Alex El-Shaikh

E-Mail	alex@el-shaikh.com
Citizenship	Dual German and Egyptian nationality
GitHub	https://github.com/alexelshaikh

Computer scientist and software engineer with a PhD in Computer Science and several years of experience leading complex software projects across academic and industrial contexts.

Expertise in scalable system architectures, requirements engineering, data-intensive applications, and the coordination of interdisciplinary software development processes.

Professional Experience

04/2026 – Present

Senior Software Engineer

- Responsible for **architectural decisions** with a focus on scalability, maintainability, and **product quality**
- **Analysis** and optimization of existing systems to improve performance, **efficiency**, and **operational reliability**
- Introduction of **cloud technologies**, particularly AWS, to improve scalability and **security** of production applications
- Evaluation and **prioritization** of technical requirements, **coordination** of implementation with **development teams**, and ensuring efficient development **workflows**

02/2025 – 03/2026

Postdoctoral Researcher, Imperial College London (UK)

- **Led** and **coordinated** the development of scalable system architectures and **data-intensive** applications in an **international** research environment
- Analyzed **complex requirements** and **translated** them into high-performance and **robust technical solutions**
- Improved system performance by up to 50% through **targeted optimization of architecture** and data processing
- **Communicated** technical concepts and supervised students

11/2019 – 12/2024

Research Fellow, Marburg University

- **Designed** and developed **new database systems** for processing **large scientific datasets** in the terabyte range
- Held overall **responsibility** for the **coordination** and continued

development of database systems within the **project context**
- Developed software solutions used by **international research** partners to support **scientific analyses**
- Analyzed **complex requirements** from **various departments** and **translated** them into scalable **technical concepts**
- **Integrated heterogeneous data sources** and developed ETL processes for structured data processing
- Contributed to the **NFDI4Biodiversity** project, focusing on the standardization of data formats and the development of **interoperable interfaces**

03/2014 – 10/2019 **Research Assistant, Marburg University**
- **Supervision** of students in Java programming **internships**
- **Organized** and **coordinated** student working **groups**
- Assisted in the **preparation** and **delivery** of **lectures** and practical exercises

Education

11/2019 – 12/2024 **PhD in Computer Science, Marburg University**
- Awarded the title "Doctor of Natural Sciences (Dr. rer. nat.)"
- Dissertation title: "Implementing random access on DNA data storage systems" (Grade: 1.0 – very good)

01/2016 – 10/2019 **M.Sc. in Computer Science, Marburg University**
- Master's thesis title: "Lightweight Indexing on Data Streams" (Grade: 1.3 – very good)
- Minor subject: Economics
- Aug 2016 – Dec 2016: ERASMUS Semester at Aalto University in Helsinki, Finland
  - Enhanced English proficiency
  - Exposure to Finnish academic, cultural, and social environment

03/2012 – 12/2015 **B.Sc. in Computer Science, Marburg University**
- Bachelor's thesis title: "Developing an Android game with an interactive water simulation" (Grade: 1.3 – very good)
- Minor subject: Business Administration

Talks

07/2023 **Invited Speaker, Ain Shams University in Cairo, Egypt**
- Presented DNA as an alternative medium for data storage
- Reviewed current DNA storage approaches, with emphasis on cost considerations and long-term viability

03/2023 **Paper Presentation at BTW 2023, TU Dresden, Germany**
- Presented accepted paper entitled “DNAContainer: an object-based storage architecture on DNA”
- Best Workshop Paper award for research quality and presentation
- Invited to submit an extended version to Datenbank-Spektrum

03/2022 **Paper Presentation at DSMM 2022, University of Marburg, Germany**
- Presented accepted paper entitled “High-scale random access on DNA storage systems”
- Discussed emerging directions for scalable DNA data storage systems

Awards

03/2023 **Best Workshop Paper Award, NoDMC Workshop (BTW 2023)**
- Awarded for “DNAContainer: an object-based storage architecture on DNA”
- Invited to submit an extended version to Datenbank-Spektrum

03/2022 **Editor’s Choice, NAR Genomics and Bioinformatics**
- Awarded for “High-scale random access on DNA storage systems”

Publications

Alex El-Shaikh, Bernhard Seeger, and Thomas Heinis. “An Economic Analysis of DNA-based Data Storage Systems”. Under Review in Trends in Biotechnology (2026).

Alex El-Shaikh and Bernhard Seeger. “An Extension of DNAContainer with a Small Memory Footprint”. In Datenbank-Spektrum, 23.3 (2023), pp. 211-220.
DOI: 10.1007/s13222-023-00460-3

Alex El-Shaikh and Bernhard Seeger. “DNAContainer: An object-based storage architecture on DNA”. In BTW 2023. Gesellschaft für Informatik e.V., 2023, pp. 773-795.
Best Workshop Paper
DOI: 10.18420/BTW2023-50

Alex El-Shaikh and Bernhard Seeger. “Content-based filter queries on DNA data storage systems”. In Scientific Reports, 13.1 (2023), p. 7053.
DOI: 10.1038/s41598-023-34160-5

Alex El-Shaikh, Marius Welzel, Dominik Heider, and Bernhard Seeger. “High scale random access on DNA storage systems”. In: NAR Genomics and Bioinformatics. Oxford University Press, 4.1 (2022), lqab126.
Editor’s Choice
DOI: 10.1093/nargab/lqab126

In addition, I am currently working on two further publications with my colleagues from biology and chemistry at Imperial College London, which deal with random access in DNA-based database systems.

On-going Academic Service

Peer Reviewer	Trends in Biotechnology, Nature Communications, Scientific Reports, Briefings in Bioinformatics, Computational and Structural Biotechnology Journal, BMC Bioinformatics, Egyptian Journal of Forensic Sciences
Teaching & Lecturing	Linear Algebra, Analysis, Relational Database Systems, NoSQL Databases, Geo Databases, Implementing Database Systems, Software Engineering, Programming Internships, Object-oriented Programming, Efficient Algorithms
Student Supervision	Bachelor’s Projects, Master’s Projects, Programming Projects, Exercise Classes and Tutorials

Technical Skills & Expertise

Programming Languages	**Java (very good), Python (very good), SQL (very good),** Rust (good), C#, C++, R, Scala, JavaScript, Kotlin, Lua, Prolog, Julia, Haskell
Backend & Cloud	Spring Boot, AWS, REST APIs
Data & Streaming	PostgreSQL, MongoDB, Apache Kafka, Apache Spark, Elasticsearch, Neo4j, HBase
Tools	Maven, Docker, Kubernetes, CI/CD, JUnit, Pandas, FastAPI, JDBC, JPA, JOOQ
Methods & Working Style	Requirements engineering, agile software development (Scrum/Kanban), systems analysis and solution design, technical project coordination
Areas of Expertise	Database systems, software architecture, object-oriented and modular programming, algorithms and optimization, data processing, parallel programming, software refactoring
Language Skills	German and Arabic (mother tongues), English (level C1)
Interests	Sports (swimming, table tennis), travel, teaching, debates