



# David Alexander

david.alxndr01@gmail.com | ogiorgil.github.io |  david-alexander01 |  ogiorgil

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

## EDUCATION

**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

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

*Jakarta, Indonesia*

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

Feb. 2023 – Jul. 2023

## PUBLICATION

**Pneuma: Leveraging LLMs for Tabular Data Representation and Retrieval in an End-to-End System.**

*Under submission to SIGMOD 2025. The manuscript is available upon request.*

## RESEARCH EXPERIENCE

**University of Chicago** *Remote, USA*

**International Undergraduate Research Collaboration on Data Discovery**

Jan. 2024 – Dec. 2024

- Collaborated with Professor **Raul C. Fernandez** of **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×.
- Under submission to SIGMOD 2025.
- Supported by the MoECRT Garuda Open Research Program.

## WORK EXPERIENCE

**Studio S.** *Jakarta, Indonesia*

**Frontend Engineer (Freelance)**

Jan. 2024 – Feb. 2024

- Implemented page flow for a certain feature in the company's website using React.
- Fixed various unresolved bugs and code smells in the codebase.
- Created a form scanner to quickly input data by scanning various QR Codes and Aruco Scanners. Implemented 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 and Amazon API Gateway, connected to DynamoDB.

**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.

## ORGANIZATIONAL EXPERIENCE

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### Orkes Simfoni Universitas Indonesia Mahawaditra *Depok, Indonesia*

#### Advisory Committee

Jan. 2024 – Present

- Part of a three-person team that provides strategic and technical organizational 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.

## PROJECTS

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### Pneuma

2024

Pneuma is a retrieval-augmented generation system designed to efficiently and effectively 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 that do not contain join path information. I designed the detection of spatiotemporal columns in tabular data while refactoring code smells.

## SKILLS

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**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

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### 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.  
University of Indonesia  
adila@cs.ui.ac.id

### Mikael Harseno S.

CEO  
Studio S.  
mikael@studios.id