

# IT314-SOFTWARE ENGINEERING(LAB 06)

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

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### ❖ Process Sale

#### Q1. Develop Use Case Textual Description for "Process Sale".

**Ans: Actors:** Cashier

#### **Preconditions:**

- The cashier is logged into the Point of Sale (POS) system.
- The system has updated inventory and pricing information.
- Payment systems (e.g., card readers) are connected or ready for offline cash transactions.

#### **Basic Flow:**

1. The customer arrives at the checkout with their items.
2. The cashier scans or manually enters the product details.
3. The POS system retrieves the price, description, and stock status from the database.
4. The cashier reviews and confirms the total price, including any taxes or discounts.
5. The system calculates the final amount based on stored tax and discount information.
6. The cashier communicates the final amount to the customer.
7. The customer selects a payment method, and the cashier processes the payment.
8. Upon successful payment, the system deducts the items from inventory.
9. The system generates and prints a receipt for the customer.
10. The sale is recorded in the system's database.

#### **Postconditions:**

- The sale is logged in the POS system.
- The inventory reflects the sold items.

#### **Alternate Flows:**

- 2.1 Barcode Scan Error: If an item scan fails, the cashier manually enters the product code.
- 2.2 Remove an Item: The cashier removes an item from the list, and the total updates accordingly.

- 4.1 Amount Discrepancy: If the total amount doesn't match expectations, the customer or cashier reviews the items.
- 7.1 Promotional Coupons: The customer presents a coupon, which the cashier enters or scans to adjust the total.
- 7.2 Payment Declined: If a card payment is declined, the cashier requests an alternative payment method.

This use case involves a cashier processing a customer's purchase. It includes scanning items, calculating the total, accepting payment, updating inventory, and generating a receipt. The system ensures accurate pricing, applies discounts, and handles different payment methods. Post-sale, inventory is updated, and the transaction is logged.

## **Q2. Identify Entity/Boundary Control Objects**

**Ans:** Entity Objects:

- Item
- Stock Management System
- Cashier
- Shopper
- Sales Receipt
- Transaction

Boundary Objects:

- POS Screen
- Product Scanner
- Payment Terminal
- Receipt Generator
- Customer Display

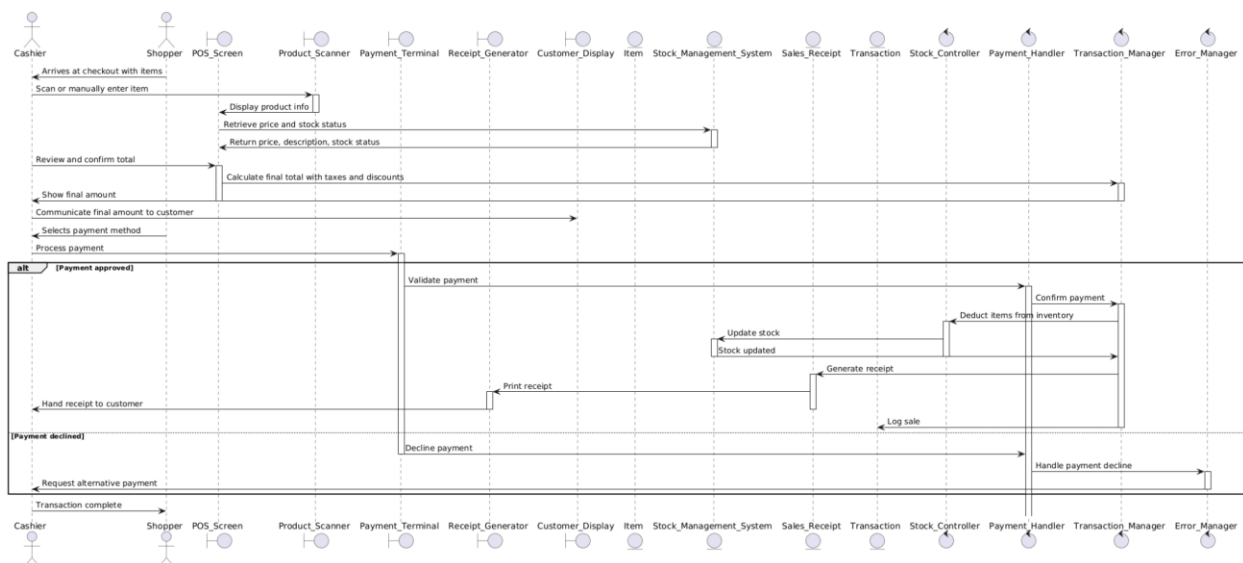
Control Objects:

- Stock Controller
- Payment Handler
- Transaction Manager
- Error Manager

In "Process Sale," key **entity objects** like items, receipts, and transactions interact with the stock management system to track sales. The **boundary objects**—including the POS screen, product scanner, and payment terminal—enable communication between the cashier and the system. The **control objects**, such as the stock and payment handlers, manage inventory updates and transaction completion, ensuring the sale is processed accurately.

### Q3. Develop Sequence Diagram.

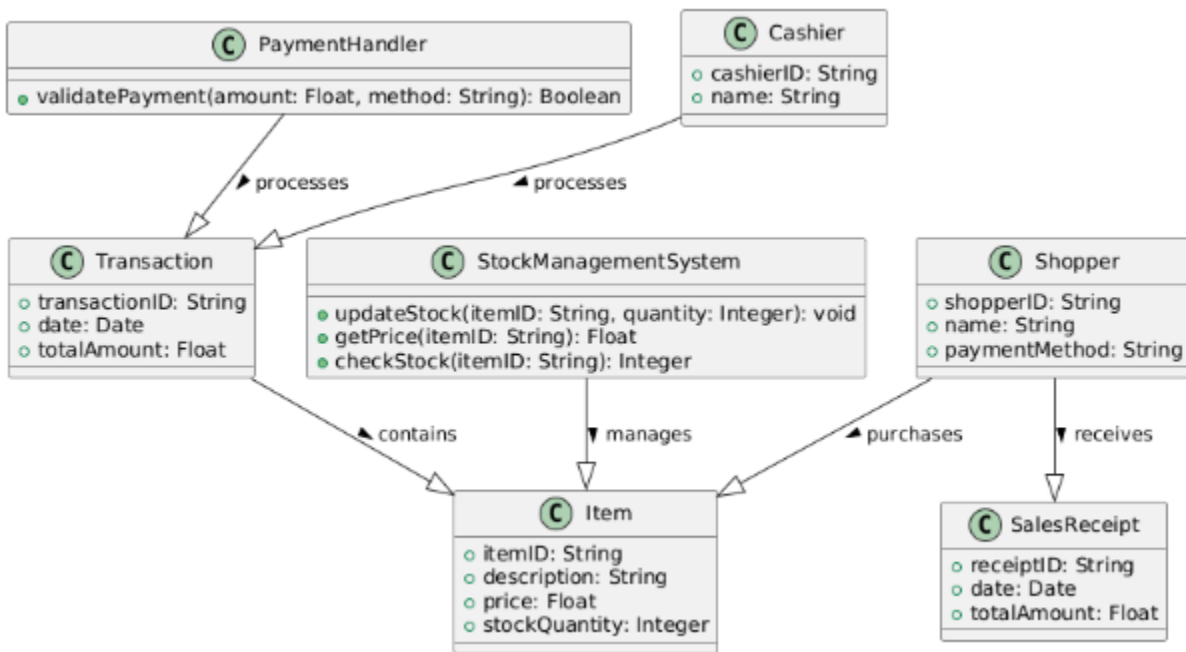
Ans:



The sequence diagram shows the interactions between the cashier and the POS system, starting with item scanning, retrieving details from the inventory, calculating the total, processing the payment, updating the inventory, and printing a receipt.

#### Q4. Develop Analysis Model.

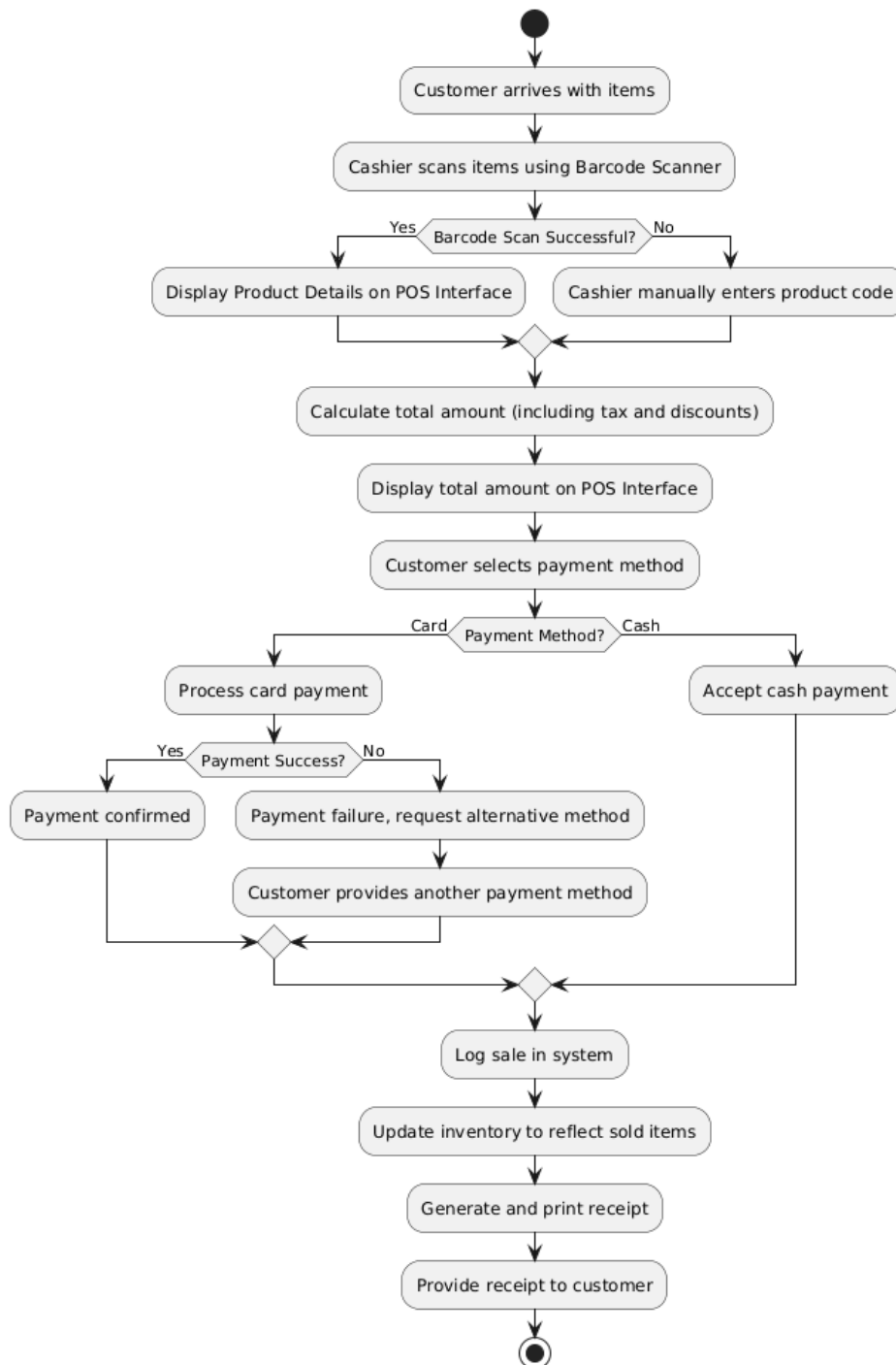
Ans:



The analysis model outlines the relationships between key entities like Item, Customer, Cashier, Sale, and Inventory. Each object is associated with attributes such as price, quantity, and transaction details, showing how they interact during a sale.

Q5. Develop an activity diagram.

Ans:



This diagram outlines the workflow from scanning items, calculating the total, processing the payment, and updating the inventory, ending with generating and printing the receipt.

## ❖ Handle Returns:

### 1. Develop Use Case for "Handle Return" use case.

**Ans:**

**Actor:** Cashier

**Preconditions:**

- The POS (Point of Sale) system is working.
- The customer has a valid receipt or proof of purchase.
- Sales data can be accessed.

**Flow:**

1. The customer asks to return an item.
2. The cashier searches for the sale in the local database using the receipt or transaction ID.
3. The system checks if the items can be returned according to store policy.
4. The cashier confirms the return and processes it.
5. The system calculates the refund based on the original transaction (the refund will likely be in cash since online payment methods may not be accessible).
6. The system updates the local inventory and records the return transaction locally.
7. A return receipt is printed for the customer.

**Postconditions:**

- The return is recorded in the local database.
- Local inventory is updated to show the returned items.
- The system will wait to sync with the central server once connectivity is restored.

**Alternate Flow:**

#### 2.1 Product Not Found in the System:

The system shows an error that the product cannot be found in the database, so the cashier checks the purchase receipt manually.

#### 3.1 No Receipt Available:

If the customer doesn't have a receipt, the cashier asks for another proof of purchase (like a loyalty account or card transaction).

#### 4.1 Item Condition Not Acceptable:

If the item is damaged or not in acceptable condition, the cashier informs the customer about the return policy.

#### 5.1 Partial Refund or Exchange:

Instead of a full refund, the customer can choose to exchange the item or receive a partial refund based on the store's return policy.

#### 6.1 Payment Method Mismatch:

If the customer wants the refund in a different way (like cash for a card transaction), the system will only allow the refund to go back to the original payment method.

#### 7.1 System Error During Refund:

If a system error happens during the refund, the cashier may process the refund manually or give store credit to the customer.

This use case handles the process of returning items. The cashier identifies the original transaction using a receipt or transaction ID, verifies if the item is eligible for return, and processes a refund. The inventory is updated, and a return receipt is generated.

## 2. Identify Entity/Boundary Control Objects.

**Ans:**

### Entity Objects:

1. Product
2. Receipt
3. Return
4. Refund
5. Inventory System
6. Customer
7. Cashier

**Boundary Objects:**

1. POS Interface
2. Barcode Scanner
3. Display

**Control Objects:**

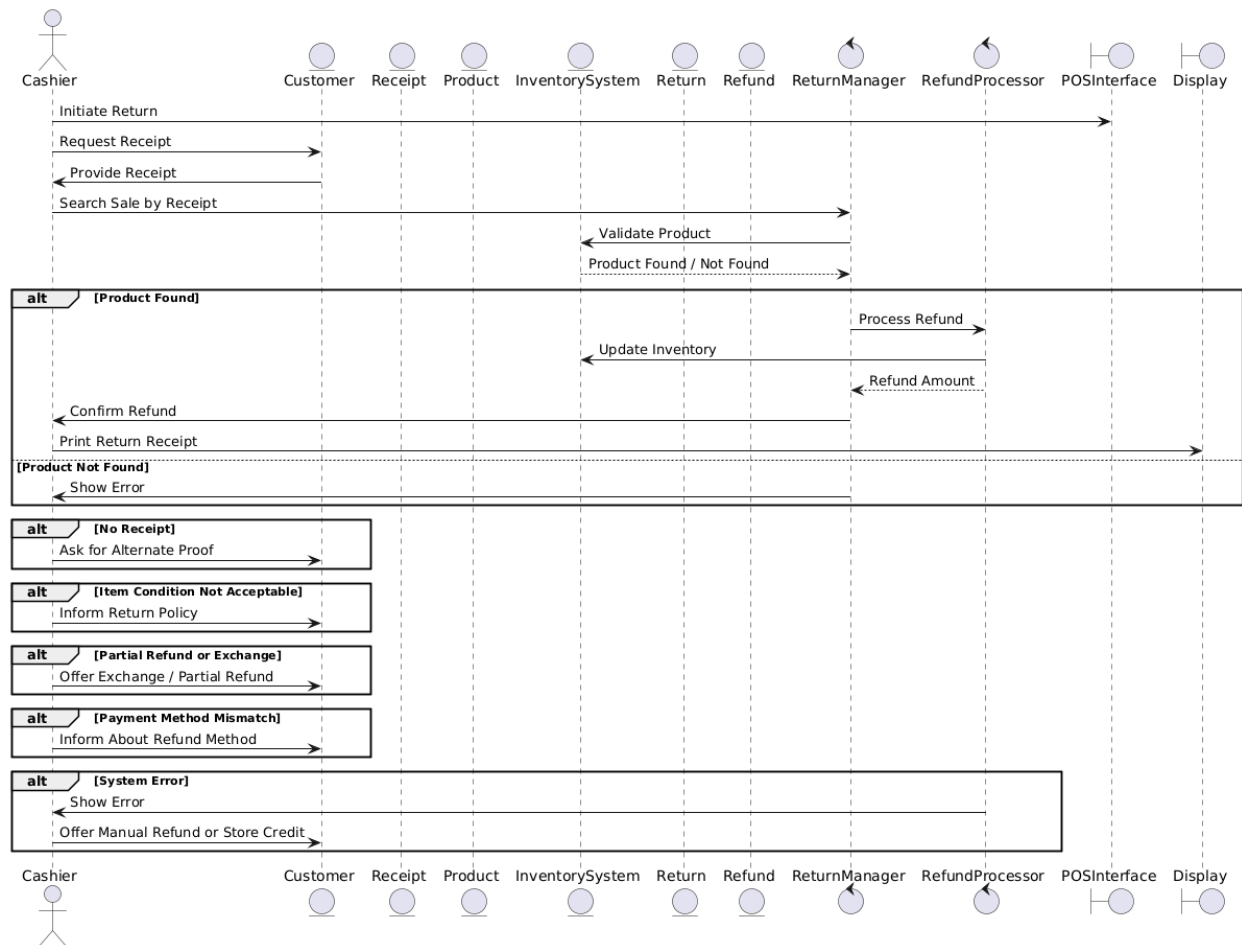
1. Return Manager
2. Refund Processor
3. Inventory Manager
4. Error Handler

In "Handle Return," essential **entity objects** like the product, receipt, and refund are involved in tracking the return. The **boundary objects**—the POS interface and barcode scanner—help the cashier process the return, while **control objects** like the return and inventory managers handle the refund and update the stock, ensuring that returns are recorded and inventory is adjusted accordingly.

**3. Develop a sequence diagram.**

**Ans:**



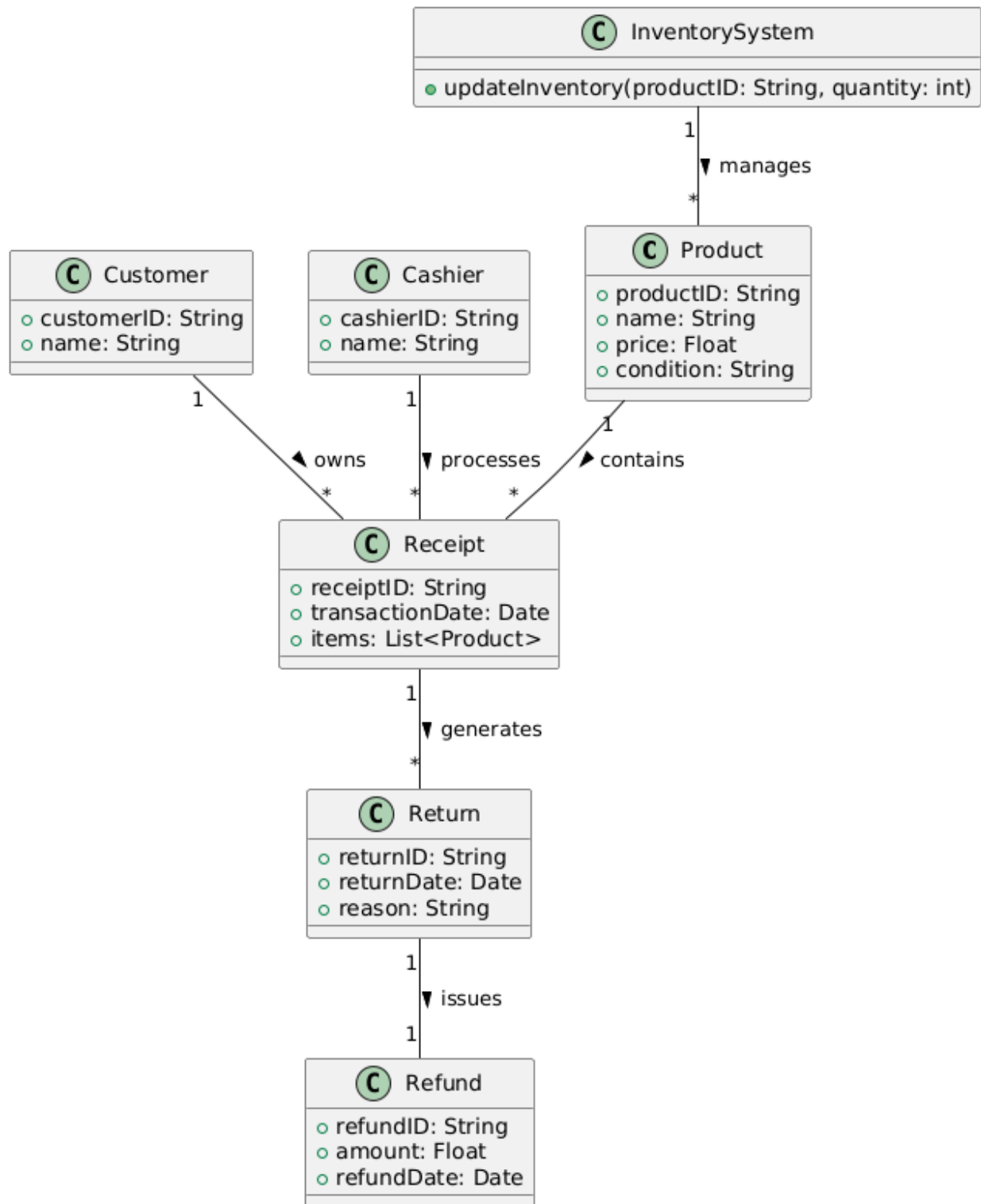


The sequence diagram shows the interactions between the cashier, customer, and system. It starts with locating the transaction, verifying return eligibility, processing the refund, updating inventory, and generating the return receipt.

#### Q4. Develop Analysis Domain Model.

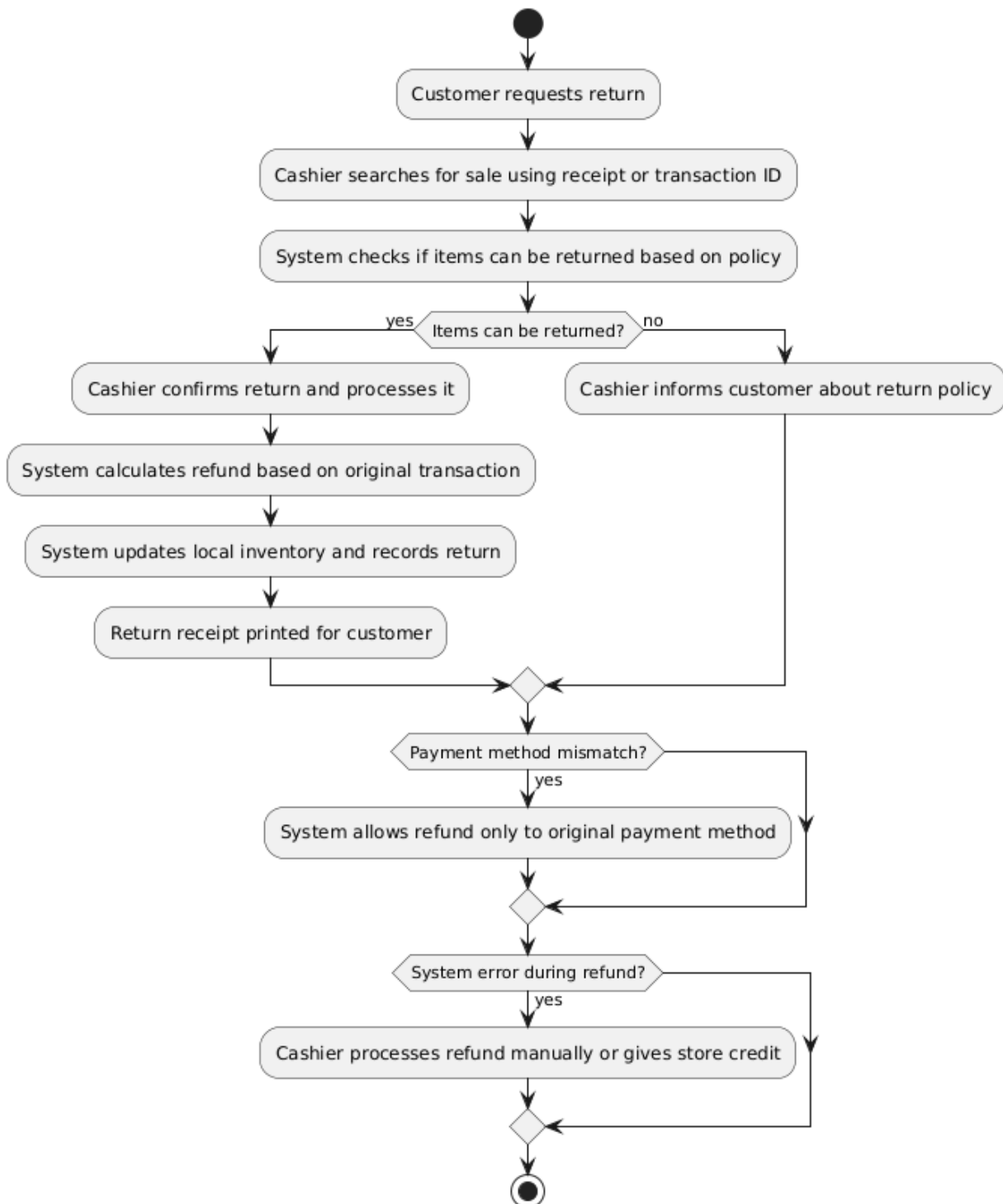
Ans:

The analysis model depicts the relationships between entities like Return, Refund, Customer, and Inventory. Attributes such as return date, refund amount, and product condition are shown in how they interact during a return.



Q5: Develop activity diagram.

Ans:



This diagram outlines the return process, starting from the customer's return request, verifying the transaction, processing the refund, updating the inventory, and issuing the return receipt.