

# MARWAN ZEIN

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## Summary

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Computer Science student (Alexandria University, expected May 2027) focused on backend and systems software engineering. Built and deployed projects across cloud (AWS/Azure), microservices (NestJS/Node.js), and low-level systems (Rust, x86\_64).

## Education

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**Faculty of Computers and Data Science, Alexandria University**

**Expected May 2027**

*Bachelor of Computer Science*

*Alexandria, Egypt*

- **Concentrations:** Competitive Programming, Software Engineering, Cybersecurity
- **Relevant Coursework:** Data Structures and Algorithms, Machine Learning, Artificial Intelligence, Object-Oriented Programming, Statistics, Linear Algebra, Probability

## Skills

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**Programming Languages:** C++, Java, Python, JavaScript (Node.js), HTML, CSS

**Frameworks & Libraries:** NestJS, Express.js, .NET, ASP.NET Core, Angular

**Databases:** Microsoft SQL Server, PostgreSQL

**Tools & Platforms:** Docker, Git/GitHub, AWS (EC2, S3, IAM, VPC), Azure, Linux, QEMU

**Core Concepts:** OOP, MVC, Microservices, RESTful APIs, Authentication & Authorization, SQL

**Security:** OWASP Top 10, CTF Competitions

**Other:** Competitive Programming (ECPC finalist), Algorithm Analysis

## Projects

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**Rusty-x86\_64 Operating System Kernel** — Operating Systems and Low-Level Systems Programming

**Jan 2026**

- Architected a 64-bit x86\_64 OS kernel in Rust, implementing memory management, GDT/IDT interrupt handling, and custom allocators.
- Ensured memory safety and prevented race conditions using Rust's ownership and concurrency models.
- Achieved a fully bootable kernel supporting basic I/O, process isolation, and task scheduling with **100% successful test boot cycles on QEMU**.
- Reduced kernel memory footprint by **15%** through optimized custom allocators.
- **Tech Stack:** Rust, x86\_64, QEMU, Linux, Git
- GitHub Repository

**VisionGate – Smart Parking System** — Backend, IoT, AI Integration

**May 2025**

- Developed an IoT & AI smart parking system with **4 microservices** and **2+ real-time sensors**, reducing manual parking management effort by **60%**.
- Engineered ESP32 firmware (C++/PlatformIO) for secure MQTT communication and sensor control, handling **10,000 sensor messages/day** reliably.
- Built a Kotlin-based image capture app feeding YOLO computer vision pipeline, achieving **95% vehicle detection accuracy** in real-time tests.
- Optimized backend API latency to **150ms per request** while scaling to **100 concurrent users**.
- **Tech Stack:** NestJS, TypeORM, PostgreSQL, Docker, Azure, ESP32, MQTT, Flask, Flutter, Kotlin, YOLO
- GitHub Repository

- Designed secure file-sharing web app handling **100+ uploads/downloads per test cycle**, ensuring zero data loss.
- Optimized AWS Free Tier usage by **25% cost reduction** through efficient EC2 and S3 resource allocation.
- Implemented authentication and access control supporting **role-based permissions for 50+ users**.
- Hosted static frontend on Amazon S3 integrated with backend APIs for seamless UX, achieving **99% uptime** in testing.
- **Tech Stack:** Node.js, AWS EC2/S3/IAM/VPC, JavaScript
- GitHub Repository

## Achievements

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### Egyptian Collegiate Programming Contest (ECPC)

**Summer 2024**

- Qualified for ECPC finals on first participation, ranking 5th overall and 2nd within faculty among 50+ teams.
- Solved complex algorithmic problems under timed, multi-round competitive conditions.
- Certification

## Civil Work and Activities

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### ElCode-FCDS

**Aug 2023**

*Coding Instructor & Content Creator*

- Conducted 10+ coding workshops for 150+ students, creating educational content that improved student competency by 30%.
- Mentored peers in programming and software development, fostering collaborative learning.

### ICPC-FCDS

**Nov 2023**

*Organizing Committee Representative*

- Organized ICPC-FCDS contests and training events for 200+ participants, ensuring smooth execution and adherence to schedules.

### TECHNE Summit

**Oct 2024**

*Attendee*

- Engaged with industry professionals and explored emerging trends in technology and software engineering.