DRIVEMASTER: SAAS PLATFORM FOR INTEGRATED MANAGEMENT AND REGULATORY COMPLIANCE IN COLOMBIAN DRIVING SCHOOLS

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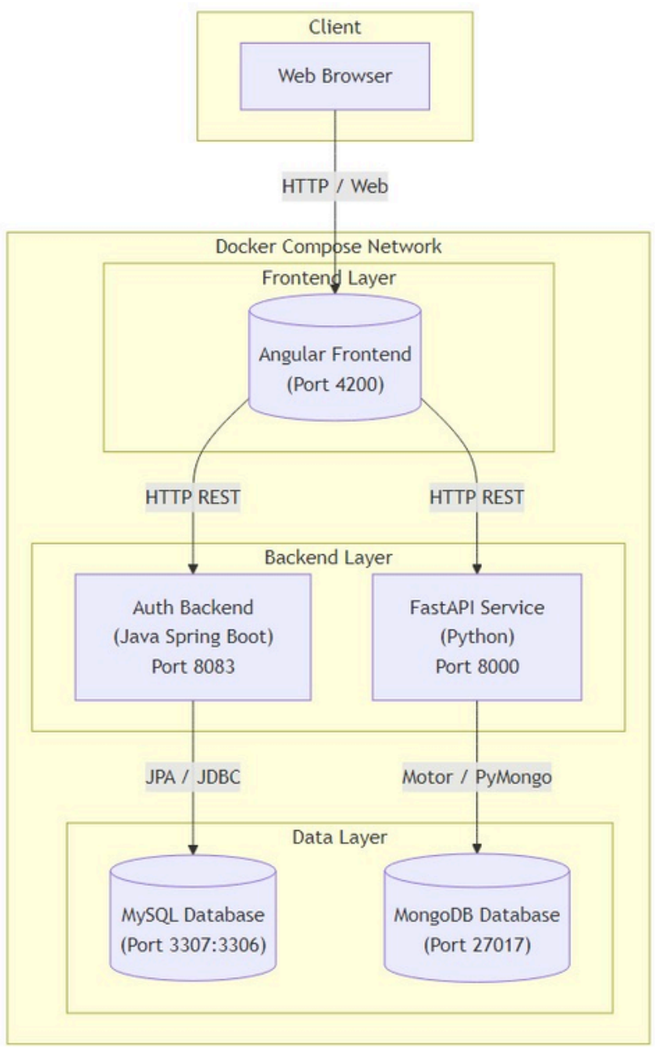
1 BACKGROUND

Driving schools in Colombia face critical challenges due to manual management processes and strict regulatory requirements from the Ministry of Transport. Current disconnected systems lead to inconsistencies in tracking theoretical and practical hours, operational inefficiencies, and compliance risks. There is an urgent need for a centralized, scalable platform to digitize and automate these workflows.

2 GOAL

The goal is to develop 'DriveMaster', a SaaS platform based on microservices architecture to centralize academic and operational management. This solution aims to automate student registration, scheduling, and certificate generation while ensuring regulatory compliance and system scalability.

3 PROPOSED METHODS



We implemented a polyglot microservices architecture utilizing Java (Spring Boot) for secure authentication and Python (FastAPI) for business logic, with an Angular frontend. The infrastructure is containerized using Docker and orchestrated with Docker Compose, ensuring environment consistency, isolation, and portability across development and production stages.

4 ARGUMENTS

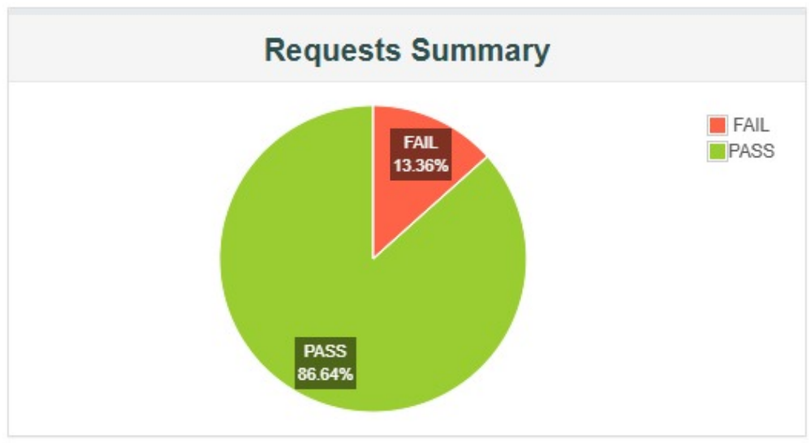
A multi-layered testing strategy was executed to validate functionality and performance:

- Unit Testing: JUnit 5 (Java) and Pytest (Python) with mocks for component isolation.
- Acceptance Testing: Gherkin scenarios executed with Cucumber to validate user workflows.
- Performance Testing: Apache JMeter simulations to evaluate throughput and stability under load. * CI/CD: Automated pipelines via GitHub Actions for continuous integration.

5 RESULTS

High Reliability: Backend services achieved a >90% success rate in unit tests with high code coverage. * Performance: The system handled 561,078 requests with stable response times, validating robustness under load. * Efficiency: Full platform deployment via Docker Compose takes less than 2 minutes, ensuring rapid reproducibility.

- Compliance: Successful validation of hour-tracking algorithms against regulatory rules."



Response Code	Fail	Success	Total
200 (OK)	0	360,200	360,200
400 (Bad Request)	29,200	0	29,200
403 (Forbidden)	171,678	0	171,678
Total	**200,878**	**360,200**	**561,078**

TABLE I
JMETER RESPONSE DISTRIBUTION FOR THE JAVA AUTHENTICATION SERVICE.

6 CONCLUSIONS

DriveMaster successfully modernizes driving school management by centralizing operations into a scalable, microservices-based SaaS platform. The integration of Docker containerization and automated CI/CD pipelines ensures a maintainable and production-ready architecture, effectively solving the challenges of manual compliance tracking and operational fragmentation.

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