

# Curriculum Vitae

Shan Lu

University of Chicago, Dept. of Computer Science  
1100E 58<sup>th</sup> St.. Room 257A  
Chicago, IL 60637 USA

Phone: +1-773-702-3184  
E-mail: shanlu@cs.uchicago.edu  
Homepage: <http://people.cs.uchicago.edu/~shanlu>

## RESEARCH INTERESTS

Software systems; software dependability; program analysis; concurrent and parallel software

## EMPLOYMENT

Associate Professor, August 2014 -- present  
Department of Computer Sciences, University of Chicago

Assistant Professor, January 2009 – July 2014  
Department of Computer Sciences, University of Wisconsin – Madison, WI

## EDUCATION

University of Illinois at Urbana-Champaign, Urbana, IL  
Ph.D. in Computer Science, 2008  
Thesis: Understanding, Detecting, and Exposing Concurrency Bugs (Advisor: Prof. Yuanyuan Zhou)

University of Science & Technology of China, Hefei, China  
B.S. in Computer Science, 2003

## HONORS AND AWARDS

[Google Scholar Classic Papers \(Software Systems\), 2017](#)

“CP-Miner: finding copy-paste and related bugs in large-scale software code” published in IEEE-TSE 2006  
*One of the ten most cited software systems papers published in 2006 based on [Google Scholar](#)*

**Best Paper Award**, USENIX OSDI 2016

“Early Detection of Configuration Errors to Reduce Failure Damage” published in OSDI’16  
*One of three papers selected from 267 OSDI’16 submissions*

**Google Faculty Research Award**, 2015

**ACM SIGSOFT Distinguished Paper Award**, 2015

“CAMEL: Detecting and Fixing Performance Problems That Have Non-Intrusive Fixes” published in ICSE’15  
*One of six papers selected from 452 ICSE’15 submissions*

**Distinguished referee of ACM Transactions on Software Engineering and Methodology**, 2013--2014

**ACM SIGSOFT Distinguished Paper Award**, 2014

“Al: a Lightweight System for Tolerating Concurrency Bugs” published in FSE’14  
*One of six papers selected from 280 FSE’14 submissions*

**Alfred P. Sloan Research Fellow**, 2014

*One of 126 “early-career scholars (who) represent the most promising scientific researchers working today” selected by Alfred P. Sloan Foundation*

**Invited Speaker at the UVa CS Top Gun Speaker Series**, 2013

*A speaker series organized to “Recognizes faculty on a trajectory to be the research leaders of the coming decades” by Department of Computer Science, University of Virginia*

**Distinguished Alumni Educator Award, 2013**

*One of three awardees selected by Department of Computer Science, University of Illinois*

**Best Paper Award, USENIX FAST 2013**

*"A Study of Linux File System Evolution" published in FAST'13*

*One of two papers selected from 127 FAST'13 submissions*

**ACM SIGPLAN Research Highlights Award, 2011**

*"Automated Atomicity-Violation Fixing" published in PLDI'11*

*One of eight papers selected from all papers published in 13 ACM SIGPLAN conferences in 2011*

**NSF Career Award, 2010****Clare Boothe Luce Assistant Professorship, 2009 -- 2014****W. J. Poppelbaum Memorial Award, 2007**

*Top student in computer hardware/architecture selected by Dept. of Computer Science, Univ. of Illinois*

**IEEE Micro Top Picks in Computer Architecture, 2006**

*"AVIO: Detecting Atomicity Violations via Access-Interleaving Invariants" published in ASPLOS'06*

*One of 11 papers selected from all papers published in computer architecture conferences in 2006*

**RESEARCH AND CREATIVE SCHOLARSHIP<sup>1</sup>****Refereed Conference Papers**

---- 2018 ----

C51. Jiaxin Li<sup>S</sup>, Yuxi Chen<sup>S</sup>, Haopeng Liu<sup>S</sup>, Shan Lu, Yiming Zhang, Haryadi Gunawi, Xiaohui Gu, Dongsheng Li, and Xicheng Lu, "PCatch: Automatically Detecting Performance Cascading Bugs in Cloud Systems", EuroSys (**EuroSys**), April 2018.

Acceptance Rate: 16.4%, 43 out of 262.

C50. Junwen Yang<sup>S</sup>, Cong Yan, Pranav Subramaniam<sup>S</sup>, Shan Lu, and Alvin Cheung, "A Comprehensive Study and Discovery of Performance Problems in Database-Backed Web Applications", The 40th International Conference on Software Engineering (**ICSE**), May 2018.

Acceptance Rate: 20.9%, 105 out of 502.

C49. Haopeng Liu<sup>S</sup>, Xu Wang, Guangpu Li<sup>S</sup>, Shan Lu, Feng Ye, and Chen Tian, "FCatch: Automatically Detecting Time-of-Fault Bugs in Cloud Systems", 23rd International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2018.

Acceptance Rate: 18.2%, 56 out of 307

C48. Shu Wang<sup>S</sup>, Chi Li<sup>S</sup>, William Sentosa<sup>S</sup>, Henry Hoffmann, and Shan Lu, "Understanding and Auto-Adjusting Performance-Sensitive Configurations", 23rd International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2018.

Acceptance Rate: 18.2%, 56 out of 307

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<sup>1</sup> Students under my supervision are denoted by "S"

C47. Khanh Nguyen, Lu Fang, Christian Navasca, Guoqing Harry Xu, Brian Demsky, and Shan Lu, "Skyway: Connecting Managed Heaps in Distributed Big Data Systems", 23rd International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2018.  
Acceptance Rate: 18.2%, 56 out of 307

---- 2017 ----

C46. Cong Yan, Junwen Yang<sup>S</sup>, Alvin Cheung, and Shan Lu, "Understanding Database Performance Inefficiencies in Real-World Web Applications", ACM International Conference on Information and Knowledge Management, November 2017 (**CIKM**)  
Acceptance Rate: 21%, 171 out of 820.

C45. Linhai Song<sup>S</sup>, and Shan Lu, "Performance Diagnosis for Inefficient Loops", The 39th International Conference on Software Engineering (**ICSE**), May 2017.  
Acceptance Rate: 16.4%, 68 out of 415.

C44. Ankit Choudhary, Shan Lu, and Michael Pradel, "Efficient Detection of Thread Safety Violations via Coverage-Guided Generation of Concurrent Tests", The 39th International Conference on Software Engineering (**ICSE**), May 2017.  
Acceptance Rate: 16.4%, 68 out of 415.

C43. Haopeng Liu<sup>S</sup>, Guangpu Li<sup>S</sup>, Jeffrey F. Lukman, Jiaxin Li<sup>S</sup>, Shan Lu, Haryadi S. Gunawi, and Chen Tian, "DCatch: Automatically Detecting Distributed Concurrency Bugs in Cloud Systems", 22nd International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), April 2017.  
Acceptance Rate: 17.4%, 56 out of 321

---- 2016 ----

C42. Zhiqiang Zuo, Lu Fang, Siau Cheng Khoo, Harry Xu, and Shan Lu, "Low-Overhead and Fully Automated Statistical Debugging with Abstraction Refinement", ACM International Conference on Object Oriented Programming Systems Languages and Applications (**OOPSLA**), November 2016.  
Acceptance Rate: 25.6%, 52 out of 203.

C41. Tianyin Xu, Xinxin Jin, Peng Huang, Yuanyuan Zhou, Shan Lu, Long Jin, Shankar Pasupathy, "Early Detection of Configuration Errors to Reduce Failure Damage", 12th USENIX Symposium on Operating Systems Design and Implementation (**OSDI**), November 2016.  
Acceptance Rate: 17.6%, 47 out of 267. **Best Paper Award**

C40. Khanh Nguyen, Lu Fang, Guoqing (Harry) Xu, Brian Demsky, Shan Lu, Sanazsadat Alamian, Onur Mutlu, "Yak: A High-Performance Big-Data-Friendly Garbage Collector", 12th USENIX Symposium on Operating Systems Design and Implementation (**OSDI**), November 2016.  
Acceptance Rate: 17.6%, 47 out of 267.

C39. Haopeng Liu<sup>S</sup>, Yuxi Chen<sup>S</sup>, and Shan Lu, “Understanding and Generating High Quality Patches for Concurrency Bugs”, ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE), November 2016.

Acceptance Rate: 27.1%, 74 out of 273.

C38. Jeffrey F. Lukman, Tanakorn Leesatapornwongsa, Shan Lu, and Haryadi S. Gunawi, “TaxDC: A Taxonomy of Concurrency Bugs in Datacenter Distributed Systems”, 21st International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), April 2016.

Acceptance Rate: 22.1%, 53 out of 240.

---- 2015 ----

C37. Lu Fang, Khanh Nguyen, Guoqing (Harry) Xu, Brian Demsky, and Shan Lu, “[Interruptable Tasks: Treating Memory Pressure As Interrupts for Highly Scalable Data-Parallel Programs](#)”, 25th ACM Symposium on Operating Systems Principles (SOSP), October 2015.

Acceptance Rate: 16.1%, 30 out of 186.

C36. Rui Gu<sup>S</sup>, Guoliang Jin<sup>S</sup>, Linhai Song<sup>S</sup>, Linjie Zhu<sup>S</sup>, and Shan Lu, “[What Change History Tells Us About Thread Synchronization](#)”, 29th ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE), August 2015.

Acceptance Rate: 25.4%, 74 out of 291.

C35. Adrian Nistor<sup>S</sup>, Po-Chun Chang<sup>S</sup>, Cosmin Rădoi, and Shan Lu, “[CAMEL: Detecting and Fixing Performance Problems That Have Non-Intrusive Fixes](#)”, The 37th International Conference on Software Engineering (ICSE), May 2015.

Acceptance Rate: 18.5%, 84 out of 452. **Won SIGSOFT Distinguished Paper Award.**

---- 2014 ----

C34. Mingxing Zhang, Yongwei Wu, Shan Lu, Shanxiang Qi, Jinglei Ren, and Weimin Zheng, “[AI: a Lightweight System for Tolerating Concurrency Bugs](#)”, 28th ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE), November 2014.

Acceptance Rate: 22.3%, 61 out of 273. **Won SIGSOFT Distinguished Paper Award.**

C33. Linhai Song<sup>S</sup> and Shan Lu, “[Statistical Debugging for Real-World Performance Problems](#)”, International Conference on Object-Oriented Programming, Systems, Languages & Applications (OOPSLA), October 2014.

Acceptance Rate: 28.4%, 53 out of 186.

C32. Joy Arulraj<sup>S</sup>, Guoliang Jin<sup>S</sup>, and Shan Lu, “[Leveraging the Short-Term Memory of Hardware to Diagnose Production-Run Software Failures](#)”, 19th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), March 2014.

Acceptance Rate: 22.6%, 49 out of 217.

---- 2013 ----

C31. Dongdong Deng<sup>S</sup>, Wei Zhang<sup>S</sup>, and Shan Lu, "[Efficient Concurrency-Bug Detection Across Inputs](#)", International Conference on Object-Oriented Programming, Systems, Languages & Applications (**OOPSLA**), October 2013.

*Acceptance Rate: 26.4%, 50 out of 189*

C30. William Harris, Guoliang Jin<sup>S</sup>, Shan Lu, and Somesh Jha, "[Validating Library Usage Interactively](#)", 25<sup>th</sup> International Conference on Computer Aided Verification (**CAV**), July 2013.

C29. Lanyue Lu, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, and Shan Lu, "[A Study of Linux File System Evolution](#)", 11<sup>th</sup> USENIX Conference on File and Storage Technologies (**FAST**), February 2013.

*Acceptance Rate: 18.9%, 24 out of 127; **Best Paper Award***

C28. Adrian Nistor<sup>S</sup>, Linhai Song<sup>S</sup>, Darko Marinov, and Shan Lu, "[Toddler: Detecting Performance Problems via Similar Memory-Access Patterns](#)", 35<sup>th</sup> International Conference on Software Engineering (**ICSE**), May 2013.

*Acceptance Rate: 18.5%, 85 out of 461*

C27. Joy Arulraj<sup>S</sup>, Po-Chun Chang<sup>S</sup>, Guoliang Jin<sup>S</sup>, and Shan Lu, "[Production-Run Software Failure Diagnosis via Hardware Performance Counters](#)", 18<sup>th</sup> International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2013.

*Acceptance Rate: 22.7%, 44 out of 193*

C26. Wei Zhang<sup>S</sup>, Marc de Kruijf, Ang Li<sup>S</sup>, Shan Lu, and Karthikeyan Sankaralingam, "[ConAir: Featherweight Concurrency Bug Recovery Via Single-Threaded Idempotent Execution](#)", 18<sup>th</sup> International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2013.

*Acceptance Rate: 22.7%, 44 out of 193*

---- 2012 ----

C25. Guoliang Jin<sup>S</sup>, Wei Zhang<sup>S</sup>, Dongdong Deng<sup>S</sup>, Shan Lu, and Ben Liblit, "[Automated Concurrency-Bug Fixing](#)", USENIX Symposium on Operating Systems Design and Implementation (**OSDI**), October 2012.

*Acceptance Rate: 11.6%, 25 out of 215*

C24. Guoliang Jin<sup>S</sup>, Linhai Song<sup>S</sup>, Xiaoming Shi<sup>S</sup>, Joel Scherpelz<sup>S</sup>, and Shan Lu, "[Understanding and Detecting Real-World Performance Bugs](#)", Programming Language Design and Implementation (**PLDI**), June 2012.

*Acceptance Rate: 18.8%, 48 out of 255*

C23. Haris Volos, Andres Jaan Tack, Michael Swift, Shan Lu "[Applying Transactional Memory to Concurrency Bugs](#)", 17<sup>th</sup> International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2012.

*Acceptance Rate: 21.5%, 37 out of 172*

---- 2011 ----

C22. Guoliang Jin<sup>S</sup>, Linhai Song<sup>S</sup>, Wei Zhang<sup>S</sup>, Shan Lu, Ben Liblit, "[Automated Atomicity-Violation Fixing](#)", Programming Language Design and Implementation (**PLDI**), June 2011.

*Acceptance Rate: 23.3%, 55 out of 236; **ACM SIGPLAN Research Highlights Award***

C21. Wei Zhang<sup>S</sup>, Junghee Lim, Ramya Olichandran<sup>S</sup>, Joel Scherpelz<sup>S</sup>, Guoliang Jin<sup>S</sup>, Shan Lu, Thomas Reps, "[ConSeq: Detecting Concurrency Bugs through Sequential Errors](#)", 16<sup>th</sup> International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2011.

*Acceptance Rate: 21.0%, 32 out of 152*

---- 2010 ----

C20. Guoliang Jin<sup>S</sup>, Aditya Thakur, Ben Liblit, Shan Lu, "[Instrumentation and Sampling Strategies for Cooperative Concurrency Bug Isolation](#)", International Conference on Object-Oriented Programming, Systems, Languages & Applications (**OOPSLA**), October 2010.

*Acceptance Rate: 27%, 45 out of 164*

C19. Yao Shi, Soyeon Park, Zuoning Yin, Shan Lu, Yuanyuan Zhou, Wenguang Chen, Weimin Zheng, "[Do I Use the Wrong Definition? DefUse: Definition-Use Invariants for Detecting Concurrency and Sequential Bugs](#)", International Conference on Object-Oriented Programming, Systems, Languages & Applications (**OOPSLA**), October 2010.

*Acceptance Rate: 27%, 45 out of 164*

C18. YadiMa, Suman Banerjee, Shan Lu, Cristian Estan, "[Leveraging Parallelism for Multi-dimensional Packet Classification on Software Routers](#)", ACM SIGMETRICS 2010 International Conference on Measurement and Modeling of Computer Systems (**SIGMETRICS**), June 2010.

*Acceptance Rate: 16%, 29 out of 184*

C17. Wei Zhang<sup>S</sup>, Chong Sun<sup>S</sup>, Shan Lu, "[ConMem: Detecting Severe Concurrency Bugs through an Effect-Oriented Approach](#)", 15<sup>th</sup> International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2010.

*Acceptance Rate: 17.7%, 32 out of 181*

---- 2009 ----

C16. Soyeon Park, Weiwei Xiong, Zuoning Yin, Rini Kaushik, Kyu H. Lee, Shan Lu, Yuanyuan Zhou, "[Do You Have to Reproduce the Bug at the First Replay Attempt? – PRES: Probabilistic Replay with Execution Sketching on Multiprocessors](#)", 22<sup>nd</sup> ACM Symposium on Operating Systems Principles (**SOSP**), October 2009.

*Acceptance Rate: 16.4%, 23 out of 140*

C15. Soyeon Park, Shan Lu, Yuanyuan Zhou, "[CTrigger: Exposing Atomicity Violation Bugs from Their Hiding Places](#)", 14<sup>th</sup> International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2009.

*Acceptance Rate: 25.7%, 29 out of 113*

---- 2008 ----

C14. Shan Lu, Soyeon Park, Eunsoo Seo, Yuanyuan Zhou, "[Learning from mistakes — a comprehensive study of real world concurrency bug characteristics](#)", 13<sup>th</sup> International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), March 2008.

---- 2007 ----

C13. Shan Lu, Soyeon Park, Chongfeng Hu, Xiao Ma, Weihang Jiang, Zhenmin Li, Raluca Popa, Yuanyuan Zhou, "[MUVI: Automatically Inferring Multi-Variable Access Correlations and Detecting Related Semantic and Concurrency Bugs](#)", 21<sup>st</sup> ACM Symposium on Operating Systems Principles (**SOSP**), October 2007.

C12. Joseph Tucek, Shan Lu, Chengdu Huang, Spiros Xanthos, and Yuanyuan Zhou, "[Triage: Diagnosing Production Run Failures at the User's Site](#)", 21<sup>st</sup> ACM Symposium on Operating Systems Principles (**SOSP**), October 2007.

C11. Shan Lu, Weihang Jiang and Yuanyuan Zhou, "[A Study of Interleaving Coverage Criteria](#)", 15<sup>th</sup> ACM SIGSOFT Symposium on the Foundations of Software Engineering (**FSE**) (short paper), September 2007.

C10. Joseph Tucek, James Newsome, Shan Lu, Chengdu Huang, Spiros Xanthos, David Brumley, Yuanyuan Zhou and Dawn Song, "[Sweeper: A Lightweight End-to-end System for Defending Against Fast Worms](#)", 2<sup>nd</sup> ACM SIGOPS EuroSys (**EuroSys**), March 2007.

---- 2006 ----

C9. Shan Lu, Pin Zhou, Wei Liu, Yuanyuan Zhou, Josep Torrellas, "[PathExpander: Architectural Support for Increasing the Path Coverage of Dynamic Bug Detection](#)", 39<sup>th</sup> Annual IEEE/ACM International Symposium on Microarchitecture (**MICRO**), December 2006.

C8. Shan Lu, Joe Tucek, Feng Qin, and Yuanyuan Zhou, "[AVIO: Detecting Atomicity Violations via Access-Interleaving Invariants](#)", 12<sup>th</sup> International Conference on Architecture Support for Programming Languages and Operating Systems (**ASPLOS**), October 2006.

**IEEE Micro Top Picks Award**

C7. Chad Verbowski, Emre Kiciman, Arunvijay Kumar, and Brad Daniels, Shan Lu, Juhan Lee, Yi-Min Wang, Roussi Roussev. "[Flight Data Recorder: Monitoring Persistent-State Interactions to Improve Systems Management](#)", 7<sup>th</sup> Symposium on Operating System Design and Implementation (**OSDI**), November 2006.

C6. Chad Verbowski, Brad Daniels, Emre Kiciman, Shan Lu, Roussi Roussev, Yi-Min Wang and Juhan Lee. "[Analyzing Persistent State Interactions to Improve State Management](#)", Joint International Conference on Measurement and Modeling of Computer Systems (**SIGMETRICS**) (short paper), June 2006.

---- 2005 ----

C5. Feng Qin, Shan Lu and Yuanyuan Zhou, "[SafeMem: Exploiting ECC-Memory for Detecting Memory Leaks and Memory Corruption During Production Runs](#)", 10<sup>th</sup> International Symposium on High-Performance Computer Architecture (**HPCA**), February 2005.

---- 2004 ----

C4. Zhenmin Li, Shan Lu, Suvda Myagmar and Yuanyuan Zhou, "[CP-Miner: A Tool for Finding Copy-paste and Related Bugs in Operating System Code](#)", 6<sup>th</sup> Symposium on Operating System Design and Implementation (**OSDI**), December 2004.

C3. Pin Zhou, Wei Liu, Long Fei, Shan Lu, Feng Qin, Yuanyuan Zhou, Samuel Midkiff and Josep Torrellas, "[AccMon: Automatically Detecting Memory-related Bugs via Program Counter-based Invariants](#)", 37<sup>th</sup> Annual IEEE/ACM International Symposium on Micro-architecture (**MICRO**), December 2004.

C2. Keman Yu, Shan Lu, Jiang Li and Shipeng Li, "Half-pixel Motion Estimation Bypass Based on a Linear Model", 24<sup>th</sup> Picture Coding Symposium (**PCS**), December 2004.

---- 2003 ----

C1. Shan Lu, Keman Yu, Jiang Li and Shipeng Li, "A Low Complexity 2-Power Transform for Video Compression", 4<sup>th</sup> International Conference on Information, Communications & Signal Processing (**ICICS**), December 2003.

## Journal Articles

---- 2016 ----

J8. Mingxing Zhang, Yongwei Wu, Shan Lu, Shanxiang Qi, Jinglei Ren, Weimin Zheng, "[A Lightweight System for Detecting and Tolerating Concurrency Bugs](#)", IEEE Transactions on Software Engineering (**TSE**), 2016.

---- 2015 ----

J7. DongDong Deng<sup>S</sup>, GuoLiang Jin<sup>S</sup>, Marc de Kruijff, Ang Li<sup>S</sup>, Ben Liblit, Shan Lu, ShanXiang Qi, JingLei Ren, Karthikeyan Sankaralingam, LinHai Song<sup>S</sup>, YongWei Wu, MingXing Zhang, Wei Zhang<sup>S</sup>, WeiMin Zheng, "[Fixing, preventing, and recovering from concurrency bugs](#)", Science China Information Sciences, April 2015.

--- 2014 ---

J6. Lanyue Lu, Andrea C. Arpaci-Dusseu, Remzi H. Arpaci-Dusseu, and Shan Lu, "[A Study of Linux File System Evolution](#)", ACM Transactions on Storage (**ACM-TOS**), Volume 10, Issue 1, 2014.

---- 2013 ----

J5. Wei Zhang<sup>S</sup>, Chong Sun<sup>S</sup>, Junghee Lim, Shan Lu, and Thomas Reps, "ConMem: Detecting Crash-Triggering Concurrency Bugs through an Effect-Oriented Approach", ACM Transactions on Software Engineering and Methodology (**ACM-TOSEM**), Volume 22, Issue 2, 2013.



---- 2012 ----

J4. Shan Lu, Soyeon Park, and Yuanyuan Zhou, "Detecting Concurrency Bugs From the Perspectives of Synchronization Intentions", IEEE Transactions on Parallel and Distributed Systems (**IEEE-TPDS**), Volume 23, Issue 6, 2012.

---- 2011 ----

J3. Shan Lu, Soyeon Park, and Yuanyuan Zhou, "Finding Atomicity-Violation Bugs Through Unserializable Interleaving Testing", IEEE Transactions on Software Engineering (**IEEE-TSE**), Volume 38, Issue 4, 2011.

---- 2007 ----

J2. Shan Lu, Joe Tucek, Feng Qin, and Yuanyuan Zhou, "AVIO: Detecting Atomicity Violations via Access-Interleaving Invariants", **IEEE Micro** Special Issue: Top Picks from Computer Architecture Conferences, January-February 2007 Issue.

---- 2006 ----

J1. Zhenmin Li, Shan Lu, Suvda Myagmar and Yuanyuan Zhou, "CP-Miner: finding copy-paste and related bugs in large-scale software code", IEEE Transactions on Software Engineering (**IEEE-TSE**), April 2006.

## Workshop Papers

---- 2012 ----

W6. Dongdong Deng<sup>S</sup>, Wei Zhang<sup>S</sup>, Borui Wang<sup>S</sup>, Peisen Zhao<sup>S</sup>, and Shan Lu, "Understanding the Interleaving Space Overlap across Inputs and Software Versions", USENIX Workshop on Hot Topics in Parallelism (**HotPar**), June 2012.

---- 2010 ----

W5. Joel Scherpelz<sup>S</sup>, and Shan Lu, "Lessons from performance bugs for performance evaluation", Workshop on Experimental Evaluation of Software and Systems in Computer Science, October 2010.

---- 2009 ----

W4. Aditya Thakur, Rathijit Sen, Ben Liblit, and Shan Lu, "Cooperative Crug Isolation", 7th International Workshop on Dynamic Analysis (**WODA**), July 2009.

---- 2006 ----

W3. Joseph Tucek, Shan Lu, Chengdu Huang, Spiros Xanthos, Yuanyuan Zhou, "Automatic Online Failure Diagnosis at the End-User Site", 2nd Workshop on Hot Topics in System Dependability (**HotDep**), November 2006.

W2. Zhenmin Li, Lin Tan, Xuanhui Wang, Shan Lu, Yuanyuan Zhou and Chengxiang Zhai, "Have Things Changed Now? – An Empirical Study of Bug Characteristics in Modern Open Source Software", 1st Workshop on Architectural and System Support for Improving Software Dependability (**ASID**), October 2006.

---- 2005 ----

W1. Shan Lu, Zhenmin Li, Feng Qin, Lin Tan, Pin Zhou and Yuanyuan Zhou, "BugBench: A Benchmark for Evaluating Bug Detection Tools", Workshop on the Evaluation of Software Defect Detection Tools (**Bug**), June 2005.

### Magazine Articles

M1. Lanyue Lu, Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau, and Shan Lu, "A Study of Linux File System Evolution", ;login: The USENIX Magazine (**;login:**), Volume 38, Number 3, June 2013.

M2. Shan Lu, "Challenges and Opportunities in Fighting Concurrency Bugs in Multi-threaded Software", Communications of the China Computer Federation (**CCCF**), February 2013.

### Patents

P1. Yuanyuan Zhou, Shan Lu, and Joseph Andrew Tucek, "Atomicity Violation Detection Using Access Interleaving Invariants", U.S. patent No. 8533681, Sep. 10<sup>th</sup>, 2013. (**Licensed to Intel**)

P2. Brad Daniels, John Dunagan, Arunvijay Kumar, Juhan Lee, Shan Lu, Roussi Roussev, Chad Verbowski, "Thread Interception and Analysis", U.S. patent No. 7865777, Jan. 4<sup>th</sup>, 2011.

P3. Shan Lu, Keman Yu, Jiang Li, and Shipeng Li, "Low-complexity 2-power transform for image/video compression", U.S. Patent No. 7379500, May 27<sup>th</sup>, 2008.

### Systems Released

S1. BugBench, a benchmark for software bug detection, released to more than 70 research groups.

S2. AVIO, a concurrency bug detection tool, licensed to Intel.

### Selected Talks

Invited Speaker, Green IT Systems Winter School, January 2014  
Conférence universitaire de Suisse occidentale (CUSO), Switzerland

Invited Speaker, **Top Gun Speaker Series**, November, 2013  
Department of Computer Science, University of Virginia  
Title: An Effect-Oriented Approach to Concurrency Bug Detection and Recovery

Invited Speaker, Illinois-Intel Parallelism Center (I2PC) **Distinguished Speaker Series**, February, 2012  
Department of Computer Sciences, University of Illinois  
Title: Concurrency-Bug Detection, Diagnosis, and Fixing

## PROFESSIONAL SERVICE

### Professional Society Service

ACM SIGOPS Vice Chair, 7/2015 –

ACM SIGOPS Information Director, 8/2013 – 6/2015

ACM SIGSOFT Dissertation Award Committee, 2013

### Conference Chairing & Steering Committee Service

Steering Committee Member for Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), 2016 –

Steering Committee Member for Workshop on Hot Topics in Operating Systems (**HotOS**), 2016/2017

Chair for ACM Asia-Pacific Workshop on Systems (APSys), 2018

Chair for USENIX Annual Technical Conference, 2015

### Other Conference, Workshop, Journal Organization Work

Co-Organizer for Diversity Workshop at SOSp, 2017

Associate Editor for IEEE Computer Architecture Letters, 2016 --

Chair for 5<sup>th</sup> Greater Chicago Area Systems Research Workshop (GCASR), 2016

Chair for 8th Workshop on Programming Languages and Operating Systems (PLOS), 2015

Chair for OSDI Poster Session, 2012

Chair for ACM Student Research Competition at ICS, 2011

Chair for ICS Poster session, 2011

Chair for USENIX Annual Technical Conference Poster/WIP, 2010

### Conference Program Committee Work

ACM Symposium on Operating Systems Principles (**SOSP**), 2017, 2015, 2013

USENIX Symposium on Operating Systems Design and Implementation (**OSDI**), 2016, 2012, 2010

ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI**), 2017, 2015, 2013

International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), 2018, 2017, 2014

International Conference on Object-Oriented Programming, Systems, Languages, and Applications (**OOPSLA**), 2014

IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (**CCGrid**), 2014

International Symposium on Memory Management (**ISMM**), 2014

**EuroSys**, 2013

IEEE/IFIP International Conference on Dependable Systems and Networks (**DSN**), 2013

International Conference on Runtime Verification (**RV**), 2012

USENIX Annual Technical Conference (**USENIX ATC**), 2014, 2010

### Workshop Program Committee Work

Workshop on Hot Topics in Operating Systems (**HotOS**), 2015

Asia-Pacific Workshop on Systems (**APSYS**), 2014, 2013  
Workshop on Programming Languages and Operating Systems (**PLOS**), 2013, 2011  
International Workshop on Dynamic Analysis (**WODA**), 2012  
USENIX Workshop on Hot Topics in Parallelism (**HotPar**), 2012  
Workshop on Determinism and Correctness in Parallel Programming (**WoDet**), 2014, 2012;  
Workshop on Parallel and Distributed Systems: Testing, Analysis, and Debugging (**PADTAD**), 2012  
Workshop on Program Analysis for Software Tools and Engineering (**PASTE**), 2011  
Workshop on Hot Topics in System Dependability (**HotDep**), 2009  
SOSP Work-In-Progress/Poster session, 2009

### **Conference Reviewer Service**

ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI**), 2014, 2008  
USENIX Symposium on Operating Systems Design and Implementation (**OSDI**), 2014  
International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), 2016, 2013, 2010  
International Symposium on Computer Architecture (**ISCA**), 2014, 2013, 2012, 2009  
International Symposium on Microarchitecture (**Micro**), 2013, 2012, 2011, 2007  
IEEE International Symposium on High-Performance Computer Architecture (**HPCA**), 2013, 2014  
IEEE/IFIP International Conference on Dependable Systems and Networks (**DSN**), 2009, 2008  
International Symposium on Software Testing and Analysis (**ISSTA**), 2007

### **Journal Reviewer Service**

ACM Transactions on Programming Languages and Systems (**TOPLAS**), 2015  
ACM Transactions on Parallel Computing (**TOPC**), 2015  
Journal of Parallel and Distributed Computing (**JPDC**), 2015  
ACM Transactions on Computer Systems (**TOCS**), 2014, 2010  
Special issue of Wiley's Software Testing, Verification and Reliability Journal (**STVR**), 2013, 2015  
ACM Transactions on Architecture and Code Optimization (**TACO**), 2013  
ACM Transactions on Software Engineering and Methodology (**TOSEM**), 2013  
IEEE Transactions on Parallel and Distributed Systems (**TPDS**), 2012  
Wiley's Software: Practice and Experience, 2011  
ACM Transactions on the Web (**TWEB**), 2010  
ACM Computing Surveys (**CSUR**), 2010

### **Reviewer for Funding Agency**

National Science Foundation, 2014, 2015, 2016, 2017  
Natural Sciences and Engineering Research Council of Canada (NSERC), 2012  
U.S.-Israel Binational Science Foundation, 2010

## TEACHING

### Courses Taught In University of Chicago

Course#	Course Title	Quarters
CS 331	Advanced Operating Systems	2014 Winter, 2015 Fall, 2016 Fall, 2017 Fall
CS 220	Software Construction	2014 Fall, 2016 Spring, 2017 Winter, 2018 Winter

### Courses Taught In University of Wisconsin

Term	Year	Course#	Course Title	Size	Evaluation
Spring	2014	CS 537	Introduction to Operating Systems	49	4.60 out of 5
Fall	2013	CS 739	Distributed Systems	31	4.38 out of 5
Fall	2012	CS 739	Distributed Systems	24	4.57 out of 5
Spring	2012	CS 736	Advanced Operating Systems	35	4.45 out of 5
Spring	2011	CS 736	Advanced Operating Systems	30	4.68 out of 5
Fall	2010	CS 537	Introduction to Operating Systems	54	4.43 out of 5
Spring	2010	CS 537	Introduction to Operating Systems	40	4.41 out of 5
Fall	2009	CS 736	Advanced Operating Systems	29	4.56 out of 5
Spring	2009	CS 736	Advanced Operating Systems	14	4.77 out of 5

### Past Ph.D. Students

1. Wei Zhang, 2009 – 2013

Publications: C17, C21, C22, C25, C26, C31, J5, J7, W6

Thesis: Improving concurrent software reliability via an effect-oriented approach

Employment: Researcher in IBM Research T.J. Watson

2. Adrian Nistor, 2012 – 2014 (co-advised with Prof. Darko Marinov)

Publications: C28, C35

Thesis: Understanding, detecting, and repairing performance bugs

Employment: Tenure-track assistant professor in Florida State University

3. Guoliang Jin, 2009 – 2014

Publications: C20, C21, C22, C24, C25, C27, C30, C32, C36, J7

Thesis: Diagnosing and Fixing Concurrency Bugs

Employment: Tenure-track assistant professor in North Carolina State University

4. Linhai song, 2010 – 2015

Publications: C22, C24, C28, C33, C36, J7

Thesis: Understanding, Detecting and Diagnosing Real-World Performance Bugs

Employment: Tenure-track assistant professor at Penn State University

### Past Master Students Advised

1. Joy James Prabhu Arulraj, 2011 -- 2013

Publications: C27, C32

Employment: Carnegie Mellon University for Ph.D.

2. Aaron Gravesdale (Master), 2010 – 2011

Employment: PDFTron

3. Joel Scherpelz (Master), 2009 – 2010

Publications: C21, C24, W5

Employment: Nvidia

4. Po-Chun Chang, 2012 – 2013

Publications: C27, C35

5. Dongdong Deng, 2012 – 2014

Publications: C25, C31, J7, W6

Employment: VMWare

6. Rui Gu, 2013 – 2014

Publications: C36

Employment: Columbia University for Ph.D.

### **Undergraduate Students Advised**

1. Peisen Zhao, Univ. of Wisconsin, 2011 -- 2012

Winner of the 2011 Dewitt Undergraduate Scholarships

Publications: W6

Employment: Facebook

2. Borui Wang, Univ. of Wisconsin, 2011 – 2012

Publications: W6

Employment: Stanford for Master

3. Linjie Zhu, Univ. of Wisconsin, 2013

Publications: C36

4. Sophia Yang, Univ. of Chicago, 2015

5. Johanna Goergen, Washington & Lee University, 2015

6. Michelle Tocora, Kean University, 2015

7. Pranav Subramaniam, Univ. of Chicago, 2017

### **Dissertation Committees**

Prelim committee for Haris Volos, October 2010

*Advisor: Michael Swift*

Prelim committee for Yadi Ma, December 2010  
*Advisor: Suman Banerjee*

Prelim committee for Swaminathan Sundararaman, December 2010  
*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Prelim committee for Joshua Hare, June 2011  
*Advisor: Suman Banerjee*

Prelim committee for Emily Blem, June 2011  
*Advisor: Karu Sankaralingham*

Dissertation defense committee for Swaminathan Sundararaman, July 2011  
*Advisor: Andrea and Remzi Arpaci-Dusseau*

Prelim committee for Hsiang-Kuo Tang (ECE), August 2011  
*Advisor: Katherine Compton*

Prelim committee for Yiyang Zhang, November 2011  
*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Prelim committee for Yupu Zhang, November 2011  
*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Prelim committee for Guoliang Jin, December 2011  
*Advisor: Shan Lu*

Prelim committee for Sriram Subramanian, December 2011  
*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Dissertation defense committee for Kevin A. Roundy, May 2012  
*Advisor: Barton Miller*

Prelim committee for Shang-Hsiang Shen, May 2012  
*Advisor: Aditya Akella*

Dissertation defense committee for Piramanayagam Arumuga Nainar, August 2012  
*Advisor: Ben Liblit*

Dissertation defense committee for Cindy Rubio Gonzalez, August 2012  
*Advisor: Ben Liblit*

Prelim committee for Shanxiang Qi (University of Illinois, Urbana Champaign), November 2012  
*Advisor: Josep Torrellas*

Dissertation defense committee for Haris Volos, December 2012  
*Advisor: Michael Swift*

Dissertation defense committee for Sriram Subramanian, April 2013  
*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Dissertation defense committee for Shanxiang Qi (University of Illinois), May 2013  
*Advisor: Josep Torrellas*

Dissertation defense committee for Wei Zhang, June 2013  
*Advisor: Shan Lu*

Dissertation defense committee for Yadi Ma, July 2013  
*Advisor: Suman Banerjee*

Prelim committee for Thanh Do, August 2013  
*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Dissertation defense committee for Emily Blem, August 2013

*Advisor: Karu Sankaralingham*

Prelim committee for Daniel Myers, August 2013

*Advisor: Mary Vernon*

Dissertation defense committee for Yiyang Zhang, August 2013

*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Prelim committee for Adrian Nistor (University of Illinois, Urbana Champaign), September 2013

*Advisor: Darko Marinov and Shan Lu*

Prelim committee for Kwanghyun Park, November 2013

*Advisor: Jignesh M. Patel*

Prelim committee for Jerry Lin, December 2013

*Advisor: Yu Hen Hu*

Prelim committee for Linhai Song, December 2013

*Advisor: Shan Lu*

Dissertation defense committee for Yupu Zhang, February 2014

*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Dissertation defense committee for Hsiang-Kuo Tang, February 2014

*Advisor: Katherine Compton*

Prelim committee for Wenfei Wu, March 2014

*Advisor: Jeff Naughton*

Dissertation defense committee for Daniel Myers, June 2014

*Advisor: Mary Vernon*

Prelim committee for Lanyue Lu, June 2014

*Advisor: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau*

Prelim committee for Tushar Sharma, August 2014

*Advisor: Thomas Reps*

Dissertation defense committee for Guoliang Jin, November 2014

*Advisor: Shan Lu*

Prelim Committee for Tanakorn Leesatapornwongsa, December 2014

*Advisor: Haryadi Gunawi*

Prelim Committee for Peter Ohmann, December 2014

*Advisor: Ben Liblit*

Dissertation defense committee for Shang-Hsiang Shen, December 2014

*Advisor: Aditya Akella*

Prelim Committee for Aiman Fang, May 2015

*Advisor: Andrew Chien*

Prelim Committee for Tristan Rasmussen, May 2015

*Advisor: Hank Hoffmann*

Prelim Committee for Riza Suminto, September 2015

*Advisor: Haryadi Gunawi*

Dissertation defense Committee for Wenfei Wu, October 2015

*Advisor: Aditya Akella*

Dissertation defense Committee for Linhai Song, October 2015

*Advisor: Shan Lu*



Dissertation defense Committee for Lanyue Lu, December 2015

*Advisor: Andrea and Remzi Arpaci-Dusseau*

Dissertation defense Committee for Joshua Hare, December 2015

*Adivosr: Suman Banerjee*

Dissertation defense Committee for Tanakorn Leesatapornwongsa, June 2017

*Advisor: Haryadi Gunawi*

## OUTREACH

15. Organizer of Diversity Workshop at SOSP 2017 2017
14. Panelist for the Collegiate Scholars Program at University of Chicago 2017  
*A program that helps high-school students, particularly those from underrepresented groups, from all over the city of Chicago to get prepared for colleges;*
13. Advisor in the Student Inquiry and Research program of Illinois Mathematics & Science Academy  
*Advising a female high-school student for a 4-month research project* 2017
12. Panelist at NSF REU Panel event “Women in Computing” 2016  
*DePaul University, Chicago, IL*
11. Presenter at ACM SIGPLAN Programming Languages Mentoring Workshop @ PLDI 2016
10. CRA-W DREU advisor 2015  
*Hosting two female undergraduate students for summer research*
9. Member of The Women in the Physical Sciences Committee 2015
8. Presenter at USENIX's Women In Advanced Computing Summit (WiAC) 2014
7. Panelist at CRA-W/SOSP Diversity Workshop 2013  
*I was a panelist in the “Demystifying career planning, elevator speeches, and picking good research topics” panel during CRA-W/SOSP Diversity Workshop 2013.*
6. Program committee member of GHC (Grace Hopper Celebration of Women in Computing) Panels, Workshops, and Presentations 2012
5. Volunteers at EYH (Expanding Your Horizons – Young Women Exploring Math and Science Careers), an event for middle-school aged (6-8th grade) girls from south-central Wisconsin 2010, 2011  
*Offering “Computers in Sciences” career sessions to middle-school girls.*
4. Member of ACM-W in University of Wisconsin, Madison 2009--2014  
*Regular dinners/breakfasts with female (prospective) students in our department.*
3. Guest at the freshmen seminar of Women in Science and Engineering (WISE) residential learning community in University of Wisconsin 2009--2013  
*Discussing with freshmen girls who are interested in STEM fields about academics, career planning, etc.*
2. Presenter at CRA-W/SOSP Diversity Workshop 2009  
*I gave a talk on “Hot Topics in Systems” during CRA-W/SOSP Diversity Workshop 2009.*
1. Help supervise female undergraduate students in CRA-W DMP (Computing Research Association - Women Distributed Mentor Project) 2006  
*One of the students (Raluca A. Popa) won the CRA’s Outstanding Undergraduate Award in 2009*

## GRANTS

CNS-1563956, CSR:Medium:DCRUGS:Combating Distributed Concurrency Bugs in Cloud Systems  
National Science Foundation  
Investigator: Haryadi Gunawi (PI), Shan Lu  
Period: 2016 -- 2020  
Amount: \$799,977

IIS-1546543, BIGDATA: Collaborative Research: F: Holistic Optimization of Data-Driven Applications  
National Science Foundation  
Investigator: Shan Lu (PI), Alvin Cheung  
Period: 2015 -- 2018  
Amount: \$1,200,000

CNS-1514256, CSR: Medium:Collaborative Research:Holistic, Cross-Site, Hybrid System Anomaly  
Debugging for Large Scale Hosting Infrastructures  
National Science Foundation  
Investigator: Xiaohui Gu (PI), Shan Lu  
Period: 2015 -- 2019  
Amount: \$800,000

CCF-1439091, XPS: FULL: CCA: Production-Run Failure Recovery Based Approach to Reliable Parallel  
Software  
National Science Foundation  
Investigator: Shan Lu (PI), Karthikeyan Sankaralingam  
Period: 2014 -- 2017  
Amount: \$750,000

Diagnosing Performance Problems in Software  
Fall Research Competition Award, The University of Wisconsin–Madison Graduate School  
Investigator: Shan Lu (PI)  
Period: 2014 -- 2015  
Amount: \$33,844

Effective Regression Testing for Multi-Threaded Software  
Fall Research Competition Award, The University of Wisconsin–Madison Graduate School  
Investigator: Shan Lu (PI)  
Period: 2013 -- 2014  
Amount: \$34,112

Effective Testing for Multi-Threaded Software  
Fall Research Competition Award, The University of Wisconsin–Madison Graduate School  
Investigator: Shan Lu (PI)  
Period: 2012 -- 2013  
Amount: \$35,729

CCF-1217582, A Framework for Self-Healing Multi-Threaded Software  
National Science Foundation

Investigator: Shan Lu (PI), Benjamin R. Liblit  
Period: 2012 -- 2015  
Amount: \$499,999

CCF- 1054616, Combating Performance Bugs in Software Systems  
National Science Foundation  
Investigator: Shan Lu (PI)  
Period: 2011 -- 2016  
Amount: \$449,680

CCF- 1018180, Fighting Concurrency Bugs through Effect-Oriented Approaches  
National Science Foundation  
Investigator: Shan Lu (PI)  
Period: 2010 -- 2013  
Amount: \$469,488