AHMED BERRADA

Software Engineer – Critical Systems and Performance – C++, Java, Python
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PROFILE

Software engineer (ESIEA, class of 2027), apprentice at Siemens Mobility since 2025: byte-exact radio message simulator for **safety-critical railway software**, used by 9 validators. The same rigor (determinism, testing, replay) applied to **trading systems**. Seeking a permanent position from September 2027.

PROFESSIONAL EXPERIENCE

Siemens Mobility – Software Engineer (apprenticeship), Châtillon, France Sept. 2025 – Aug. 2027

- 5G radio CBTC modernization of the Crosstown line of the New York City subway (MTA); safety-critical software (CENELEC EN 50128); Scrum, in English, with the radio, embedded software and test teams (France and India).
- Designed and developed in **Python** the **CRG Message Generator**, a simulator of the onboard and wayside equipment (CC, ZC, WRG) that generates byte-exact radio messages (UDP framing, CRC-32/MPEG-2) from YAML/XML configuration: **200+ message types, 300+ scenarios**, conformance checked by a **pytest** suite (JUnit-XML reports). Delivered for CRG 4.2: without this tool, the software cannot be tested.
- Developed a **Robot Framework** library with business-level keywords; the tool is used by **9 validators** (5 developers, 4 trained non-developers) who write and run the scenarios they need on their own.
- Built with the team, from scratch (no existing test bench, tool or product), the execution environment: **GitLab CI/CD** and runners, virtualized CRG (**QEMU/KVM**, **Linux** network namespaces), automatic archiving of reports and logs. Test bench owner.

PROJECTS – TRADING SYSTEMS

Order Book – limit order book matching engine | GitHub Java 21, C++17, FIX 4.4

- Designed a deterministic price-time priority engine (Java 21), one thread per instrument (LMAX-inspired); write-ahead journal: state rebuilt identically by replay after a crash; FIX 4.4 order entry (QuickFIX/J), REST API.
- Proved correctness through tooling: property-based tests (jqwik), mutation testing (PIT), JaCoCo coverage, ArchUnit rules, GitHub Actions CI.
- Implemented a **C++17** version with no allocation on the critical path (pool allocator, intrusive list, O(1) cancel): **3.46M operations/s, 163 ns median latency**.

GPU-accelerated Monte Carlo option pricer Python, Numba CUDA, CuPy

- Accelerated a European option pricer (geometric Brownian motion): **16x faster than vectorized NumPy** (7.4 s to 0.46 s; 295 s in pure Python).

SKILLS

Languages: C++, Java, Python, SQL, Bash
Engineering: Linux, Git, GitLab CI/CD, GitHub Actions, Docker, QEMU/KVM, Spring Boot, pytest, Robot Framework, JUnit 5, AWS
Data and computing: NumPy, Pandas, CUDA (Numba, CuPy), scikit-learn, PyTorch
Markets domain (projects): order book, matching, FIX, option pricing, Monte Carlo
Certification: AWS Certified AI Practitioner (October 2026)

EDUCATION

ESIEA (Paris) – Engineering degree (Master's level), Computer Science, Artificial Intelligence track 2022 – 2027

- Coursework: mathematics (probability, statistics, optimization), algorithms, software development, architecture.

ACTIVITIES AND LANGUAGES

- **Co-founder of the Google Developer Group (GDG) on Campus ESIEA**, Google-recognized (since Sept. 2026): AI workshops; co-organizing a Finance × AI hackathon with GDG EPITA.
- ESIEA student ambassador (since 2024); participant in Junction Hackathon 2026 (Espoo, Finland).
- Languages: French (C2), English (C1, working language), Arabic (native).