

HEERAK LIM / 임희락

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Summary

Expected to master's degree graduate in August 2019 with two years of experience working on database systems and storage systems including Key-Value store, RocksDB, Open-Channel SSDs and parallel computing. Looking for research and engineering position in system, storage and database.

Academic Experience

데이터베이스 workload 기반 NVMe SSD 의 신규 command set 연구 (SAMSUNG 산학 연구 과제)

Distributed Computing System Laboratory (DCSLAB), Seoul National University (Jul 2017 – Dec 2018)

- Profiled characteristics of database workload in Linux kernel module level
- Analyzed MySQL I/O process and function call stack by SQL query type (insert, select, delete, etc.)
- Designed and implemented I/O benchmark tool for Open-Channel SSDs using user-space I/O library
- Managed codebases using GitHub - https://github.com/RockyLim92/ocssd_bench
- https://rockylim92.github.io/research/mysql_02/
- https://rockylim92.github.io/research/innodb_01/

LSM-tree based Database System Optimization using Application-Driven Flash Management

Distributed Computing System Laboratory (DCSLAB), Seoul National University (Sep 2018 –)

- Optimized the LSM-tree based Key-Value store database system by processing I/O taking account into of application context
- Modified RocksDB storage backend to manage Flash based storage device directly using user-space I/O library
- Deployed RocksDB on High Performance Computing (HPC) System
- Open-source contribution (bug fix) and managed codebases using GitHub - <https://github.com/OpenChannelSSD/rocksdb/pull/3>
- Learned how to quantitatively evaluate and analyze system performance
- Documented the results of the project through technical documentation such as thesis and report
- Contributed to international conferences and presented academic conferences
- Managed codebases using GitHub - <https://rockylim92.github.io/research/dapdb/>
- https://rockylim92.github.io/research/rocksdb_ocssd_01/
- https://rockylim92.github.io/research/rocksdb_ocssd_02/

Multi-threaded processing

Distributed Computing System Laboratory (DCSLAB), Seoul National University (Jan 2018 – Jun 2018)

- Learned lock-free data structure
- Understood various system designing taking concurrency into account
- Learned how to implement lock-free program using Intel Transactional Memory Instructions

Performance Modeling and Measurement of Selective Page-Mapping Table on the OpenSSD Platform

Ajou University (Apr 2016 – June 2016)

- Developed Demand-based Flash Translation Layer (DFTL) on OpenSSD platform
- Evaluated DFTL on OpenSSD with micro benchmark tool
- Established a mathematical model to predict the performance of the DFTL
- Established a performance prediction model through linear regression and multiple linear regression methods using R programming environment
- <https://rockylim92.github.io/research/KIISE/>

Work Experience

Programming Instructor

CIT Code Academy, Korea (Jul 2017 – Jan 2018)

- Computer Architecture Class
- C, C++, Python Class

Research Intern

Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australia. Data61, Distributed Sensing System Team. (Jan 2017 – Feb 2017),

- Development of Radio Tomographic Imaging (RTI) system on low-power sensor networks
- Designed and implemented multiple sensor network node synchronization algorithm
- Designed and Implemented RTI application on Contiki OS
- Modified network device driver as low-overhead manner to achieve superlative frequency
- Developed Image reconstruction utility using python
- Managed codebases using GitHub - <https://github.com/RockyLim92/radio-tomography>
- <https://rockylim92.github.io/research/csiro01/>
- <https://rockylim92.github.io/research/csiro02/>
- <https://rockylim92.github.io/research/csiro03/>
- <https://rockylim92.github.io/research/csiro04/>
- <https://rockylim92.github.io/research/csiro05/>
- <https://rockylim92.github.io/research/csiro06/>

Research Intern

차세대융합기술연구원 [Advanced Institute of Convergence Technology; AICT], 의료-IT 연구 센터 [Medical-IT research center] (Jan 2017 – Feb 2017)

- Developed web page crawler using Python to build database system for digital pathology.
- Developed C# scripts for 3D model that simulates a skeletal movement

Education

Master of Science in Computer Science

Seoul National University, Distributed Computing System Laboratory (DCSLAB) (2019),

Graduated with a bachelor's degree in Department of Software Engineering

Ajou University (2017)

Publications

International conference

- **Lim, Heerak**. "Application-Driven Flash Management: LSM-tree based Database Optimization through Read/Write Isolation." Proceedings of the Doctoral Symposium of the 19th International Middleware Conference. ACM, 2018.

Domestic conference

- **임희락**, 엄현영, and 손용석. "플래시 내 I/O 분리 처리를 통한 LSM-tree 기반 데이터베이스 성능 최적화." *한국정보과학회 학술발표논문집*(2018): 19-21.
- **임희락**, et al. "Deep Neural Network 기반의 비언어 인식을 통한 청각장애인 위험 인지 보조 시스템." *한국지능정보시스템학회 학술대회논문집*(2017): 121-122.
- **임희락**. "Open Channel SSD 플랫폼에서 쓰기 버퍼 및 스레드 구성에 따른 성능 분석." *한국정보과학회 학술발표논문집* (2017): 73-75.
- 강동현, 하영남, **임희락**, & 김영재. (2016). OpenSSD 플랫폼에서 선택적 캐싱 기반 페이지 매핑 테이블의 캐시 비율에 따른 성능 모델 연구. *한국정보과학회 학술발표논문집*, 1245-1247.

Technical Document

- The Jasmine OpenSSD Platform: Technical Reference Manual (v1.4, in English) (By Preethika Kasu, Donghyun Kang, **Heerak Lim**), http://www.openssd-project.org/mediawiki/images/Jasmine_Tech_Ref_Manual_v.1.4e.pdf
- The Jasmine OpenSSD Platform: FTL Developer's Guide (v1.2, in English) (By Preethika Kasu, Donghyun Kang, **Heerak Lim**). http://www.openssd-project.org/mediawiki/images/Jasmine_FTL_Dev_Guide_v.1.2e.pdf

Awards and Honours

- Awarded Excellence Paper Award at the 45th Korea Software Congress (Dec 2019)
- Scholarship of 21 items including Honor scholarship S (the greatest) for all semesters at Ajou
- Ajou Greative (Great + Creative) software concert, Excellence Award (Jun 2017)
- Ajou Greative (Great + Creative) software concert, Excellence Award (Aug 2016)

Technical Skills

- Extensive experience in C, C++ Programing language
- Deep understanding in Linux operating system and storage system
- Deep understanding in LSM-tree data structure and database such as RocksDB
- Extensive experience in Open-Channel SSDs, Application-Driven Flash Management, FTL
- Extensive experience of development under Linux/Unix environment
- Worked on system performance profiling and monitoring
- Practical experience in large-scale source code analysis
- Practical experience in system performance tuning and monitoring
- Experienced in data analysis using Python (numpy, pandas, matplotlib, etc)

Areas of interest

- Database, Storage system, Parallel Computing
- Key-Value store, NoSQL
- Linux/Unix environment
- System performance tuning
- Application-Driven Storage Management
- Troubleshooting with multi-thread concurrency
- Automation in the development process

Language Skills

Abounding experience in technical writing. Intermediate English speaker. Achieved Test Of English for International Communication (TOEIC) score 850.

Others

- Research Blog - <https://rockylim92.github.io/>