Requirement Gathering and Analysis Phase

Solution Architecture

Date	6-07-2024
Team ID	SWTID1719933594
Project Name	Project - SHOPEZ
Maximum Marks	4

Solution Architecture

Comparison feature for an E-Commerce Website

1. Functional Requirements

- **User Actions:** Users can add, delete or modify multiple products for comparison.
- **Comparison Attributes:** Users can compare attributes like price, specifications, availability, ratings, and reviews.
- **Functional Buttons:** User should be able to add to cart or buy the products.

2. Non-Functional Requirements

- **Performance:** Fast response times for loading comparison results.
- **Scalability:** Able to handle increasing numbers of products and users.
- **Security:** Secure handling of user data and comparisons.
- **User Appeal:** Should be appealing to the user.

3. System Components

Frontend:

- **Framework: React.js -** Provides a robust frontend framework for building dynamic user interfaces.
- **UI Library: Material-UI -** Provides ready-to-use UI components for a consistent and responsive design.

Backend:

- **Framework: Node.js**- Efficient for handling HTTP requests and serving APIs.
- **APIs: RESTful APIs** for CRUD operations on products and comparisons.
- **Database: MongoDB**- Depending on the structure and complexity of product data. MongoDB is flexible for unstructured data.

Infrastructure:

- **Cloud Platform: AWS** or **Google Cloud Platform (GCP)** - Provides scalability, reliability, and managed services.
- **Database Hosting: MongoDB Atlas** - Managed database services for scalability and reliability.

4. Architecture Diagram

- **User Interface (UI):** React.js frontend with Material-UI components.
- **Application Layer:** Node.js with Express serving RESTful APIs.
- **Data Layer:** MongoDB for storing product data and comparison results.
- **Infrastructure:** Deployed on AWS with Atlas as a database

5. Data Flow

- Users select products and initiate comparison in the frontend.
- Frontend sends API requests to backend services.
- Backend retrieves product data from the database.
- Backend processes comparison logic and returns results to the frontend.

6. Security Considerations

- **Data Encryption:** HTTPS for secure data transmission.
- **Input Validation:** Validate user inputs to prevent injection attacks.

7. Scalability and Performance

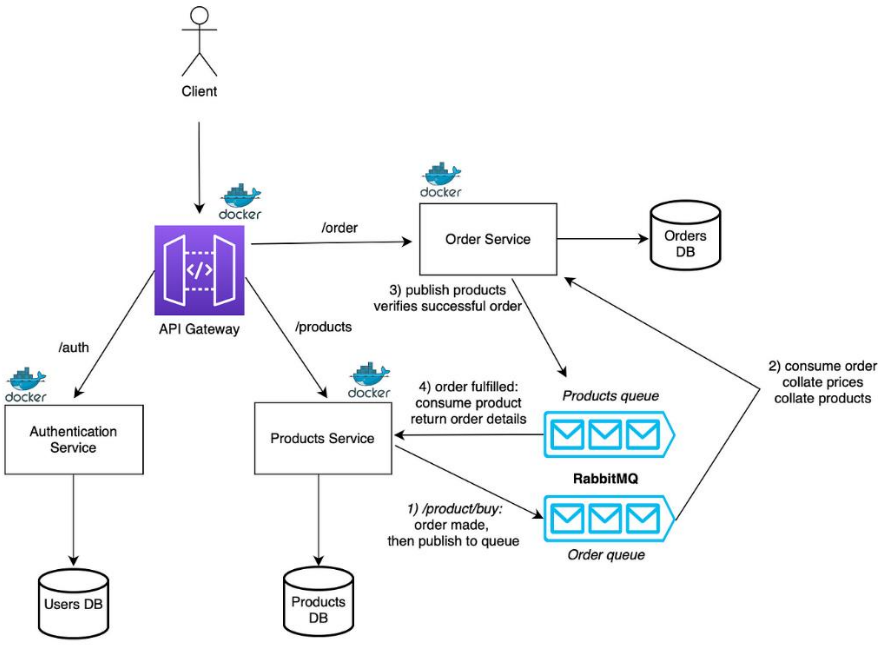
- **Horizontal Scaling:** Autoscaling on AWS EC2 instances based on traffic.
- **Database Scaling:** Vertical scaling with Amazon RDS or MongoDB Atlas.
- **Caching: Redis** for caching frequently accessed data and queries.
- **Load Balancing: AWS Elastic Load Balancing** for distributing traffic across multiple EC2 instances.

8. Deployment Strategy

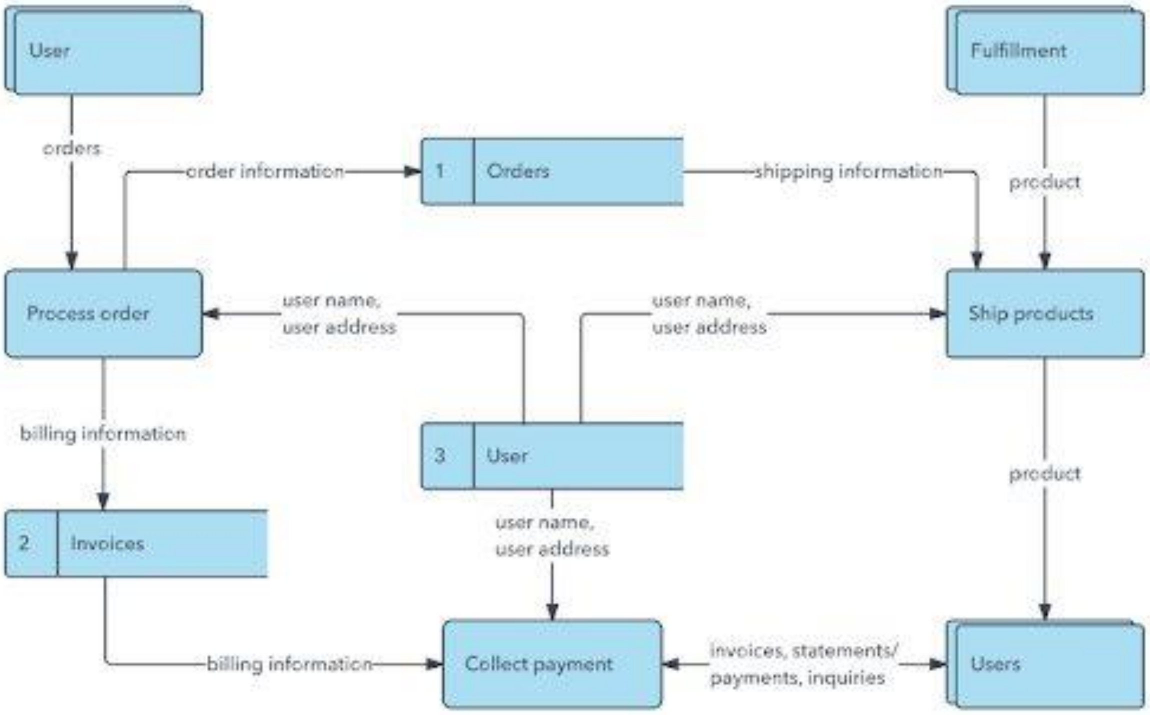
- **Continuous Integration/Continuous Deployment (CI/CD): GitHub Actions** for automated builds and deployments.

9. Documentation

- **API Documentation: Swagger** or **Postman** for documenting API endpoints and usage.
- **System Architecture:** Detailed architecture diagrams and component descriptions.



Client
docker
API Gateway
/order
docker
Order Service
Orders DB
3) publish products verifies successful order
/products
/auth
docker
Authentication Service
Users DB
docker
Products Service
Products DB
4) order fulfilled: consume product return order details
Products queue
RabbitMQ
1) /product/buy: order made, then publish to queue
Order queue
2) consume order collate prices collate products



User
orders
order information
1 Orders
shipping information
Fulfillment
product
Process order
user name, user address
user name, user address
Ship products
billing information
3 User
product
2 Invoices
user name, user address
billing information
Collect payment
invoices, statements/ payments, inquiries
Users