School of Computer Science
Tel Aviv University

**Mooly (Shmuel) SAGIV, Ph.D.**

# CURRICULUM VITAE

E-mail:msagiv@acm.org

## EDUCATION

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|---|---|
| 1986–1990 | Ph.D. Computer Science Technion, Israel Institute of Technology. "High Level Formalisms for Program Flow Analysis and their use in Compiling." Advisers: Professor Michael Rodeh and Professor Nissim Francez |
| 1982–1985 | B.A. Computer Science, Cum Laude, Technion, Israel Institute of Technology |

## Professional Career

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| 2008– | Full Professor, School of Computer Science, Tel-Aviv University |

## Visiting Positions

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| 2009–10 | Visiting Research Professor, Stanford University |
| 2008–9 | Visiting Research Professor, University of Berkeley |
| Summer'01,05,13–15 | Visiting Researcher, Microsoft Research Redmond |
| 2006-7 | Distinguished Visiting Scientist, Microsoft Research Cambridge |
| Summer'01,08 | Visiting Research Scientist, IBM T.J. Watson Center |

## GRANTS

| | |
|---|---|
| 2013–2017 | **Senior ERC Grant**: "Verifying and Synthesizing Software Compositions" (PI, 1.57 Million Euros) |
| 2011–2016 | Israel academy of science grant, PI "Enabling Software Scalability Via Dynamic and Static Program Analysis", (PI, $240K). |
| 2011–2014 | Microsoft Research, "Enforcing Automicity for Data Structure Manipulations", ($64K). |
| 2011–12 | IBM OCR Gift jointly with Alex Aiken ($500k) |
| 2007–2011 | Israel academy of science grant, "Specialized Shape Analysis", PI (1,120K NIS) |
| 2008–2010 | Microsoft Research grant, "Program verification/analysis techniques for concurrent programs with heap", PI ($90K) |
| 2007–2009 | GIF "Shape Analysis and Encapsulation", PI 87K Euro |

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| 2004–5 | IBM Faculty Partnership Award, "Combining Dynamic and Static Analysis", PI ($40K) |
| 2003–2007 | Israel academy of science grant, PI (1,200,000 NIS) |
| 2002–2004 | Giesecke & Devrient GmbH, and Tel Aviv University, "Garbage Collection for Smartcards", PI (106K Euro) |
| 2003 | Intel innovation grant, "Subpath profiling", PI (co-PI: Yossi Matias) (jointly: $20K) |
| 2000–2002 | IBM Faculty Partnership Award, "Garbage Collection", PI ($70,000) |
| 2000–2002 | The European IST Programme of the Fifth Framework Programme (FP5), Coordinator: Patrick Cousot, PI (my share: 93,360 Euro), |
| 1999–2002 | Israel academy of science grant, "Shape Analysis", PI ($76K) |
| 1999–2000 | Intel innovation grant, "Static Analysis", PI ($30K) |
| 1997–2000 | B.S.F grant, "Slicing Programs with Recursive Data Structures", PI (co-PI: Susan Horwitz and Thomas Reps), ($47K) |

**Honors and Awards**

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| 2016 | ACM Fellow |
| 2012 | Best paper award, PLDI'12 |
| 2011 | Best paper award, PLDI'11 |
| 2011 | ACM SIGSOFT Impact Paper Award for 2011: T. Reps, S. Horowitz, M. Sagiv and G. Rosay. Speeding-Up Slicing. In Proc. Second ACM SIGSOFT Symposium on Foundations of Software Engineering, New Orleans, LA, USA, December 1994. |
| 2000,01,02,04,05 | IBM Faculty Awards |
| 2002 | The Friedrich Wilhelm Bessel Research Award, granted by the Humboldt Foundation, Germany for Shape Analysis |
| 1993 | IBM Outstanding Technical Achievement Award for semi automatically porting the IBM AS/400 operating system to a new platform |
| 1989 | Wolf Foundation Fellowship |
| 1985 | Miriam and Aharon Gutwirth Fellowship |

**Honors and Awards Students**

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| Eran Yahav | The Eshkol Graduate Fellowship, IBM Fellowship, and Allon Prestigious Fellowship for new faculty in all sciences. Currently Associate Professor at the Technion, Received several best paper awards and the Technion Yanai Prize for Excellence in Academic Education. |
| Noam Rinetzky | IBM graduate scholarship and a Royal Academy of Engineering/EPSRC Research Fellow. Currently Assistant Professor at Tel Aviv University |

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| Roman Manevich | The Clore PhD Fellowship. Currently Assistant Professor at Ben-Gurion University |
| Greta Yorsh | The Eshkol Graduate Fellowship. Currently Assistant Professor at Queen Mary University |
| Tal Lev-Ami | Adams graduate scholarship |
| Nurit Dor | The Eshkol Graduate Fellowship, CTO of the Panaya Static Analysis company, acquired by InfoSys |
| Michal Segalov | Anita Borg co-winner for social impact |

## OTHER ACTIVITIES

**Journal Editor:** Foundations and Trends in Programming Languages

**Conference Program Committee Chair:**

• The 38-th ACM SIGACT-SIGPLAN Symposium on Programming Languages January 2011 (Program Committee Chair)

• The 18-th International Static Analysis Symposium September 2011 (General co-chair)

• The Dagstuhl Seminar "Typing, Analysis and Verification of Heap Manipulating Programs" July 2009, Schloss Dagstuhl, Germany (co-chair)

• Heap Analysis and Verification Workshop July 2008, Princeton, USA. A satellite workshop of CAV 2008 (co-chair)

• Workshop on the Verification of Concurrent Algorithms, Microsoft Research Cambridge, May 2008 (co-chair).

• Heap Analysis and Verification Workshop March 25, 2007, Braga, Portugal. A satellite workshop of ETAPS 2007 (co-chair)

• The 6th ACM International Symposium on Memory Management, ISMM 2007, Montreal, Quebec, Canada, October 21–22, 2007 ACM 2007 (chair)

• The ESOP'05 European Conference on Programming (chair)

• The Dagstuhl Seminar "Program Analysis" 12–18 April 1999, Schloss Dagstuhl, Germany (co-chair)

• The Dagstuhl Seminar "Programs with Recursively Defined Data Structures (using pointers)" 20–24 April 1998, Schloss Dagstuhl, Germany (co-chair)

**Conference Program Committee:** •

• POPL 2017, The 44th annual ACM SIGPLAN - SIGACT Symposium on Principles of Programming Languages

• 28th International Conference on Computer Aided Verification(CAV'16)

• The 24th European Symposium on Programming (ESOP'15)

• 27th International Conference on Computer Aided Verification(CAV'15)

• TACAS 2013, Sixteenth International Conference on Tools and Algorithms for the Construction and Analysis of Systems

• The 20th SAS 2013, Static Analysis Symposiums

• VMCAI 2012, The 13th International Conference on Verification, Model Checking, and Abstract Interpretation

• POPL 2010, The 37th annual ACM SIGPLAN - SIGACT Symposium on Principles of Programming Languages.

• CC'09, International Conference on Compiler Construction.

• TACAS 2008, Fourteenth International Conference on Tools and Algorithms for the Construction and Analysis of Systems

• APLAS 2008, 6th Asian Symposium on Programming Languages and Systems.

• IWACO 2008, International Workshop on Aliasing, Confinement and Ownership.

• SAS'07, The 14th International Static Analysis Symposium

• VMCAI'05, Verification, Model Checking and Abstract Interpretation

• CAV'05, 17th Conference on Computer Aided Verification

• ACM PLDI'06, SIGPLAN Conference on Programming Language Design and Implementation, 2006

• ACM POPL'04, Principles of Programming Languages

• SPIN'04, International SPIN Workshop on Model Checking of Software

• ACM ISMM'04, International Symposium on Memory Management

• CC'03, 10th International Conference on Compiler Construction.

• The SAS'03 Static Analysis Symposium

• SPIN'03, International SPIN Workshop on Model Checking of Software

• The ESOP'02 European Conference on Programming.

• The SAS'02 Static Analysis Symposium

• Paste'02, Program Analysis for Software Tools and Engineering (PASTE 2002)

• The ESOP'01 European Conference on Programming.

• ACM POPL'01, Principles of Programming Languages

• The CC'00 9-th International Conference on Compiler Construction.

• The SAS'99 Static Analysis Symposium

• The CC'99 8-th International Conference on Compiler Construction.

• ACM PLDI'98, SIGPLAN Conference on Programming Language Design and Implementation, 1998

• ACM PLDI'97 SIGPLAN Conference on Programming Language Design and Implementation, 1997

**Invited Speaker**

2015 Keynote Invited Speaker, Compiler and Architecture Tool Conference 2015, "Synthesizing Concurrent Data Structures"

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| 2015 | Keynote Invited Speaker, Haifa Verification Conference 2015, "Reasoning about Data Structure Shape: From the Heap to Distributed Systems" |
| 2015 | Distinguished Lecture Series, UC San Diego, "Reasoning about Data Structure Shape: From the Heap to Distributed Systems" |
| 2015 | Keynote Invited Speaker, ECOOP'2015, "Analyzing Networks" |
| 2014 | "Concurrent Data Representation Synthesis", Distinguished lecture EPFL |
| 2014 | "Modular Reasoning about Heap Paths via Effectively Propositional Formulas", Workshop on Software Correctness and Reliability, ETH Zurich |
| 2013 | "Data Structure Synthesis", Strachey Lecture Oxford University |
| 2012 | "Checking Atomicity of Composed Collection Operations", Invited speaker: Workshop on Software Testing and Verification, The CREST Open Workshop (COW) Program, UCL London. |
| 2010 | "Statically Inferring Complex Heap, Array, and Numeric invariants" Invited Conference Speaker SAS 2010: 71–99. |
| 2009 | "Thread Modular Shape Analysis", Invited Conference Speaker VMCAI'09. |
| 2009 | "Thread Modular Shape Analysis", Stanford Software Seminar. |
| 2008 | Thirty Years of Abstract Interpretation, Co-located with POPL'08 |
| 2007 | "Shape Analysis", Berkeley, CA |
| 2005 | "Automatically proving properties of heap intensive imperative programs", Software Model Checking Workshop |
| 2005 | "Decision Procedures for Linked Data Structures", Marktoberdorf Summer School 2005, an Advanced Study Institute of the NATO Science committee. |
| 2005 | "Shape Analysis", The Program Analysis and Transformation Summer School Denmark |
| 2005 | "Shape Analysis", Shape Analysis workshop, CVS Osaka Japan |
| 2004 | "On the Expressive Power of Canonical Abstraction", Conference on Verification, Model Checking, and Abstract Interpretation |
| 2004 | "TVLA: A System for Generating Abstract Interpreters" Marktoberdorf Summer School 2004, an Advanced Study Institute of the NATO Science committee |
| 2004 | "Compile-Time Verification of Properties of Heap Intensive Programs", UC Berkeley Distinguished Lecture Series |
| 2003 | "Shape Analysis", Workshop on Infinite State Systems France. |

**SOFTWARE DEVELOPED**

**TVLA:** A System for implementing Static Analysis
"http://www.cs.tau.ac.il/∼tvla/" TVLA is a generic system for implementing static analysis algorithm.

## PATENTS

| | |
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| 2014 | "Apparatus with general numeric backtracking algorithm for solving satisfiability problems to verify functionality of circuits and software," United States Patent 8656330 |
| 2001 | "Method for detecting buffer overflow for computer security." United States Patent 6301699 |
| 2004 | "Automatic removal of array memory leaks." United States Patent 6675379 |
| 1996 | "Complier and method for alias checking in a complier." Unite States Patent 5555412 |

## POSTDOCTORAL STUDENTS AND VISTORS

| | |
|---|---|
| 2015 | Yaron Velner, "Complexity of Network Verification". |
| 2014–15 | Aleksandr Karbyshev, "Property Guided Verification of Dynamically Evolving Systems", Currently Postdoc at Aarhus University |
| 2013–2014 | Ori Lahav, "Effectively Propositional Reasoning". Currently Postdoc at MPI. |
| 2015–2016 | Sharon Shoham, "Inferring Inductive Invariants" |

## DOCTORAL STUDENTS SUPERVISED

| | |
|---|---|
| 2014– | Oded Padon, "Verifying Distributed Protocols" |
| 2009–2014 | Guy Guta (jointly with Eran Yahav), Tel-Aviv University. Currently Research Scientist in the Scalable Systems Research Group at Yahoo Lab |
| 2009–2014 | Shachar Itzhaky, Tel-Aviv University, "Automatic Reasoning for Pointer Programs Using Decidable Logics". Currently postdoc at MIT |
| 2009–2013 | Omer Tripp, Tel-Aviv University, "Incorporating Data Abstractions into Concurrency Control". Currently research member at IBM Research IBM T.J. Watson Center |
| 2007–2012 | Ohad Shacham, Tel-Aviv University (jointly with Eran Yahav), "Verifying Atomicity of Composed Concurrent Operations ". Currently Research Scientist in the Scalable Systems Research Group at Yahoo Lab |
| 2004–2009 | Tal Lev-Ami, Tel-Aviv University, "Automatic Maintenance of Transitive Properties with Applications for Shape Analysis ". Currently Co-founder at Cloudinary |

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| 2003–2008 | Greta Yorsh, Tel-Aviv University (jointly with Alexander Rabinovich), "Employing Decision Procedures in Abstract Interpretation". Currently Faculty member at Queen Mary University London |
| 2003–2008 | Noam Rinetzky, Tel-Aviv University "Hierarchical Shape Analysis of Object Oriented Programs". Currently Faculty member at Tel Aviv University |
| 2003–2008 | Roman Manevich, Tel-Aviv University, "Heap Decompositions". Currently Faculty member at Ben Gurion University |
| 1999–2004 | Professor Eran Yahav, Tel-Aviv University, "Analyzing Multithreading in Java". Currently Faculty member at Technion Israel |
| 2000–2003 | Ran Shaham, Tel-Aviv University, "Memory Management in Java using Static Analysis". Currently Inventor Amuse Toy & Game Development |
| 1999–2003 | Nurit Dor, Tel-Aviv University, "Checking Memory Cleanness". Currently at IDF |

## MASTERS STUDENTS SUPERVISION

| | |
|---|---|
| 2014– | Kalev Alpernas |
| 2014– | Asya Frumklin |
| 2013–2015 | Ofri Ziv, Tel-Aviv University "Composable Concurrency Control" |
| 2012–2015 | Hila Peleg (jointly with Eran Yahav) |
| 2011–2015 | Orr Tamir, Tel-Aviv University (jointly with Noam Rinetzky) "Parrallelizing Shortest Path Algorithms for Dense Graphs" |
| 2010-2012 | Ghila Castelnuovo, "Modular Lattices for Compositional Interprocedural Analysis" |
| 2007–2009 | Michal Segalov, Tel-Aviv University, "Checking linearizability of concurrent implementations" |
| 2006–2009 | Shachar Yitzhaky, Tel-Aviv University, "Synthesizing Graph Algorithms" |
| 2006–2008 | Igor Bogodlov, Tel-Aviv University, "Reducing the cost of parametric shape analysis using database optimizations" |
| 2005–2008 | Sharon-Zvi Goldshlager, Tel-Aviv University, "Producing Counterexamples for static analysis" |
| 2005–2008 | Uri Juhasz, Tel-Aviv University, "Assume Guarantee Reasoning with Abstraction" |
| 2005–2007 | Aharon Abadi, Tel-Aviv University, "Proving Specifications with First Order Theorem provers" (jointly with Alexander Rabinovich) |
| 2005–2007 | Daphna Amit, Tel-Aviv University, "Automatic Proving of Linearizability" |

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| 2005–2006 | Shachar Rubinstein, Tel-Aviv University, "Dynamic heap Profiling" |
| 2005–2006 | Ronny Morad, Tel-Aviv University, "Garbage Collection of Long-Lived Objects" |
| 2005–2006 | Guy Gueta, Tel-Aviv University, "Cartesian Partial-Order Reduction" |
| 2004–2005 | Ohad Shacham, Tel-Aviv University, "Improving Scalability of Model Checking using Dynamic Information" (jointly with Assaf Shuster) |
| 2004–2005 | Ron Elebogen, Tel-Aviv University, "Fully Automatic Verification of Absence of Errors via Interprocedural Integer Analysis" (jointly with Nurit Dor and Roberto Bagnara) |
| 2003–2004 | Guy Erez, Tel-Aviv University, "Generating Concrete Counter Examples for Abstract Interpreters" |
| 2003–2004 | Yair Sade, Tel-Aviv University, "Allocating thread-local storage in C programs" |
| 2003–2004 | Gilad Arnold, Tel-Aviv University, "Merging Heap Abstractions" |
| 2002–2004 | Boris Litvin, System and framework for Low-overhead on-line subpath profiling, Tel-Aviv University (jointly with Yossi Matias) |
| 2000–2003 | Roman Manevich, Tel-Aviv University, "Efficient Data Structures for Shape Analysis" |
| 2000–2003 | Greta Yorsh, Tel-Aviv University, "Logical Characterizations of Heap Abstractions" |
| 1999–2002 | David Oren, Tel-Aviv University (jointly with Yossi Matias) |
| 2000–2001 | Alex Warshavsky, Tel-Aviv University, "Analysing Java Components" |
| 2000–2001 | Michael Pan, Tel-Aviv University, "Heap Profiling for Java Programs" |
| 1999–2000 | Tal Lev-Ami, Tel-Aviv University, "TVLA: A System for implementing Static Analysis" |
| 1999–2000 | Noam Rinetskey, Technion, "Interprocedural Shape Analysis" (jointly with Orna Grumberg) |
| 1998–1999 | Ran Shaham, Tel-Aviv University (jointly with Elliot Kolodner) "Automatic Removal of Array Memory Leaks in Java" |
| 1998–1999 | Nurit Dor, Tel-Aviv University (jointly with Michael Rodeh) "Detecting Memory Errors via Static Pointer Analysis" |

**Advisory Board**

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|---|---|
| 2006-2009 | Panaya Inc (Acquired by InfoSys 200M$) |

Date: January 2016

January, 2016

# Shmuel (Mooly) Sagiv, Ph.D.

## Publications

### Notable publications

1. Shachar Itzhaky, Anindya Banerjee, Neil Immerman, Aleksandar Nanevski, Mooly Sagiv: "Effectively-Propositional Reasoning about Reachability in Linked Data Structures." CAV 2013: 756–772

2. Peter Hawkins, Martin C. Rinard, Alex Aiken, Mooly Sagiv, Kathleen Fisher: "An introduction to data representation synthesis." Commun. ACM 55(12): 91–99 (2012) Invited paper Programming Language Highlights, see also Peter Hawkins' dissertation, Honorable Mention ACM dissertation award

3. O. Shacham, N. Bronson, A. Aiken, M. Sagiv, M.T. Vechev, E. Yahav: "Testing atomicity of composed concurrent operations." OOPSLA 2011: 51–64
This paper affected the design of the Java concurrent library.

4. Eran Yahav, Mooly Sagiv: "Verifying safety properties of concurrent heap-manipulating programs." ACM Trans. Program. Lang. Syst. 32(5): (2010)

5. Rinetzky N., Baur J., Reps T., Sagiv M., Wilhelm R.:"A Semantics for Procedure Local Heaps and its Abstractions." In *The 32nd Annual. ACM SIGPLAN - SIGACT. Symposium. on Principles of Programming Languages (POPL'05), Long Beach, California.* 296–209.

6. Gopan D., Reps T., Sagiv M.: "A framework for Numeric Analysis of Array Operations." In *The 32nd Annual. ACM SIGPLAN - SIGACT. Symposium. on Principles of Programming Languages (POPL'05). Long Beach, California.* 338–350.

7. Reps T., Sagiv M., and Yorsh G.: "Symbolic implementation of the best transformer." in Proc. Verification, Model Checking, and Abstract Interpretation (VMCAI), Lecture Notes in Computer Science, 2937, Springer Verlag (2004), 252–266.

8. Dor Nurit, Rodeh Michael, Mooly Sagiv: "CSSV: Towards a Realistic Tool for Statically Detecting All Buffer Overflows in C." *Conference on Programming Language Design and Implementation archive Proceedings of the ACM SIGPLAN 2003 conference on Programming language design and implementation (PLDI'03)*, 155–167

9. Sagiv, M., Reps, T., and Wilhelm, R.: "Parametric Shape Analysis via 3-Valued Logic." ACM Transactions on Programming Languages and Systems 24:3 (2002), 217–298

10. Reps T., Horwitz S., and Sagiv M.: "Precise Interprocedural Dataflow Analysis via Graph Reachability".
*The Twenty-Second ACM Symposium on Principles of Programming Languages*, (1995),

49–61.
**This article defines the basic Microsoft SLAM device driver static algorithm.**

11. Sagiv, S., Francez, N., Rodeh, M., Wilhelm, R.: "A Logic-based approach to program flow analysis." ACTA Informatica, 35:6 (1998), 457–504.
This article introduced the use of Horn Clauses in program analysis.

**Journal Publications**

1. Jörg Kreiker, Thomas W. Reps, Noam Rinetzky, Mooly Sagiv, Reinhard Wilhelm, Eran Yahav: "Interprocedural Shape Analysis for Effectively Cutpoint-Free Programs." Programming Logics 2013: 414–445

2. Peter Hawkins, Martin C. Rinard, Alex Aiken, Mooly Sagiv, Kathleen Fisher: "An introduction to data representation synthesis." Commun. ACM 55(12): 91–99 (2012) (Invited paper Programming Language Highlights)

3. Yahav E. and Sagiv M.: "Verifying Safety Properties of Concurrent Java Programs using 3-Valued Logic." ACM Trans. Program. Lang. Syst. 32(5): (2010)

4. Aharon Abadi, Alexander Rabinovich, Mooly Sagiv: "Decidable Fragments of Many-Sorted Logic." J. Symb. Comput. 45(2): 153–172 (2010)

5. T. Reps and M. Sagiv and A. Loginov: "Finite differencing of logical formulas for static analysis." Thomas W. Reps, Mooly Sagiv, Alexey Loginov: Finite differencing of logical formulas for static analysis. ACM Trans. Program. Lang. Syst. 32(6): (2010)

6. Jeannet, B. Loginov, A., Reps T., Sagiv., M: "A Relational Approach to Interprocedural Shape Analysis." ACM Trans. Program. Lang. Syst. 32(2): (2010)

7. S. Dolev, Y. A. Haviv, M. Sagiv: "Self-stabilization Preserving Compiler." ACM Trans. Program. Lang. Syst. 31(6): (2009)

8. T. Lev-Ami, N. Immerman, T. W. Reps, S. Sagiv, S. Srivastava, G. Yorsh: "Simulating Reachability Using First-Order Logic with Applications to Verification of Linked Data Structures." Logical Methods in Computer Science 5(2):(2009)

9. N. Rinetzky., G. Ramalingam, M. Sagiv, and E. Yahav: "On the Complexity of Partially-Flow-Sensitive Alias Analysis." ACM Transactions on Programming Languages and Systems, Vol. 30, No. 3, article 13, 28 pages (2008).

10. Yorsh G., Reps T., Sagiv M., Wilhelm R.: "Logical Characterizations of Heap Abstractions." ACM Transactions on Computational Logic (TOCL) 8(1),27 pages, January 2007.

11. G. Yorsh, A. Rabinovich, M. Sagiv, A. Meyer, A. Bouajjani: "A Logic of Reachable Patterns in Linked Data-Structures." The Journal of Logic and Algebraic Programming, 73, 111–142 (2007)

12. O. Shacham, M. Sagiv, A. Schuster: "Scaling model checking of dataraces using dynamic information." Journal of Parallel and Distributed Computing, Volume 67 (2007) 536–550

13. E. Yahav, T. W. Reps, S. Sagiv, R. Wilhelm: "Verifying Temporal Heap Properties Specified via Evolution Logic." Logic Journal of the IGPL, 14(5), 755–783 (2006)

14. Nebenzahl, D. Sagiv, S., and Wool, A.: "Install-Time Vaccination of Windows Executables to Defend against Stack Smashing Attacks." IEEE Trans. on Dependable Secure Computing 3(1), 78–90 (2006)

15. Shaham R., Yahav E., Kolodner E.K., and Sagiv M.: "Establishing Local Temporal Heap Safety Properties with Application to Compile-Time Memory Management." Science of Computer Programming, 58(1-2): 264-289 (2005)

16. Sagiv, M., Reps, T., and Wilhelm, R.: "Parametric Shape Analysis via 3-Valued Logic." ACM Transactions on Programming Languages and Systems 24:3 (2002), 217–298

17. Nielson, F., Nielson, H.R. and Sagiv, M.: "Kleene's Logic with Equality." IPL (Information Processing Letters), 80 (2001), 131–137.

18. Rodeh, M., Sagiv, S.: "Finding Circular Attributes in Attribute Grammars." JACM, 46:4 (1999), 556–575.

19. Sagiv, M., Reps T., and Wilhelm R.: "Solving Shape-Analysis Problems in Languages with Destructive Updating." ACM Transactions on Programming Languages and Systems, 20:1 (1998), 1–50.

20. Ross, J. and Sagiv, M.,: "Building a Bridge between Pointer Aliases and Program Dependences." Nordic Journal of Computing, 5 (1998), 361–386.

21. Sagiv, M., Reps, T., and Horwitz, S.: "Precise interprocedural dataflow analysis with applications to constant propagation." Theoretical Computer Science, 167 (1996), 131–170.

22. Makowsky, J., Gregoire, J., and Sagiv, M.: "The Expressive Power of Side Effects in Prolog." J. Logic Programming, 12 (1992), 179–188.

**In preparation - invited**

1. M. Sagiv.: "The Shape of Shape Analysis." Invited to CACM

## CHAPTERS IN BOOKS

1. Reps T., Sagiv S., and Wilhelm R.: "Shape Analysis and Applications." In *the Compiler Design Handbook: Optimizations & Machine Code Generation*, (Y.N. Srikant, P. Shankar, eds.), CRC Press (2003), 175–217.

2. T. Reps, M. Sagiv, J. Bauer: "Program Analysis and Compilation, Theory and Practice." Essays Dedicated to Reinhard Wilhelm on the Occasion of His 60th Birthday Springer 2007.

## BOOK EDITING (special issue)

1. Sagiv S.: Special Issue ESOP'05 ACM Transactions on Programming Languages and Systems, Vol. 29, No. 5, 2007.

### Articles In Peer Reviewed Conferences

1. Oded Padon, Neil Immerman, Sharon Shoham, Aleksandr Karbyshev, Mooly Sagiv: Decidability of Inferring Inductive Invariants. The 43rd Annual ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL 2016)

2. Ghila Castelnuovo, Mayur Naik, Noam Rinetzky, Mooly Sagiv and Hongseok Yang: Modularity in Lattices: A Case Study on the Correspondence between Top-Down and Bottom-Up Analysis. SAS 2015

3. Ofri Ziv, Alex Aiken, Guy Golan-Gueta, G. Ramalingam, Mooly Sagiv: Composing concurrency control. PLDI 2015: 240–249

4. Oded Padon, Neil Immerman, Ori Lahav, Aleksandr Karbyshev, Mooly Sagiv, Sharon Shoham: Decentralizing SDN Policies. POPL 2015

5. Guy Golan-Gueta, G. Ramalingam, Mooly Sagiv, Eran Yahav: Automatic Scalable Atomicity via Semantic Locking PPoPP 2015

6. Shachar Itzhaky, Anindya Banerjee, Neil Immerman, Ori Lahav, Aleksandar Nanevski, Mooly Sagiv: "Modular reasoning about heap paths via effectively propositional formulas." POPL 2014: 385–396

7. Thomas Ball, Nikolaj Bjørner, Aaron Gember, Shachar Itzhaky, Aleksandr Karbyshev, Mooly Sagiv, Michael Schapira, Asaf Valadarsky: VeriCon: "Towards verifying controller programs in software-defined networks." PLDI 2014: 31

8. Ohad Shacham, Eran Yahav, Guy Golan-Gueta, Alex Aiken, Nathan Grasso Bronson, Mooly Sagiv, Martin T. Vechev: "Verifying atomicity via data independence." ISSTA 2014: 26-36

9. Oren Zomer, Guy Golan-Gueta, G. Ramalingam, Mooly Sagiv: "Checking Linearizability of Encapsulated Extended Operations." ESOP 2014: 311–330

10. Shachar Itzhaky, Nikolaj Bjørner, Thomas W. Reps, Mooly Sagiv, Aditya V. Thakur: "Property-Directed Shape Analysis." CAV 2014: 35–51

11. Guy Golan-Gueta, G. Ramalingam, Mooly Sagiv, Eran Yahav: "Automatic semantic locking." PPOPP 2014: 385–386

12. Boyang Li, Isil Dillig, Thomas Dillig, Kenneth L. McMillan, Mooly Sagiv: "Synthesis of Circular Compositional Program Proofs via Abduction." TACAS 2013: 370–384

13. Guy Golan-Gueta, G. Ramalingam, Mooly Sagiv, Eran Yahav: "Concurrent libraries with foresight." PLDI 2013: 263–274

14. Omer Tripp, Eric Koskinen, Mooly Sagiv: "Turning nondeterminism into parallelism." OOPSLA 2013: 589–604

15. Shachar Itzhaky, Sumit Gulwani, Neil Immerman, Mooly Sagiv: "Solving Geometry Problems Using a Combination of Symbolic and Numerical Reasoning." LPAR 2013: 457–472

16. Shachar Itzhaky, Anindya Banerjee, Neil Immerman, Aleksandar Nanevski, Mooly Sagiv: "Effectively-Propositional Reasoning about Reachability in Linked Data Structures." CAV 2013: 756–772

17. O. Tripp, R. Manevich, J. Field, and M. Sagiv: "Janus: Exploiting Parallelism via Hindsight." PLDI'12: ACM Conference on Programming Language Design and Implementation, June 2012

18. P. Hawkins, A. Aiken, K. Fisher, M. Rinard, M. Sagiv: "Concurrent Data Representation Synthesis." PLDI'12: ACM Conference on Programming Language Design and Implementation, June 2012 **Best Paper Award**

19. P. Hawkins, A. Aiken, K. Fisher, M. Rinard, M. Sagiv: "Reasoning About Lock Placements." Proceedings of the 22n European Symposium on Programming (ESOP), Springer, 24 March 2012

20. S. Burckhardt, M. Fahndrich, D. Leijen, and M. Sagiv: "Eventually Consistent Transactions." Proceedings of the 22n European Symposium on Programming (ESOP), Springer, 24 March 2012

21. Juan M. Tamayo, Alex Aiken, Nathan Grasso Bronson, Mooly Sagiv: "Understanding the behavior of database operations under program control." OOPSLA 2012: 983–996

22. M. Naik, H. Yang, G. Castelnuovo, M. Sagiv: "Abstractions from tests". POPL 2012: 373–386

23. I. Dillig, T. Dillig, A. Aiken, M. Sagiv: "Precise and compact modular procedure summaries for heap manipulating programs." PLDI 2011: 567–577

24. P. Hawkins, A. Aiken, K. Fisher, M.C. Rinard, M. Sagiv: "Data representation synthesis." PLDI 2011: 38–49 **Best Paper Award**

25. O. Shacham, N. Bronson, A. Aiken, M. Sagiv, M.T. Vechev, E. Yahav: "Testing atomicity of composed concurrent operations." OOPSLA 2011: 51–64

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1. Oded Padon, Kenneth L. McMillan, Aurojit Panda, Mooly Sagiv, and Sharon Shoham: Ivy: Interactive Verification of Parameterized Systems via Effectively Propositional Reasoning. To appear in PLDI'16

2. Yaron Velner, Kalev Aplernas, Aurojit Panda, Alexander Rabinovich, Mooly Sagiv, Scott Shenker, Sharon Shoham: Some Complexity Results for Stateful Network Verification. To appear in TACAS'16.

**Invited Papers**

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"Abstract Counterexample-Based Refinement for Powerset Domains"
In Program Analysis and Compilation 2006, LNCS 4444, 273–292.

2. Alexey Loginov, Thomas W. Reps, Mooly Sagiv
"Refinement-Based Verification for Possibly-Cyclic Lists."
In Program Analysis and Compilation 2006, LNCS 4444, 247–272.

3. Tal Lev-Ami, Roman Manevich, Shmuel Sagiv
"TVLA: A system for generating abstract interpreters"
IFIP Congress Topical Sessions 2004, 367–376.

4. Wilhelm, R., Sagiv, M., and Reps, T.,
"Shape analysis"
In Proc. of CC 2000: 9th Int. Conf. on Compiler Construction, Lecture Notes in Computer Science 1781, (2000), 1-17.

5. Reps, T., Sagiv, M., and Wilhelm, R.
"Static program analysis via 3-valued logic"
In Proc. Int. Conf. on Computer-Aided Verification, (CAV'04), Lecture Notes in Computer Science, 3114, Springer Verlag (2004), 15–30.

**REFEREED WORKSHOPS**

1. Aurojit Panda, Katerina J. Argyraki, Mooly Sagiv, Michael Schapira, Scott Shenker: New Directions for Network Verification. SNAPL 2015: 209–220

2. Uri Juhasz, Noam Rinetzky, Arnd Poetzsch-Heffter, Mooly Sagiv and Eran Yahav
"Modular Verification with Shared Abstractions"
Foundations of Object Oriented Languages (FOOL'2009)

3. Greta Yorsh, Alexey Skidanov, Thomas W. Reps, Shmuel Sagiv
"Automatic Assume/Guarantee Reasoning for Heap-Manipulating Programs: Ongoing Work"
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"Cartesian Partial-Order Reduction"
SPIN 2007, LNCS 4595, 95–112.

5. Yahav, E., and Sagiv M.,
"Automatically Verifying Concurrent Queue Algorithms"
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"Detecting Memory Errors via Static Pointer Analysis"
*Proceedings of the ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE'98)* (Montreal, June 1998), (1998), 27–34.