Jiacheng Wu

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Research Interests

My current research interest lies in database systems and theories, especially big data systems, relational database systems and etc. With my brilliant familiarity of the architectures of several data platforms, especially MySQL, ClickHouse and Apache Spark, I am very interested in building data-intensive systems that can efficiently scale in modern computing environments.

Education

- Ph.D. Computer Science and Engineering, University of Washington, Seattle, WA
  2022.09 - Present. GPA: 3.98/4.0; Advisor: Prof. **Dan Suciu**
- M.S. Computer Science and Technology, Tsinghua University, Beijing, China
  2018.09 - 2021.06. GPA: 3.89/4.0; Rank: 11/149
- B.E. Software Engineering, Nankai University, Tianjin, China
  2014.09 - 2018.06. GPA: 93/100; Rank: 1/99

Selected Projects

Topic: Parallel Worst-Case Optimal Join on Multicores [Work at University of Washington]

- Present a pioneering two-stage sorting-based parallel worst-case optimal join algorithm with a novel index and rewriting mechanism, ensuring full parallelism in each phase.
- Investigate the impact of variable order and partition strategies on parallel join efficiency and establish a cost model for configuration decisions.

Topic: Updatable Learned Indexes [Work at Tsinghua University with Institute of Computing Technology, Chinese Academy of Sciences]

- Propose a brand new updatable learned index with precise key-to-position mapping, eliminating the "last-mile" search in nodes and ensuring lookup/insert cost with theoretical guarantees.
- Devise a linear time algorithm to obtain the model which evenly distributes the mapping as much as possible and a light-weight adjust strategy to keep the index tree height bounded.

Topic: Efficient Parallel Datalog Evaluation [Work at University of California at Los Angeles]

- Propose a new coordination strategy to improve parallel Datalog evaluation in the shared-memory environment by eliminating the requirement of global coordination among all workers.
- Devise and implement a prototype system ($\sim$ 20k of C++ code) with extensive optimizations to improve its overall performance, which outperforms existing solutions by 1 to 2 orders of magnitude.

Publication and Manuscript

1. **Jiacheng Wu**, Dan Suciu. HoneyComb: A Parallel Worst-Case Optimal Join on Multicores. ACM Special Interest Group in Management Of Data (**SIGMOD**) 2025.
2. Qizhen Zhang, **Jiacheng Wu**, Ang Chen, Vincent Liu, Boon Thau Loo. Templating Shuffles. Conference on Innovative Data Systems Research (**CIDR**) 2023. pages: 88-94.

3. **Jiacheng Wu**, Jin Wang, Carlo Zaniolo. Optimizing Parallel Recursive Datalog Evaluation on Multicore Machines. ACM Special Interest Group in Management Of Data (**SIGMOD**) 2022, pages: 1433-1446.
4. **Jiacheng Wu**, Yong Zhang, Shimin Chen, Yu Chen, Jin Wang, Chunxiao Xing. Updatable Learned Index with Precise Positions. Proc. VLDB Endow. 14(8):1276-1288, 2021.
5. Jin Wang, **Jiacheng Wu**, Mingda Li, Jiaqi Gu, Ariyam Das, Carlo Zaniolo. Formal Semantics and High Performance in Declarative Machine Learning using Datalog. VLDB J. 30(5):859-881, 2021.
6. Yu Chen, Yong Zhang, **Jiacheng Wu**, Jin Wang, Chunxiao Xing. Revisiting Data Prefetching for Database Systems with Machine Learning Techniques. IEEE International Conference on Data Engineering (**ICDE**) 2021, pages: 2165-2170. (short paper)
7. Yong Zhang, **Jiacheng Wu**, Jin Wang, Chunxiao Xing. A Transformation-Based Framework for KNN Set Similarity Search. IEEE Trans. Knowl. Data Eng. 32(3): 409-423, 2020.
8. **Jiacheng Wu**, Yong Zhang, Yu Chen, Chunxiao Xing. A Progressive Approach for Computing the Earth Mover's Distance. Database Systems for Advanced Applications (**DASFAA**) 2020, pages: 122-138.
9. Jin Wang, Guorui Xiao, Jiaqi Gu, **Jiacheng Wu**, Carlo Zaniolo. RASQL: A Powerful Language and its System for Big Data Applications. ACM International Conference on Management of Data (**SIGMOD**) 2020, pages: 2673-2676. (demo)
10. **Jiacheng Wu**, Yong Zhang, Jin Wang, Chunbin Lin, Yingjia Fu, Chunxiao Xin. Scalable Metric Similarity Join Using MapReduce. IEEE International Conference on Data Engineering (**ICDE**) 2019, pages: 1662-1665. (short paper)
11. Bo Ren, **Jia-Cheng Wu**, Ya-Lei Lv, Ming-Ming Cheng, Shao-Ping Lu. Geometry-Aware ICP for Scene Reconstruction from RGB-D Camera. J. Comput. Sci. Technol. 34(3): 581-593, 2019.
12. Wenwen Wang, **Jiacheng Wu**, Xiaoli Gong, Tao Li, Pen-Chung Yew. Improving Dynamically-Generated Code Performance on Dynamic Binary Translators. 14th ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (**VEE**), pages: 17-30, 2018.
13. Jin Zhang, Yuxuan Li, Chengjun Sun, Haoxiang Yang, **Jiacheng Wu**, Xiaoli Gong. XoT: A Flexible Block I/O Data Transfer Protocol for Xen. Security, Privacy, and Anonymity in Computation, Communication, and Storage (**SpaCCS**) 2017, pages: 791-800. (workshop)

Research Experience

- Research Engineer. Chinese Academy of Sciences. 2021.06 - 2022.06.
  Advisor: Professor Shimin Chen.
- Research Intern. University of California, Los Angeles. 2019.07-2019.09, 2020.01-2020.07 (remotely).
  Advisor: Professor Carlo Zaniolo.
- Research Intern. University of Pennsylvania. 2018.07-2018.09.
  Advisor: Professor Boon Thau Loo and Professor Vincent Liu.
- Research Intern. University of Minnesota, Twin Cities. 2017.07-2017.09.
  Advisor: Professor Pen-Chung Yew.

Honors and Awards

- Siebel Scholar, Class of 2021.
- Outstanding Graduates. Nankai University, 2018.
- National Scholarship for Undergraduate Student (top 1%) three times: 2015, 2016, 2017.

Academic Service

- External Reviewer: SIGMOD 2023, DASFAA 2023
- PC Member: AAAI 2021