

Muhammad Haekal Muhyidin Al-Araby

5024221030@student.its.ac.id | muhhae.github.io | linkedin.com/in/muhhae | github.com/muhhae

Research Interest

Storage Systems, Operating Systems, and Systems in general, with experience in efficient **cache management systems** to enhance performance in 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 <i>In submission to VLDB 2026 - Manuscripts available upon request</i>	2025
Qinghan Chen, <u>Muhammad Haekal Muhyidin Al-Araby</u> , Ziyue Qiu, Zhuofan Chen, Rashmi Vinayak, Juncheng Yang	

Research Experience

International Research Collaboration on Cache System utilizing Flash Storage Undergraduate Researcher	July 2025 - Present
• Collaborated with <i>Prof. Juncheng Yang</i> from <i>Harvard University</i> 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 utilizing DRAM and Flash Device . • Experimented on commonly used algorithms such as: CLOCK, LRU, and FIFO . We discovered that CLOCK would always outperform LRU and FIFO while having sequential operation and low writes .	

International Research Collaboration on the Novel Concept of Lazy Promotion in Cache Eviction Algorithm Undergraduate Researcher	March 2025 - October 2025
• Collaborated with <i>Prof. Juncheng Yang</i> from <i>Harvard University</i> to improve miss ratio and efficiency in cache utilizing the novel concept of Lazy Promotion . • Developed experiment and processing pipeline on 6300+ traces from Twitter, TencentPhoto, TencentBlock, CloudPhysics, WikiMedia, 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 SSystem and AI Research Training Research Trainee	Jan 2025 – Jun 2025
• Top 50 students from Indonesia are selected for this program. • Covered 20+ papers and reproduced key experiments from OSDI, SOSP, FAST conferences. • Instructor: <i>Prof. Haryadi Gunawi</i> from <i>University of Chicago</i> .	

Work Experience

Computer Engineering Department & Faculty of Medics, 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

- Our app used by **Direktorate General of Digital Infrastructure(DGDI)** under **Indonesian Ministry of Communication and Digital Affairs**.
- Designed and implemented system for efficiently finding **anomalies** in **DGDI's** database, 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 (*source*)

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

Tetromino - Tetromania Castle (*source*)

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

ESP32 PingPong Game (*source*)

- Ping-Pong Game written in C++ for ESP32 and dot-matrix display.
- Implemented the **dot-matrix display rendering** and a **buzzer-based music player** for the game.

Image sharing platform - Lorem Ipsum (*source*)

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

Technical Skill

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

Framework: 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