It-314
Software Engineering

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Lab06: Point of Sale System

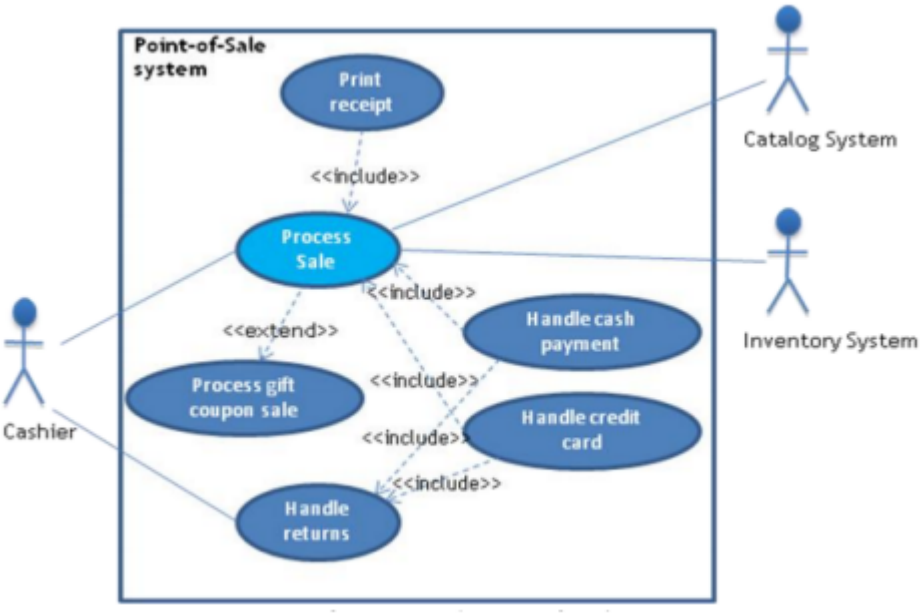
A Problem Description

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 catalogue 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.... [The details of which are not given here]

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, Customer
Preconditions: The customer has selected products for purchase, and the POS system is ready to process the transaction.

Main Flow:

1. The customer presents the items they wish to purchase at the POS counter.
2. The cashier scans the products using a barcode scanner.
3. The POS system retrieves details such as the product name and price from the catalog and shows them on the screen.
4. The system calculates the total cost of all the items.
5. If applicable, promotions, discounts, or gift coupons are applied by the system.
6. The cashier asks the customer to choose a payment method (cash, credit card, or another option).
7. The cashier processes the payment through the POS.
8. If the customer chooses card payment, the system interacts with the payment gateway to authenticate the transaction.
9. Once the payment is approved, the system updates the inventory, reducing the stock levels of the purchased items.
10. The system prints a receipt and provides it to the customer.
11. Optionally, the system may issue promotional coupons for future use.
12. The transaction concludes with the cashier handing the purchased items to the customer.

Extensions:

- **3a**: If an item isn't found in the system after scanning, the cashier enters its details manually or requests assistance from an administrator to update the catalog.

- **5a**: If an invalid coupon or discount is detected, the cashier notifies the customer, proceeds without the discount, or seeks manager approval.
- **9a**: If payment authorization fails, the cashier asks the customer to use a different payment method before continuing.
- **9b**: If the payment fails due to insufficient funds or cancellation, the transaction cannot be completed.
- **10a**: In case of a receipt printing failure, the cashier troubleshoots the issue or provides a digital receipt.

Postconditions: The sale is successfully completed, and the inventory is updated to reflect the reduced stock.

- **Use Case:** Handle Return

  Primary Actor: Cashier, Customer
  Preconditions: The customer wishes to return an item, and the POS system is ready to handle the return.

  Main Flow:

  1. The customer brings the item to the cashier along with the original receipt for return.
  2. The cashier enters the transaction ID from the receipt or scans the receipt to retrieve details of the original sale.
  3. The system verifies whether the item is eligible for return, considering factors such as return policy, return period, and item condition.
  4. If the item meets the return criteria, the system initiates the return process.
  5. The system provides options for refund or exchange as per store policy.
  6. The inventory is updated, adding the returned item back to stock.
  7. If the customer requests a refund, the system processes the refund (via cash, credit card, etc.).

8. If the customer chooses to exchange the item, the new item is scanned, and the price difference is calculated.
9. The system prints a return receipt, which the cashier gives to the customer.
10. The return process concludes, and the cashier provides the receipt or refund to the customer.

Extensions:

- **3a**: If the item is deemed ineligible for return, the cashier explains the return policy to the customer.
- **3b**: In case of a mismatch between the item and the original transaction during verification, the cashier investigates the issue and resolves it with the customer.
- **7a**: If a refund fails during processing, the cashier addresses the problem and informs the customer of any delays or alternate solutions.

Postconditions: The return is completed successfully, and inventory is updated accordingly.

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2. Identify Entity/Boundary Control Objects

Entity Objects:

1. Sale
2. Item
3. Payment
4. Customer
5. Cashier
6. Inventory
7. Coupon
8. Return

Boundary Objects:

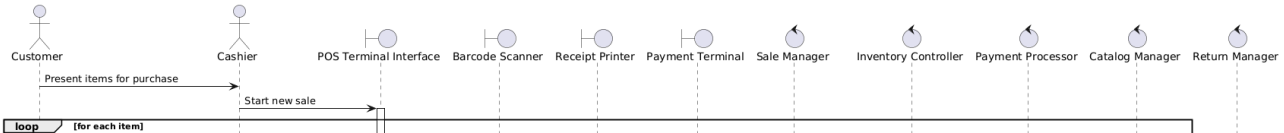
1. POS Terminal Interface
2. Barcode Scanner
3. Receipt Printer
4. Payment Terminal

Control Objects:

1. Sale Manager
2. Inventory Controller
3. Payment Processor
4. Catalog Manager
5. Return Manager

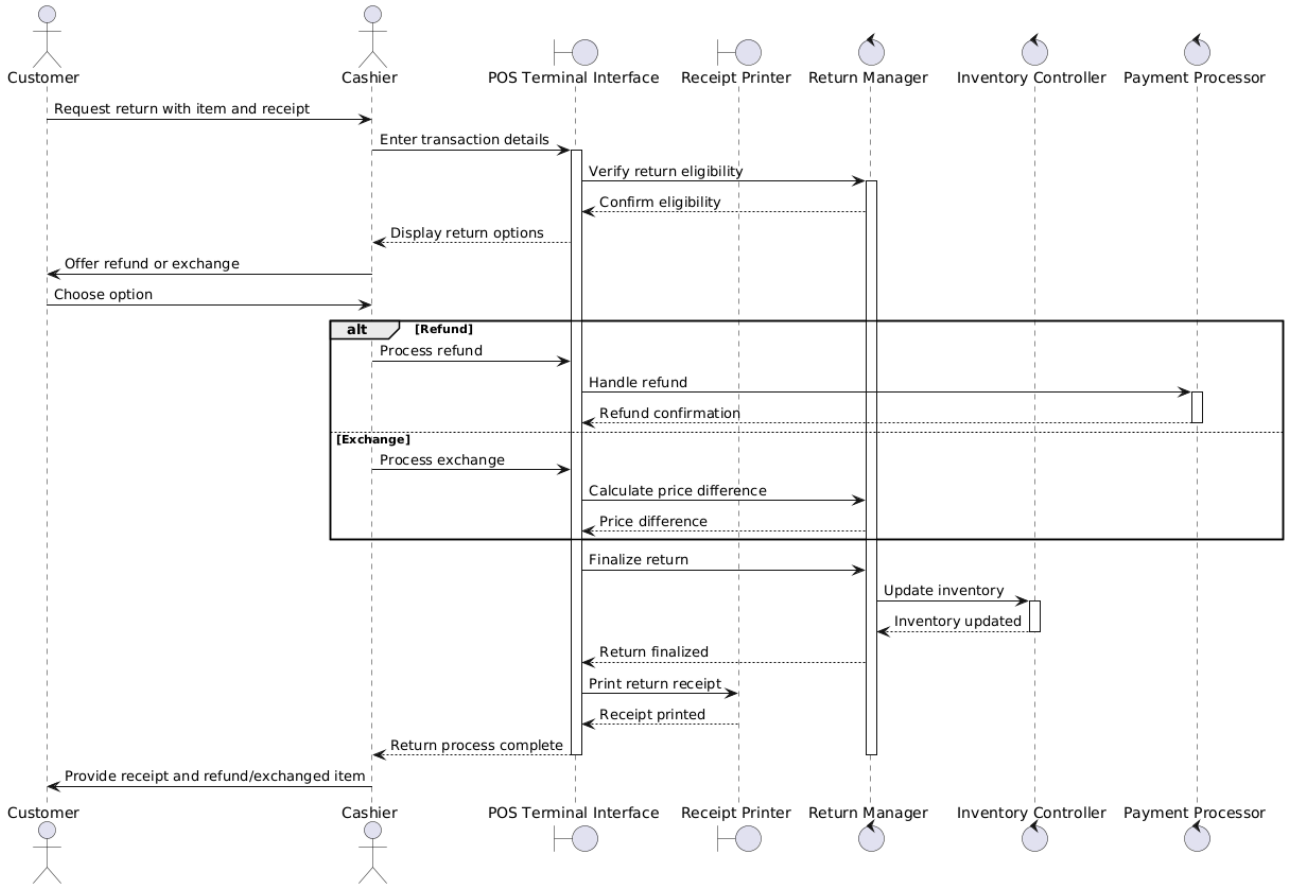
3.Develop Sequence Diagrams

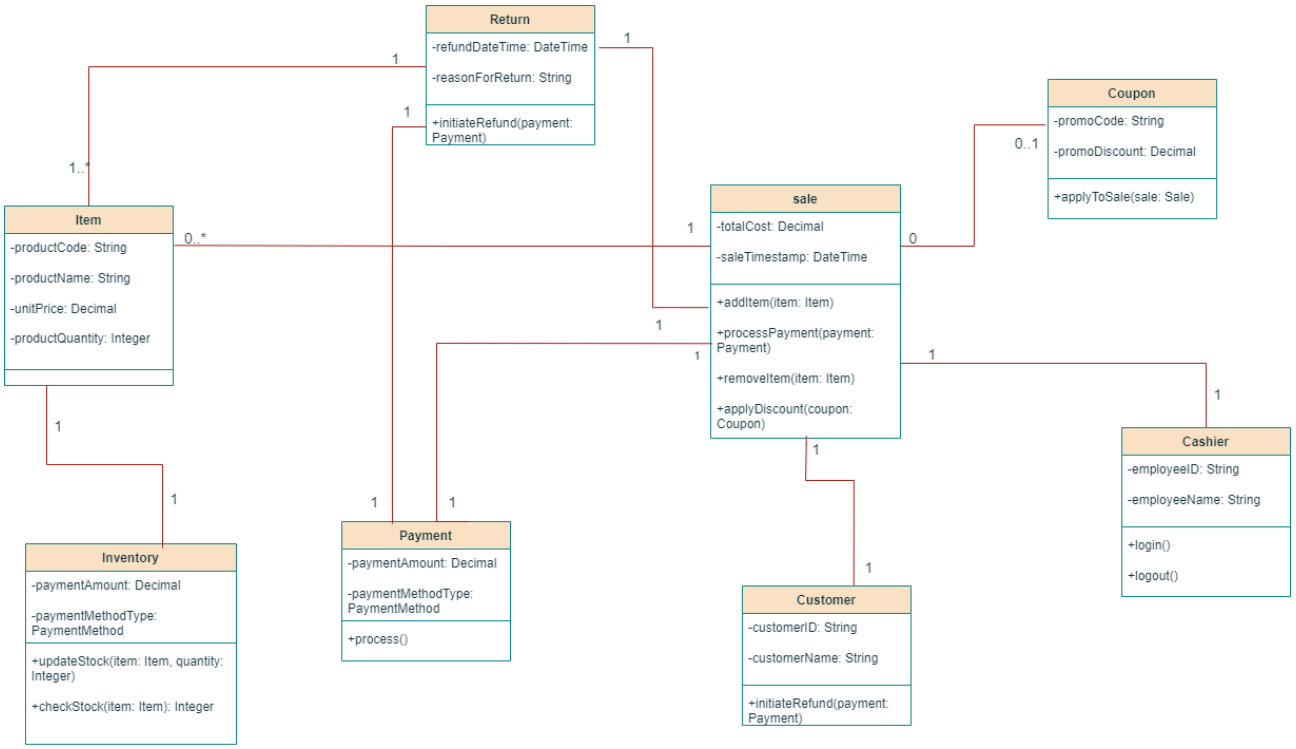
For Process Sale:



For Handle Return:

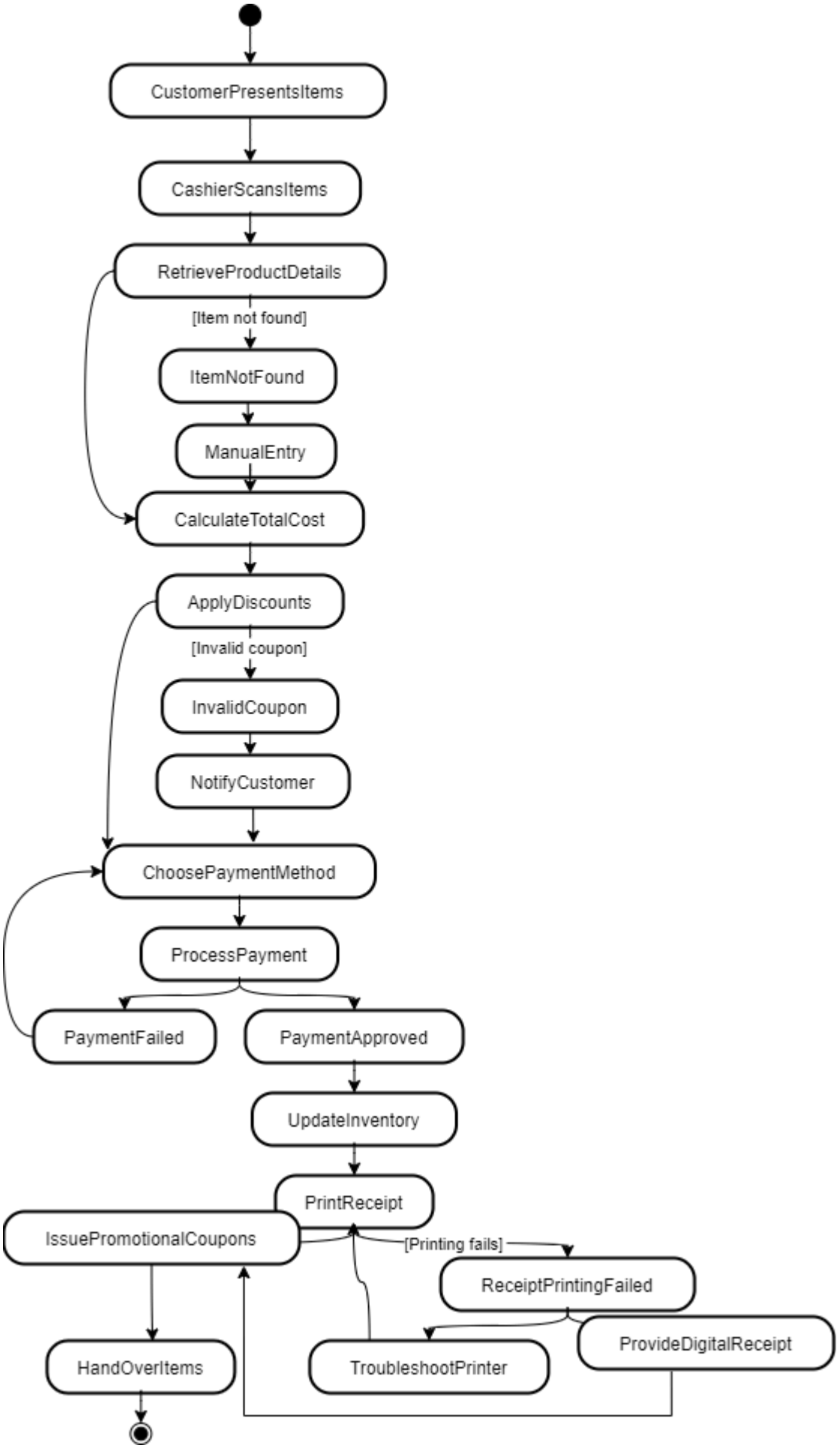
4.Develop Analysis Domain Models

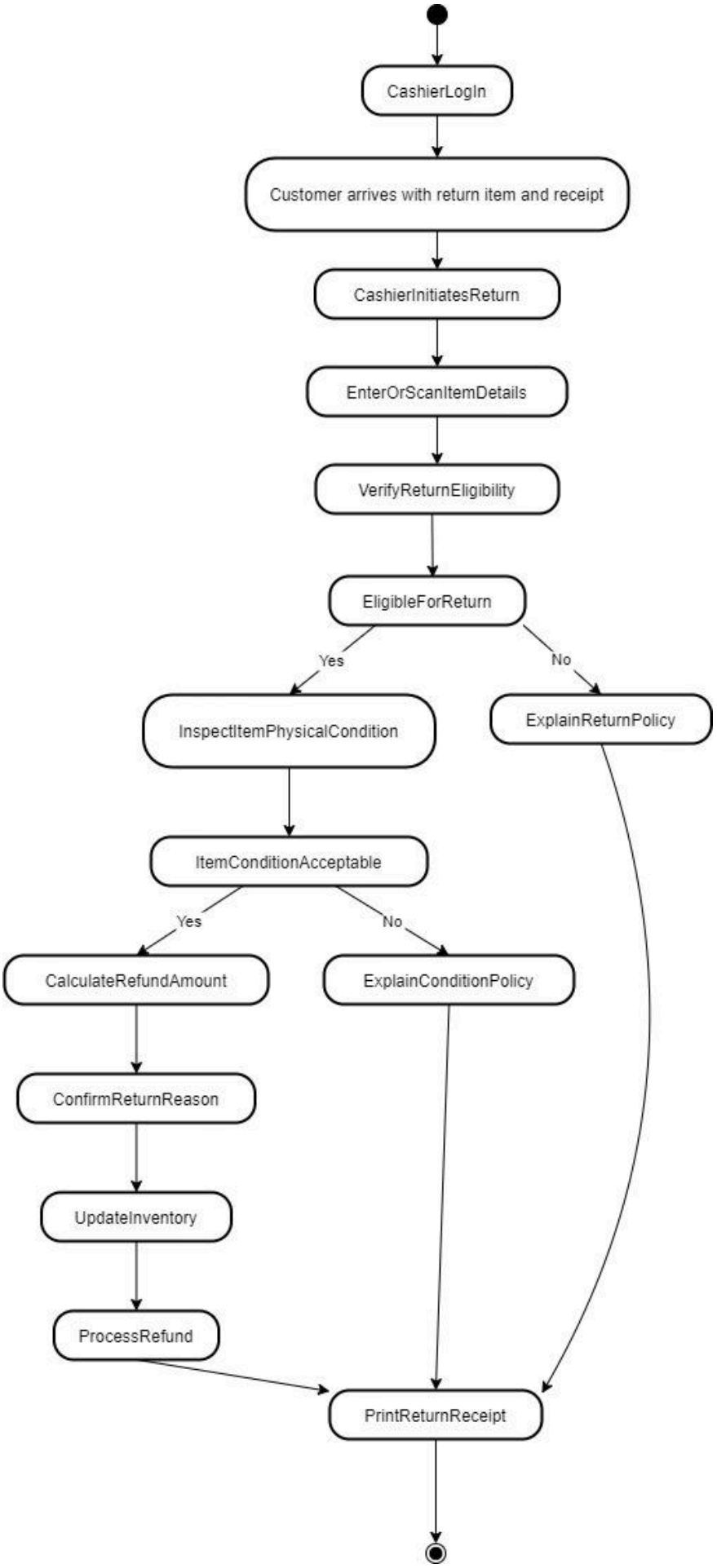




5.Develop activity diagrams for "Process Sale" and "Handle Return" use cases.

1) **For Process Sale:**
2) **For Handle Return:**


CustomerPresentsItems
CashierScansItems
RetrieveProductDetails
[Item not found]
ItemNotFound
ManualEntry
CalculateTotalCost
ApplyDiscounts
[Invalid coupon]
InvalidCoupon
NotifyCustomer
ChoosePaymentMethod
ProcessPayment
PaymentFailed
PaymentApproved
UpdateInventory
PrintReceipt
IssuePromotionalCoupons
[Printing fails]
ReceiptPrintingFailed
ProvideDigitalReceipt
HandOverItems
TroubleshootPrinter


CashierLogIn
Customer arrives with return item and receipt
CashierInitiatesReturn
EnterOrScanItemDetails
VerifyReturnEligibility
EligibleForReturn
Yes
No
InspectItemPhysicalCondition
ExplainReturnPolicy
ItemConditionAcceptable
Yes
No
CalculateRefundAmount
ExplainConditionPolicy
ConfirmReturnReason
UpdateInventory
ProcessRefund
PrintReturnReceipt