

Haryadi S. Gunawi

Associate Professor
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Research Interests

Areas: Operating Systems, File/Storage Systems, Cloud/Distributed Systems

Focus: Building dependable cloud-scale distributed and storage systems in the context of:

- (1) Performance (tolerating limpware/tail latencies in storage systems)
- (2) Reliability (combating distributed concurrency and crash bugs)
- (3) Scalability (combating latent scalability bugs), and
- (4) Interaction between Machine Learning and storage systems

Appointments

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|---|------------------------------------|--------------------------|
| - Associate Professor | University of Chicago | July 2019 - Current |
| - Assistant Professor | University of Chicago | July 2012 - 2019 |
| - Neubauer Family Assistant Professorship | 2012-2017 | |
| - Visiting Researcher (Invited) | Microsoft Research | June 2016 |
| - Postdoctoral Fellow | University of California, Berkeley | January 2010 - July 2012 |

Education

- Ph.D. in Computer Science University of Wisconsin, Madison
Thesis: Towards Reliable Storage Systems
Awarded the 2009 ACM Doctoral Dissertation Award, Honorable Mention
Awarded the 2009 Departmental Best Thesis Award
- B.S. in Computer Engineering University of Wisconsin, Madison
Double major in Comp. Science and Comp. Engineering (and Graduated with Distinction)

Honors, Awards and Recognitions

- | | |
|---|------|
| - Program Co-Chair, USENIX Annual Technical Conference (70 PC members, 380 submissions) | 2018 |
| - File and Storage Technologies (FAST) Best Paper Nominee | 2018 |
| - File and Storage Technologies (FAST) Best Paper Nominee | 2017 |
| - Keynote Speaker at IEEE Cloud Resiliency Workshop | 2017 |
| - Google Faculty Research Award | 2015 |
| - NetApp Faculty Fellowship | 2015 |
| - NSF CAREER Award | 2014 |
| - NetApp Faculty Fellowship | 2013 |
| - Neubauer Family Assistant Professorship, Univ. of Chicago | 2012 |
| - CCC/CRA/NSF Computing Innovation Fellow | 2009 |
| - ACM Doctoral Dissertation Award, Honorable Mention | 2009 |
| - Departmental Outstanding Graduate Student Research Award, Univ. of Wisconsin | 2009 |
| - Finalist, Microsoft Research Ph.D. Fellowship program | 2007 |
| - Lawrence H. Landweber NCR Fellowship in Distributed Systems, Univ. of Wisconsin | 2006 |

Publications

REFEREED CONFERENCE PUBLICATIONS

- C1. Huaicheng Li, Mingzhe Hao, Stanko Novakovic, Vaibhav Gogte, Sriram Govindan, Dan R. K. Ports, Irene Zhang, Ricardo Bianchini, Haryadi S. Gunawi, Anirudh Badam. **Efficient and Portable Virtual NVMe Storage on ARM SoCs**. *In the Proceedings of the 25th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, 2020*. [14 pages, 86/476 (18%) acceptance rate]. ASPLOS '20
- C2. Jeffrey F. Lukman, Huan Ke, Cesar A. Stuardo, Riza O. Suminto, Daniar H. Kurniawan, Dikaimin Simon, Satria Priambada, Chen Tian, Feng Ye, Tanakorn Leesatapornwongsa, Aarti Gupta, Shan Lu, Haryadi S. Gunawi. **FlyMC: Highly Scalable Testing of Complex Interleavings in Distributed Systems**. *In the Proceedings of the 14th EuroSys Conference, 2019*. [16 pages, 45/207 (22%) acceptance rate]. EuroSys '19
- C3. Cesar A. Stuardo, Tanakorn Leesatapornwongsa, Riza O. Suminto, Huan Ke, Jeffrey F. Lukman, Wei-Chiu Chuang, Shan Lu, Haryadi S. Gunawi. **ScaleCheck: A Single-Machine Approach for Discovering Scalability Bugs in Large Distributed Systems**. *In the Proceedings of the 17th USENIX Symposium on File and Storage Technologies, 2019*. [16 pages, 26/145 (18%) acceptance rate]. FAST '19
- C4. Biswaranjan Panda, Deepthi Srinivasan, Huan Ke, Karan Gupta, Vinayak Khot, Haryadi S. Gunawi. **IASO: A Fail-Slow Detection and Mitigation Framework for Distributed Storage Services**. *In the 2019 USENIX Annual Technical Conference, 2019*. [15 pages, 71/356 (20%) acceptance rate]. ATC '19
- C5. Guangpu Li, Haopeng Liu, Xianglan Chen, Haryadi S. Gunawi, Shan Lu. **DFix: Automatically Fixing Timing Bugs in Distributed Systems**. *In the Proceedings of the 40th ACM SIGPLAN Conference on Programming Language Design and Implementation, 2019*. [14 pages, 76/274 (28%) acceptance rate]. PLDI '19
- C6. Xu Zhang, Siddhartha Sen, Daniar Kurniawan, Haryadi S. Gunawi, Junchen Jiang. **E2E: Embracing User Heterogeneity to Improve Quality of Experience on the Web**. *In the Proceedings of 2019 ACM Special Interest Group on Data Communication, 2019*. [14 pages, 32/221 (14%) acceptance rate]. SIGCOMM '19
- C7. Haryadi S. Gunawi, Riza O. Suminto, Russell Sears, Casey Golliber, Swaminathan Sundararaman, Xing Lin, Tim Emami, Weiguang Sheng, Nematollah Bidokhti, Caitie McCaffrey, Gary Grider, Parks M. Fields, Kevin Harms, Robert B. Ross, Andree Jacobson, Robert Ricci, Kirk Webb, Peter Alvaro, H. Birali Runesha, Mingzhe Hao, Huaicheng Li. **Fail-Slow at Scale: Evidence of Hardware Performance Faults in Large Production Systems**. *In the Proceedings of the 16th USENIX Conference on File and Storage Technologies, 2018*. [14 pages, 23/139 (16%) acceptance rate, **Best Paper Nominee**]. FAST '18
- C8. Huaicheng Li, Mingzhe Hao, Michael Hao Tong, Swaminathan Sundararaman, Matias Bjørling, Haryadi S. Gunawi. **The CASE of FEMU: Cheap, Accurate, Scalable and Extensible Flash Emulator**. *In the Proceedings of the 16th USENIX Conference on File and Storage Technologies, 2018*. [8 pages, 23/139 (16%) acceptance rate]. FAST '18
- C9. Bernard Dickens III, Haryadi S. Gunawi, Ariel J. Feldman, Henry Hoffmann. **StrongBox: Confidentiality, Integrity, and Performance using Stream Ciphers for Full Drive Encryption**. *In the Proceedings of the 23rd International Conference on Architectural Support for Programming Languages and Operating Systems, 2018*. [14 pages, 56/319 (17%) acceptance rate]. ASPLOS '18

- C10. Jiaxin Li, Yuxi Chen, Haopeng Liu, Shan Lu, Yiming Zhang, Haryadi S. Gunawi, Xiaohui Gu, Dongsheng Li, and Xicheng Lu. **PCatch: Automatically Detecting Performance Cascading Bugs in Cloud Systems**. *In the 2018 EuroSys Conference, 2018*. [16 pages, 43/262 (16%) acceptance rate]. EuroSys '18
- C11. Mingzhe Hao, Huaicheng Li, Michael Hao Tong, Chrisma Pakha, Riza O. Suminto, Cesar A. Stuardo, Andrew A. Chien, and Haryadi S. Gunawi. **MittOS: Supporting Millisecond Tail Tolerance with Fast Rejecting SLO-Aware OS Interface**. *In the Proceedings of the 26th Symposium on Operating Systems Principles, 2017*. [16 pages, 39/232 (17%) acceptance rate]. SOSOP '17
- C12. Riza O. Suminto, Cesar A. Stuardo, Alexandra Clark, Huan Ke, Tanakorn Leesatapornwongsa, Bo Fu, Daniar H. Kurniawan, Vincentius Martin, Uma Maheswara Rao G., and Haryadi S. Gunawi. **PBSE: A Robust Path-Based Speculative Execution for Degraded-Network Tail Tolerance in Data-Parallel Frameworks**. *In the Proceedings of the 2017 Symposium on Cloud Computing, 2017*. [14 pages, 48/203 (24%) acceptance rate]. SoCC '17
- C13. Shiqin Yan, Huaicheng Li, Mingzhe Hao, Michael Hao Tong, Swaminathan Sundararaman, Andrew A. Chien, Haryadi S. Gunawi. **Tiny-Tail Flash: Near-Perfect Elimination of Garbage Collection Tail Latencies in NAND SSDs**. *In the Proceedings of the 15th USENIX Conference on File and Storage Technologies, 2017*. [14 pages, 28/116 (24%) acceptance rate, **Best Paper Nominee**]. FAST '17
- C14. Haopeng Liu, Guangpu Li, Jeffrey F. Lukman, Jiaxin Li, Shan Lu, Haryadi S. Gunawi, Chen Tian. **DCatch: Automatically Detecting Distributed Concurrency Bugs in Cloud Systems**. *In the Proceedings of the 22nd ACM International Conference on Architectural Support for Programming Languages and Operating Systems, 2017*. [15 pages, 56/321 (17%) acceptance rate]. ASPLOS '17
- C15. Fan Yang, Haryadi S. Gunawi, Andrew A. Chien. **Exploring the Challenges and Opportunities of Cloud Stacks in Dynamic Resource Environments**. *In the Proceedings of the IEEE 3rd International Conference on Collaboration and Internet Computing, 2017*. CIC '17
- C16. Haryadi S. Gunawi, Mingzhe Hao, Riza O. Suminto, Agung Laksono, Anang D. Satria, Jeffrey Adityatama, Kurnia J. Eliazar. **Why Does the Cloud Stop Computing? Lessons from Hundreds of Service Outages**. *In Proceedings of the 7th ACM Symposium on Cloud Computing, 2016*. [16 pages, 38/151 (25%) acceptance rate]. SoCC '16
- C17. Tanakorn Leesatapornwongsa, Jeffrey F. Lukman, Shan Lu, and Haryadi S. Gunawi. **TaxDC: A Taxonomy of Non-Deterministic Concurrency Bugs in Datacenter Distributed Systems**. *In the Proceedings of the 21th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, 2016*. [14 pages, 53/240 (22%) acceptance rate]. ASPLOS '16
- C18. Mingzhe Hao, Gokul Soundararajan, Deepak Kenchamma, Andrew A. Chien, and Haryadi S. Gunawi. **The Tail at Store: A Revelation from Millions of Hours of Disk and SSD Deployments**. *In the Proceedings of the 14th USENIX Conference on File and Storage Technologies, 2016*. [14 pages, 27/115 (23%) acceptance rate, **rated 6th¹**]. FAST '16
- C19. Tiratat Patana-anake, Vincentius Martin, Nora Sandler, Cheng Wu, and Haryadi S. Gunawi. **Manylogs: Improved CMR/SMR Disk Bandwidth and Faster Durability with Scattered Logs**. *In the Proceedings of 32nd International Conference on Massive Storage Systems and Technology, 2016*. [16 pages, 21/71 (30%) acceptance rate]. MSST '16

¹Rating is based on the "Overall Recommendation" metric from the reviewing systems (e.g., HotCRP).

- C20. Tanakorn Leesatapornwongsa, Mingzhe Hao, Pallavi Joshi, Jeffrey F. Lukman, Haryadi S. Gunawi. **SAMC: Semantic-Aware Model Checking for Fast Discovery of Deep Bugs in Cloud Systems**. In *the 11th USENIX Symposium on Operating Systems Design and Implementation, 2014*. [16 pages, 42/228 (18%) acceptance rate, **rated 3rd**]. OSDI '14
- C21. Haryadi S. Gunawi, Mingzhe Hao, Tanakorn Leesatapornwongsa, Tiratat Patana-anake, Thanh Do, Jeffry Adityatama, Kurnia J. Eliazar, Agung Laksono, Jeffrey F. Lukman, Vincentius Martin, and Anang D. Satria. **What Bugs Live in the Cloud? A Study of 3000+ Issues in Cloud Systems**. In *Proceedings of the 5th ACM Symposium on Cloud Computing, 2014*. [14 pages, 29/119 (24%) acceptance rate, **rated 3rd**]. SoCC '14
- C22. Tanakorn Leesatapornwongsa and Haryadi S. Gunawi. **The Case for Drill-Ready Cloud Computing**. In *Proceedings of the 5th ACM Symposium on Cloud Computing, 2014*. [8 pages, 29/119 (24%) acceptance rate]. SoCC '14
- C23. Thanh Do, Mingzhe Hao, Tanakorn Leesatapornwongsa, Tiratat Patana-anake, and Haryadi S. Gunawi. **Limlock: Understanding the Impact of Limeware on Scale-Out Cloud Systems**. In *Proceedings of the 4th ACM Symposium on Cloud Computing, 2013*. [14 pages, 23/114 (20%) acceptance rate, **rated 2nd**]. SoCC '13
- C24. Thanh Do, Tyler Harter, Yingchao Liu, Haryadi S. Gunawi, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. **HARDFS: Hardening HDFS with Selective and Lightweight Versioning**. In *Proceedings of the 11th USENIX Conference on File and Storage Technologies, 2013*. [14 pages, 24/127 (19%) acceptance rate]. FAST '13
- C25. Haryadi S. Gunawi, Thanh Do, Pallavi Joshi, Peter Alvaro, Joseph M. Hellerstein, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, Koushik Sen, and Dhruva Borthakur. **FATE and DESTINI: A Framework for Cloud Recovery Testing**. In *Proceedings of the 8th Symposium on Networked Systems Design and Implementation, 2011*. [14 pages, 27/157 (17%) acceptance rate]. NSDI '11
- C26. Pallavi Joshi, Haryadi S. Gunawi, and Koushik Sen. **PreFail: A Programmable Tool for Multiple-Failure Injection**. In *Proceedings of the 26th ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications, October 2011*. [17 pages, 61/166 (37%) acceptance rate]. OOPSLA '11
- C27. Sriram Subramanian, Yupu Zhang, Rajiv Vaidyanathan, Haryadi S. Gunawi, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, and Jeffrey F. Naughton. **Impact of Disk Corruption on Open-Source DBMS**. In *the 26th IEEE International Conference on Data Engineering, 2010*. [12 pages, 69/523 (13%) acceptance rate]. ICDE '10
- C28. Cindy Rubio-González, Haryadi S. Gunawi, Ben Liblit, Andrea C. Arpaci-Dusseau, and Remzi H. Arpaci-Dusseau. **Error Propagation Analysis for File Systems**. In *ACM SIGPLAN 2009 Conf. on Programming Language Design and Implementation, 2009*. [11 pages, 41/194 (21%) acceptance rate]. PLDI '09
- C29. Haryadi S. Gunawi, Abhishek Rajimwale, Andrea C. Arpaci-Dusseau, and Remzi H. Arpaci-Dusseau. **SQCK: A Declarative File System Checker**. In *Proceedings of the 8th USENIX Symposium on Operating Systems Design and Implementation, 2008*. [16 pages, 26/193 (13%) acceptance rate, **rated 4th**]. OSDI '08

- C30. Haryadi S. Gunawi, Cindy Rubio-González, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, and Ben Liblit. **EIO: Error-handling is Occasionally Correct**. In *Proceedings of the 6th USENIX Conference on File and Storage Technologies, 2008*. [16 pages, 21/94 (22% acceptance rate)]. FAST '08
- C31. Haryadi S. Gunawi, Vijayan Prabhakaran, Swetha Krishnan, Andrea C. Arpaci-Dusseau, and Remzi H. Arpaci-Dusseau. **Improving File System Reliability with I/O Shepherd**. In *Proceedings of the 21st ACM Symposium on Operating Systems Principles, 2007*. [14 pages, 25/131 (19% acceptance rate)]. SOSP '07
- C32. Vijayan Prabhakaran, Lakshmi N. Bairavasundaram, Nitin Agrawal, Haryadi S. Gunawi, Andrea C. Arpaci-Dusseau, and Remzi H. Arpaci-Dusseau. **IRON File Systems**. In *Proceedings of the 20th ACM Symposium on Operating Systems Principles, 2005*. [15 pages, 20/155 (13% acceptance rate)]. SOSP '05
- C33. Haryadi S. Gunawi, Nitin Agrawal, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, and Jiri Schindler. **Deconstructing Commodity Storage Clusters**. In *Proceedings of the 32nd International Symposium on Computer Architecture, 2005*. [12 pages, 45/194 (23% acceptance rate)]. ISCA '05
- C34. Haryadi S. Gunawi, Andrea C. Arpaci-Dusseau, and Remzi H. Arpaci-Dusseau. **Deploying Safe User-Level Network Services with icTCP**. In *Proceedings of the 6th USENIX Symposium on Operating Systems Design and Implementation, 2004*. [16 pages, 27/193 (14% acceptance rate)]. OSDI '04
- C35. Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, Nathan C. Burnett, Timothy E. Denehy, Thomas J. Engle, Haryadi S. Gunawi, James A. Nugent, and Florentina I. Popovici. **Transforming Policies into Mechanisms with Infokernel**. In *Proceedings of the 19th ACM Symposium on Operating Systems Principles, 2003*. [16 pages, 22/128 (17% acceptance rate)]. SOSP '03

REFEREED JOURNAL PUBLICATIONS

- C1. Haryadi S. Gunawi, Riza O. Suminto, Russell Sears, Casey Golliver, Swaminathan Sundararaman, Xing Lin, Tim Emami, Weiguang Sheng, Nematollah Bidokhti, Caitie McCaffrey, Gary Grider, Parks M. Fields, Kevin Harms, Robert B. Ross, Andree Jacobson, Robert Ricci, Kirk Webb, Peter Alvaro, H. Birali Runesha, Mingzhe Hao, Huaicheng Li. **Fail-Slow at Scale: Evidence of Hardware Performance Faults in Large Production Systems**. *ACM Transactions on Storage, 2018 (Invited, and Under Preparation)*. [24 pages, **Fast-tracked**]. TOS '18
- C2. Shiqin Yan, Huaicheng Li, Mingzhe Hao, Michael Hao Tong, Swaminathan Sundararaman, Andrew A. Chien, Haryadi S. Gunawi. **Tiny-Tail Flash: Near-Perfect Elimination of Garbage Collection Tail Latencies in NAND SSDs**. *ACM Transactions on Storage, Volume 13, Issue #3, September 2017*. [24 pages, **Fast-tracked**]. TOS '17

REFEREED WORKSHOP AND DEMO^d PUBLICATIONS

- W1. Huan Ke, Brad Settlemyer, David Bonnie, Dominic Manno, John Bent, Haryadi S. Gunawi. **Surviving a Disk Apocalypse with Single-Overlap Declustered Parity**. *The Linux Storage and Filesystems Conference, 2020*.. Vault '20
- W2. Tanakorn Leesatapornwongsa, Cesar A. Stuardo, Riza O. Suminto, Huan Ke, Jeffrey F. Lukman, Haryadi S. Gunawi. **Scalability Bugs: When 100-Node Testing is Not Enough**. In *the 16th Workshop on Hot Topics in Operating Systems, 2017*. [8 pages, 29/94 (30% acceptance rate)]. HotOS '17

- W3. Riza O. Suminto, Agung Laksono, Anang D. Satria, Thanh Do and Haryadi S. Gunawi. **Towards Pre-Deployment Detection of Performance Failures in Distributed Systems.** *In the 7th USENIX Workshop on Hot Topics in Cloud Computing, 2015.* [7 pages, 21/64 (33% acceptance rate)]. HotCloud '15
- W4. Tanakorn Leesatapornwongsa and Haryadi S. Gunawi. **SAMC: A Fast Model Checker for Finding Heisenbugs in Distributed Systems.** *Demo^d Paper at the ACM International Symposium on Software Testing and Analysis, 2015.* [5 pages]. ^dISSTA '15
- W5. Thanh Do and Haryadi S. Gunawi. **The Case for Limping-Hardware Tolerant Clouds.** *In the 5th USENIX Workshop on Hot Topics in Cloud Computing, 2013.* [6 pages, 21/74 (28% acceptance rate)]. HotCloud '13
- W6. Haryadi S. Gunawi, Thanh Do, Pallavi Joshi, Joseph M. Hellerstein, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, and Koushik Sen. **Towards Automatically Checking Thousands of Failures with Micro-specifications.** *In the 6th Workshop on Hot Topics in System Dependability, 2010.* [6 pages, 11/29 (38% acceptance rate)]. HotDep '10

MISCELLANEOUS (ARTICLES^a, POSTERS^p, WIPS^w, AND TECH. REPORTS)

- M1. Mingzhe Hao, Anqi Zhang, Adylan Roaffa, Andrew A. Chien, Henry Hoffmann, Haryadi S. Gunawi **Machine Learning for Operating Systems: A Case of Using Deep Neural Network for OS-Level I/O Latency Prediction.** *Poster.* ^pOSDI '18
- M2. Haryadi S. Gunawi et al. (see FAST '18 version). **Fail-Slow at Scale: Evidence of Hardware Performance Faults in Large Production Systems.** *USENIX ;login: Magazine (In Preparation).* ^a;login: '18
- M3. Fan Yang, Andrew A. Chien, Haryadi S. Gunawi **Resilient Cloud in Dynamic Resource Environments.** *Poster.* ^pSoCC '17
- M4. T. Leesatapornwongsa, C. Stuardo, H. Ke, J. F. Lukman, R. O. Suminto, D. H. Kurniawan, and H. S. Gunawi **SCK: Scale-Checking and Debugging Scalability Bugs on One Machine.** *Poster.* ^pOSDI '16
- M5. R. O. Suminto, C. Stuardo, A. Clark, H. Ke, B. Fu, T. Leesatapornwongsa, V. Martin, D. H. Kurniawan, and H. S. Gunawi. **PBSE: Path-Based Speculative Execution for Robust Tail Tolerance in Data-Parallel Systems.** *Poster.* ^pOSDI '16
- M6. S. Yan, H. Li, M. Hao, H. Tong, S. Sundararaman, A. A. Chien, and H. S. Gunawi. **Tiny-Tail Flash: Near-Perfect Elimination of Garbage Collection Tail Latencies.** *Poster.* ^pOSDI '16
- M7. H. S. Gunawi, T. Do, A. Laksono, M. Hao, T. Leesatapornwongsa, J. F. Lukman, and R. O. Suminto. **What Bugs Live in the Cloud?: A Study of Issues in Scalable Distributed Systems.** *USENIX ;login: Magazine, Vol. 40, No. 4.* ^a;login: '15
- M8. R. O. Suminto, T. Do, and H. S. Gunawi. **Finding Limpleck Bugs in Scalable Cloud Systems.** *Poster.* ^pOSDI '14
- M9. T. Patana-anake, C. Chen, N. Sandler, and H. S. Gunawi. **Improving Multi-Tenant Storage Performance with I/O Sheltering.** *WIP Presentation and Poster.* ^wpFAST '14

- M10. H. S. Gunawi. **The Case for Limpware-Tolerant Operating Systems.** *WIP Presentation.* ^wSOSP '13
- M11. T. Do and H. S. Gunawi. **Impact of Limpware on HDFS: A Probabilistic Estimation.** *University of Chicago, Computer Science, #TR-2013-08.* TR '13

Grants (Government^g and Industryⁱ)

Aproximately a total of US\$ 3.7 million (2.7 as primary PI) and 0.7 million (0.3 as PI) of government and industry fundings, respectively

- 1.ⁱ Haryadi S. Gunawi (PI) and Shan Lu. **Scale-Checkable Systems.** *Univ. of Chicago CERES Center grant, 2018-2020.*
- 2.ⁱ Haryadi S. Gunawi (PI) and Andrew A. Chien. **Operating System and Runtime Supports for Millisecond-level Tail Tolerance.** *Univ. of Chicago CERES Center grant, 2017-2019.*
- 3.ⁱ Shan Lu and Haryadi S. Gunawi (Co-PI). *Huawei Research Grant 2017.*
- 4.ⁱ Haryadi S. Gunawi (PI) and Shan Lu. **Cascading Outage Bugs Elimination.** *Univ. of Chicago CERES Center grant, 2016-2017.*
- 5.^g Haryadi S. Gunawi (PI) and Shan Lu. **Combating Distributed Concurrency Bugs in Cloud Systems.** *NSF grant# CNS-1563956, 2016-2020, \$799,974.*
- 6.^g Haryadi S. Gunawi (PI) and Henry Hoffmann. **BreezeFS: File System Transformation for Cloud and Multistore Era.** *NSF grant# CNS-1526304, 2015-2018, \$498,013.*
- 7.ⁱ Haryadi S. Gunawi (PI) and Shan Lu. **Limplock-Free Cloud Systems.** *Univ. of Chicago CERES Center grant, 2015-2016.*
- 8.ⁱ Haryadi S. Gunawi (PI) and Shan Lu. *Google Faculty Research Award, 2015.*
- 9.ⁱ Haryadi S. Gunawi (PI). *NetApp Faculty Fellowship grant, 2015.*
- 10.ⁱ Shan Lu and Haryadi S. Gunawi (Co-PI). *Huawei Research Grant, 2015.*
- 11.^g Haryadi S. Gunawi (PI). **DrCloud: Drill-Ready Cloud Computing.** *NSF CAREER grant# CNS-1350499, 2014-2019, \$449,349.*
- 12.^g Andrew Chien, Ian Foster, Haryadi Gunawi (Co-PI), Henry Hoffmann, L. Ridgway Scott. **RIVER: A Research Infrastructure to Explore Volatility.** *NSF grant# CNS-1405959, Computing Research Infrastructure (CRI) program, 2014-2017, \$997,432.*
- 13.ⁱ Haryadi S. Gunawi (PI). *NetApp Faculty Fellowship grant, 2013.*
- 14.^g Haryadi S. Gunawi (PI), Andrew Chien, Dries Kimpe, and Rob Ross. **LigHTS: Limping-Hardware Tolerant Systems.** *NSF grant# CCF-1336580, Exploiting Parallelism and Scalability (XPS) program, 2013-2017, \$749,854.*

- 15.⁹ Haryadi S. Gunawi (PI). **DARE: Declarative and scAlable REcovery**. *NSF grants# CCF-1321958 (Data-Intensive Computing program), 2013-2014, \$235,663.*

Talks

1.	NetApp	Towards Tail-Free Flash/SSD Storage Systems	Dec '20
2.	NUS	Bugs at Scale: What New Bugs Live in the Cloud and How to Exterminate Them	Aug '19
3.	NTU	"—"	Aug '19
4.	SMU	"—"	Aug '19
5.	U. Teax	"—"	Feb '18
6.	Princeton	"—"	Jan '18
7.	Harvard	"—"	Nov '17
8.	Columbia	"—"	Apr '17
9.	Cornell	"—"	Apr '17
10.	NYU	"—"	Apr '17
11.	CMU	"—"	Apr '17
12.	Twitter	"—"	Mar '17
13.	U. Michigan	"—"	Dec '16
14.	Huawei Labs	"—"	Oct '16
15.	IEEE CRW	"—" (Keynote)	Oct '16
16.	Microsoft Res.	"—"	Jun '16
17.	U. Wisconsin	"—"	Sep '15
18.	Google	"—"	Jul '15
19.	Facebook	"—"	Jul '15
20.	NetApp	Scalability Bugs: When 100-Node Testing is Not Enough	Feb '18
21.	HotOS '17	"—"	May '17
22.	NetApp	MittOS: OS Support for Millisecond Tail Tolerance	Feb '18
23.	SoCC	Why Does the Cloud Stop Computing?	Oct '16
24.	Microsoft Azure	"—"	Jun '16
25.	CERES Summit	"—" (Keynote)	Jan '16
26.	NetApp	Tiny-Tail Flash: Near-Perfect Elimination of GC Tail Latencies	Oct '16
27.	Huawei Labs	"—"	Oct '16
28.	IBM	The Tail at Store: A Large-Scale Analysis of Storage Variability	Jul '15
29.	SanDisk	"—"	Jul '15
30.	CRW	The Case for LIGHTS: Limping-Hardware Tolerant Systems	Oct '17
31.	GCASR	"—"	May '14
32.	Cloudera	"—"	Feb '14
33.	Facebook	"—"	Sep '13
34.	Purdue	"—"	Sep '13
35.	ANL	"—"	Jul '13
36.	HotCloud '13	"—"	Jun '13
<i>Postdoctoral period:</i>			
37.	NSDI '11	Fate and Destini: A Framework for Cloud Recovery Testing	Mar '11
38.	UC Berkeley	"—"	Mar '11

39.	Google	“_”	Nov '10
40.	Yahoo!	“_”	Nov '10
41.	Facebook	“_”	Nov '10
42.	Twitter	“_”	Nov '10
43.	Cloudera	“_”	Nov '10
44.	NetApp	“_”	Nov '10
45.	LANL	“_”	Nov '10

PhD period:

46.	UC Berkeley	Towards Reliable Storage Systems	Mar '10
47.	CMU	“_”	Apr '09
48.	Microsoft Rsch	“_”	Mar '09
49.	OSDI '08	SQCK: A Declarative File System Checker	Dec '08
50.	FAST '08	EIO: Error-handling is Occasionally Correct	Feb '08
51.	NetApp	“_”	Nov '07
52.	SOSP '07	Improving File System Reliability with I/O Shepherding	Oct '07
53.	ISCA '05	Deconstructing Commodity Storage Clusters	Jun '05
54.	EMC	“_”	Jun '05
55.	OSDI '04	Deploying Safe User-Level Network Services with icTCP	Dec '04

Teaching

- CS 154: Introduction to Computer Systems (Spring every year from 2014 to now)
- CS 230: Operating Systems (Fall every year from 2012 to now)
- CS 331: Advanced Operating Systems (Winter 2013, 2014)
- CS 332: Topics in Operating Systems – Cloud storage and new storage technology (Fall 2013, Winter 2018)

Services and Other Activities

Program Chair/Co-Chair, Associate Editors:

ATC '18	USENIX Annual Technical Conference (70 PC members, 380 submissions)
TOS '17/18	Associate Editor for ACM Transactions on Storage
GCASR '15	Co-Chair for Greater Chicago Area Systems Research Workshop

Organizational Work:

SoCC '17	Publicity Chair
FAST '16	Co-Chair for WIP and Poster Sessions
SoCC '13	Co-Chair for Travel Scholarships

Program Committee:

1.	NSDI '21	USENIX Symposium on Networked Systems Design and Implementation
2.	APSys '20	ACM SIGOPS Asia-Pacific Workshop on System
3.	FAST '20	USENIX Conference on File and Storage Technologies
4.	OSDI '20	USENIX Symposium on Operating Systems Design and Implementation
5.	Systor '20	ACM International Systems and Storage Conference
6.	FAST '19	USENIX Conference on File and Storage Technologies
7.	NSDI '19	USENIX Symposium on Networked Systems Design and Implementation
8.	NVMW '19	Non-Volatile Memories Workshop
9.	SOSP '19	ACM Symposium on Operating Systems Principles
10.	ATC '18	USENIX Annual Technical Conference
11.	FAST '18	USENIX Conference on File and Storage Technologies
12.	OSDI '18	USENIX Symposium on Operating Systems Design and Implementation

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| 13. | SoCC '18 | ACM Symposium on Cloud Computing |
| 14. | VLDB '18 | Intl' Conference on Very Large Data Bases |
| 15. | HotCloud '17 | USENIX Workshop on Hot Topics in Cloud Computing |
| 16. | HPDC '17 | ACM Symposium on High-Performance Parallel and Distributed Computing |
| 17. | ICDCS '17 | IEEE International Conference on Distributed Computing Systems |
| 18. | Middleware '17 | ACM/IFIP/USENIX Intl' Middleware Conf. |
| 19. | SoCC '17 | ACM Symposium on Cloud Computing |
| 20. | SOSP SRC '17 | Student Research Competition at ACM Symposium on Operating Systems Principles |
| 21. | ASPLOS '16 (ERC) | Intl' Conf. on Architectural Support for PL and OS |
| 22. | ATC '16 | USENIX Annual Technical Conference |
| 23. | CLOUD '16 | IEEE International Conference on Cloud Computing |
| 24. | FAST '16 | USENIX Conference on File and Storage Technologies |
| 25. | HotStorage '16 | USENIX Workshop on Hot Topics in Storage and File Systems |
| 26. | VLDB '16 | Intl' Conference on Very Large Data Bases |
| 27. | ASPLOS '15 (ERC) | Intl' Conf. on Architectural Support for PL and OS |
| 28. | ATC '15 | USENIX Annual Technical Conference |
| 29. | CLOUD '15 | IEEE International Conference on Cloud Computing |
| 30. | FAST '15 | USENIX Conference on File and Storage Technologies |
| 31. | INFLOW '15 | Workshop on Interactions of NVM/Flash with Operating-Systems and Workloads |
| 32. | MSST '15 | Intl' Conference on Massive Storage Systems and Technology |
| 33. | HotCloud '14 | USENIX Workshop on Hot Topics in Cloud Computing |
| 34. | HPDC '14 | ACM Symposium on High-Performance Parallel and Distributed Computing |
| 35. | INFLOW '14 | Workshop on Interactions of NVM/Flash with Operating-Systems and Workloads |
| 36. | MSST '14 | Intl' Conference on Massive Storage Systems and Technology |
| 37. | SoCC '14 | ACM Symposium on Cloud Computing |
| 38. | SoCC '13 | ACM Symposium on Cloud Computing |
| 39. | VLDB '13 | Intl' Conference on Very Large Data Bases |
| 40. | MSST '12 | IEEE Conference on Mass Storage Systems and Technologies |
| 41. | NAS '12 | IEEE Intl' Conference on Networking, Architecture, and Storage |
| 42. | ScienceCloud '12 | Workshop on Scientific Cloud Computing, co-located with HPDC '12 |
| 43. | VLDB '12 | Intl' Conference on Very Large Data Bases |
| 44. | DBTest '10 | Intl' Workshop on Testing Database Systems, co-located with SIGMOD '10 |
| 45. | PDSW '11 | Petascale Data Storage Workshop, co-located with Supercomputing '11 |

Journal Reviewing:

- | | | |
|-----|----------|--|
| 46. | TOCS '16 | ACM Transactions on Computer Systems |
| 47. | TOS '14 | ACM Transactions on Storage |
| 48. | CSUR '13 | ACM Computing Surveys |
| 49. | HPCA '13 | IEEE International Symposium on High Performance Computer Architecture |
| 50. | TOC '13 | IEEE Transactions on Computers |
| 51. | TOS '12 | ACM Transactions on Storage |
| 52. | TKDE '12 | IEEE Transactions on Knowledge and Data Engineering |

Panels:

- | | | |
|-----|----------------|---|
| 53. | NSF CSR '19 | National Science Foundation Computer Systems Research Panel |
| 54. | NSF CSR '18 | National Science Foundation Computer Systems Research Panel |
| 55. | NSF CSR '17 | National Science Foundation Computer Systems Research Panel |
| 56. | NSF CAREER '15 | National Science Foundation CAREER Award Panel |
| 57. | NSF XPS '14 | National Science Foundation Computer Systems Research Panel |
| 58. | NSF CSR '14 | National Science Foundation Computer Systems Research Panel |
| 59. | NSF CSR '13 | National Science Foundation Computer Systems Research Panel |

Departmental/University Services:

- Provost Board of Computing Activities and Services (2019-2021)

- Chair of the Departmental Computing and IT Committee (2019-present)
- Dean IT Committee (2019)
- Graduate Program Committee (2017-present)
- Distinguished Lectures Organizer (2015)
- Coordinator for PhD Student Admission in Systems (2014 to current)
- Systems Faculty Recruiting Committee (2014, 2015)
- International outreach via remote research program (2013 to current)

Visiting:

Microsoft Research Invited to Cloud Computing and Storage group, Jun '16

Memberships:

ACM, IEEE, USENIX

Advising

The column format is as follow:

Name	Period	First Employment (+ Internships in parantheses)
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PhD Alumni:

- | | | | |
|----|----------------------------|-----------|---|
| 1. | Riza O. Suminto | 2013-2019 | Cloudera (+ Samsung Rsch.) |
| 2. | Tanakorn Leesatapornwongsa | 2012-2017 | Samsung Research (+ NetApp, Microsoft Research) |

PhD Students (Current):

- | | | | |
|----|-------------------|--------------|-------------------------------------|
| 3. | Huan Ke | 2015-current | (Huawei, LANL) |
| 4. | Huaicheng Li | 2015-current | (Microsoft Rsch. 2x, NetApp) |
| 5. | Jeffrey F. Lukman | 2015-current | (Cloudera, Microsoft Rsch.) |
| 6. | Mingzhe Hao | 2015-current | (NetApp, Microsoft Rsch., Facebook) |
| 7. | Cesar Stuardo | 2017-current | (Samsung Rsch., Microsoft Rsch.) |
| 8. | Meng Wang | 2018-current | |
| 9. | Daniar Kurniawan | 2018-current | |

Student Awards/Recognitions:

- | | | |
|----------------------------|------|--|
| Mingzhe Hao | 2020 | Siebel Scholar, Elastos Fellowship |
| Mingzhe Hao | 2019 | UChicago Harper Dissertation Fellowship |
| Cesar Stuardo | 2019 | Finalist of Facebook Emerging Scholars Award |
| Ronald Shi | 2019 | College Undergraduate Research Fellows Award |
| Mingzhe Hao | 2018 | Finalist of Facebook PhD Fellowship |
| Tanakorn Leesatapornwongsa | 2016 | Finalist of Facebook PhD Fellowship |

Master MPCS Students (Current and Alumni):

- | | | | |
|-----|-----------------|------|--------------------------------|
| 10. | Atlas Chuen | 2020 | |
| 11. | Levent Toksoz | 2019 | PhD student @ TBA |
| 12. | Nanqinqin Li | 2019 | PhD student @ TBA |
| 13. | Patrick Huarng | 2019 | CTDS @ UChicago |
| 14. | Angela Zhang | 2018 | PhD student @ NYU |
| 15. | Meng Wang | 2018 | PhD student @ UChicago |
| 16. | Shiqin Yan | 2017 | (EMC) |
| 17. | Chrisma Pakha | 2017 | PhD student @ CMU |
| 18. | Alexandra Clark | 2017 | Google |
| 19. | Xueyin Wang | 2017 | Facebook |
| 20. | Bo Fu | 2016 | PhD student @ Purdue ECE Dept. |
| 21. | Murphy Zhang | 2015 | EMC |

22.	Cheng Wu	2015	Baidu
23.	Joseph Harrow	2015	Glory Global Solutions
24.	Morenvino Mochtar	2014	Symantec Corp.
25.	Linda Xu	2014	Knobbe, Martens, Olson & Bear
26.	Haichen Liu	2014	Microsoft
27.	Mingzhe Hao	2013	PhD student @ UChicago

BS/MS Students:

28.	Ronald Shi	2018	Facebook
29.	Joseph Ellis	2015	Palantir

Undergraduate Students:

30.	Zayne Khouja	2020	
31.	Cameron Chyla	2020	
32.	Yasoob Rasheed	2019	
33.	Max Demers	2018	
34.	Harry Wang	2016	(Facebook)
35.	Sonja Li	2016	
36.	Nora Sandler	2014	Security Innovation
37.	Shankara Pailoor	2014	

PhD Dissertation Defense Committee:

2019: Harper Zhang, Yuxi Chen, Riza Suminto

2017: Tanakorn Leesatapornwongsa

PhD Candidacy Exam Committee:

2019: Bernard Dickens, Haopeng Liu, Michael Tong, Huan Ke, Jeffrey Lukman, Huaicheng Li

2018: Fan Yang, Harper Zhang

2017: Harper Zhang

2016: Aiman Fang, Tanakorn Leesatapornwongsa

Master Thesis Committee (PhD Program):

2018: Guangpu Li, Shu Wang

2017: Bernard Dickens

2016: Anne Farrell, Haopeng Liu, Yuxi Chen, Yun Li, Jeremy Archer, Shiqin Yan, Michael Tong, Mingzhe Hao

2015: Aiman Fang, Amirali Shambayati, Harper Zhang, Saeid Barati, Riza Suminto

2014: Tanakorn Leesatapornwongsa

External Candidacy and Defense Committee:

2017: Ben Blum, CMU (Candidacy and Defense)

– Last updated: March 19, 2020