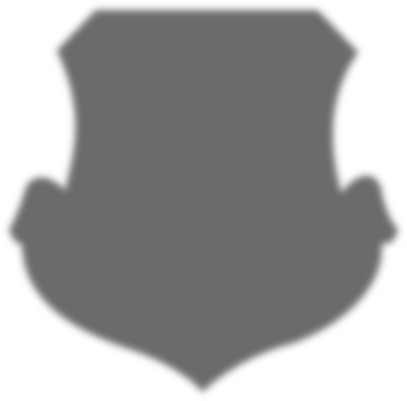
A blue green and white text

Description automatically generated



Daffodil International University

**Group Project**

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**Project Report: Car Rental System**

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**1. Project Title and Introduction**

Introduction: The Car Rental Management System is designed to simplify and streamline the process of renting vehicles. It is a robust database-driven system that manages reservations, payments, customer details, vehicle inventory, and more. This system ensures efficient operations, improved customer experience, and enhanced decision-making capabilities for cars.

The primary objectives of this system include:

* Facilitating smooth reservation processes.
* Managing vehicle availability and customer data effectively.
* Generating insights through reports for better business decisions.

**2. ER Diagram Description**

The Car Rental System is built around the following entities:

* **Users**: Stores customer data.
* **Cars**: Details about the vehicles available for rent.
* **Branches**: Information about rental locations.
* **Reservations**: Tracks booking details.
* **Payments**: Logs payment transactions.
* **Staff**: Data about branch employees.
* **Admins**: System administrators for managing the database.
* **Reviews**: Customer feedback and ratings for vehicles.
* **Promotions**: Discount offers and deals.
* **InsurancePlans**: Available insurance options for rentals.

Relationships:

* **Users** have many **Reservations**.
* **Cars** belong to **Branches**.
* **Reservations** generate **Payments**.
* **Staff** and **Admins** manage the system.
* **Reviews** are linked to **Users** and **Cars**.

**3. Database Design**

**Table Descriptions**

* **Users**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | **Column** | **Type** | **Description** | | user\_id | INT | Primary key, unique identifier for users. | | full\_name | VARCHAR(100) | Name of the user. | | email | VARCHAR(100) | User’s email address. | | phone | VARCHAR(15) | Contact number. | | address | TEXT | User’s address. | |

* **Admins**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | Column | Type | Description | | admin\_id | INT | Primary key, unique identifier for admins. | | username | VARCHAR(50) | Login username. | | password\_hash | VARCHAR(255) | Securely hashed password. | | full\_name | VARCHAR(100) | Admin’s full name. | | email | VARCHAR(100) | Admin’s email address. | | phone | VARCHAR(15) | Contact number. | | role | VARCHAR(20) | Role of the admin (e.g., super\_admin). | |

* **Cars**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | Column | Type | Description | | car\_id | INT | Primary key, unique identifier for cars. | | car\_model | VARCHAR(50) | Model name of the car. | | rental\_price\_per\_day | DECIMAL(10,2) | Daily rental rate. | | availability\_status | BOOLEAN | Whether the car is available for rent. | |

***... (Tables for Reservations, Payments, Reviews, etc., are similarly detailed in the report)***

**SQL File:** 

**4.SQL Features**

**Joins**

**Example: Retrieve all reservations along with user and car details:**

SELECT

Reservations.reservation\_id,

Users.full\_name AS customer\_name,

Cars.car\_model,

Reservations.start\_date,

Reservations.end\_date

FROM Reservations

JOIN Users ON Reservations.user\_id = Users.user\_id

JOIN Cars ON Reservations.car\_id = Cars.car\_id;

**Views**

Create a view to summarize branch revenue:

CREATE VIEW BranchRevenue AS

SELECT

Branches.branch\_name,

SUM(Payments.amount) AS total\_revenue

FROM Payments

JOIN Reservations ON Payments.reservation\_id = Reservations.reservation\_id

JOIN Cars ON Reservations.car\_id = Cars.car\_id

JOIN Branches ON Cars.branch\_id = Branches.branch\_id

GROUP BY Branches.branch\_name;

**Stored Procedure**

Procedure to calculate the total rental cost:

DELIMITER $$

CREATE PROCEDURE CalculateRentalCost (

IN car\_id INT, IN start\_date DATE, IN end\_date DATE, OUT total\_cost DECIMAL(10,2))

BEGIN

DECLARE daily\_rate DECIMAL(10,2);

DECLARE rental\_days INT;

SET rental\_days = DATEDIFF(end\_date, start\_date) + 1;

SELECT rental\_price\_per\_day INTO daily\_rate FROM Cars WHERE car\_id = car\_id;

SET total\_cost = rental\_days \* daily\_rate;

END $$

DELIMITER ;

**Trigger**

Trigger to update car availability:

DELIMITER $$

CREATE TRIGGER UpdateCarAvailability AFTER INSERT ON Reservations

FOR EACH ROW

BEGIN

UPDATE Cars SET availability\_status = FALSE WHERE car\_id = NEW.car\_id;

END $$

DELIMITER ;

**5. Future Scope and Enhancements**

1. **Real-Time Tracking**: Integrate GPS to track rented vehicles.
2. **Mobile Application**: Develop a mobile app for customers to book and manage reservations.
3. **Advanced Analytics**: Use machine learning for predictive maintenance and demand forecasting.
4. **Loyalty Program**: Reward repeat customers with discounts and perks.

**6. Special Features**

1. **Comprehensive Database Design**: Includes all necessary entities and relationships to manage a car rental system efficiently.
2. **Automated Availability Updates**: Real-time triggers ensure car availability status is updated immediately after a reservation.
3. **Revenue Insights**: Predefined SQL views offer detailed revenue breakdowns by branch.
4. **Custom Procedures**: Tailored stored procedures calculate costs dynamically, reducing manual computations.
5. **Secure System**: Admins’ passwords are securely stored using hashing techniques.
6. **Promotional Management**: Offers and discounts are integrated for enhanced customer satisfaction.

**7. Conclusion**

The Car Rental Management System is a highly scalable and efficient solution for modern car rental businesses. Its structured database design and advanced SQL features facilitate seamless operations, better customer service, and informed decision-making. Future enhancements, such as mobile app integration and machine learning, can further elevate its functionality, ensuring it stays competitive in a rapidly evolving industry.

This project demonstrates the effective application of database principles and SQL techniques to solve real-world challenges, making it an ideal solution for car rental businesses aiming for operational excellence.