Sekwon Lee

sekwon.lee@hpe.com | sekwonlee.github.io

Research Interest

Computer systems: Storage/Memory systems, Distributed systems, Operating systems, Database systems

Focus: Next-generation systems for emerging memory (PM) and disaggregation (RDMA, CXL) technologies

- Indexing, Caching, Concurrency, Crash consistency, Fault tolerance

Education

University of Texas at Austin *Austin, TX, US*

Ph.D. in Computer Science *Aug. 2018 - Dec. 2023*

- Advisor: Vijay Chidambaram
- Dissertation: Designing Key-Value Stores for Emerging Memory and Disaggregation Technologies

UNIST (Ulsan National Institute of Science and Technology) *Ulsan, South Korea*

M.S. in Computer Science and Engineering *Mar. 2016 - Feb. 2018*

- Advisor: Sam H. Noh
- Thesis: Write-Optimal Radix Tree: A Deterministic Indexing Structure for Persistent Memory Storage Systems

Hongik University *Seoul, South Korea*

B.S. in Computer Engineering *Mar. 2009 - Feb. 2015*

- Undergraduate advisor: Sam H. Noh

Work Experience

Hewlett Packard Labs *Austin, TX, US (Remote)*

Research Engineer *Jan. 2024 - present*

- Job description: Work as a research engineer carrying out the investigation, design, and implementation of libraries and systems for far memory, which is a disaggregated memory pool shared across heterogeneous and decentralized compute nodes over high performance interconnects (e.g., HPE Slingshot, Infiniband, CXL).

Microsoft Research *Austin, TX, US (Remote)*

Research Intern *May 2021 - Aug. 2021*

- Job description: Scale-out AMBROSIA, a general framework to build resilient distributed systems. Implemented sharding supports with functions to filter out RPC requests and log entries irrelevant to the corresponding shard membership.
- Mentor: Jonathan Goldstein

Hewlett Packard Labs *Palo Alto, CA, US*

Research Associate Intern *June 2019 - Aug. 2019*

- Job description: Designing far-memory data structures optimized for one-sided RDMA operations. Designed and implemented a hybrid index structure combining a prefix trie with hash tables to take both advantages of an easily cacheable trie structure and one-sided RDMA-efficient hash tables.
- Mentors: Kimberly Keeton, Sharad Singhal, and Marcos K. Aguilera

Hewlett Packard Labs *Palo Alto, CA, US*

Research Associate Intern *June 2017 - Sep. 2017*

- Job description: Designing a DRAM cache for key-value stores working on FAM (Fabric-Attached Memory). Designed and implemented a hybrid approach that caches both value and shortcut entries. The posters of this work were presented at OSDI'18 and SOCC'18.
- Mentors: Kimberly Keeton, Haris Volos, and Yupu Zhang

Publications

Conferences

[1] **Sekwon Lee**, Soujanya Ponnapalli, Sharad Singhal, Marcos K. Aguilera, Kimberly Keeton, and Vijay Chidambaram, **DINOMO: An Elastic, Scalable, High-Performance Key-Value Store for Disaggregated Persistent Memory**, Proceedings of the VLDB Endowment, Volume 15, Issue 13 (VLDB 2023).

[2] **Se Kwon Lee**, Jayashree Mohan, Sanidhya Kashyap, Taesoo Kim, and Vijay Chidambaram, **RECIPE: Converting Concurrent DRAM Indexes to Persistent-Memory Indexes**, Proceedings of the 27th ACM Symposium on Operating Systems Principles (SOSP 2019).

[3] Rohan Kadekodi, **Se Kwon Lee**, Sanidhya Kashyap, Taesoo Kim, Aasheesh Kolli and Vijay Chidambaram, **SplitFS: Reducing Software Overhead in File Systems for Persistent Memory**, Proceedings of the 27th ACM Symposium on Operating Systems Principles (SOSP 2019).

[4] Qingrui Liu, Joseph Izraelevitz, **Se Kwon Lee**, Michael L. Scott, Sam H. Noh, and Changhee Jung, **iDO: Compiler-Directed Failure Atomicity for Nonvolatile Memory**, Proceedings of the 51st Annual IEEE/ACM International Symposium on Microarchitecture (MICRO 2018).

[5] **Se Kwon Lee**, K. Hyun Lim, Hyunsub Song, Beomseok Nam, and Sam H. Noh, **WORT: Write Optimal Radix Tree for Persistent Memory Storage Systems**, Proceedings of the 15th USENIX Conference on File and Storage Technology (FAST 2017).

[6] Hyunsub Song, Young Je Moon, **Se Kwon Lee** and Sam H. Noh, **PMAL: Enabling Lightweight Adaptation of Legacy File Systems on Persistent Memory Systems**, Proceedings of the 2017 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS 2017).

Workshops

[1] **Sekwon Lee**, Soujanya Ponnapalli, Sharad Singhal, Marcos K. Aguilera, Kimberly Keeton, and Vijay Chidambaram, **DINOMO: An Elastic, Scalable, High-Performance Key-Value Store for Disaggregated Persistent Memory** (Extended abstract of the VLDB 2023 paper), The 3rd Workshop On Resource Disaggregation and Serverless Computing (WORDS 2022).

[2] **Se Kwon Lee**, Jayashree Mohan, Sanidhya Kashyap, Taesoo Kim, and Vijay Chidambaram, **RECIPE: Converting Concurrent DRAM Indexes to Persistent-Memory Indexes** (Extended abstract of the SOSP 2019 paper), The 11th Annual Non-Volatile Memories Workshop (NVMW 2020).

[3] Rohan Kadekodi, **Se Kwon Lee**, Sanidhya Kashyap, Taesoo Kim, Aasheesh Kolli and Vijay Chidambaram, **SplitFS: Reducing Software Overhead in File Systems for Persistent Memory** (Extended abstract of the SOSP 2019 paper), The 11th Annual Non-Volatile Memories Workshop (NVMW 2020, **Memorable Paper Award**).

[4] Qingrui Liu, Joseph Izraelevitz, **Se Kwon Lee**, Michael L. Scott, Sam H. Noh, and Changhee Jung, **iDO: Compiler-Directed Failure Atomicity for Nonvolatile Memory** (Extended abstract of the MICRO 2018 paper), The 10th Annual Non-Volatile Memories Workshop (NVMW 2019).

[5] **Se Kwon Lee**, K. Hyun Lim, Hyunsub Song, Beomseok Nam, and Sam H. Noh, **WORT: Write Optimal Radix Tree for Persistent Memory Storage Systems** (Extended abstract of the FAST 2017 paper), The 8th Annual Non-Volatile Memories Workshop (NVMW 2017).

[6] Hyunsub Song, Young Je Moon, **Se Kwon Lee**, and Sam H. Noh, **Transforming Legacy File Systems into Persistent Memory Exploiting File Systems with MeLo@V**, The 8th Annual Non-Volatile Memories Workshop (NVMW 2017).

Posters

[1] Taeklim Kim, **Sekwon Lee**, Sergey Serebryakov, Harumi Kuno, Sharad Singhal, and Christopher J. Rossbach, **Improving GPU Utilization with a Zero-Copy Object Store for ML Applications**, Poster at the 30th ACM Symposium on Operating Systems Principles (SOSP 2024).

[2] Haris Volos, Kimberly Keeton, Yupu Zhang, Milind Chabbi, **Se Kwon Lee**, Mark Lillibridge, Yuvraj Patel, and Wei Zhang, **Memory-Oriented Distributed Computing at Rack Scale**, Poster at the 9th ACM Symposium on Cloud Computing (SOCC 2018).

[3] Rohan Kadekodi, **Se Kwon Lee**, Aasheesh Kolli, and Vijay Chidambaram, **Ledger: Increasing Performance of POSIX Applications on Persistent Memory**, Poster at the 13th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2018).

[4] Haris Volos, Kimberly Keeton, Yupu Zhang, Milind Chabbi, **Se Kwon Lee**, Mark Lillibridge, Yuvraj Patel, and Wei Zhang, **Software challenges for persistent fabric-attached memory**, Poster at the 13th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2018).

[5] Hyunsub Song, Young Je Moon, **Se Kwon Lee**, and Sam H. Noh, **Adapting Legacy File Systems to Work Efficiently for Persistent Memory based Storage**, Poster at the 14th USENIX Conference on File and Storage Technology (FAST 2016).

Patents

[1] Sam H. Noh, Young Je Moon, Hyunsub Song, and **Se Kwon Lee**, **Computing System and Method for Data Consistency**, Registration No. 10-1789933 (KO), Registration Date 10.18.2017.

Honors & Awards

2022	**UT Austin Graduate Dean's Prestigious Fellowship Supplement**	*2022*
2021	**UT Austin Graduate Dean's Prestigious Fellowship Supplement**	*2021*
2021	**Microsoft Research PhD Fellowship**	*2021-2023*

Skills

Programming Languages	C, C++, C#, Python
System Programming	Linux kernel, Memcached, Tizen
Tools and libraries	Perf, Kubernetes, Docker, ZeroMQ, Protobuf, YCSB benchmarks

Professional Activities

- Program Committee for ACM SoCC (2024), IEEE CLOUD (2025)
- Reviewer for IEEE Transactions on Knowledge and Data Engineering, ACM Transactions on Architecture and Code Optimization, ACM Transactions on Storage (2024)
- Reviewer for IEEE Transactions on Computers (2023)
- Invited talk at IBM Research (May. 2023). Data-Intensive Systems for Emerging Memory and Disaggregation Technologies
- Volunteered as Slack Co-Chair for SOSP 2021
- Invited talk at Intel Labs (Oct. 2020). RECIPE : Converting Concurrent DRAM Indexes to Persistent-Memory Indexes