IT 314: SOFTWARE ENGINEERING

LAB 6

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

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Q. Develop a textual description for "process sale" and "handle return" use cases.

Process Sale:

Use Case: Process Sale

Actors: Cashier

Preconditions:

- The cashier is logged into the store's Point of Sale (POS) system.
- Payment systems, such as card readers, are either connected or ready for offline cash transactions.

Basic Flow:

1. The customer brings their items.
2. The cashier either scans or manually inputs the items to be purchased.
3. The POS system fetches the price, description, and availability from the database.
4. The cashier verifies the total cost, accounting for taxes or discounts.
5. The system computes the final amount using locally stored tax and discount rules.
6. The cashier informs the customer of the total.
7. The customer chooses a payment method, and the cashier processes the payment.
8. After payment is confirmed, the system updates the inventory to reflect the sold items.
9. A receipt is printed for the customer.
10. The sale is saved in the POS system.

Postconditions:

- The sale is logged in the POS system.
- The inventory is updated to reflect the sold products.

Alternate Flow:

- Step 2.1 Barcode Scan Error: The system alerts the cashier, who then manually enters the product code.
- Step 2.2 Remove an Item: The cashier removes an item, and the bill is recalculated.
- Step 4.1 Amount Mismatch: The customer requests an update.

- Step 7.1 Promotional Coupons: The customer presents a coupon, which the cashier scans or enters, adjusting the total amount.
- Step 7.2 Payment Failure: If the payment method is declined, the cashier requests an alternative payment method.

Entity, boundary, and control objects

Entity Objects:

1. Inventory System
2. Cashier
3. Receipt
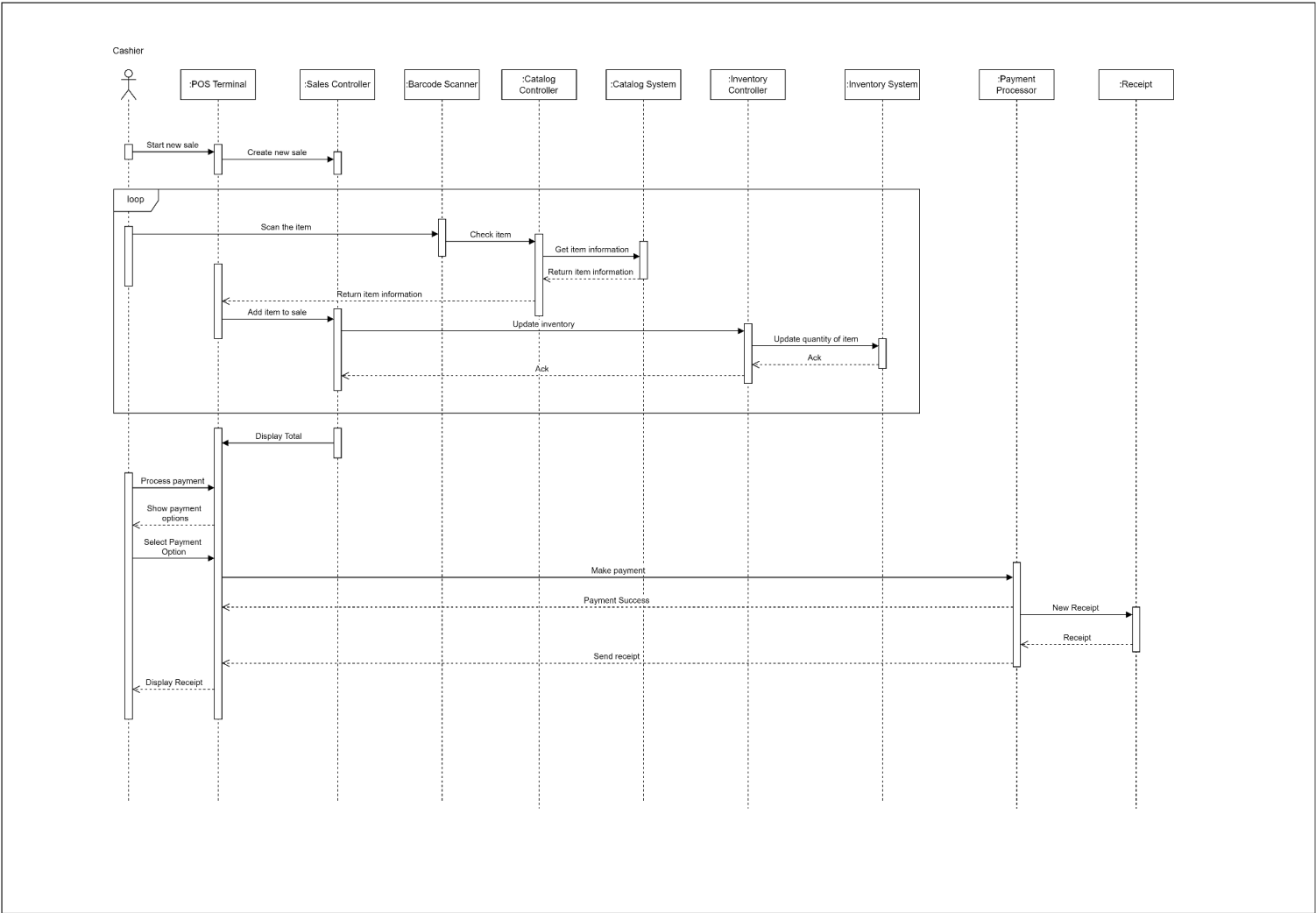4. Catalog System
5. Receipt
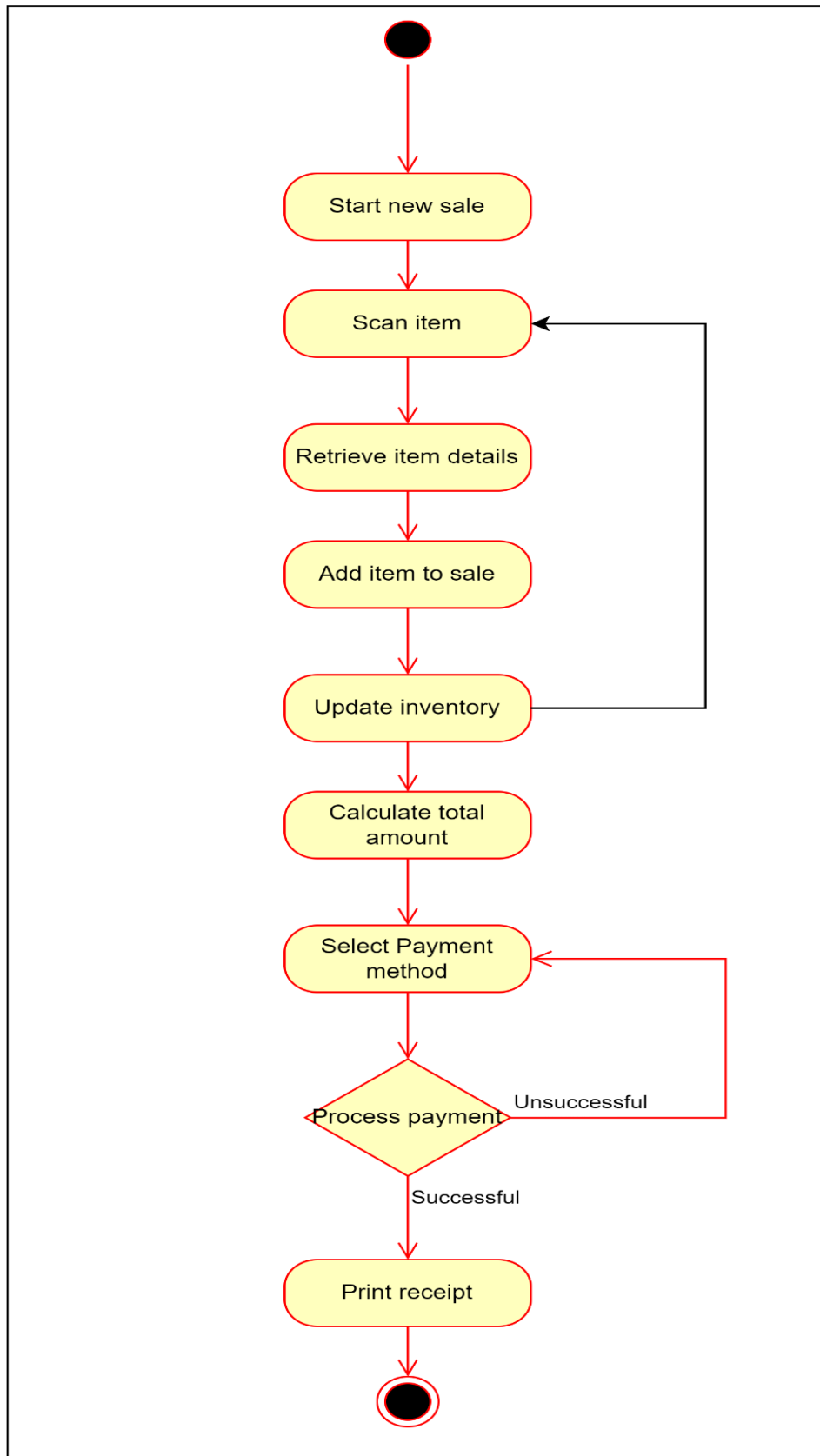
Boundary Objects:

1. POS Interface
2. Barcode Scanner

Control Objects:

1. Inventory Manager
2. Catalog Manager
3. Payment Processor
4. Sales Controller

SEQUENCE DIAGRAM:

Cashier

:POS Terminal | :Sales Controller | :Barcode Scanner | :Catalog Controller | :Catalog System | :Inventory Controller | :Inventory System | :Payment Processor | :Receipt

Start new sale

Create new sale

loop

Scan the item

Check item

Get item information

Return item information

Return item information

Add item to sale

Update inventory

Update quantity of item

Ack

Ack

Display Total

Process payment

Show payment options

Select Payment Option

Make payment

Payment Success

New Receipt

Receipt

Send receipt

Display Receipt

ACTIVITY DIAGRAM:

Start new sale

Scan item

Retrieve item details

Add item to sale

Update inventory

Calculate total amount

Select Payment method

Process payment — Unsuccessful

Successful

Print receipt

HANDLE RETURNS:

Use Case: Handle Returns

Actor: Cashier

Preconditions:

- The customer provides a valid receipt or proof of purchase.
- Sales data is accessible in the system.

Flow:

1. The customer initiates a return request.
2. The cashier locates the transaction in the local database by searching with the receipt or transaction ID.
3. The system checks if the items meet the store's return eligibility criteria.
4. The cashier confirms the return and completes the process.
5. The system calculates the refund amount based on the original purchase.
6. The system updates the local inventory to account for the returned items and stores the return transaction locally.
7. A return receipt is printed for the customer.

Postconditions:

- The return is recorded in the local database.
- The inventory is updated to reflect the returned items.
- The system awaits synchronization with the central server when connectivity is restored.

Alternate Flow:

- Step 2.1 Product Not Found in the System: The system displays an error if the product is not located in the database, prompting the cashier to manually verify the receipt.
- Step 3.1 No Receipt Available: If the customer does not have a receipt, the cashier requests other proof of purchase, such as a loyalty account or card transaction details.
- Step 4.1 Item Condition Not Acceptable: If the returned item is damaged or otherwise unacceptable for return, the cashier informs the customer of the store's return policy.
- Step 5.1 Partial Refund or Exchange: Instead of a full refund, the customer opts for an exchange or a partial refund as per store policy.
- Step 6.1 Payment Method Mismatch: If the customer requests a refund through a different payment method (e.g., cash for a card payment), but the system only allows refunds to the original payment method.
- Step 7.1 System Error During Refund: In the event of a system error during the refund process, the cashier manually processes the refund or issues store credit to the customer.

Entity, boundary, and control objects:

Entity Objects:

1. Return Receipt
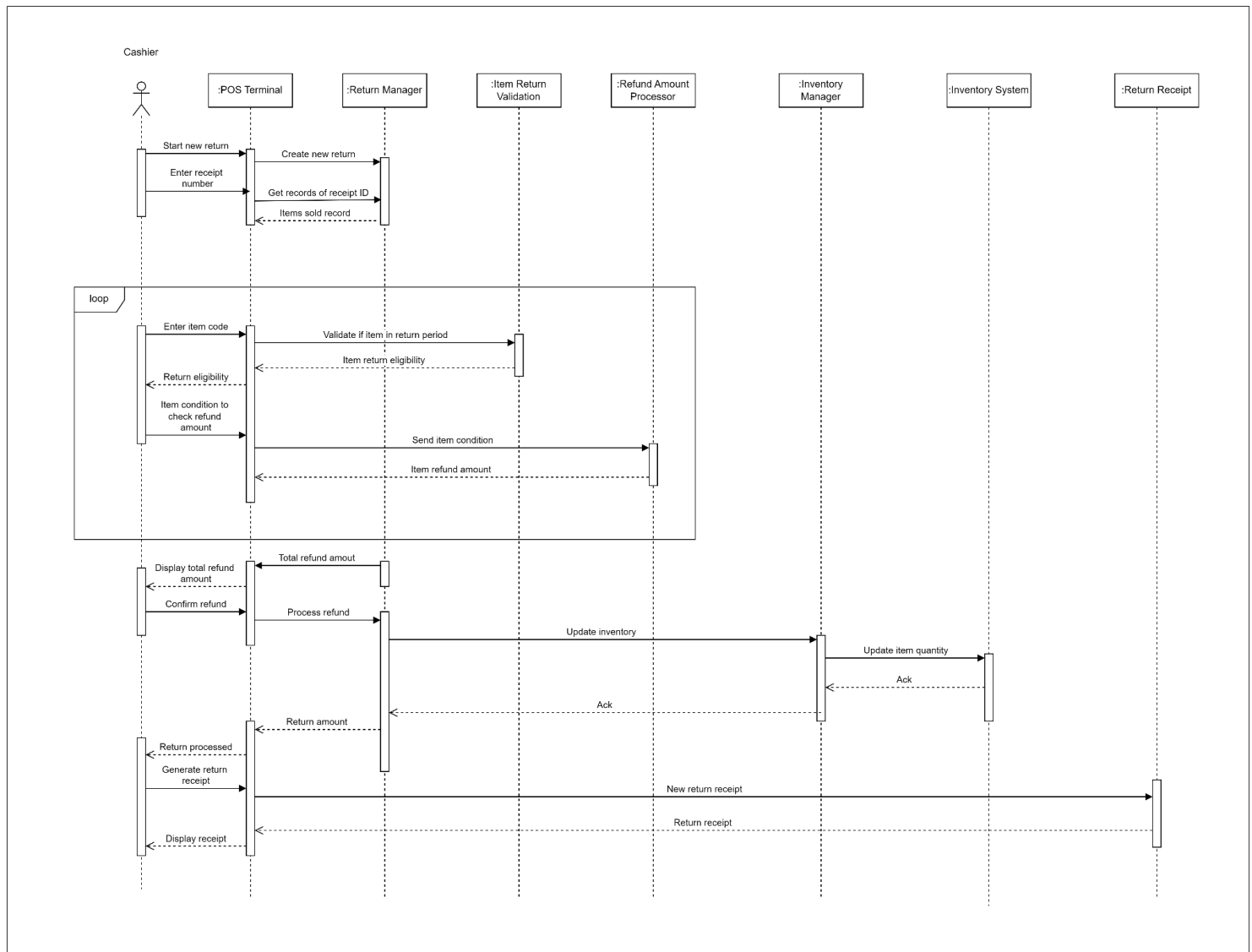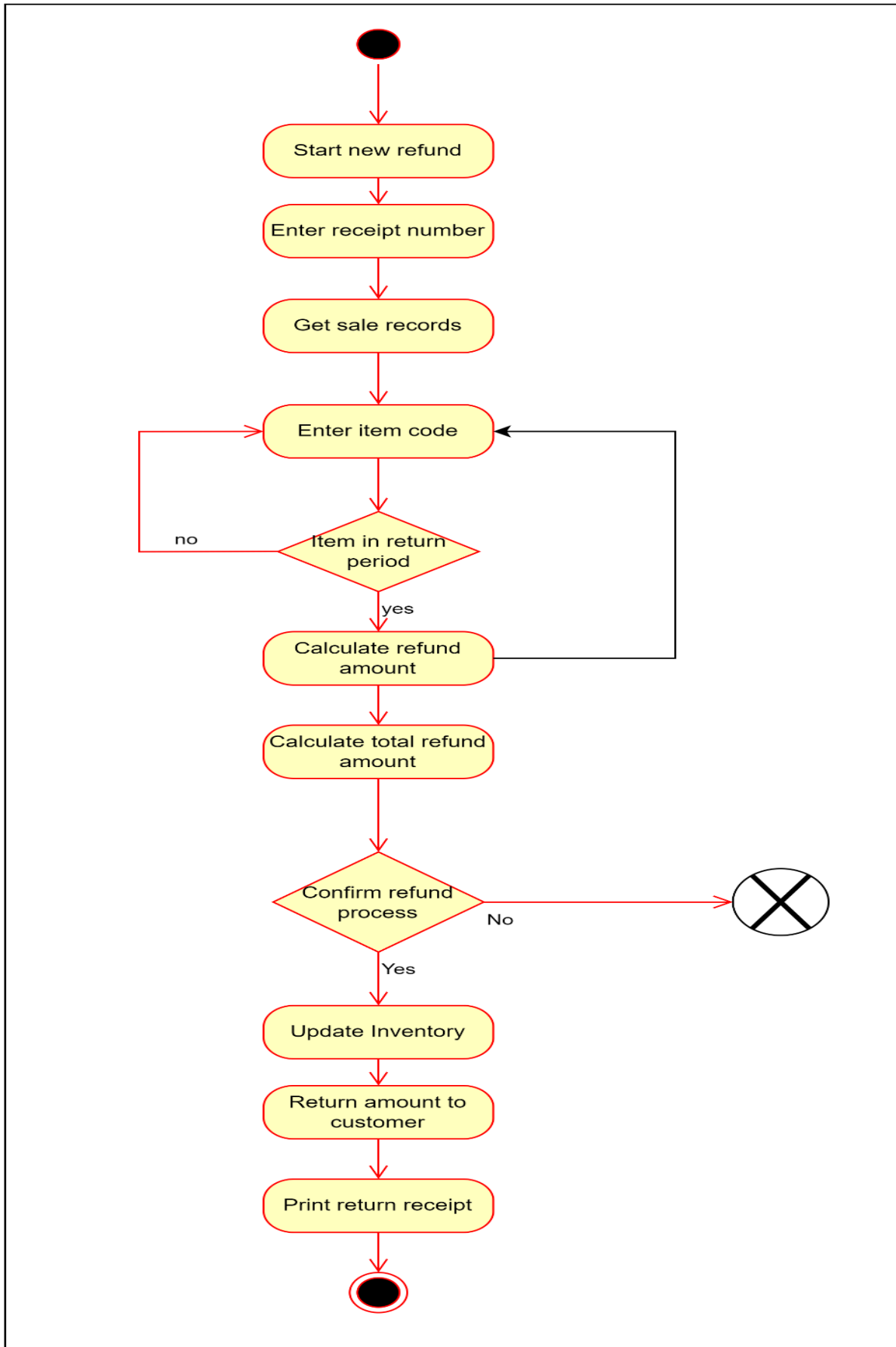2. Inventory System
3. Cashier

Boundary Objects:

1. POS Interface

Control Objects:

1. Return Manager
2. Refund Amount Processor
3. Inventory Manager
4. Item Return Validation

SEQUENCE DIAGRAM:

ACTIVITY DIAGRAM:

CLASS DIAGRAM:

Sale Receipt

Receipt No : string
Total Amount: decimal
Total Items : int

Item

ItemCode : string
ItemName : string
BarCode
Price : decimal
QuantityinStock : int

Return Receipt

Receipt No : string
Total Amount: decimal
Total Items returned : int

0..1

1

1..*   1..*

1..*   1..*

1

Payment

Payment Method : string
Amount : decimal

processPayment()

1   1

1

1

Sale

Total Amount: decimal
Date: date
Time : time

addItem()
deleteItem()
processPayment()
calculateTotal()
applyCoupon(CouponID)

1..*

Return

Total Amount: decimal
Date : date
Time : time
1..*

returnItem()
crefundAmount()
check_if_valid()calculateTotal()
processPayment()

1

1

1

Coupon

CouponID : string
Discount Amount : decimal