IT314 - Software Engineering

POS System Lab by Dev Vyas

Student ID : 202201453

Use Case: Process Sale

Description:
The "Process Sale" use case represents the transaction where a customer purchases goods at a POS counter. The cashier scans the items, the system retrieves the details from the backend catalog and inventory systems, and the customer completes the transaction by paying through various payment methods. The system also handles gift coupons for promotional discounts.

Primary Actor: Cashier
Supporting Actors: Customer, Inventory System, Catalog System, Payment Gateway
Preconditions:

- The cashier is logged into the POS system.
- The system is connected to the catalog and inventory systems.

Basic Flow:

1. The cashier starts a new sale transaction.
2. The cashier scans the barcode of the goods using the scanner.
3. The system retrieves the item’s details (name, price) from the catalog system.
4. The system interacts with the inventory system to update the stock amount for each good.
5. The system calculates the total price of all scanned items and displays it.
6. The customer presents any applicable gift coupons.
7. The system applies the discount for valid coupons and updates the total price.
8. The customer selects the payment method (cash, credit card, check).
9. The system processes the payment using the selected payment method.
    - For card or check payments, the system verifies the payment details with the payment gateway.
10. If the payment is successful, the system prints a receipt for the customer.
11. The sale is finalized, and the inventory is updated.

Postconditions:

- The sale transaction is recorded.
- The inventory system reflects the reduced stock for the items sold.
- A receipt is printed and handed to the customer.

Extensions:

- [Step 3] If the item’s barcode is not recognized, the cashier manually enters the details or searches for the item.
- [Step 9] If the payment is declined, the cashier asks the customer to try a different payment method.
- [Step 7] If the coupon is invalid or expired, the system notifies the cashier, and the sale proceeds without applying the coupon.

Use Case: Handle Return

Description:
The "Handle Return" use case describes the process where a customer returns previously purchased goods. The cashier initiates the return, scans the items, and the system verifies the purchase details. Once validated, the system updates the inventory and processes the refund based on the original payment method or offers store credit.

Primary Actor: Cashier
Supporting Actors: Customer, Inventory System, Catalog System, Payment Gateway
Preconditions:

- The cashier is logged into the system.
- The customer has a receipt for the original purchase.

Basic Flow:

1. The cashier initiates a return process.
2. The customer presents the receipt and the items they wish to return.
3. The cashier scans the barcode of each item.
4. The system verifies the original sale transaction by cross-referencing the receipt details.
5. The system checks if the item is eligible for return based on store policy (return window, item condition).
6. The system adjusts the inventory to reflect the return of the item.
7. The system calculates the refund amount (based on the original purchase price).
8. The customer selects the refund method (cash, store credit, or original payment method).
9. The system processes the refund.
    - If using the original payment method, the system communicates with the payment gateway to process the refund.
10. The system prints a return receipt for the customer.
11. The return transaction is completed.

Postconditions:

- The return transaction is recorded.
- The inventory is updated to reflect the returned items.
- A return receipt is printed and handed to the customer.

Extensions:

- [Step 5] If the return policy is not met (e.g., the item is beyond the return window or damaged), the cashier may offer store credit or escalate to management.
- [Step 8] If the original payment method cannot be refunded (e.g., card expired), the system offers an alternative (e.g., store credit or cash).

Entity and Boundary Control Objects

Entity Objects

1. **Product**
   - Attributes: ProductID, Name, Price, StockQuantity
   - Description: Represents goods available for sale.
2. **Transaction**
   - Attributes: TransactionID, Date, TotalAmount, PaymentMethod
   - Description: Represents a sale transaction.
3. **Coupon**
   - Attributes: CouponID, DiscountAmount, ExpiryDate
   - Description: Represents promotional coupons for discounts.
4. **User**
   - Attributes: UserID, Username, Password, Role (Cashier/Admin)
   - Description: Represents the users of the POS system.

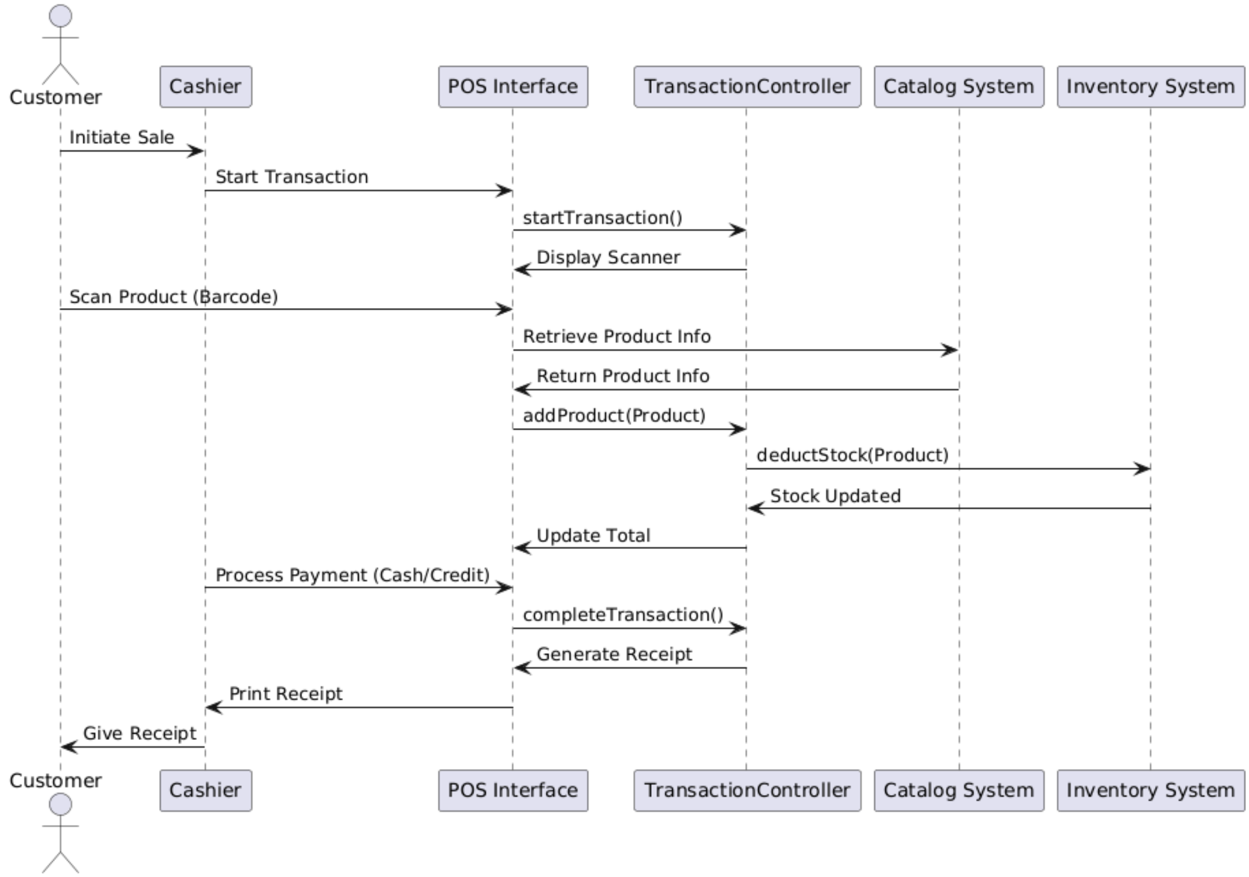
Boundary Objects

1. **POS Interface**
   - Description: The user interface for cashiers to interact with the system, including scanning products, entering payment details, and printing receipts.
2. **Login Screen**
   - Description: The interface for users to log in to the POS system.
3. **Receipt**
   - Description: Represents the printed receipt provided to the customer after a successful transaction.

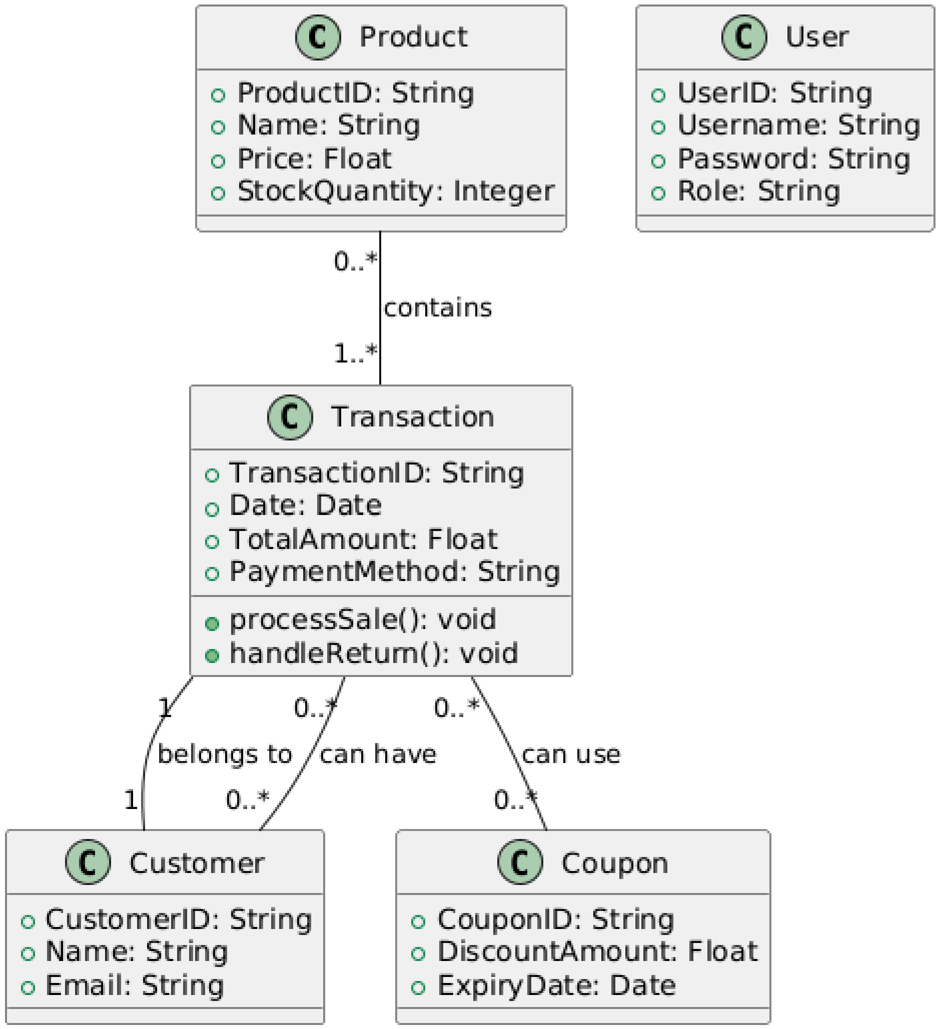
Control Objects

1. **TransactionController**
   - Methods: `startTransaction()`, `addProduct(Product product)`, `applyCoupon(Coupon coupon)`, `completeTransaction()`
   - Description: Manages the flow of a transaction from start to finish.
2. **InventoryController**
   - Methods: `deductStock(Product product)`, `checkStock(Product product)`
   - Description: Manages inventory levels and stock deduction during sales.
3. **UserController**
   - Methods: `login(User user)`, `logout()`, `manageUsers()`
   - Description: Handles user authentication and management.

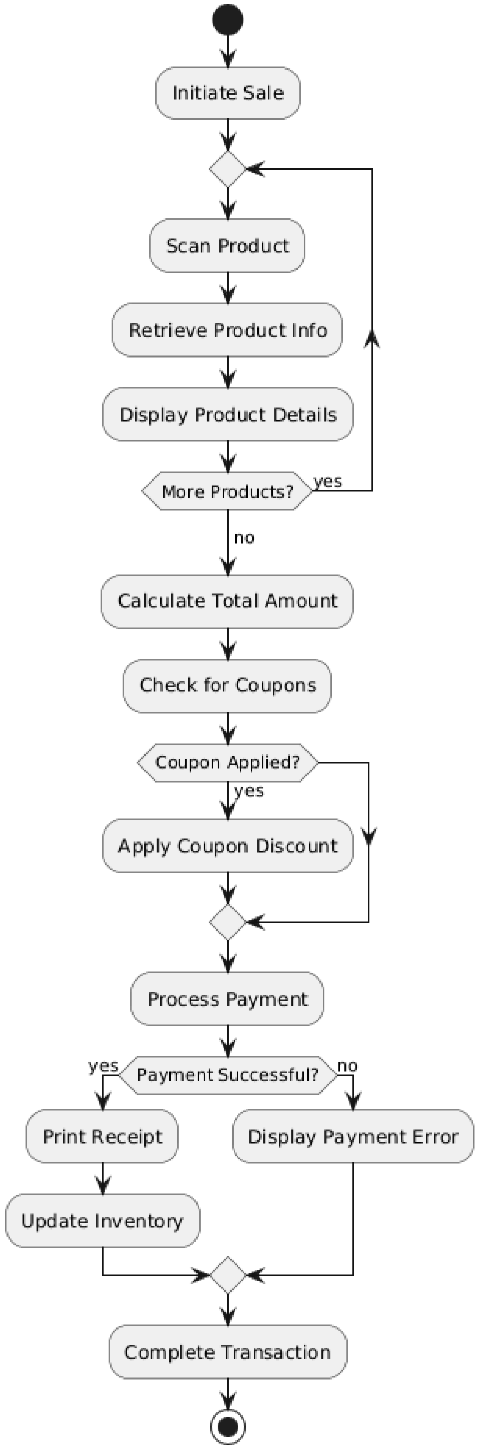
Sequence Diagram of the POS System



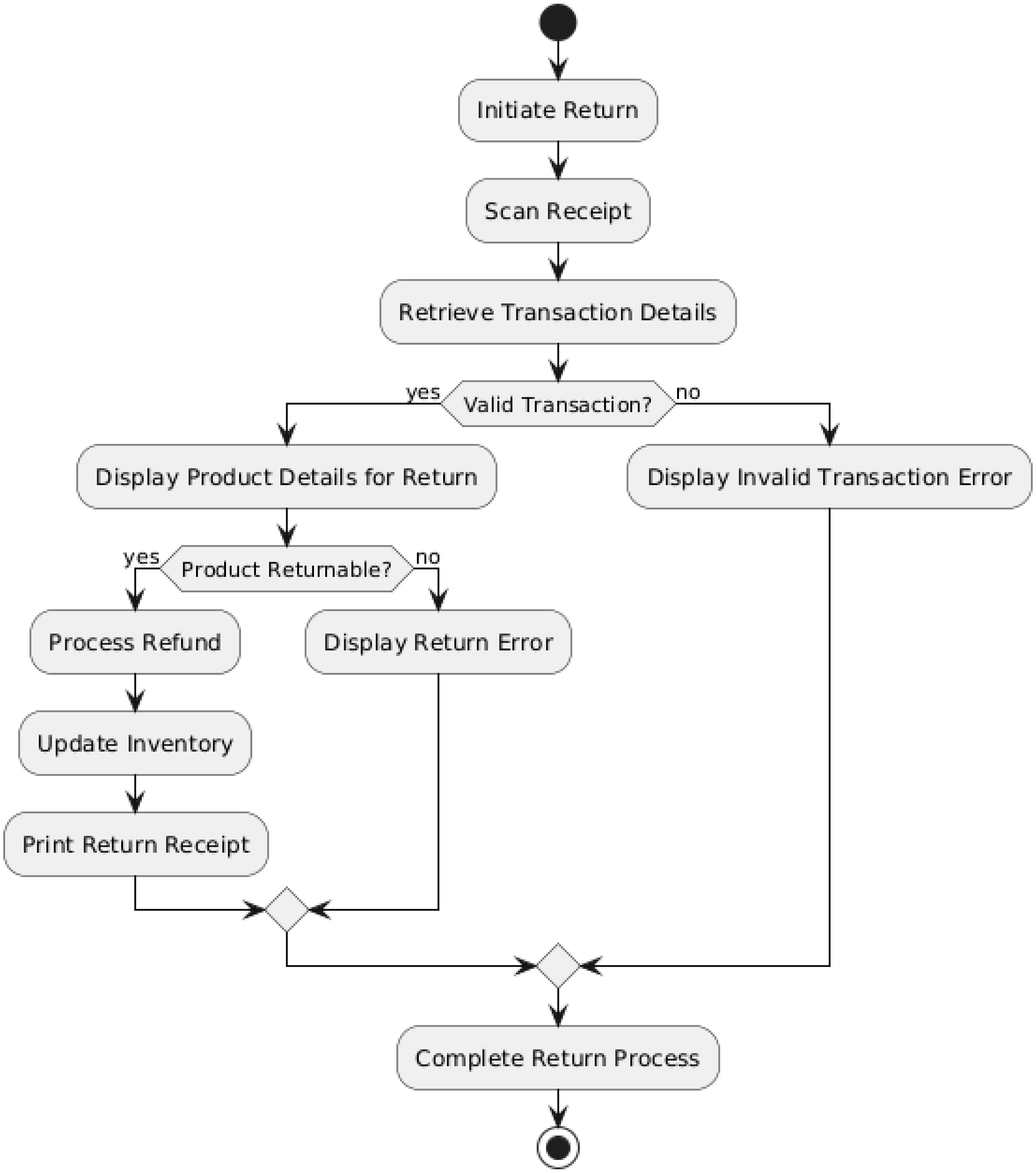
Analysis Domain Models (Class Diagram)



Activity Diagram of “Process Sale”



Activity Diagram of “Handle Returns”



Initiate Return
Scan Receipt
Retrieve Transaction Details
yes
Valid Transaction?
no
Display Product Details for Return
Display Invalid Transaction Error
yes
Product Returnable?
no
Process Refund
Display Return Error
Update Inventory
Print Return Receipt
Complete Return Process