

Transport Management System

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Database Systems

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Introduction

- **Overview: Comprehensive Coordination, Operational Streamlining, Enhanced Efficiency and Experience**
- **Objectives: Streamline transport operations, improve efficiency, enhance customer experience**
- **Importance: Efficient management of vehicles, drivers, and routes**

Database Schema Overview

ENTITIES:

- Vehicle
- Schedule
- Route
- Passenger
- Driver
- Booking

Normalized Database (3NF)



1st Entity: **VEHICLE**

Attributes:

- **VehicleID: INT, Primary Key, Auto-increment**
- **RegistrationNumber: VARCHAR(20), Unique, Not Null**
- **VehicleType: VARCHAR(50)**
- **Capacity: INT**
- **Status: VARCHAR(20), Not Null, Check constraint (active, maintenance)**

Use Cases:

- Managing vehicle details
- Tracking vehicle status



2nd Entity: **DRIVER**

Attributes:

- **DriverID: INT, Primary Key, Auto-increment**
- **Name: VARCHAR(100), Not Null**
- **LicenseNumber: VARCHAR(20), Unique, Not Null**
- **ContactInfo: VARCHAR(100)**
- **Status: VARCHAR(20), Not Null, Check constraint (available, on leave)**

Use Cases:

- **Storing driver information**
- **Monitoring driver availability**



3rd Entity: **ROUTE**

Attributes:

- **RouteID: INT, Primary Key, Auto-increment**
- **StartLocation: VARCHAR(100), Not Null**
- **EndLocation: VARCHAR(100), Not Null**
- **Distance: FLOAT**
- **EstimatedTime: TIME**

Use Cases:

- **Defining travel routes**
- **Estimating travel time and distance**

| | | | |
|------|-----|---------|----------|
| 2106 | B10 | 11:05am | On Time |
| 4547 | D01 | 11:15am | Boarding |
| 780 | C03 | 11:05am | Boarding |
| 4649 | E83 | 3:00pm | On Time |
| 5296 | E83 | 2:00pm | On Time |
| 6729 | D09 | 11:00am | Boarding |
| 7383 | E70 | 11:10am | On Time |
| 6466 | B7 | 11:09am | On Time |
| | | | Boarding |

4th Entity: SCHEDULE

Foreign Key Constraints:

- RoutelD references Route (RoutelD)
- VehicleID references Vehicle (VehicleID)
- DriverID references Driver (DriverID)

Attributes:

- **ScheduleID:** INT, Primary Key, Auto-increment
- **RoutelD:** INT, Foreign Key
- **VehicleID:** INT, Foreign Key
- **DriverID:** INT, Foreign Key
- **DepartureTime:** DATETIME
- **ArrivalTime:** DATETIME

Use Cases:

- Scheduling trips
- Associating routes with vehicles and drivers

5th Entity: PASSENGER



Attributes:

- PassengerID: INT, Primary Key, Auto-increment
- Name: VARCHAR(100), Not Null
- ContactInfo: VARCHAR(100)

Use Cases:

- Managing passenger details
- Contacting passengers if needed



6th Entity: **BOOKING**

Foreign Key Constraints:

- ScheduleID references Schedule (ScheduleID)
- PassengerID references Passenger (PassengerID)

Attributes:

- **BookingID: INT, Primary Key, Auto-increment**
- **ScheduleID: INT, Foreign Key**
- **PassengerID: INT, Foreign Key**
- **BookingTime: DATETIME**
- **SeatNumber: INT**
- **PaymentStatus: VARCHAR(20), Not Null, Check constraint (pending, completed)**

Use Cases:

- Recording booking details
- Tracking payment status

Unique Constraints

Vehicle Table:

- RegistrationNumber: Ensures unique registration numbers

Driver Table:

- LicenseNumber: Ensures unique license numbers

Importance:

- Ensuring data integrity
- Avoiding duplicates

Data Integrity and Constraints

Check Constraints:

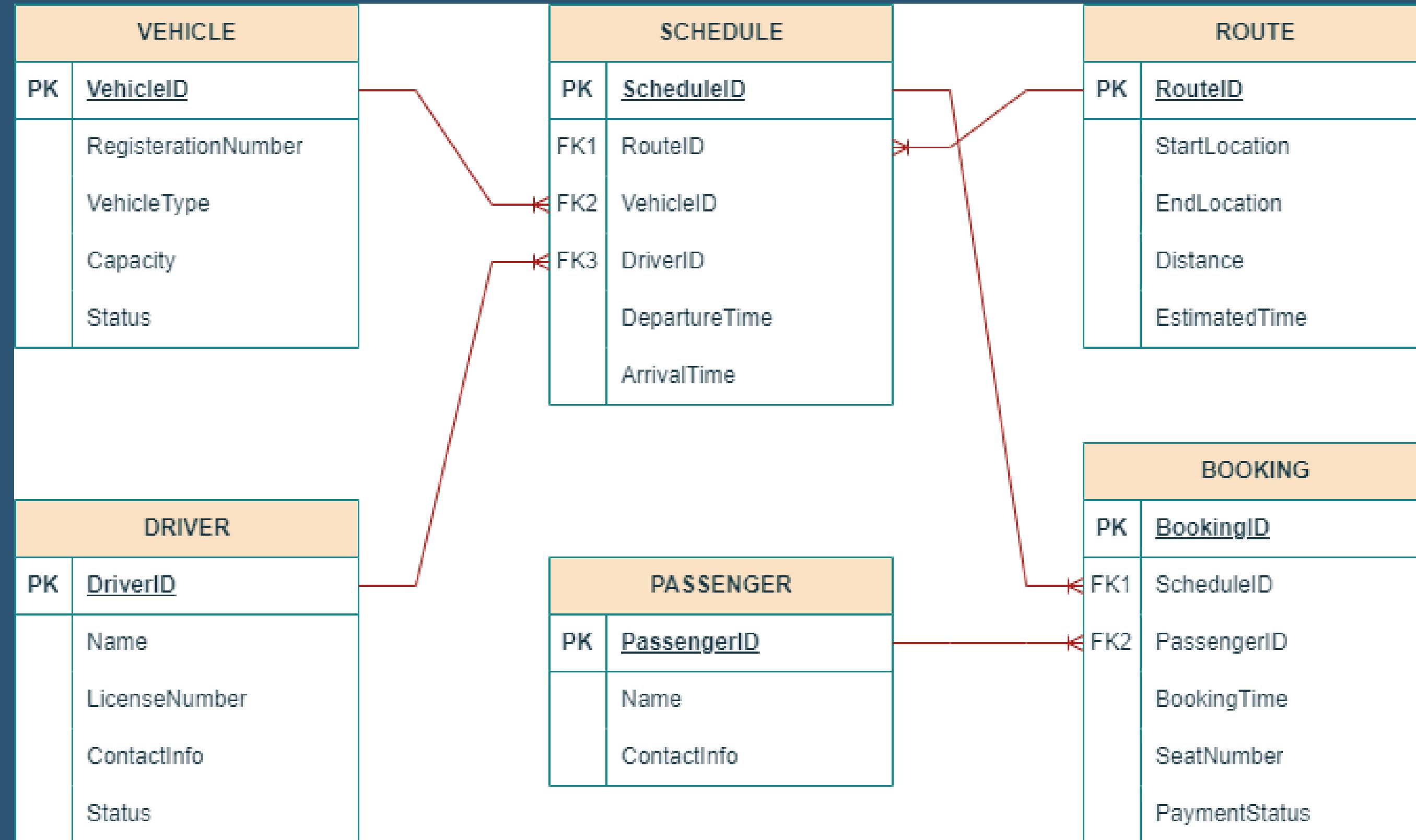
- Vehicle Status: active, maintenance
- Driver Status: available, on leave
- Booking Payment Status: pending, completed

Importance:

- Ensuring accurate and consistent data



Entity Relationship Diagram



Types of Relationships

- **One Route to Many Schedules:** Each route can have multiple schedules.
- **One Vehicle to Many Schedules:** Each vehicle can have multiple schedules.
- **One Driver to Many Schedules:** Each driver can be assigned to multiple schedules.
- **One Schedule to Many Bookings:** Each schedule can have multiple bookings.
- **One Passenger to Many Bookings:** Each passenger can make multiple bookings.

Use Case Scenarios

Examples:

- Adding a New Vehicle
- Scheduling a Trip
- Booking a Seat for a Passenger
- Updating Driver Status
- Managing Route Changes
- Handling Maintenance Requests
- Generating Reports and Analytics

Benefits of the Transport Management System

- Improved efficiency in managing transport operations
- Enhanced tracking of vehicles and drivers
- Better customer service through reliable booking and scheduling

Challenges and Future Improvements

Challenges:

- **Integration complexity**
- **Data accuracy and consistency**
- **User adoption**

Future Improvements:

- **Real-time tracking**
- **Mobile app integration**
- **Predictive analytics**



Conclusion

Provides a comprehensive solution for efficient transport operations. Emphasize the importance of streamlined management of vehicles, drivers, routes, and bookings.

Thank You!

Stay tuned for more!

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