Car Rental Database System Project - Final Merged Document

**Introduction and Database Description**

- Database is the key to managing the huge volume of data.  
- Databases are an organizational memory. Organizations rely on them to continue as a going concern.  
  
In today's fast-paced, tech-driven world, data plays a critical role in keeping businesses organized and efficient. For a car rental company, managing details about vehicles, customers, rental transactions, and payments can quickly become overwhelming without a proper system in place. This is where a well-designed database comes in.  
  
Purpose:  
To build a smart, user-friendly database system that helps a car rental company manage its daily operations, support business decision-making, and enhance customer satisfaction.  
  
Features:  
- Keeps track of customers, cars, and locations.  
- Logs rental transactions (pickup and return details).  
- Records payment and offer information.  
- Supports efficient service and future growth like online booking.  
  
Why it matters:  
Customers expect quick, easy, and reliable service. This database ensures that information is managed efficiently, reducing errors and improving service quality.

**Relational Model With Keys**

Customer Table  
- CustomerID (PK)  
- FirstName  
- LastName  
- Address  
- DriversLicenseNo  
- MembershipStatus  
- OfferID (FK → Offers.OfferID)  
  
Car Table  
- CarID (PK)  
- Make  
- Model  
- Year  
- Color  
- LicensePlateNo  
  
Rental Table  
- RentalDateTime (PK Part)  
- CustomerID (PK Part, FK → Customer.CustomerID)  
- CarID (PK Part, FK → Car.CarID)  
- RentalDueDate  
- PickupLocation  
- DropoffLocation  
- DropoffTime  
  
Offers Table  
- OfferID (PK)  
- Duration  
- Type  
- Amount  
- Eligibility  
  
Insurance Table  
- InsuranceID (PK)  
- Provider  
- Type  
- CoverageAmount  
  
Services Table  
- CarID (FK → Car.CarID)  
  
Price Table  
- CarID (PK Part, FK → Car.CarID)  
- OfferID (PK Part, FK → Offers.OfferID)  
- PriceBefore  
- PriceAfter

**SQL Table Creation**

-- Customer Table  
CREATE TABLE Customer (  
 CustomerID INT PRIMARY KEY,  
 FirstName VARCHAR(50),  
 LastName VARCHAR(50),  
 Address VARCHAR(100),  
 DriversLicenseNo VARCHAR(20),  
 MembershipStatus VARCHAR(20),  
 OfferID INT,  
 FOREIGN KEY (OfferID) REFERENCES Offers(OfferID)  
);  
  
-- Car Table  
CREATE TABLE Car (  
 CarID INT PRIMARY KEY,  
 Make VARCHAR(30),  
 Model VARCHAR(30),  
 Year INT,  
 Color VARCHAR(20),  
 LicensePlateNo VARCHAR(15)  
);  
  
-- Rental Table  
CREATE TABLE Rental (  
 CustomerID INT,  
 CarID INT,  
 RentalDateTime DATETIME,  
 RentalDueDate DATETIME,  
 PickupLocation VARCHAR(100),  
 DropoffLocation VARCHAR(100),  
 DropoffTime DATETIME,  
 PRIMARY KEY (CustomerID, CarID, RentalDateTime),  
 FOREIGN KEY (CustomerID) REFERENCES Customer(CustomerID),  
 FOREIGN KEY (CarID) REFERENCES Car(CarID)  
);  
  
-- Offers Table  
CREATE TABLE Offers (  
 OfferID INT PRIMARY KEY,  
 Duration VARCHAR(20),  
 Type VARCHAR(30),  
 Amount DECIMAL(10,2),  
 Eligibility VARCHAR(50)  
);  
  
-- Insurance Table  
CREATE TABLE Insurance (  
 InsuranceID INT PRIMARY KEY,  
 Provider VARCHAR(50),  
 Type VARCHAR(30),  
 CoverageAmount DECIMAL(10,2)  
);  
  
-- Services Table  
CREATE TABLE Services (  
 CarID INT,  
 FOREIGN KEY (CarID) REFERENCES Car(CarID)  
);  
  
-- Price Table  
CREATE TABLE Price (  
 CarID INT,  
 OfferID INT,  
 PriceBefore DECIMAL(10,2),  
 PriceAfter DECIMAL(10,2),  
 PRIMARY KEY (CarID, OfferID),  
 FOREIGN KEY (CarID) REFERENCES Car(CarID),  
 FOREIGN KEY (OfferID) REFERENCES Offers(OfferID)  
);

**Insert Tuples (Sample Data)**

-- Insert into Customer  
INSERT INTO Customer VALUES  
(1, 'Alice', 'Walker', '123 Main St', 'D1234567', 'Gold', 201),  
(2, 'Bob', 'Smith', '456 Oak Ave', 'D7654321', 'Silver', 202),  
(3, 'Carlos', 'Mendez', '789 Pine Rd', 'D2468101', 'None', 206),  
(4, 'Diana', 'Nguyen', '321 Birch Blvd', 'D1357913', 'Gold', 202),  
(5, 'Eli', 'Chen', '654 Cedar Ln', 'D1122334', 'Silver', 204),  
(6, 'Fatima', 'Rahman', '987 Spruce Ct', 'D5566778', 'None', 206);  
  
-- Insert into Car  
INSERT INTO Car VALUES  
(101, 'Toyota', 'Corolla', 2020, 'White', 'ABC1234'),  
(102, 'Honda', 'Civic', 2019, 'Black', 'XYZ5678'),  
(103, 'Tesla', 'Model 3', 2021, 'Red', 'TES2021'),  
(104, 'Ford', 'Focus', 2018, 'Blue', 'FOC8888'),  
(105, 'Chevrolet', 'Malibu', 2022, 'Silver', 'CHE2022'),  
(106, 'Hyundai', 'Elantra', 2023, 'Gray', 'HYN1234');  
  
-- Insert into Rental  
INSERT INTO Rental VALUES  
(1, 101, '2025-04-01 09:00:00', '2025-04-05 09:00:00', 'Downtown Branch', 'Airport Branch', '2025-04-05 08:45:00'),  
(2, 102, '2025-04-02 10:30:00', '2025-04-06 10:30:00', 'Airport Branch', 'Mall Branch', '2025-04-06 09:50:00'),  
(3, 103, '2025-04-03 08:00:00', '2025-04-04 08:00:00', 'Mall Branch', 'Downtown Branch', '2025-04-04 07:45:00'),  
(4, 104, '2025-04-01 14:15:00', '2025-04-03 14:15:00', 'Downtown Branch', 'Downtown Branch', '2025-04-03 13:50:00'),  
(5, 105, '2025-04-04 12:00:00', '2025-04-07 12:00:00', 'Mall Branch', 'Airport Branch', '2025-04-07 11:30:00'),  
(6, 106, '2025-04-05 11:00:00', '2025-04-10 11:00:00', 'Airport Branch', 'Downtown Branch', '2025-04-10 10:45:00');  
  
-- Insert into Offers  
INSERT INTO Offers VALUES  
(201, '1 Day', 'Weekend Special', 20.00, 'All Members'),  
(202, '3 Days', 'Midweek Deal', 50.00, 'Gold Members Only'),  
(203, '1 Week', 'Family Package', 100.00, 'All'),  
(204, '2 Days', 'Business Plan', 40.00, 'Silver/Gold'),  
(205, '5 Days', 'Adventure Pack', 80.00, 'Gold Only'),  
(206, 'Weekend', 'Late Return Flex', 25.00, 'None');  
  
-- Insert into Price  
INSERT INTO Price VALUES  
(101, 201, 50.00, 40.00),  
(102, 202, 90.00, 70.00),  
(103, 203, 150.00, 130.00),  
(104, 204, 60.00, 50.00),  
(105, 205, 110.00, 90.00),  
(106, 206, 75.00, 60.00);

**Sample Queries**

-- List Customers with their Rental Cars  
SELECT c.FirstName, c.LastName, ca.Make, ca.Model, r.RentalDateTime, r.DropoffTime  
FROM Customer c  
JOIN Rental r ON c.CustomerID = r.CustomerID  
JOIN Car ca ON r.CarID = ca.CarID;  
  
-- Show Cars and the Offers Applied to Them  
SELECT ca.Make, ca.Model, o.Type AS OfferType, p.PriceBefore, p.PriceAfter  
FROM Car ca  
JOIN Price p ON ca.CarID = p.CarID  
JOIN Offers o ON p.OfferID = o.OfferID;  
  
-- Find Rentals by Members with "Gold" Status  
SELECT c.FirstName, c.LastName, r.RentalDateTime, r.PickupLocation  
FROM Customer c  
JOIN Rental r ON c.CustomerID = r.CustomerID  
WHERE c.MembershipStatus = 'Gold';

**ER Diagram**

The following diagram shows the Entity-Relationship (ER) model for the Car Rental Database System.

