

Minwoo Ahn

Scalable Systems Software Laboratory

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About Me

I am a Ph.D. candidate in the Department of Electrical and Computer Engineering at Sungkyunkwan University (SKKU) advised by prof. Jinkyu Jeong at Yonsei University as a member of the S3 Lab (<https://cslab.yonsei.ac.kr>). I received my B.S. degree in the Department of Semiconductor Systems Engineering at Sungkyunkwan University. My main research areas are centered around application profiling and optimization, especially applications that execute on heterogeneous computing environments that include high-performance I/O devices, domain-specific accelerators, Smart devices, etc.

Research Interests

Operating Systems, Storage Systems, Database Systems, System AI, Performance Analysis

Education

Sungkyunkwan University (SKKU) <i>Combined M.S./Ph.D. in Electrical and Computer Engineering</i> <ul style="list-style-type: none">• Advisor: Jinkyu Jeong (in Yonsei University)• Proposal: Research on Application Performance Profiling Technique in Heterogeneous Computing Environments	Mar. 2017 - Present South Korea
Sungkyunkwan University (SKKU) <i>BS in Semiconductor Systems Engineering</i> <ul style="list-style-type: none">• Relevant Coursework: Operating Systems, Computer Architecture, Multicore Systems, Embedded Systems	Mar. 2013 - Feb. 2017 South Korea
Korea Science Academy of KAIST (KSA)	Mar. 2010 - Feb. 2013 South Korea

Research Experience

Scalable Systems Software Laboratory, Yonsei University <i>Dispatched Researcher (Advisor: Jinkyu Jeong)</i>	Mar. 2023 – Present Seoul, South Korea
Computer Systems Laboratory, SKKU <i>Graduate Student Researcher (Advisor: Jinkyu Jeong)</i>	Mar. 2017 – Feb. 2023 Suwon, South Korea

Projects

Korea Exascale Application Software Development Environments

- Keywords: Performance Profiling, HPC
- Goal: Performance profiling framework for exa-scale HPC applications.
- National Research Foundation of Korea (NRF), Nov 2023- Apr 2028

Research of Key-Value Stores for Exa-scale SSDs

- Keywords: NoSQL DBMS, storage systems, memory management
- Goal: Cost-effective memory management of large-scale DBMS with peta-scale SSDs.
- Samsung Electronics, Aug 2022-Jul 2024

Causal Profiling for Heterogeneous Systems

- Keywords: performance profiling, causal profiling, domain-specific accelerators
- Goal: Developing causal profiler for heterogeneous systems that include SSDs along with GPU and FPGA.
- National Research Foundation of Korea (NRF), Sep 2020-Feb 2024

Application's Performance Profiling and Optimization for Next-Generation SSDs

- Keywords: storage systems, performance profiling, NoSQL DBMS
- Goal: Performance profiling and optimization of applications with ultra-low latency SSDs.
- Samsung Electronics, Aug 2020-Jul 2022

High Performance Computing Environment and Storage System

- Keywords: high-performance computing, OS noise, memory management, CPU scheduling
- Goal: Light-weighted Linux kernel for heterogeneous high-performance computing.
- National Research Foundation of Korea (NRF), Mar 2017-Jun 2021

Publications

Identifying On-/Off-CPU Bottlenecks Together with Blocked Samples

- **Minwoo Ahn**, Jeongmin Han, Youngjin Kwon, and Jinkyu Jeong
- Proceedings of the 18th USENIX Symposium on Operating Systems Design and Implementation (**OSDI'24**).

A Performance-Stable NUMA Management Scheme for Linux-Based HPC Systems

- Jaehyun Song, **Minwoo Ahn**, Gysun Lee, Euseong Seo, and Jinkyu Jeong
- **IEEE Access**, vol. 9, pp. 52987-53002, March 2021, doi:10.1109/ACCESS.2021.3069991.

D2FQ: Device-Direct Fair Queueing for NVMe SSDs

- Jiwon Woo, **Minwoo Ahn**, Gysun Lee, and Jinkyu Jeong
- Proceedings of 19th USENIX Conference on File and Storage Technologies (**FAST'21**).

SCOZ: A System-Wide Causal Profiler for Multicore Systems

- **Minwoo Ahn**, Donghyun Kim, Taekeun Nam, and Jinkyu Jeong
- **Software: Practice and Experience**, vol. 51, issue 5, pp. 1043-1058, May 2021, doi:10.1002/spe.2930.

Domestic Papers (Korean)

Parallel Filter/Index Access for Improving Read Performance of LSM-Tree

- Jeongmin Han, **Minwoo Ahn**, and Jinkyu Jeong
- KIISE Transactions on Computing Practices (KTCP), Sep. 2023.
- Invited Paper (Excellent Presentation Award)

GPU Kernel Speedup Prediction using GPU Causal Profiling

- Sangyoon Kwon, **Minwoo Ahn**, and Jinkyu Jeong
- Korea Software Congress, Dec. 2022.

Multi-Level Filter Access in LSM-tree using Asynchronous I/O

- Jeongmin Han, **Minwoo Ahn**, and Jinkyu Jeong
- Korea Software Congress, Dec. 2022.
- Excellent Presentation Award

I/O Polling Task Placement on Hyperthreading-Enabled Multicore CPU

- Sungyoon Kim, Sungjun Ha, **Minwoo Ahn**, and Jinkyu Jeong
- Korea Computer Congress, July. 2019.
- Excellent Paper Award

Awards and Honors

Excellent Poster Prize - Computer Systems Society	2024
Excellent Presentation Prize - Korea Software Congress	2022
Excellent Paper Prize - Korea Software Congress	2019
Grand Prize (2nd place) - Korea Supercomputing Challenge	2018

Teaching Experiences (TA)

System Programming Experiment - UNIX programming	2022
JAVA Programming Experiment - basics of object-oriented programming (JAVA)	2022
Embedded Systems Design - FTL design in OpenSSD (Jasmine)	2018
Embedded Systems Experiment - android kernel programming (virtual device)	2018, 2019, 2020, 2021
Operating Systems - design of operating systems and exercises with xv6	2017, 2018
Computer Architecture - design of computer architecture	2017, 2019, 2020
System Software Experiment 3 - object-oriented programming (C++)	2017, 2018

Technical Skills

Languages: C, C++, Java, Python, Kotlin

Skills: Linux kernel programming, android kernel programming, FTL programming, performance profiling