# Chenhao Ye

chenhaoy@cs.wisc.edu • https://pages.cs.wisc.edu/~chenhaoy

## EDUCATION

**Ph.D. student in Computer Science**, University of Wisconsin–Madison — Madison, WI, Sep 2020 – Present
- Advisors: Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau
- Research Interests: Storage Systems, Distributed Systems, Databases

**B.S. in Computer Science**, University of Wisconsin–Madison — Madison, WI, Jan 2019 – Aug 2020
- GPA: 4.00 / 4.00, Graduated with Honor

**B.S. in Electrical and Computer Engineering**, Shanghai Jiao Tong University — Shanghai, China, Sep 2016 – Dec 2018
- GPA: 3.73 / 4.00

## WORK EXPERIENCE

**Software Engineer Intern**, Snowflake Inc., supervised by Leonidas Galanis — San Mateo, CA, May 2023 – Aug 2023
- Prototyped a workload replay tool that generates realistic workloads based on job statistics from the data infrastructure. This tool attracted significant interest from multiple internal customers for benchmarking and resource provisioning purposes.
- Implemented a critical multi-metadata-store feature for a data exporting component; the previous version of this component only supported a single metadata store, which prevented it from being deployed in production.
- Uncovered and fixed a subtle concurrency bug in the data infrastructure that could cause data loss in production.

## RESEARCH PROJECTS

**Cache-Centric Multi-Resource Allocation for Storage Services**, Project Leader — Jan 2021 – Present
- Present a novel resource allocation algorithm that holistically allocates caches, I/O bandwidth, and other resources in multi-tenant storage services. By exploiting the correlation between caches and I/O bandwidth, the algorithm significantly optimizes resource utilization while respecting the fairness goal.
- Implement *HareFS*, a multi-tenant filesystem service that allocates resources with the awareness of heterogeneous cache sensitivity across tenants. Measurements show that it can deliver up to 1.6× throughput in microbenchmarks and 1.4× on real-world applications.
- *This project is currently in submission.*

**Enabling Transaction Priority in Optimistic Concurrency Control**, Project Leader — Oct 2021 – Apr 2023
- Recognize the critical role of transaction priority in real-world database systems and its absent support in optimistic concurrency control (OCC) protocol.
- Propose a lightweight *reservation* mechanism in OCC, which protects a high-priority transaction from being aborted by low-priority transactions in the case of conflicts.
- Design and implement *Polaris*, an OCC protocol that supports multiple priority levels; benchmarks show it could achieve up to 1.9× higher throughput and 17× lower latency compared to an existing OCC protocol on high-contention workloads.

**MadFS: Per-File Virtualization for Userspace Persistent Memory Filesystems**, Project Co-Leader — Oct 2021 – Jan 2023
- Propose a novel *per-file virtualization* technique for persistent memory filesystems, which encapsulates a set of filesystem functionalities, including metadata management, crash consistency, and concurrency control, fully in userspace; this technique significantly reduces the kernel-crossing overhead on the I/O path.
- Build *MadFS*, a kernel-bypassing persistent memory filesystem based on the per-file virtualization, which achieves up to 1.5× speedup for LevelDB on YCSB workload and 1.9× for SQLite on TPC-C workload compared to NOVA filesystem.

## PUBLICATIONS

[1] **Chenhao Ye**, Wuh-Chwen Hwang, Keren Chen, Xiangyao Yu. Polaris: Enabling Transaction Priority in Optimistic Concurrency Control. In *Proceedings of the 2023 International Conference on Management of Data*. **SIGMOD '23**

[2] Shawn Zhong*, **Chenhao Ye***, Guanzhou Hu, Suyan Qu, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, Michael M. Swift. MadFS: Per-File Virtualization for Userspace Persistent Memory Filesystems. In *21st USENIX Conference on File and Storage Technologies*. (*contributed equally) **FAST '23**

[3] Yuvraj Patel, **Chenhao Ye**, Akshat Sinha, Abigail Matthews, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, Michael M. Swift. Using Trāṭr to tame Adversarial Synchronization. In *31st USENIX Security Symposium*. **Security '22**

[4] Jing Liu, Anthony Rebello, Yifan Dai, **Chenhao Ye**, Sudarsun Kannan, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. Scale and Performance in a Filesystem Semi-Microkernel. In *Proceedings of the ACM SIGOPS 28th Symposium on Operating Systems Principles*. **SOSP '21**