# 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 and also a member of Scalable Systems Laboratory at Yonsei University advised by prof. Jinkyu Jeong. I received my B.S. degree in the Department of Semiconductor Systems Engineering at Sungkyunkwan University.
My research areas encompass operating systems, storage systems, database systems, and performance analysis. I mainly research on system profiling and optimization, especially for heterogeneous computing environments that include emerging hardware devices.

## Research Interests

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

## Education

**Sungkyunkwan University (SKKU)** Mar. 2017 - Present
*Combined M.S./Ph.D. in Electrical and Computer Engineering* *South Korea*

- **Advisor**: Jinkyu Jeong (in Yonsei University)
- **Proposal**: Research on Application Performance Profiling Technique in Heterogeneous Computing Environments

**Sungkyunkwan University (SKKU)** Mar. 2013 - Feb. 2017
*BS in Semiconductor Systems Engineering* *South Korea*

- **Relevant Coursework:** Operating Systems, Computer Architecture, Multicore Systems, Embedded Systems

**Korea Science Academy of KAIST (KSA)** Mar. 2010 - Feb. 2013
*South Korea*

## Research Experience

**Scalable Systems Software Laboratory, Yonsei University** Mar. 2023 – Present
*Dispatched Researcher (Advisor: Jinkyu Jeong)* *Seoul, South Korea*

**Computer Systems Laboratory, SKKU** Mar. 2017 – Feb. 2023
*Graduate Student Researcher (Advisor: Jinkyu Jeong)* *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**, Gyusun Lee, Euiseong 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**, Gyusun 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

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|---|---|
| **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)

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|---|---|
| **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