**Data Requirements**

**Data Entities**

**- Users**

- User ID: String (Unique identifier)

- Name: String

- Email: String (Unique, validation required)

- Password: String (Hashed)

- Role: Enum (Buyer, Seller, Admin)

- Address: String

- Phone Number: String

**- Products**

- Product ID: String (Unique identifier)

- Seller ID: String (Reference to Users)

- Title: String

- Description: String

- Price: Decimal

- Stock Quantity: Integer

- Category: String

- Images: Array of Strings (URLs)

- Orders

- Order ID: String (Unique identifier)

- Buyer ID: String (Reference to Users)

- Product ID: String (Reference to Products)

- Order Date: Date Time

- Quantity: Integer

- Total Price: Decimal

- Status: Enum (Pending, Shipped, Delivered, Cancelled)

**- Reviews**

- Review ID: String (Unique identifier)

- Product ID: String (Reference to Products)

- User ID: String (Reference to Users)

- Rating: Integer (1-5)

- Comment: String

- Review Date: Date Time

**Data Relationships**

- One-to-many relationship between Users (seller) and Products

- One-to-many relationship between Users (buyer) and Orders

- One-to-many relationship between Products and Reviews

**Algorithm Designs**

User Authentication Algorithm

- Step 1: Accept user credentials (email & password).

- Step 2: Fetch user data based on email.

- Step 3: Verify hashed password with stored hash.

- Step 4: If valid, create a session token; else return an error message.

3.2 Product Search Algorithm

- Step 1: Accept search query and category filter.

- Step 2: Parse the search query for keywords.

- Step 3: Query the database for products matching keywords and filters.

- Step 4: Rank results based on relevance and return structured output.

**Order Processing Algorithm**

- Step 1: Accept Order ID and perform validation.

- Step 2: Fetch order details, validate stock levels.

- Step 3: Update stock levels in the database.

- Step 4: Change order status to ‘Shipped’.

- Step 5: Notify seller and buyer via email.

**Review Submission Algorithm**

- Step 1: Accept Review details from user.

- Step 2: Validate product and user IDs.

- Step 3: Insert review into the database.

- Step 4: Update product average rating.

- Step 5: Notify the seller about the new review.

**Cart Management Algorithm**

- Step 1: Accept user ID and product ID to add to the cart.

- Step 2: Fetch the user’s current cart from the database.

- Step 3: Update the cart with new product ID and quantity.

- Step 4: Save updated cart back to the database.