Jinghan Sun

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EDUCATION

University of Illinois at Urbana-Champaign **Champaign, IL**
M.S./Ph.D. in Computer Science *2018 - 2024 (expected)*

- − Research Interests: High-Performance and Reliable Storage, ML for Systems, System Security
- − Advisors: Prof. Marc Snir and Prof. Jian Huang
- − GPA: 4.0/4.0

Beihang University **Beijing, China**
Bachelor's in Computer Science *2014 - 2018*

- − GPA: 3.60/4.0, Major GPA: 3.74/4.0
- − Outstanding Undergraduate Award – degree obtained at age 19

PUBLICATIONS

[1] Benjamin Reidys*, **Jinghan Sun***, Anirudh Badam, Shadi Noghabi, Jian Huang "Enabling Storage Harvesting for Improved Storage Utilization in Cloud Platforms." Proceedings of the 16th Usenix Symposium on Operating Systems Design and Implementation (OSDI'22). 2022.

[2] **Jinghan Sun**, Jian Huang, and Marc Snir. "Pinpointing Crash-Consistency Bugs in the HPC I/O Stack: A Cross-Layer Approach." Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC'21). 2021.

[3] Daixuan Li, Benjamin Reidys, **Jinghan Sun**, Thomas Shull, Josep Torrellas, Jian Huang. "UniHeap: Managing Persistent Objects Across Managed Runtimes for Non-Volatile Memory." Proceedings of the 14th ACM International System and Storage Conference (SYSTOR'21). 2021.

[4] **Jinghan Sun**, Chen Wang, Jian Huang, and Marc Snir. "Understanding and Finding Crash-Consistency Bugs in Parallel File Systems." In 12th USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage '20). 2020.

MANUSCRIPTS

[1] "Learned Address Translation for Flash-Based Solid-State Drives." (In submission)

RESEARCH EXPERIENCE

Learned Address Translation for Flash Storage **2021-now**
Research Assistant of Prof. Jian Huang *UIUC*

- − We built a learned index-based flash translation layer LeaFTL, which learns the address mapping to tolerate dynamic data access patterns via piecewise linear regression (PLR) at runtime. By grouping a large set of mapping table entries into a learned segment, it significantly reduces the memory footprint of the address mapping table, which further benefits the data caching. LeaFTL can also tolerate mispredictions with our proposed optimization techniques that include out-of-band metadata verification, coordinated garbage collection, and dynamic compaction of learned index segments.

Crash-Consistency Checking of Parallel File Systems — 2018-2020
Research Assistant of Prof. Marc Snir, Prof. Jian Huang — *UIUC*

- A generic testing framework ParaCrash that systematically identifies crash-consistency bugs in various popular parallel file systems, e.g. BeeGFS, GlusterFS, PVFS2 and I/O libraries; ParaCrash found 14 new crash-consistency bugs in the file systems and the HDF5 I/O library;
- Formal models for parallel file systems in rewriting logic and use Maude model checking techniques to verify the crash consistency.
- A multi-level I/O tracing library Recorder, which efficiently generates traces for parallel programs at multiple storage layers without modifying or re-compiling the original program.

Performance Variability Analysis of Supercomputers — 2019
Research Intern of Prof. Jidong Zhai — *Tsinghua University*

- A lightweight performance variability analysis tool for programs running on supercomputers with LLVM/Clang and ROSE compiler; evaluated the tool on Tianhe-2 Supercomputer with more than 16,000 parallel processes; showed that the tool can detect performance variability issues in real-world supercomputer with minimal overhead (less than 10%). I designed and implemented a novel analysis approach that can improves its detection coverage.

INTERNSHIP EXPERIENCE

Microsoft Research — Remote
Research Intern — *June 2021 - Sept 2021*

- Built an energy-optimized scheduling framework for foreground applications running in data centers powered by renewables.

Tsinghua University — Beijing, China
Research Intern — *June 2019 - Sept 2019*

- Worked on performance variability detection framework for Supercomputers and HPC applications using Clang/LLVM.

Intel Corporation — Beijing, China
Software Development Intern — *Sept 2017 - May 2018*

- Contributed to the development of the quota management framework of the open-source cloud platform OpenStack and its automated deployment scripts.

OTHER EXPERIENCES

Skills
- Programming Languages: C/C++, Python, Java, SQL, Verilog, Maude
- Libraries & Frameworks: PyTorch, TensorFlow, CUDA, MPI, OpenMP, LLVM/Clang, HDFS
- DevOps Tools: Git, Docker, OpenStack

Activities & Awards
- UIUC Conference Travel Grant, 2021
- *Finalist* in Mathematical Contest in Modeling (23 out of 10670 teams), 2018

Teaching Assistantship
- Introduction to Data Structure and Algorithms, Beihang University, 2018
- Mathematical Modeling, Beihang University, 2017