ECOMMERCE - BOGOGO

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INTRODUCTION

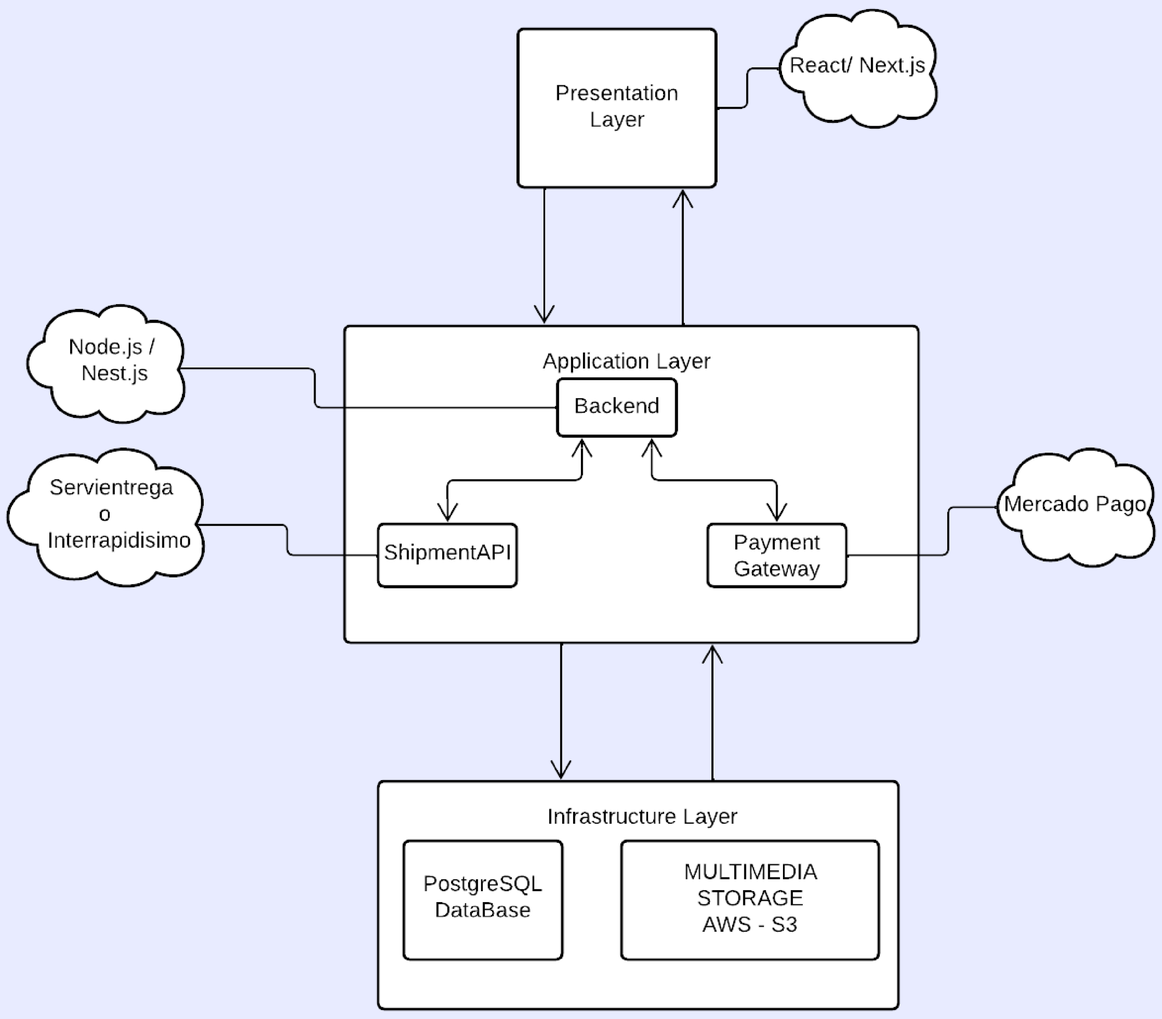
The project addresses the lack of a scalable, locally focused e-commerce platform connecting Bogotá's independent fashion brands with consumers. Existing global solutions meet general needs but overlook local logistics, vendor analytics, and cultural relevance. Prior works show that layered cloud architectures improve scalability and performance, yet challenges remain in ensuring secure multi-role access, real-time analytics, and consistent performance under high demand.

GOAL

The main goal of this work is to design and implement BogoGo, a scalable and secure e-commerce platform that connects local fashion brands and consumers in Bogotá. The research seeks to determine whether a cloud-based three-layer architecture can provide a robust, efficient, and user-centered solution for local e-commerce environments.

SOLUTION

The proposed solution is BogoGo, a cloud-based e-commerce platform built on a three-layer architecture that separates the presentation, application, and data layers to ensure scalability, maintainability, and performance. The presentation layer, developed with React and Next.js, delivers a fast and responsive user interface for customers, vendors, and administrators. The application layer, built with Node.js and NestJS, manages business logic, authentication, and API communication with external services such as Mercado Pago for payments and logistics APIs for deliveries. The infrastructure layer uses PostgreSQL as the relational database for transactional and analytical data, and AWS S3 for multimedia storage. Hosted entirely on Amazon Web Services (AWS), the platform guarantees high availability, low latency, and secure data handling, enabling a reliable and modern shopping experience tailored to Bogotá's local fashion ecosystem.



EXPERIMENTS

To validate BogoGo's functionality and performance, a series of unit, integration, and acceptance tests will ensure compliance with all functional and non-functional requirements. Tests will verify correct operation of product browsing, payments, and user authentication under typical and peak conditions, confirming secure data exchange across all layers. Simulated sessions for customers, vendors, and administrators will assess the fulfillment of user stories, while stress tests will evaluate scalability with up to 500 concurrent users, maintaining an average load time of 1.8 seconds. These validations will confirm the platform's robustness, usability, and efficiency after implementation.

Test Scenario	Expected Response Time	Expected Outcome
Normal load (50 users)	1.2 seconds average page load	Stable system, zero critical errors
Moderate load (250 users)	1.5 seconds average page load	Slight increase, stable performance
Peak load (500 users)	1.8 seconds average page load	No critical failures, minimal latency
Database transactions (PostgreSQL)	< 200 ms query time under peak load	Consistent response time due to indexing strategies

Operation	Expected Behavior
User registration and login	Secure authentication with JWT and encrypted
Product browsing and filtering	Dynamic rendering of product listings with search and
Shopping cart and checkout	Real-time updates and integration with Mercado Pago test
Order tracking	Vendor updates reflected immediately in user
Data analytics dashboard	Real-time report generation through AWS-managed

CONCLUSIONS

The project seeks to fulfill all defined functional and non-functional requirements, ensuring usability, reliability, and performance through the implementation of user stories. Testing is expected to confirm that the proposed three-layer architecture efficiently supports multiple user roles, secure transactions, and real-time analytics. Therefore, it is anticipated that the research question—whether a cloud-based architecture can provide a robust and efficient solution for local e-commerce—will be positively answered once the system's functionality and scalability are validated.

Feature / Aspect	Existing Solutions (e.g., Shopify, Mercado Libre)	Proposed Solution: BogoGo	Strengths / Weaknesses
Architecture	Monolithic or partially modular	Three-layer cloud architecture (AWS, PostgreSQL,	Scalable, maintainable; / Higher initial complexity
Performance	High, but optimized for large-scale cloud services	< 2.5s load time, optimized for 500 users	Meets Web Vitals; / Limited test scope
User Roles	Typically customers and admins	Customers, Vendors, and Admins	Greater role separation and control
Analytics / BI	Often premium or external feature	Integrated real-time BI dashboard	endor insights; /equires data pipeline maintenan
Deployment / Cloud	Proprietary cloud	AWS ecosystem (RDS, S3, EC2)	Flexible, reliable; /Cost scales with usage