

# KAN WU

The University of Wisconsin – Madison

Department of Computer Sciences

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## RESEARCH INTERESTS

**Areas:** Storage Systems, Caching, and Databases

**Focus:** Caching and Persistent Memory

## EDUCATION

**Ph.D. in Computer Science, UW-Madison / 2016.09 – 2022.05 (expected)**

advised by Professor Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau

**M.S. in Computer Science, UW-Madison / 2016.09 – 2020.05**

advised by Professor Andrea Arpaci-Dusseau and Remzi Arpaci-Dusseau

**B.Eng. in Computer Science, University of Science and Technology of China / 2012.09 – 2016.06**

Rank: 5/107, Outstanding Graduate

## RESEARCH EXPERIENCE

**Multi-tenant Persistent Memory Caching (In Submission, FAST'22)**

advised by Prof. Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau

Developed a multi-tenant persistent memory caching sharing framework that can efficiently estimate PM resource usage of each client cache and regulate interferences across multi-tenants, achieving resource-limit, QoS guarantee, fairness and proportional resource sharing goals.

**Optimizing Caching for Persistent Memory Hierarchies (FAST'21, NVM'21)**

advised by Prof. Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau

Proposed non-hierarchical caching, a novel approach to automatically tuning caching to exploit combined-peak performance from modern storage hierarchies with emerging devices (e.g., Optane DC PMM, Optane SSD, Flash SSD).

**Field-Granularity Caching for PM-based OLTP Databases (In Submission, SIGMOD'22)**

advised by Prof. Xiangyao Yu, Tianzhen Wang

Designed field-granularity caching mechanisms and policies for in-memory relational databases based on DRAM and PM hierarchies.

**Building Search Engines for Tiny Memory and Flash Hierarchies (FAST'20)**

advised by Prof. Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau

Developed a new search engine that efficiently uses Flash SSDs with tiny amounts of main memory. Proposed multiple techniques, including optimized data layout, a novel Bloom filter, adaptive prefetching, and space-time trade-offs.

### **Performance Characterization of Persistent Memory Devices (HotStorage'19, DaMoN'19)**

advised by Prof. Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau

Formalized guidelines to be followed by the users of Intel Optane SSD (a popular PM-based block device). Examined Optane SSD's internals to provide insights into each rule.

## **PUBLICATIONS**

[10] (In Submission) **Shared Persistent Memory Caching** [Kan Wu](#) et. al. **FAST'2022**

[9] (In Submission) **Field-granularity Caching for Persistent Memory-based OLTP Databases**  
Second Author **SIGMOD'2022**

[8] (In Submission) **Segmented Cache Admission Policy for CDN** Third Author **FAST'2022**

[7] (In Submission) **Optimizing Two-Phase Commit for Disaggregated Storage Architecture** Third Author **SIGMOD'2022**

[6] **Releasing Locks As Early As You Can: Reducing Contention of Hotspots by Violating Two-Phase Locking** Zhihan Guo, [Kan Wu](#), Cong Yan, Xiangyao Yu **SIGMOD'2021**

[5] **The Storage Hierarchy is Not a Hierarchy: Optimizing Caching on Modern Storage Devices with Orthus** [Kan Wu](#), Zhihan Guo, Guanzhou Hu, Kaiwei Tu, Ramnatthan Alagappan, Rathijit Sen, Kwanghyun Park, Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau, **FAST'2021**

[4] **Read as Needed: Building WiSER, a Flash-Optimized Search Engine** Jun He, [Kan Wu](#), Sudarsun Kannan, Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau, **FAST'2020**

[3] **Towards an Unwritten Contract of Intel Optane SSD** [Kan Wu](#), Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau, **HotStorage'2019**

[2] **Exploiting Intel Optane SSD for Microsoft SQL Server** [Kan Wu](#), Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau, Rathijit Sen, Kwanghyun Park, SIGMOD, DaMoN'2019

[1] **The Storage Hierarchy is Not a Hierarchy: Optimizing Caching on Modern Storage Devices with Orthus** [Kan Wu](#), Zhihan Guo, Guanzhou Hu, Kaiwei Tu, Ramnatthan Alagappan, Rathijit Sen, Kwanghyun Park, Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau, NVMW'2021

## **PROFESSIONAL EXPERIENCE**

**Research Assistant, Microsoft Gray System Lab / 2018.09 – 2021.09**

Mentor: Kwanghyun Park, Rathijit Sen

**Software Engineering Intern, VMWare / 2019.05 – 2019.08**

Mentor: Wenguang Wang

## **Research Assistant, Chinese University of Hong Kong / 2016.01 – 2016.06**

Mentor: Prof. Patrick P.C. Lee, Qun Huang

## **PROFESSIONAL SERVICES**

Reviewer, ACM Transactions on Storage (TOS) 2021

Student Editorial Board, Journal of Systems Research (JSys) 2021

External Reviewer, NSDI 2020

External Reviewer, FAST 2018

## **HONORS AND AWARDS**

Summer Research Award, UW-Madison / 2017

Outstanding Graduate, USTC / 2016

Winner Algorithm, IEEE Congress on Evolutionary Computation / 2015

Tencent Innovation Scholarship / 2014

## **SKILLS & RELEVANT COURSEWORK**

Programming language: C, C++, Python, Java.

Relevant coursework: operating system, computer architecture, distributed system, database.