INHO SONG

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OBJECTIVE

I'm a Computer Science Ph.D. student at Virginia Tech. I am broadly interested in computer systems, especially "How to design a scalable, high performance storage systems".
My research interests include but are not limited to, SSD(solid-state device), file system, CXL(compute express link), operating system, and flash-centric systems for AI applications(NDP).

EDUCATION

Ph.D. in Computer Science *Virginia Tech* *Aug. 2023 -*

Research Topic: Storage System
Co-advised by Huaicheng Li and Sam H. Noh

Master's Degree in Computer Science *Dankook University* *Graduated in Aug. 2023*

Research Topic: ZNS SSD Internals and Filesystem
GPA 4.4/4.5
Advisor: Jongmoo Choi

Visiting Scholar *Syracuse University* *July – Dec. 2022*

Electrical Engineering and Computer Science
Co-advised by Bryan S. Kim and Jongmoo Choi

Bachelor of Computer Science *Dankook University* *Graduated in Feb. 2022*

Department of Software
GPA 4.06/4.5

PUBLICATION

Inho Song, Myunghoon Oh, Bryan S. Kim, Seewhan Yoo, Jae-Dong Lee and Jongmoo Choi
ConfZNS : A Novel Emulator for Exploring Design Space of ZNS SSDs
The ACM International Systems and Storage Conference 2023 (SYSTOR'23)

Inho Song, Gunhee Choi, Bryan S. Kim, Wonjin Lee, Seewhan Yoo, Jae-Dong Lee and Jongmoo Choi
Analysis of Zone Reclaiming Overhead
Korean Computer Congress 2023 (KCC 2023) ***Best paper award***

Inho Song, Yejin Han, Hojin Shin, Seehwan Yoo, Jongmoo Choi, and Yoojin Chung
Quantitative Analysis of Compaction Policies in a Key-Value Store
7th International Conference on Next Generation Computing (ICNGC 2021)

Inho Song, and Jongmoo Choi
Heap-based Data Structure for Stride Scheduling to Enhance Multicore Parallelism
Korea Computer Congress 2020 (KCC 2020)

PATENT

Jongmoo Choi, Samuel Woo, and **Inho Song** *Korea: filed*
Method for analyzing vehicle forensic and computing device for execution the same *10-2022-0139234*

RESEARCH PROJECT

Building a Big Data System with Next-generation SSD *funded by IITP (2022 – 2030)*

- This is the **StarLab project in IITP**. There are numerous studies about next-generation SSD focusing on the bottleneck of the existing storage system. I am **expecting to provide higher isolation support** and **stable tail latency with HW-SW co-design.**
- **Expected impact**:
  1. **Achieve optimal throughput** with **lower garbage collection overhead** and **lower write amplification factor.** (Motivated by F2FS[1] and ZNS[2])
  2. **Supports high isolation among tenants with scalable design.** (Inspired by MAX[3] and Tectonic[4])

Design Tradeoff in ZNS SSD *funded by SK Hynix(2020-2022)*

- This is research for ZNS SSD internals. The main goal of this work is to **show the design tradeoff in ZNS SSD** with **a reliable ZNS emulator.**
- **Impact**:
  1. **This ZNS emulator** shows **under 6-17% error rate** on average which is accurate performance compared to the real device.Based on this software, 3 main lessons are uncovered which **motivates the existing ZNS ecosystem.**
  2. This work shows the **tradeoff between different designs in ZNS.** However, it also uncovers that **existing ZNS ecosystems are unaware of this tradeoff in ZNS.**

Semantic-aware Vehicle Forensic *funded by SPO(2020-2021) and IITP(2022)*

- According to Google, modern vehicles are now generating about 1GB of data every second. This emerging field is not only in the spotlight of the forensic investigation field but also for the storage systems. After recognizing significant results, the project grows more important. This work motivated development of a forensic big data system that is useful to SPO and national police organizations.
- **Impact**:
  1. Based on a holistic approach to retrieving the artifacts from the vehicle, we found **critical artifacts that strongly imply the driver's or accompanies behaviors.**
  2. This work shows that even if the driver deletes data in the vehicle, **data could still be retrieved** by physical dump with metadata analysis.

[1] Changman Lee, et al., F2FS: A New File System for Flash Storage, FAST'15
[2] Matias Björling, et al., ZNS: Avoiding the Block Interface Tax for Flash-based SSDs, ATC'21
[3] Xiaojian Liao, et al., MAX: A Multicore-Accelerated File System for Flash Storage, ATC'21
[4] Satadru Pan, et al., Facebook's Tectonic Filesystem: Efficiency from Exascale, ATC'21

SKILLS

Programming	C/C++, Python, and Java
Systems	Linux Kernel, RocksDB, and F2FS
Open Source Contribution	FEMU (https://github.com/vtess/FEMU)

ACADEMIC AWARDS AND ACHIEVEMENTS

- Academic Excellence Scholarship *Fall Semester 2022*
- Academic Excellence Scholarship *Spring Semester 2022*
- Graduation Excellence Award *Dankook Univ. 2022*
- Dean's List *Spring Semester 2020*
- Academic Excellence Scholarship *Spring Semester 2020*
- Dean's List *Fall Semester 2019*
- Academic Excellence Scholarship *Fall Semester 2016*
- Admission Scholarship *Spring Semester 2015*

CERTIFICATION

- **Teacher's Certificate** *Ministry of Education, Republic of Korea, 2022*
  The Secondary School Teacher(Grade II) of Information & Computer

MISCELLANEOUS ACTIVITIES

- International Joint Workshop for High-Potential Individuals Global Training Program *IITP 2022*
- CPU cache simulator [Git] *2021*
- Dankook university data analysis AI contest (Rank: 13/400) *DACON 2021*
- Camino de Santiago *Santiago Compostella, Spain, 2018*
- Military service in Republic of Korea Army *Republic of Korea, Jan. 2017 – Oct. 2018*
  – Special Warrior Certification
- **Editor**, Consulate General of the Republic of Korea in Jeddah *Jeddah, Saudi Arabia, Sep. – Dec. 2016*