

# AISHWARYA GANESAN

POSTDOCTORAL RESEARCHER  
VMware Research

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## RESEARCH SUMMARY

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I am broadly interested in distributed systems and storage systems. *My research addresses the fundamental tradeoff between strong consistency and performance in distributed storage systems.*

The tradeoff between performance and correctness is pervasive across computer systems, including shared-memory multiprocessors, databases, and local file systems. The same tradeoff exists in distributed storage systems as well; designers must often choose consistency or performance but not both. In my research, I design and build distributed storage systems that provide strong guarantees yet also perform well. These new systems are designed based on a central idea: a system can remain inconsistent as long as external entities do not observe the system state, and consistency must be enforced only when the state is externalized to the outside world. This idea enables a system to defer and group expensive work, thereby improving performance while providing strong guarantees.

## EDUCATION

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- University of Wisconsin – Madison**  
Ph.D. in Computer Sciences 2015–2020  
Advisors: Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau
- Indian Institute of Technology Bombay**  
M.Tech in Computer Science and Engineering 2011–2013  
Advisor: S. Sudarshan
- Coimbatore Institute of Technology, Anna University**  
B.Tech in Information Technology 2006–2010

## HONORS & AWARDS

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- Selected for Rising Stars in EECS '21** 2021
- Graduate Student Instructor Award** 2020  
For teaching graduate-level distributed systems at UW Madison
- FAST Best Paper Award** 2020  
For our paper *Consistency-Aware Durability*
- Facebook Ph.D., Fellowship** 2019-2020  
Fellowship in distributed systems; funding towards tuition, stipend, and travel.
- Facebook Distributed Systems Research Award for \$50,000** 2020  
Jointly with Ramnathan Alagappan, Andrea Arpaci-Dusseau, and Remzi Arpaci-Dusseau
- CS Department Golden Brick Award** 2019  
For leading diversity efforts as president of UW Madison chapter of ACM-W
- Selected for Rising Stars in EECS '18** 2018
- FAST Best Paper Award** 2018  
For our paper *Protocol-Aware Recovery*
- Grace Hopper Celebration of Women in Computing Scholarship** 2017

- **FAST Best Paper Award Nominee** 2017  
For our paper *Redundancy Does Not Imply Fault-Tolerance*
- **Departmental Research Fellowship, University of Wisconsin – Madison** 2015
- **Department Gold Medal** 2010  
For ranking first during under graduation
- **Tata Consultancy Services endowed Best Student Award** 2010

## PEER-REVIEWED CONFERENCE PUBLICATIONS

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- [1] **Aishwarya Ganesan**, Ramnatthan Alagappan, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Exploiting Nil-Externality for Fast Replicated Storage*. In Proceedings of the 28th ACM Symposium on Operating Systems Principles, October 2021. **SOSP '21**
- [2] Yifan Dai, Yien Xu, **Aishwarya Ganesan**, Ramnatthan Alagappan, Brian Kroth, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *From Wiskey to Bourbon: A Learned Index for Log-structured Merge Trees*. In Proceedings of the 14th USENIX Conference on Operating Systems Design and Implementation, 2020. **OSDI '20**  
*Invited to Workshop on Learned Algorithms, Data Structures, and Instance-Optimized Systems @ VLDB '21*
- [3] **Aishwarya Ganesan**, Ramnatthan Alagappan, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Strong and Efficient Consistency with Consistency-aware Durability*. In Proceedings of the 18th Conference on File and Storage Technologies, February 2020. **FAST '20**  
*Best Paper Award*  
*Fast-tracked to ACM Transactions on Storage*
- [4] Iyswarya Narayanan, **Aishwarya Ganesan**, Anirudh Badam, Sriram Govindan, Bikash Sharma, Anand Sivasubramaniam. *Getting More Performance with Polymorphism from Emerging Memory Technologies*. In Proceedings of the 12th ACM International Conference on Systems and Storage, June 2019. **SYSTOR '19**
- [5] Ramnatthan Alagappan, **Aishwarya Ganesan**, Jing Liu, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Fault Tolerance, Fast and Slow: Exploiting Failure Asynchrony in Distributed Systems*. In Proceedings of the 13th USENIX Conference on Operating Systems Design and Implementation, 2018. **OSDI '18**
- [6] Ramnatthan Alagappan, **Aishwarya Ganesan**, Eric Lee, Aws Albarghouthi, Vijay Chidambaram, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Protocol-Aware Recovery for Consensus-Based Storage*. In Proceedings of the 16th USENIX Conference on File and Storage Technologies, February 2018. **FAST '18**  
*Best Paper Award*  
*Best of the Rest at ATC '19*  
*Fast-tracked to ACM Transactions on Storage*
- [7] **Aishwarya Ganesan**, Ramnatthan Alagappan, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Redundancy Does Not Imply Fault Tolerance: Analysis of Distributed Storage Reactions to Single Errors and Corruptions*. In Proceedings of the 15th USENIX Conference on File and Storage Technologies, 2017. **FAST '17**  
*Best Paper Nominee*  
*Fast-tracked to ACM Transactions on Storage*  
*Invited to USENIX ;login:*
- [8] Ramnatthan Alagappan, **Aishwarya Ganesan**, Yuvraj Patel, Thanumalayan Sankaranarayanan Pillai, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Correlated Crash Vulnerabilities*. In Proceedings of the 12th USENIX Conference on Operating Systems Design and Implementation, November 2016. **OSDI '16**

- [9] Swati Rallapalli, **Aishwarya Ganesan**, Krishna Chintalapudi, Venkat Padmanabhan, Lili Qiu. *Enabling Physical Analytics in Retail Stores using Smart Glasses*. In Proceedings of the 20th Annual International Conference on Mobile Computing and Networking, September 2014. **MOBICOM '14**

## PEER-REVIEWED JOURNAL AND WORKSHOP PUBLICATIONS & DEMOS

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- [1] Xudong Sun, Lalith Suresh, **Aishwarya Ganesan**, Ramnatthan Alagappan, Michael Gasch, Lilia Tang, and Tianyin Xu. *Reasoning About Modern Datacenter Infrastructures using Partial Histories*. In Proceedings of the Workshop on Hot Topics in Operating Systems, June 2021. **HOTOS '21**
- [2] **Aishwarya Ganesan**, Ramnatthan Alagappan, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Strong and Efficient Consistency with Consistency-aware Durability*. *ACM Transactions on Storage (TOS)*, 17(1), January 2021. (*Fast-tracked*) **ACM Tos '21**
- [3] Ramnatthan Alagappan, **Aishwarya Ganesan**, Eric Lee, Aws Albarghouthi, Vijay Chidambaram, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Protocol-Aware Recovery for Consensus-Based Distributed Storage*. *ACM Transactions on Storage (TOS)*, 14(3), October 2018. (*Fast-tracked*) **ACM Tos '18**
- [4] **Aishwarya Ganesan**, Ramnatthan Alagappan, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Redundancy Does Not Imply Fault Tolerance: Analysis of Distributed Storage Reactions to File-System Faults*. *ACM Transactions on Storage (TOS)*, 13(3), September 2017. (*Fast-tracked*) **ACM Tos '18**
- [5] **Aishwarya Ganesan**, Swati Rallapalli, Krishna Chintalapudi, Venkat Padmanabhan, Lili Qiu. *Demo: Tracking User Browsing on a Demo Floor*, In Proceedings of the 20th Annual International Conference on Mobile Computing and Networking, September 2014. **MOBICOM '14**

## OTHER PUBLICATIONS

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- [1] **Aishwarya Ganesan**, Ramnatthan Alagappan, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Redundancy Does Not Imply Fault Tolerance: Analysis of Distributed Storage Reactions to Single Errors and Corruptions*. ;login: The USENIX Magazine, 42(2), Summer 2017. (*Invited*) **;LOGIN:**
- [2] Rajalakshmi Nandakumar, Swati Rallapalli, Krishna Chintalapudi, Venkat Padmanabhan, Lili Qiu, **Aishwarya Ganesan**, Saikat Guha, Deepanker Aggarwal, Aakash Goenka. *Physical Analytics: A New Frontier for (Indoor) Location Research*. Microsoft Technical Report no. MSR-TR-2013-107, October 2013. **TECH REPORT**

## COVERAGE ON RESEARCH

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- The Morning Paper. Protocol-Aware Recovery for Consensus-Based Storage ([link](#)). Feb 2018
- ZDNet. Eliminating storage failures in the cloud ([link](#)). Feb 2018
- The Morning Paper. Redundancy does not imply fault tolerance ([link](#)). Mar 2017
- DHSR's Blog. Injecting Faults in Distributed Storage ([link](#)). Mar 2017
- StorageMojo. StorageMojo's Best Paper of FAST 2017 ([link](#)). Mar 2017

## WORK EXPERIENCE

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- **VMware Research** Palo Alto, CA  
*Postdoctoral Researcher* OCT '20 –
- **Microsoft Research** Redmond, WA  
*Research Intern, Systems Research Group* SUMMER '17  
Mentor: Anirudh Badam
- **Microsoft Research** Bangalore, India  
*Research Fellow, Mobility, Networks, and Systems Group* JUL '13 – APR '15  
Mentors: Krishna Chintalapudi and Venkat Padmanabhan
- **United Online Software Development Limited** Hyderabad, India  
*Software Engineer* JUL '10 – JUN '11

## TEACHING

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- **Distributed Systems, University of Wisconsin – Madison**  
Instructor SPRING '20  
[Course webpage](#)  
*Graduate Student Instructor Award*  
Course evaluation score: **6.42/7.00**
- **Distributed Systems, University of Wisconsin – Madison**  
Guest Lectures FALL '18, FALL '17
- **Design and Analysis of Algorithms, Indian Institute of Technology, Bombay**  
Teaching Assistant SPRING '13
- **Implementation Techniques of DBMS, Indian Institute of Technology, Bombay**  
Teaching Assistant FALL '12

## GRANTS

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- Travel grants for FAST '17, FAST '18
- Facebook Distributed Systems *Research Award for \$50,000* (along with Ramnatthan Alagappan, Prof. Andrea Arpaci-Dusseau, and Prof. Remzi Arpaci-Dusseau)

## RESEARCH MENTORING

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- **Yi Xu (graduate student at UC San Diego)**  
Exploiting persistent memory in modern key-value stores (internship at VMware Research)
- **Yifan Dai, Yien Xu**  
Learned indexes for log-structured merge trees (CS 739 course project, OSDI 2020)
- **Sreya Dutta Roy, Nikita Kad, Venkat Allam, Shreeshrita Patnaik**  
Predicted ordering in geo-replicated logs (CS 739 course project)
- **Akshat Jain, Grishma Gupta, Venkata Malireddy**  
Learning based ordering for replicated state machines (CS 739 course project)
- **Deepak Srinath, Lokit Kumar Paras, Nithin Venkatesh, Phanindra Moganti**  
Speculative geo-replicated message ordering (CS 739 course project)
- **Ruohui Wang, Kaiwei Tu, Max Zhang, Emma He**  
Read-triggered durability for HDFS (CS 739 course project)
- **Muthunagappan Muthuraman, Srivatsan Ramesh, Suryadev Sahadevan Rajesh, Vinith Venkatesan**  
Consistency-aware durability for highly available systems (CS 739 course project)

- **Aashish Richhariya, Akanksha, Sanchit Jain**  
Consistency at the edge (CS 739 course project)
- **Dax Chen, Yi-Shiun Chang, Chia-Wei Chen, Pei-Hsuan Wu**  
Performance and reliability isolation in ZooKeeper (CS 739 course project)
- **Kumar Biplav, Aditya Rungta, Nisarg Shah, Shaurya Shekhar**  
Fast consensus for fast storage (CS 739 course project)
- **Neil Perry, (undergrad at UW Madison)**  
Corruption analysis of Ethereum blockchain (now a graduate student at Stanford)

## SERVICE

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- **Chair**
  - SOSP '21 AMA Co-chair 2021
  - Journal of Systems Research, Student Editorial Board Co-chair 2021
  - Founded and organized graduate student research symposium at UW Madison 2019
- **Program Committee Member**
  - APSys '21, Program Committee Member 2021
  - SYSTOR '21, Program Committee Member 2021
  - HAOC '21 (co-organized with EuroSys '21), Program Committee Member 2021
  - EuroDW '21 (co-organized with EuroSys '21), Program Committee Member 2021
- **External Reviewer and Shadow PC Member**
  - NVMW, External Reviewer 2020
  - ACM Transactions on Storage, Reviewer 2019
  - EuroSys, Shadow PC Member 2019
  - FAST, External Reviewer 2018
  - EuroSys, Contributor to PC Reviews 2017
  - OSDI, External Reviewer 2016
- **Outreach**
  - President, W-ACM, UW Madison chapter of ACM's Women in Computing 2018–2019
  - UW Madison CS department outreach at Grace Hopper Conference career fair 2018
  - WACM Graduate Student Mentor (for women undergraduate and graduate students) 2017

## INVITED TALKS AND PRESENTATIONS

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- **From Wiskey to Bourbon: A Learned Index for Log-structured Merge Trees**  
Invited talk at Workshop on Learned Algorithms, Data Structures, and Instance-Optimized  
(co-organized with VLDB '21) AUG '21
- **Consistency and Performance in Distributed Storage Systems**
  - Invited talk at University of Waterloo JUN '21
  - Invited talk at Rutgers University OCT '20
  - Invited talk at VMware Research JUN '20

- Strong and Efficient Consistency with Consistency-aware Durability**  
 Microsoft AUG '20  
 VMWare Tech Talk MAR '20  
 Talk and Poster at FAST FEB '20
  
- A Measure-then-Build Approach to Distributed Storage Reliability**  
 Talk at Facebook Research Women in Research Lean In event SEP '19  
 Poster at Facebook Research Fellowship and Emerging Scholars Summit SEP '19  
 Poster at Rising Stars in EECS, MIT OCT '18
  
- Fault Analysis of Scalable Distributed Storage**  
 Talk at SCI Labs Kick-off Meeting APR '17
  
- Redundancy Does Not Imply Fault Tolerance**  
 Invited talk at Hydra '20 JUL '20  
 Poster at SCI Labs Kick-off Meeting APR '17  
 Talk and Poster at FAST MAR '17  
 Invited Poster at NetApp University Day FEB '17
  
- Correlated Crash Vulnerabilities**  
 Poster at OSDI NOV '17  
 Talk at Microsoft Gray Systems Lab JUN '16
  
- Tracking User Browsing on a Demo Floor**  
 Invited Demo and Poster at Microsoft Research's TechVista JAN '15  
 Invited Demo and Poster at COMSNETS JAN '15  
 Demo and Poster at MobiCom SEP '14

## REFERENCES

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Available upon request