

Course Code	:	MCS-014
Course Title	:	Systems Analysis and Design
Assignment Number	:	BCA(III)/014/Assignment/2024-25
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31stOctober,2024(For July Session) 30thApril,2025(For January Session)

This assignment has three questions of 80 marks. Rest 20 marks are for viva voce. Answer all questions. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

- Q1.** Develop SRS for **Railway Reservation System** . SRS should be as per IEEE (30 Marks) standard SRS template. Make necessary assumptions.
- Q2.** Draw the DFDs upto 3rd level for **Railway ReservationSystem**. (30 Marks)
- Q3.** Draw ERD for an **Railway Reservation System**. Make necessary assumptions. (20 Marks)

Question 1: Develop SRS for Railway Reservation System as per IEEE standard.

Introduction

A Software Requirements Specification (SRS) is a document that describes the intended behavior of the system along with functional and non-functional requirements, constraints, and assumptions. This SRS follows the IEEE standard template and focuses on the development of a Railway Reservation System.

1. Introduction

- Purpose: The purpose of this system is to provide users with the ability to search for trains, book tickets, make payments, and manage reservations online.
- Scope: This system allows customers to register, book train tickets, view booking status, make payments, and print tickets. It also provides administrative capabilities for managing train schedules and bookings.
- Definitions, Acronyms, and Abbreviations:
 - SRS: Software Requirements Specification
 - DB: Database
 - PK: Primary Key
 - FK: Foreign Key
- Assumptions: It is assumed that users will have a stable internet connection and the system will be accessible 24/7.

2. Overall Description

- Product Perspective: The Railway Reservation System is a web-based application and is part of the larger railway management system. It interfaces with a payment gateway and the train scheduling system.
- Product Functions:
 1. User registration and login.
 2. Search trains by date, source, and destination.
 3. Book tickets and choose seats.
 4. Make payments and confirm bookings.
 5. View and manage bookings.

- **User Characteristics:** Users include registered customers and railway administrators. Customers must have basic computer literacy and administrators should have advanced permissions to manage train schedules.
- **Constraints:**
 1. The system should handle high transaction volumes during peak times.
 2. It must comply with the security standards for payment transactions.
- **Assumptions:** The system will only support online bookings, and physical ticket counters are not integrated.

3. Specific Requirements

- **Functional Requirements:**
 1. **User Management:**
 - The system must allow users to create accounts and log in.
 - Users must be able to update their profile information.
 2. **Train Search:**
 - Users must be able to search for trains based on departure and arrival locations and dates.
 3. **Booking System:**
 - Users must be able to select seats and book tickets.
 - After booking, users must receive confirmation with booking details.
 4. **Payment Processing:**
 - The system must integrate with secure payment gateways (e.g., credit card, debit card, net banking).
 5. **Booking Management:**
 - Users must be able to view, modify, or cancel their bookings.
- **Non-functional Requirements:**
 1. **Performance:** The system must support up to 1000 concurrent users during peak times.
 2. **Security:** The system should use SSL for secure transactions and follow the PCI DSS for handling credit card payments.
 3. **Usability:** The user interface should be simple and intuitive, with minimal steps to complete bookings.
- **Interface Requirements:** The system will use an API to interface with the payment gateway and train scheduling system.

4. Assumptions and Dependencies

- The system is dependent on the availability of the train scheduling service and the payment gateway.
- Users are expected to access the system from modern web browsers.

Conclusion

The SRS for the Railway Reservation System defines the functional and non-functional requirements needed to design, build, and implement the system. The system aims to provide users with a seamless experience in booking train tickets and managing their reservations.

Question 2: Draw DFDs up to 3rd level for Railway Reservation System.

Introduction

A Data Flow Diagram (DFD) illustrates the flow of data within a system and how inputs are processed into outputs. The DFD for the Railway Reservation System shows the flow of information between the various entities (users, databases, and external systems) and system processes involved in making train reservations. This DFD will go up to Level 3, detailing sub-processes for better clarity.

1. Level 0: Context Diagram

- Entities:
 1. Customer: Provides inputs such as search criteria and booking requests.
 2. Admin: Manages train schedules and availability.
 3. Payment Gateway: Handles secure payment transactions.
- Processes:
 1. Search Train: Customer searches for available trains.
 2. Booking: Customer books tickets based on availability.
 3. Payment Processing: Handles customer payment.
 4. Ticket Generation: Confirms booking and generates a ticket.
- Data Stores:
 1. Train Database: Stores train information such as routes and availability.
 2. Booking Database: Stores customer bookings and their status.
 3. Payment Database: Stores payment transactions.

2. Level 1: Major Processes

1. Search Trains:
 - Sub-processes:
 - Input search parameters (source, destination, date).
 - Display list of available trains.
 - Fetch availability from the train database.

2. Book Ticket:

- Sub-processes:
 - Select train and seat.
 - Update seat availability in the train database.
 - Store booking details in the booking database.

3. Process Payment:

- Sub-processes:
 - Input payment details (card, net banking, etc.).
 - Validate payment.
 - Store transaction details in the payment database.

4. Generate Ticket:

- Sub-processes:
 - Confirm the booking.
 - Generate a digital ticket.
 - Send confirmation email or SMS to the customer.

3. Level 2: Detailed Sub-processes

- Search Trains:
 - Input departure and arrival stations.
 - Input date of travel.
 - Query the train database for available trains.
 - Display results to the customer.
- Book Ticket:
 - Select seat from available options.
 - Confirm passenger details.
 - Update seat status in the train database.
 - Create a booking entry in the booking database.

- Process Payment:

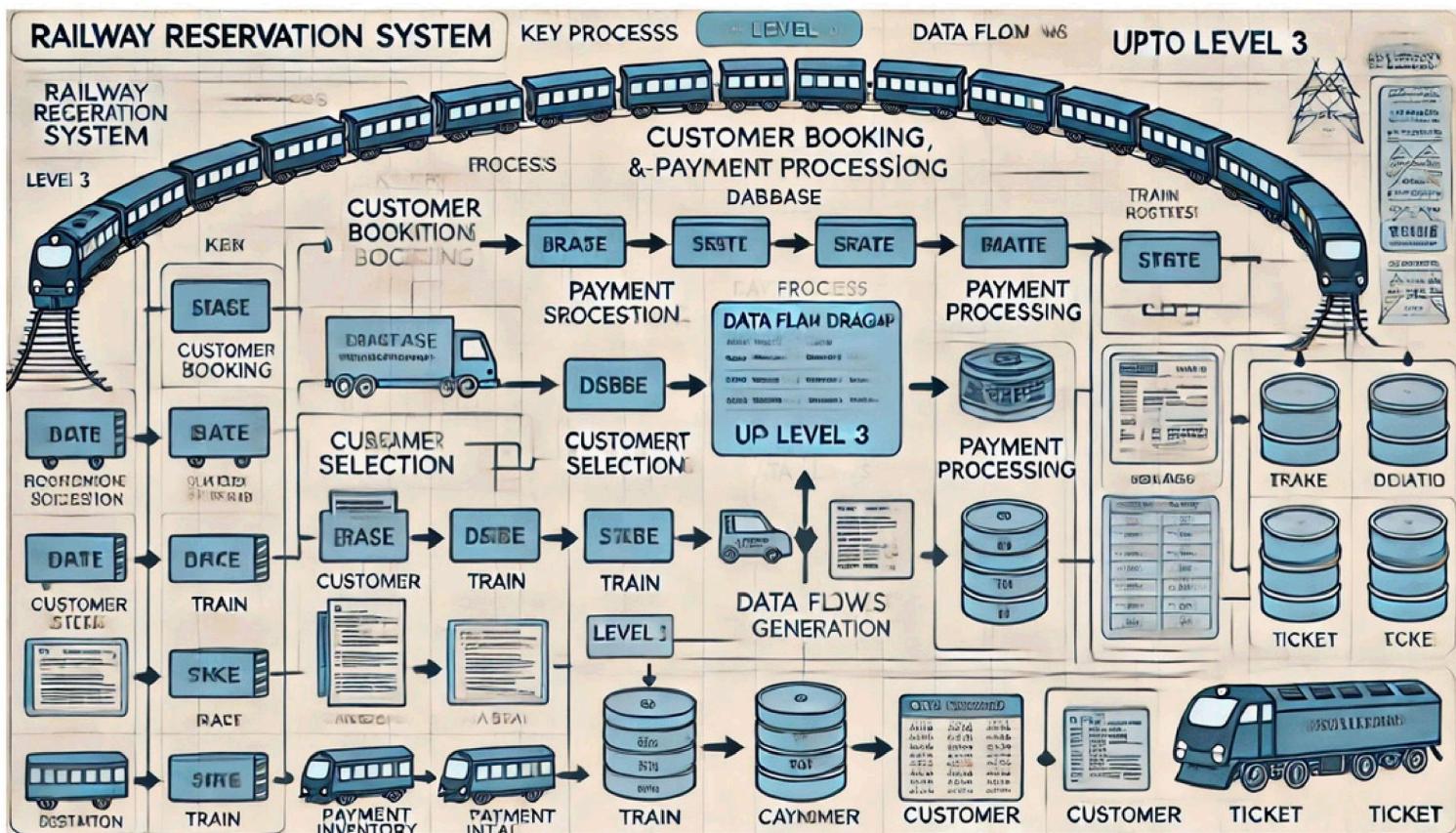
- Validate payment method.
- Confirm amount.
- Connect with the payment gateway.
- Store payment information in the payment database.

- Generate Ticket:

- Check booking status.
- Generate ticket in PDF format.
- Send the ticket via email or SMS.

Conclusion

The DFD up to Level 3 for the Railway Reservation System provides a comprehensive view of how the system processes data at various levels. By breaking down each core process into smaller sub-processes, it becomes easier to understand the data interactions and flow within the system.



Entity-Relationship Diagram (ERD) for the Railway Reservation System

Question 3: Draw ERD for a Railway Reservation System. Make necessary assumptions.

Introduction

The Entity-Relationship Diagram (ERD) for a Railway Reservation System represents the key entities, their attributes, and the relationships between them. This system involves various processes such as customer reservations, train scheduling, and payment processing. ERD helps in understanding how the data is structured within the system.

Key Entities and Their Relationships

1. Customer:

- Attributes: CustomerID (PK), Name, Address, PhoneNumber, Email.
- Relationship: A customer can make multiple bookings, hence there is a one-to-many relationship between the Customer and Booking entities.

2. Booking:

- Attributes: BookingID (PK), BookingDate, BookingStatus, TotalPrice, CustomerID (FK).
- Relationship: Each booking is associated with one train, but a train can have many bookings (one-to-many relationship between Booking and Train).
- Relationship: Each booking is linked to exactly one payment (one-to-one relationship between Booking and Payment).

3. Train:

- Attributes: TrainID (PK), TrainName, SourceStation, DestinationStation, DepartureTime, ArrivalTime.
- Relationship: A train can have multiple seats booked (one-to-many relationship between Train and Seat).
- Relationship: A train can have multiple bookings (one-to-many relationship between Train and Booking).

4. Seat:

- Attributes: SeatID (PK), SeatNumber, SeatType, AvailabilityStatus, TrainID (FK).
- Relationship: Each seat is linked to a specific booking (one-to-one relationship between Seat and Booking).

5. Payment:

- Attributes: PaymentID (PK), PaymentMode, PaymentAmount, PaymentDate, BookingID (FK).
- Relationship: A booking has exactly one payment linked to it, and one payment corresponds to one booking (one-to-one relationship between Payment and Booking).

ERD for Railway Reservation System

Entities:

1. Customer: Stores information about users (ID, Name, Email, Phone).
2. Booking: Stores the details of each booking (Booking ID, Date, PNR, Fare).
3. Train: Contains the details of the trains (Train Number, Name, Route).
4. Seat: Represents the seat availability for each train (Seat Number, Class, Availability).
5. Payment: Tracks payment transactions (Transaction ID, Amount, Date).

Relationships:

1. Customer to Booking: A customer can have many bookings (one-to-many).
2. Booking to Train: Each booking is associated with one train (many-to-one).
3. Train to Seat: Each train has multiple seats (one-to-many).
4. Booking to Payment: Each booking corresponds to a single payment (one-to-one).

Attributes:

- Customer: Customer_ID (PK), Name, Email, Phone
- Booking: Booking_ID (PK), PNR, Date, Fare, Customer_ID (FK), Train_ID (FK)
- Train: Train_ID (PK), Train_Name, Route
- Seat: Seat_ID (PK), Seat_Number, Availability, Train_ID (FK)
- Payment: Payment_ID (PK), Transaction_ID, Amount, Booking_ID (FK)

ERD Explanation

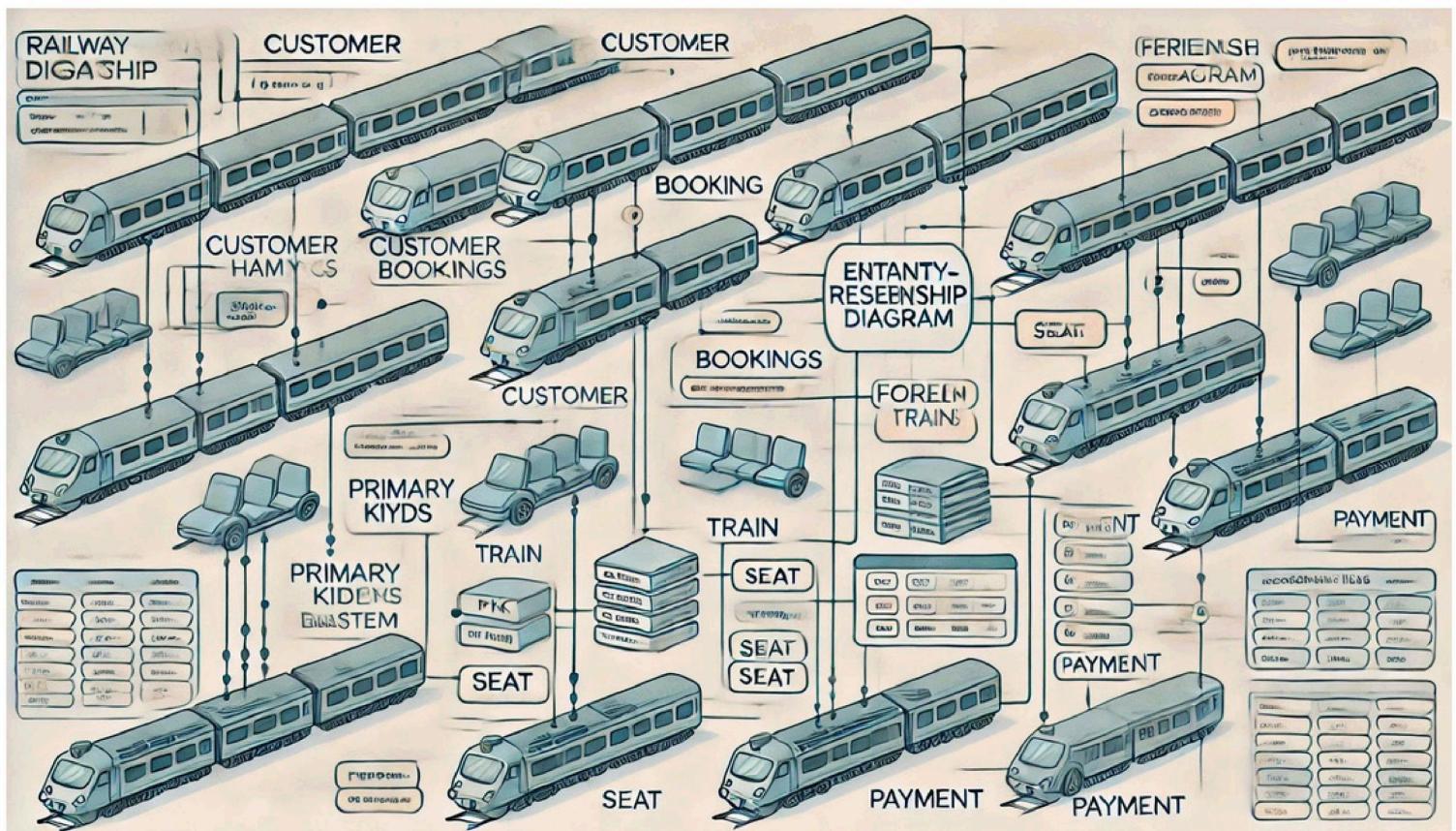
- The Customer entity represents individuals who use the Railway Reservation System to book train tickets.
- The Booking entity records every booking transaction made by a customer, storing important details like booking status, booking date, and total price.
- The Train entity contains details of all trains available for booking, including their schedules, source, and destination stations.
- The Seat entity represents the seats available on each train and tracks whether a seat is booked or available.
- The Payment entity records the payment details for each booking, linking it back to the corresponding booking and customer.

Assumptions

- A Customer can book multiple tickets, but each Booking must be linked to exactly one train.
- Each Train has many seats, but a specific Seat can only be reserved by one customer at a time.
- Each Booking is processed with a single Payment.
- Every Train has a fixed schedule that includes the source station, destination station, departure, and arrival times.

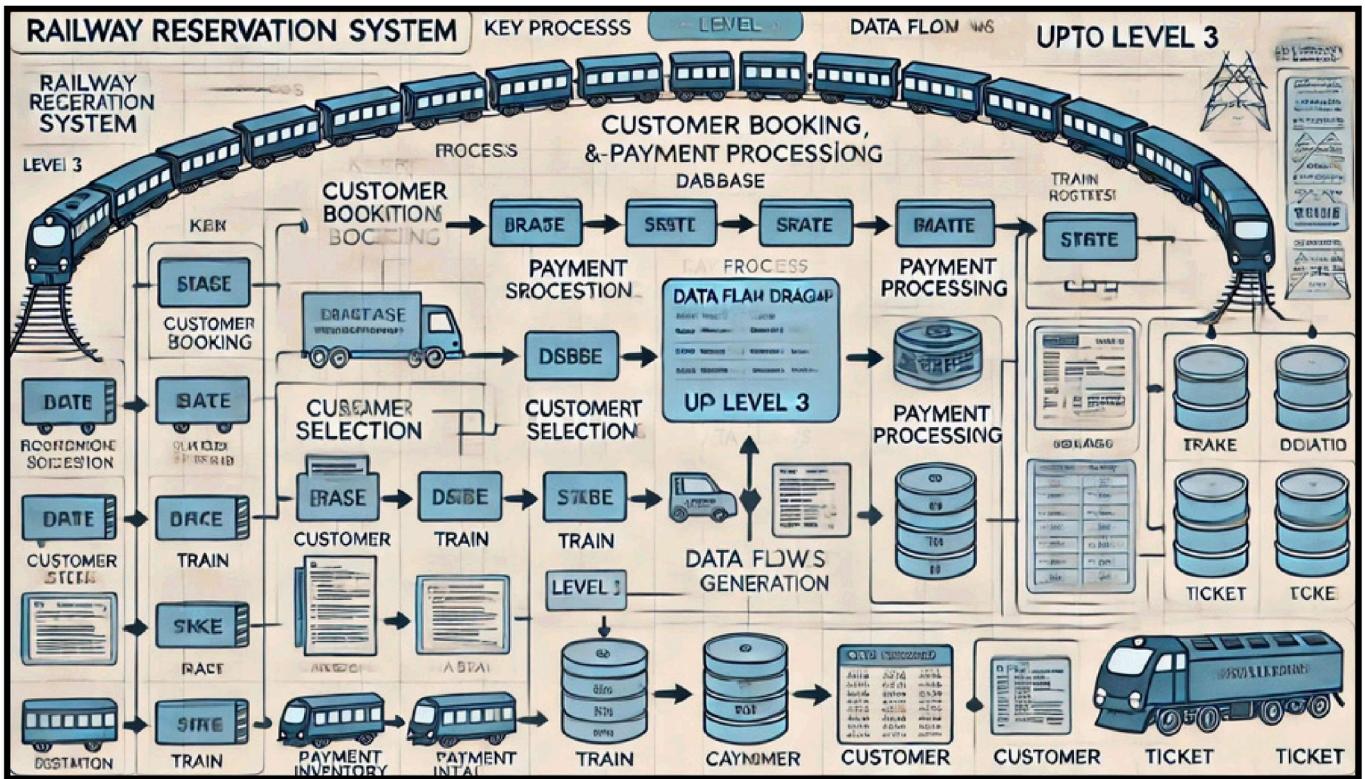
Conclusion

The ERD for the Railway Reservation System clearly shows the relationships between the core entities: Customer, Booking, Train, Seat, and Payment. It helps in understanding how data flows within the system, ensuring the proper management of reservations and facilitating smooth interactions between customers and the railway system.

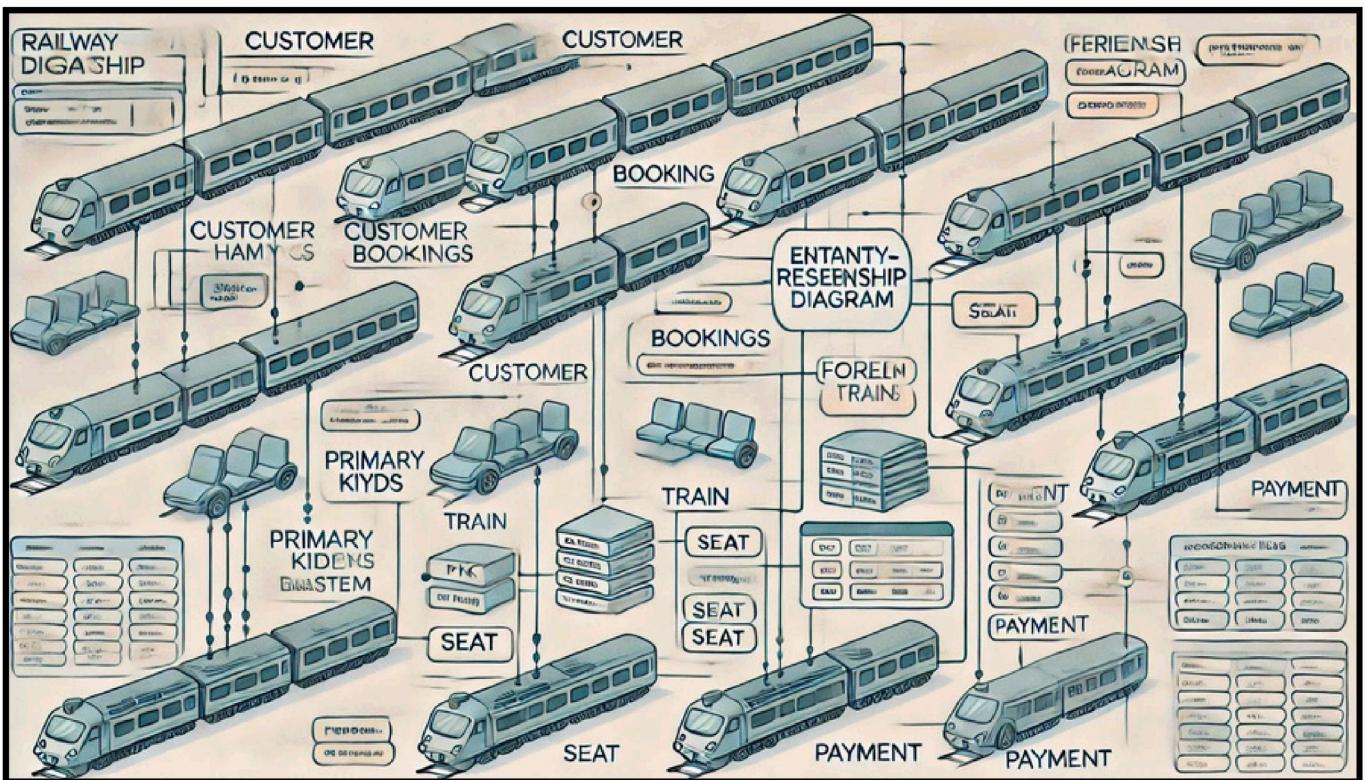


Data Flow Diagram (DFD) for the Railway Reservation System

PRINTS



Entity-Relationship Diagram (ERD) for the Railway Reservation System



Data Flow Diagram (DFD) for the Railway Reservation System