Kaiwen Xue (Kevin)

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EDUCATION

Carnegie Mellon University   Pittsburgh, PA
Master of Science in Computer Science, QPA: 3.95/4.33   2022.9–2023.12 (Expected)

Columbia University*   New York, NY
Bachelor of Arts, Major: Computer Science, GPA: 4.03/4.33   2020.6–2022.5
- Graduated *summa cum laude* and Phi Beta Kappa

City University of Hong Kong*   Hong Kong
Bachelor of Science, Major: Computer Science, GPA: 4.00/4.30   2017.9–2020.5 (Conferred 2022.5)
- Graduated with First Class Honours

**Joint Bachelor's Degree, equivalent to completion of a degree at either institution*

RESEARCH

- Research interests: Operating Systems, Computer Architecture

Refereed Publications

[1] Kaiyang Zhao, **Kaiwen Xue**, Ziqi Wang, Dan Schatzberg, Leon Yang, Antonis Manousis, Johannes Weiner, Rik van Riel, Bikash Sharma, Chunqiang Tang, and Dimitrios Skarlatos, "Contiguitas: The Pursuit of Physical Memory Contiguity in Datacenters," *Proceedings of the 50th Annual International Symposium on Computer Architecture (ISCA 2023)*, Orlando, FL, June 17-21, 2023. (21% accepted, 79/372, **Best Paper Award**)

Research Experience

Memory Management of Tiered-memory Systems   Carnegie Mellon University
Advisor: Dimitrios Skarlatos. Ongoing Project.   2023.6–now
- Proposed architectural support for tracking memory access patterns in fine granularity
- Identified potential benefits of huge pages on application performance in tiered-memory systems such as CXL
- Working on developing a smart page size determination algorithm in tiered-memory systems

Contiguitas: Memory Defragmentation in Data Centers   Carnegie Mellon University
Advisor: Dimitrios Skarlatos   2022.9–2023.6
- Supported separated regions of unmovable and movable physical memory to reduce fragmentation in Linux kernel
- Proposed a dynamic region resizing algorithm to achieve optimal memory usage of both allocation regions
- Co-authored an award paper [1] published at ISCA 2023

Live Migration of Confidential Virtual Machine   Columbia University
Advisors: Shih-Wei Li and Jason Nieh   2021.6–2023.11
- Extended feature of SeKVM, a secure hypervisor enabling a software-based confidential virtual machine (VM)
- Re-implemented SeKVM on multiple Linux kernel versions and ARM hardware
- Designed VM live migration on SeKVM, efficiently migrating confidential VM with an untrusted hypervisor
- Co-authored a paper under review at ASPLOS 2024

INDUSTRY

Rivos Inc.   Mountain View, CA
Member of Technical Staff Intern - Software   2023.5–2023.8
- Improved full-stack software support for RISC-V Performance Monitoring Unit (PMU)
- Implemented 3 RISC-V Instruction Set Architecture (ISA) extensions related to PMU on Linux kernel, QEMU, and OpenSBI
- Reduced context switch cost by 64% and end-to-end runtime of `perf` command line tool on QEMU by 3.5%
- Sent Linux kernel, QEMU, and OpenSBI patches to corresponding mailing lists for upstreaming discussion

TEACHING

COMS W4118 Operating Systems I   Columbia University
Teaching Assistant   Semesters Fall 2021 and Spring 2022
- Cooperated with a teaching team of 8 to mentor a graduate-level 120-student class composed of advanced UNIX programming, operating systems concepts, and Linux kernel hacking for two consecutive semesters
- Held office hours, graded homework and exams, and maintained assignments on Linux kernel programming
- Received over 4.5 out of 5.0 in individual TA evaluation submitted by students

TECHNICAL PROJECTS

CloudFS - Cloud-backed File System   Carnegie Mellon University
15/18-746 Storage Systems. Technologies: C++, FUSE, Amazon S3   Semester Fall 2023
- Designed and implemented in FUSE a file system transparently offloading large files to a cloud service
- Leveraged file content deduplication and caching to save cloud capacity and operational costs to 50%

Live Sequence Protocol - User-level Reliable Transport Layer Protocol   Carnegie Mellon University
15-440/640 Distributed Systems. Technologies: Go, Socket Programming   Semester Fall 2022
- Designed and implemented LSP, a TCP-like reliable transport protocol on top of UDP in Go, supporting data integrity checking, connection detection, sliding-window-based flow-control, and packet ordering
- Used LSP to implement a distributed bitcoin mining simulator

CLeuRoS - Pseudo-code-like Programming Language   Columbia University
COMS W4115 Programming Languages and Translators. Technologies: OCaml, LLVM   Semester Spring 2022
- Designed a pseudo-code-like programming language and implemented a compiler with `ocamllex`, `ocamlyacc`, and LLVM, supporting I/O, control flow, and basic data structures

SKILLS

- Programming Languages: C, C++, Go, Python, OCaml, Haskell, Java, RISC-V Assembly
- Technologies: Git, Linux kernel, QEMU, OpenSBI
- Natural Languages: English (Bilingual Proficient), Mandarin and Cantonese Chinese (Native)

HONORS AND AWARDS

- ISCA Best Paper Award - ACM SIGARCH, 2023
- Member, Sigma Xi - Sigma Xi Committee, 2022
- Russell C. Mills Award - Columbia Fu Foundation School of Engineering and Applied Science, 2022
- Member, Phi Beta Kappa - Phi Beta Kappa New York Delta Chapter, 2022
- Member, GS Honor Society - Columbia School of General Studies, 2021
- Chow Sang Sang Joint Bachelor's Degree Scholarship - Chow Sang Sang Group, 2019
- Hong Kong SAR Government Scholarship - Hong Kong SAR Government Education Bureau, 2019
- Dean's List - Columbia University and City University of Hong Kong, all semesters enrolled in full-time in 2017-2022

EXTRACURRICULAR ACTIVITIES

Weilu.Flame (Website in Chinese)   Hong Kong
Person in Charge - City University of Hong Kong   2018.10–2019.9
- Served in a web media founded by students, publishing opinion pieces on student life and social issues
- Wrote and edited pieces, collaborating with students from various universities around the globe
- Organized multiple iterations of Weilu Yehua (Fireside chat), a panel for members to express opinions on given topics