Jiyuan Zhang Last Update: June 10, 2023

Personal Information

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Education

University of Illinois Urbana-Champaign — Champaign, IL
M.S. in Computer Science — Aug 2022 – May 2024
Advisor: Prof. Tianyin Xu
GPA: 4.0/4.0

New Jersey Institute of Technology — Newark, NJ
B.S. in Computer Science — Jan 2020 – May 2022
GPA: 4.0/4.0

Refereed Conference Publications

1. [**EuroSys '23**] Weiwei Jia*, **Jiyuan Zhang***, Jiachen Shan, and Xiaoning Ding. "Making Dynamic Page Coalescing Effective on Virtualized Clouds". In *Proceedings of the 18th European Conference on Computer Systems (EuroSys)*, 2023.
2. [**ICSE '23**] Wenbo Wang, Tien N. Nguyen, Shaohua Wang, Yi Li, **Jiyuan Zhang**, and Aashish Yadavally. "DeepVD: Toward Class-Separation Features for Neural Network". In *Proceedings of the 45th ACM/IEEE International Conference on Software Engineering (ICSE)*, 2023.
3. [**SoCC '22**] Weiwei Jia, **Jiyuan Zhang**, Jiachen Shan, Jing Li, and Xiaoning Ding. "Achieving Low Latency in Public Edges by Hiding Workloads Mutual Interference". In *Proceedings of the 13th Symposium on Cloud Computing (SoCC)*, 2022.

* Equal contribution authors

Publications Under Review

1. **Jiyuan Zhang**, Siyuan Chai, Weiwei Jia, and Tianyin Xu. "Direct Memory Translation for Virtualized Cloud". Under review at *ACM Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, 2024.
2. **Jiyuan Zhang**, Yiming Du, Weiwei Jia, Jiachen Shan, Xiaoning Ding, and Tianyin Xu. "HugeGPT: Using Huge Pages to Accelerate Address Translation for Weak Locality Data". Under review at *32nd International Conference on Parallel Architectures and Compilation Techniques (PACT)*, 2023.

Research Experience

UIUC xLab, Prof. Tianyin Xu — Aug 2022 – Present

Direct File Translation for Persistent Memory
- Working on the design and implemention of a new filesystem that can drastically reduce the file indexing overhead for persistent memory devices.

Direct Memory Translation for Virtualized Cloud
- Designed and implemented a novel address translation scheme that minimizes the worst-case memory translation overhead to 1, 2, and 3 for native, virtualized, and nested virtualized memory, with backward compatibility to x86 architecture.
- Evaluated the performance in native, virtualized, and nested virtualized environments with a hardware simulator.

Inclusive OS for New Virtual Memory Architectures
- Redesigned the memory management subsystem of Linux kernel to provide a inclusive and unified memory management interface for supporting different virtual memory translation schemes.

- Implemented and evaluated the new memory system with x86 Radix Page Table and Elastic Cuckoo Hash Page Table.

Using Huge Pages to Accelerate Address Translation for Weak Locality Data

- Designed and implemented a software system solution to improve the Page Walk Cache efficiency, which strategically clusters page table pages in physical memory.
- Evaluated the effectiveness of such design in a virtualized environment.

NJIT Operating System Group, Prof. Xiaoning Ding — Sep 2021 – Aug 2022

Making Dynamic Page Coalescing Effective on Virtualized Clouds

- Identified host-guest page size mismatch as a main cause of high TLB misses and low performance in virtualized systems.
- Designed and implemented a software-only solution to page size mismatch in virtualized systems.

Achieving Low Latency in Public Edges by Hiding Workloads Mutual Interference

- Designed and implemented a task scheduler that can identify critical threads in workloads and perform adaptive scheduling.
- Evaluated the performance of the task scheduler.

NJIT SPACE Lab, Prof. Shaohua Wang — May 2021 – Sep 2021

Identifying Software Vulnerabilities with Graph-based Neural Networks

- Designed and implemented an automated toolchain to identify security patches from software repositories, and to extract source code class-separation features.

Teaching and Mentoring Experience

Research Mentoring

- Fan Chung (Undergraduate Student, UIUC) — Jan 2023 – Present
  I am mentoring Chung on the project of Inclusive OS for New Virtual Memory Architectures.
- Yiming Du (Junior Student, University of Rhode Island) — Aug 2022 – May 2023
  I mentored Du on the project of Using Huge Pages to Accelerate Address Translation for Weak Locality Data.

Teaching Assistant

- NJIT CS 114: Introduction to Computer Science II — Jan 2021 – May 2021
  Worked with Prof. Calvin M. James

Professional Experience

University of Illinois Urbana-Champaign — Champaign, IL

Graduate Research Assistant — May 2023 – Aug 2023
Graduate Research Assistant — Jan 2023 – May 2023
Graduate Research Assistant — Aug 2022 – Dec 2022

New Jersey Institute of Technology — Newark, NJ

Undergraduate Research Assistant — Jan 2022 – May 2022

Awards and Honors

NJIT Presidential Medal, NJIT — 2022
Summa Cum Laude, NJIT — 2022
Dean's List, NJIT — 2020 - 2022

Other Projects

Timing Simulator for Page Walk Latency Analysis

- Developed a hardware page walker simulator to perform timing simulation for novel virtual memory designs.
- Implemented several state-of-the-art novel designs in the simulator to analyze and compare the performance of these designs.

Page Table Debugging Framework for Linux Kernel

- Developed a kernel module to read, modify, and relocate page table entries for the Linux kernel.
- Designed and implemented an interactive page table debugger based on the kernel module to perform page table experiments.

Automated Configuration Tool for Linux Kernel Compilation

- Developed an automated kernel compilation configurator to speed up the development process and reduce configuration errors.
- The tool can automatically modify and verify the kernel compilation configuration according to user instructions.

High-performance Parser for Paradox Language

- Developed a SIMD-accelerated high-performance parser for Paradox language.
- The parser has features such as error recovery, style-preserving code refactoring, code formatting, and code generation API. The parser is designed to improve the code editing experience for the language.

Chinese Text Segmentation Library

- Implemented a Chinese text segmentation library to extract words and keywords from raw texts. The library is based on the Viterbi algorithm.

Grants

Travel grants for EuroSys'23

Skills

Programming Languages:
C, C++, C#, D, Java, Python, TypeScript

System-level Development:
KVM, Linux, OpenMP, QEMU, Windows

Hardware and Instrument Programming:
Assembly (x86 with SSE/AVX, ARM), CUDA, LabVIEW, Verilog

References

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