

Yifei Liu

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Education

- Stony Brook University** Stony Brook, NY
• Ph.D. in Computer Science (Advisor: Prof. Erez Zadok) 08/2019 – 08/2025 (expected)
• GPA: 3.93 / 4.0
- Huazhong University of Science and Technology** Wuhan, China
• M.Eng. in Computer System Architecture (Advisor: Prof. Ke Zhou) 09/2016 – 06/2019
- Huazhong Agricultural University** Wuhan, China
• B.Eng. in Computer Science and Technology 09/2012 – 06/2016

Experience

- File systems and Storage Lab (FSL), Stony Brook University** Stony Brook, NY
Graduate Research Assistant (C/C++, File Systems, Model Checking) 05/2020 – Present
• Developed Metis, a file system model-checking framework that identified over 12 bugs in Linux kernel file systems with thorough coverage
• Developed RefFS, a reliable user-space file system with state-saving and restoration features, achieving 3-28x better performance than other file systems
- Samsung Semiconductor, Inc.** San Jose, CA
Storage Systems Architect Intern (C++, Databases, Storage) 05/2022 – 08/2022
• Implemented the custom PostgreSQL plans and paths to offload aggregate operations to SmartSSD, for enhancing the performance of queries
- Wuhan National Laboratory for Optoelectronics** Wuhan, China
Research Assistant (Python, Deep Learning, Storage) 09/2016 – 06/2019
• Designed and implemented a storage system that uses deep learning hashing and a graph database to integrate high-precision, low-latency content-based semantic queries
- Tencent Cloud** Shenzhen, China
Backend Developer Intern (C++, Machine Learning, Storage) 12/2015 – 08/2016
• Developed infrastructure to collect long-term disk S.M.A.R.T. data from over 10,000 servers, utilizing machine learning to predict disk failures with high precision and recall

Selected Publications

Google Scholar Profile: scholar.google.com/citations?user=WNu87vQAAAAJ

Journal Articles

- [1] Tyler Estro, Mário Antunes, Pranav Bhandari, Anshul Gandhi, Geoff Kuenning, Yifei Liu, Carl Waldspurger, Avani Wildani and Erez Zadok. “Accelerating Multi-Tier Storage Cache Simulations Using Knee Detection.” *Performance Evaluation*, 2024.
- [2] Ke Zhou, Yangtao Wang, Yu Liu, Yujuan Yang, Yifei Liu, Guoliang Li, Lianli Gao, and Zhili Xiao. “A Framework for Image Dark Data Assessment.” *World Wide Web*, 2020.
- [3] Yu Liu, Yangtao Wang, Ke Zhou, Yujuan Yang, and Yifei Liu. “Semantic-aware Data Quality Assessment for Image Big Data.” *Future Generation Computer Systems*, 2020.

Conference and Workshop Papers

- [1] Yifei Liu, Manish Adkar, Gerard Holzmann, Geoff Kuenning, Pei Liu, Scott Smolka, Wei Su and Erez Zadok. “Metis: File System Model Checking via Versatile Input and State Exploration.” In *the 22nd USENIX Conference on File and Storage Technologies (FAST)*, 2024.
- [2] Tyler Estro, Mário Antunes, Pranav Bhandari, Anshul Gandhi, Geoff Kuenning, Yifei Liu, Carl Waldspurger, Avani Wildani and Erez Zadok. “Guiding Simulations of Multi-Tier Storage Caches Using Knee Detection.” In *the 31st International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS)*, 2023.

- [3] Yifei Liu, Gautam Ahuja, Geoff Kuenning, Scott Smolka, and Erez Zadok. “Input and Output Coverage Needed in File System Testing.” In *the 15th ACM Workshop on Hot Topics in Storage and File Systems (HotStorage)*, 2023.
- [4] Wei Su, Yifei Liu, Gomathi Ganesan, Gerard Holzmann, Scott Smolka, Erez Zadok, and Geoff Kuenning. “Model-Checking Support for File System Development.” In *the 13th ACM Workshop on Hot Topics in Storage and File Systems (HotStorage)*, 2021.
- [5] Yu Liu, Hong Jiang, Yangtao Wang, Ke Zhou, Yifei Liu, and Li Liu. “Content Sifting Storage: Achieving Fast Read for Large-scale Image Dataset Analysis.” In *the 57th Design Automation Conference (DAC)*, 2020.
- [6] Yu Liu, Yangtao Wang, Ke Zhou, Yujuan Yang, Yifei Liu, Jingkuan Song, and Zhili Xiao. “A Framework for Image Dark Data Assessment.” In *the 3rd APWeb-WAIM joint conference on Web and Big Data (APWeb-WAIM)*, 2019. **(Best Paper Runner-Up)**
- [7] Yangtao Wang, Yu Liu, Yifei Liu, Ke Zhou, Yujuan Yang, Jiangfeng Zeng, Xiaodong Xu, and Zhili Xiao. “Analysis and Management to Hash-Based Graph and Rank.” In *the 3rd APWeb-WAIM joint conference on Web and Big Data (APWeb-WAIM)*, 2019.

Patents

- [1] Ke Zhou, Yu Liu, Yujuan Yang, Hua Wang, Chunhua Li, Yangtao Wang, Yifei Liu. Method for valuation of image dark data based on similarity hashing. U.S. Patent US11,138,479B2, Granted: 10/05/2021.
- [2] Ke Zhou, Yifei Liu, Yu Liu, Yangtao Wang, Yujuan Yang. Image query method and system based on content semantic metadata. Chinese Patent CN110413807B, Granted: 04/20/2021.

Skills




Programming Languages

- **Fluent ($\geq 7,000$ LoC):** C, C++, Python, Bash
- **Intermediate ($\geq 2,000$ LoC):** SQL, Java, MATLAB, Cypher, JavaScript, Promela, Prolog

Technologies

- **Databases:** MySQL, Neo4j, PostgreSQL, HBase
- **File and Storage:** Linux VFS and kernel file systems, OpenStack Swift, HDFS
- **Other Tools:** Git, GNU make, CMake, GDB, Elasticsearch, Hadoop, Spark, \LaTeX

Projects

- Metis : A Versatile Framework for File System Model Checking (C/C++)** 2020 – 2024
 - A framework for thoroughly checking Linux file systems with minimal constraints
- RefFS : A Fast and Reliable File System for Checking Reference (C++)** 2020 – 2024
 - An in-memory FUSE file system capable of independently saving and restoring its entire state
- IOCov : Input and Output Coverage for File System Testing (Python)** 2022 – 2024
 - A framework for computing syscall input and output coverage in file system test suites

Talks

- **Metis: File System Model Checking via Versatile Input and State Exploration**
- USENIX FAST 2024, Graduate Research Day 2024
- **Input and Output Coverage Needed in File System Testing**
- ACM HotStorage 2023
- **Model-Checking Support for File System Development**
- ACM HotStorage 2021, Dutch Model Checking Day 2022

Service

Journal Reviewer: ACM Trans. on Architecture and Code Optimization (TACO), IEEE Access
Artifact Evaluation Committee: USENIX OSDI '23, USENIX ATC '23

Teaching

Teaching Assistant for CSE376 Advanced Systems Programming in Unix/C S '20, S '21
 Teaching Assistant for CSE306 Operating Systems F '19

Contest Awards

- Finalist, Interdisciplinary Contest in Modeling (MCM/ICM), USA, 2015.
- First Prize, National Postgraduate Mathematic Contest in Modeling, China, 2014.
- First Prize, Contemporary Undergraduate Mathematical Contest in Modeling, China, 2014.