UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS
Acreditación Institucional de Alta Calidad

Web Bookstore

Cristian Andres Gamez Nuñez[1], Catherine Melisa Maldonado Melenge[2]
[1,2] Universidad Distrital, Bogotá , Colombia

Introduction

The digitalization of commerce has transformed how books are bought and sold, increasing the demand for scalable and efficient online bookstores. Traditional SQL-based inventory management solutions provide structure and reliability but require complex maintenance. Due to project constraints and the need for flexibility, this project implements a JSON-based storage system. By integrating Java (Spring Boot) and Python (FastAPI) using a microservices architecture, the system ensures modularity and efficiency.

Goal

Research Questions:

- How can we enhance book discoverability and user experience in an online bookstore?
- What essential functionalities are needed for buyers and administrators?

Expected Outcome:
A scalable online bookstore that ensures seamless book discovery, purchasing, and inventory management.

Proposed Solution

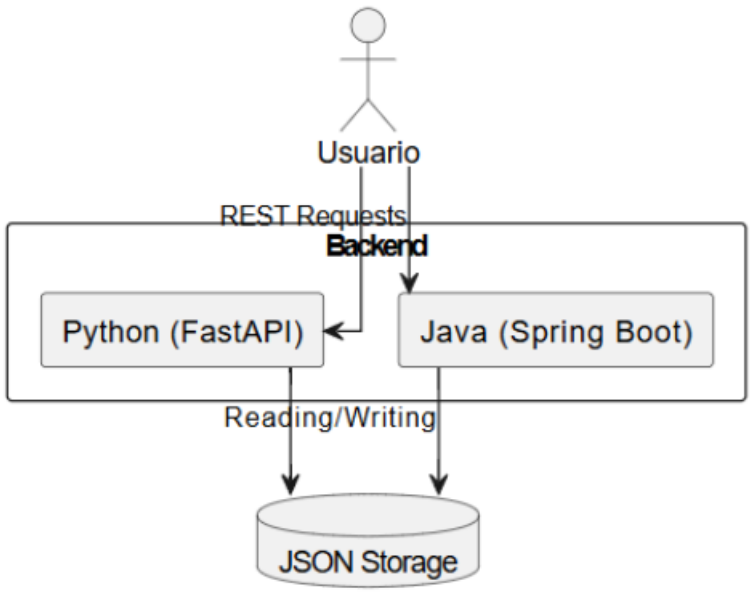
This bookstore platform prioritizes user experience and administrative efficiency through microservices architecture, RESTful APIs, and JSON storage.

Key Technical Considerations:

- Backend Technologies: Java (Spring Boot) & Python (FastAPI).
- Data Storage: JSON for flexibility and schema-free management.

System Features:

- Advanced Book Search (title, author, ISBN).
- Shopping Cart & Transaction Management.
- Efficient Inventory Control.



Results

To validate the effectiveness of the system, different types of tests were designed and applied:

- Unit Tests: Focused on verifying the correct functionality of book management, shopping cart updates, and inventory tracking. These tests ensured that individual components worked as expected.
- Integration Tests: Evaluated how different microservices communicated, ensuring that data consistency and proper API interactions were maintained across the system.
- Performance Tests: Measured system response times under different workloads to assess scalability and identify potential bottlenecks. This helped optimize API calls and data retrieval processes.
- System Stability Tests: Simulated failure scenarios where one or more services were temporarily unavailable. The results demonstrated that the system maintained partial functionality and recovered gracefully, ensuring fault tolerance.

Conclusions

The development of the web bookstore successfully addressed the challenges of book discoverability, user experience, and system scalability. By implementing a microservices-based approach, the platform remains modular, making it easier to expand and maintain. The combination of Java and Python ensures performance and adaptability, while JSON-based storage offers a lightweight yet flexible data management solution. Future work will focus on incorporating AI-driven book recommendations, enhancing security protocols, and refining the overall user experience. Additional improvements may include support for multiple payment integrations and analytics to further optimize the platform's functionality.

Biography

[1] Smith, J. "E-commerce solutions for digital bookstores," IEEE Transactions, 2020.[2] Olsina, L., Lafuente, G., & Rossi, G. Quality Evaluation of E-bookstore Sites.[3] Pleskach, V. et al. Investigating E-Commerce Systems for Book Sales, 2024.