Hojin Park

PhD Candidate at Carnegie Mellon University
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I research autonomous storage and caching systems in public clouds, designing self-optimizing system configurations and resource provisioning strategies to minimize costs while achieving performance SLOs. My approach integrates efficient workload monitoring, adaptive cache management, and mathematical modeling to optimize system performance. My work has been published at SOSP, SYSTOR, and HotCloud. Prior to CMU, I worked on distributed deep learning systems at Seoul National University, with publications in EuroSys and ICDCS.

PROFESSIONAL EXPERIENCE

Parallel Data Lab, Carnegie Mellon University; Pittsburgh, PA Sep. 2019 – Sep. 2025 (Expected)
PhD Candidate (Advisors: George Amvrosiadis and Greg Ganger)

- Auto-configuring cache for cross-cloud/region data access cost reduction [SOSP '24]
  - Reduced remote data access costs by 99.3% compared to SOTA by designing a two-level auto-configuring cache (DRAM and object storage).
  - Enhanced runtime workload monitoring through miniature simulations, cache priming for quick scaling, and object packing to optimize access costs.
  - Collected and analyzed object storage access traces from Uber and VMware for system validation.
- Resource auto-selector for storage cluster cost optimization [SYSTOR '23]
  - Reduced storage cluster costs by up to 81% compared to SOTA by developing a resource auto-selection tool using dynamic programming and mixed-integer programming.
  - Addressed challenges in resource selection for cloud-based storage clusters with large search spaces and complex performance characteristics.
  - Highlighted the importance of heterogeneous resource configurations for cost efficiency.
- Exploiting burstable storage in public clouds [HotCloud '20]
  - Proposed leveraging burstable cloud storage features for persistent and ephemeral storage, as well as SSD caching, enabling high performance at low cost.
- Other ongoing projects
  - Job and data placement optimization for hybrid cloud environments, including case studies on large-scale Presto and Spark cluster migrations (hundreds of PB of data).
  - Cost-efficient data prefetching strategies for cross-cloud/region workloads, extending auto-configuring cache research.

VMware Research Group, Broadcom; Remote May. 2023 – Aug. 2023
Intern - Member of Technical Staff (Mentor: Adriana Szekeres)

- Collection and analysis of object storage access traces from Amazon Athena workloads
  - Evaluated our auto-configuring cache (Macaron) on production workloads.
  - Optimized SQL query performance by identifying table-level access patterns and advising on proper indexing strategies.

Cloud Operation Research group, Microsoft; Remote May 2021 – Aug. 2021
Research Intern (Mentor: Ishai Menache)

- Imitation learning for improving VM packing efficiency in Azure cloud clusters
  - Analyzed VM request streams to identify learnable patterns and simulated an offline optimal algorithm for maximizing packing efficiency.
  - Trained a SortNet model to replicate the offline optimal decision-making process.

Software Platform Lab, Seoul National University; Seoul, Korea Jan. 2017 – Aug. 2019
Research Intern (Advisor: Byung-Gon Chun)

- Auto-parallelization tool for deep learning training [EuroSys '19]
  - Achieved a 6× speedup in distributed model training using a hybrid approach with All-Reduce and Parameter Server for dense and sparse variables.
  - The tool auto-parallelizes single-GPU deep learning executions into distributed multi-GPU systems within the TensorFlow framework.
  - Implemented and evaluated distributed training across different models, identifying performance variations based on communication methods.
- Distributed machine learning framework with automatic configuration [ICDCS '19]
  - Achieved a 58.3% improvement in model training performance for Parameter Server-based machine learning frameworks (Apache REEF) by dynamically adjusting worker-server assignments at runtime.
  - Enabled support for heterogeneous clusters by implementing a linear-programming solver for generalized cost optimization and evaluated the tool using a Gradient Boosting Tree (GBT) application.

Virtual Machine and Optimization Lab, Seoul National University; Seoul, Korea Jan. 2018 – Jul. 2018
Research Intern (Advisor: Soo-Mook Moon)

- Blockchain-based distributed version control system.
  - Implemented Git functions (push, pull, clone) on the InterPlanetary File System (IPFS).
  - Utilized a public ledger to manage version-controlled repositories in IPFS.

EDUCATION

Carnegie Mellon University Sep. 2019 – Sep. 2025 (Expected)
PhD Candidate in Computer Science Department Pittsburgh, PA

Seoul National University Mar. 2013 – Feb. 2019
B.S. in Electrical and Computer Engineering Seoul, Korea
Graduated with Summa Cum Laude (GPA: 4.21 / 4.30)

PUBLICATIONS

Reducing cross-cloud/region costs with the auto-configuring MACARON cache SOSP 2024
Hojin Park, Ziyue Qiu, Gregory R. Ganger, George Amvrosiadis

Mimir: Finding Cost-efficient Storage Configurations in the Public Cloud SYSTOR 2023
Hojin Park, Gregory R. Ganger, George Amvrosiadis

More IOPS for Less: Exploiting Burstable Storage in Public Clouds HotCloud 2020
Hojin Park, Gregory R. Ganger, George Amvrosiadis

Automating System Configuration of Distributed Machine Learning ICDCS 2019
Woo-Yeon Lee, Yunseong Lee, Joo Seong Jeong, Gyeong-In Yu, Joo Yeon Kim, **Hojin Park**, Beomyeol Jeon, Wonwook Song, Gunhee Kim, Markus Weimer, Brian Cho, Byung-Gon Chun

Parallax: Sparsity-aware Data Parallel Training of Deep Neural Networks EuroSys 2019
Soojeong Kim, Gyeong-In Yu, **Hojin Park**, Sungwoo Cho, Eunji Jeong, Hyeonmin Ha, Sanha Lee, Joo Seong Jeong, Byung-Gon Chun

Auto-Parallelizing Deep Learning for Multi-machine, Multi-GPU Environments Workshop at SOSP 2017
Soojeong Kim, Eunji Jeong, Joo Seong Jeong, Gyeong-In Yu, **Hojin Park**, Byung-Gon Chun AI Systems

SCHOLARSHIPS & AWARDS

International Graduate Student Scholarship Sep. 2019 - Aug. 2024
Full tuition, insurance, and living expenses (5 years) Korea Foundation for Advanced Studies

Blockchain Technology Competition — Jul. 2018
First prize ($3,000), GitChain project — LINE, KIISE

Undergraduate Study Scholarship — Feb. 2017 - Dec. 2018
Full tuition and $2,500 stipend per semester — Kwanjeong Educational Foundation

Academic Excellence Scholarship — June 2013 - Dec. 2014
Full tuition — Seoul National University

TALKS

MACARON: Multi-cloud/region Aware Cache Auto-ReconfiguratiON
The 30th ACM Symposium on Operating Systems Principles (SOSP) — Nov. 2024
CMU Parallel Data Lab Retreat — Oct. 2024
CMU Advanced Cloud Computing Course Guest Lecture — Apr. 2024
Alluxio & Uber Data Infra Meetup — Jan. 2024
CMU Parallel Data Lab Retreat — Nov. 2023

Toward cost-efficient storage systems and data transfer in public clouds
Salesforce Database Team Reading Group — Jan. 2024

Mimir: Finding Cost-efficient Storage Configurations in the Public Cloud
The 16th ACM International Systems and Storage Conference (SYSTOR) — June 2023
CMU Advanced Cloud Computing Course Guest Lecture — Apr. 2023
CMU Parallel Data Lab Retreat — Nov. 2022

TEACHING

Carnegie Mellon University
Storage Systems (15-746) — TA, Fall 2022
Advanced Cloud Computing (15-719) — TA, Spring 2022

Seoul National University
Operating Systems — TA, Spring 2019

MENTORING

Saileshwar Karthik CMU Information Networking Institute masters student — 2025
Mohit Gaggar CMU Information Networking Institute masters student — 2025
Fulun Ma CMU Computational Data Science masters student — 2024
Somansh Satish CMU Computational Data Science masters student — 2023
Anurag Choudhary CMU Computational Data Science masters student — 2023
Midhush Manohar Thevendria Karthic CMU Computational Data Science masters student — 2023
Shalini Shukla CMU ECE masters student — 2022
Hao Yang Lu CMU SCS masters student — 2022