# IT-314

Lab Assignment

Assignment Title : Point of sale System

Date of Submission : September 23, 2024

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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 catalog system and interact with 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 issue 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.
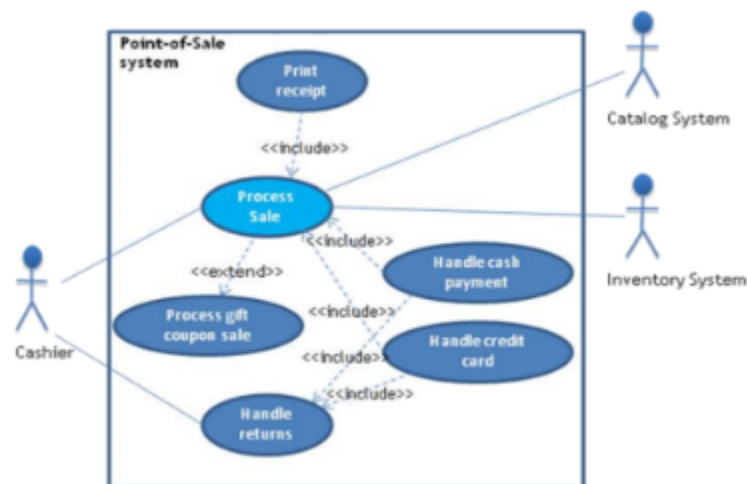
1. Develop Use Case Textual Description for "Process Sale" and "Handle Return" use cases.

- **For Process sale**

  USE CASE : Process Sale

  Primary Actor : Cashier

  Preconditions : The customer has selected items for purchase and POS system

  is ready to process sales.

  Main Flow :

  1. The customer brings items to the point-of-sale (POS) counter for purchase.
  2. The cashier uses a barcode scanner to scan the items.
  3. The POS system retrieves item details (name, price) from the catalog and displays them on the screen.
  4. The system adds up the prices of all the items.
  5. If applicable, the system applies any promotions, discounts, or gift coupons.
  6. The cashier asks the customer for their preferred payment method (cash, credit card, or other).
  7. The cashier processes the payment through the POS system.
  8. For card payments, the system communicates with the payment gateway to verify the transaction.
  9. Once the payment is successful, the POS system updates the inventory by deducting the purchased items' quantities.
  10. The POS system prints a receipt and gives it to the customer.
  11. The system may also issue promotional gift coupons for future purchases.
  12. The sale transaction is complete, and the cashier hands over the purchased items to the customer.

  Extension:

  3a. If the item is not found in the system when the cashier scans it, the cashier manually enters the item information or seeks assistance from an administrator to update the catalog.

5a. If an invalid coupon or discount is detected when the system applies promotions or coupons, the cashier informs the customer and proceeds with the transaction without the discount or seeks manager approval.

9a. If the payment authorization fails when the cashier processes the payment, the cashier requests the customer to use an alternative payment method before proceeding.

9b. If insufficient funds are present or a payment cancellation occurs when the cashier processes the payment, the transaction cannot be completed as intended.

10a. If a receipt printing failure occurs after the transaction is completed and the receipt is being printed, the cashier must troubleshoot the printer or provide a digital receipt to the customer.

Postcondition : The sale is completed, and inventory reflects the reduced stock.

● **For Handle Return**

USE CASE : Handle Return

Primary Actor : Cashier

Preconditions : The customer wishes to return an item, and the POS system is

 ready to process the return.

Main Flow :

1. The customer brings an item to the cashier for return, along with the original receipt.
2. The cashier enters the transaction ID from the receipt into the POS system or scans the receipt to retrieve the original sale information.
3. The system checks whether the item is eligible for return based on the store's return policy (e.g., return window, item condition).
4. If the item is eligible for return, the system initiates the return process.
5. The system may offer an option for refund or exchange, based on store policy.

6. The POS system updates the inventory by adding the returned item back to stock.
7. If a refund is chosen, the system processes the refund (cash, credit back to card, etc.).
8. If an exchange is chosen, the new item is scanned, and the difference is calculated.
9. The system prints a return receipt, which the cashier hands to the customer.
10. The return transaction is completed, and the cashier provides the receipt or any refund to the customer.

Extension :

3a. If an item is found to be not eligible for return after verifying the return, the cashier must inform the customer and explain the return policy.

3b. If an item mismatch is detected in the system during item verification, the cashier should investigate the discrepancy and clarify the correct item details with the customer.

7a. If a refund processing failure occurs during refund processing, the cashier must troubleshoot the issue and inform the customer about the delay or alternative solutions.

Postcondition : The return is completed, and inventory is updated.

2. Identify Entity/Boundary Control Objects

Entity Objects:

- Sale
- Item
- Payment
- Customer
- Cashier
- Inventory
- Coupon
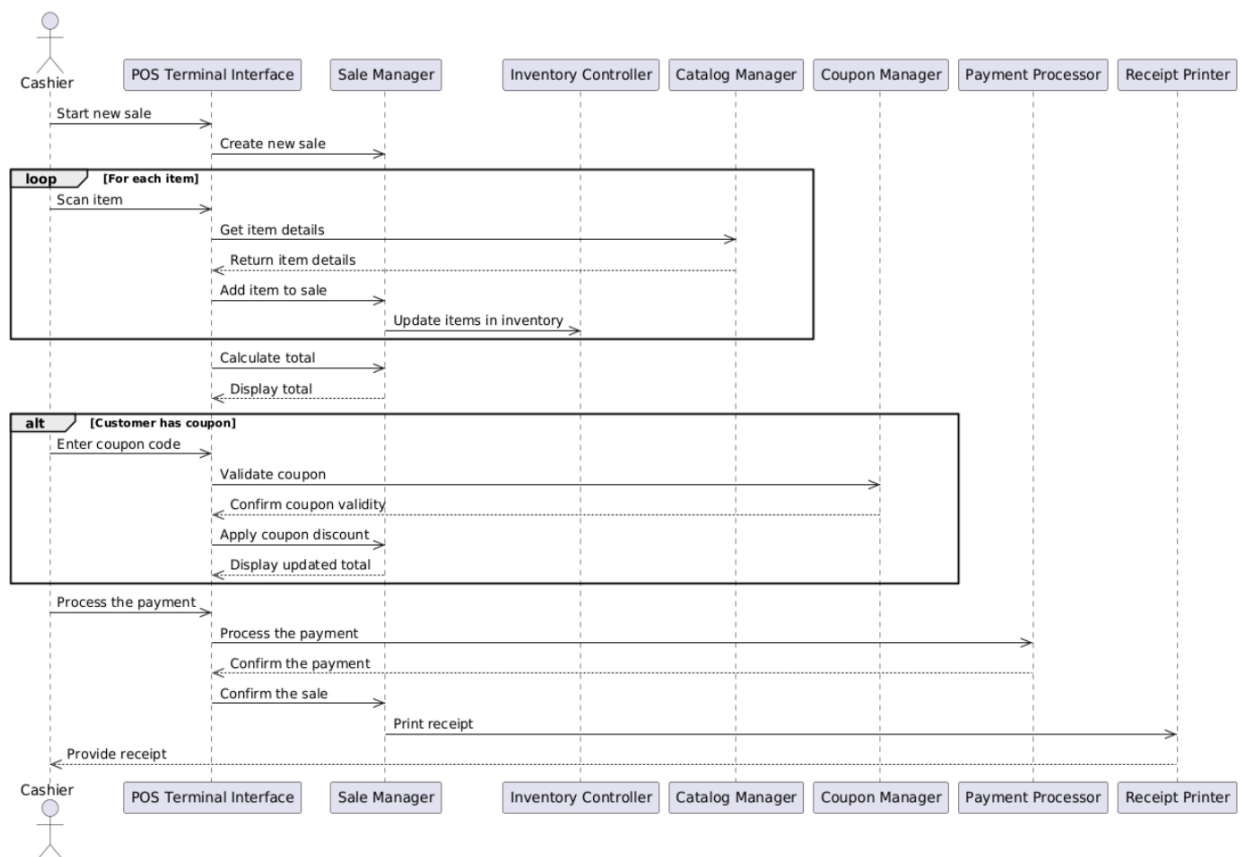- Return

Boundary Objects:

- POS Terminal Interface
- Barcode Scanner
- Receipt Printer
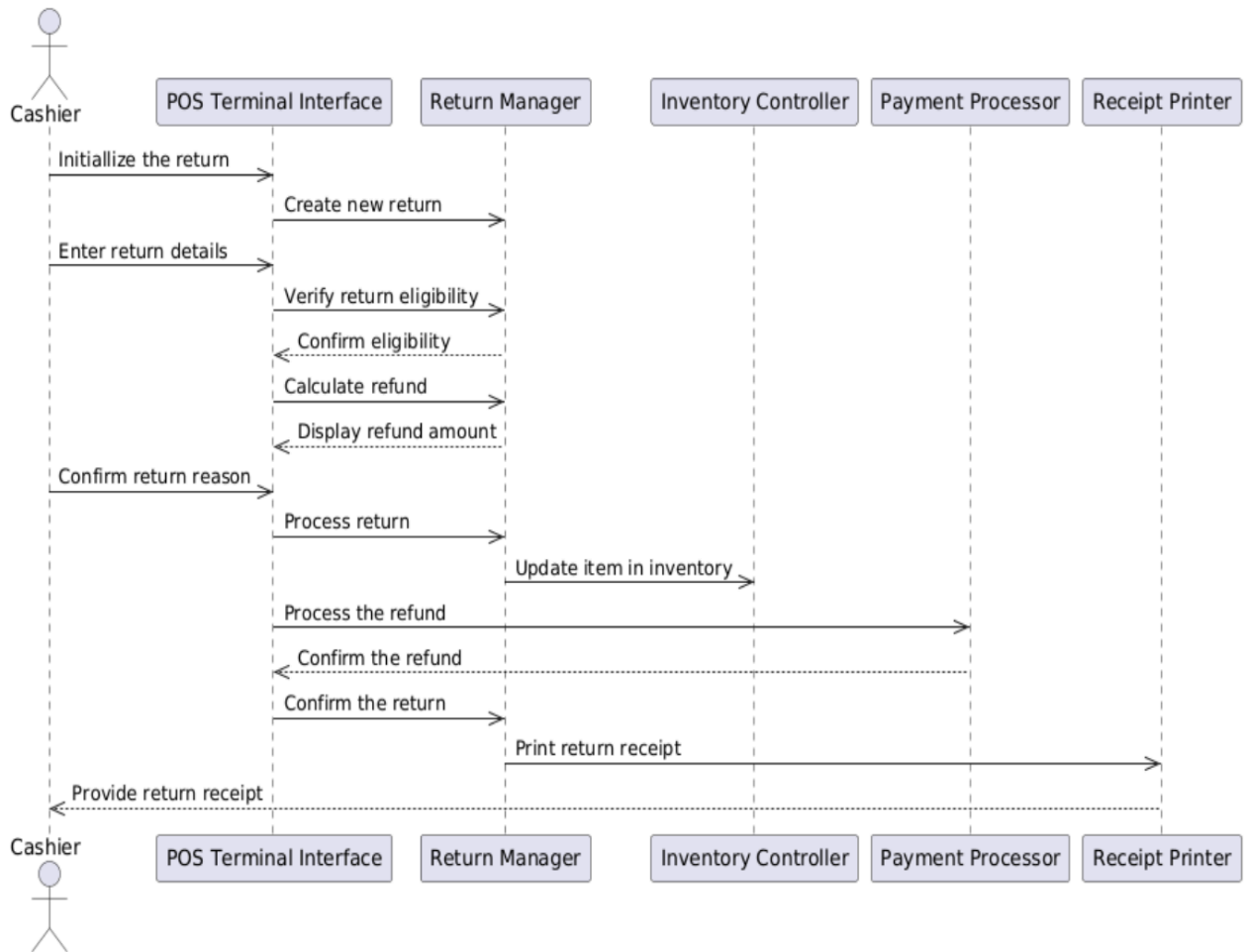- Payment Terminal

Control Objects:

- Sale Manager
- Inventory Controller
- Payment Processor
- Catalog Manager
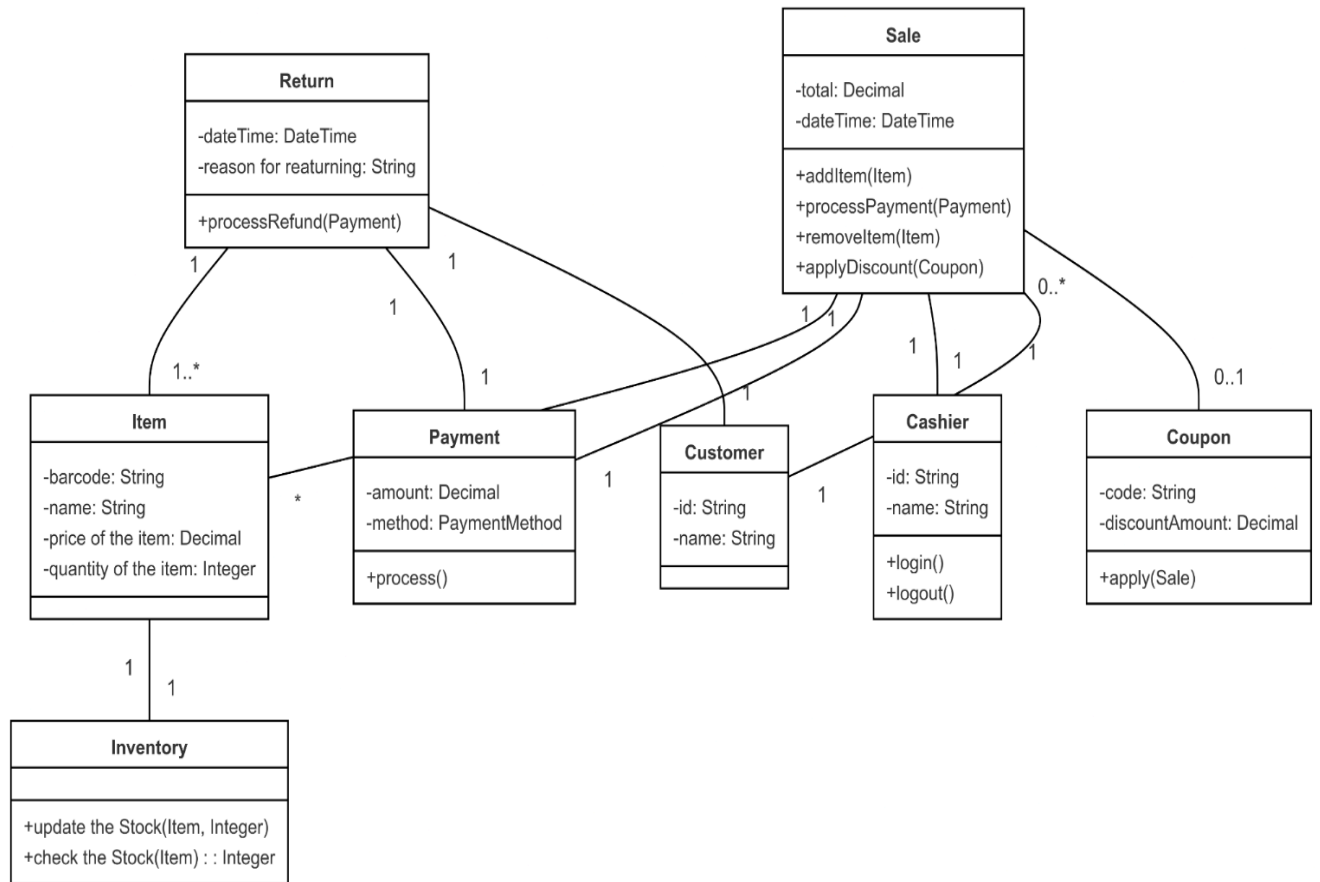- Return Manager

3. Develop Sequence Diagrams
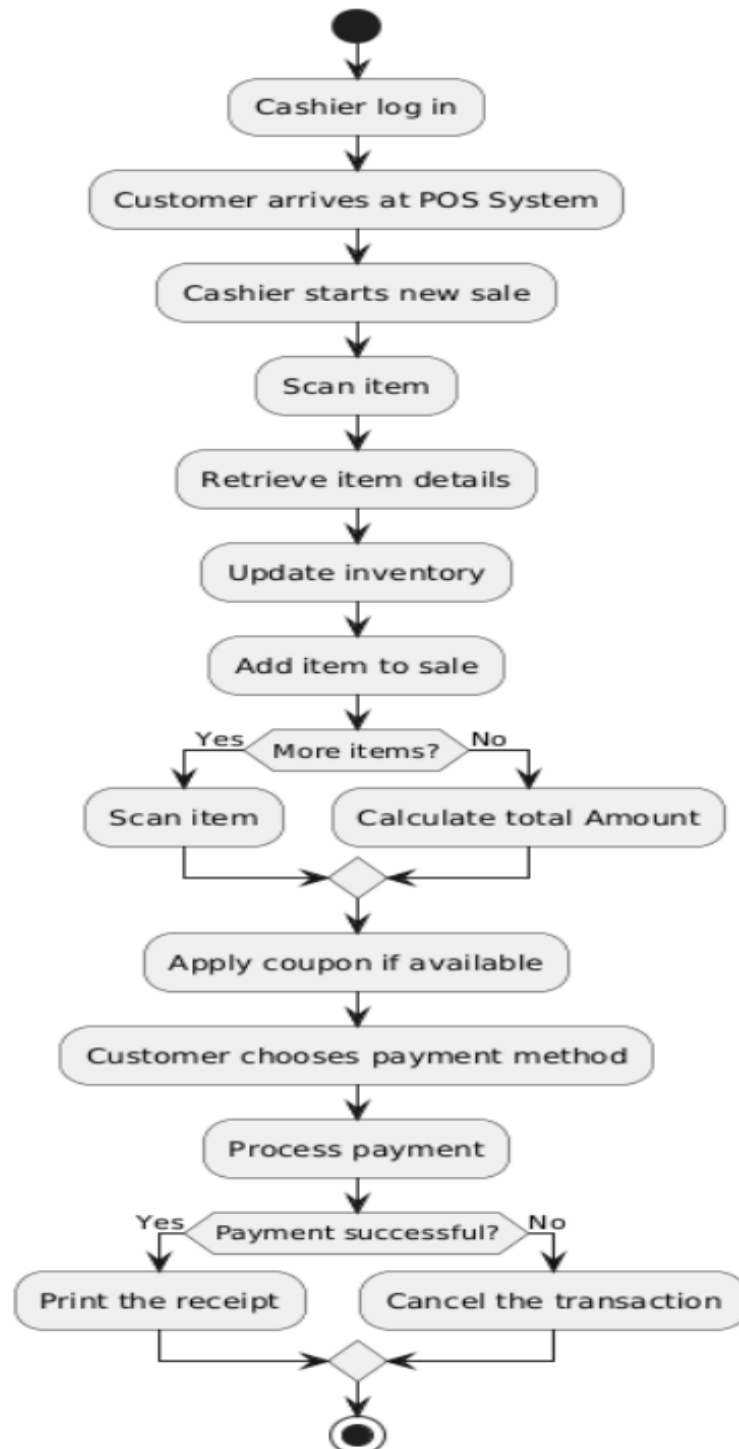
- **For "Process Sale"**

- **For "Handle Return"**

4. Develop Analysis Domain Models

Return

-dateTime: DateTime
-reason for reaturning: String

+processRefund(Payment)

Sale

-total: Decimal
-dateTime: DateTime

+addItem(Item)
+processPayment(Payment)
+removeItem(Item)
+applyDiscount(Coupon)

Item

-barcode: String
-name: String
-price of the item: Decimal
-quantity of the item: Integer

Payment

-amount: Decimal
-method: PaymentMethod

+process()

Customer

-id: String
-name: String

Cashier

-id: String
-name: String

+login()
+logout()

Coupon

-code: String
-discountAmount: Decimal

+apply(Sale)

Inventory

+update the Stock(Item, Integer)
+check the Stock(Item) : : Integer

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

- **For "Process Sale"**

● **For "Handle Return"**