

# Xiangyao Yu

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RESEARCH INTERESTS	<b>Cloud-native databases:</b> Storage disaggregation, computation pushdown, auto-scaling <b>New hardware for DB:</b> Multicore, GPU, two-tier memory, SmartNIC <b>Transaction processing:</b> Concurrency control, logging, high availability, HTAP	
EDUCATION	<b>Massachusetts Institute of Technology (MIT)</b> Ph.D. in Computer Science - Thesis: Logical Leases: Scalable Hardware and Software Systems through Time Traveling - Advisor: Prof. Srinivas Devadas  S.M. in Computer Science - Thesis: An Evaluation of Concurrency Control with One Thousand Cores - Advisor: Prof. Srinivas Devadas  <b>Tsinghua University</b> B.E. in Microelectronics Science and Engineering - Advisor: Prof. Leibo Liu	Cambridge, MA Feb. 2015 – Sep. 2017  Sep. 2012 – Feb. 2015  Beijing, China Sep. 2008 – Aug. 2012
PROFESSIONAL EXPERIENCE	<b>Computer Sciences Department, University of Wisconsin-Madison</b> Assistant Professor.  <b>Google</b> Visiting Researcher. Supervisor: Dr. Jeffrey Naughton  <b>Database Group, MIT</b> Postdoctoral Associate. Supervisor: Prof. Michael Stonebraker  <b>Computer Structure Group, MIT</b> Graduate Research Assistant. Supervisor: Prof. Srinivas Devadas  <b>Parallel Computing Lab, Intel</b> Research Intern. Supervisor: Dr. Pradeep Dubey  <b>Microsoft Research Asia (MSRA)</b> Research Intern. Supervisor: Dr. Thomas Moscibroda  <b>Safari Group, CMU</b> Research Intern. Supervisor: Prof. Onur Mutlu  <b>Hulu</b> Full-Time Intern. Supervisor: Dr. Zhibing Wang	Madison, WI Jan. 2020 – Present  Madison, WI Aug. 2019 – Jan. 2020  Cambridge, MA Oct. 2017 – Aug. 2019  Cambridge, MA Sep. 2012 – Sep. 2017  Santa Clara, CA Jun. – Aug. 2016  Beijing, China Oct. 2011 – Jun. 2012  Pittsburgh, PA Jun. – Sep. 2011  Beijing, China Aug. 2009 – Feb. 2010
HONORS AND AWARDS	<b>Distinguished Program Committee Member</b> ACM Special Interest Group on Management of Data  <b>NSF CAREER Award</b>  <b>Runner Up Award (overall category)</b> DAPA Demo Day, Google	Jun. 2022  Apr. 2022  Dec. 2019

**George M. Sprowls Award for Outstanding Ph.D. Thesis** Nov. 2017  
Department of Electrical Engineering and Computer Science, MIT

**Best Paper Nomination** Oct. 2015  
Parallel Architectures and Compilation Techniques (PACT)

**Best Student Paper Award** Nov. 2013  
Computer and Communication Security Conference (CCS)

**Energy Initiative Fellowship** 2012 – 2013  
MIT

**Graduation with Honors** Jun. 2012  
Tsinghua University

**Best Paper Nomination** May 2012  
International Symposium on Networks on Chip (NOCS)

**First Prize Winner** Apr. 2010  
Challenge Cup, Tsinghua University

**Comprehensive Scholarship** 2009 – 2012  
Tsinghua University

**Third Prize Winner** Jun. 2008  
21st International Young Physicists' Tournament (IYPT)

TEACHING

**CS764 Topics in Database Management Systems** Fall 2022

**CS764 Topics in Database Management Systems** Fall 2021

**CS564 Database Management Systems: Design and Implementation** Spring 2021

**CS764 Topics in Database Management Systems** Fall 2020

**CS839 Design the Next-Generation Databases** Spring 2020

PROFESSIONAL  
SERVICE

**Program Committee:**

- SIGMOD 2024
- DaMoN workshop 2023
- VLDB Industry 2023
- VLDB 2023
- SIGMOD 2023
- SIGMOD Student Research Competition 2022
- SIGMOD Industry 2022
- SIGMOD 2022
- ICDE Industry 2022
- ICDE 2022
- VLDB 2021
- SIGMOD 2021
- SIGMOD Demo 2021
- ICDE 2021
- VLDB 2020
- SIGMOD 2020
- SIGMOD Student Research Competition 2020
- VLDB Demo 2019
- SoCC 2019
- DASFAA 2019

**Reviewer for:**

VLDB Journal (2021), ISCA (2020), SIGMOD Record (2019), TKDE (2019), Transactions on Storage (2019), SIGMETRICS (2019), SPAA (2018), Journal of Supercomputing (2017), Transactions on Computers (2017), SBAC-PAD (2016)

PATENTS

- P2. **Xiangyao Yu**, Christopher J. Hughes, Nadathur Rajagopalan Satish, *Hardware Prefetcher for Indirect Access Patterns*, US9582422B2, June 2016
- P1. Thomas Moscibroda, Zhengping Qian, Mark Eugene Russinovich, **Xiangyao Yu**, Jiaying Zhang, Feng Zhao, *Service Allocation in a Distributed Computing Platform*, US9419859B2, August 2016

CONFERENCE  
PUBLICATIONS

Names of my students and myself are highlighted with underline.

- C39. Chenhao Ye, Wuh-Chwen Hwang, Keren Chen, Xiangyao Yu, *Polaris: Enabling Transaction Priority in Optimistic Concurrency Control*, Proceeding of **SIGMOD**, June 2023. *To appear*.
- C38. Xinjing Zhou, Xiangyao Yu, Goetz Graefe, Michael Stonebraker, *Two is Better Than One: The Case for 2-Tree for Skewed Data Sets*, Proceedings of The Conference on Innovative Data Systems Research (**CIDR**), January 2023.
- C37. Zhihan Guo, Xinyu Zeng, Kan Wu, Wuh-Chwen Hwang, Ziwei Ren, Xiangyao Yu, Mahesh Balakrishnan, Philip Bernstein, *Cornus: Atomic Commit for a Cloud DBMS with Storage Disaggregation*, Proceedings of the **VLDB** Endowment, Vol. 16, Iss. 2, October 2022.
- C36. Xinjing Zhou, Xiangyao Yu, Goetz Graefe, Michael Stonebraker, *Lotus: Scalable Multi-Partition Transactions on Single-Threaded Partitioned Databases*, Proceedings of the **VLDB** Endowment, Vol. 15, Iss. 11, July 2022.
- C35. Bobbi Yogatama, Weiwei Gong, Xiangyao Yu, *Orchestrating Data Placement and Query Execution in Heterogeneous CPU-GPU DBMS*, Proceedings of the **VLDB** Endowment, Vol. 15, Iss. 11, July 2022.
- C34. Elena Milkai, Yannis Chronis, Kevin Gaffney, Zhihan Guo, Jignesh Patel, Xiangyao Yu, *How good is my HTAP system?*, Proceeding of **SIGMOD**, June 2022.
- C33. Anil Shanbhag\*, Bobbi Yogatama\*, Xiangyao Yu, Samuel Madden, *Tile-based Lightweight Integer Compression in GPU*, Proceeding of **SIGMOD**, June 2022.  
\*Equal contribution
- C32. Yu Xia, Xiangyao Yu, Matthew Butrovich, Andrew Pavlo, Srinivad Devadas, *Litmus: Towards a Practical Database Management System with Verifiable ACID Properties and Transaction Correctness*, Proceeding of **SIGMOD**, June 2022.
- C31. Youmin Chen, Xiangyao Yu, Paraschos Koutris, Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau, Jiwu Shu, *Plor: General Transactions with Predictable, Low Tail Latency*, Proceedings of **SIGMOD**, June 2022.
- C30. Jin Zhang, Xiangyao Yu, Zhengwei Qi, Haibing Guan, *Falcon: A Timestamp-based Protocol to Maximize the Cache Efficiency in the Distributed Shared Memory*, International Parallel & Distributed Processing Symposium (**IPDPS**), May 2022.
- C29. Sujay Yadalam, Nisarg Shah, Xiangyao Yu, Michael Swift, *ASAP: A Speculative Approach to Persistence*, Proceedings of the International Symposium on High Performance Computer Architecture (**HPCA**), April 2022.
- C28. Yifei Yang, Matt Youill, Matthew Woicik, Yizhou Liu, Xiangyao Yu, Marco Serafini, Ashraf Aboul-naga, Michael Stonebraker, *FlexPushdownDB: Hybrid Pushdown and Caching in a Cloud DBMS*, Proceedings of the **VLDB** Endowment, Vol. 14, Iss. 11, July 2021.
- C27. Zhihan Guo, Kan Wu, Cong Yan, Xiangyao Yu, *Releasing Locks As Early As You Can: Reducing Contention of Hotspots by Violating Two-Phase Locking*, Proceedings of **SIGMOD**, June 2021.
- C26. Yi Lu, Xiangyao Yu, Lei Cao, Samuel Madden, *Epoch-based Commit and Replication in Distributed OLTP Databases*, Proceedings of the **VLDB** Endowment, Vol. 14, Iss. 5, January 2021.

- C25. Yu Xia, Xiangyao Yu, Andrew Pavlo, Srinivas Devadas, *Taurus: Lightweight Parallel Logging for In-Memory Database Management Systems*, Proceedings of the **VLDB** Endowment, Vol. 14, Iss. 2, October 2020.
- C24. Yi Lu, Xiangyao Yu, Lei Cao, Samuel Madden, *Aria: A Fast and Practical Deterministic OLTP Database*, Proceedings of the **VLDB** Endowment, Vol. 13, Iss. 11, July 2020.
- C23. Anil Shanbhag, Samuel Madden, Xiangyao Yu, *A Study of the Fundamental Performance Characteristics of GPUs and CPUs for Database Analytics*, Proceedings of **SIGMOD**, June 2020.
- C22. Xiangyao Yu, Matt Youill, Matthew Woicik, Abdurrahman Ghanem, Marco Serafini, Ashraf Aboulnaga, Michael Stonebraker, *PushdownDB: Accelerating a DBMS using S3 Computation*, Proceedings of 36th International Conference on Data Engineering (**ICDE**), April 2020.
- C21. Junjay Tan, Thanaa Ghanem, Matthew Perron, Xiangyao Yu, Michael Stonebraker, David DeWitt, Ashraf Aboulnaga, Marco Serafini, Tim Kraska, *Choosing A Cloud DBMS: Architectures and Tradeoffs*, Proceedings of the **VLDB** Endowment, August 2019.
- C20. Erfan Zamanian, Xiangyao Yu, Michael Stonebraker, Tim Kraska, *Rethinking Database High Availability with RDMA Networks*, Proceedings of the **VLDB** Endowment, Vol. 12, Iss. 11, July 2019.
- C19. Yi Lu, Xiangyao Yu, Samuel Madden, *STAR: Scaling Transactions through Asymmetric Replication*, Proceedings of the **VLDB** Endowment, Vol. 12, Iss. 11, July 2019.
- C18. Yu Xia, Xiangyao Yu, Willian Moses, Julian Shun, Srinivas Devadas, *LiTM: A Lightweight Deterministic Software Transactional Memory System*, International Workshop on Programming Models and Applications for Multicores and Manycores (**PMAM@PPoPP**), February 2019.
- C17. Xiangyao Yu, Vijay Gadepally, Stan Zdonik, Tim Kraska, and Michael Stonebraker, *FastDAWG: Improving Data Migration in the BigDAWG Polystore System*, VLDB workshop on Polystores and other Systems for Heterogeneous Data (**POLY@VLDB**), August 2018.
- C16. Xiangyao Yu, Yu Xia, Andrew Pavlo, Daniel Sanchez, Larry Rudolph, Srinivas Devadas, *Sundial: Harmonizing Concurrency Control and Caching in a Distributed OLTP Database Management System*, Proceedings of the **VLDB** Endowment, Vol. 11, Iss. 10, June 2018.
- C15. Xiangyao Yu, Chris Hughes, Nadathur Satish, Onur Mutlu, Srinivas Devadas, *Banshee: Bandwidth-Efficient DRAM Caching via Software/Hardware Cooperation*, Proceedings of the 50th International Symposium on Microarchitecture (**MICRO**), October 2017.
- C14. Xiangyao Yu, Hongzhe Liu, Ethan Zou, Srinivas Devadas, *Tardis 2.0: Optimized Time Traveling Coherence for Relaxed Consistency Models*, Proceedings of the 25th International Conference on Parallel Architectures and Compilation Techniques (**PACT**), September 2016.
- C13. Xiangyao Yu, Andrew Pavlo, Daniel Sanchez, Srinivas Devadas, *TicToc: Time Traveling Optimistic Concurrency Control*, Proceedings of **SIGMOD**, June 2016.
- C12. Xiangyao Yu, Christopher Hughes, Nadathur Satish, Srinivas Devadas, *IMP: Indirect Memory Prefetcher*, Proceedings of the 48th International Symposium on Microarchitecture (**MICRO**), December 2015.
- C11. Xiangyao Yu, Srinivas Devadas, *Tardis: Time Traveling Coherence Algorithm for Distributed Shared Memory*, Proceedings of the 24th International Conference on Parallel Architectures and Compilation Techniques (**PACT**), October 2015. **Best Paper Session.**
- C10. Xiangyao Yu, Syed Kamran Haider, Ling Ren, Christopher Fletcher, Albert Kwon, Marten van Dijk, Srinivas Devadas, *PrORAM: Dynamic Prefetcher for Oblivious RAM*, International Symposium on Computer Architecture (**ISCA**), June 2015.
- C9. Xiangyao Yu, George Bezerra, Andrew Pavlo, Srinivas Devadas, and Michael Stonebraker, *Staring into the Abyss: An Evaluation of Concurrency Control with One Thousand Cores*, Proceedings of the **VLDB** Endowment, vol. 8, iss. 3, November 2014.
- C8. Rachata Ausavarungnirun, Chris Fallin, Xiangyao Yu, Kevin Chang, Greg Nazario, Reetuparna Das, Gabriel Loh, and Onur Mutlu, *Design and Evaluation of Hierarchical Rings with Deflection Routing*, Proceedings of the 26th International Symposium on Computer Architecture and High Performance Computing (**SBAC-PAD**), October 2014.

- C7. Christopher Fletcher, Ling Ren, Xiangyao Yu, Marten van Dijk, Omer Khan, and Srinivas Devadas, *Suppressing the Oblivious RAM Timing Channel While Making Information Leakage and Program Efficiency Trade-offs*, Proceedings of the International Symposium on High Performance Computer Architecture (**HPCA**), February 2014.
- C6. Xiangyao Yu, Christopher Fletcher, Ling Ren, Marten Van Dijk, and Srinivas Devadas, *Generalized External Interaction with Tamper-Resistant Hardware with Bounded Information Leakage*, Proceedings of the Cloud Computing Security Workshop (**CCSW**), November 2013.
- C5. Emil Stefanov, Marten van Dijk, Elaine Shi, Christopher Fletcher, Ling Ren, Xiangyao Yu, and Srinivas Devadas, *Path ORAM: An Extremely Simple Oblivious RAM Protocol*, Proceedings of the 20th Computer and Communication Security Conference (**CCS**), 2013. **Best Student Paper Award.**
- C4. Ling Ren, Christopher W. Fletcher, Xiangyao Yu, Marten van Dijk, and Srinivas Devadas, *Integrity Verification for Path Oblivious-RAM*, Proceedings of the 17th IEEE High Performance Extreme Computing Conference (**HPEC**), 2013.
- C3. Ling Ren, Xiangyao Yu, Christopher W. Fletcher, Marten van Dijk, Srinivas Devadas, *Design Space Exploration and Optimization of Path Oblivious RAM in Secure Processors*, 40th International Symposium on Computer Architecture (**ISCA**), 2013.
- C2. Yuan Lin Yeoh, Bo Wang, Xiangyao Yu, Tony Tae Hyoung Kim, *A 0.4V 7T SRAM with Write Through Virtual Ground and Ultra-fine Grain Power Gating Switches*, IEEE International Symposium on Circuits and Systems (**ISCAS**), 2013.
- C1. Chris Fallin, Greg Nazario, Xiangyao Yu, Kevin Chang, Rachata Ausavarungnirun, Onur Mutlu. *MinBD: Minimally-Buffered Deflection Routing for Energy-Efficient Interconnect*, In 6th ACM/IEEE International Symposium on Networks-on-Chip (**NOCS**), 2012.  
Acceptance rate: 25%. Contribution: 20% idea, 10% implementation, 10% writing.  
**One of the five papers nominated for the Best Paper Award.**
- J2. Emil Stefanov, Marten van Dijk, Elaine Shi, Christopher Fletcher, Ling Ren, **Xiangyao Yu**, Srinivas Devadas, *A Retrospective on Path ORAM*, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), 2019.
- J1. Rachata Ausavarungnirun, Chris Fallin, **Xiangyao Yu**, Kevin Chang, Greg Nazario, Reetuparna Das, Gabriel Loh, Onur Mutlu, *A Case for Hierarchical Rings with Deflection Routing: An Energy-Efficient On-Chip Communication Substrate*, Parallel Computing (**PARCO**), 2016.

JOURNAL  
PUBLICATIONS