

# Alex El-Shaikh

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GitHub <https://github.com/alexelshaikh>



## Senior Software Engineer | Java, Distributed Systems, Concurrency, Databases

PhD-trained software engineer with 7+ years of experience designing scalable, high-performance systems in Java. Skilled in architecture design, performance optimisation, and data-intensive and real-time applications. Currently optimising a high-throughput Java database (~30% throughput gain) and developing a simulation framework for complex query execution on novel storage systems.

## Professional Experience

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Feb 2025 - Present

### Postdoctoral Researcher, Imperial College London, UK

#### Responsibilities:

- **Led development** of high-throughput simulation/database components in **Java** for DNA data storage experiments
- Owned core system design and implementation, including performance profiling, concurrency, and reliability under load
- **Mentored** and supervised **students** on graduation projects, providing **technical direction** and feedback

#### Achievements:

- Optimised a high-throughput Java database, improving throughput and query performance by up to 30% under heavy load via **concurrency tuning** and **architectural changes**
- Reduced memory footprint by 10× through **data-structure redesign**, **caching**, and GC-aware allocation optimisations
- Implemented new query capabilities (e.g., content-based filters), enabling additional experimental scenarios and analyses

Nov 2019 – Dec 2024

### Research Fellow, University of Marburg, Germany

#### Responsibilities:

- Initiated the development of high-throughput database and simulation tooling in **Java** and **Rust** for DNA data storage research
- Supported lectures/workshops by creating exercises/demos and mentoring in lab sessions

**Achievements:**

- **PhD** in Computer Science (Grade: 1.0; very good)
- **Built and led** development of DNAContainer, a **Java-based database system** for DNA data storage, coordinating a multi-disciplinary team across computer science, chemistry, and biology
- First-authored four peer-reviewed publications

Mar 2014 – Oct 2019

**Student Research Assistant, University of Marburg, Germany****Responsibilities:**

- Provided academic and technical support across linear algebra, analysis, logic, **OOP**, relational/distributed **database systems**, and **software architecture**
- Supervised **Java** programming internships, **mentoring students** on implementation, debugging, and best practices
- Organised and **coordinated student group projects**, including planning, team allocation, and progress tracking

**Achievements:**

- Strengthened students' technical understanding and developed my **leadership** and **mentoring skills**
- Developed clear **technical communication** through regular code reviews and written feedback, improving code quality and helping students deliver projects on time

## Education

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2019 – 2024

**Ph.D. in Computer Science, University of Marburg, Germany**

- Awarded the title "Doctor of Natural Sciences (Dr. rer. nat.)"
- Dissertation's title: "Implementing random access on DNA data storage systems" (Grade: 1.0; very good)

2016 – 2019

**M.Sc. Computer Science, University of Marburg, Germany**

- Master's thesis title: "Lightweight Indexing on Data Streams" (Grade: 1.3; very good)
- Minor subject: Economics
- Aug 2016 – Dec 2016: ERASMUS Semester at the Aalto University in Helsinki, Finland
  - Enhanced English proficiency
  - Exposure to Finnish academic, cultural, and social environment

2012 – 2015

**B.Sc. Computer Science, University of Marburg, Germany**

- Bachelor's thesis title: "Developing an Android game with an interactive water simulation" (Grade: 1.3; very good)
- Minor subject: Business Administration

## Technical Skills & Expertise

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### Programming Languages

- **Core:** Java, Python, SQL
- **Also worked with:** Rust, C#, C++, R, Kotlin, Scala, MATLAB, JavaScript, TypeScript, Dart, Go, PHP, Lua, Prolog, Julia, Haskell

### Frameworks & Tools

Spring Boot, Maven, Docker, Kubernetes, Git, Linux, JUnit, Pandas, FastAPI, RESTful API, JDBC, jOOQ, JPA, AWS, Kafka, PostgreSQL, NoSQL (Elasticsearch, Spark, Neo4j, HBase, MongoDB, Redis), CI/CD

### Areas of Expertise

Database systems, software architecture, object-oriented and modular programming, concurrency, algorithms & optimisation, data processing, software refactoring

### Language Skills

German and Arabic (mother tongues), English (level C1)

### Interests

Sports (swimming, table tennis), travel, teaching, debates