

David Alexander

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Research Interests: Systems, databases, distributed systems, infrastructure.

EDUCATIONS

University of Indonesia, #1 *University in Indonesia* Depok, Indonesia

Bachelor of Computer Science. Cumulative GPA: 3.99/4.0, highest out of more than 400 students. Sep. 2020 – Dec. 2024

Thesis: Building a Retrieval Module for a Retrieval-Augmented Generation System for Data Discovery Queries.

Bangkit Academy led by Google, Tokopedia, Gojek, & Traveloka

Jakarta, Indonesia

Distinguished Cloud Computing Graduate. Google Cloud ACE and PCA certified.

Feb. 2023 – Jul. 2023

PUBLICATIONS

M. I. Balaka, David Alexander, Qiming Wang, Yue Gong, Adila Krisnadhi, and Raul C. Fernandez. **Pneuma: Leveraging LLMs for Tabular Data Representation and Retrieval in an End-to-End System.** *Accepted with shepherding to SIGMOD 2025. The manuscript is available upon request.*

PROJECTS

Pneuma  2024

Pneuma is a retrieval-augmented generation system designed to discover tabular data based on content and context, leveraging LLMs for table representation and retrieval. I designed the whole Pneuma architecture.

Ver  2024

Ver is a data discovery system that identifies project-join views over large repositories of tables without join path information. I designed the detection of spatiotemporal columns in tabular data while refactoring code smells.

RESEARCH EXPERIENCES

International Undergraduate Research Collaboration on Data Discovery Jan. 2024 – Dec. 2024

- Collaborated with Professor **Raul C. Fernandez** of the **University of Chicago** on **Pneuma**.
- Leverage LLMs to represent and retrieve tabular data. Retrieval also uses hybrid search with the BM25 algorithm and HNSW vector index.
- Packaged the project and introduced an end-to-end open-source system, accessible on GitHub.
- Utilize batch processing on table summarization using binary search to find the optimal batch size, speeding up runtime up to 4×.
- Paper accepted with shepherding to SIGMOD 2025.
- Supported by the MoECRT Garuda Open Research Program.

TEACHING EXPERIENCES

University of Indonesia *Depok, Indonesia*

Teaching Assistant Aug. 2021 – Jun. 2023

- Assisted lecturers and undergraduate students in the following courses:
 - * CSCM603154 - Computer Networks (Jan. 2023 – Jun. 2023)
 - * CSGE602040 - Data Structures & Algorithm (Jul. 2022 – Dec. 2022)
 - * CSGE601021 - Programming Foundations 2 with Java (Jan. 2022 – Jun. 2022)
 - * CSCM601150 - Introduction to Digital Systems (Aug. 2021 – Jan. 2022)
- My responsibilities included, but are not limited to:
 - * Preparing assignments
 - * Providing feedback and solutions to the assignments
 - * Giving tutorials and lab sessions to students
 - * Mentoring students on their final project

Peer Tutor for Programming Foundations 1 with Python Feb. 2021 – Jul. 2021

- Privately tutored 2 students.
- Gave out weekly/by request sessions.

WORK EXPERIENCES

Studio S. *Jakarta, Indonesia*

Frontend Engineer (Freelance)

Jan. 2024 – Feb. 2024

- Developed a customer onboarding feature enabling users to register personalized body measurements using React.
- Fixed various bugs and code smells in the codebase.
- Created a form scanner to quickly input data by scanning various QR Codes and Aruco Scanners with React.

Studio S. *Jakarta, Indonesia*

Backend Engineer (Freelance)

Jul. 2023 – Aug. 2023

- Created a Backend API for a Human Resource Information System software using Express.js + Prisma, deployed on Google Cloud Run.
- Built an algorithm to get attendance data of employees, matched with their shifts and leave permits to create payroll automatically. This streamlines the previously manual and labor-intensive task of creating payroll.
- Communicated requirements with the client and designed the database schema according to the client's request.

SUR Studios *Jakarta, Indonesia*

Software Engineer Intern

Jun. 2022 – Sep. 2022

- Main software engineer in developing the company's production software.
- Built a desktop application using C++ and Qt. Dockerized and deployed the application using AWS ECS with autoscaling and load balancing.
- Designed and built a REST API and link tracking system using AWS Lambda, Amazon API Gateway, and DynamoDB.

ORGANIZATIONAL EXPERIENCES

Orkes Simfoni Universitas Indonesia Mahawaditra *Depok, Indonesia*

Advisory Committee

Jan. 2024 – Present

- Part of a three-person team that provides strategic and technical advice and feedback for the organization's leaders.

President

Jan. 2023 – Dec. 2023

- Led and supervised an 80-person team in various orchestral and organizational projects.

COMPFEST *Depok, Indonesia*

Vice Manager of Competition

Nov. 2021 – Nov. 2022

- Together with the manager, my role is to lead a team of 60 to hold 7 national tech competitions on the topic of AI Innovation Challenge, Business-IT Case, Capture the Flag, Competitive Programming, and Indie Game Development.

Staff of AI Innovation Challenge

Mar. 2021 – Nov. 2021

- Held the first-ever AIC by COMPFEST. Tasked to validate participants' submissions and chosen to be the contact person for any AIC-related inquiries from participants.

SKILLS

Languages: Python, Java, C++, TypeScript, JavaScript, HTML, CSS, SQL, SPARQL

Back End: Express.js, Prisma, Node.js, Django REST Framework, Java Spring Boot

Front End: React, Bootstrap

Developer Tools: Git, Docker, AWS, GCP, PostgreSQL

Selected Coursework: Data Structures and Algorithms, Design and Analysis of Algorithms, Advanced Programming, Platform-Based Programming, Database Design, Software Quality Assurance, Image Processing, Computer Networks, Semantic Web

Linguistics: English (Fluent), Indonesian (Native), Bangka Malay (Passive)

REFERENCES

Raul C. Fernandez

Assistant Professor
University of Chicago
raulcf@uchicago.edu

Adila A. Krisnadhi

Senior Lecturer, Researcher, Manager
of Research and Community Services,
and Co-Director of Tokopedia-UI AI
Center of Excellence.
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