TU Wien), Vienna, Austria, Nov 6, 2018

"Formal Verification (Expert Panel)", Panelist, MathWorks Research Summit, Newton, MA, USA, Jun 2, 2018

"Data Race Detection for Industry-Scale OpenMP Applications", Workshop on Verification of Distributed Systems (VDS), Essaouira, Morocco, May 7, 2018

"Analysis and Synthesis of Floating-point Routines", University of Waterloo, Waterloo, ON, Canada, Sep 29, 2017

"Utah Floating-point Toolset", *Analysis and Synthesis of Floating-point Programs*, Schloss Dagstuhl Seminar (by-invitation-only international seminar), Wadern, Germany, Aug 29, 2017

"SMACK Software Verification Toolchain", Vienna University of Technology (TU Wien), Vienna, Austria, Jun 7, 2017

"Analysis and Synthesis of Floating-point Routines", Institute of Science and Technology (IST) Austria, Klosterneuburg, Austria, Jun 6, 2017

"SMACK Software Verification Toolchain", University of British Columbia, Vancouver, BC, Canada, May 8, 2017

"Software Verification Competitions", JASON Defense Advisory Group study on industrial-scale formal methods, La Jolla, CA, USA, Jan 17, 2017

"SMACK Software Verification Toolchain", NASA Ames Research Center, CA, USA, Nov 2, 2016

"SMACK Software Verification Toolchain", University of California, Irvine, CA, USA, Sep 23, 2016

"Decomposing Commodity Kernels for Verification", DARPA Transparent Computing PI Meeting, Cambridge, MA, USA, Jul 28, 2016

"Formal Methods for High-Performance Computing: Finding Data Races in Large OpenMP Applications", International Workshop on Exploiting Concurrency Efficiently and Correctly (EC2), Toronto, Canada, Jul 18, 2016

"Analysis and Synthesis of Floating-point Routines", MathWorks Research Summit, Newton,

MA, USA, Jun 4, 2016

"Android Malware Detection", Ruđer Bošković Institute, Zagreb, Croatia, May 3, 2016

"Automated SMT-Based Verification for Reasoning About Approximations", Microsoft Research, Redmond, WA, USA, Oct 14, 2015

"SMACK: Decoupling Source Language Details from Verifier Implementations", New York University (NYU), New York, NY, USA, Sep 24, 2014

"SMACK: Decoupling Source Language Details from Verifier Implementations", Yale University, New Haven, CT, USA, Sep 23, 2014

"SMACK: Decoupling Source Language Details from Verifier Implementations", University of Texas at Austin, Austin, TX, USA, Sep 9, 2014

"Efficient Estimation of Floating-point Errors", University of Delaware, Newark, DE, USA, May 13, 2014

"Formal Analysis of GPU Programs with Atomics via Conflict-Directed Delay-Bounding", *Correct and Efficient Accelerator Programming*, Schloss Dagstuhl Seminar (by-invitation-only international seminar), Wadern, Germany, Apr 3, 2013

"Learning Symbolic Interfaces of Software Components", Brigham Young University, Provo, UT, USA, Mar 21, 2013

"Learning Symbolic Interfaces of Software Components", University of British Columbia, Vancouver, BC, Canada, Mar 13, 2013

"SMT at Utah", *Z3 Special Interest Group Meeting*, Microsoft Research, Redmond, WA, USA, Oct 22, 2012

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

"Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers", *Interaction versus Automation: The Two Faces of Deduction*, Schloss Dagstuhl Seminar (by-invitation-only international seminar), Wadern, Germany, Oct 9, 2009

"Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers", Intel, Hillsboro, OR, USA, Aug 5, 2009

"Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers", Verimag, Grenoble, France, Jun 25, 2009

"Automatizing Modular Software Verification Using Static Analysis", Faculty of Electrical Engineering and Computing, University of Zagreb, Zagreb, Croatia, Oct 2, 2008

Conference and Workshop Talks

"Analysis and Synthesis of Floating-point Routines", LASER Summer School on Software Engineering, Elba Island, Italy, Jun 4, 2019

"SMACK Software Verification Toolchain", LLVM Developers' Meeting, San Jose, CA, USA, Nov 3, 2016

"SMACK Software Verification Toolchain", ICSE, Austin, TX, USA, May 18, 2016

"Towards Automated Differential Program Verification for Approximate Computing", WAX, Portland, OR, USA, Jun 13, 2015

"SMACK: Decoupling Source Language Details from Verifier Implementations", CAV, Vienna, Austria, Jul 19, 2014

"Practical Formal Correctness Checking of Million-core Problem Solving Environments for HPC",

SE-CSE, San Francisco, CA, USA, May 18, 2013

"Context-Bounded Translations for Concurrent Software: An Empirical Evaluation", SPIN, Enschede, The Netherlands, Sep 29, 2010

"STORM: Static Unit Checking of Concurrent Programs", ICSE, Cape Town, South Africa, May 6, 2010

"Static and Precise Detection of Concurrency Errors in Systems Code Using SMT Solvers", CAV, Grenoble, France, Jun 29, 2009

"A Scalable Memory Model for Low-Level Code", VMCAI, Savannah, GA, USA, Jan 20, 2009

"Automatic Inference of Frame Axioms Using Static Analysis", ASE, L'Aquila, Italy, Sep 17, 2008

"Verifying Heap-Manipulating Programs in an SMT Framework", ATVA, Tokyo, Japan, Oct 25, 2007

"Deciding Unbounded Heaps in an SMT Framework", SMT, Berlin, Germany, Jul 1, 2007

"A Reachability Predicate for Analyzing Low-Level Software", TACAS, Braga, Portugal, Mar 24, 2007

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

SOFTWARE

Sword: Lightweight Bounded-Memory-Overhead OpenMP Data Race Detector
`https://github.com/PRUNERS/sword`

FPTaylor: Tool for Rigorous Estimation of Round-Off Floating-Point Errors
`https://github.com/soarlab/FPTaylor`

FPTuner: Rigorous Floating-Point Mixed-Precision Tuner
`https://github.com/soarlab/FPTuner`

Gelpia: Rigorous Global Branch-and-Bound Optimizer
`https://github.com/soarlab/gelpia`

S3FP: Guided Random Testing for Floating-Point Error Estimation
`https://github.com/soarlab/S3FP`

JDoop: Automatic Testing Tool for Java Software
`https://github.com/psycopaths/jdoop`

JDart: Dynamic Symbolic Analysis Tool for Java
`https://github.com/psycopaths/jdart`
Used to automatically test NASA's flight control system called AutoResolver.

Archer: Data Race Detection Tool for Large OpenMP Applications
`https://github.com/PRUNER/archer`
Used by developers at LLNL to find data races in real-world high performance computing applications. Featured in LLNL research highlights. Part of the PRUNERS software project that has been named a finalist in the 2017 R&D 100 Awards.

maline: Android Malware Detection Framework
`https://github.com/soarlab/maline`

SMACKd: Eclipse Plugin for Debugging with SMACK
`http://github.com/smackers/smackd`

SMACK: Software Verifier and Verification Toolchain
`http://github.com/smackers/smack`
Contributions from University of Utah, IMDEA Software Institute, Microsoft Research, SRI International, and Imperial College London. Used in both research and teaching at other institu-

tions; also, used by industry to find bugs in proprietary software.

KULFI: LLVM Instruction Level Fault Injector
`http://github.com/soarlab/KULFI`

STORM: Tool for Detecting Concurrency Errors in System Software

STRACLOS: Decision Procedure for a Transitive Closure Logic

PROFESSIONAL SERVICE

Program committees and organization:

- Chair, International Conference on Computer Aided Verification (CAV), 2025
- Member, International Conference on Computer Aided Verification (CAV), 2024
- Member, NASA Formal Methods Symposium (NFM), 2021
- Member, Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE), 2020
- Workshop Chair, International Conference on Computer Aided Verification (CAV), 2020
- Member, European Symposium on Programming (ESOP), 2020
- Chair, Workshop on Democratizing Software Verification (DSV), 2019
- Publicity Chair, International Conference on Computer Aided Verification (CAV), 2019
- Member, International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC), 2019
- Member, International Competition on Software Verification (SV-COMP), 2019
- Member, International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2018
- Member, ACM SIGPLAN Symposium on Principles of Programming Languages (POPL), 2018
- Member (external review committee), ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2017
- Member, International Conference on Computer Aided Verification (CAV), 2017
- Member, NASA Formal Methods Symposium (NFM), 2017
- Member, International Competition on Software Verification (SV-COMP), 2017
- Member (external review committee), International Conference on Computer Aided Verification (CAV), 2016
- Member (poster track), International Conference on Software Engineering (ICSE), 2016
- Member, International Competition on Software Verification (SV-COMP), 2016
- Member, Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE), 2015
- Chair, International Workshop on Exploiting Concurrency Efficiently and Correctly (EC2), 2015
- Member, International Conference on Computer Aided Verification (CAV), 2015
- Member, International Competition on Software Verification (SV-COMP), 2015
- Publications Chair, ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2015
- Chair, Java Pathfinder Workshop (JPF), 2014
- Member, International Conference on Runtime Verification (RV), 2014
- Member, International SPIN Symposium on Model Checking of Software (SPIN), 2014
- Member, Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE), 2014
- Member, International Workshop on Exploiting Concurrency Efficiently and Correctly (EC2), 2014
- Member (external review committee), ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2014
- Member, AAAI Symposium on Formal Verification in Human-Machine Systems (FVHMS), 2014
- Member, International Conference on Reconfigurable Computing and FPGAs (ReConFig), 2013

- Chair, International Workshop on Exploiting Concurrency Efficiently and Correctly (EC2), 2013
- Member, International Workshop on Satisfiability Modulo Theories (SMT), 2013
- Member, Asian Symposium on Programming Languages and Systems (APLAS), 2012
- Member, Java Pathfinder Workshop (JPF), 2012
- Member, International Conference on Computer Aided Verification (CAV), 2012
- Chair, International Workshop on Intermediate Verification Languages (BOOGIE), 2012

Panels:

- National Science Foundation (NSF), 2017
- National Science Foundation (NSF), 2016
- National Science Foundation (NSF), 2015
- National Science Foundation (NSF), 2013
- National Science Foundation (NSF), 2012

Reviewer for journals:

- ACM Transactions on Programming Languages and Systems (TOPLAS), 2021
- Journal of Computing and Information Technology (CIT), 2017
- ACM Transactions on Programming Languages and Systems (TOPLAS), 2015
- Journal of Zhejiang University Science C (Computers & Electronics), 2014
- Acta Informatica, 2014
- Formal Methods in System Design (FMSD), 2013
- IEEE Transactions on Software Engineering (TSE), 2012
- Formal Methods in System Design (FMSD), 2011
- ACM Transactions on Programming Languages and Systems (TOPLAS), 2009

Reviewer for conferences:

- International Conference on Formal Methods and Models for System Design (MEMOCODE), 2019
- International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI), 2017
- International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2016
- International Conference on Automated Software Engineering (ASE), 2013
- International Conference on Software Engineering (ICSE), 2013
- International Conference on Fundamental Approaches to Software Engineering (FASE), 2012
- International Conference on Formal Methods in Computer-Aided Design (FMCAD), 2011
- International Conference on Computer Aided Verification (CAV), 2010
- International Conference on Fundamental Approaches to Software Engineering (FASE), 2010
- International Conference on Computer Aided Verification (CAV), 2009
- International Symposium on Automated Technology for Verification and Analysis (ATVA), 2008
- International Conference on Computer Aided Verification (CAV), 2008
- Design, Automation and Test in Europe Conference and Exposition (DATE), 2008
- International Haifa Verification Conference (HVC), 2007
- International Symposium on Automated Technology for Verification and Analysis (ATVA), 2007
- International Conference on Computer Aided Verification (CAV), 2007
- Heap Analysis and Verification Workshop (HAV), 2007
- International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2007
- Workshop on Pragmatics of Decision Procedures in Automated Reasoning (PDPAR), 2006
- Design Automation Conference (DAC), 2006

- Design, Automation and Test in Europe Conference and Exposition (DATE), 2006

Other:

- External PhD thesis reviewer for Yulia Demyanova, Vienna University of Technology (TU Wien), 2018
- Organizer, Schloss Dagstuhl Seminar "Analysis and Synthesis of Floating-point Programs", 2017
- Mentor, Google Summer of Code mentor, 2016
- Mentor, Google Summer of Code mentor, 2013
- Mentor, Google Summer of Code mentor, 2012

Invitation-Only Events

MathWorks Research Summit, 2018, Newton, MA, USA

Microsoft Research Faculty Summit, 2016, Redmond, WA, USA

MathWorks Research Summit, 2016, Newton, MA, USA

Schloss Dagstuhl Seminar "Machine Learning for Dynamic Software Analysis", 2016, Wadern, Germany

Schloss Dagstuhl Seminar "Correct and Efficient Accelerator Programming", 2013, Wadern, Germany

Microsoft Research Faculty Summit, 2012, Redmond, WA, USA

Schloss Dagstuhl Seminar "Decision Procedures in Software, Hardware and Bioware", 2010, Wadern, Germany[3]

Schloss Dagstuhl Seminar "Interaction versus Automation: The Two Faces of Deduction", 2009, Wadern, Germany

Students and Postdocs

Students:

- Marek Baranowski, PhD, October 2024
- Rocco Salvia, PhD, October 2021
- Jack Garzella, BS, September 2021
- Maryam Dabaghchian, PhD, July 2020
- Shaobo He, PhD, September 2019
- Liam Machado, BS, August 2019
- Ankit Agrawal, MS and non-student researcher, August 2019
- Simone Atzeni, PhD (co-advised with Ganesh Gopalakrishnan), August 2017
- Jiten Thakkar, MS, August 2017
- Marko Dimjašević, PhD, May 2017
- Dietrich Geisler, BS, May 2017
- Jonathan Whitaker, BS, December 2016
- Wei-Fan Chiang, PhD (co-advised with Ganesh Gopalakrishnan), August 2016
- Montgomery Carter, BS/MS, May 2016
- Arvind Haran, MS, December 2014

Postdocs:

- Faraz Hussain, 2016–2017
- Alexey Solovyev, 2013–2015

[3] Could not attend because volcanic ash from Iceland brought air traffic to a halt in Europe.