IT-314 Software Engineering

Lab 6

Modeling Class Diagram and Activity Diagram (Point of Sale System)

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Problem Description:

A POS (Point-Of-Sale) system is a computer system typically used to manage the sales in retail stores. It includes hardware components such as a computer, a bar code scanner, a printer and also software to manage the operation of the store. The most basic function of a POS system is to handle sales. When a customer arrives at a POS counter with goods to purchase, the cashier will start a new sale transaction. When the barcode of a good is read by the POS system, it will retrieve the name and price of this good from the backend catalog system and interact with the inventory system to deduce the stock amount of this good. When the sale transaction is over, the customer can pay in cash, credit card or even check. After the payment is successful, a receipt will be printed. Note that for promotion, the store frequently issues gift coupons. The customer can use the coupons for a better price when purchasing goods. Another function of a POS system is to handle returns. A user must log in to use the POS. The users of a POS system are the employees of the store including cashiers and the administrator. The administrator can access the system management functions of the POS system including user management and security configuration that cashiers can’t do.

1. Develop Use Case Textual Description for "Process Sale" and "Handle Return" use cases.

Use Case: Process Sale

- **Primary Actor:** Cashier
- **Stakeholders and Interests:**
    - **Cashier:** Wants to complete the sale efficiently and accurately.
    - **Customer:** Wants a smooth, fast, and accurate transaction.
    - **Store Owner:** Wants accurate sales records and updated inventory information.

- **Inventory System:** Requires accurate tracking of stock level

- **Precondition:**
  - The cashier must be logged into the POS system.
  - The POS system is connected to the Catalog System and Inventory System.
  - Items to be sold are in the store inventory.

- **Main Flow:**
  - The cashier starts a new sale transaction.
  - The cashier scans items, and the system retrieves item details (name and price) from the Catalog System.
  - The system communicates with the Inventory System to update stock.
  - The cashier finalizes the sale, and the customer chooses a payment method (cash, credit card, etc.).
  - The system processes the payment and confirms the transaction.
  - A receipt is printed, and the transaction is completed.

- **Alternate Flow:**

  A1: Item is not in the Catalog System:

  - If an item's barcode cannot be found in the Catalog System, the system prompts the cashier to manually enter the item details or search again.
  - The cashier can either enter the details or skip the item.

  A2: Inventory out of stock:

  - If an item scanned is found to be out of stock, the system notifies the cashier.
  - The cashier informs the customer and removes the item from the sale list.

  A3: Customer uses a gift coupon:

  - If the customer has a gift coupon, the cashier enters the coupon code.
  - The system validates the coupon and applies the discount to the sale total.

A4: Credit card payment failure:

- If the credit card payment is declined, the system notifies the cashier.
- The cashier asks the customer to try another card or choose a different payment method.

- **Postcondition:**
  - The sale is recorded in the system.
  - Inventory is updated to reflect the items sold.
  - A receipt is printed for the customer.
  - Payment is processed successfully.

Use Case: Handle Return

- **Primary Actor:** Cashier
- **Stakeholders and Interests:**
  - **Cashier:** Wants to process returns accurately and quickly.
  - **Customer:** Wants a hassle-free return process and appropriate refunds or store credit.
  - **Store Owner:** Wants accurate record-keeping and updated inventory levels.

- **Precondition:**
  1. The cashier must be logged into the POS system.
  2. The item to be returned must have a valid purchase record in the system.
  3. The item must be in returnable condition based on store policies.
- **Main Flow:**
  1. The cashier initiates the return process in the POS system.
  2. The cashier scans the receipt or enters the transaction number to locate the original sale.
  3. The system retrieves the sale details, and the cashier selects the item(s) being returned.
  4. The system verifies the return eligibility (e.g., within the return period, in saleable condition).
  5. The cashier confirms the return details and selects the refund method (cash, credit card refund, or store credit).
  6. For cash refunds:
     - The system prompts the cashier to enter the amount to be refunded.
     - The cashier hands the cash to the customer.

        - The system updates the sale record as returned.
    7. For credit card refunds:
        - The system processes the refund to the customer's credit card.
        - The system updates the sale record as returned.
    8. For store credit:
        - The system issues store credit, and the credit note is printed.
        - The system updates the sale record.
    9. The system adds the returned item back into the inventory.
    10. The system prints a return receipt, and the transaction is completed.

- **Alternative Flows:**
    1. **B1: No receipt available:**
        - If the customer does not have a receipt, the cashier may search for the transaction using the date, credit card number, or item details.
        - If the original sale cannot be located, the return cannot be processed, and the customer is informed.
    2. **B2: Item is not eligible for return:**
        - If the system determines the item is not eligible (e.g., past return period, item in unsellable condition), the cashier informs the customer, and the return process is aborted.
    3. **B3: Payment method mismatch:**
        - If the customer requests a refund in a different form than the original payment (e.g., originally paid by credit card but wants cash), the cashier informs the customer of the policy to match the original payment method.

- **Postcondition:**
    1. The returned item is added back to the inventory.
    2. The sale record is updated to reflect the return.
    3. The customer receives a refund or store credit.

2. Identify Entity/Boundary Control Objects

Entity Objects:

- Customer
- Item/Product
- Receipt
- Payment
- Inventory
- Discount/Coupon

Boundary Objects:

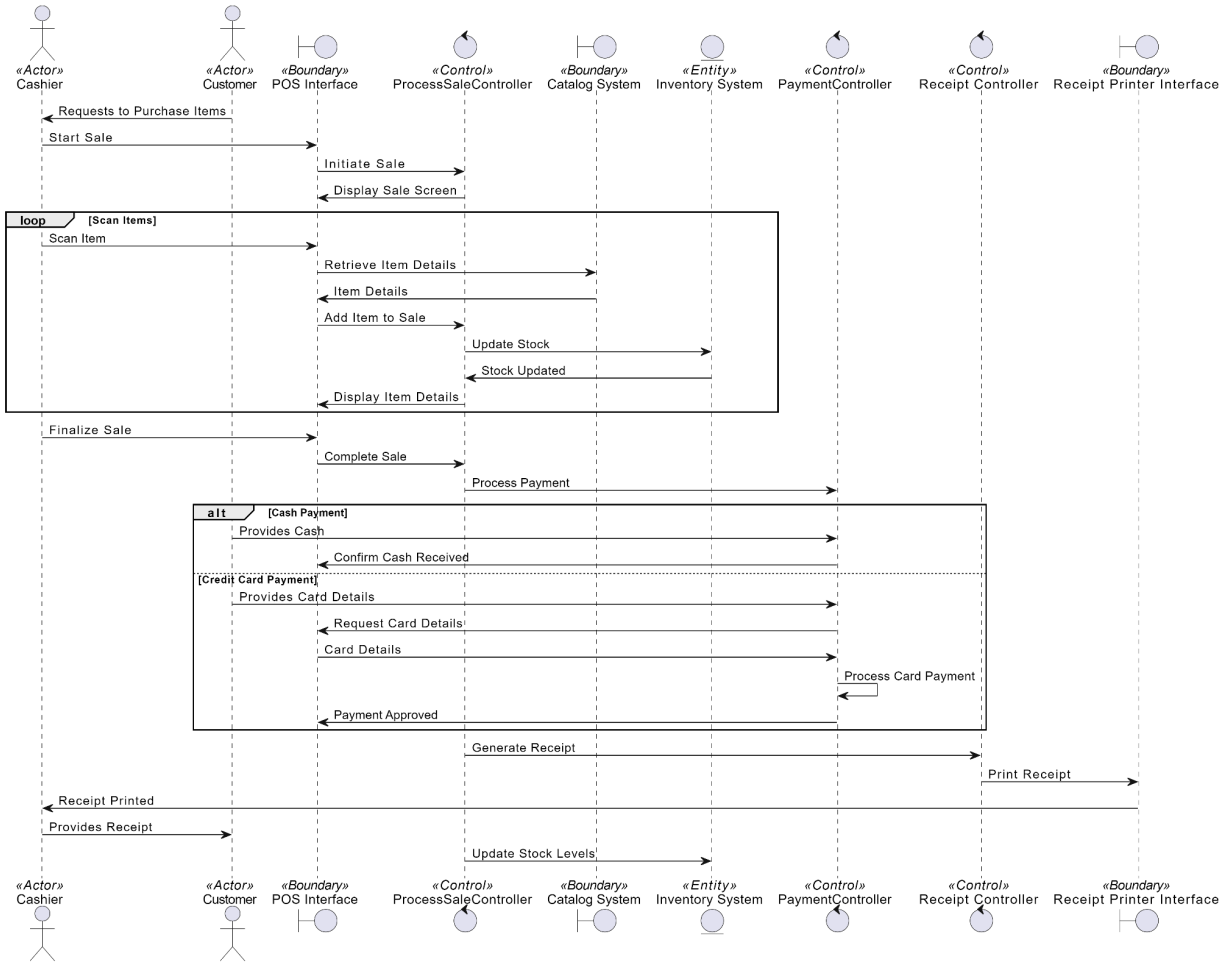
- POS Interface/Login Screen
- Barcode Scanner
- Catalog System
- Receipt Printer Interface
- Inventory System

Control Objects:

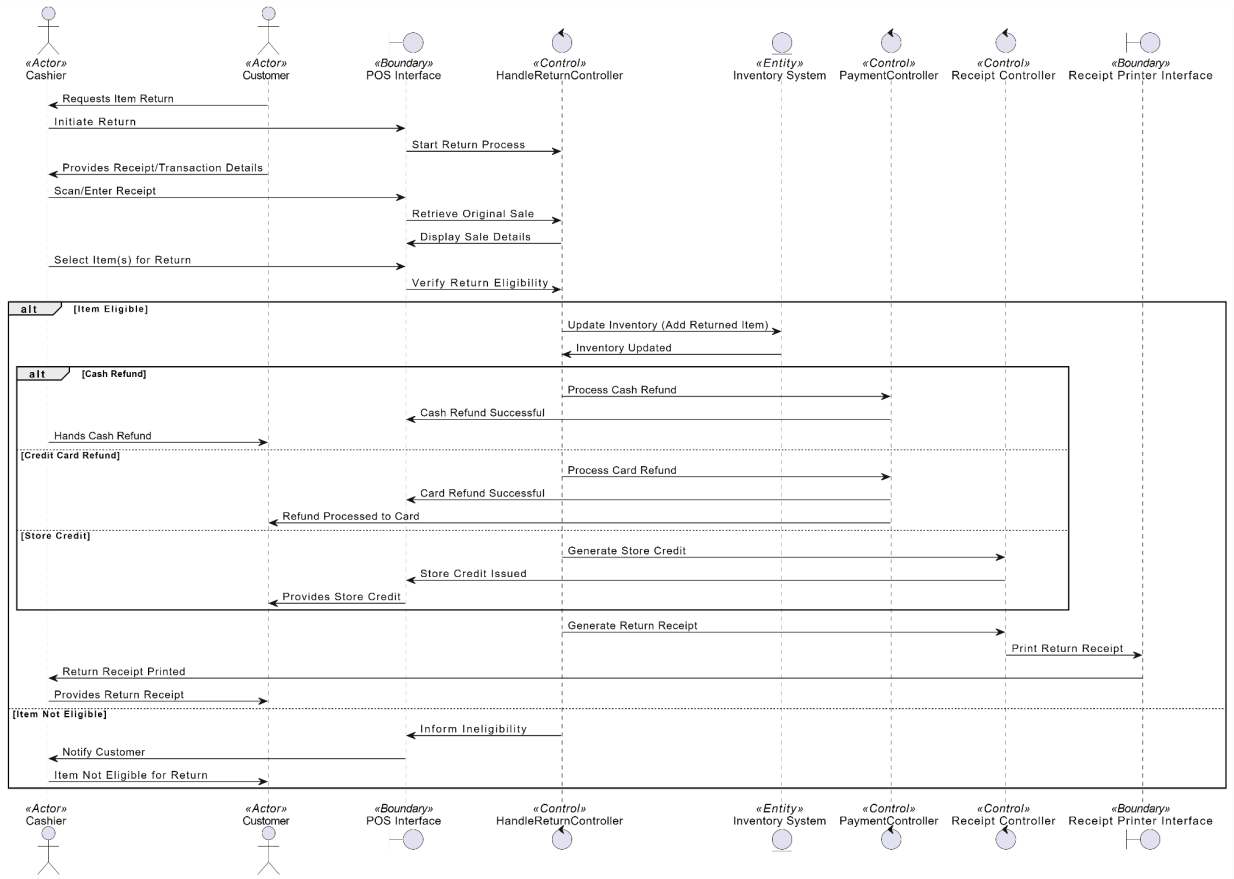
- Process Sale Controller
- Handle Return Controller
- Payment Controller
- Receipt Controller

3. Develop Sequence Diagrams

Process Sales

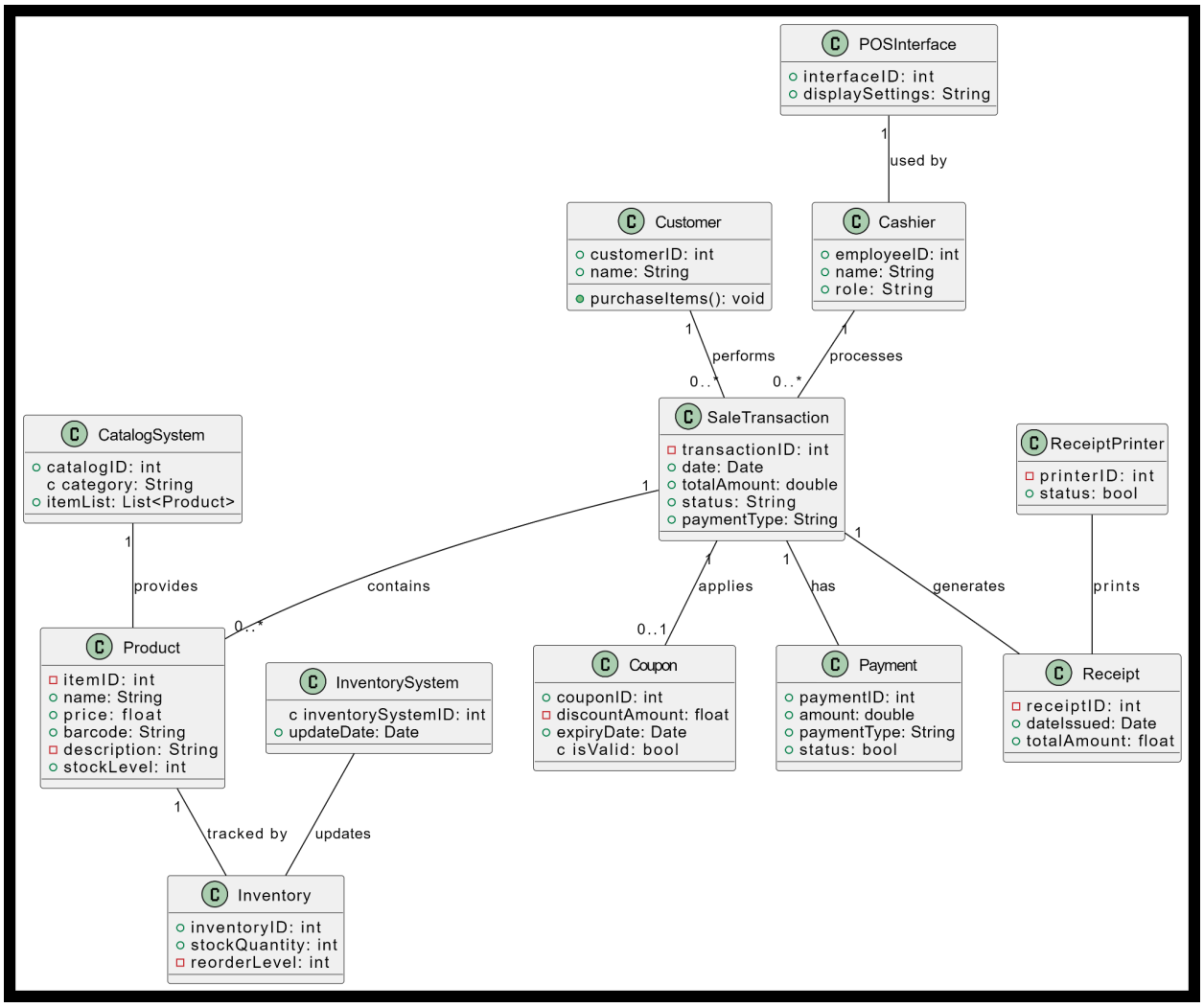


Handle Return

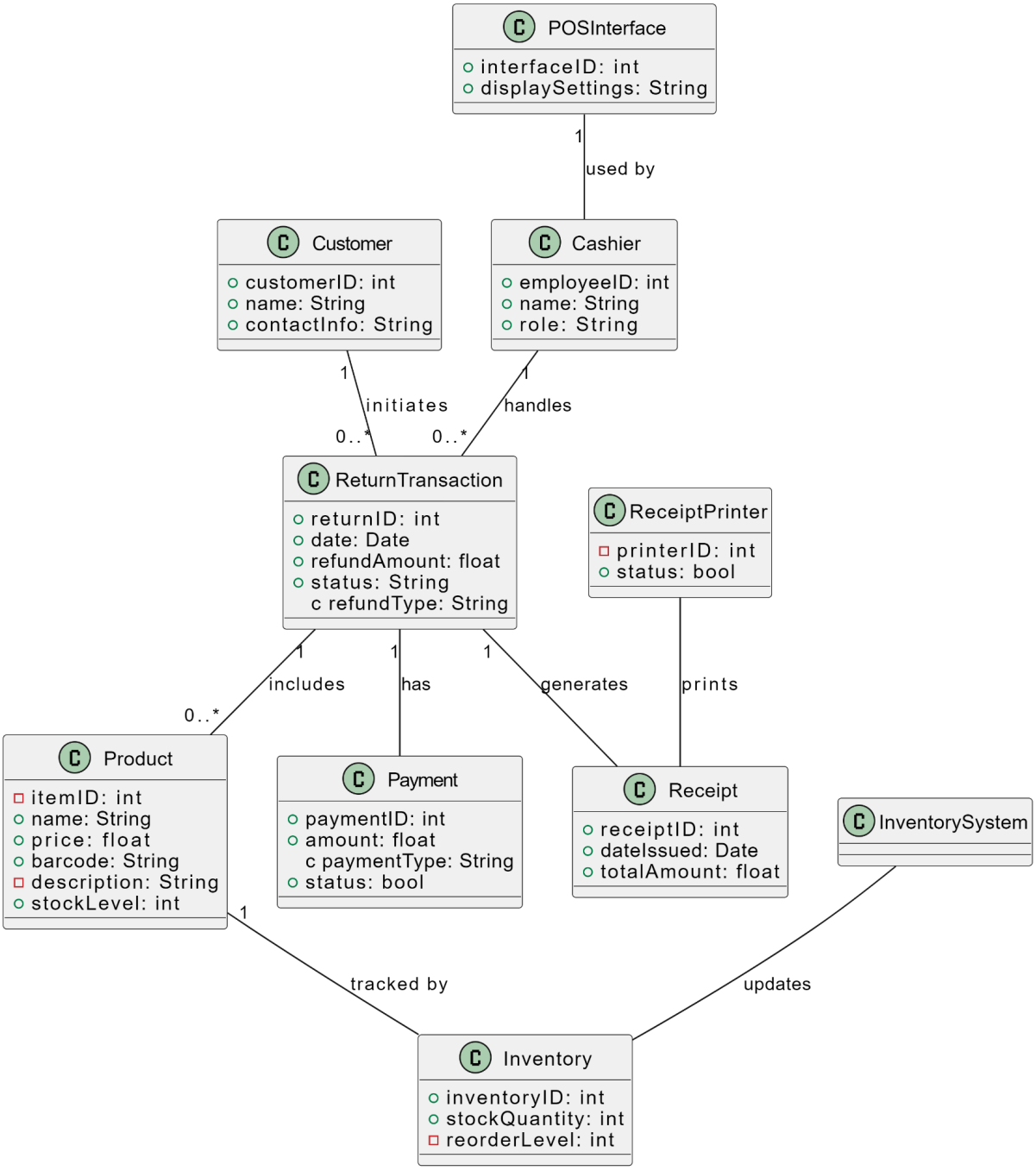


4. Develop Analysis Domain Models

- Process Sales:

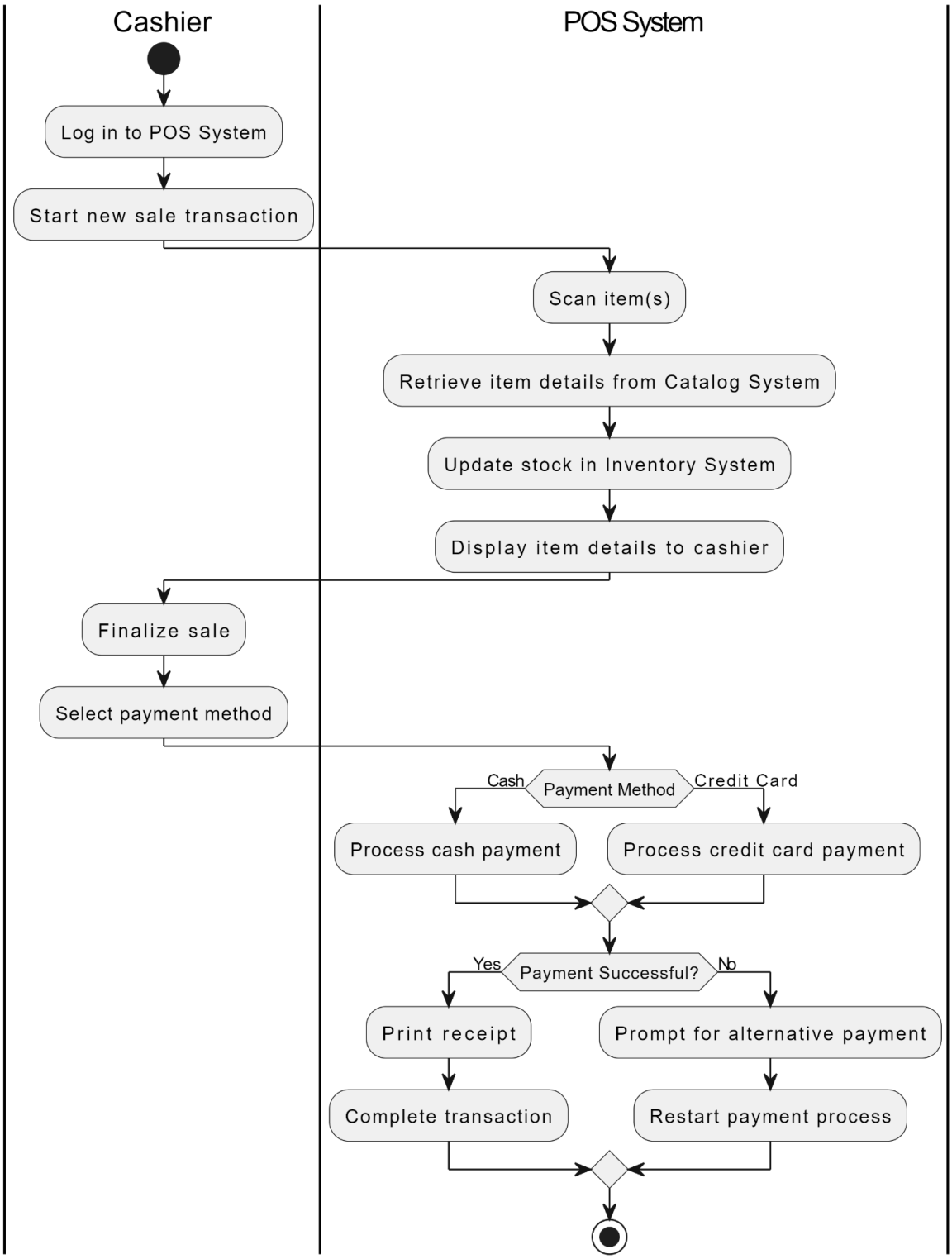


- Handle Return:

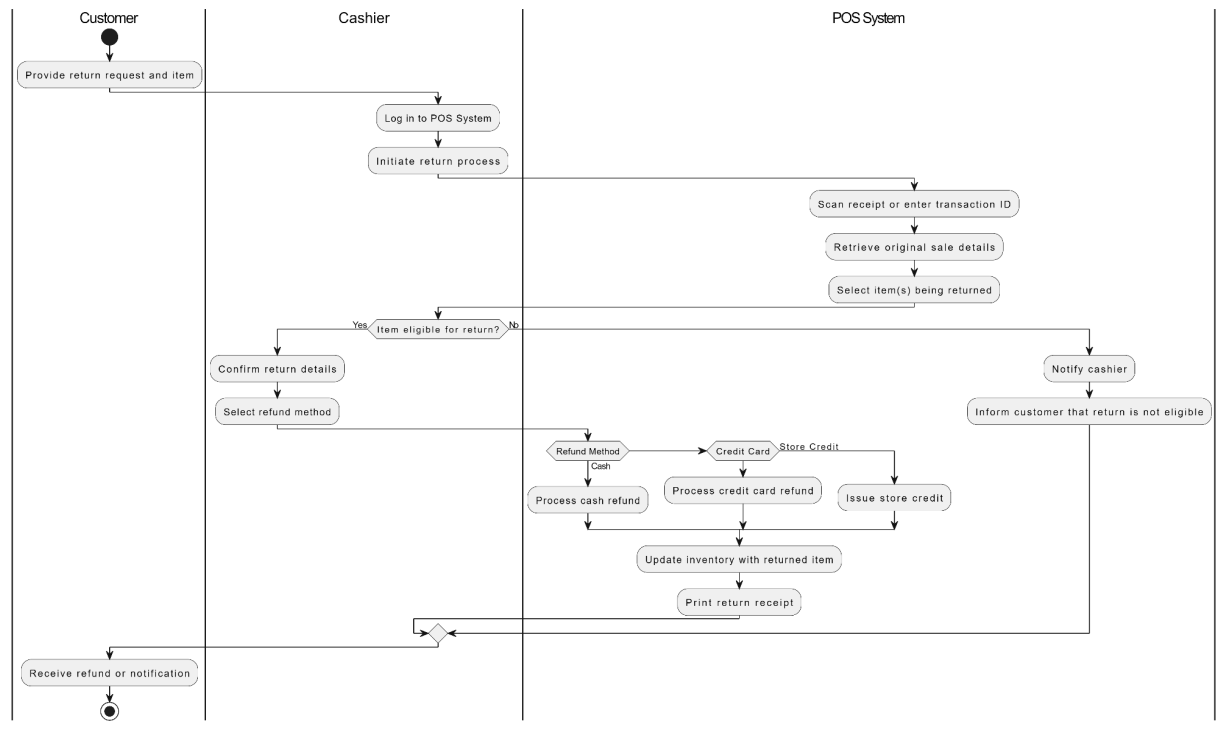


5. Develop activity diagrams for "Process Sale" and "Handle Return" use cases.

- Process Sale:



- Handle Return:


Customer
Cashier
POS System
Provide return request and item
Log in to POS System
Initiate return process
Scan receipt or enter transaction ID
Retrieve original sale details
Select item(s) being returned
Item eligible for return?
Yes
No
Confirm return details
Select refund method
Notify cashier
Inform customer that return is not eligible
Refund Method
Cash
Credit Card
Store Credit
Process cash refund
Process credit card refund
Issue store credit
Update inventory with returned item
Print return receipt
Receive refund or notification