

ZHIZHEN (CATHY) CAI

cathyc5@illinois.edu

<https://cathy-cai.page>

EDUCATION

University of Illinois Urbana-Champaign

Sep 2024 - Jun 2029 (expected)

- PhD student in Computer Science

University of Science and Technology of China

Sep 2019 - Jun 2023

- Degree of Bachelor of Engineering in Computer Science and Technology

PUBLICATION

Q. Zhang, S. Xu, Qi Chen, Guxin Sui, Jiadong Xie, **Zhizhen Cai**, et al. VBase: A High-Performance Vector Database for Approximate Online Similarity Queries. *OSDI'23*

- Our team identified relaxed monotonicity in existing high-dimensional indices, incorporated vector indices into relational databases with noticeable performance gain.
- I proposed cost abstraction for vector search and implemented query-planning subsystem based on monotonicity we discovered, which minimized the latency for mixed query (query with both scalar and vector filter). I summarized the work in §4.3 and §5.5.
- I optimize our implementation with profiling and coding to solve hot-spots.

RESEARCH & PROFESSIONAL EXPERIENCE

Researcher XLab

Sep 2024 - Present

Advisor: Tianyin Xu, Xudong Sun

- Compositional verification of Kubernetes Cluster Controllers (ongoing project)

Researcher Microsoft Research Asia Internship

Aug 2022 - May 2023

Advisor: Qianxi Zhang & Qi Chen (System Research Group)

- Inspected PostgreSQL's source code, communicated with experienced developers, and helped the whole team in extension development.
- Researched query planning & optimization in database, and gave an outstanding performance in index selectivity and cost estimation. This work is accepted to **OSDI 2023**.

Teaching Assistant CS 423: Operating System Design

Aug 2025 - Jan 2026 (expected)

Teacher: Tianyin Xu

- Update documentations of MPs in Linux kernel programming and grade submissions

Technical Support USTC Work-Study Program in Library

Sep 2022 - Jul 2023

- Helped the library maintain query machine (we ran netbooted Linux on them).

Teaching Assistant Web Information Processing and Application

Aug 2022 - Jan 2023

Teacher: Tong Xu

- Designed & Implemented experiment framework on information retrieval and recommendation system, scored homework
- Maintained & updated teacher's lecture, adding SOTA techniques and examples

Teaching Assistant Operating System (Honored)

Jan 2022 - Jun 2022

Teacher: Kai Xing

- Designed & Implemented OS experiment framework for spring 2022 Courses, introduced state of the art tools to class (introduced io_uring and fine-grained lock concept).

LEADERSHIP AND ACTIVITIES

Vice President Linux User Group of USTC

Jun 2021 - May 2022

- Planned and held activities including Software Freedom Day 2021, Hackergame 2021, Club Opening Day, and maintained daily operation of the club

Alternative & Outreach Leader Hackergame 2021

Nov 2021 - Dec 2021

- Drafted and completed outreach proposal, invited other universities' teams, set participants information sharing criteria and form with back-end team and other universities' representatives
- Team leader before and during the contest, delivered work and responded to contingencies (participant cheating, platform being attacked, etc.)

Organizer & Lecturer Software Freedom Day 2021

Sep 2021

- Organized and prepared for the whole event; designed the awards
- Delivered a speech on Wireguard's principle and potential

HONORS AND AWARDS

- Summer 2021 of Open Source Promotion Plan (scholarship of medium-class project)
(This open source event is similar to GSOC in China)

I implemented an intranet mesh-network based on Wireguard and Bird to replace Tinc project.

SKILLS

Technical Skills

- Use Arch Linux everyday
- Proficient in programming language of C++ & Python
- Proficient in Verus (Rust-based verification language) and familiar with Rust

Soft Skills

- Teamwork, Communication, Leadership

Language

- Fluent in English
- Native in Chinese (Mandarin)