

Mustafa Arslan

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TECHNICAL SKILLS

AI & Agentic Systems: Agentic AI, Multi-Agent Systems, LLM Agents, MCP, Hybrid RAG, GraphRAG, RRF Fusion, Cross-Encoder Reranking, Vector DBs (FAISS), Sentence Transformers, NER, Local LLMs (Ollama), Neuro-Symbolic Architectures, GNNs, LightGBM, Contextual Bandits, RL/ML/Deep Learning

Architecture & Methodologies: Software Architecture (iSAQB CPSA-F), Microservices & Resilience Patterns, Hexagonal Architecture, Event Sourcing & CQRS, Enterprise Integration Patterns, Design Patterns, Cloud Native, Service Mesh (Istio), Agile/Scrum

Languages: Java (8–25), C/C++ (C++23, AVX-512/SIMD), Python, Go, TypeScript, JavaScript, SQL, Fortran

Frameworks & Libraries: Spring Boot, Spring Framework, FastAPI, Flask, Angular, React, Node.js, Hibernate ORM, JUnit, Mockito, Caffeine, nanobind, Tree-sitter, Qt

Data, Infra & Tools: Kubernetes, Docker, Istio, OpenShift, Helm, ArgoCD, Jenkins, Ansible, AWS, Kafka, RabbitMQ, Elasticsearch, Kibana, Graylog, Prometheus, Grafana, PostgreSQL, MongoDB, Oracle, Neo4j (GDS), Keycloak (OAuth2/OIDC), Liquibase, Gradle, Maven

WORK EXPERIENCE

ASEE Türkiye

Hybrid – Istanbul, Turkey

Senior Software Engineer (Acting Lead Software Architect)

Apr 2026 – Present

- Joined to lead a customer-facing fraud detection initiative and quickly assumed acting architectural leadership across three concurrent projects.
- Designed and delivered a **Neo4j**-based PoC for graph database integration for fraud detection for a Tier-1 private bank in Türkiye, demonstrating advanced fraud detection using graph analytics, **Machine Learning**, **Deep Learning**, and **Reinforcement Learning** via the **Neo4j Graph Data Science (GDS)** library.
- Presented **Orion—my independent, personal Agentic AI research project** (currently under review)—to demonstrate future-facing automated fraud investigation capabilities, providing strategic vision to both ASEE and the bank.
- PoC outcomes and architecture discussions directly contributed to securing a multi-project contract with the bank, covering both Business Intelligence (**BI**) and **Graph Database Integration for Fraud Detection** under my technical leadership.
- Serving as the sole architect driving the design and technical direction of the **Anti-Fraud Hub Platform**—a unification initiative to consolidate ASEE’s independent fraud products into a cohesive platform with cross-product intelligence, coordinated decision-making, and extensible with AI driven capabilities in mind.
- Led a privacy-preserving fraud detection ML initiative on transaction data, mentoring an intern through the full pipeline from data engineering to model deployment strategy
- Benchmarked 6 model families for fraud classification; selected and tuned an XGBoost model that outperformed all alternatives on a leakage-safe, time-based holdout set
- Applied SHAP-based feature selection to cut the model’s feature footprint by ~95% (391 → 20 features) while retaining 98% of predictive performance, simplifying the production data contract
- Designed and ran a 4-path federated learning research program (Flower gRPC production pipeline, a 47-config aggregation benchmark, personalized FL, and a GNN generalization study) to evaluate cross-bank fraud collaboration without sharing raw records

Independent Engineering & Research

Istanbul, Turkey

Applied AI Researcher (Independent)

Oct 2025 – Present

- **Orion (Agentic AI for Fraud Detection):** Designed a bisected **neuro-symbolic** architecture splitting a deterministic **C++23** data-plane— $\mathcal{O}(1)$ streaming state-folding (online Welford) and a symbolic anomaly engine at **8.1M ops/sec** under sub-ms SLAs—from an asynchronous **Python** control-plane orchestrating a **GNN** and a lightweight **LLM agent**, cutting LLM context-memory from $\mathcal{O}(N)$ to $\mathcal{O}(1)$ via compact semantic traces. On 1.3M out-of-time transactions: **0.93 recall** at **0.004 FPR**. Paper authored independently, submitted to arXiv (under review).
 - **Aeon (Neuro-Symbolic Memory):** Architected a high-performance memory kernel to solve "Vector Haze" in long-horizon LLM agents. Replaced flat RAG with a structured system combining **Atlas** (a SIMD-accelerated B+ Tree for spatial indexing) and **Trace** (an episodic causal graph). Implemented the core engine in **C++23** using **AVX-512 intrinsics** for < 1ms retrieval latency and **Zero-Copy Python bindings** (nanobind) for seamless LLM integration. (Paper: arXiv:2601.15311)
- Github:** <https://github.com/mustafarslan/aeon>

- **PandoraLM**: Novel tri-modal **RAG architecture** (Vector, Graph, Agentic) with a **Cognitive Router**. Achieved 70% cost reduction via **tiered inference** and implemented **RRF Fusion** with **Cross-Encoder ReRanking**. Contributed open-source **GraphRAG** orchestration and **AST-based chunking** with **Tree-sitter**.
Github: <https://github.com/mustafarslan/pandoralm>
- **Neura**: AI-native payment switch prototype replacing static routing with **Contextual Bandits** for real-time bank selection. Built in **48 hours**. Implemented **Java 26 (Valhalla)** Value Records to eliminate GC overhead and **Vector API (SIMD)** for neural inference. Designed a **double-entry ledger** with Hexagonal Architecture and smart failover.
Github: <https://github.com/mustafarslan/neura>
- **Carbon Omniverse**: **Model Context Protocol (MCP)** integration for natural language inventory management. Demonstrated **Java 25** production features: **Virtual Threads** for high-concurrency I/O, **ScopedValue API**, and Spring Boot 4.0 native compilation. Built **Hexagonal Architecture** with polyglot persistence.
Github: <https://github.com/mustafarslan/carbon>

Turkish Technology via KG Teknoloji

Hybrid – Istanbul, Turkey

Software Architect

Mar 2025 – Sep 2025

- Served in a dual role as Software Architect and Hands-on Senior Engineer, actively developing backend services using **Java 11** and **Spring Boot 2.7.x**.
- Architected and led the end-to-end development of OpsNow, the CEO's highest-priority project, a complex situational awareness dashboard integrating over 90 data points to enhance executive visibility into flight and airport operations.
- Led the hands-on modernization of the OpsNow project, developing and deploying a new, high performance version on **OpenShift** with **Java 21**, **Spring Boot 3** and **Gradle**. Personally engineered framework components to accelerate development velocity for the team.
- Drove significant application performance improvements by rewriting API bottlenecks, optimizing business logic, and refactoring core algorithms to reduce time and space complexity.
- Implemented **Event Sourcing** and **CQRS** (Enterprise Integration Patterns) with multi-layer caching and asynchronous logging, reducing API response times drastically under load.
- Provided architectural oversight for the CEO's top three priority projects, ensuring alignment with modern best practices and high-performance standards.
- Guided Application Security Team in pioneering a new pipeline using **AI Agents** to automatically analyze and substantially reduce the high volume of false positives from Fortify security scans.
- Mentored junior engineers through code reviews and technical guidance, while actively assisting senior and lead engineers in resolving complex architectural and performance-related tasks.

Vodafone

Hybrid – Istanbul, Turkey

Solutions Architect

Apr 2022 – Dec 2024

- Served in a dual role as Solutions Architect and Senior Software Engineer for the flagship e-commerce application "Her Sey Yanimda", contributing to full-stack **Cloud Native** development using **Java 8**, **Spring Boot**, and **Angular**.
- Led the design of new modules that improved usability metrics by 30%
- Delivered **Hybrid Cloud Proof-of-Concept** with **AWS** backend, demonstrating **40%** infrastructure cost reduction potential, directly enabling enterprise adoption of hybrid cloud architecture
- Engineered internal **Python/Grafana/Prometheus** observability tool (now RedPulse) to monitor frontend API latencies, reducing troubleshooting time by **25%** and saving **\$300K–\$400K** in licensing fees
- Developed Mockery – Python-based mock data generator creating realistic test scenarios (reviews, customer profiles, lottery tickets) adopted by development and testing teams
- Authored Carbon npm package in **JavaScript**, eliminating **40%** code duplication across frontend projects through reusable utilities
- Optimized **Java 8/Spring Boot** microservices achieving **40%** faster startup times and **50%** reduction in API response sizes
- Full-stack development of new features using **Angular/TypeScript** frontend and **Java 8/Spring Boot/Elasticsearch** backend

- **Flow Simulator Team:**

- Improved mixed-fidelity simulations in Flow Simulator (integrated flow/heat transfer/combustion software) using **C++11**, reducing system Cyclomatic Complexity by 30%+ through architectural refactoring.
- Instituted pair programming practices that decreased critical bugs by 40% and improved code review efficiency.
- Containerized SonarQube for localized code quality analysis, cutting technical debt identification time by 65%.
- Optimized **Jenkins** CI/CD pipelines achieving 25% faster build time.

- **SIESTA Modernization Initiative:**

- Acted as Team Lead and Hands-on Architect guiding 1 mid-level and 1 junior software engineer.
- Led cross-platform transformation by porting a 20-year-old Windows-exclusive engineering suite to Linux, enabling HPC cluster deployment utilizing **Fortran, Python, C++11**, and **Go**.
- Architected **Go** microservices for critical functions: Identity management (OAuth2/OIDC authentication & authorization) and Application lifecycle orchestration.
- Developed a CLI toolchain for packaging and deploying 400+ legacy applications as containerized services.
- Engineered an application marketplace allowing engineers to package multi-step workflows as reusable templates and share certified configurations across global teams.
- Containerized legacy applications using **Docker/Kubernetes**, automatically resolving deep dependency and version conflicts within a 20+ year-old codebase.
- Designed a resilient service mesh architecture (**Kubernetes/Istio**) for hybrid Windows-Linux microservices.

- Contributed to embedded projects utilizing **C++** and supported the Unify Desktop phone user interface (UI) using the **Qt** framework.
- Created features as part of SIP and HFA protocols.
- Quickly adapted to the team within the first week of onboarding, delivering impactful contributions early on.
- Improved internal development toolchains and the overall development environment.
- Enhanced project Cyclomatic Complexity by reducing it by over **20%**.

- Contributed to full-stack **Cloud Native** application development for the **AnalyzeMyMachine** project using **Java 8**, **Spring Boot**, and **Angular**.
- Designed, developed, and implemented embedded projects in **C++**, delivering solid output within weeks.
- Mentored junior developers and assisted in **CI/CD** pipelines.
- Spearheaded critical and complex projects, including **Protect MyMachine/3D Twin Edge**, where I served as the Software Architect. Developed a **Python-** and **Ansible-**based tool called "Flow" to automate development environment setup, reducing deployment time by over **50%** for both cloud (**MindSphere**) and local industrial PCs. Collaborated with DevOps to create **Jenkins** pipelines and mentored junior developers throughout the project lifecycle.
- Created a **LogSDK** in C++ to standardize logging processes for internal Siemens teams, improving efficiency and consistency across projects.
- Constructed prototype versions of **Edge Application Software Development Kits** (SDKs) in **Node.js** and **JavaScript**, validating their readiness for production use.
- Drove the development of AppDeployer, a tool to streamline the upload of MindSphere applications to the cloud. Enhanced dependency management and project deployment processes using **Angular 5**, **TypeScript**, **Python 3**, and **Flask**.
- Actively contributed to the release phase of Analyze My Drives as a front-end developer, ensuring smooth delivery.
- Developed internal tools to improve reusability and increase efficiency across teams.

- Served as a **Full-Stack Developer** using **Java 8** and **Spring Boot** for the Base Station Control Application within the Wireless LTE team.
- Worked as a **Front-End Developer** in the IPTV department of Huawei Türkiye, contributing to both international projects and local initiatives such as Turkcell TV+.
- Built **Asset Tracking System**, an internal tool for the IPTV mobile team. Implemented in **Objective-C** with a **Node.js** server, it tracked mobile device possession and usage by scanning developer ID cards and device QR codes.
- Served as a **Back-End Developer** in the Wireless LTE team, working on the Base Station software known as WEB LMT (Web Local Maintenance Terminal) using **C/C++** and **MFC**.
- Acted as a **System Engineer** in the Wireless LTE team, gathering, analyzing, and documenting requirements in compliance with **CMMI Level 5** standards, enabling developers to work effectively on user stories.
- Functioned as a **Security System Engineer**, identifying and addressing security risks by analyzing test results from security tools and assigning issues to appropriate stakeholders.
- Led a tiger team to develop internal tools aimed at improving productivity across teams.
- Recommended architectural improvements for Base Station software, enhancing system capabilities and performance.
- For Dispatcher Console project, conducted project analysis, and initiated its development with the internal team. Designed and architected both front-end and back-end systems for the project, including creating UI/UX prototypes.

EDUCATION

Izmir University of Economics

BSc in Software Engineering

Izmir, Turkey

January 2013

- Worked on **Comparison of Different Machine Learning Algorithms for Opining Mining**. Used **Association Rule Mining** and **Decision Trees** to classify hotel reviews as good or bad.

CERTIFICATIONS

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| • Certified Professional for Software Architecture-Foundation Level (CPSA-F) by iSAQB | Aug 2019 |
| • Algorithm Specialization by Stanford University, Coursera | Jun 2024 |
| • AI Agents Fundamentals by Hugging Face | Feb 2025 |
| • Machine Learning Specialization by Stanford University, DeepLearning.AI | July 2026 |
| • Neo4j Certified Professional by Neo4j | July 2026 |
| • Neo4j Graph Data Science Certification by Neo4j | July 2026 |
| • Deep Learning Specialization by DeepLearning.AI | Aug 2026 |
| • Generative AI with Large Language Models by AWS, DeepLearning.AI | Aug 2026 |