Lab 06

IT 314

KATHAN

(202201091)

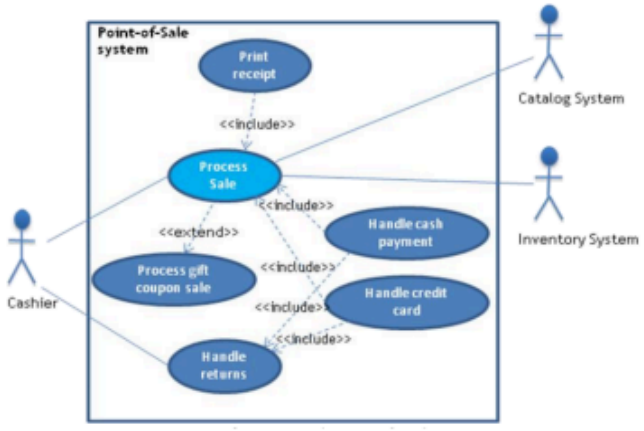
A Problem Description

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.



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

Use Case: Process Sale

Use Case ID: UC-01
Actor: Cashier
Preconditions:

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

Postconditions:

- The transaction is recorded in the system.
- Inventory is updated to reflect the sale.
- A receipt is generated and printed.

Main Flow:

1. The cashier initiates a new sale transaction in the POS system.
2. The cashier scans the barcode of each item.
    - The system retrieves the item name and price from the catalog.
    - The system checks the inventory for stock availability.
    - If the item is out of stock, the system alerts the cashier and the item is skipped.
3. The cashier confirms the items and total amount due.
4. If applicable, the cashier applies any promotional gift coupons presented by the customer.
5. The cashier selects the payment method (cash, credit card, or check).
6. The system processes the payment.
    - For credit card payments, the system verifies card details with the payment processor.
    - If payment is successful, the system records the transaction.
7. A receipt is generated and printed for the customer.
8. The transaction is finalized, and the system updates inventory levels accordingly.

Alternate Flow:

- **A1**: Item not found: If the scanned barcode does not match any item in the catalog, the system alerts the cashier.
- **A2**: Payment failed: If the payment cannot be processed (e.g., insufficient funds, expired card), the system prompts the cashier to retry the payment or select a different method.

Use Case: Handle Return

Use Case ID: UC-02
Actor: Cashier
Preconditions:

- The cashier is logged into the POS system.
- The customer has items to return.

Postconditions:

- The return transaction is recorded in the system.
- Inventory is updated to reflect the returned items.
- A receipt for the return is generated and printed.

Main Flow:

1. The cashier initiates a return transaction in the POS system.
2. The cashier scans the barcode of the item being returned.
    - The system retrieves the item details and checks if the item is eligible for return (e.g., within return period, original packaging).
3. If the item is eligible, the cashier verifies the reason for the return with the customer.
4. The system processes the return and calculates the refund amount.
5. The cashier selects the refund method (cash, credit card reversal, etc.).
6. The system processes the refund.
    - For credit card refunds, the system verifies the original transaction and processes the reversal.
7. A receipt for the return transaction is generated and printed for the customer.
8. The transaction is finalized, and the system updates inventory levels to add the returned item back into stock.

Alternate Flow:

- **A1**: Item not eligible for return: If the item cannot be returned (e.g., outside return period), the system alerts the cashier, and they inform the customer.
- **A2**: Payment method issues: If there are issues with processing the refund (e.g., card no longer valid), the system prompts the cashier to select a different method.

These descriptions provide a clear outline of the interactions and processes involved in the "Process Sale" and "Handle Return" use cases in a POS system.

Entity/Boundary Control Objects.

Entity Objects

Entity objects represent the core data and state of the system. In a POS system, they may include:

1. **Product**
    - Attributes: barcode, name, price, description, stock amount.
2. **Transaction**
    - Attributes: transaction ID, date/time, total amount, payment method, list of products, status (completed, refunded).
3. **User**
    - Attributes: user ID, username, password, role (cashier or administrator), permissions.
4. **Coupon**
    - Attributes: coupon code, discount amount, expiration date, applicable products.
5. **Receipt**
    - Attributes: receipt ID, transaction details, date/time, total amount.
6. **Inventory**
    - Attributes: product ID, quantity available, reorder level.

Boundary Objects

Boundary objects define the interaction between the user (cashiers, administrators) and the system. They handle user inputs and outputs. In a POS system, they may include:

1. **Login Screen**
    - Accepts user credentials and initiates session.
2. **Sales Interface**
    - Displays product information, allows barcode scanning, shows current transaction total, and processes payments.
3. **Return Interface**
    - Allows cashiers to process product returns, display return policies, and handle refunds.
4. **Admin Dashboard**
    - Interface for administrators to manage users, view reports, and configure system settings.
5. **Receipt Printer**
    - Interface for printing transaction receipts.

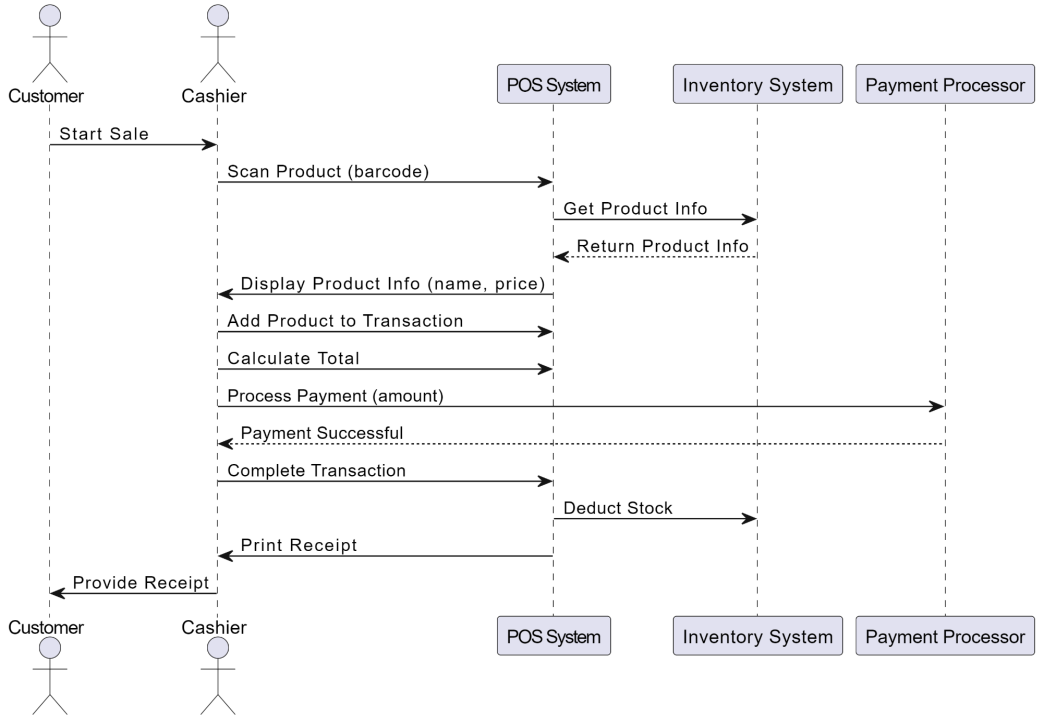
Control Objects

Control objects manage the flow of information between entity and boundary objects. They enforce business rules and coordinate system operations. In a POS system, they may include:

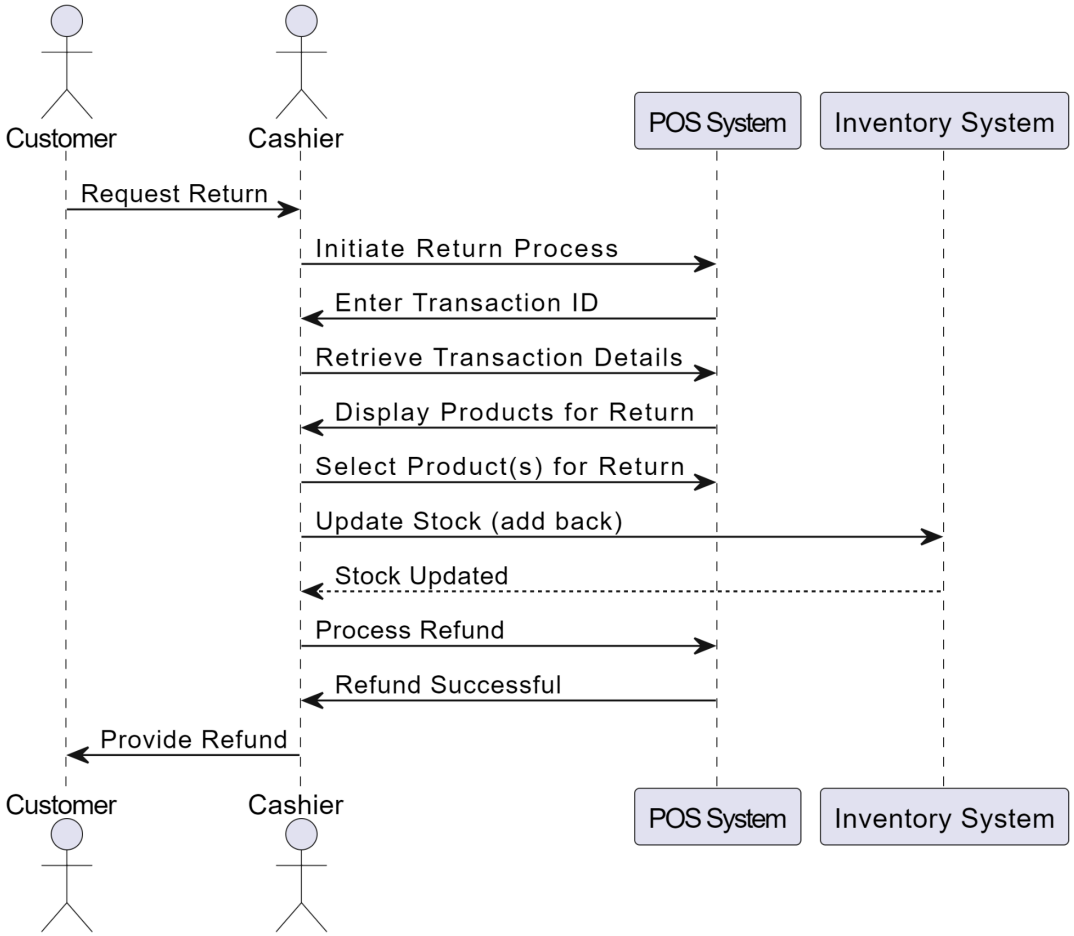
1. **Transaction Controller**
    - Manages the lifecycle of a transaction, including starting, processing payments, and completing or cancelling the transaction.
2. **User Management Controller**
    - Handles user login/logout, user creation, and permission assignment.
3. **Inventory Controller**
    - Manages stock levels, updates inventory upon sales or returns, and checks for restocking needs.
4. **Coupon Controller**
    - Validates coupon codes, applies discounts, and checks coupon eligibility based on conditions.
5. **Payment Processor**
    - Handles different payment methods, verifies payment, and updates transaction status.

Sequence Diagrams

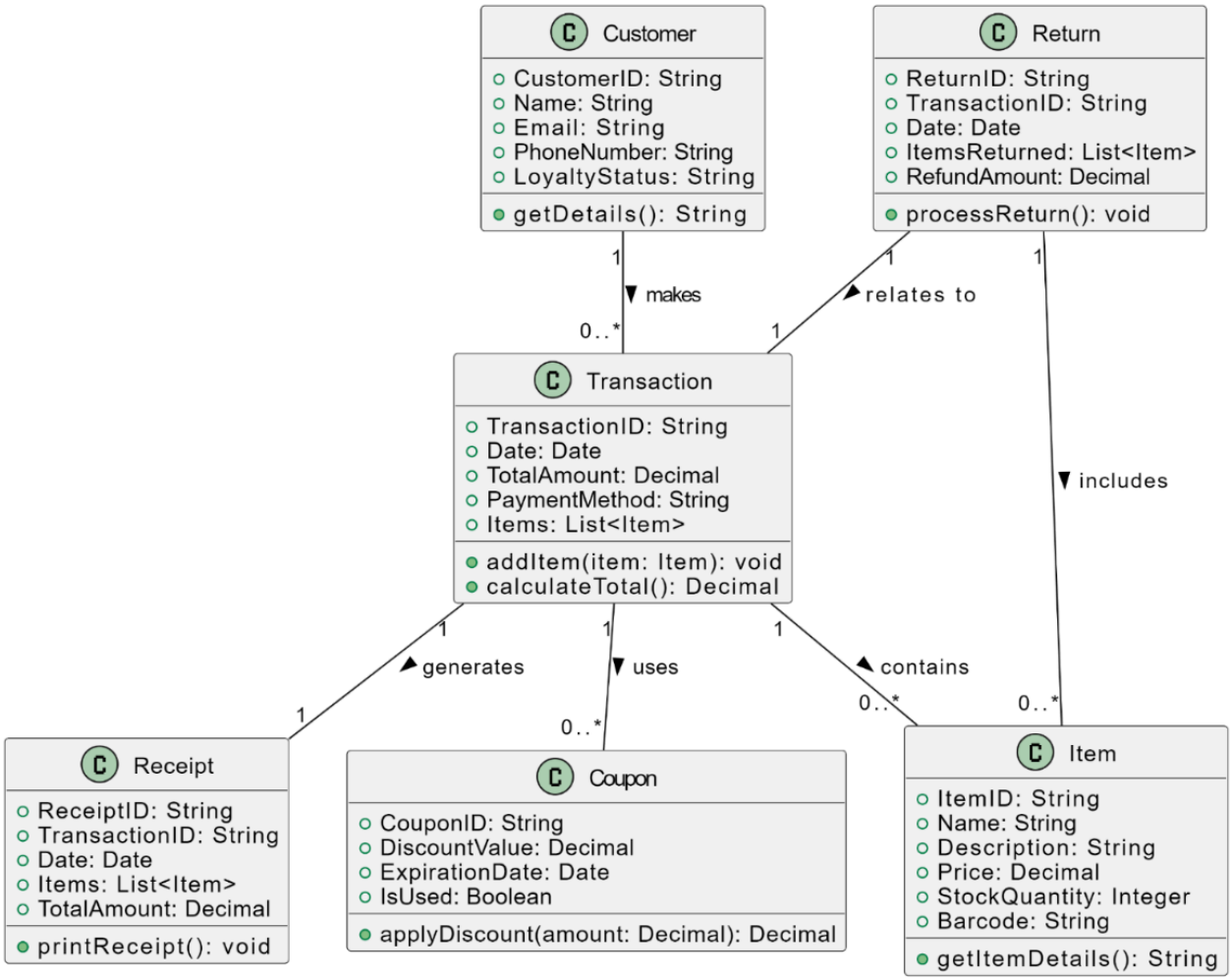
1. Sequence Diagram for Processing a Sale Transaction.



2. Sequence Diagram for Handling a Return.

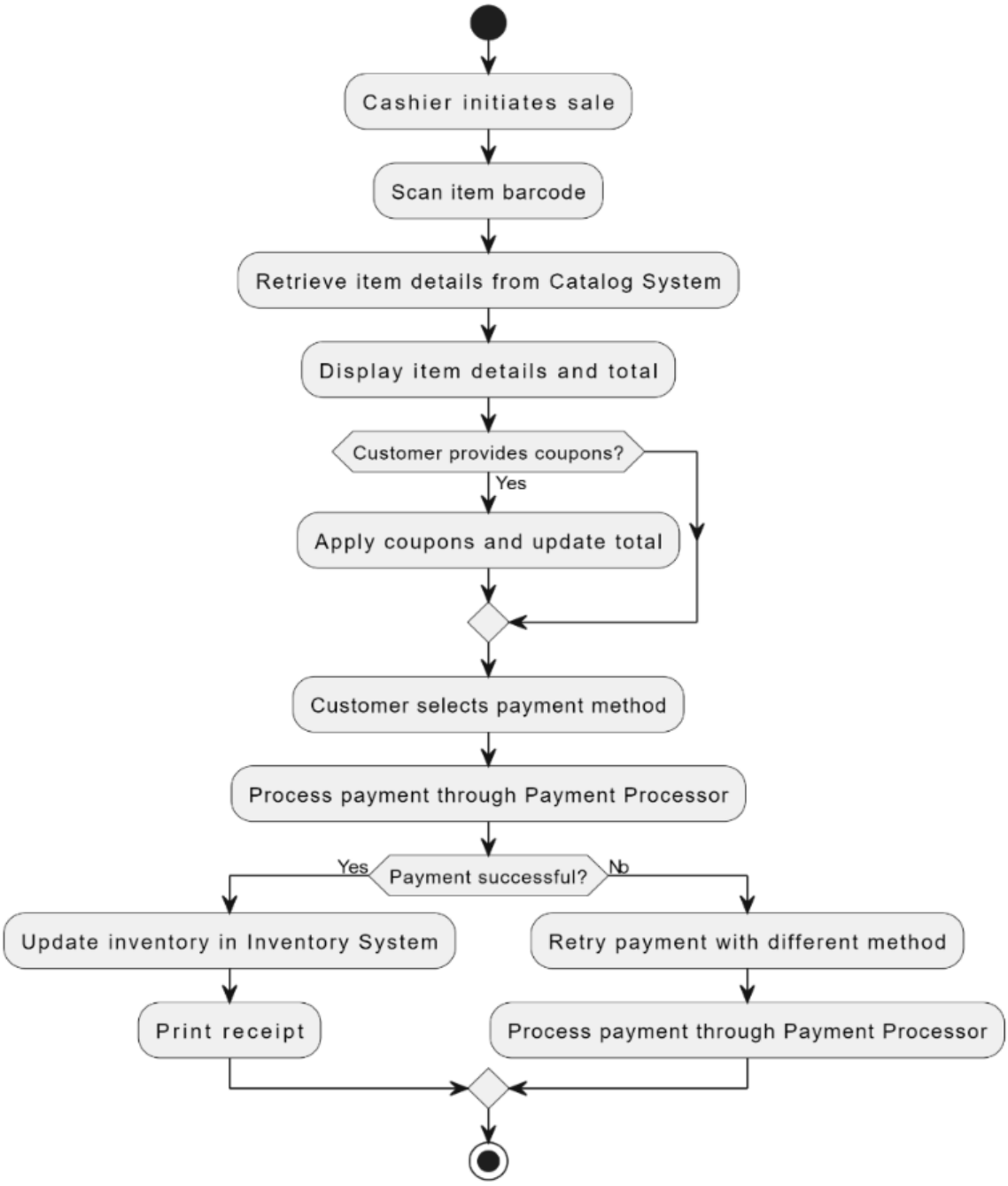


Analysis Domain Models.



Activity diagram for "Process Sale" and "Handle Return" use cases.

1. **Process Sale**



2. Handle Return