

Phase 5

E Commerce Application on IBM Cloud Foundry



1. Introduction

In the everevolving landscape of online retail, the integration of a robust database management system is paramount. This document provides an indepth exploration of the architecture, technologies, and key functionalities of an ecommerce website with a focus on utilizing the DB2 database.

2. System Architecture

The system architecture follows a threetier model, ensuring a clear separation of concerns and facilitating scalability:

Presentation Tier:

User interaction occurs through a modern and responsive interface developed using HTML, CSS, and JavaScript.

React.js is employed to enhance user experience through dynamic and reactive components.

Application Tier:

The backend is powered by Node.js, providing a nonblocking, eventdriven architecture for handling concurrent user requests efficiently.

Express.js serves as the web application framework, simplifying the development of RESTful APIs and handling routing.

Data Tier:

The DB2 database, chosen for its reliability and scalability, constitutes the data tier.

Structured tables store information related to users, products, orders, and other relevant entities.

3. Technologies Used

Frontend Technologies:

HTML, CSS, and JavaScript: Standard technologies for creating a visually appealing and interactive user interface.

React.js: A declarative and efficient JavaScript library for building user interfaces, facilitating the development of dynamic and responsive web pages.

Backend Technologies:

Node.js: An opensource, crossplatform JavaScript runtime environment for executing JavaScript code serverside.

Express.js: A minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications.

Database Technology:

IBM DB2: A reliable, enterprisegrade relational database management system known for its scalability, security features, and support for complex data structures.

4. Database Design

The database design is a critical aspect of the system, ensuring efficient data storage and retrieval. Key entities include:

Users: Storing user information such as username, password (hashed), email, and user roles.

Products: Capturing details like product name, description, price, and availability.

Orders: Managing order information, linking to users, and storing order status.

Cart: Facilitating the storage of selected products before checkout.

Refer to the detailed database schema documentation for a comprehensive view of table structures, relationships, and constraints.

5. User Authentication and Authorization

Authentication:

User authentication is implemented using JSON Web Tokens (JWT) to secure user credentials during login. The process involves:

1. User Registration: Users provide necessary information, and passwords are securely hashed before storage.

2. Login: Successful login generates a JWT, which is used for subsequent authenticated requests.

Authorization:

Rolebased access control ensures that users have appropriate permissions based on their roles (e.g., regular user, admin). Authorization middleware validates access rights for protected routes.

6. Product Management

CRUD Operations:

Product management is facilitated through CRUD (Create, Read, Update, Delete) operations, allowing administrators to:

Create Products: Add new products with details such as name, description, price, and images.

Read Products: Retrieve product information for display on the frontend.

Update Products: Modify product details as needed.

Delete Products: Remove products that are no longer available.

7. Cart and Checkout Process

Cart Management:

Users can add products to their shopping cart, review selected items, and proceed to checkout. The cart management system includes:

Add to Cart: Users can add products to their cart, where the information is temporarily stored.

Review Cart: Users can view and modify their cart contents before proceeding to checkout.

Checkout Process:

The checkout process involves several steps, including:

1. Order Summary: Displaying a summary of selected items and their prices.
2. Address Validation: Verifying userprovided shipping information.
3. Payment Processing: Integration with secure payment gateways for transaction completion.

8. Order Management

Order Processing:

Orders are stored in the DB2 database, creating a seamless process for order management:

Order Creation: When a user completes the checkout process, an order is generated and stored in the database.

Order Status: The system updates the order status throughout the fulfillment process (e.g., processing, shipped, delivered).

Admin Capabilities:

Administrators have access to an admin dashboard with functionalities such as:

Order Tracking: Monitoring the status of orders.

Order Management: Updating order status and handling exceptions.

9. Security Measures

Security Protocols:

The ecommerce platform prioritizes security through various measures:

Encryption: Sensitive data, such as passwords and payment information, is encrypted to prevent unauthorized access.

HTTPS: All communication between the client and server is encrypted using the HTTPS protocol.

Input Validation: User inputs are validated to prevent common security vulnerabilities, such as SQL injection and crosssite scripting (XSS).

Regular Audits: Periodic security audits are conducted to identify and address potential vulnerabilities.

10. Performance Optimization

Strategies Implemented:

To ensure optimal performance, the system employs various strategies:

Caching: Caching mechanisms are implemented to store frequently accessed data, reducing the need for repeated database queries.

Database Indexing: Indexes are created to enhance the speed of data retrieval operations.

CDN Integration: Content Delivery Networks (CDNs) are utilized to distribute static assets, reducing latency and improving page load times.

Performance Monitoring:

Regular performance monitoring is conducted to identify potential bottlenecks and areas for improvement. This includes analyzing server response times, database query performance, and overall system resource utilization.

11. Conclusion

In conclusion, this comprehensive document has provided a detailed overview of the ecommerce website with a DB2 database. The integration of frontend technologies, a robust backend, and the reliability of IBM DB2 ensures a secure, scalable, and efficient platform for online retail. Regular maintenance, updates, and adherence to security best practices are essential for the continued success of the platform in the dynamic ecommerce landscape.

Website View

