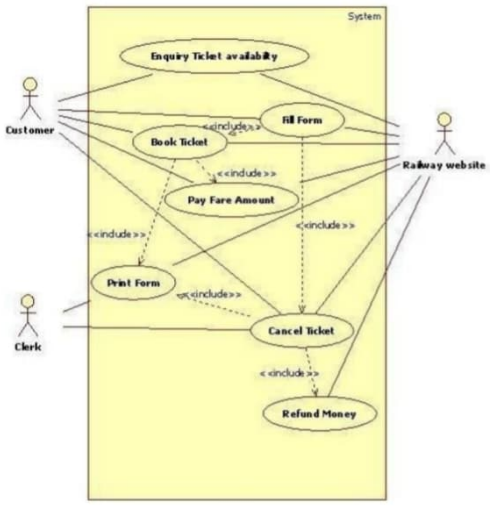
4. Design the UML diagram for a Railway Reservation System, emphasizing interactions, user roles, booking processes, and scalability features tailored for accommodating future system enhancements.

Use Case Diagram:



A use case diagram for a railway reservation system provides a high-level view of the system's functionality from the perspective of different actors (users or external systems) and the interactions they have with the system. Here's a description of key elements in a use case diagram for a railway reservation system:

Actors:

Customer:
Represents individuals who use the system to make reservations, check train schedules, and manage their bookings.

Administrator:
Represents system administrators who have the authority to manage users, trains, and other system-related tasks.

Train System:
Represents external systems or services that might interact with the railway reservation system, such as a payment gateway.

Use Cases:

Register Account:
The Customer initiates this use case to create a new account in the system, providing necessary details.

Log In:
Both Customers and Administrators can log into the system using their credentials.
Search Trains: Customers can search for available trains based on criteria like source, destination, date, etc.

Book Ticket:
Customers can select a train, specify the number of tickets, and make a reservation.

Cancel Reservation:
Customers can cancel their existing reservations.

Manage Bookings:
Customers can view and modify their existing reservations, check PNR status, etc.

Manage Trains:
Administrators can add, edit, or delete train information, including schedules and seat availability.

Manage Users:
Administrators can add or remove users, reset passwords, etc.

Generate Reports:
Administrators can generate reports related to bookings, revenue, or other system metrics.

Process Payment:
The system interacts with external payment systems to process payments for reservations.

Associations:

- Associations between actors and use cases show which actors are involved in each use case. For example, the "Book Ticket" use case involves the "Customer" actor.
- Associations between use cases indicate dependencies or flow of actions. For instance, "Book Ticket" might be dependent on "Search Trains."

Include and Extend Relationships:

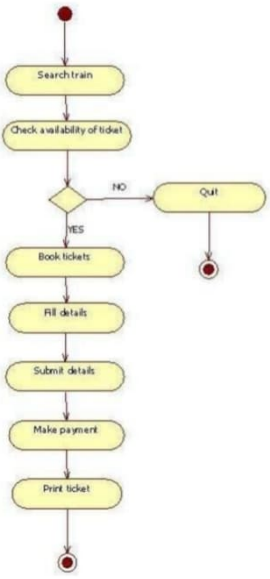
Include Relationship:
Represents a situation where one use case includes another. For instance, "Book Ticket" may include "Process Payment."
Extend Relationship:
Represents optional or conditional behavior that can extend the functionality of a base use case.

For example, "Cancel Reservation" might extend "Manage Bookings."

System Boundary:

- Represents the boundary of the railway reservation system, encapsulating all the use cases and actors involved.
- A use case diagram visually illustrates how various actors interact with the system and the different functionalities provided by the system. It serves as a valuable tool for communication and understanding the system's high-level behavior.

RRS Activity Diagram for Booking Ticket:



- **Enter Details:**
  The process starts with the user entering journey details, including the source station, destination station, travel date, and the number of passengers.

- **Search Available Trains:**
  The system performs a search for available trains based on the entered journey details. It retrieves a list of trains that match the criteria.

- **Select Train:**
  The user reviews the list of available trains and selects a preferred option. This involves considering factors such as departure time, duration, and class of service.

- **Enter Passenger Details:**
  After selecting a train, the user enters details for each passenger, including names, ages, and any other required information.

- **Choose Seat/Class:**
  The user chooses specific seats or selects a travel class based on preferences. This step may involve selecting seat types (e.g., window seat) or specifying class options (e.g., economy or first class).

- **Confirm Reservation:**
  The system validates the entered details, ensuring they meet the system's requirements. If everything is in order, the reservation is confirmed, and the system proceeds to the next step.

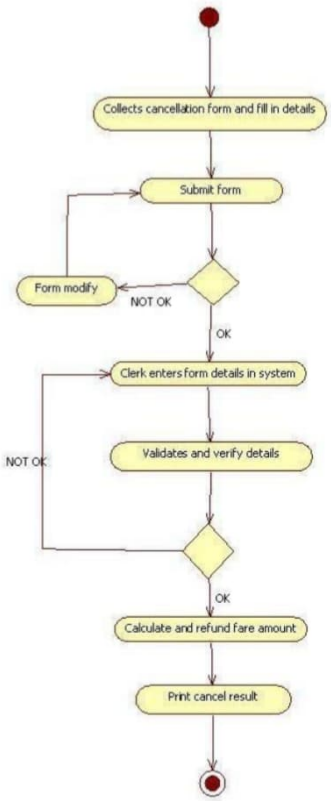
- **Process Payment:**
  The system interacts with an external payment gateway to process the payment for the reservation. This step involves secure payment processing, and the user may need to provide payment details.

- **Generate Ticket:**
  After successful payment, the system generates a ticket with all the relevant details, including train information, passenger details, seat assignments, and a unique booking reference (PNR).

- **Display Ticket:**
  - The generated ticket is displayed to the user on the system interface.
  - This allows the user to review the booking details, verify correctness, and confirm the successful completion of the reservation.
  - The activity diagram captures the sequential flow of actions involved in the user's process of booking a ticket in the Railway Reservation System. It provides a clear visual representation of the steps, decisions, and interactions between the user and

the system throughout the booking process. This diagram is a valuable tool for understanding the user's journey and can be used for system design and communication purposes.

RRS Activity Diagram for Cancelling Ticket:



- **Enter Booking Details:**
  The cancellation process begins with the user providing necessary details to identify the

booking that needs to be canceled. This typically includes entering the booking reference (PNR), ticket number, or other relevant identification information.

- **Retrieve Booking Info:**
  - The system retrieves the booking information associated with the details provided by the user.
  - This information includes details about the booked ticket, such as train details, passenger names, and other relevant data.

- **Confirm Cancellation:**
  The user confirms the cancellation request. At this stage, the system may validate the request against certain conditions, such as checking if the cancellation is within the allowed time frame or ensuring that the ticket is eligible for cancellation based on the fare rules.

- **Process Refund:**
  If the cancellation is eligible for a refund according to the system's rules and policies, the system initiates the refund process. This involves interacting with the payment gateway to refund the applicable amount to the user's account. The amount refunded may be subject to cancellation charges or other rules.

- **Update Database:**
  The system updates its database to reflect the canceled ticket. This involves adjusting seat availability, updating passenger records, and recording the cancellation details for reporting purposes.

- **Display Cancellation Confirmation:**

  - The system provides a confirmation to the user that the ticket has been successfully canceled.
  - This confirmation includes relevant details such as the refunded amount, if applicable. It serves to inform the user about the completion of the cancellation process.
  - The activity diagram visually represents the sequential flow of actions involved in canceling a ticket in the Railway Reservation System. It helps stakeholders, including system designers and users, understand the steps and interactions involved in the cancellation process. Note that the actual implementation details may vary based on the specific business rules and requirements of the railway reservation system.