Yifei Liu

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Education

Stony Brook University — Stony Brook, NY
- Ph.D. in Computer Science (Advisor: Prof. Erez Zadok) — 08/2019 – 05/2025 (expected)
- M.S. in Computer Science (earned en route to Ph.D. program) — 08/2019 – 12/2021
- 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
Research Assistant (C/C++, File Systems, Formal Verification) — 05/2020 – Present
- Developed Metis, a file system model-checking framework that identified over 15 bugs in Linux kernel file systems with greater coverage than existing tools
- Developed RefFS, a reliable user-space file system with state-saving and restoration features, achieving 3–28x better performance than other file systems
- Designed and evaluated multi-tier caching systems with intelligent MRC point selection, reducing analysis effort by 5.5–7.7x to optimize cache configurations

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, Cloud Storage) — 09/2016 – 06/2019
- Designed and implemented a storage system leveraging deep learning hashing and a graph database to enable fast and accurate semantic queries, reducing read latency by 82%–94%

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 10,000+ servers, using machine learning to predict disk failures with more than 90% precision and recall

Selected Publications

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

Journal Articles

[1] T. Estro, M. Antunes, P. Bhandari, A. Gandhi, G. Kuenning, **Y. Liu**, C. Waldspurger, A. Wildani and E. Zadok. "Accelerating Multi-Tier Storage Cache Simulations Using Knee Detection." ***Performance Evaluation***, 2024.

[2] K. Zhou, Y. Wang, Y. Liu, Y. Yang, **Y. Liu**, G. Li, L. Gao, and Z. Xiao. "A Framework for Image Dark Data Assessment." ***World Wide Web***, 2020.

[3] Y. Liu, Y. Wang, K. Zhou, Y. Yang, and **Y. Liu**. "Semantic-aware Data Quality Assessment for Image Big Data." ***Future Generation Computer Systems***, 2020.

Conference and Workshop Papers

[1] **Y. Liu**, M. Adkar, G. Holzmann, G. Kuenning, P. Liu, S. Smolka, W. Su and E. 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] T. Estro, M. Antunes, P. Bhandari, A. Gandhi, G. Kuenning, **Y. Liu**, C. Waldspurger, A. Wildani and E. 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] **Y. Liu**, G. Ahuja, G. Kuenning, S. Smolka, and E. 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] W. Su, **Y. Liu**, G. Ganesan, G. Holzmann, S. Smolka, E. Zadok, and G. Kuenning. "Model-Checking Support for File System Development." In *the 13th ACM Workshop on Hot Topics in Storage and File Systems* ***(HotStorage)***, 2021.

[5] Y. Liu, H. Jiang, Y. Wang, K. Zhou, **Y. Liu**, and L. Liu. "Content Sifting Storage: Achieving Fast Read for Large-scale Image Dataset Analysis." In *the 57th Design Automation Conference* ***(DAC)***, 2020.

[6] Y. Liu, Y. Wang, K. Zhou, Y. Yang, **Y. Liu**, J. Song, and Z. 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] Y. Wang, Y. Liu, **Y. Liu**, K. Zhou, Y. Yang, J. Zeng, X. Xu, and Z. 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] K. Zhou, Y. Liu, Y. Yang, H. Wang, C. Li, Y. Wang, **Y. Liu**. Method for valuation of image dark data based on similarity hashing. U.S. Patent US11,138,479B2, Granted: 10/05/2021.

[2] K. Zhou, **Y. Liu**, Y. Liu, Y. Wang, Y. Yang. Image query method and system based on content semantic metadata. Chinese Patent CN110413807B, Granted: 04/20/2021.

Skills

Programming Languages

- **Fluent (>= 7,000 LoC):** C, C++, Python, Bash
- **Intermediate (>= 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
- **Tools:** Git, GNU Make, CMake, GDB, Elasticsearch, Hadoop, Spark, Docker, K8s, 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.