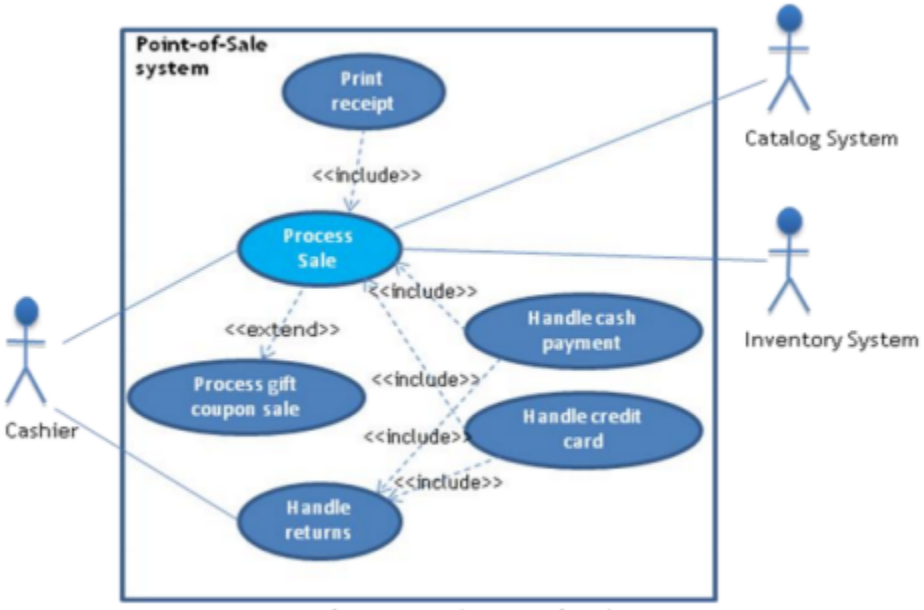
IT314 Software Engineering
Lab 6

Lab Session: Modeling Class Diagram and Activity Diagram (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 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.



Q. Develop Use Case Textual Description for "Process Sale" and "Handle Return" use cases.

A. **Use Case: Process Sale**

Use Case ID**:** UC-01
Actors**:** Cashier, Customer

Preconditions**:**

- The cashier is logged into the POS system.
- The inventory is updated and accessible.
- The customer has selected items for purchase.

Postconditions**:**

- The sale transaction is completed.
- The inventory is updated to reflect the sale.
- A receipt is printed for the customer.

Main Flow**:**

1. The cashier initiates a new sale transaction in the POS system.
2. The cashier scans the barcode of the first item.
3. The system retrieves the item's name and price from the catalog.
4. The system checks inventory for item availability.
5. The system displays the item details and updates the running total for the transaction.
6. The cashier continues scanning items until all items are processed.
7. The cashier reviews the transaction total with the customer.
8. The customer presents payment (cash, credit card, or check).
9. The customer also presents any coupons.
10. The cashier scans the coupons.
11. The system applies the coupon discounts automatically:
    - It updates the transaction total accordingly.
12. The system processes the payment:
    - If successful, it updates the inventory and marks the transaction as complete.
    - If payment fails, the system prompts for a different payment method.
13. The system prints a receipt.
14. The cashier hands the receipt and items to the customer.

Alternative Flows**:**

- A1**:** If an item is not found in the inventory, the system notifies the cashier and allows them to either skip the item or input it manually.

- A2**:** If the payment is not approved (e.g., declined credit card), the system prompts the cashier for an alternative payment method.
- A3**:** If the customer does not present any coupons:
    - System moves to step - 12 directly.

Use Case: Handle Return

Use Case ID**:** UC-02
Actors**:** Cashier, Customer
Preconditions**:**

- The cashier is logged into the POS system.
- The customer has items to return, along with the original receipt (if applicable).

Postconditions**:**

- The return transaction is completed.
- The inventory is updated to reflect the returned items.
- A return receipt is printed for the customer.

Main Flow**:**

1. The cashier initiates a return transaction in the POS system.
2. The cashier requests the original receipt or the details of the transaction.
3. The cashier scans the barcode of the returned item(s).
    - The system verifies the item against the original sale.
4. The system displays the item details, including any applicable return policies (e.g., time limits, condition).
5. The cashier confirms the return with the customer.
6. The system processes the return:
    - If eligible, the system updates the inventory and calculates the refund amount.
    - If the return is not eligible (e.g., expired return period), the system notifies the cashier.
7. The cashier processes the refund:
    - If the original payment was in cash, the system prepares the cash refund.
    - If by credit card, the system processes a refund transaction.
8. The system prints a return receipt.
9. The cashier hands the return receipt to the customer.

Alternative Flows**:**

- A1**:** If the item is not found in the original sale or does not match the return policy, the system informs the cashier and cancels the return process.
- A2**:** If the refund fails (e.g., credit card processing error), the system prompts for an alternative method or notifies the cashier of the issue.

Q. Identify Entity/Boundary Control Objects

Entity Objects:

- Customer
- Cashier
- Catalog System
- Inventory System
- Payment Processor
- Receipt Generator

Boundary Object:

- POS System

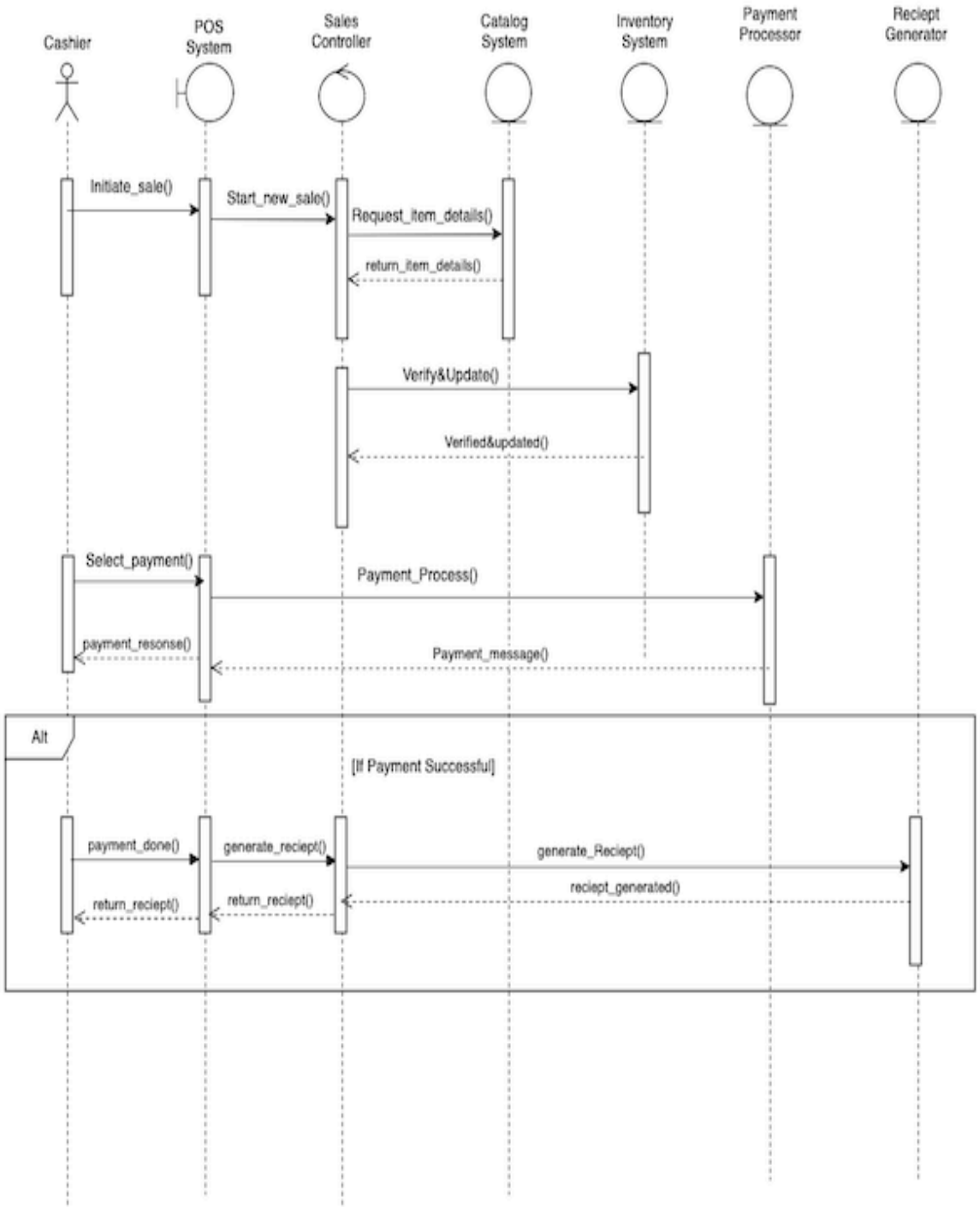
Controller Object

- Sales Controller

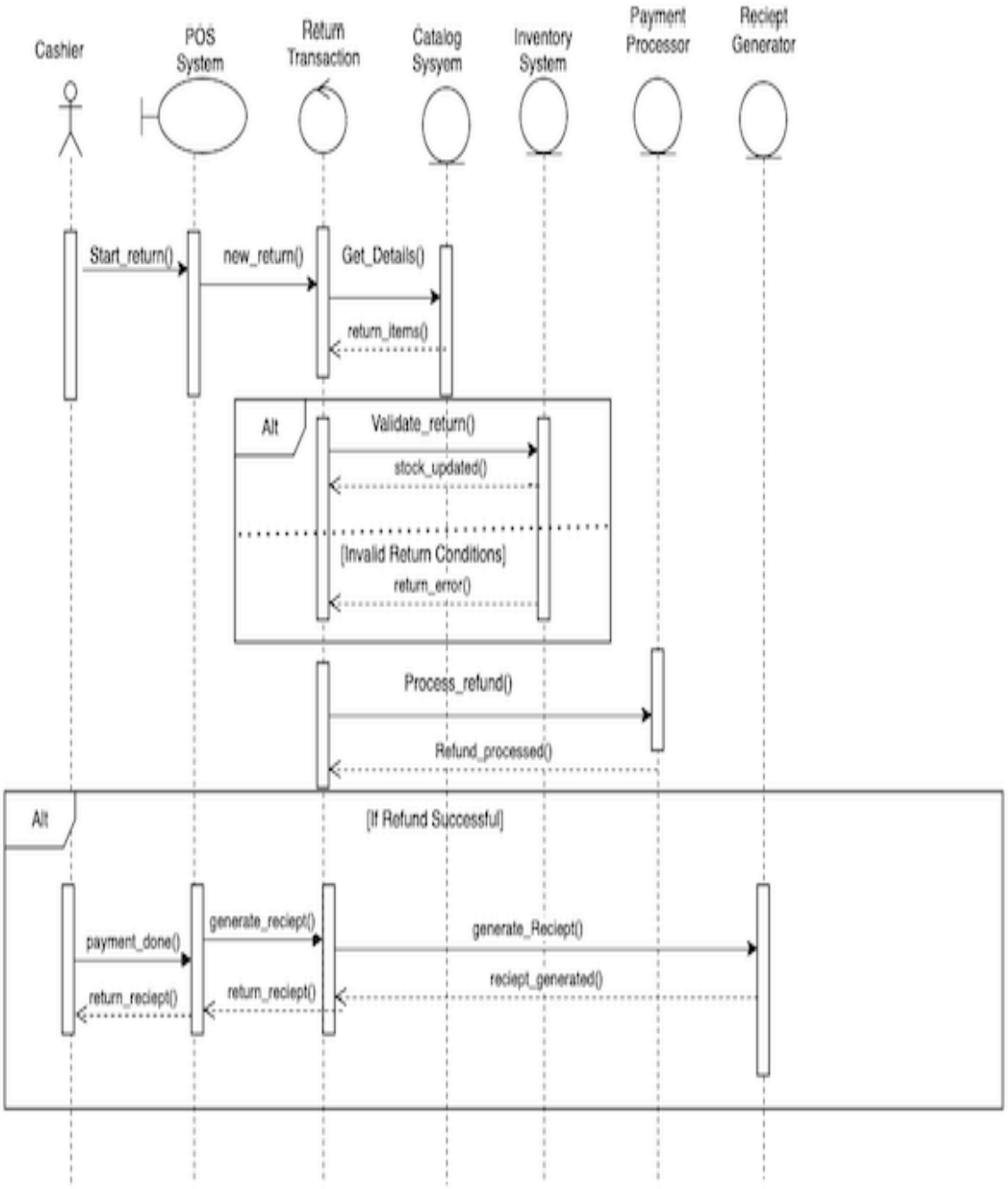
Q. Develop Sequence Diagrams

Sequence Diagram:

For Process Sale:

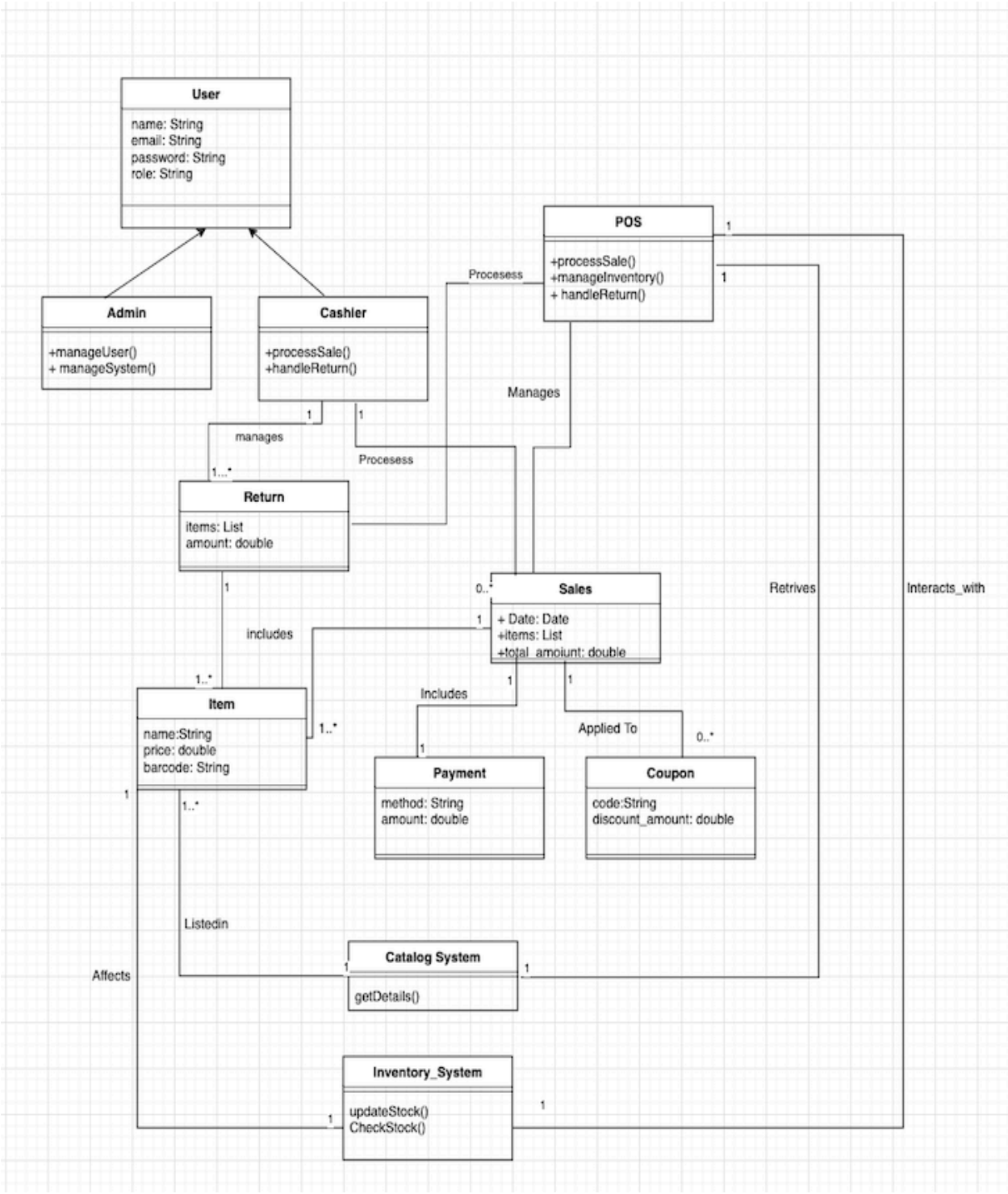


For Handle Return:



Q. Develop Analysis Domain Models

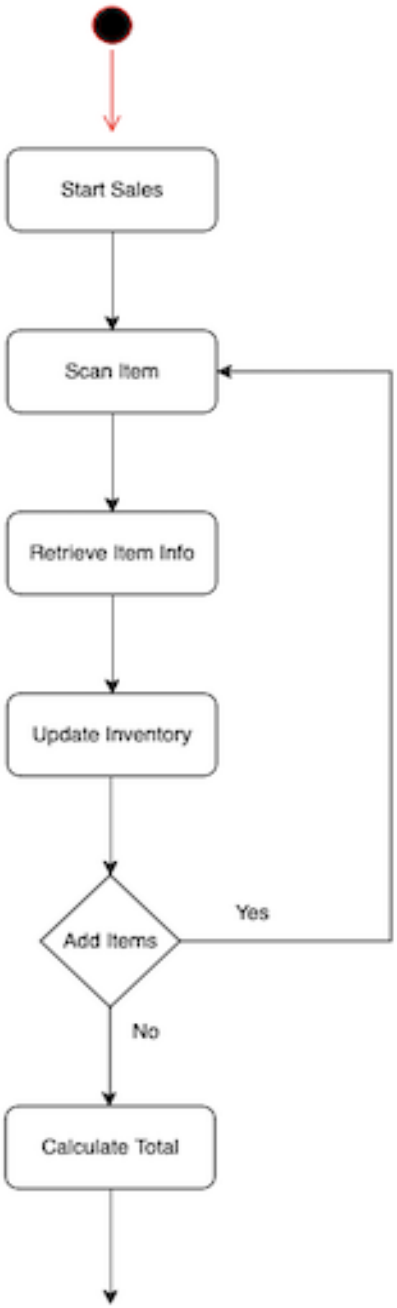
Analysis Domain Model:

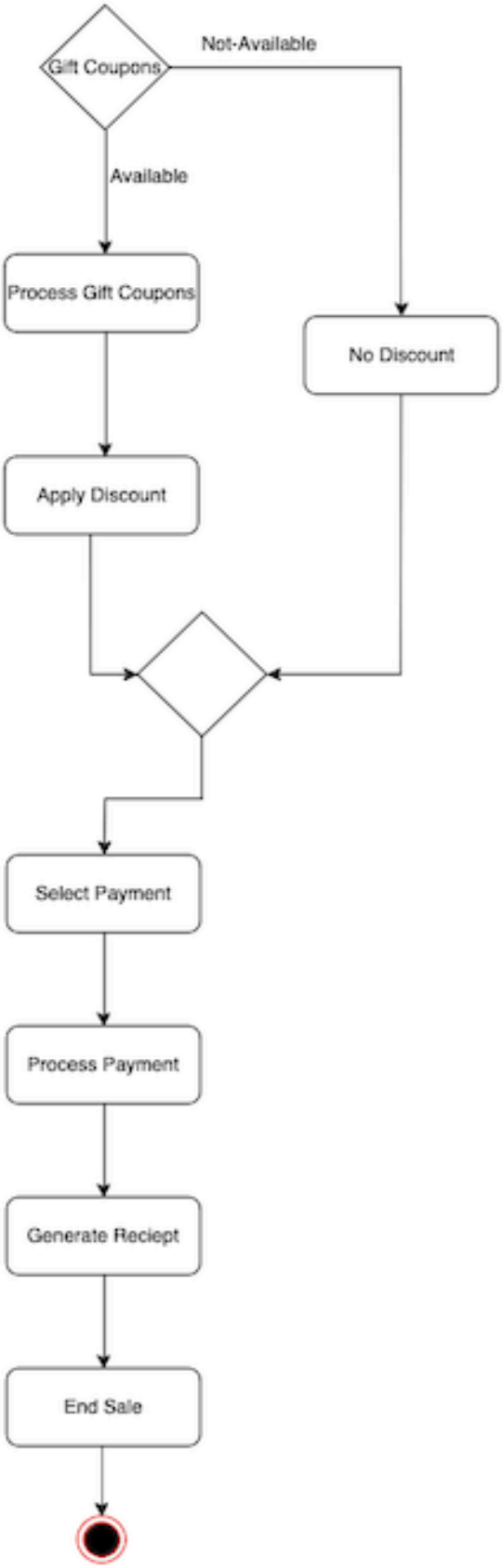


Q. Develop activity diagram for "Process Sale" and "Handle Return" use cases

Activity Diagram:

For Process Sale:




Gift Coupons
Not-Available
Available
Process Gift Coupons
No Discount
Apply Discount
Select Payment
Process Payment
Generate Reciept
End Sale

For Handle Return: