Haryadi S. Gunawi

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Research Interests

Areas: Operating Systems, File/Storage Systems, Cloud/Distributed Systems, ML-for-storage and storage-for-ML

Focus: Building dependable cloud-scale distributed and storage systems in the context of:
  (1) Performance (tolerating 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

-	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, Recognitions, and Significant Roles

-	SYSTOR Best Paper Award	2022
-	Provost's Global Faculty Award	2022
-	Facebook Faculty Research Award	2021
-	Program Co-Chair, ACM SIGOPS Asia-Pacific Workshop on Systems (APSys, 40 PC members)	2021
-	Keynote Speaker at EuroSys Workshop on High Availability and Observability of Cloud Systems	2021
-	Program Co-Chair, USENIX Annual Technical Conference (ATC, 70 PC members, 380 subm.)	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. Daniar H. Kurniawan, Ruipu Wang, Kahfi S. Zulkifli, Fandi A. Wiranata, John Bent, Ymir Vigfusson, and Haryadi S. Gunawi. **EVStore: Storage and Caching Capabilities for Scaling Embedding Tables in Deep Recommendation Systems**. *In the Proceedings of ACM International Conference on Architectural Support for Programming Languages and Operating Systems, 2023.*
ASPLOS '23

C2. Meng Wang, Jiajun Mao, Rajdeep Rana, John Bent, Serkay Olmez, Anjus George, Garrett Wilson Ransom, Jun Li, and Haryadi S. Gunawi **Design Considerations and Analysis of Multi-Level Erasure Coding in Large-Scale Data Centers**. *In the International Conference for High Performance Computing, Networking, Storage and Analysis, 2023.*
SC '23

C3. Meng Wang, Cesar A. Stuardo, Daniar Heri Kurniawan, Ray A. O. Sinurat, Haryadi S. Gunawi. **Layered Contention Mitigation for Cloud Storage**. *In the Proceedings of IEEE International Conference on Cloud Computing, 2022.*
CLOUD '22

C4. Nanqinqin Li, Mingzhe Hao, Huaicheng Li, Xing Lin, Tim Emami, Haryadi S. Gunawi. **Fantastic SSD Internals and How to Learn and Use Them**. *In the Proceedings of ACM International Conference on Systems and Storage, 2022.* Best Paper Award
SYSTOR '22

C5. Huaicheng Li, Martin L. Putra, Ronald Shi, Xing Lin, Gregory R. Ganger, Haryadi S. Gunawi **IODA: A Host/Device Co-Design for Strong Predictability Contract on Modern Flash Storage**. *In the Proceedings of the 28th Symposium on Operating Systems Principles, 2021.*
SOSP '21

C6. Michael Hao Tong, Robert L. Grossman, Haryadi S. Gunawi. **Experiences in Managing the Performance and Reliability of a Large-Scale Genomics Cloud Platform**. *USENIX Annual Technical Conference.*
ATC '21

C7. Mingzhe Hao, Levent Toksoz, Nanqinqin Li, Edward Edberg Halim, Henry Hoffmann, Haryadi S. Gunawi **LinnOS: Predictability on Unpredictable Flash Storage with a Light Neural Network**. *In the Proceedings of the 14th USENIX Symposium on Operating Systems Design and Implementation, 2020.*
OSDI '20

C8. Huaicheng Li, Mingzhe Hao, Stanko Novakovic, Vaibhav Gogte, Sriram Govindan, Dan R. K. Ports, IreneZhang, 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

C9.	Huan Ke, Haryadi S. Gunawi, David Bonnie, Nathan DeBardeleben, Michael Grosskopf, Terry Grove, Dominic Manno, Elisabeth Moore, Brad Settlemyer **Extreme Protection against Data Loss with Single-Overlap Declustered Parity**. *In the 50th IEEE/IFIP International Conference on Dependable Systems and Networks, 2020.*	DSN '20
C10.	Kate Keahey, Jason Anderson, Zhuo Zhen, Pierre Riteau, Paul Ruth, Dan Stanzione, Jacob Colleran, Haryadi Gunawi, Cody Hammock, Joe Mambretti **Lessons Learned from the Chameleon Testbed**. *In the USENIX Annual Technical Conference, 2020.*	ATC '20
C11.	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
C12.	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
C13.	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
C14.	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
C15.	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
C16.	Haryadi S. Gunawi, Riza O. Suminto, Russell Sears, Casey Golliher, 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
C17.	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
C18.	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 23nd International Conference on Architectural Support for Programming Languages and Operating Systems, 2018.* [14 pages, 56/319 (17%) acceptance rate].	ASPLOS '18

C19.	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
C20.	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].	SOSP '17
C21.	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
C22.	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
C23.	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
C24.	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
C25.	Haryadi S. Gunawi, Mingzhe Hao, Riza O. Suminto, Agung Laksono, Anang D. Satria, Jeffry 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
C26.	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
C27.	Mingzhe Hao, Gokul Soundararajan, Deepak Kenchammana, 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 6th**[1]].	FAST '16
C28.	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

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

C29. 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

C30. 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

C31. 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

C32. Thanh Do, Mingzhe Hao, Tanakorn Leesatapornwongsa, Tiratat Patana-anake, and Haryadi S. Gunawi. **Limplock: Understanding the Impact of Limpware 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

C33. 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

C34. Haryadi S. Gunawi, Thanh Do, Pallavi Joshi, Peter Alvaro, Joseph M. Hellerstein, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, Koushik Sen, and Dhruba 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

C35. 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

C36. 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

C37. 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

C38. 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

C39. 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

C40.	Haryadi S. Gunawi, Vijayan Prabhakaran, Swetha Krishnan, Andrea C. Arpaci-Dusseau, and Remzi H. Arpaci-Dusseau. **Improving File System Reliability with I/O Shepherding**. *In Proceedings of the 21st ACM Symposium on Operating Systems Principles, 2007*. [14 pages, 25/131 (19%) acceptance rate].	SOSP '07
C41.	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
C42.	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
C43.	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
C44.	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.	Jiaxin Li, Yiming Zhang, Shan Lu, Haryadi S. Gunawi, Xiaohui Gu, Feng Huang, Dongsheng Li **Performance Bug Analysis and Detection for Distributed Storage and Computing Systems**. *ACM Transactions on Storage, Vol. 9, No. 4, 2022.*.	TOS '22
C2.	Huaicheng Li, Martin L. Putra, Ronald Shi, Fadhil I. Kurnia, Xing Lin, Jaeyoung Do, Achmad I. Kistijantoro, Gregory R. Ganger, Haryadi S. Gunawi **Extending and Programming the NVMe I/O Determinism Interface for Flash Arrays**. *ACM Transactions on Storage, Vol. 1, No. 1, 2022.*.	TOS '22
C3.	Haryadi S. Gunawi, Riza O. Suminto, Russell Sears, Casey Golliher, 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)*. [24 pages, **Fast-tracked**].	TOS '18
C4.	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.	Ray A. O. Sinurat, Anurag Daram, Haryadi S. Gunawi, Robert B. Ross, Sandeep Madireddy **Towards Continually Learning Application Performance Models**. *Workshop on ML for Systems at NeurIPS, 2023.*.	MLFS '23

W2.	Huan Ke, Haryadi S. Gunawi, Dominic Manno, David Bonnie, Brad Settlemyer **Fractional-Overlap Declustered Parity: Evaluating Reliability for Storage Systems**. *The 5th International Parallel Data Systems Workshop (PDSW), 2020.*.	PDSW '20
W3.	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
W4.	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
W5.	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
W6.	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].	^{d}ISSTA '15
W7.	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
W8.	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

Grants   (Government^g and Industry^i)

1. Haryadi S. Gunawi (PI) **University of Chicago Provost's Global Faculty Award**., *2022*, .

2.^{i} Haryadi S. Gunawi (PI) **Storage Systems in Machine Learning Era (Cont'd)**. *Seagate Inc., 2023*, .

3.^{g} Katarzyna Keahey, Carlos G. Maltzahn, Fraida Fund, and Haryadi S. Gunawi (Co-PI), **Repeto: Building a Network for Practical Reproducibility in Experimental Computer Science**. *NSF FAIROS RCN Proposal, 2022-2025*, $1,500,000.

4.^{g} Haryadi S. Gunawi, Henry Hoffmann, Shan Lu, Robert B. Ross, Venkatram Vishwanath, Manos Kapritsos, Cindy Rubio-Gonzalez, Yang Wang, Katarzyna Keahey, and Sandeep Madireddy. **ScaleStuds: Foundations for Correctness Checkability and Performance Predictability of Systems at Scale**. *NSF PPoSS Large Proposal, 2021-2026*, $5,000,000.

5.^{i} Haryadi S. Gunawi (PI) **Facebook Faculty Award**. *Facbook (Meta), 2021-2022*, .

6.^{i} Haryadi S. Gunawi (PI) **Storage Systems in Machine Learning Era (Cont'd)**. *Seagate Inc., 2021-2022*, .

7.^{g} Haryadi S. Gunawi (PI), Henry Hoffmann, and Shan Lu. **PPoSS: Planning: CP2: Towards Systems Correctness Checkability and Performance Predictability at Scale**. *NSF grant# CCF-2028427, 2020-2021*, $247,993.

8.[g] Katarzyna Keahey, Dan Stanzione, Joe Mambretti, Paul Ruth, Haryadi Gunawi (Co-PI). **Chameleon Phase III: A Large-Scale, Reconfigurable Experimental Environment for Cloud Research**. *NSF infrastructure grant, 2020-2024,* >$3,000,000.

9.[i] Haryadi S. Gunawi (PI) **Storage Systems in Machine Learning Era**. *Seagate Inc., 2020-2021, .*

10.[i] Haryadi S. Gunawi (PI) and Shan Lu. **Scale-Checkable Systems**. *Univ. of Chicago CERES Center grant, 2018-2020.*

11.[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.*

12.[i] Shan Lu and Haryadi S. Gunawi (Co-PI). *Huawei Research Grant, 2017, .*

13.[i] Haryadi S. Gunawi (PI) and Shan Lu. **Cascading Outage Bugs Elimination**. *Univ. of Chicago CERES Center grant, 2016-2017, .*

14.[g] Haryadi S. Gunawi (PI) and Shan Lu. **Combating Distributed Concurrency Bugs in Cloud Systems**. *NSF grant# CNS-1563956, 2016-2020,* $799,974.

15.[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.

16.[i] Haryadi S. Gunawi (PI) and Shan Lu. **Limplock-Free Cloud Systems**. *Univ. of Chicago CERES Center grant, 2015-2016, .*

17.[i] Haryadi S. Gunawi (PI) and Shan Lu. *Google Faculty Research Award, 2015, .*

18.[i] Haryadi S. Gunawi (PI). *NetApp Faculty Fellowship grant, 2015, .*

19.[i] Shan Lu and Haryadi S. Gunawi (Co-PI). *Huawei Research Grant, 2015, .*

20.[g] Haryadi S. Gunawi (PI). **DrCloud: Drill-Ready Cloud Computing**. *NSF CAREER grant# CNS-1350499, 2014-2019,* $449,349.

21.[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.

22.[i] Haryadi S. Gunawi (PI). *NetApp Faculty Fellowship grant, 2013, .*

23.[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.

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

Talks (Invited[†])

1.	Tufts Univ.[†]	Towards cale-Checkable Systems	Dec '22

2.	ICTIAA†	ScaleStuds: Foundations for Correctness Checkability and erformance Predictability of Systems at Scale	Sep '22
3.	CERES Center†	"—" (Keynote Talk)	May '22
4.	Meta Summit†	Predictability on Unpredictable Storage	Apr '22
5.	Wiliam and Mary	"—"	Apr '22
6.	ICOICT†	Why does the cloud stop computing? (Keynote)	Aug '21
7.	Facebook†	Predictability on unpredictable storage	Jul '21
8.	EuroSys-HAOC†	Large-scale reliability (Keynote)	Apr '21
9.	NetApp	Towards Tail-Free Flash/SSD Storage Systems	Dec '20
10.	NUS	Bugs at Scale: What New Bugs Live in the Cloud and How to Exterminate Them	Aug '19
11.	NTU	"—"	Aug '19
12.	SMU	"—"	Aug '19
13.	U. Texas	"—"	Feb '18
14.	Princeton	"—"	Jan '18
15.	Harvard	"—"	Nov '17
16.	Columbia	"—"	Apr '17
17.	Cornell	"—"	Apr '17
18.	NYU	"—"	Apr '17
19.	CMU†	"—"	Apr '17
20.	Twitter	"—"	Mar '17
21.	U. Michigan	"—"	Dec '16
22.	Huawei Labs†	"—"	Oct '16
23.	IEEE CRW†	"—" (Keynote)	Oct '16
24.	Microsoft Res.†	"—"	Jun '16
25.	U. Wisconsin†	"—"	Sep '15
26.	Google	"—"	Jul '15
27.	Facebook	"—"	Jul '15
28.	NetApp	Scalability Bugs: When 100-Node Testing is Not Enough	Feb '18
29.	HotOS '17	"—"	May '17
30.	NetApp	MittOS: OS Support for Millisecond Tail Tolerance	Feb '18
31.	SoCC†	Why Does the Cloud Stop Computing?	Oct '16
32.	Microsoft Azure†	"—"	Jun '16
33.	CERES Summit†	"—" (Keynote)	Jan '16
34.	NetApp†	Tiny-Tail Flash: Near-Perfect Elimination of GC Tail Latencies	†Oct '16
35.	Huawei Labs†	"—"	Oct '16
36.	IBM	The Tail at Store: A Large-Scale Analysis of Storage Variability	Jul '15
37.	SanDisk	"—"	Jul '15
38.	CRW†	The Case for LIGHTS: Limping-Hardware Tolerant Systems	Oct '17
39.	GCASR†	"—"	May '14
40.	Cloudera†	"—"	Feb '14
41.	Facebook	"—"	Sep '13
42.	Purdue†	"—"	Sep '13
43.	ANL†	"—"	Jul '13
44.	HotCloud '13	"—"	Jun '13

Postdoctoral period:

45.	NSDI '11	Fate and Destini: A Framework for Cloud Recovery Testing	Mar '11

46.	UC Berkeley	"—"	Mar '11
47.	Google	"—"	Nov '10
48.	Yahoo!	"—"	Nov '10
49.	Facebook	"—"	Nov '10
50.	Twitter	"—"	Nov '10
51.	Cloudera	"—"	Nov '10
52.	NetApp	"—"	Nov '10
53.	LANL	"—"	Nov '10

PhD period:

54.	UC Berkeley	Towards Reliable Storage Systems	Mar '10 [†]
55.	CMU	"—"	Apr '09 [†]
56.	Microsoft Rsch	"—"	Mar '09 [†]
57.	OSDI '08	SQCK: A Declarative File System Checker	Dec '08
58.	FAST '08	EIO: Error-handling is Occasionally Correct	Feb '08
59.	NetApp	"—"	Nov '07
60.	SOSP '07	Improving File System Reliability with I/O Shepherding	Oct '07
61.	ISCA '05	Deconstructing Commodity Storage Clusters	Jun '05
62.	EMC	"—"	Jun '05
63.	OSDI '04	Deploying Safe User-Level Network Services with icTCP	Dec '04

Teaching

- CMSC 15400: Introduction to Computer Systems (once every year from 2014 to now)
- CMSC 23000: Operating Systems (once every year from 2012 to now)
- CMSC 33200: Topics in Operating Systems ('13, '18, '21, '23)
- CMSC 33100: Advanced Operating Systems (Winter 2013, 2014)

Services and Other Activities

Program Chair/Co-Chair, Associate Editors:

APSys '21	ACM SIGOPS Asia-Pacific Workshop on Systems (40 PC members)
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:

SOSP '23	Best Paper Committee
ASPLOS '23	Best Paper Committee
OSDI '21	Best Paper Committee
SoCC '17	Publicity Chair
FAST '16	Co-Chair for WIP and Poster Sessions
SoCC '13	Co-Chair for Travel Scholarships

Steering Committee:

REP '23	ACM Conference on Reproducibility and Replicability.

Program Committee:

1.	ASPLOS '24	Intl' Conf. on Architectural Support for PL and OS
2.	FAST '24	USENIX Conference on File and Storage Technologies
3.	OSDI '24	USENIX Symposium on Operating Systems Design and Implementation
4.	SOSP '23 (Heavy)	ACM Symposium on Operating Systems Principles

5.	REP '23	ACM Conference on Reproducibility and Replicability
6.	ASPLOS '23	Intl' Conf. on Architectural Support for PL and OS
7.	OSDI '22	USENIX Symposium on Operating Systems Design and Implementation
8.	EuroSys '22	European Conference on Computer Systems
9.	APSys '21	ACM SIGOPS Asia-Pacific Workshop on Systems
10.	EurosSys '21	European Conference on Computer Systems
11.	NSDI '21 (Heavy)	USENIX Symposium on Networked Systems Design and Implementation
12.	OSDI '21	USENIX Symposium on Operating Systems Design and Implementation
13.	APSys '20	ACM SIGOPS Asia-Pacific Workshop on System
14.	FAST '20	USENIX Conference on File and Storage Technologies
15.	OSDI '20 (Heavy)	USENIX Symposium on Operating Systems Design and Implementation
16.	Systor '20	ACM International Systems and Storage Conference
17.	FAST '19	USENIX Conference on File and Storage Technologies
18.	NSDI '19	USENIX Symposium on Networked Systems Design and Implementation
19.	NVMW '19	Non-Volatile Memories Workshop
20.	SOSP '19 (Heavy)	ACM Symposium on Operating Systems Principles
21.	ATC '18	USENIX Annual Technical Conference
22.	FAST '18	USENIX Conference on File and Storage Technologies
23.	OSDI '18	USENIX Symposium on Operating Systems Design and Implementation
24.	SoCC '18	ACM Symposium on Cloud Computing
25.	VLDB '18	Intl' Conference on Very Large Data Bases
26.	HotCloud '17	USENIX Workshop on Hot Topics in Cloud Computing
27.	HPDC '17	ACM Symposium on High-Performance Parallel and Distributed Computing
28.	ICDCS '17	IEEE International Conference on Distributed Computing Systems
29.	Middleware '17	ACM/IFIP/USENIX Intl' Middleware Conf.
30.	SoCC '17	ACM Symposium on Cloud Computing
31.	SOSP SRC '17	Student Research Competition at ACM Symposium on Operating Systems Principles
32.	ASPLOS '16 (ERC)	Intl' Conf. on Architectural Support for PL and OS
33.	ATC '16	USENIX Annual Technical Conference
34.	CLOUD '16	IEEE International Conference on Cloud Computing
35.	FAST '16	USENIX Conference on File and Storage Technologies
36.	HotStorage '16	USENIX Workshop on Hot Topics in Storage and File Systems
37.	VLDB '16	Intl' Conference on Very Large Data Bases
38.	ASPLOS '15 (ERC)	Intl' Conf. on Architectural Support for PL and OS
39.	ATC '15	USENIX Annual Technical Conference
40.	CLOUD '15	IEEE International Conference on Cloud Computing
41.	FAST '15	USENIX Conference on File and Storage Technologies
42.	INFLOW '15	Workshop on Interactions of NVM/Flash with Operating-Systems and Workloads
43.	MSST '15	Intl' Conference on Massive Storage Systems and Technology
44.	HotCloud '14	USENIX Workshop on Hot Topics in Cloud Computing
45.	HPDC '14	ACM Symposium on High-Performance Parallel and Distributed Computing
46.	INFLOW '14	Workshop on Interactions of NVM/Flash with Operating-Systems and Workloads
47.	MSST '14	Intl' Conference on Massive Storage Systems and Technology
48.	SoCC '14	ACM Symposium on Cloud Computing
49.	SoCC '13	ACM Symposium on Cloud Computing
50.	VLDB '13	Intl' Conference on Very Large Data Bases
51.	MSST '12	IEEE Conference on Mass Storage Systems and Technologies
52.	NAS '12	IEEE Intl' Conference on Networking, Architecture, and Storage
53.	ScienceCloud '12	Workshop on Scientific Cloud Computing, co-located with HPDC '12
54.	VLDB '12	Intl' Conference on Very Large Data Bases
55.	DBTest '10	Intl' Workshop on Testing Database Systems, co-located with SIGMOD '10
56.	PDSW '11	Petascale Data Storage Workshop, co-located with Supercomputing '11

Journal Reviewing:

57.	TOS '21	ACM Transactions on Storage
58.	TOCS '16	ACM Transactions on Computer Systems
59.	TOS '14	ACM Transactions on Storage
60.	CSUR '13	ACM Computing Surveys
61.	HPCA '13	IEEE International Symposium on High Performance Computer Architecture
62.	TOC '13	IEEE Transactions on Computers
63.	TOS '12	ACM Transactions on Storage
64.	TKDE '12	IEEE Transactions on Knowledge and Data Engineering

Panels:

65.	NSF Panel '22	National Science Foundation Large Award Panel
66.	NSF Expedition '21	National Science Foundation Expedition Panel
67.	NSF CSR '19	National Science Foundation Computer Systems Research Panel
68.	NSF CSR '18	National Science Foundation Computer Systems Research Panel
69.	NSF CSR '17	National Science Foundation Computer Systems Research Panel
70.	NSF CAREER '15	National Science Foundation CAREER Award Panel
71.	NSF XPS '14	National Science Foundation Computer Systems Research Panel
72.	NSF CSR '14	National Science Foundation Computer Systems Research Panel
73.	NSF CSR '13	National Science Foundation Computer Systems Research Panel

Departmental/University Services:
- Faculty Advisory Board for UChicago Yuen Campus in Hong Kong (2023-present)
- Faculty Advisory Board for PSD Computing and Information Technology (2022-present
- 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)

PhD Alumni:

	Name	Period	First Employment (+ Internships)
1.	Cesar A. Stuardo	2017-2022	TikTok/ByteDance (Samsung Rsch., Microsoft Rsch., VMware)
2.	Mingzhe Hao	2015-2020	Huawei (NetApp, Microsoft Rsch., Facebook)
3.	Huan Ke	2015-2020	TBA (Huawei, LANL)
4.	Huaicheng Li	2015-2020	Asst. Prof. @ Virginia Tech (Microsoft Rsch. 2x, NetApp, Postdoc@CMU)
5.	Jeffrey F. Lukman	2015-2020	Bloomberg (Cloudera, Microsoft Rsch.)
6.	Riza O. Suminto	2013-2019	Cloudera (+ Samsung Rsch.)
7.	Tanakorn Leesatapornwongsa	2012-2017	Samsung Research (+ NetApp, Microsoft Research)

PhD Students (Current):

8.	Meng Wang	2018-current	(Huawei, Seagate)
9.	Daniar Kurniawan	2018-current	(VMware, Seagate)
10.	Martin L. Putra (co-advised)	2020-current	
11.	Ruidan Li	2021-current	
12.	Ray Andrew O. Sinurat	2022-current	(Argonne)
13.	Yuyang (Roy) Huang	2023-current	

Student Awards/Recognitions:

Dang Nguyen	2022	Quad Faculty Research Grant
Xinyu Liu	2021	College Undergraduate Research Fellows Award
Dang Nguyen	2021	Odyssey/Empower Summer Program
Huaicheng Li	2020	Department Nominated for ACM SIGOPS Dennis M. Ritchie Dissertation Award
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):

14.	Ethan Ho	2022-current	
15.	Kangrui Wang	2022-current	
16.	Qingyang Xu	2022-current	
17.	Siqi Li	2021-2022	
18.	Roy Huang	2021-2022	
19.	Siqi Li	2021-current	
20.	Roy Huang	2021-2022	PhD student @ UChicago
21.	Peng Cheng	2020	
22.	Atlas Chuen	2020	
23.	Levent Toksoz	2019	PhD student @ PennState
24.	Nanqinqin Li	2019	PhD student @ Princeton
25.	Patrick Huarng	2019	CTDS @ UChicago
26.	Angela Zhang	2018	PhD student @ NYU
27.	Meng Wang	2018	PhD student @ UChicago
28.	Shiqin Yan	2017	(EMC)
29.	Chrisma Pakha	2017	PhD student @ CMU
30.	Alexandra Clark	2017	Google
31.	Xueyin Wang	2017	Facebook
32.	Bo Fu	2016	PhD student @ Purdue ECE Dept.
33.	Murphy Zhang	2015	EMC
34.	Cheng Wu	2015	Baidu
35.	Joseph Harrow	2015	Glory Global Solutions
36.	Morenvino Mochtar	2014	Symantec Corp.
37.	Linda Xu	2014	Knobbe, Martens, Olson & Bear
38.	Haichen Liu	2014	Microsoft
39.	Mingzhe Hao	2013	PhD student @ UChicago

BS/MS Students:

40.	Faradawn Yang	2022-curr	
41.	Ronald Shi	2018	Facebook
42.	Joseph Ellis	2015	Palantir

Undergraduate Students:

| 43. | Raj Rana | 2022-curr | |

44.	Jiajun Mao	2022-curr	
45.	Jack Nugent	2022	(Summer DSI student)
46.	Xinyu Liu	2020-2022	
47.	Dang Nguyen	2020-2022	
48.	Zayne Khouja	2020	
49.	Max Demers	2018	
50.	Harry Wang	2016	(Facebook)
51.	Sonja Li	2016	
52.	Nora Sandler	2014	Security Innovation
53.	Shankara Pailoor	2014	

Highschool Students:

| 54. | Jax Alemu | 2023 | (Summer DSI student) |
| 55. | Pavithra Kamatchisoundaram | 2022 | (Summer DSI student) |

PhD Dissertation Defense Committee:
(might be slightly incomplete)
2023: Ahsan Pervaiz
2022: Cesar Stuardo
2021: Michael Hao Tong, Shu Wang
2020: Bernard Dickens, Guangpu Li, Huan Ke, Huaicheng Li, Jeffrey Lukman
2019: Harper Zhang, Yuxi Chen, Riza Suminto

PhD Candidacy Exam Committee:
2023: Utsav Sethi
2022: Ahsan Pervaiz
2021: Shu Wang
2019: Bernard Dickens, Haopeng Liu, Michael Hao Tong, Huan Ke, Jeffrey Lukman, Huaicheng Li
2018: Fan Yang, Harper Zhang
2017: Harper Zhang
2016: Aiman Fang, Tanakorn Leesatapornwongsa

Master Thesis/Qualifying Exam Committee (PhD Program):
2023: Utsav Sethi
2022: Bogdan Stoica
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: October 11, 2023