

Sijie Lan

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ABOUT ME

My research interests cover flash memory and NVM. These researches focus on the structure and error characteristics of storage media to propose methods to improve performance and reliability. Another research direction combines storage media with other storage techniques, such as deduplication system.

One ongoing work focuses on the performance and reliability study of 3D flash memory. Our objective is to improve the performance of flash memory by utilizing the characteristics of 3D-NAND memory, such as data allocation, garbage collection, error correction codes, etc.

EDUCATION

M.E. Xiamen University Computer Sciences, Advanced Storage Technology Lab (ASTL) Advisor: Prof. <i>Suzhen Wu</i>	2018.9 - NOW
B.E. Zhejiang Sci-Tech University Computer Science and Engineering	2013.9 - 2017. 6

RESEARCH

BitFlip: A Bit-Flipping Scheme for Reducing Read Latency and Improving Reliability of Flash Memory 2019 – 2020

I created the idea and designed the system.

Each cell in NAND flash memory contains kinds of threshold voltages to store corresponding bit information. By analyzing characteristics of different threshold voltages and amounts of files in the real world, the cells' bits information with higher threshold voltages is more likely to leak their electrons to arise bit errors. Based on this observation, we proposed a method called BitFlip, which minimizes the number of the state with higher threshold voltage to achieve better performance.

In this work, ***my main contributions*** are as follows:

1. Read and analyze related research on flash memory and propose a method called BitFlip.
2. Test the performance of this method on the SSDsim simulation platform.
3. Write the first draft of the paper based on the results of the experiment.

The paper of this work has been accepted by ***MSST'2020***.

Further work in BitFlip 2020 – NOW

We carried out further research on the previous work. Based on the exploration of data characteristics and further research on flash memory, we found that the extended work can further improve the read performance and lifespan of flash memory. I created the idea and designed the system. Our paper is planned to be submitted to ***TCAD***.

Combine flash characteristics with deduplication characteristics 2020 - NOW

We are combining the deduplication system with characteristics of flash memory. Traditional optimizations in deduplication focus on the features of the deduplicate process, but they rarely take the characteristics of flash memory as the research focuses. In our work, we combine the characteristics of flash memory with some key features in deduplication to improve the performance of flash memory. Our paper is planned to be submitted to ***DAC'2021***.

RESEARCH PUBLICATION

- Suzhen Wu (Advisor), **Sijie Lan**, Jindong Zhou, Hong Jiang, Zhirong Shen. *"BitFlip: A Bit-Flipping Scheme for Reducing Read Latency and Improving Reliability of Flash Memory"*. (**MSST'20, CCF-B**), 2020.

PATENTS

- Suzhen Wu (Advisor), **Sijie Lan**, Zhirong Shen, Bo Mao, Jindong Zhou, Zhihao Zhang. *"A solid-state disk data storage method and device based on bit flipping"*. China National Invention Patent. Application number: 202010953993.X. Application date: Sept. 11, 2020.
- Suzhen Wu (Advisor), Zhihao Zhang, Zhirong Shen, Bo Mao, **Sijie Lan**. *"A data processing method for non-volatile storage media and computer storage media"*. China National Invention Patent. Application number: 202010825520.1. Application date: Aug. 17, 2020.

PROFESSIONAL EXPERIENCE

Xiamen University, Xiamen

Teaching Assistant for C language

2019.9 – 2020.1

Alibaba Mobile Business Group, Hangzhou

Data Engineering Intern

2016.3 – 2016.9

SKILLS

Languages

Mandarin Chinese (Native), English (Fluent).

Coding

C, C++, LATEX, Python, PHP

REFERENCES

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Prof. Zhirong Shen

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