IT – 314 Software Engineering

Assignment 6: Point of Sale (POS) System

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Question-1: Use Case Textual Descriptions

Use Case: Process Sale

- Name: Process Sale
- Actors: Cashier, Customer
- Preconditions:
    1. The cashier is logged into the POS system.
    2. The POS system is connected to the catalog and inventory systems.
- Trigger:
  A customer arrives at the point-of-sale counter with items to purchase.
- Main Flow:
    1. The cashier initiates a new transaction on the POS system.
    2. The cashier scans the barcode of each product.
    3. The POS system retrieves product information (name, price) from the catalog system.
    4. The POS system deducts the purchased items from inventory.
    5. The cashier applies any valid discounts or promotional coupons presented by the customer.
    6. The POS system calculates the total payment due.
    7. The customer selects a payment method (cash, credit card, or check).
    8. The cashier inputs the payment details.
    9. The POS system processes the payment.
    10. Once payment is successful, the POS system generates and prints a receipt.
    11. The sale is finalized.
- Postconditions:
    1. The payment has been successfully processed, and inventory is updated.

2. A printed receipt is handed to the customer.

- Alternative Flows:
    - If a barcode is unrecognized, the cashier can manually enter the product information.
    - If the customer cannot pay the full amount, the cashier cancels the transaction.
    - If the payment method fails, the cashier asks the customer to try an alternative method.

Use Case: Handle Return

- Name: Handle Return
- Actors: Cashier, Customer
- Preconditions:
    1. The cashier is logged into the POS system.
    2. The customer possesses a receipt for the items to be returned.
- Trigger:
  A customer requests to return items that were previously purchased.
- Main Flow:
    1. The cashier starts a return transaction on the POS system.
    2. The customer provides a receipt, and the cashier scans the items or enters return details manually.
    3. The POS system verifies the items against the provided receipt.
    4. The inventory is updated by restocking the returned items.
    5. The cashier asks the customer for their preferred refund method (cash, credit card refund, or store credit).
    6. The cashier processes the refund in the POS system.
    7. Once the refund is successful, the POS system prints a return receipt.
    8. The return transaction is completed.
- Postconditions:
    1. The refund has been processed, and the inventory is updated.
    2. A return receipt is printed and given to the customer.
- Alternative Flows:
    - If the return period has expired or the item is ineligible for return, the cashier informs the customer and cancels the transaction.
    - If the customer lacks a receipt, the cashier follows the store's policy to handle the return manually.

Question-2: Identification of Entity, Boundary, and Control Objects

Entity Objects:

- Item: Represents the product being sold or returned, containing information such as name, barcode, price, and stock availability.
- Sale Transaction: Tracks details of the transaction, including the items sold, total cost, and payment method.
- Return Transaction: Records details of returned items, the original purchase, and the refund process.
- Receipt: Represents the printed proof of a sale or return transaction.
- Coupon: Represents any discount or promotion applied during a sale.

Boundary Objects:

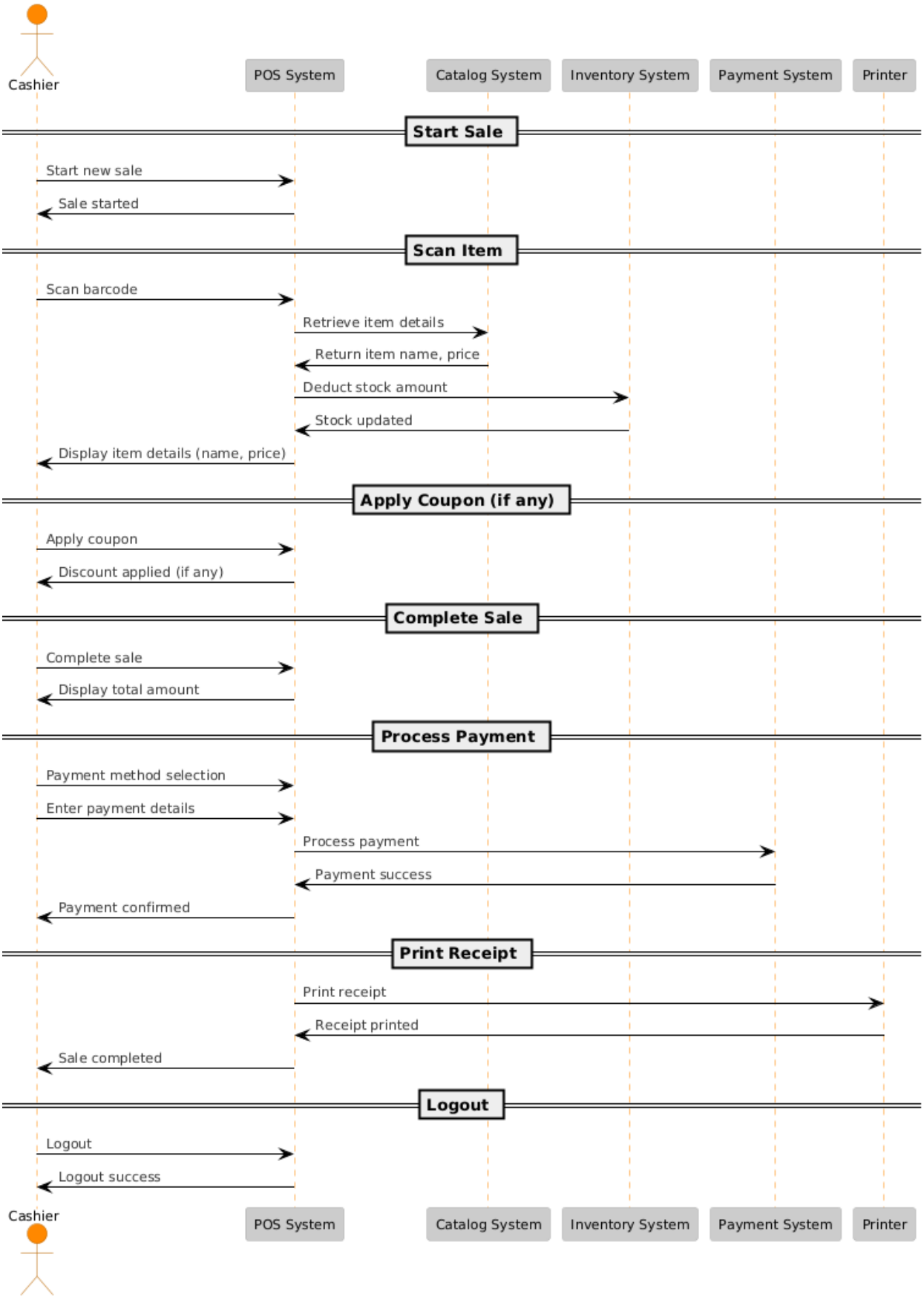
- POS Interface: The system interface that the cashier interacts with to operate the POS.
- Barcode Scanner: Device used by the cashier to scan item barcodes.
- Payment Terminal: Hardware used to process payment methods like cash, credit card, or check.
- Printer: Device that prints receipts for both sales and returns.

Control Objects:

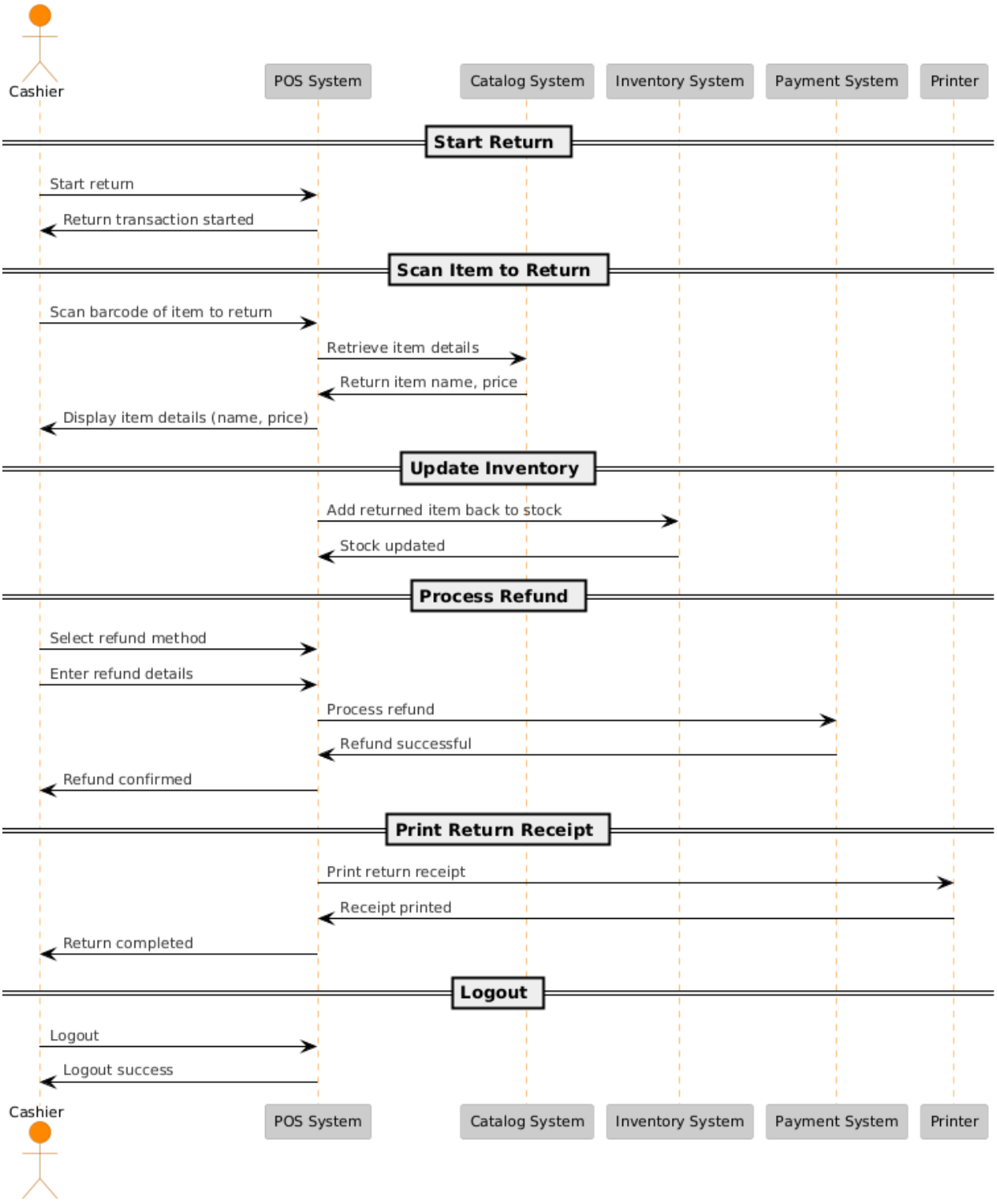
- SaleController: Manages the sales process, including retrieving item details, deducting inventory, and processing payments.
- ReturnController: Handles the return process by verifying items and managing the refund.
- InventoryController: Ensures inventory is updated correctly during sales and returns.
- PaymentController: Responsible for handling payment transactions, regardless of the method.
- CouponController: Manages the validation and application of promotional discounts or coupons during the sale.

Question-3: Develop Sequence Diagrams

1. **Process Sales Sequence Diagram:**

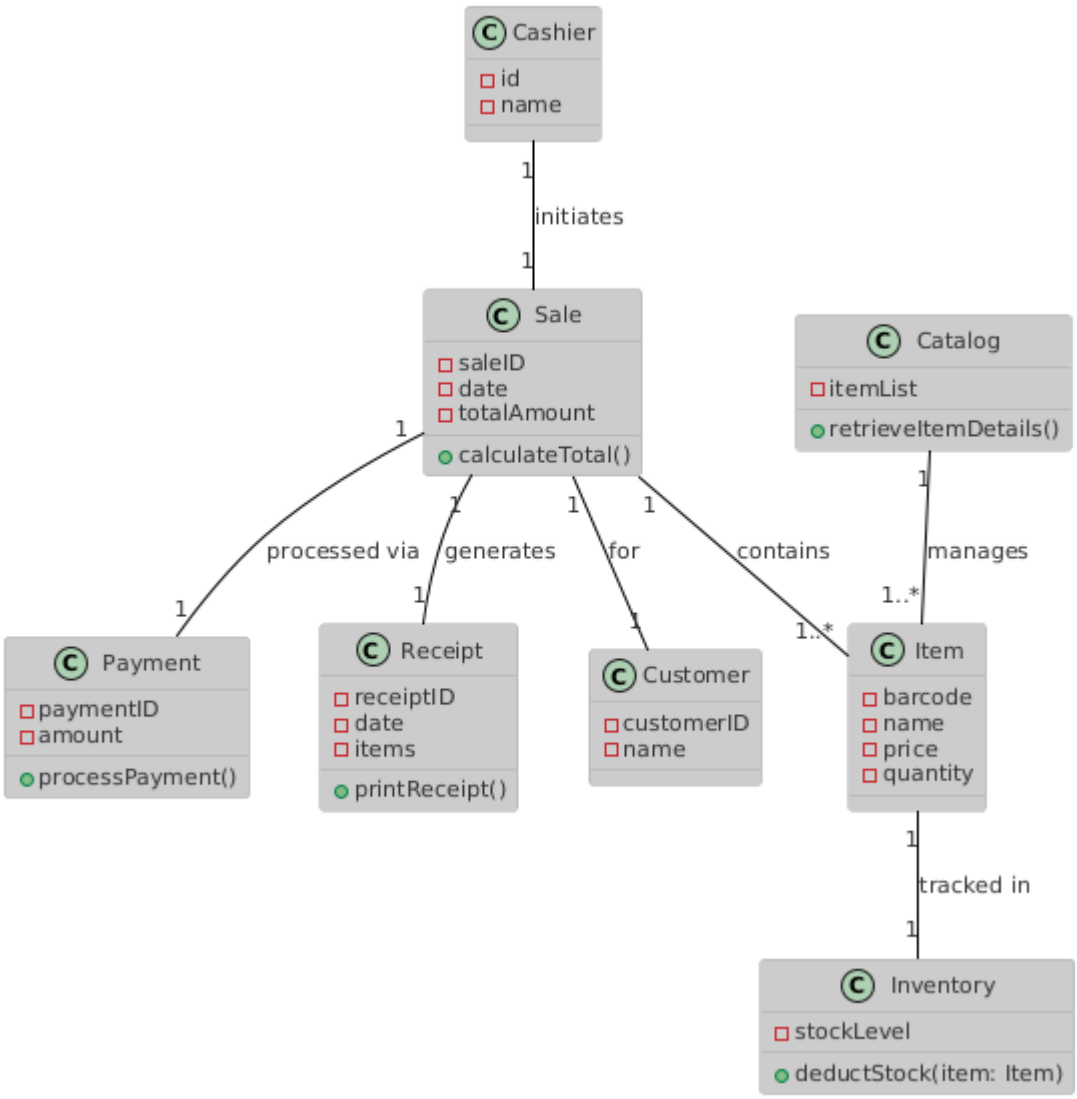

Cashier
POS System
Catalog System
Inventory System
Payment System
Printer
Start Sale
Start new sale
Sale started
Scan Item
Scan barcode
Retrieve item details
Return item name, price
Deduct stock amount
Stock updated
Display item details (name, price)
Apply Coupon (if any)
Apply coupon
Discount applied (if any)
Complete Sale
Complete sale
Display total amount
Process Payment
Payment method selection
Enter payment details
Process payment
Payment success
Payment confirmed
Print Receipt
Print receipt
Receipt printed
Sale completed
Logout
Logout
Logout success
Cashier
POS System
Catalog System
Inventory System
Payment System
Printer

2. Handle Return Sequence Diagram:

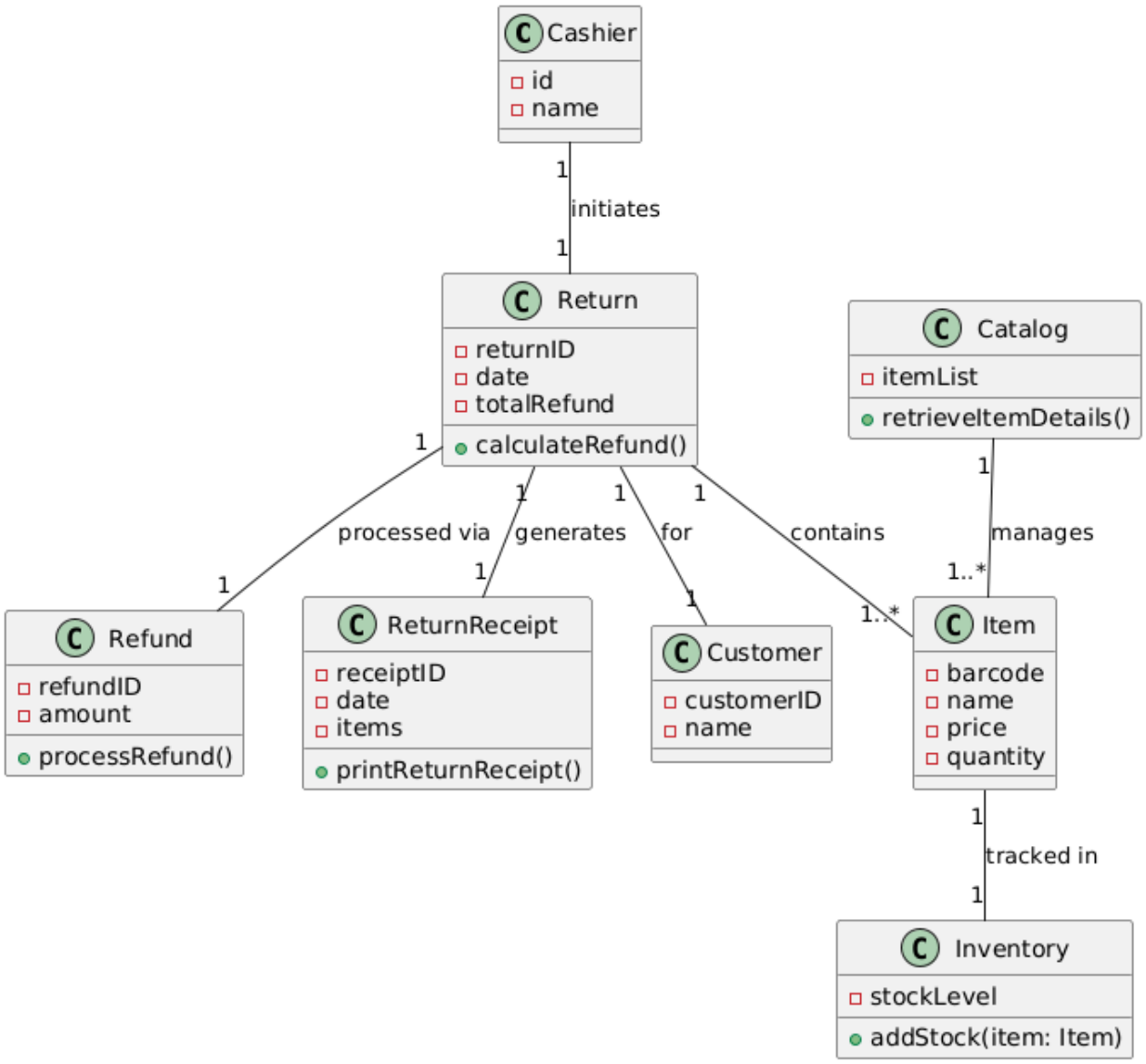


Question-4: Develop Analysis Domain Models

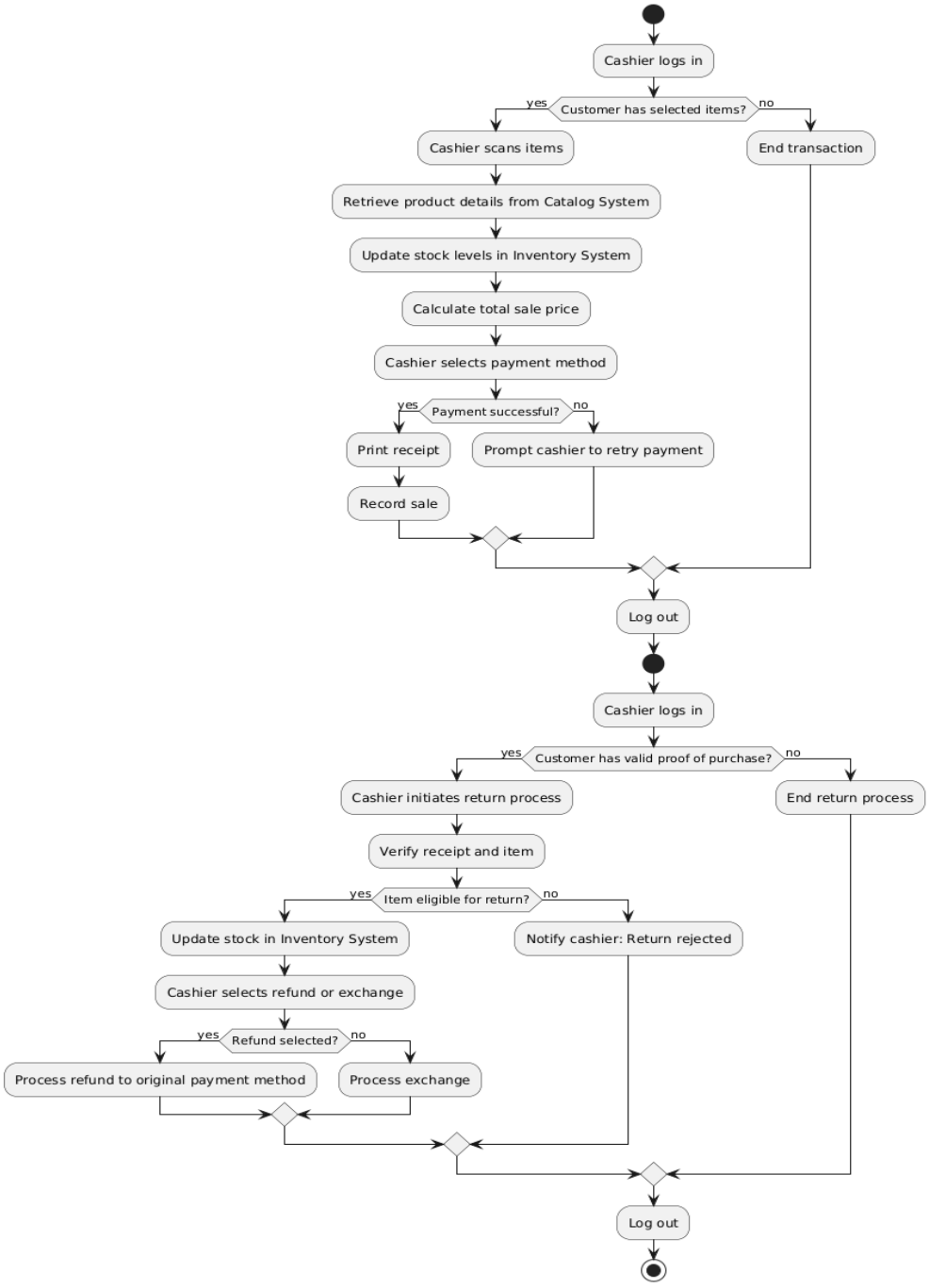
1. Process Sales Diagram:



2. **Handle Return Diagram:**



Question-5: Develop Activity Diagram for Process Sales and Handle Return Use Case:


Cashier logs in
Customer has selected items?
yes
no
Cashier scans items
End transaction
Retrieve product details from Catalog System
Update stock levels in Inventory System
Calculate total sale price
Cashier selects payment method
Payment successful?
yes
no
Print receipt
Prompt cashier to retry payment
Record sale
Log out
Cashier logs in
Customer has valid proof of purchase?
yes
no
Cashier initiates return process
End return process
Verify receipt and item
Item eligible for return?
yes
no
Update stock in Inventory System
Notify cashier: Return rejected
Cashier selects refund or exchange
Refund selected?
yes
no
Process refund to original payment method
Process exchange
Log out