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Ecommerce Website Backend Service

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A REPORT

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# Introduction

**Project Overview:** This project focuses on developing the backend web services for an e-commerce website. The system consists of four key services—Customers, Inventory, Sales, and Reviews—which will handle customer registration, product management, sales transactions, and product reviews respectively. These services are designed to interact with each other through API calls, providing a seamless and efficient user experience. The project is containerized using Docker to ensure consistent deployment across various environments. The goal is to build a robust, scalable, and secure backend system that supports an e-commerce platform's core functionalities, such as user management, product inventory, and order processing.

**Objectives:** The main objectives of this project are:

1. To develop four independent backend services for handling customers, inventory, sales, and reviews.
2. To ensure effective inter-service communication via API calls.
3. To utilize Docker for containerization and ensure the services run consistently across different environments.
4. To implement user authentication, error handling, and data validation to ensure the security and reliability of the system.
5. To perform thorough testing using Pytest and validate the system's functionality and performance.
6. To apply professional development practices, such as version control, documentation, and profiling, to ensure the project meets industry standards.
7. To integrate additional features like rate-limiting, logging, and secure configuration management for enhanced functionality and security.

# System Architecture

The system is composed of four backend services—Customers, Inventory, Sales, and Reviews—designed to provide the core functionality of an e-commerce platform. These services interact with each other to manage customer information, product inventory, sales transactions, and product reviews, while ensuring scalability, flexibility, and separation of concerns.

## Customers Service

Responsibilities: The Customers service manages all aspects of customer data, including account creation, management, and updating of personal details. It also handles wallet management, where customers can add or deduct funds for purchases. The service ensures secure customer registration, updates, and retrieves customer information as needed. Additionally, it handles account deletions and allows for querying customer details.

## Inventory Service

Responsibilities: The Inventory service manages the products available for sale. It is responsible for adding new products to the inventory, updating product information (such as price and description), and removing products when necessary. The service ensures that stock levels are properly maintained and allows for tracking of available items for sale. It provides functionality to check and update product availability, ensuring accurate listings on the platform.

## Sales Service

Responsibilities: The Sales service handles all transactions between customers and the platform. It ensures that products are purchased only when sufficient funds are available in the customer's wallet and when the product is in stock. The service processes the transaction by charging the customer’s wallet and updating the inventory to reflect the sale. It also tracks purchase history and maintains records of all transactions for customers.

## Reviews Service

Responsibilities: The Reviews service allows customers to leave feedback on products they have purchased. Customers can provide ratings and comments on products, helping other customers make informed decisions. The service supports moderating reviews to ensure quality and appropriateness of content. It also tracks reviews submitted by each customer and allows for retrieving all reviews related to a specific product.

## Communication Between Services

Each service communicates with others through API calls, ensuring that the system operates in an integrated and seamless manner. For instance, the Sales service communicates with the Customers service to verify available funds in the customer’s wallet and with the Inventory service to ensure product availability before processing a sale. The Reviews service interacts with both the Sales and Inventory services to ensure that only customers who have made a purchase can leave a review for a product.

## Docker Containerization

Each service is containerized using Docker to ensure isolated, consistent environments across development and production stages. Docker provides flexibility in deploying and scaling the services, while ensuring that dependencies and configurations are handled properly. The services are organized into a multi-container setup managed by Docker Compose, which enables streamlined orchestration and deployment.