Last updated in January 25, 2026

Muhammad Haekal Muhyidin Al-Araby

5024221030@student.its.ac.id | muhhae.github.io | muhhae | muhhae

Research Interest

Storage Systems, ***Operating Systems***, ***Databases***, ***Computer Networks***, ***Computer Architecture***, and ***Systems*** in general, with experience in efficient and sustainable ***cache management systems*** to enhance performance in modern large-scale systems.

Education

Sepuluh Nopember Institute of Technology (***its.ac.id***) Aug 2022 – Jan 2026
B.Eng. in Computer Engineering (Expected)

- GPA: **3.71/4.0**
- Major GPA: **3.8/4.0**

Publications

Demystifying and Improving Lazy Promotion in Cache Eviction 2026
Proceedings of the VLDB Endowment (VLDB) (In Press)

Qinghan Chen, **Muhammad Haekal Muhyidin Al-Araby**, Ziyue Qiu, Zhuofan Chen, Rashmi Vinayak, Juncheng Yang

Research Experience

International Research Collaboration on Cache System using Flash Storage July 2025 - Present
Undergraduate Researcher

- Collaborated with ***Prof. Juncheng Yang*** from ***Harvard University*** researching on how to integrate machine learning into ***Flash Cache*** to reduce unnecessary write without sacrificing miss ratio.
- Designed and implemented ***Hierarchical Cache Simulator*** to simulate Cache Management System consisting of DRAM and flash device.
- Benchmarked commonly used algorithms such as: ***CLOCK, LRU, and FIFO***. We discovered that CLOCK would always outperform LRU while having sequential write operation and low write overhead.
- Integrated machine learning into ***CLOCK*** algorithm as an additional decision-maker, using ***ONNX*** to ensure a portable pipeline.

International Research Collaboration on the Novel Concept of Lazy Promotion in Cache Eviction Algorithm March 2025 - October 2025
Undergraduate Researcher

- Collaborated with ***Prof. Juncheng Yang*** from ***Harvard University*** to improve ***miss ratio*** and ***efficiency*** in cache using the novel concept of ***Lazy Promotion***.
- Developed experiment and processing pipeline on ***6300+ traces*** from Twitter, TencentPhoto, TencentBlock, CloudPhysics, Wikipedia, Alibaba, and proprietary traces.
- Implemented the concept of ***Lazy Promotion*** into advanced algorithms such as ***ARC*** and ***2Q***. Improved miss ratio by ***1%*** and reduced promotion by ***80%***
- Discovered ***Delayed-CLOCK*** which outperforms both ***LRU*** and ***CLOCK***. Reduced miss ratio by ***20%*** and promotion by ***90%*** compared to LRU.
- Packaged the experiments conducted into ***fully reproducible artifact***.

UChicago-Indonesia SYstem and AI Research Training Jan 2025 – Jun 2025
Research Trainee

- ***Top 50*** students from Indonesia are selected for this program.
- Covered ***20+*** papers and reproduced key experiments from ***OSDI, SOSP, FAST*** conferences.
- Instructor: ***Prof. Haryadi Gunawi*** from ***University of Chicago***.

Work Experience

Computer Engineering Department & Faculty of Medicine, Sepuluh Nopember Institute of Technology Sept 2024 – Jan 2025
Backend Software Engineer

- Designed, implemented, and deployed a system for efficiently storing images of ***cancer cells***. Increased the ***performance*** of medical practitioner by ***25%***

Computer Engineering Department, Sepuluh Nopember Institute of Technology July 2024 – Jan 2025
Backend Software Engineer

- Designed and implemented system for efficiently finding anomalies in database for ***Directorate General of Digital Infrastructure(DGDI)*** under ***Indonesian Ministry of Communication and Digital Affairs***, reduced it to ***0***.

Computer Engineering Department, Sepuluh Nopember Institute of Technology Aug 2023 – Jan 2025
Teaching Assistant

- Computer Security : Graded midterm and final exam of ***70+*** students.
- Digital Circuit : Oversaw practicum and assisted ***30+*** students.
- Basic Programming : Oversaw practicum and assisted ***30+*** students.

Projects

Interpreted Programming Language

- Implemented core programming language feature such as variables, arithmetic, functions, and class.
- Designed and implemented ***custom IDE*** with working syntax highlighting and interactive shell.

Tetromino - Tetromania Castle

- Implemented the ***game mechanics and 2D collision detection*** from scratch using C++.

ESP32 PingPong Game

- Implemented the ***dot-matrix display rendering*** and a ***buzzer-based music player*** for the game in C++.

Image sharing platform - Lorem Ipsum

- Developed web application for sharing random image using Go and HTMX. Includes authentication and light-weight image loader algorithm.

Technical Skills

Languages: C/C++, Zig, Python, Javascript, Go, C#, Shell, Lua

Frameworks: Tensorflow, Keras, React, Echo

Database: PostgreSQL, MongoDB

Tools: Linux, Neovim, Git, GitHub, Docker, libCacheSim, distComp

Misc: CloudLab, AWS EC2, AWS S3, Arduino, PlatformIO, ESP32

References

Juncheng Yang *juncheng@g.harvard.edu*
Assistant Professor of Computer Science, Harvard University

Haryadi S. Gunawi *haryadi@cs.uchicago.edu*
Professor of Computer Science, University of Chicago

Reza Fuad Rachmadi *fuad@its.ac.id*
Associate Professor of Computer Engineering, Sepuluh Nopember Institute of Technology