IT313 - Software Engineering

LAB-6

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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 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.

Question 1 : Use CaseTextual Description

Use Case Name: Process Sale
Primary Actor: Cashier
Stakeholders & Interests:

- Customer: Wants a fast and accurate checkout process.
- Cashier: Needs to efficiently complete sales transactions and ensure accurate billing.

- Store Management: Requires accurate sales records and inventory updates.

Preconditions:

- The cashier is logged into the POS system.
- The system is connected to the inventory and catalog databases.
- The POS hardware (barcode scanner, receipt printer, etc.) is operational.

Main Success Scenario:

1. Customer presents items to the cashier for purchase.
2. The cashier initiates a new sale in the POS system.
3. The cashier scans the barcode of each item, and the system retrieves the item details (name, price) from the catalog database.
4. The system calculates the total price of all items, including any taxes or discounts.
5. The customer provides payment (cash, credit card, or check).
6. The POS system processes the payment, verifying the transaction.
7. The system updates the inventory by deducting the quantity of purchased items.
8. A receipt is printed, and the cashier gives it to the customer.
9. The transaction is completed, and the customer leaves with their purchased goods.

Extensions:

- 3a. Invalid Item: If an item's barcode cannot be scanned or is not recognized:
    - The cashier manually enters the item code or looks up the item in the system.

    - If the item is still unrecognized, the cashier informs the customer and excludes the item from the sale.
- 5a. Payment Declined: If the payment is declined:
    - The cashier asks the customer for an alternative payment method.
    - If the customer cannot provide valid payment, the transaction is canceled.
- 7a. Out of Stock: If an item is found to be out of stock during processing:
    - The system alerts the cashier.
    - The cashier informs the customer and offers to remove the item or suggest alternatives.

Postconditions:

- The sale is recorded in the POS system.
- The inventory system is updated to reflect the new stock levels.
- A receipt is issued, and the customer has successfully purchased their items.

Use Case Name: Handle Return
Primary Actor: Cashier
Stakeholders & Interests:

- Customer: Wants a straightforward process for returning purchased items and receiving refunds or exchanges.
- Cashier: Needs to efficiently process returns while ensuring accurate updates to inventory and sales records.
- Store Management: Requires accurate record-keeping of returns for inventory management and financial reporting.

Preconditions:

- The cashier is logged into the POS system.
- The return policy is known and accessible.
- The system is connected to the inventory and sales databases.

Main Success Scenario:

1. Customer approaches the cashier with an item to return, along with the receipt.
2. The cashier verifies the return eligibility based on the store's return policy (time frame, condition of the item, etc.).
3. The cashier initiates a return in the POS system.
4. The cashier scans the item or enters the item ID.
5. The system retrieves the original sale record and confirms the item's details.
6. The system updates inventory to reflect the returned item.
7. The cashier processes the refund using the original payment method (cash, credit card, etc.).
8. The system generates a return receipt and provides it to the customer.
9. The return transaction is completed, and the customer leaves with their refund or exchanged item.

Extensions:

- 2a. Item Not Eligible for Return: If the item does not meet the return criteria:
    - The cashier informs the customer of the reason and may suggest alternatives (e.g., store credit).
- 4a. Invalid Item**:** If the item barcode cannot be scanned or is not recognized:
    - The cashier manually enters the item code or looks up the item in the system.
    - If the item is still unrecognized, the cashier informs the customer and cancels the return.

- 7a. Refund Declined: If the refund cannot be processed (e.g., payment method issues):
    - The cashier informs the customer and discusses alternative refund methods.

Postconditions:

- The return is recorded in the POS system.
- The inventory system is updated to reflect the returned item.
- A return receipt is issued, and the customer has successfully completed the return process.

Question 2 : Identify Entity, Boundary, Control Objects.

For "Process Sale" :

1. Entity Objects

- Sale
- Item
- Inventory
- Payment
- Receipt
- User (Cashier, Administrator)
- Catalog

2. Boundary Objects

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

3. Control Objects

- SaleController
- InventoryController
- PaymentController
- ReceiptController
- LoginController

For "Handle Return" :

1. Entity Objects

- Return
- Item
- Inventory
- Payment
- Receipt
- User (Cashier)
- Sales Record

2. Boundary Objects

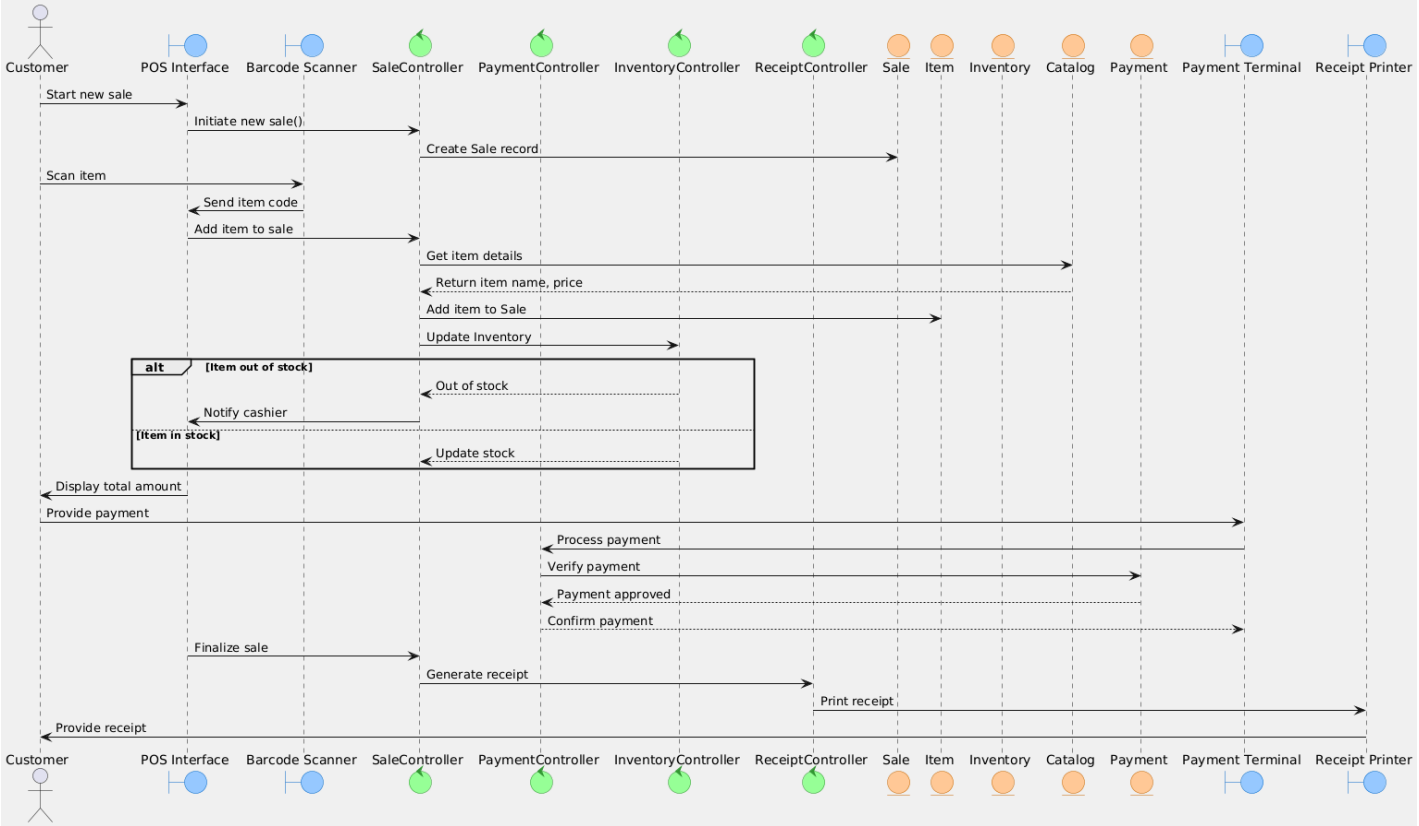
- POS Interface
- Barcode Scanner
- Receipt Printer

3. Control Objects

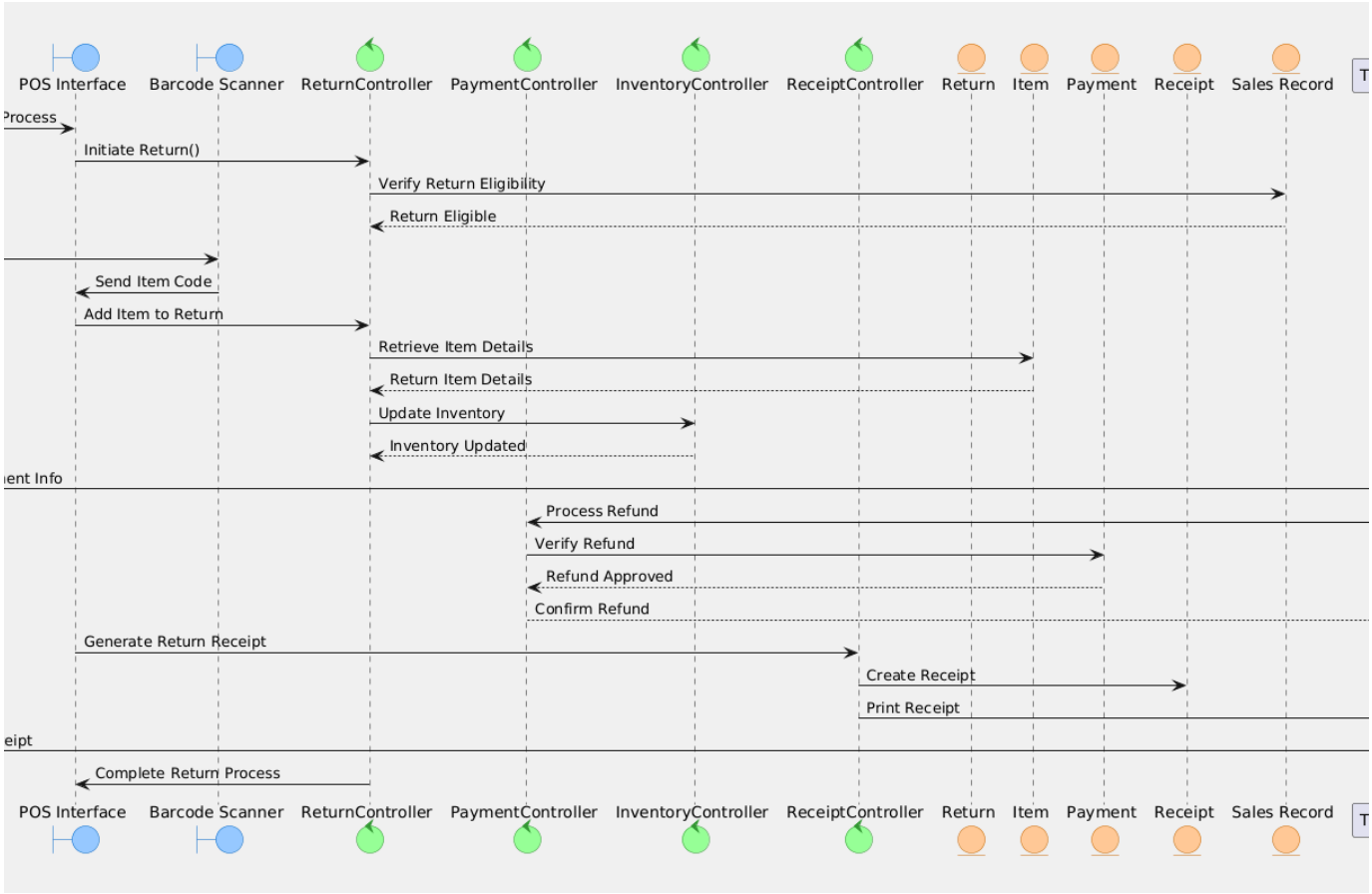
- ReturnController
- InventoryController
- PaymentController
- ReceiptController
- LoginController

Question 3 : Develop Sequence Diagrams

1. Process Sales Sequence Diagram :

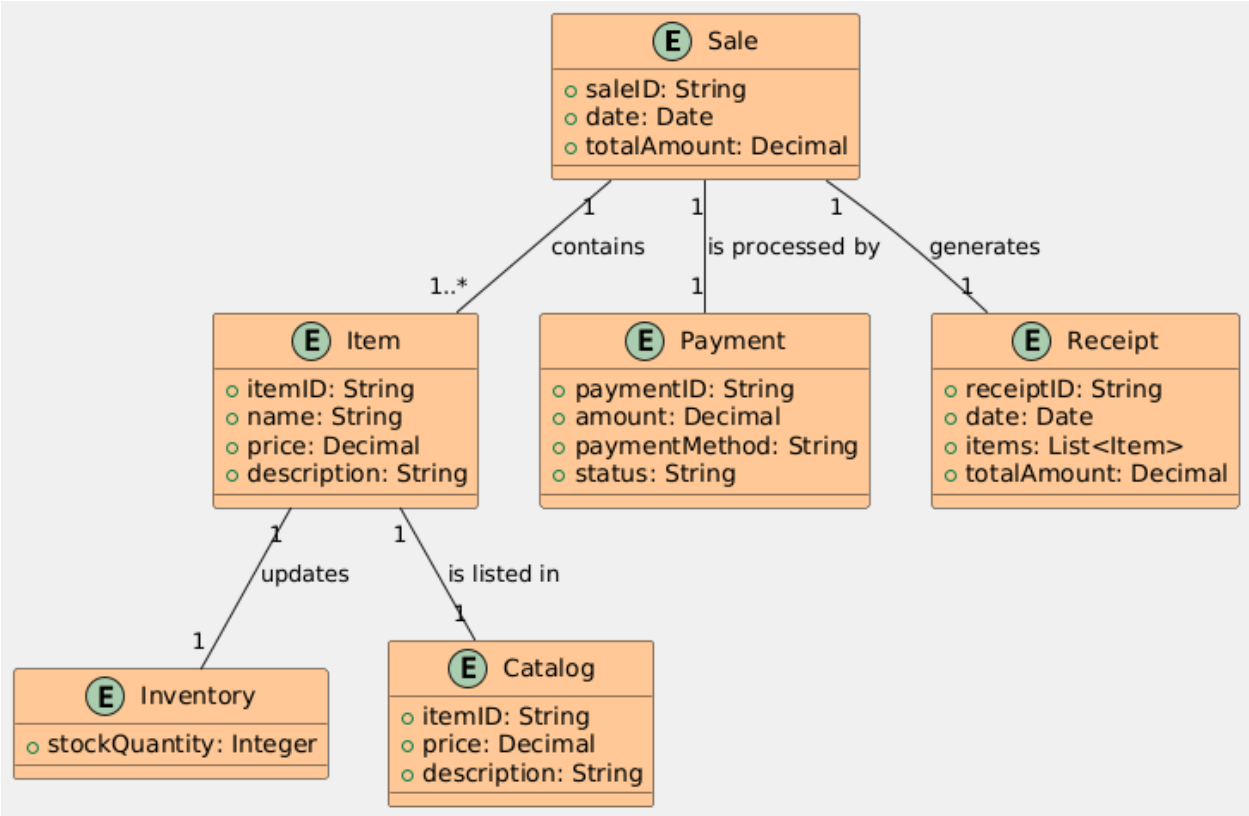


2. Handle Return Sequence Diagram :

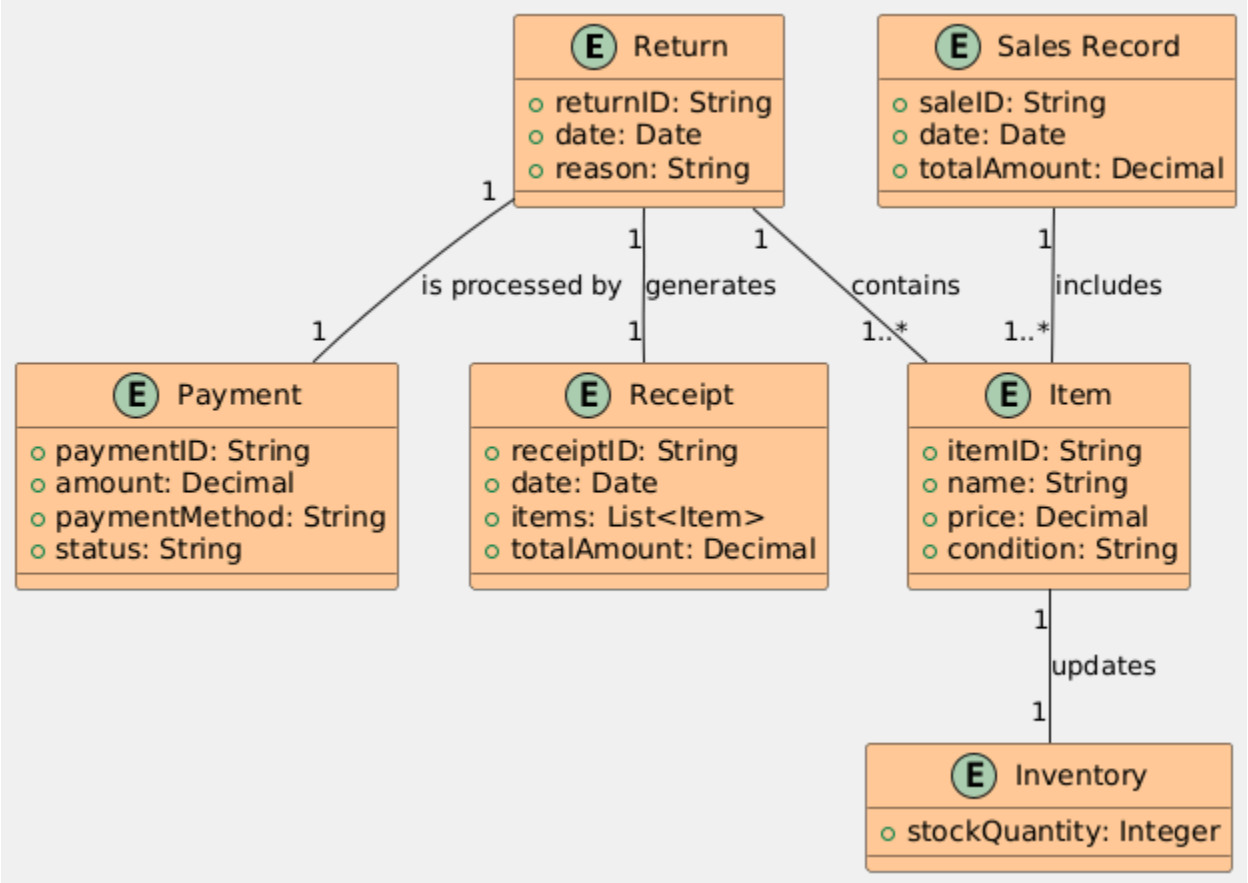


Question 4 : Develop Analysis Domain Models

1. Process Sale Diagram :

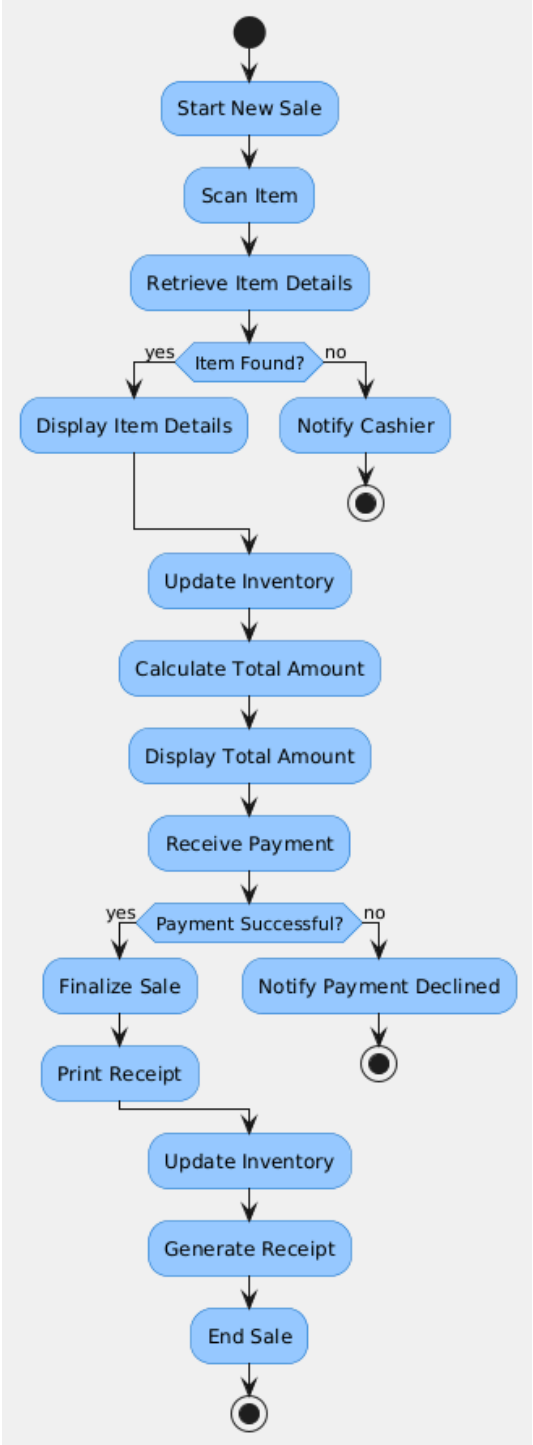


2. Handle Return Diagram :



Question 5 : Develop activity diagram for "Process Sale" and "Handle Return" use cases.

1. Process Sale :



2. Handle Return :