E-Commerce Multivendor Platform - Requirement Analysis

Project Overview:

The E-Commerce Multivendor Platform is a system where multiple vendors can list products for sale, and customers can browse, select, and purchase items. The platform will facilitate secure payments, manage customer interactions, and ensure timely delivery of products. The system will also handle returns, refunds, and customer service through support tickets.

Entities and Attributes:

1. **Vendor:**
   - Attributes:
     - vendorId (Primary Key)
     - name
     - email
     - password
     - address
     - phoneNumber
     - rating
     - bankDetails
   - Relationships:
     - One-to-Many with Product
     - One-to-Many with Order

2. **Product:**
   - Attributes:
     - productId (Primary Key)
     - name
     - description
     - price
     - stock
     - category
     - discount
     - vendorId (Foreign Key)
   - Relationships:
     - Many-to-One with Vendor
     - Many-to-One with Category
     - One-to-Many with Review

- Many-to-Many with Cart

3. **Customer:**
    - Attributes:
        - customerId (Primary Key)
        - name
        - email
        - password
        - address
        - phoneNumber
    - Relationships:
        - One-to-Many with Order
        - One-to-Many with Review
        - One-to-Many with SupportTicket

4. **Order:**
    - Attributes:
        - orderId (Primary Key)
        - orderDate
        - status (Pending, Shipped, Delivered, Cancelled)
        - totalAmount
        - paymentStatus
        - shipmentId (Foreign Key)
        - customerId (Foreign Key)
        - vendorId (Foreign Key)
    - Relationships:
        - Many-to-One with Customer
        - Many-to-One with Vendor
        - One-to-One with Shipment
        - Many-to-One with Cart

5. **Cart:**
    - Attributes:
        - cartId (Primary Key)
        - customerId (Foreign Key)
        - totalAmount
    - Relationships:
        - Many-to-Many with Product

- One-to-Many with Order

6. **Payment:**
   - Attributes:
     - paymentId (Primary Key)
     - amount
     - paymentMethod (Credit Card, Debit Card, PayPal, etc.)
     - paymentStatus
     - orderId (Foreign Key)
   - Relationships:
     - One-to-One with Order

7. **Review:**
   - Attributes:
     - reviewId (Primary Key)
     - rating
     - comment
     - productId (Foreign Key)
     - customerId (Foreign Key)
   - Relationships:
     - Many-to-One with Product
     - Many-to-One with Customer

8. **Discount:**
   - Attributes:
     - discountId (Primary Key)
     - discountCode
     - percentage
     - expiryDate
   - Relationships:
     - Many-to-One with Product

9. **Invoice:**
   - Attributes:
     - invoiceId (Primary Key)
     - orderId (Foreign Key)
     - invoiceDate
     - totalAmount
   - Relationships:

- One-to-One with Order

10. **Shipment:**
    - Attributes:
        - shipmentId (Primary Key)
        - shippingDate
        - estimatedDelivery
        - deliveryStatus
        - deliveryAddress
        - orderId (Foreign Key)
    - Relationships:
        - One-to-One with Order

11. **Category:**
    - Attributes:
        - categoryId (Primary Key)
        - categoryName
        - description
    - Relationships:
        - One-to-Many with Product

12. **Delivery:**
    - Attributes:
        - deliveryId (Primary Key)
        - shipmentId (Foreign Key)
        - deliveryDate
        - deliveredBy
    - Relationships:
        - Many-to-One with Shipment

13. **Refund:**
    - Attributes:
        - refundId (Primary Key)
        - orderId (Foreign Key)
        - refundAmount
        - refundDate
    - Relationships:
        - One-to-One with Order

14. **SupportTicket:**

- o Attributes:
    - ticketId (Primary Key)
    - issueDescription
    - status
    - customerId (Foreign Key)
- o Relationships:
    - Many-to-One with Customer

15. **Coupon:**
    - o Attributes:
        - couponId (Primary Key)
        - couponCode
        - discountPercentage
        - expiryDate
    - o Relationships:
        - Many-to-One with Product

Modules and Features:

1. **Vendor Management:**
    - o Features:
        - Vendor registration and login.
        - Manage product listings, including adding, updating, and removing products.
        - View and manage orders, returns, and shipments.
        - View sales reports and product performance.
    - o Entities Involved: Vendor, Product, Order

2. **Product Management:**
    - o Features:
        - Categorization of products.
        - Manage stock levels, pricing, and discounts.
        - Add reviews and ratings.
    - o Entities Involved: Product, Category, Discount, Review

3. **Order Management:**
    - o Features:
        - Place and track orders.
        - Handle order cancellations and returns.
        - Generate invoices and manage order history.

- Entities Involved: Order, Customer, Invoice

4. **Payment Gateway:**

   - Features:

     - Secure payment processing.

     - Handle refunds and commissions.

     - View payment history and transaction status.

   - Entities Involved: Payment, Order, Refund

5. **Customer Service:**

   - Features:

     - Manage customer support tickets.

     - Address complaints and issues.

   - Entities Involved: SupportTicket, Customer

6. **Shipment and Delivery:**

   - Features:

     - Integrate with third-party shipping services.

     - Track orders in transit.

     - Manage delivery schedules and update order statuses.

   - Entities Involved: Shipment, Delivery

7. **Reporting Module:**

   - Features:

     - Generate reports on sales, product performance, vendor performance, and customer interactions.

     - Provide insights through dashboards and graphical reports.

   - Entities Involved: Vendor, Order, Product

Functional Requirements:

- Vendors can register, manage their products, and track orders.

- Customers can browse products, add to cart, and checkout.

- Support for multiple payment gateways.

- Secure transaction processing.

- Real-time shipment tracking for orders.

- Comprehensive reports for vendors and administrators.

Non-Functional Requirements:

- **Scalability:** Should handle increasing vendors and customers.

- **Performance:** Optimized product searches and order placements.

- **Security:** Secure payments and data protection for users.

This analysis serves as the blueprint for the E-Commerce Multivendor Platform development.

E-Commerce Multivendor Platform - Detailed Modules Description

Here's a more in-depth description of each module for your project, covering the functionalities, entities, and operations involved:

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1. Vendor Management Module:

This module is responsible for managing all vendor-related activities, from product management to order tracking and handling returns.

Key Features:

- **Vendor Registration & Authentication:**
    - Vendors can sign up and create their accounts by providing information like business name, email, password, and address.
    - Login functionality with secure authentication.

- **Vendor Dashboard:**
    - Displays an overview of sales, orders, and performance.
    - Analytics for product performance and order status.

- **Product Management:**
    - Vendors can create, update, and delete their product listings.
    - Manage product information like name, description, price, stock, discounts, and category assignment.

- **Order Management for Vendors:**
    - View all placed orders, including their statuses (pending, shipped, delivered).
    - Handle order cancellations, returns, and refunds.
    - View transaction details, such as customer information and payment status.

- **Sales Reports:**
    - Generate reports on monthly/weekly sales, revenue, and product performance.
    - Insights into the most popular products.

Entities Involved:

- Vendor
- Product
- Order
- Invoice
- Shipment

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2. Product Management Module:

This module is responsible for the entire lifecycle of products available on the platform, including categorization, discounts, and stock management.

Key Features:

- **Product Listings:**
    - Vendors can list new products with attributes such as name, description, price, stock, images, and related categories.

- **Product Categories:**
    - Products are categorized (e.g., electronics, clothing) for easy navigation.
    - Category management functionality allows administrators to create, edit, or remove categories.

- **Discount Management:**
    - Vendors can assign discounts to products, set discount periods, and apply promotional offers.

- **Product Reviews:**
    - Customers can leave reviews and ratings on purchased products.
    - Vendors can view product reviews to assess customer feedback and improve offerings.

- **Stock Management:**
    - Real-time stock updates whenever a product is purchased or a return is processed.
    - Alert vendors when stock levels are low.

Entities Involved:

- Product
- Category
- Discount
- Review

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3. Order Management Module:

This module handles the complete order lifecycle, from cart to checkout, tracking, and returns.

Key Features:

- **Cart Management:**
    - Customers can add products to their cart.
    - Ability to update quantities or remove items.
    - Calculation of cart total, applying coupons or discounts.

- **Order Placement:**
    - Once the cart is finalized, customers proceed to checkout.
    - Customers provide shipping and billing details.
    - Order summary and confirmation.

- **Order Tracking:**
    - Customers can track the status of their orders: placed, shipped, in transit, delivered.
    - Vendors can update the order status (e.g., shipped, out for delivery).

- **Order Cancellation and Return:**

- o Customers can request an order cancellation before it's shipped.
- o Return functionality for delivered products (based on the platform's return policies).

- **Invoice Generation:**
    - o Upon successful order placement, an invoice is generated.
    - o Invoices can be downloaded by customers and vendors.

Entities Involved:

- Order
- Cart
- Invoice
- Shipment
- Refund

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4. Payment Gateway Module:

This module ensures secure and seamless payment transactions between customers and vendors, handling refunds and commission payments to the platform.

Key Features:

- **Payment Processing:**
    - o Supports multiple payment options: Credit/Debit Cards, PayPal, Net Banking, UPI, etc.
    - o Integration with third-party payment processors to ensure secure transactions.

- **Payment Status Management:**
    - o Payment statuses like 'Pending', 'Completed', and 'Failed' are updated and displayed for customers and vendors.

- **Refund Processing:**
    - o In case of product returns, refund processes are handled.
    - o Commission calculations for the platform and vendors during refund transactions.

- **Payment History:**
    - o Both customers and vendors can view their payment history, including successful and failed transactions.

Entities Involved:

- Payment
- Order
- Refund

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5. Customer Service Module:

This module provides a platform for customers to raise complaints and manage their queries through support tickets.

Key Features:

- **Support Ticket Creation:**

  - Customers can raise tickets for issues such as order delays, defective products, payment failures, etc.

  - Support ticket statuses (e.g., open, in-progress, closed) are tracked.

- **Customer Query Management:**

  - Support staff can view and respond to customer issues.

  - Update ticket status as the issue is resolved.

- **Response and Resolution:**

  - Automatic notifications to customers when their ticket is updated or resolved.

Entities Involved:

- SupportTicket

- Customer

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6. Shipment and Delivery Module:

This module tracks the logistics of product shipments and deliveries to ensure smooth and timely deliveries.

Key Features:

- **Shipment Tracking:**

  - Integration with third-party logistics providers for real-time tracking of orders in transit.

  - Track shipments from order dispatch to delivery.

- **Delivery Scheduling:**

  - Customers can select delivery options, such as standard or express delivery.

- **Order Delivery Confirmation:**

  - Upon successful delivery, customers confirm the receipt of products.

- **Return Shipments:**

  - Manage the logistics of product returns, including shipment tracking of returned items.

Entities Involved:

- Shipment

- Delivery

- Order

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7. Reporting Module:

This module provides detailed insights and reports for both vendors and administrators to analyze performance.

Key Features:

- **Sales Reports:**

- o Vendors can generate reports on sales, revenue, most popular products, and periods of high activity.

- **Performance Reports:**

  - o Generate performance reports for vendors, showing sales, returns, and customer ratings.

- **Customer Insights:**

  - o Reports on customer behavior, including most frequent buyers, high-value orders, and product preferences.

- **Platform-Wide Analytics:**

  - o Administrators can generate reports on total sales, vendor performances, and overall platform revenue.

Entities Involved:

- Vendor

- Order

- Product

Additional Features to Consider:

- **Coupon and Discount Management:**

  - o Customers can apply coupons at checkout.

  - o Coupons can be issued for specific products, categories, or customers.

- **Notifications System:**

  - o Real-time notifications for order status updates, shipment tracking, payment confirmations, and support ticket updates.

- **Security Features:**

  - o Data encryption for secure payment processing.

  - o User authentication and role-based access control (e.g., vendor, customer, admin).

User Roles and Access:

- **Admin:**

  - o Full access to all modules.

  - o Can manage vendors, customers, and products.

  - o Can view and manage all orders, payments, refunds, and reports.

- **Vendor:**

  - o Can manage their products, view orders, track shipments, and handle returns.

  - o Can generate reports for their own performance.

- **Customer:**

  - o Can browse products, manage their cart, place orders, and track shipments.

- o   Can raise support tickets and request refunds.

This detailed module breakdown provides a comprehensive roadmap for building the E-Commerce Multivendor Platform using Core Java, Collections, and Hibernate as the ORM tool. Each module serves a critical function in managing the flow of vendors, products, customers, orders, and payments across the system.

E-Commerce Multivendor Platform - Detailed Workflow

This workflow explains how each module interacts in the E-Commerce Multivendor Platform using Core Java, Collections, and Hibernate as the ORM tool. The workflow is divided into the user roles (Admin, Vendor, and Customer) and outlines how various entities interact in the system from registration to order completion, including detailed steps for handling products, payments, shipments, and returns.

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1. User Registration and Authentication Workflow

Actors Involved:

- **Customer**

- **Vendor**

- **Admin**

Steps:

1. **User Registration:**

   o   A new user (Customer or Vendor) visits the platform and initiates the registration process.

   o   The user fills out their personal details (e.g., email, name, password, address for customers, and business details for vendors).

   o   The system validates the data and creates a new Customer or Vendor entity in the database using Hibernate.

2. **User Authentication:**

   o   Registered users log in with their email and password.

   o   The system authenticates the user credentials against the stored data using encryption for secure access.

   o   Once authenticated, users are redirected to their respective dashboards (Customer or Vendor Dashboard).

Entities Involved:

- Customer

- Vendor

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2. Product Management Workflow (Vendor)

Actors Involved:

- **Vendor**

- **Admin** (for category management)

Steps:

1. **Product Listing by Vendor:**

   o   Vendors log in to their accounts and navigate to the product management section of their dashboard.

   o   The vendor adds new products by filling out information such as product name, description, price, images, stock availability, and applicable discounts.

- The vendor assigns the product to one or more categories (e.g., electronics, fashion) from the list of categories managed by the admin.
- The system creates a new Product entity in the database using Hibernate.

2. **Product Updates:**

- Vendors can update product details such as price, description, stock levels, or apply new discounts at any time.
- The system updates the existing Product entity in the database.

3. **Product Deletion:**

- Vendors can delete products that they no longer wish to sell.
- The system marks the product as inactive in the database to retain historical sales data for reporting.

Entities Involved:

- Product
- Category
- Discount

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3. Customer Browsing and Cart Management Workflow

Actors Involved:

- **Customer**

Steps:

1. **Product Browsing:**

- The customer logs in and browses the product catalog, which displays products categorized by type.
- Customers can use filters like price range, category, and rating to narrow down their search.
- The system queries the Product and Category entities using Hibernate to retrieve and display products that meet the customer's criteria.

2. **Add to Cart:**

- The customer selects a product and adds it to their shopping cart.
- The system creates or updates a Cart entity for the customer, which holds the selected products along with their quantities, price, and discounts applied.

3. **View Cart:**

- The customer views their cart and can update the quantity of items, remove items, or apply discount codes.
- The system recalculates the cart total and applies any valid Coupon or Discount.

4. **Checkout:**

- Once the customer finalizes the items in their cart, they proceed to checkout.
- The customer provides or confirms shipping and billing information.

Entities Involved:

- Product

- Cart

- Category

- Coupon

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4. Order Management Workflow

Actors Involved:

- **Customer**

- **Vendor**

Steps:

1. **Order Placement:**

   o After the customer confirms the cart, an Order entity is created, capturing the order details such as items purchased, quantity, customer details, shipping address, and total amount.

   o The system generates an Invoice for the customer and sends an order confirmation notification.

2. **Order Processing (Vendor):**

   o The vendor receives a notification about the new order and checks the order details in their dashboard.

   o The vendor updates the order status to "Processed" and prepares the items for shipment.

3. **Shipment Initiation:**

   o Once the items are ready, the vendor dispatches the order, and the system creates a Shipment entity, linking it with the Order.

   o The system updates the order status to "Shipped" and provides shipment tracking details to the customer.

4. **Order Tracking:**

   o The customer can track the shipment's progress via their dashboard, where the system fetches the latest status from the Shipment entity.

5. **Order Delivery and Confirmation:**

   o Upon delivery, the customer confirms receipt, and the system updates the order status to "Delivered".

   o The order is marked as complete, and the transaction details are archived for reporting purposes.

Entities Involved:

- Order

- Invoice

- Shipment

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5. Payment Gateway Workflow

Actors Involved:

- **Customer**
- **Vendor**
- **Payment Gateway**

Steps:

1. **Payment Selection:**

   o During checkout, the customer selects a payment method (e.g., credit card, debit card, UPI, etc.).

   o The system displays the total amount to be paid, including discounts, taxes, and shipping fees.

2. **Payment Processing:**

   o The system initiates the payment request with the selected payment gateway.

   o Once the payment is authorized, the system updates the Payment entity with the status "Completed".

3. **Order Confirmation:**

   o Upon successful payment, the system confirms the order placement.

   o In case of payment failure, the customer is prompted to try another payment method.

4. **Vendor Payout and Platform Commission:**

   o The system calculates the commission owed to the platform based on the total sale amount.

   o The vendor receives their payout after deducting the platform's commission.

   o Payment details are recorded in the Invoice entity.

Entities Involved:

- Payment
- Invoice
- Order

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6. Customer Support and Ticket Workflow

Actors Involved:

- **Customer**
- **Admin**

Steps:

1. **Raising a Support Ticket:**

   o If the customer encounters an issue (e.g., delayed shipment, defective product), they can raise a SupportTicket through their account.

   o The customer provides a description of the issue and attaches any relevant order information.

2. **Ticket Assignment and Response:**

   o The system assigns the ticket to a customer support agent, who reviews the issue.

   o The support team responds to the ticket, providing updates or requesting additional information.

3. **Issue Resolution:**

      o Once the issue is resolved (e.g., refund, replacement shipment), the system marks the ticket as "Closed".

      o The customer is notified of the resolution.

Entities Involved:

- SupportTicket

- Order

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7. Refund and Return Workflow

Actors Involved:

- **Customer**

- **Vendor**

Steps:

   1. **Return Request:**

      o Customers can request a return if they are dissatisfied with a product, initiating the return process from their order history.

      o The system checks if the product is eligible for return (based on return policies) and generates a return request.

   2. **Return Approval by Vendor:**

      o The vendor receives the return request and either approves or rejects it based on the condition and policies.

      o If approved, the system creates a Refund entity and initiates the return shipment.

   3. **Return Shipment:**

      o The system generates a return shipment label, and the customer sends back the product.

      o Once the product is received by the vendor, the system confirms the return.

   4. **Refund Processing:**

      o Upon successful return, the system processes the refund and updates the Payment entity to reflect the refund status.

      o The customer is notified about the refund being processed, and the refund is credited back to their payment method.

Entities Involved:

- Refund

- Order

- Payment

- Shipment

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8. Reporting and Analytics Workflow

Actors Involved:

- **Admin**
- **Vendor**

Steps:

1. **Vendor Reports:**
   - Vendors can generate reports on their sales, including total revenue, top-selling products, and customer reviews.
   - Reports are generated by querying the Order, Product, and Review entities and presented in a dashboard.

2. **Admin Reports:**
   - The admin can generate platform-wide reports, including total sales, active vendors, order statuses, and shipment details.
   - Analytical reports are created for better insights into the marketplace performance and trends.

Entities Involved:

- Order
- Product
- Vendor
- Shipment
- Review

This workflow outlines how each process interacts with various modules of the system, ensuring a seamless experience for vendors, customers, and the admin. The use of Core Java, Collections, and Hibernate ensures smooth data management and interaction between entities throughout the workflow.