Day- 02, Planning The Technical Foundation

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Day / Time- Wednisday-07 to 10 pm

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Technical Planning Documentation

Overview

This document outlines the technical plan for developing an E-Commerce Marketplace to empower small businesses and individuals by providing a platform to sell their products online. The technical planning follows the brainstorming from Hackathon Day I and incorporates the recommendations from the Day 2 guidelines.

Key Tech nologies

- Frontend: Next.js
- Content Management System (CMS): Sanity
- Order Tracking and Shipment: ShipEngine
- Database: MongoDB (for authentication)
- Hosting and Deployment: Vercel (for frontend) and AWS (for backend) • Payment Gateway. Stripe

Technical Architecture

System Overview

I. Frontend (Next.js):

   a. Client-side rendering for speed and responsiveness.
   b. Server-side rendering for SEO and product page preloading.
   c. Integration with Sanity CMS for dynamic content.

2. Backend:
   a. REST APIs to manage users, products, orders, and delivery zones.
   b. Handles business logic, data validation, and integration with external services.
3. Database (MongoDB):
   a. NoSQL database to manage flexible and scalable data structures.
   b. Collections for products, orders, customers, delivery zones, and user authentication.
4. CMS (Sanity):
   a. Manages dynamic content like banners, featured products, and blog posts.
5. Order Tracking (ShipEngine):
   a. Tracks orders in real time.
   b. Manages shipment and delivery updates.
6. Authentication (MongoDB):
   a. MongoDB stores user credentials securely.
   b. Passwords encrypted with hashing algorithms (e.g., bcrypt).
7. Deployment:
   a. Frontend deployed on Vercel.
   b. Backend deployed on AWS Lambda with serverless architecture.

System Components and Workflow

1 . User Signup/Login:

   a. Input: User credentials (email, password).
   b. Database: MongoDB for storing user data securely with hashed passwords.

   c. API Endpoint: POST / register, POST / login, and GET /verify-route for handling user authentication and verification.
   d. Outcome: JWT token issued for session management.
2. Content Management (Sanity CMS):
   a. Admin Role: Manages product listings, banners, and blog content.
   b. API Integration: GROQ Qeries to fetch content dynamically for frontend.
   c. Outcome: Content stored and updated in Sanity is rendered seamlessly on the Next.js frontend.

3. Product Browsing and Checkout:
   a. Frontend: Next.js provides server-side rendering for product pages.
   b. Database: MongoDB stores product details (name, price, stock, description, sizes, etc.).

- POST /api/products: Add a new product (requires seller role).
- PUT /api/products/:id: Update product details (requires seller role). • DELETE DELETE/api/products/:id: Delete a product (requires seller role).

Order Management

- POST /api/orders: Create a new order.
- GET /api/orders: List all orders for the authenticated user.
- GET /api/orders/:id: Fetch details of a specific order.

Category Management

- GET /api/categories: List all categories.
- POST /api/categories: Add a new category (requires admin role).
- PUT /api/categories/:id: Update category details (requires admin role).
- DELETE /api/categories/:id: Delete a category (requires admin role).

Payment Management

- POST /api/payments: Initiate a payment.
- GET /api/payments/status: Fetch payment status.

Shipment Management

- POST /api/shipments: Create a new shipment.
- GET /api/shipments/track: Track shipment status.

Component Details and Interactions

- Frontend (Next.js):
- Handles user interactions and renders data fetched via APIs.
- Communicates with the backend for authentication, product data, and order processing.

- Backend APIs:
- RESTful endpoints for CRUD operations on users, products, orders, and shipment data.

  - Integrated with ShipEngine and multiple payment gateways for third-party functionality.
  - Database (MongoDB):
  - Stores user, product, and order data.
  - Provides scalable and flexible schema designs for rapid iteration.
  - • Sanity CMS:
  - Manages dynamic content, ensuring marketing and product information stays up-to-date.

Data Schema Updates

Users:

- user_id: Unique identifier for the user.
- username: User's full name.
- email: User's email address.
- password_hash: Encrypted password.
- role: Role of the user (admin, seller, customer).
- order_ids: List of IDs referencing the user's orders.
- product_ids: List of IDs referencing products added by the user (if seller).

Products:

- product_id: Unique identifier for the product.
- name: Name of the product.
- price: Rental cost per day/hour.
- stock: Availability status of the product.
- description: Detailed description of the product.
- image_url: URL of the product image.
- sizes (optional): Available sizes for the product.

Orders:

- order_id: Unique identifier for the order.
- customer_id: Reference to the customer placing the order.
- product_id: Reference to the rented product.
- quantity: Number of products rented.
- status: Current status (e.g., Pending, Confirmed, Completed).
- order_date: Timestamp of when the order was placed.

Delivery Zones:

- zone_id: Unique identifier for the delivery zone.
- zone_name: Name of the delivery area.
- coverage_area: Geographic coverage of the delivery zone.
- drivers: List of drivers assigned to the zone.

Sellers:

- seller_id: Unique identifier for the seller.

- name: Full name of the seller.
- email: Email address of the seller.
- products: List of product IDs listed by the seller.
- delivery_zones: List of delivery zones managed by the seller.

Relationships

1. User and Orders:

2. Orders and Products:
    a. One order can include multiple products, and each product can be part of multiple orders (Many-to-Many relationship).
3. Seller and Products:
    a. One seller can list multiple products (One-to-Many relationship).
4. Seller and Delivery Zones:
    a. One seller can manage multiple delivery zones, and one delivery zone can have multiple sellers (Many-to-Many relationship).
5. Payments and Orders:
    a. Each payment is associated with exactly one order (One-to-One relationship).

7. Delivery Zones and Drivers:
    a. One delivery zone can include multiple drivers (One-to-Many relationship).

Integration Details

Sanity CMS

- Used to manage dynamic content such as:

- Homepage banners. o Category highlights.
- Blog posts for marketing.
- Sanity's GROQ Query API will be used to fetch content dynamically.

ShipEngine

- API used to:
- Generate shipping labels.
- Track shipments.
- Provide real-time delivery updates.
- user_id (mandatory): ID of the seller who listed the product.

  - Managing subscriptions (if applicable).
  - Handling refunds and payment disputes.

Deployment Plan

Frontend (Next.js)

- Hosting: Vercel.
- CI/CD: Automatically deploy changes from the GitHub repository.

Backend

- Hosting: AWS Lambda with serverless architecture.
- Scaling: Automatic scaling based on traffic.

Database (MongoDB)

- Hosting: MongoDB Atlas.
- Backups: Automated daily backups.
- Scaling: Horizontal scaling for handling high traffic.

Security Considerations

1. Data Encryption:
    a. Use HTTPS for all communications.
    b. Encrypt sensitive user data (e.g., passwords).
2. Authentication and Authorization:
    a. MongoDB stores and validates credentials securely.
    b. Role-based access control for admin and users.
3. Payment Security:
    a. Use PCI-compliant Stripe APIs for payment processing.
    a. One user can have multiple orders (One-to-Many relationship).
6. User and Products:
    a. One user can list multiple products (One-to-Many relationship).

    a. New Relic for application performance.
    b. CloudWatch for serverless logs.
2. Error Tracking:
    a. Sentry for real-time error tracking and debugging.
3. Maintenance:
    a. Weekly database maintenance and optimization.
    b. Regular updates for dependencies to fix vulnerabilities.

Timeline

1 . Day 3:
    a. Set up Next.js project structure.
    b. Configure Sanity CMS.
    c. Implement user authentication.

2. Day 4, 5:
    a. Develop product listing and detail pages.
    b. Integrate ShipEngine for order tracking.

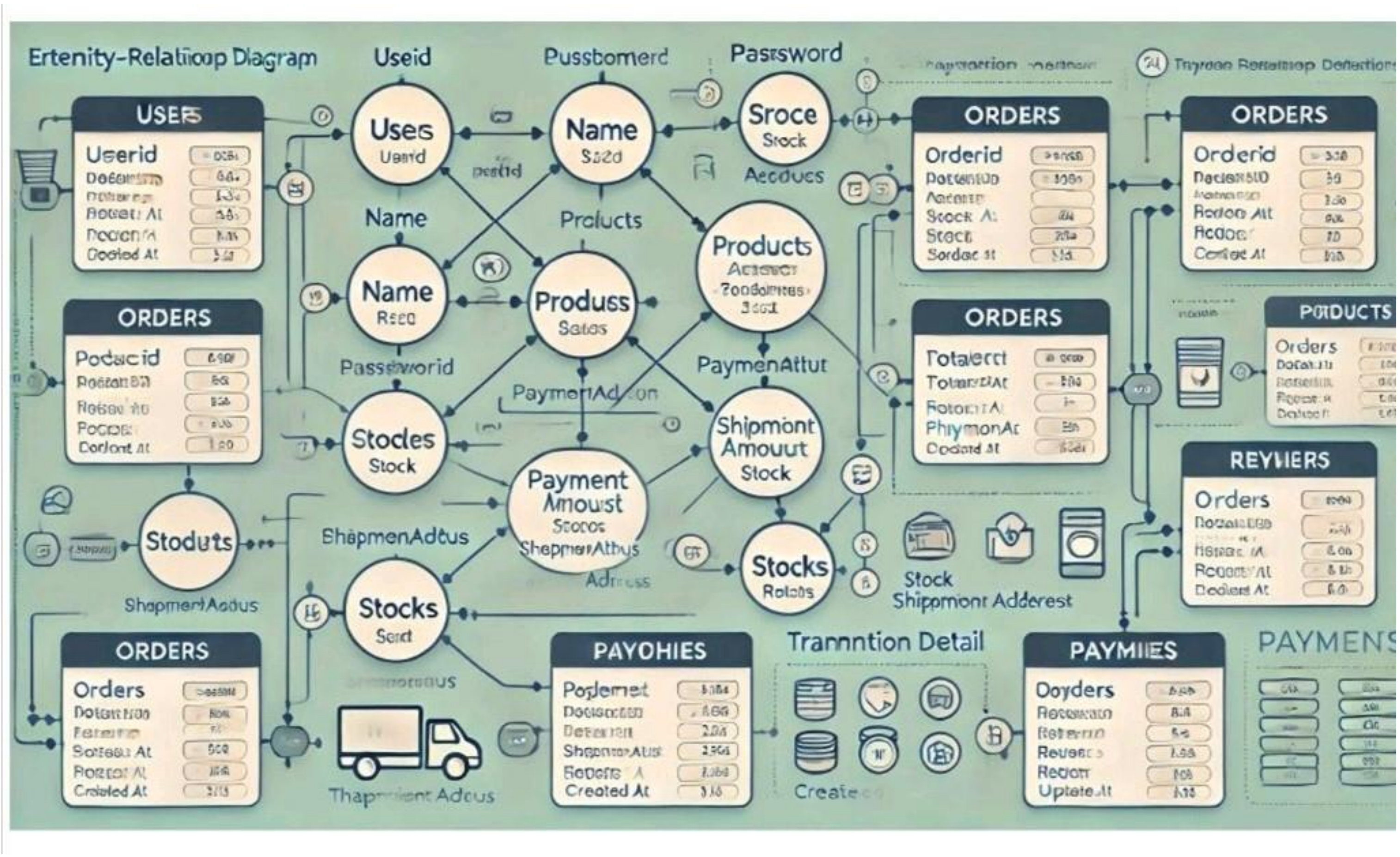
    c. Build backend APIs for orders and products.
3. Day 6:
    a. Finalize payment gateway integration.
    b. Implement delivery zones management.
    c. Test and optimize API performance.
4. Day 7:
    a. Perform end-to-end testing.
    b. Deploy the application.
    c. Monitor performance and fix any post-deployment issues.

Stripe Integration

- Used for:
- Processing payments securely.

Conclusion

This technical plan ensures a robust foundation for the marketplace, leveraging modern technologies to deliver a seamless and scalable platform for small businesses and customers alike.



4. API Security:

   a. Rate limiting to prevent abuse.

   b. Input validation to avoid SQL injection and XSS.

Monitoring and Maintenance

I. Monitoring Tools: