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 — 05/2020 – Present
- Developed Metis, a file system model-checking framework that identified over 12 bugs in Linux kernel file systems with thorough coverage (C/C++, Shell, Python, Promela)
- Developed RefFS, a reliable user-space file system with state-saving and restoration features, achieving 3-28x better performance than other file systems (C++)

Samsung Semiconductor, Inc. — San Jose, CA
Storage Systems Architect Intern — 05/2022 – 08/2022
- Implemented the custom PostgreSQL plans and paths to offload aggregate operations to SmartSSD, for enhancing the performance of queries (C++)

Wuhan National Laboratory for Optoelectronics — Wuhan, China
Research Assistant — 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 (Python)

Tencent Cloud — Shenzhen, China
Backend Developer Intern — 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 (C++, Python)

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 (>= 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
- **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.