VEHICLE PARKING MANAGEMENT SYSTEM

A PROJECT REPORT

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COLLEGE OF ENGINEERING AND TECHNOLOGY

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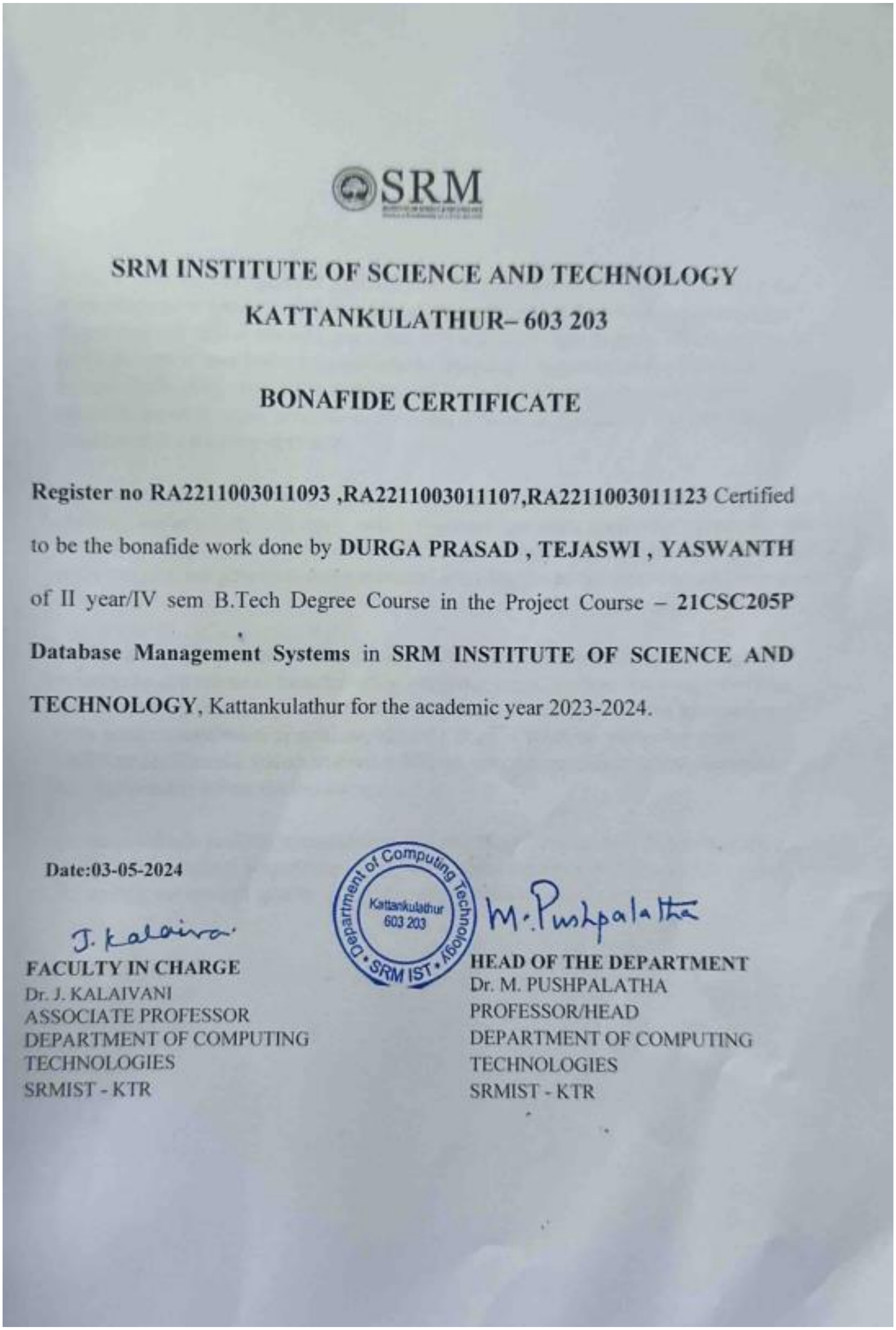
KATTANKULATHUR– 603 203

MAY 2024



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ABSTRACT

Vehicle parking management systems revolutionize urban mobility by leveraging technology to streamline parking allocation, payment, and monitoring processes. These systems utilize sensors, cameras, and software algorithms to efficiently guide drivers to available parking spaces, reducing congestion and enhancing overall traffic flow. By implementing real-time data analysis, these systems optimize parking space utilization, ensuring maximum efficiency and revenue generation for parking operators.

Moreover, advanced parking management systems offer users convenient payment options, including mobile apps and contactless payment methods, enhancing the overall parking experience. Additionally, these systems provide parking operators with valuable insights into usage patterns, allowing for better planning and resource allocation.

Furthermore, integration with smart city initiatives enables parking management systems to contribute to broader urban planning goals, such as reducing pollution and promoting sustainable transportation options. Through seamless integration with public transportation systems and ride-sharing services, these systems facilitate multimodal transportation solutions, promoting a more interconnected and sustainable urban environment.

Overall, vehicle parking management systems play a crucial role in modernizing urban infrastructure, improving traffic flow, reducing environmental impact, and enhancing the overall quality of life for city residents and visitors alike."

PROBLEM STATEMENT

In congested urban areas, effective management of vehicle parking is paramount for optimizing traffic flow and enhancing overall mobility. The existing challenges, including inefficient space utilization, lack of real-time information, and subpar user experiences, necessitate the development of an advanced Vehicle Parking Management System (VPMS). This system integrates cutting-edge technologies such as IoT sensors, data analytics, and mobile applications to revolutionize parking operations.

The proposed VPMS addresses these challenges by providing real-time updates on parking availability through mobile apps and digital signage, thus minimizing search time and reducing traffic congestion. By employing machine learning algorithms, it intelligently guides motorists to vacant parking spots, optimizing space utilization and improving user convenience. Seamless payment methods and automated access control systems enhance the overall parking experience, while robust security measures ensure the safety of vehicles and individuals within parking facilities.

Moreover, the VPMS promotes sustainability by incentivizing eco-friendly transportation options and incorporating green design principles into parking structures. With scalability and flexibility at its core, the system is poised to adapt to the evolving needs of urban environments. By streamlining parking operations, enhancing user experience, and reducing environmental impact, the VPMS contributes to a more efficient and sustainable urban mobility landscape.

TABLE OF CONTENTS

CHAPTER – 1

Problem Understanding

In busy cities, finding parking spaces can be a real headache. Traditional ways of managing parking often lead to problems like traffic jams and frustrated drivers. To tackle these issues and make city driving smoother, we need a modern Vehicle Parking Management System (VPMS). The VPMS is like a high-tech makeover for parking. It uses cool stuff like smart sensors, computer analysis, and mobile apps to solve parking problems in new ways. Its main goal is to make the most of available parking spaces, make parking easier for drivers, keep things safe, and help the environment.

This intro sets the scene for looking into how the VPMS works and why it's a big deal. From letting drivers know where parking spots are free in real-time to guiding them to empty spaces, the VPMS is all about making parking simpler. Plus, with easy payment methods and extra security, it aims to make parking safer and more convenient for everyone.

As cities get busier and more people need parking, having a good VPMS becomes really important. This intro sets the stage for understanding how the VPMS helps solve the challenges of driving in modern cities, making things better for everyone.

KEY FEAUTURES OF PROJECT :

Dashboard: In this sections, admin can briefly view the number of vehicle entries in a particular period.

Category: In this section, admin can manage category (add/update/delete).

Add Vehicle: In this section, admin add vehicle which is going to park. **Manage Vehicle**: In this section, admin can manage incoming and outgoing vehicle and admin can also add parking charges and his/her remarks.

Reports: In this section admin can generate vehicle entries reports between two dates.

Search: In this section, admin can search a particular vehicle by parking number. Admin can also update his profile, change the password and recover the password.

ENTITES:

User [Users]: This could represent a person who registers and logs in to the system.
Registration [Regm]: This could represent the process a user goes through to sign up for the system.
View [View] : This could represent different functions of the system, such as viewing cars or profiles.
Admin [Admin]: This could represent an administrator who manages the system.
Category [Category]: This could represent a classification system, such as car types or pool locations.
Vehicle [Vehicle]: This could represent a car or other vehicle used for carpooling.

ATTRIBUTES:

User [Users]
ID [User]
FirstName [User]
LastName [User]
MobileNumber [User]
Email [User]
Password [User]
RegDate [User] (Registration Date)
Admin [Admin]
AdminName [Admin]
Vehicle [Vehicle]
VehicleCompanyname [Vehicle]
RegistrationNumber [Vehicle]

OwnerName [Vehicle]
OwnerContactNumber [Vehicle]
Category [Category]
VehicleCat [Category] (Vehicle Category)
Others
Creation Date [-] (possibly for User or Registration)
Status [-] (possibly for User or Registration)
Remark [-]
InTime [-]
OutTime [-]
ParkingNumber [-]
ParkingCharge [-] (possibly associated with Vehicle)

CONSTRUCTION OF DB USING ER MODEL FOR THE PROJECT

The database construction process involves translating the entities, relationships, and attributes identified in the ER model into a physical database schema using SQL. This process ensures that the database accurately represents the structure and relationships defined in the ER model while adhering to normalization principles and best practices for database design.

Entity Identification:

Each entity identified in the ER model corresponds to a table in the database schema.
Attributes of each entity become columns in the respective tables.
Primary keys are identified for each table to uniquely identify records.
Relationships:

Relationships between entities are translated into foreign key constraints in the database schema.

One-to-one, one-to-many, and many-to-many relationships are established based on cardinality and participation constraints.

Normalization:

Normalization techniques are applied to eliminate data redundancy and ensure data integrity.

Tables are normalized to the desired normal form, typically up to the third normal form (3NF).

Composite keys are decomposed into separate attributes to achieve normalization.

Table Creation:

SQL statements are used to create tables for each entity identified in the ER model.

Attributes are defined with appropriate data types, lengths, and constraints.

Primary key constraints are added to ensure uniqueness and integrity.

Foreign key constraints are added to enforce referential integrity between related tables.

Indexing:

Indexes are created on columns frequently used for searching and querying to improve performance.

Indexes can be added to primary key columns, foreign key columns, and other frequently queried columns.

Constraints and Validation:

Check constraints are added to enforce domain integrity and validate data input.

Default values may be specified for certain attributes to provide initial values upon insertion.

Unique constraints are applied to ensure uniqueness of values in specific columns.

Views and Stored Procedures:

Views can be created to present data in a customized format, combining columns from multiple tables.

Stored procedures and functions may be implemented to encapsulate complex logic and operations.

Data Population:

Once the database schema is constructed, initial data can be populated into the tables using INSERT statements.

Data population ensures that the database contains representative sample data for testing and evaluation.

Testing and Validation:

Comprehensive testing is conducted to validate the functionality and performance of the database.

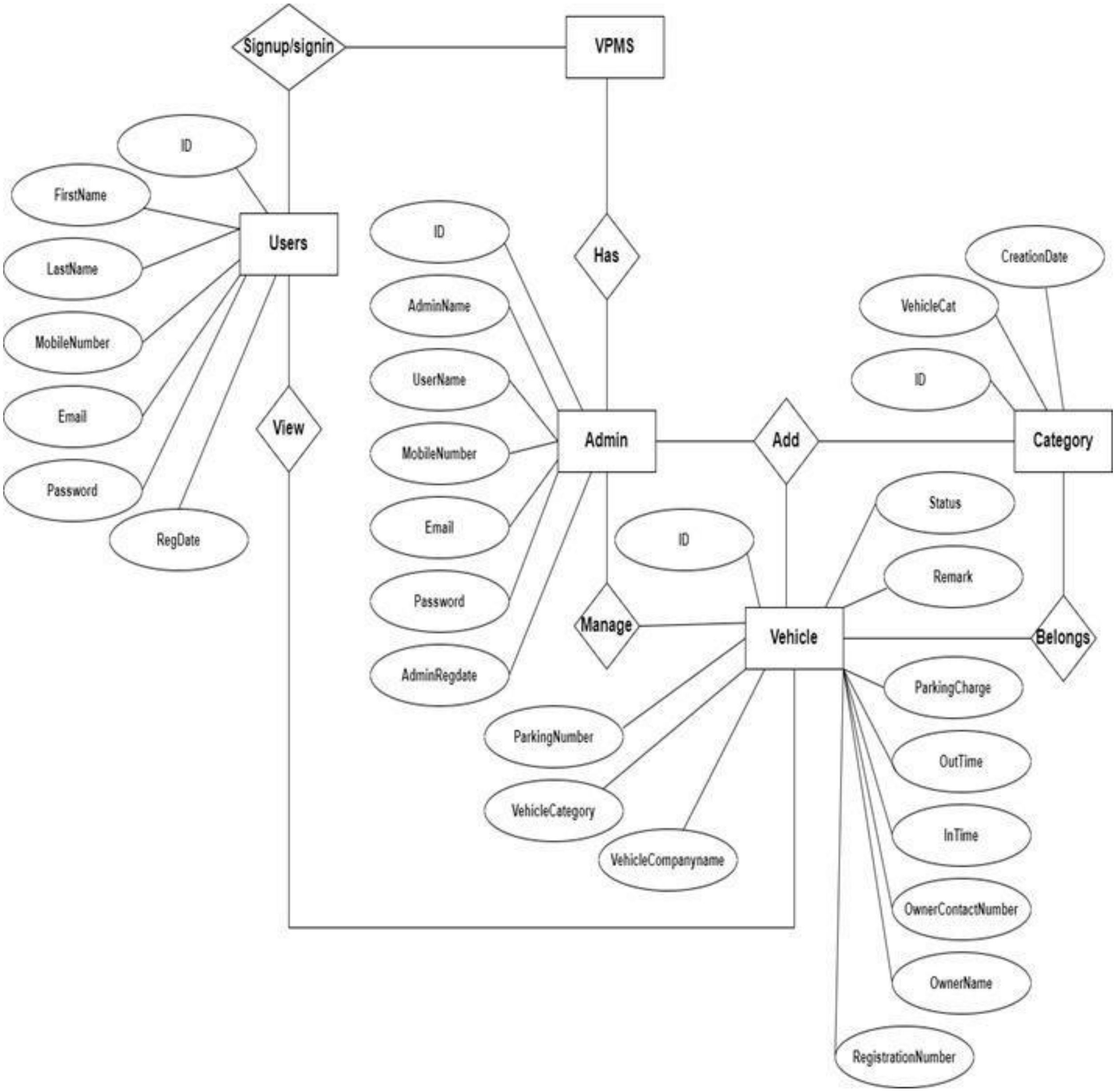
Test cases cover various scenarios, including data retrieval, insertion, deletion, and updates.

Performance testing may include load testing, stress testing, and scalability testing.

Documentation:

Documentation is prepared to describe the database schema, including table definitions, relationships, constraints, and indexing strategies. User manuals, technical documentation, and data dictionaries are provided to support users and administrators.

ER DIAGRAM:



CHAPTER – 2

DESIGN OF RELATIONAL SCHEMA

The relational schema for a project, such as a vehicle parking management System, defines the structure of the database in terms of tables, their attributes, and the relationships between them. It serves as a blueprint for organizing and storing data in a relational database management system (RDBMS). Here's a brief description of what each component of the relational schema :

Tables: Tables represent entities or concepts in the system. Each table consists of rows and columns, where each row corresponds to a specific instance of the entity, and each column represents an attribute of that entity.

Attributes: Attributes are the properties or characteristics of entities stored in the database. For example, in the vehicle parking user table has user_id,mobile number

Primary Keys: Primary keys uniquely identify each record (row) in a table. They ensure that each row in a table can be uniquely identified and serve as the basis for establishing relationships between tables.

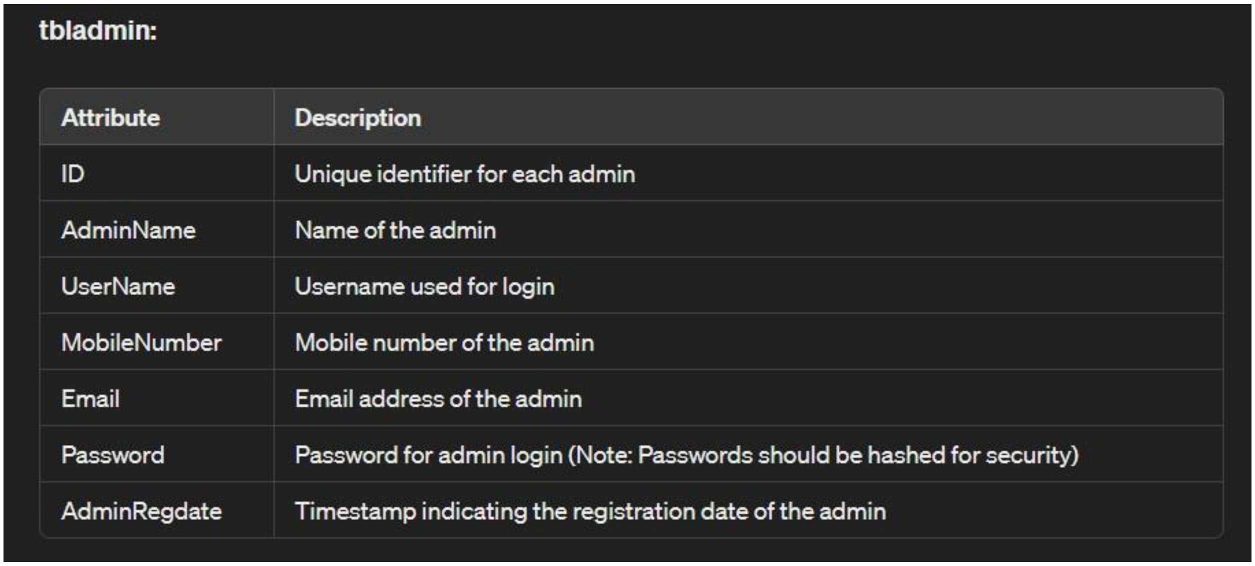
Foreign Keys: Foreign keys establish relationships between tables. They are attributes in one table that refer to the primary key of another table.

Relationships: Relationships define how tables are connected to each other and specify how data in one table is related to data in another table. Common types of relationships include one-to-one, one-tomany, and many-to-many relationships.

Constraints: Constraints are rules enforced on the data stored in the database to maintain data integrity and consistency. Examples include primary key constraints, foreign key constraints, unique constraints, and check constraints.

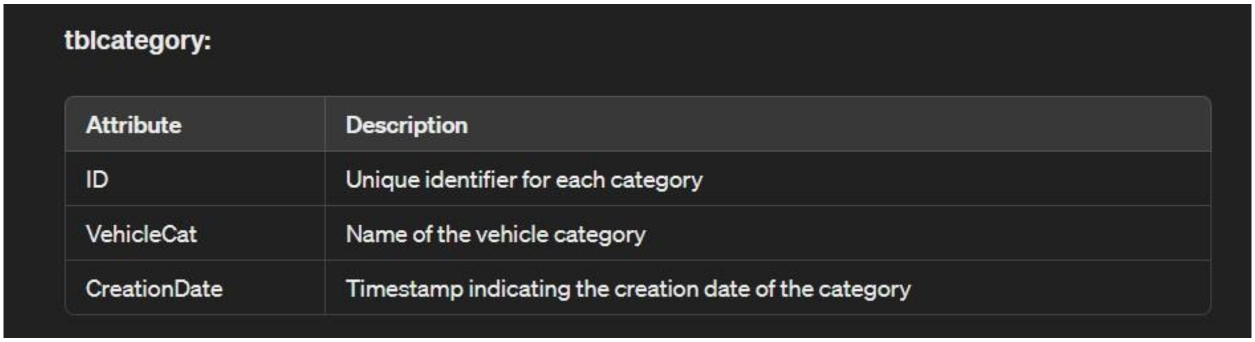
Data Types: Data types define the type of data that can be stored in each column of a table. Common data types include integer, varchar, date, float, and text.

Creation of Database for Tables for the Project



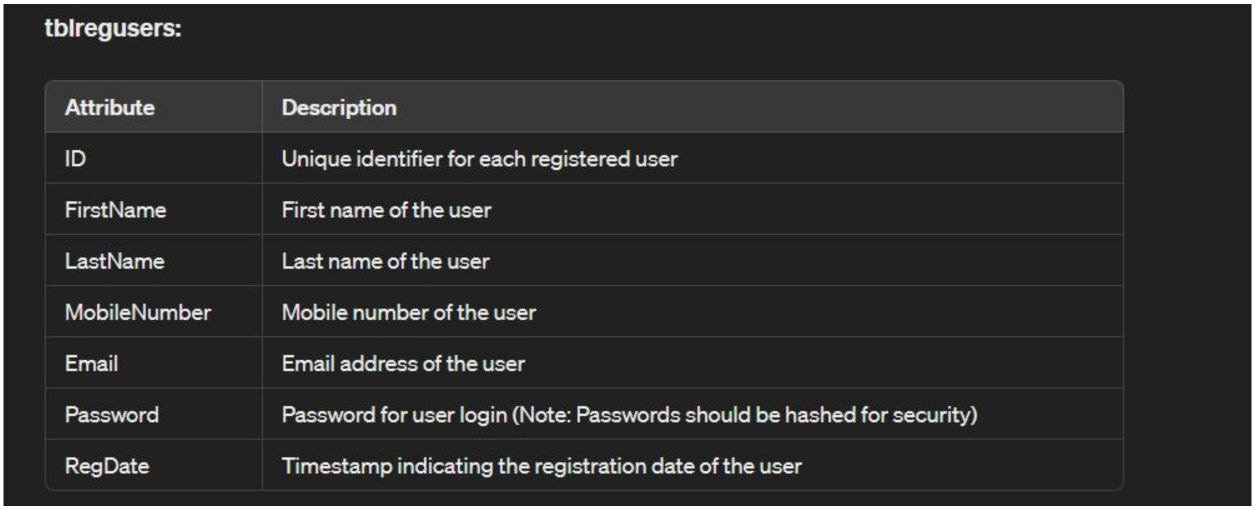
tbladmin:

Attribute	Description
ID	Unique identifier for each admin
AdminName	Name of the admin
UserName	Username used for login
MobileNumber	Mobile number of the admin
Email	Email address of the admin
Password	Password for admin login (Note: Passwords should be hashed for security)
AdminRegdate	Timestamp indicating the registration date of the admin



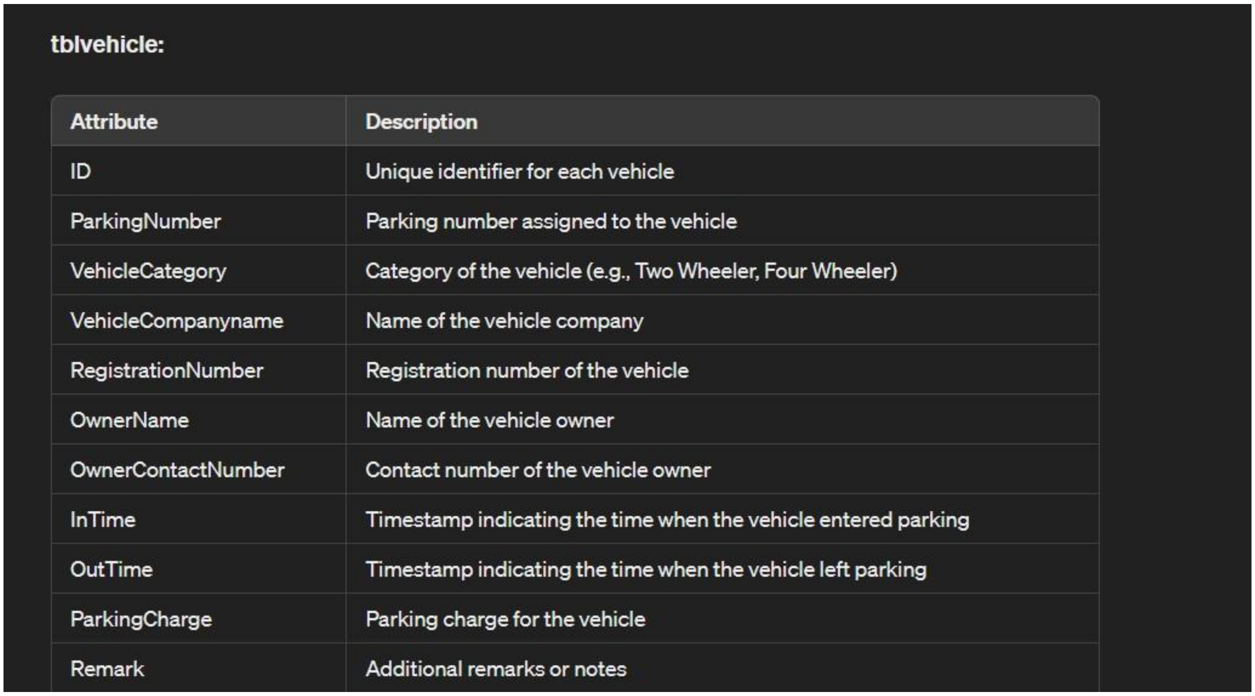
tblcategory:

Attribute	Description
ID	Unique identifier for each category
VehicleCat	Name of the vehicle category
CreationDate	Timestamp indicating the creation date of the category



tblregusers:

Attribute	Description
ID	Unique identifier for each registered user
FirstName	First name of the user
LastName	Last name of the user
MobileNumber	Mobile number of the user
Email	Email address of the user
Password	Password for user login (Note: Passwords should be hashed for security)
RegDate	Timestamp indicating the registration date of the user



tblvehicle:

Attribute	Description
ID	Unique identifier for each vehicle
ParkingNumber	Parking number assigned to the vehicle
VehicleCategory	Category of the vehicle (e.g., Two Wheeler, Four Wheeler)
VehicleCompanyname	Name of the vehicle company
RegistrationNumber	Registration number of the vehicle
OwnerName	Name of the vehicle owner
OwnerContactNumber	Contact number of the vehicle owner
InTime	Timestamp indicating the time when the vehicle entered parking
OutTime	Timestamp indicating the time when the vehicle left parking
ParkingCharge	Parking charge for the vehicle
Remark	Additional remarks or notes

CODE:

```
CREATE TABLE tbluser(     user_id INT
NOT NULL,     name VARCHAR(255)
NOT NULL,     mobileno VARCHAR(20)
NOT NULL,     email VARCHAR(255)
NOT NULL,     password
VARCHAR(255) NOT NULL
);
CREATE TABLE parking_records (     id INT NOT NULL
AUTO_INCREMENT,     parking_number INT NOT
NULL,     vehicle_category VARCHAR(255) NOT
NULL,     vehicle_company_name VARCHAR(255) NOT
NULL,     registration_number VARCHAR(255) NOT
NULL,     owner_name VARCHAR(255) NOT NULL,
owner_contact_number VARCHAR(20) NOT NULL,
intime DATETIME NOT NULL,     outtime DATETIME,
   parking_charge DECIMAL(10,2) NOT NULL,
remark VARCHAR(255),     status
VARCHAR(50) NOT NULL,     user_id INT
NOT NULL,     admin_id INT NOT NULL,
category_id INT NOT NULL,
   PRIMARY KEY (id)
);
CREATE TABLE admin_table (     admin_id INT
NOT NULL AUTO_INCREMENT,     admin_name
VARCHAR(255) NOT NULL,     username
VARCHAR(255) NOT NULL,     mobile_number
VARCHAR(20) NOT NULL,     email
VARCHAR(255) NOT NULL,     password
VARCHAR(255) NOT NULL,     admin_regdate
DATETIME NOT NULL,
   PRIMARY KEY (admin_id),
   UNIQUE (username),
   UNIQUE (email));
CREATE TABLE category (     category_id INT NOT
NULL AUTO_INCREMENT,     vehicle_category
VARCHAR(255) NOT NULL,     creation_date
DATETIME NOT NULL,
   PRIMARY KEY (category_id),
   UNIQUE (vehicle_category)
);
```

CHAPTER – 3

Complex Queries based on the concepts of constraints, sets, joins, views, Triggers and cursors

Constraints:

Constraints are rules enforced on data columns to maintain data integrity and accuracy. They include primary keys, foreign keys, unique constraints, and check constraints. In your SQL file, you've defined several constraints such as primary keys and foreign keys to maintain the relationships between tables.

Joins:

Joins are essential for combining data from multiple tables in a relational database. They are used to retrieve related data by matching values in columns common to the tables being joined.

Common types of joins include:

INNER JOIN: Returns only the rows where there is a match in both tables.

LEFT JOIN (or LEFT OUTER JOIN): Returns all rows from the left table and the matched rows from the right table, with NULL values for unmatched rows.

RIGHT JOIN (or RIGHT OUTER JOIN): Returns all rows from the right table and the matched rows from the left table, with NULL values for unmatched rows.

FULL JOIN (or FULL OUTER JOIN): Returns all rows when there is a match in either table, with NULL values for unmatched rows. Joins are used in SQL queries to retrieve data from multiple related tables based on specified criteria, such as foreign key relationships.

Set Operations:

Set operations in SQL involve combining, filtering, or comparing data from different sources.

Common set operations include:

UNION: Combines the results of two or more SELECT statements, removing duplicate rows.

INTERSECT: Returns the common rows between two or more SELECT statements.

EXCEPT (or MINUS in some databases): Returns the rows that are present in the first SELECT statement but not in the subsequent SELECT statement(s).

Set operations are useful for aggregating data from different sources, filtering data based on specific criteria, and comparing datasets to identify similarities or differences.

Views:

Views are virtual tables generated by SQL queries. They do not store data themselves but provide a way to represent the results of a query as a reusable object.

Views can encapsulate complex logic or frequently used queries, making it easier to generate reports by abstracting away the underlying complexity.

By creating views, you can simplify the process of retrieving data for reports, as you can query the view instead of writing complex SQL queries every time.

Views can also be used to restrict access to certain columns or rows of a table, providing an additional layer of security.

Triggers:

Triggers are database objects that automatically perform an action in response to certain events, such as INSERT, UPDATE, or DELETE operations on a table.

Triggers are often used to enforce data integrity constraints, perform validations, or update related data as needed.

For example, you can use triggers to validate data before insertion or update, enforce referential integrity constraints, or log changes made to a table.

Triggers can be defined to execute either before or after the triggering event, allowing you to control the timing of the trigger's execution.

Cursors:

Cursors are database objects used to traverse the results of a query one row at a time.

Cursors are typically used in stored procedures or triggers to process individual rows returned by a query and perform complex operations on them.

Cursors provide a way to iterate over a result set and perform operations such as calculations, validations, or updates on each row.

While cursors can be useful in certain scenarios, they should be used judiciously as they can have performance implications, especially when dealing with large set

CONSTRAINTS :

```
-- Table structure for table `tbladmin`
CREATE TABLE `tbladmin` (
  `ID` int(10) NOT NULL AUTO_INCREMENT,
  `AdminName` varchar(120) DEFAULT NULL,
  `UserName` varchar(120) DEFAULT NULL,
  `MobileNumber` bigint(10) DEFAULT NULL,
  `Email` varchar(200) DEFAULT NULL,
  `Password` varchar(120) DEFAULT NULL,
  `AdminRegdate` timestamp NULL DEFAULT current_timestamp(),
  PRIMARY KEY (`ID`),
  UNIQUE KEY `Unique_MobileNumber` (`MobileNumber`),
  UNIQUE KEY `Unique_Email` (`Email`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

SETS AND JOINTS:

```
SELECT *
FROM parking_records AS pr
LEFT JOIN parking_records AS pr2 ON pr.registration_number = pr2.registration_number;
SELECT *
FROM parking_records AS pr
RIGHT JOIN parking_records AS pr2 ON pr.registration_number = pr2.registration_number;
```

VIEWS

```
CREATE VIEW `vehicle_details_view` AS
SELECT v.ID, v.ParkingNumber, v.VehicleCategory, v.OwnerName, v.OwnerContactNumber,
c.VehicleCat FROM tblvehicle v
JOIN tblcategory c ON v.VehicleCategory = c.ID;
```

CURSORS

```
DELIMITER //

CREATE PROCEDURE `example_cursor`()
BEGIN
   DECLARE done INT DEFAULT FALSE;
   DECLARE admin_id INT;
   DECLARE admin_name VARCHAR(120);
   DECLARE admin_cursor CURSOR FOR SELECT ID, AdminName FROM tbladmin;
   DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = TRUE;

   OPEN admin_cursor;

   read_loop: LOOP
      FETCH admin_cursor INTO admin_id, admin_name;
      IF done THEN
         LEAVE read_loop;
      END IF;
      -- Do something with admin_id and admin_name
      SELECT CONCAT('Admin ID: ', admin_id, ', Admin Name: ', admin_name);    END
LOOP;

   CLOSE admin_cursor;
END//
```

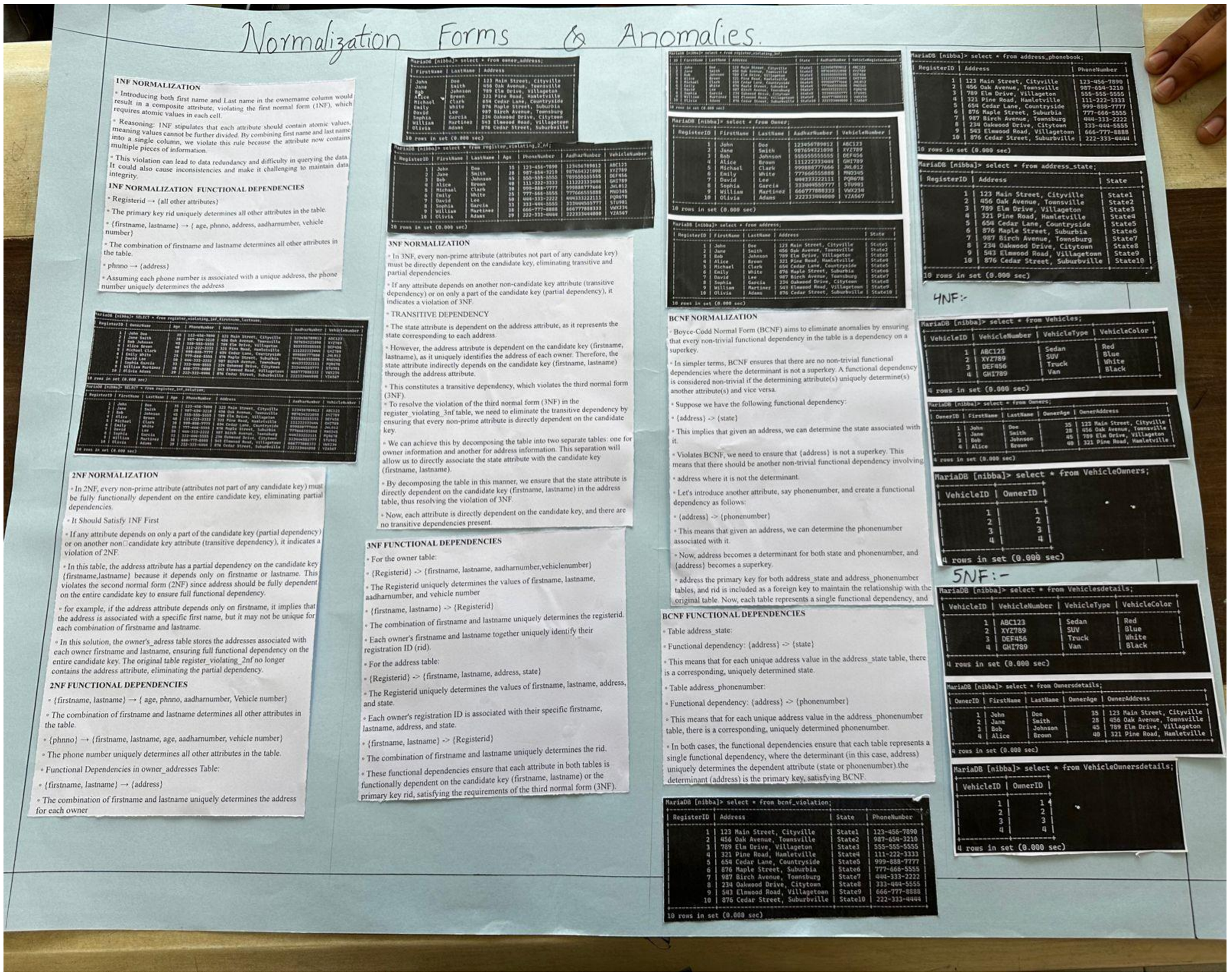
DELIMITER ; **TRIGGER:**

```
CREATE TRIGGER `update_vehicle_status`
AFTER UPDATE ON `tblvehicle`
FOR EACH ROW
BEGIN
   IF OLD.Status != NEW.Status THEN
      INSERT INTO tblvehicle_status_history (VehicleID, OldStatus, NewStatus, UpdateTime)
      VALUES (OLD.ID, OLD.Status, NEW.Status, NOW());
   END IF;
```

CHAPTER 4

Analyzing the pitfalls, identifying the dependencies and applying normalizations

Chart:



Normalization Forms & Anomalies.

1NF NORMALIZATION

- Introducing both first name and Last name in the ownername column would result in a composite attribute, violating the first normal form (1NF), which requires atomic values in each cell.
- Reasoning: 1NF stipulates that each attribute should contain atomic values, meaning values cannot be further divided. By combining first name and last name into a single column, we violate this rule because the attribute now contains multiple pieces of information.
- This violation can lead to data redundancy and difficulty in querying the data. It could also cause inconsistencies and make it challenging to maintain data integrity.

1NF NORMALIZATION FUNCTIONAL DEPENDENCIES

- Registerid → {all other attributes}
- The primary key rid uniquely determines all other attributes in the table.
- {firstname, lastname} → { age, phnno, address, aadharnumber, vehicle number}
- The combination of firstname and lastname determines all other attributes in the table.
- phnno → {address}
- Assuming each phone number is associated with a unique address, the phone number uniquely determines the address

```
MariaDB [nibba]> SELECT * from register_violating_1nf_firstname_lastname;
+------------+------------------+-----+--------------+-------------------------------+--------------+---------------+
| RegisterID | OwnerName        | Age | PhoneNumber  | Address                       | AadharNumber | VehicleNumber |
+------------+------------------+-----+--------------+-------------------------------+--------------+---------------+
|          1 | John Doe         |  35 | 123-456-7890 | 123 Main Street, Cityville    | 123456789012 | ABC123        |
|          2 | Jane Smith       |  28 | 987-654-3210 | 456 Oak Avenue, Townsville    | 987654321098 | XYZ789        |
|          3 | Bob Johnson      |  45 | 555-555-5555 | 789 Elm Drive, Villageton     | 555555555555 | DEF456        |
|          4 | Alice Brown      |  40 | 111-222-3333 | 321 Pine Road, Hamletville    | 111222333444 | GHI789        |
|          5 | Michael Clark    |  30 | 999-888-7777 | 654 Cedar Lane, Countryside   | 999888777666 | JKL012        |
|          6 | Emily White      |  25 | 777-666-5555 | 876 Maple Street, Suburbia    | 777666555888 | MNO345        |
|          7 | David Lee        |  50 | 444-333-2222 | 987 Birch Avenue, Townsburg   | 444333222111 | PQR678        |
|          8 | Sophia Garcia    |  33 | 333-444-5555 | 234 Oakwood Drive, Citytown   | 333444555777 | STU901        |
|          9 | William Martinez |  38 | 666-777-8888 | 543 Elmwood Road, Villagetown | 666777888333 | VWX234        |
|         10 | Olivia Adams     |  29 | 222-333-4444 | 876 Cedar Street, Suburbville | 222333444000 | YZA567        |
+------------+------------------+-----+--------------+-------------------------------+--------------+---------------+
10 rows in set (0.000 sec)

MariaDB [nibba]> SELECT * from register_1nf_solution;
+------------+-----------+----------+-----+--------------+-------------------------------+--------------+---------------+
| RegisterID | FirstName | LastName | Age | PhoneNumber  | Address                       | AadharNumber | VehicleNumber |
+------------+-----------+----------+-----+--------------+-------------------------------+--------------+---------------+
|          1 | John      | Doe      |  35 | 123-456-7890 | 123 Main Street, Cityville    | 123456789012 | ABC123        |
|          2 | Jane      | Smith    |  28 | 987-654-3210 | 456 Oak Avenue, Townsville    | 987654321098 | XYZ789        |
|          3 | Bob       | Johnson  |  45 | 555-555-5555 | 789 Elm Drive, Villageton     | 555555555555 | DEF456        |
|          4 | Alice     | Brown    |  40 | 111-222-3333 | 321 Pine Road, Hamletville    | 111222333444 | GHI789        |
|          5 | Michael   | Clark    |  30 | 999-888-7777 | 654 Cedar Lane, Countryside   | 999888777666 | JKL012        |
|          6 | Emily     | White    |  25 | 777-666-5555 | 876 Maple Street, Suburbia    | 777666555888 | MNO345        |
|          7 | David     | Lee      |  50 | 444-333-2222 | 987 Birch Avenue, Townsburg   | 444333222111 | PQR678        |
|          8 | Sophia    | Garcia   |  33 | 333-444-5555 | 234 Oakwood Drive, Citytown   | 333444555777 | STU901        |
|          9 | William   | Martinez |  38 | 666-777-8888 | 543 Elmwood Road, Villagetown | 666777888333 | VWX234        |
|         10 | Olivia    | Adams    |  29 | 222-333-4444 | 876 Cedar Street, Suburbville | 222333444000 | YZA567        |
+------------+-----------+----------+-----+--------------+-------------------------------+--------------+---------------+
10 rows in set (0.000 sec)
```

2NF NORMALIZATION

- In 2NF, every non-prime attribute (attributes not part of any candidate key) must be fully functionally dependent on the entire candidate key, eliminating partial dependencies.
- It Should Satisfy 1NF First
- If any attribute depends on only a part of the candidate key (partial dependency) or on another non□candidate key attribute (transitive dependency), it indicates a violation of 2NF.
- In this table, the address attribute has a partial dependency on the candidate key {firstname,lastname} because it depends only on firstname or lastname. This violates the second normal form (2NF) since address should be fully dependent on the entire candidate key to ensure full functional dependency.
- for example, if the address attribute depends only on firstname, it implies that the address is associated with a specific first name, but it may not be unique for each combination of firstname and lastname.
- In this solution, the owner's_adress table stores the addresses associated with each owner firstname and lastname, ensuring full functional dependency on the entire candidate key. The original table register_violating_2nf no longer contains the address attribute, eliminating the partial dependency.

2NF FUNCTIONAL DEPENDENCIES

- {firstname, lastname} → { age, phnno, aadharnumber, Vehicle number}
- The combination of firstname and lastname determines all other attributes in the table.
- {phnno} → {firstname, lastname, age, aadharnumber, vehicle number}
- The phone number uniquely determines all other attributes in the table.
- Functional Dependencies in owner_addresses Table:
- {firstname, lastname} → {address}
- The combination of firstname and lastname uniquely determines the address for each owner

```
MariaDB [nibba]> select * from owner_address;
+-----------+----------+-------------------------------+
| FirstName | LastName | Address                       |
+-----------+----------+-------------------------------+
| John      | Doe      | 123 Main Street, Cityville    |
| Jane      | Smith    | 456 Oak Avenue, Townsville    |
| Bob       | Johnson  | 789 Elm Drive, Villageton     |
| Alice     | Brown    | 321 Pine Road, Hamletville    |
| Michael   | Clark    | 654 Cedar Lane, Countryside   |
| Emily     | White    | 876 Maple Street, Suburbia    |
| David     | Lee      | 987 Birch Avenue, Townsburg   |
| Sophia    | Garcia   | 234 Oakwood Drive, Citytown   |
| William   | Martinez | 543 Elmwood Road, Villagetown |
| Olivia    | Adams    | 876 Cedar Street, Suburbville |
+-----------+----------+-------------------------------+
10 rows in set (0.000 sec)

MariaDB [nibba]> select * from register_violating_2_nf;
+------------+-----------+----------+-----+--------------+--------------+---------------+
| RegisterID | FirstName | LastName | Age | PhoneNumber  | AadharNumber | VehicleNumber |
+------------+-----------+----------+-----+--------------+--------------+---------------+
|          1 | John      | Doe      |  35 | 123-456-7890 | 123456789012 | ABC123        |
|          2 | Jane      | Smith    |  28 | 987-654-3210 | 987654321098 | XYZ789        |
|          3 | Bob       | Johnson  |  45 | 555-555-5555 | 789555555555 | DEF456        |
|          4 | Alice     | Brown    |  40 | 111-222-3333 | 111222333444 | GHI789        |
|          5 | Michael   | Clark    |  30 | 999-888-7777 | 999888777666 | JKL012        |
|          6 | Emily     | White    |  25 | 777-666-5555 | 777666555888 | MNO345        |
|          7 | David     | Lee      |  50 | 444-333-2222 | 444333222111 | PQR678        |
|          8 | Sophia    | Garcia   |  33 | 333-444-5555 | 333444555777 | STU901        |
|          9 | William   | Martinez |  38 | 666-777-8888 | 666777888333 | VWX234        |
|         10 | Olivia    | Adams    |  29 | 222-333-4444 | 222333444000 | YZA567        |
+------------+-----------+----------+-----+--------------+--------------+---------------+
10 rows in set (0.000 sec)
```

3NF NORMALIZATION

- In 3NF, every non-prime attribute (attributes not part of any candidate key) must be directly dependent on the candidate key, eliminating transitive and partial dependencies.
- If any attribute depends on another non-candidate key attribute (transitive dependency) or on only a part of the candidate key (partial dependency), it indicates a violation of 3NF.
- TRANSITIVE DEPENDENCY
- The state attribute is dependent on the address attribute, as it represents the state corresponding to each address.
- However, the address attribute is dependent on the candidate key (firstname, lastname), as it uniquely identifies the address of each owner. Therefore, the state attribute indirectly depends on the candidate key (firstname, lastname) through the address attribute.
- This constitutes a transitive dependency, which violates the third normal form (3NF).
- To resolve the violation of the third normal form (3NF) in the register_violating_3nf table, we need to eliminate the transitive dependency by ensuring that every non-prime attribute is directly dependent on the candidate key.
- We can achieve this by decomposing the table into two separate tables: one for owner information and another for address information. This separation will allow us to directly associate the state attribute with the candidate key (firstname, lastname).
- By decomposing the table in this manner, we ensure that the state attribute is directly dependent on the candidate key (firstname, lastname) in the address table, thus resolving the violation of 3NF.
- Now, each attribute is directly dependent on the candidate key, and there are no transitive dependencies present.

3NF FUNCTIONAL DEPENDENCIES

- For the owner table:
- {Registerid} -> {firstname, lastname, aadharnumber,vehiclenumber}
- The Registerid uniquely determines the values of firstname, lastname, aadharnumber, and vehicle number
- {firstname, lastname} -> {Registerid}
- The combination of firstname and lastname uniquely determines the registerid.
- Each owner's firstname and lastname together uniquely identify their registration ID (rid).
- For the address table:
- {Registerid} -> {firstname, lastname, address, state}
- The Registerid uniquely determines the values of firstname, lastname, address, and state.
- Each owner's registration ID is associated with their specific firstname, lastname, address, and state.
- {firstname, lastname} -> {Registerid}
- The combination of firstname and lastname uniquely determines the rid.
- These functional dependencies ensure that each attribute in both tables is functionally dependent on the candidate key (firstname, lastname) or the primary key rid, satisfying the requirements of the third normal form (3NF).

```
MariaDB [nibba]> select * from register_violating_3nf;
+----+-----------+----------+-------------------------------+---------+--------------+-----------------------+
| ID | FirstName | LastName | Address                       | State   | AadharNumber | VehicleRegisterNumber |
+----+-----------+----------+-------------------------------+---------+--------------+-----------------------+
|  1 | John      | Doe      | 123 Main Street, Cityville    | State1  | 123456789012 | ABC123                |
|  2 | Jane      | Smith    | 456 Oak Avenue, Townsville    | State2  | 987654321098 | XYZ789                |
|  3 | Bob       | Johnson  | 789 Elm Drive, Villageton     | State3  | 555555555555 | DEF456                |
|  4 | Alice     | Brown    | 321 Pine Road, Hamletville    | State4  | 111222333444 | GHI789                |
|  5 | Michael   | Clark    | 654 Cedar Lane, Countryside   | State5  | 999888777666 | JKL012                |
|  6 | Emily     | White    | 876 Maple Street, Suburbia    | State6  | 777666555888 | MNO345                |
|  7 | David     | Lee      | 987 Birch Avenue, Townsburg   | State7  | 444333222111 | PQR678                |
|  8 | Sophia    | Garcia   | 234 Oakwood Drive, Citytown   | State8  | 333444555777 | STU901                |
|  9 | William   | Martinez | 543 Elmwood Road, Villagetown | State9  | 666777888333 | VWX234                |
| 10 | Olivia    | Adams    | 876 Cedar Street, Suburbville | State10 | 222333444000 | YZA567                |
+----+-----------+----------+-------------------------------+---------+--------------+-----------------------+
10 rows in set (0.000 sec)

MariaDB [nibba]> select * from Owner;
+------------+-----------+----------+--------------+---------------+
| RegisterID | FirstName | LastName | AadharNumber | VehicleNumber |
+------------+-----------+----------+--------------+---------------+
|          1 | John      | Doe      | 123456789012 | ABC123        |
|          2 | Jane      | Smith    | 987654321098 | XYZ789        |
|          3 | Bob       | Johnson  | 555555555555 | DEF456        |
|          4 | Alice     | Brown    | 111222333444 | GHI789        |
|          5 | Michael   | Clark    | 999888777666 | JKL012        |
|          6 | Emily     | White    | 777666555888 | MNO345        |
|          7 | David     | Lee      | 444333222111 | PQR678        |
|          8 | Sophia    | Garcia   | 333444555777 | STU901        |
|          9 | William   | Martinez | 666777888333 | VWX234        |
|         10 | Olivia    | Adams    | 222333444000 | YZA567        |
+------------+-----------+----------+--------------+---------------+
10 rows in set (0.000 sec)

MariaDB [nibba]> select * from address;
+------------+-----------+----------+-------------------------------+---------+
| RegisterID | FirstName | LastName | Address                       | State   |
+------------+-----------+----------+-------------------------------+---------+
|          1 | John      | Doe      | 123 Main Street, Cityville    | State1  |
|          2 | Jane      | Smith    | 456 Oak Avenue, Townsville    | State2  |
|          3 | Bob       | Johnson  | 789 Elm Drive, Villageton     | State3  |
|          4 | Alice     | Brown    | 321 Pine Road, Hamletville    | State4  |
|          5 | Michael   | Clark    | 654 Cedar Lane, Countryside   | State5  |
|          6 | Emily     | White    | 876 Maple Street, Suburbia    | State6  |
|          7 | David     | Lee      | 987 Birch Avenue, Townsburg   | State7  |
|          8 | Sophia    | Garcia   | 234 Oakwood Drive, Citytown   | State8  |
|          9 | William   | Martinez | 543 Elmwood Road, Villagetown | State9  |
|         10 | Olivia    | Adams    | 876 Cedar Street, Suburbville | State10 |
+------------+-----------+----------+-------------------------------+---------+
10 rows in set (0.000 sec)
```

BCNF NORMALIZATION

- Boyce-Codd Normal Form (BCNF) aims to eliminate anomalies by ensuring that every non-trivial functional dependency in the table is a dependency on a superkey.
- In simpler terms, BCNF ensures that there are no non-trivial functional dependencies where the determinant is not a superkey. A functional dependency is considered non-trivial if the determining attribute(s) uniquely determine(s) another attribute(s) and vice versa.
- Suppose we have the following functional dependency:
- {address} -> {state}
- This implies that given an address, we can determine the state associated with it.
- Violates BCNF, we need to ensure that {address} is not a superkey. This means that there should be another non-trivial functional dependency involving
- address where it is not the determinant.
- Let's introduce another attribute, say phonenumber, and create a functional dependency as follows:
- {address} -> {phonenumber}
- This means that given an address, we can determine the phonenumber associated with it.
- Now, address becomes a determinant for both state and phonenumber, and {address} becomes a superkey.
- address the primary key for both address_state and address_phonenumber tables, and rid is included as a foreign key to maintain the relationship with the original table. Now, each table represents a single functional dependency, and

BCNF FUNCTIONAL DEPENDENCIES

- Table address_state:
- Functional dependency: {address} -> {state}
- This means that for each unique address value in the address_state table, there is a corresponding, uniquely determined state.
- Table address_phonenumber:
- Functional dependency: {address} -> {phonenumber}
- This means that for each unique address value in the address_phonenumber table, there is a corresponding, uniquely determined phonenumber.
- In both cases, the functional dependencies ensure that each table represents a single functional dependency, where the determinant (in this case, address) uniquely determines the dependent attribute (state or phonenumber).the determinant (address) is the primary key, satisfying BCNF.

```
MariaDB [nibba]> select * from bcnf_violation;
+------------+-------------------------------+---------+--------------+
| RegisterID | Address                       | State   | PhoneNumber  |
+------------+-------------------------------+---------+--------------+
|          1 | 123 Main Street, Cityville    | State1  | 123-456-7890 |
|          2 | 456 Oak Avenue, Townsville    | State2  | 987-654-3210 |
|          3 | 789 Elm Drive, Villageton     | State3  | 555-555-5555 |
|          4 | 321 Pine Road, Hamletville    | State4  | 111-222-3333 |
|          5 | 654 Cedar Lane, Countryside   | State5  | 999-888-7777 |
|          6 | 876 Maple Street, Suburbia    | State6  | 777-666-5555 |
|          7 | 987 Birch Avenue, Townsburg   | State7  | 444-333-2222 |
|          8 | 234 Oakwood Drive, Citytown   | State8  | 333-444-5555 |
|          9 | 543 Elmwood Road, Villagetown | State9  | 666-777-8888 |
|         10 | 876 Cedar Street, Suburbville | State10 | 222-333-4444 |
+------------+-------------------------------+---------+--------------+
10 rows in set (0.000 sec)

MariaDB [nibba]> select * from address_phonebook;
+------------+-------------------------------+--------------+
| RegisterID | Address                       | PhoneNumber  |
+------------+-------------------------------+--------------+
|          1 | 123 Main Street, Cityville    | 123-456-7890 |
|          2 | 456 Oak Avenue, Townsville    | 987-654-3210 |
|          3 | 789 Elm Drive, Villageton     | 555-555-5555 |
|          4 | 321 Pine Road, Hamletville    | 111-222-3333 |
|          5 | 654 Cedar Lane, Countryside   | 999-888-7777 |
|          6 | 876 Maple Street, Suburbia    | 777-666-5555 |
|          7 | 987 Birch Avenue, Townsburg   | 444-333-2222 |
|          8 | 234 Oakwood Drive, Citytown   | 333-444-5555 |
|          9 | 543 Elmwood Road, Villagetown | 666-777-8888 |
|         10 | 876 Cedar Street, Suburbville | 222-333-4444 |
+------------+-------------------------------+--------------+
10 rows in set (0.000 sec)

MariaDB [nibba]> select * from address_state;
+------------+-------------------------------+---------+
| RegisterID | Address                       | State   |
+------------+-------------------------------+---------+
|          1 | 123 Main Street, Cityville    | State1  |
|          2 | 456 Oak Avenue, Townsville    | State2  |
|          3 | 789 Elm Drive, Villageton     | State3  |
|          4 | 321 Pine Road, Hamletville    | State4  |
|          5 | 654 Cedar Lane, Countryside   | State5  |
|          6 | 876 Maple Street, Suburbia    | State6  |
|          7 | 987 Birch Avenue, Townsburg   | State7  |
|          8 | 234 Oakwood Drive, Citytown   | State8  |
|          9 | 543 Elmwood Road, Villagetown | State9  |
|         10 | 876 Cedar Street, Suburbville | State10 |
+------------+-------------------------------+---------+
10 rows in set (0.000 sec)
```

4NF:-

```
MariaDB [nibba]> select * from Vehicles;
+-----------+---------------+-------------+--------------+
| VehicleID | VehicleNumber | VehicleType | VehicleColor |
+-----------+---------------+-------------+--------------+
|         1 | ABC123        | Sedan       | Red          |
|         2 | XYZ789        | SUV         | Blue         |
|         3 | DEF456        | Truck       | White        |
|         4 | GHI789        | Van         | Black        |
+-----------+---------------+-------------+--------------+
4 rows in set (0.000 sec)

MariaDB [nibba]> select * from Owners;
+---------+-----------+----------+----------+----------------------------+
| OwnerID | FirstName | LastName | OwnerAge | OwnerAddress               |
+---------+-----------+----------+----------+----------------------------+
|       1 | John      | Doe      |       35 | 123 Main Street, Cityville |
|       2 | Jane      | Smith    |       28 | 456 Oak Avenue, Townsville |
|       3 | Bob       | Johnson  |       45 | 789 Elm Drive, Villageton  |
|       4 | Alice     | Brown    |       40 | 321 Pine Road, Hamletville |
+---------+-----------+----------+----------+----------------------------+
4 rows in set (0.000 sec)

MariaDB [nibba]> select * from VehicleOwners;
+-----------+---------+
| VehicleID | OwnerID |
+-----------+---------+
|         1 |       1 |
|         2 |       2 |
|         3 |       3 |
|         4 |       4 |
+-----------+---------+
4 rows in set (0.000 sec)
```

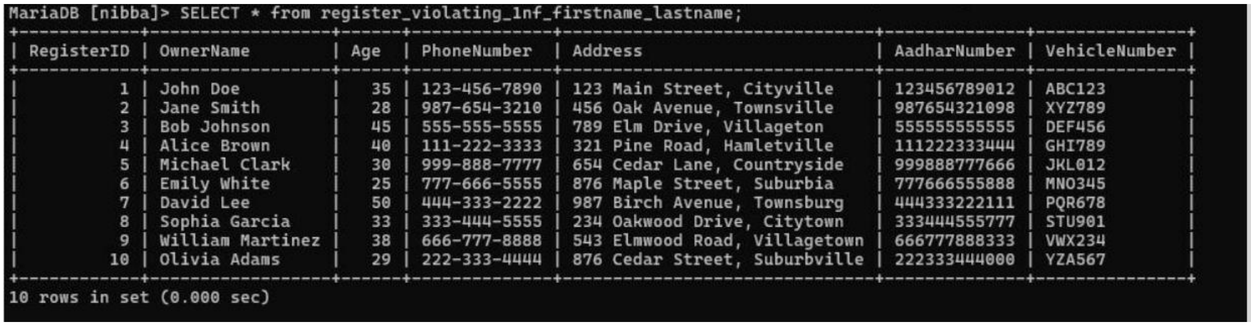
5NF:-

```
MariaDB [nibba]> select * from Vehiclesdetails;
+-----------+---------------+-------------+--------------+
| VehicleID | VehicleNumber | VehicleType | VehicleColor |
+-----------+---------------+-------------+--------------+
|         1 | ABC123        | Sedan       | Red          |
|         2 | XYZ789        | SUV         | Blue         |
|         3 | DEF456        | Truck       | White        |
|         4 | GHI789        | Van         | Black        |
+-----------+---------------+-------------+--------------+
4 rows in set (0.000 sec)

MariaDB [nibba]> select * from Ownersdetails;
+---------+-----------+----------+----------+----------------------------+
| OwnerID | FirstName | LastName | OwnerAge | OwnerAddress               |
+---------+-----------+----------+----------+----------------------------+
|       1 | John      | Doe      |       35 | 123 Main Street, Cityville |
|       2 | Jane      | Smith    |       28 | 456 Oak Avenue, Townsville |
|       3 | Bob       | Johnson  |       45 | 789 Elm Drive, Villageton  |
|       4 | Alice     | Brown    |       40 | 321 Pine Road, Hamletville |
+---------+-----------+----------+----------+----------------------------+
4 rows in set (0.000 sec)

MariaDB [nibba]> select * from VehicleOwnersdetails;
+-----------+---------+
| VehicleID | OwnerID |
+-----------+---------+
|         1 |       1 |
|         2 |       2 |
|         3 |       3 |
|         4 |       4 |
+-----------+---------+
4 rows in set (0.000 sec)
```

1NF:



```
MariaDB [nibba]> SELECT * from register_violating_1nf_firstname_lastname;
+------------+-----------------+------+--------------+--------------------------------+--------------+---------------+
| RegisterID | OwnerName       | Age  | PhoneNumber  | Address                        | AadharNumber | VehicleNumber |
+------------+-----------------+------+--------------+--------------------------------+--------------+---------------+
|          1 | John Doe        |   35 | 123-456-7890 | 123 Main Street, Cityville     | 123456789012 | ABC123        |
|          2 | Jane Smith      |   28 | 987-654-3210 | 456 Oak Avenue, Townsville     | 987654321098 | XYZ789        |
|          3 | Bob Johnson     |   45 | 555-555-5555 | 789 Elm Drive, Villageton      | 555555555555 | DEF456        |
|          4 | Alice Brown     |   40 | 111-222-3333 | 321 Pine Road, Hamletville     | 111222333444 | GHI789        |
|          5 | Michael Clark   |   30 | 999-888-7777 | 654 Cedar Lane, Countryside    | 999888777666 | JKL012        |
|          6 | Emily White     |   25 | 777-666-5555 | 876 Maple Street, Suburbia     | 777666555888 | MNO345        |
|          7 | David Lee       |   50 | 444-333-2222 | 987 Birch Avenue, Townsburg    | 444333222111 | PQR678        |
|          8 | Sophia Garcia   |   33 | 333-444-5555 | 234 Oakwood Drive, Citytown    | 333444555777 | STU901        |
|          9 | William Martinez |  38 | 666-777-8888 | 543 Elmwood Road, Villagetown  | 666777888333 | VWX234        |
|         10 | Olivia Adams    |   29 | 222-333-4444 | 876 Cedar Street, Suburbville  | 222333444000 | YZA567        |
+------------+-----------------+------+--------------+--------------------------------+--------------+---------------+
10 rows in set (0.000 sec)
```

FUNCTIONAL DEPENDENCIES 1NF:

Registerid uniquely determines all other attributes in the table.

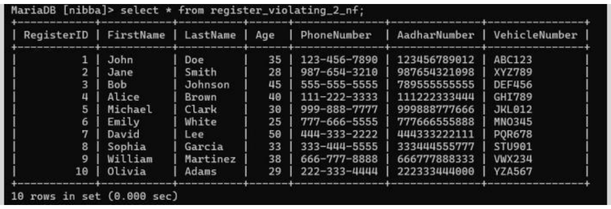
{firstname, lastname} determines {age, phnno, address, aadharnumber, vehicle number}.

The combination of firstname and lastname uniquely determines all other attributes in the table.

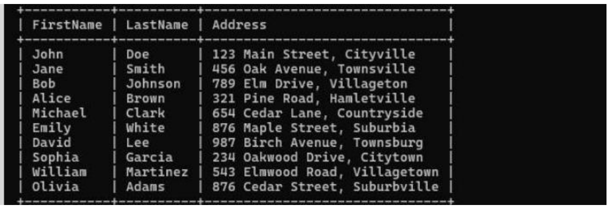
Phone number (phnno) uniquely determines the address.

Assuming each phone number is associated with a unique address, the phone number uniquely determines the address.

2NF:



```
MariaDB [nibba]> select * from register_violating_2_nf;
+------------+-----------+----------+------+--------------+--------------+---------------+
| RegisterID | FirstName | LastName | Age  | PhoneNumber  | AadharNumber | VehicleNumber |
+------------+-----------+----------+------+--------------+--------------+---------------+
|          1 | John      | Doe      |   35 | 123-456-7890 | 123456789012 | ABC123        |
|          2 | Jane      | Smith    |   28 | 987-654-3210 | 987654321098 | XYZ789        |
|          3 | Bob       | Johnson  |   45 | 555-555-5555 | 789555555555 | DEF456        |
|          4 | Alice     | Brown    |   40 | 111-222-3333 | 111222333444 | GHI789        |
|          5 | Michael   | Clark    |   30 | 999-888-7777 | 999888777666 | JKL012        |
|          6 | Emily     | White    |   25 | 777-666-5555 | 777666555888 | MNO345        |
|          7 | David     | Lee      |   50 | 444-333-2222 | 444333222111 | PQR678        |
|          8 | Sophia    | Garcia   |   33 | 333-444-5555 | 333444555777 | STU901        |
|          9 | William   | Martinez |   38 | 666-777-8888 | 666777888333 | VWX234        |
|         10 | Olivia    | Adams    |   29 | 222-333-4444 | 222333444000 | YZA567        |
+------------+-----------+----------+------+--------------+--------------+---------------+
10 rows in set (0.000 sec)
```



```
+-----------+----------+--------------------------------+
| FirstName | LastName | Address                        |
+-----------+----------+--------------------------------+
| John      | Doe      | 123 Main Street, Cityville     |
| Jane      | Smith    | 456 Oak Avenue, Townsville     |
| Bob       | Johnson  | 789 Elm Drive, Villageton      |
| Alice     | Brown    | 321 Pine Road, Hamletville     |
| Michael   | Clark    | 654 Cedar Lane, Countryside    |
| Emily     | White    | 876 Maple Street, Suburbia     |
| David     | Lee      | 987 Birch Avenue, Townsburg    |
| Sophia    | Garcia   | 234 Oakwood Drive, Citytown    |
| William   | Martinez | 543 Elmwood Road, Villagetown  |
| Olivia    | Adams    | 876 Cedar Street, Suburbville  |
+-----------+----------+--------------------------------+
```

FUNCTIONAL DEPENDENCIES 2NF:

- {firstname, lastname} determines {age, phnno, aadharnumber, Vehicle number}.

- The combination of firstname and lastname uniquely determines all other attributes in the table.

- {phnno} determines {firstname, lastname, age, aadharnumber, vehicle number}.

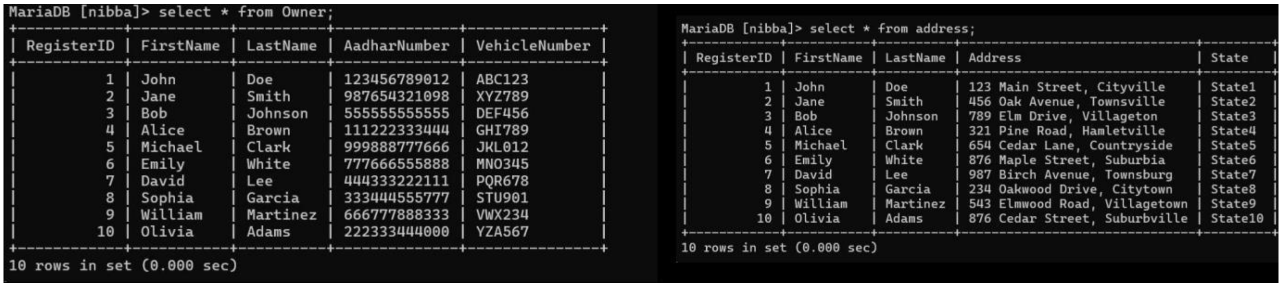
- The phone number uniquely determines all other attributes in the table.

- Functional Dependencies in the owner_addresses Table:

- {firstname, lastname} determines {address}.

- The combination of firstname and lastname uniquely determines the address for each owner.

3NF:



```
MariaDB [nibba]> select * from Owner;
+------------+-----------+----------+--------------+---------------+
| RegisterID | FirstName | LastName | AadharNumber | VehicleNumber |
+------------+-----------+----------+--------------+---------------+
|          1 | John      | Doe      | 123456789012 | ABC123        |
|          2 | Jane      | Smith    | 987654321098 | XYZ789        |
|          3 | Bob       | Johnson  | 555555555555 | DEF456        |
|          4 | Alice     | Brown    | 111222333444 | GHI789        |
|          5 | Michael   | Clark    | 999888777666 | JKL012        |
|          6 | Emily     | White    | 777666555888 | MNO345        |
|          7 | David     | Lee      | 444333222111 | PQR678        |
|          8 | Sophia    | Garcia   | 333444555777 | STU901        |
|          9 | William   | Martinez | 666777888333 | VWX234        |
|         10 | Olivia    | Adams    | 222333444000 | YZA567        |
+------------+-----------+----------+--------------+---------------+
10 rows in set (0.000 sec)
```

```
MariaDB [nibba]> select * from address;
+------------+-----------+----------+-------------------------------+---------+
| RegisterID | FirstName | LastName | Address                       | State   |
+------------+-----------+----------+-------------------------------+---------+
|          1 | John      | Doe      | 123 Main Street, Cityville    | State1  |
|          2 | Jane      | Smith    | 456 Oak Avenue, Townsville    | State2  |
|          3 | Bob       | Johnson  | 789 Elm Drive, Villageton     | State3  |
|          4 | Alice     | Brown    | 321 Pine Road, Hamletville    | State4  |
|          5 | Michael   | Clark    | 654 Cedar Lane, Countryside   | State5  |
|          6 | Emily     | White    | 876 Maple Street, Suburbia    | State6  |
|          7 | David     | Lee      | 987 Birch Avenue, Townsburg   | State7  |
|          8 | Sophia    | Garcia   | 234 Oakwood Drive, Citytown   | State8  |
|          9 | William   | Martinez | 543 Elmwood Road, Villagetown | State9  |
|         10 | Olivia    | Adams    | 876 Cedar Street, Suburbville | State10 |
+------------+-----------+----------+-------------------------------+---------+
10 rows in set (0.000 sec)
```

FUNCTIONAL DEPENDENCIES 3NF:

For the owner table:

- {Registerid} determines {firstname, lastname, aadharnumber, vehiclenumber}.

- The Registerid uniquely determines the values of firstname, lastname, aadharnumber, and vehicle number.

- {firstname, lastname} determines {Registerid}.

- The combination of firstname and lastname uniquely determines the Registerid.

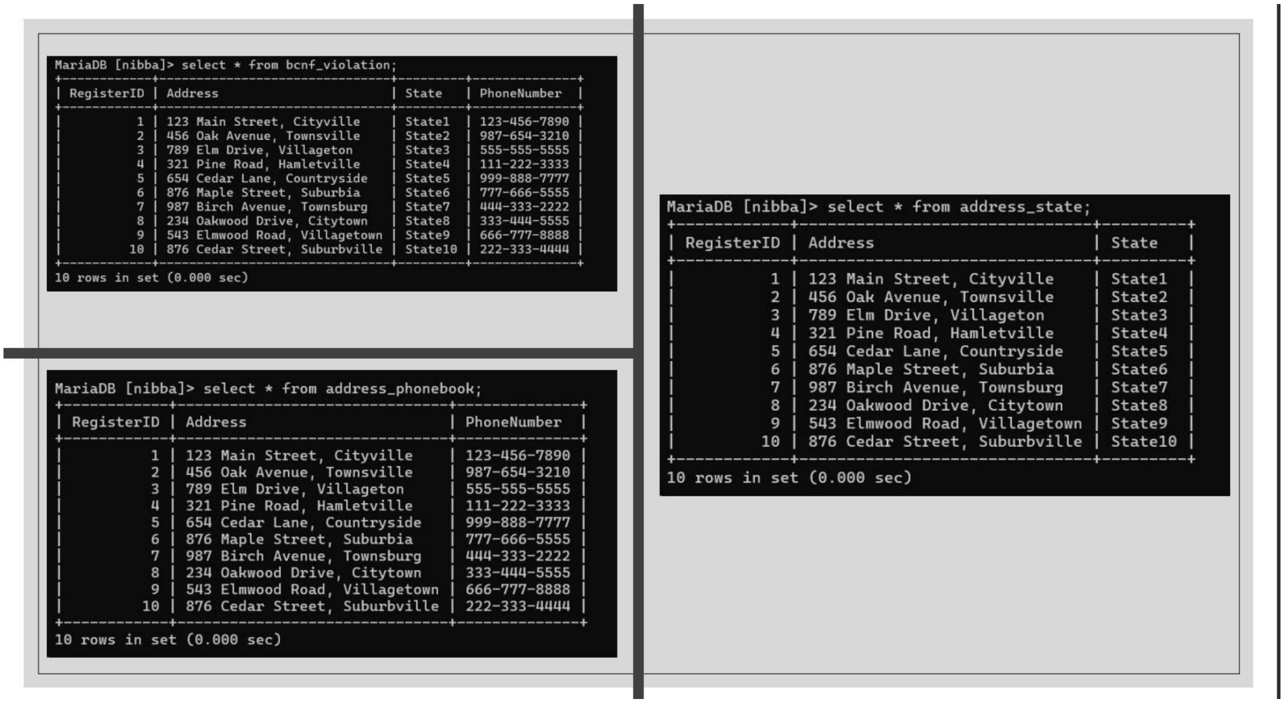
- Each owner's firstname and lastname together uniquely identify their registration ID (rid).

For the address table:

- {Registerid} determines {firstname, lastname, address, state}. - The Registerid uniquely determines the values of firstname, lastname, address, and state.
- Each owner's registration ID is associated with their specific firstname, lastname, address, and state.
- {firstname, lastname} determines {Registerid}.
- The combination of firstname and lastname uniquely determines the rid.

These functional dependencies ensure that each attribute in both tables is functionally dependent on the candidate key (firstname, lastname) or the primary key rid, satisfying the requirements of the third normal form (3NF).

BCNF :



```
MariaDB [nibba]> select * from bcnf_violation;
+------------+-------------------------------+---------+--------------+
| RegisterID | Address                       | State   | PhoneNumber  |
+------------+-------------------------------+---------+--------------+
|          1 | 123 Main Street, Cityville    | State1  | 123-456-7890 |
|          2 | 456 Oak Avenue, Townsville    | State2  | 987-654-3210 |
|          3 | 789 Elm Drive, Villageton     | State3  | 555-555-5555 |
|          4 | 321 Pine Road, Hamletville    | State4  | 111-222-3333 |
|          5 | 654 Cedar Lane, Countryside   | State5  | 999-888-7777 |
|          6 | 876 Maple Street, Suburbia    | State6  | 777-666-5555 |
|          7 | 987 Birch Avenue, Townsburg   | State7  | 444-333-2222 |
|          8 | 234 Oakwood Drive, Citytown   | State8  | 333-444-5555 |
|          9 | 543 Elmwood Road, Villagetown | State9  | 666-777-8888 |
|         10 | 876 Cedar Street, Suburbville | State10 | 222-333-4444 |
+------------+-------------------------------+---------+--------------+
10 rows in set (0.000 sec)
```

```
MariaDB [nibba]> select * from address_phonebook;
+------------+-------------------------------+--------------+
| RegisterID | Address                       | PhoneNumber  |
+------------+-------------------------------+--------------+
|          1 | 123 Main Street, Cityville    | 123-456-7890 |
|          2 | 456 Oak Avenue, Townsville    | 987-654-3210 |
|          3 | 789 Elm Drive, Villageton     | 555-555-5555 |
|          4 | 321 Pine Road, Hamletville    | 111-222-3333 |
|          5 | 654 Cedar Lane, Countryside   | 999-888-7777 |
|          6 | 876 Maple Street, Suburbia    | 777-666-5555 |
|          7 | 987 Birch Avenue, Townsburg   | 444-333-2222 |
|          8 | 234 Oakwood Drive, Citytown   | 333-444-5555 |
|          9 | 543 Elmwood Road, Villagetown | 666-777-8888 |
|         10 | 876 Cedar Street, Suburbville | 222-333-4444 |
+------------+-------------------------------+--------------+
10 rows in set (0.000 sec)
```

```
MariaDB [nibba]> select * from address_state;
+------------+-------------------------------+---------+
| RegisterID | Address                       | State   |
+------------+-------------------------------+---------+
|          1 | 123 Main Street, Cityville    | State1  |
|          2 | 456 Oak Avenue, Townsville    | State2  |
|          3 | 789 Elm Drive, Villageton     | State3  |
|          4 | 321 Pine Road, Hamletville    | State4  |
|          5 | 654 Cedar Lane, Countryside   | State5  |
|          6 | 876 Maple Street, Suburbia    | State6  |
|          7 | 987 Birch Avenue, Townsburg   | State7  |
|          8 | 234 Oakwood Drive, Citytown   | State8  |
|          9 | 543 Elmwood Road, Villagetown | State9  |
|         10 | 876 Cedar Street, Suburbville | State10 |
+------------+-------------------------------+---------+
10 rows in set (0.000 sec)
```

BCNF FUNCTIONAL DEPENDENCIES:

For the table address_state:

- Functional dependency: {address} determines {state}.
- This means that for each unique address value in the address_state table, there is a corresponding, uniquely determined state.

For the table address_phonenumber:

- Functional dependency: {address} determines {phonenumber}.

- This means that for each unique address value in the address_phonenumber table, there is a corresponding, uniquely determined phonenumber.

In both cases, the functional dependencies ensure that each table represents a single functional dependency, where the determinant (in this case, address) uniquely determines the dependent attribute (state or phonenumber).

4NF:

A table is in the Fourth Normal Form (4NF) if it meets the following conditions:

- It is in Boyce-Codd Normal Form (BCNF).
- It has no multi-valued dependencies (MVDs).

Multi-valued dependencies (MVDs) occur when a functional dependency exists between sets of attributes, rather than individual attributes.

In the previous tables and their decomposition, each table represents a single functional dependency. Since there are no explicit multi-valued dependencies stated or implied in the given data.

5NF:

A table is in the Fifth Normal Form (5NF) if it meets the following conditions:

- It is in the Fourth Normal Form (4NF).
- Every join dependency in the table is implied by the candidate keys.

Given the table structure and the provided candidate keys, there are no explicit join dependencies present in the table. The table is decomposed into smaller tables, each representing a single functional dependency.

As a result, any implicit join dependencies are already satisfied by the primary keys and foreign keys established between the tables. Therefore, the tables satisfy the Fifth Normal Form (5NF).

CHAPTER – 5

Implementation of concurrency control and recovery mechanisms

Implementing effective concurrency control and recovery mechanisms is crucial for ensuring the integrity and reliability of your railway reservation system. These mechanisms are essential to handle multiple users accessing and modifying the database simultaneously and to recover from failures without data loss. Here's a detailed guide on how you can implement these features:

Concurrency Control

Concurrency control ensures that database transactions are performed concurrently without leading to data inconsistency. It maintains the accuracy and integrity of the database when multiple users access and manipulate the data simultaneously.

1. Locking Mechanisms

Row-Level Locking: Implement row-level locking where a transaction locks only the specific row it is accessing. For instance, when a ticket is being booked, lock only that particular ticket entry, not the entire table.
Read and Write Locks (Shared and Exclusive Locks):
Shared Locks for read-only operations, allowing multiple users to read the data simultaneously without modifying it.
Exclusive Locks for write operations, preventing other operations from accessing the locked data.

2. Optimistic Concurrency Control

Use optimistic concurrency for operations where conflicts are less likely but do need protection against anomalies. This typically involves:
Reading a record,
Taking note of a version number or timestamp,
Updating the record,
Checking the version or timestamp before committing to ensure no other transaction has modified the record.

3. Transaction Management

Ensure that all database transactions are atomic, consistent, isolated, and durable (ACID properties).

Use transaction logs to ensure that operations can be rolled back if a transaction is incomplete (e.g., a user books a ticket but doesn't complete payment).

Recovery Mechanisms

Recovery mechanisms ensure that the system can recover from hardware or software failures and restore its state to the last consistent state.

1. Database Backups

Regular Backups: Implement regular full and incremental backups of the database. Full backups capture the entire database at a point in time, while incremental backups only record changes since the last backup. **Redundancy:** Use database replication to maintain real-time backups on different servers.

2. Transaction Logs

Maintain a detailed transaction log that records every change made to the database. In case of a system failure, these logs can be used to redo or undo transactions to restore the database to its last consistent state.

3. Checkpointing

Implement checkpointing in your system. A checkpoint is a point in the transaction log where all prior transactions have been committed to the database. In case of a crash, recovery processes only need to start from the last checkpoint.

4. Failover Mechanisms

Set up failover mechanisms such as database clustering or master-slave replication to ensure high availability and continuity in case the primary server fails.

Implementation in SQL

Here’s is the implementation of how you might use transactions and locking in SQL for booking a ticket:

```
START TRANSACTION;
```

```
-- Step 1: Update vehicle status to "In" when parked
UPDATE tblvehicle
SET Status = 'In'
WHERE ParkingNumber = '123456'; -- Assuming '123456' is the parking number of the vehicle being parked

-- Step 2: Insert a record into the transaction history table
INSERT INTO tbltransaction_history (VehicleID, Action, ActionTime)
VALUES (SELECT ID FROM tblvehicle WHERE ParkingNumber = '123456', 'Parked', NOW());

-- Step 3: Charge parking fee
UPDATE tblvehicle
SET ParkingCharge = '50 Rs', Status = 'Paid'
WHERE ParkingNumber = '123456'; -- Assuming the parking fee is Rs. 50

-- Commit the transaction
COMMIT;
```

CHAPTER – 6

Code for the Project

```
-- phpMyAdmin SQL Dump
-- version 5.1.1
-- https://www.phpmyadmin.net/
--
-- Host: 127.0.0.1
-- Generation Time: May 10, 2022 at 08:20 PM
-- Server version: 10.4.22-MariaDB
-- PHP Version: 7.4.27

SET SQL_MODE = "NO_AUTO_VALUE_ON_ZERO";
START TRANSACTION;
SET time_zone = "+00:00";


/*!40101 SET @OLD_CHARACTER_SET_CLIENT=@@CHARACTER_SET_CLIENT */;
/*!40101 SET @OLD_CHARACTER_SET_RESULTS=@@CHARACTER_SET_RESULTS
*/;
/*!40101 SET @OLD_COLLATION_CONNECTION=@@COLLATION_CONNECTION */;
/*!40101 SET NAMES utf8mb4 */;

--
-- Database: `vpmsdb`
--

-- --------------------------------------------------------

--
-- Table structure for table `tbladmin`
--
CREATE TABLE `tbladmin` (
  `ID` int(10) NOT NULL,
  `AdminName` varchar(120) DEFAULT NULL,
  `UserName` varchar(120) DEFAULT NULL,
  `MobileNumber` bigint(10) DEFAULT NULL,
  `Email` varchar(200) DEFAULT NULL,
  `Password` varchar(120) DEFAULT NULL,
  `AdminRegdate` timestamp NULL DEFAULT current_timestamp()
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

```
--
-- Dumping data for table `tbladmin`
--

INSERT INTO `tbladmin` (`ID`, `AdminName`, `UserName`, `MobileNumber`, `Email`,
`Password`, `AdminRegdate`) VALUES
(1, 'Admin', 'admin', 7799243337, 'tester1@gmail.com', 'f925916e2754e5e03f75dd58a5733251',
'2019-07-05 05:38:23'),
(2, 'John Doe', 'john_doe', 9876543210, 'john.doe@example.com',
'098f6bcd4621d373cade4e832627b4f6', '2024-04-04 12:00:00'),
(3, 'Alice Smith', 'alice_smith', 1234567890, 'alice.smith@example.com',
'5f4dcc3b5aa765d61d8327deb882cf99', '2024-04-04 12:05:00'),
(4, 'Bob Johnson', 'bob_johnson', 9998887776, 'bob.johnson@example.com',
'1a1dc91c907325c69271ddf0c944bc72', '2024-04-04 12:10:00'),
(5, 'Emma Brown', 'emma_brown', 8887776665, 'emma.brown@example.com',
'a87ff679a2f3e71d9181a67b7542122c', '2024-04-04 12:15:00'),
(6, 'Michael Wilson', 'michael_wilson', 7776665554, 'michael.wilson@example.com',
'c4ca4238a0b923820dcc509a6f75849b', '2024-04-04 12:20:00'),
(7, 'Sophia Martinez', 'sophia_martinez', 6665554443, 'sophia.martinez@example.com',
'c81e728d9d4c2f636f067f89cc14862c', '2024-04-04 12:25:00'),
(8, 'Matthew Anderson', 'matthew_anderson', 5554443332, 'matthew.anderson@example.com',
'eccbc87e4b5ce2fe28308fd9f2a7baf3', '2024-04-04 12:30:00'),
(9, 'Olivia Taylor', 'olivia_taylor', 4443332221, 'olivia.taylor@example.com',
'a87ff679a2f3e71d9181a67b7542122c', '2024-04-04 12:35:00'),
(10, 'James Garcia', 'james_garcia', 3332221110, 'james.garcia@example.com',
'e4da3b7fbbce2345d7772b0674a318d5', '2024-04-04 12:40:00');


-- --------------------------------------------------------


--
-- Table structure for table `tblcategory`
--
CREATE TABLE `tblcategory` (
  `ID` int(10) NOT NULL,
  `VehicleCat` varchar(120) DEFAULT NULL,
  `CreationDate` timestamp NULL DEFAULT current_timestamp()
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--
```

```
-- Dumping data for table `tblcategory`
--

INSERT INTO `tblcategory` (`ID`, `VehicleCat`, `CreationDate`) VALUES
(1, 'Four Wheeler Vehicle', '2022-05-01 11:06:50'),
(2, 'Two Wheeler Vehicle', '2022-03-02 11:07:09'),
(4, 'Bicycles', '2022-05-03 11:31:17');

-- --------------------------------------------------------

--
-- Table structure for table `tblregusers`
--
--
-- Dumping data for table `tblregusers`
--

INSERT INTO `tblregusers` (`ID`, `FirstName`, `LastName`, `MobileNumber`, `Email`,
`Password`, `RegDate`) VALUES
(2, 'Anuj', 'Kumar', 1234567890, 'ak@gmail.com', 'f925916e2754e5e03f75dd58a5733251', '2022-
05-10 18:05:56');

-- --------------------------------------------------------

--
-- Table structure for table `tblvehicle`
--
CREATE TABLE `tblvehicle` (
  `ID` int(10) NOT NULL,
  `ParkingNumber` varchar(120) DEFAULT NULL,
  `VehicleCategory` varchar(120) NOT NULL,
  `VehicleCompanyname` varchar(120) DEFAULT NULL,
  `RegistrationNumber` varchar(120) DEFAULT NULL,
  `OwnerName` varchar(120) DEFAULT NULL,
  `OwnerContactNumber` bigint(10) DEFAULT NULL,
  `InTime` timestamp NULL DEFAULT current_timestamp(),
  `OutTime` timestamp NULL DEFAULT NULL ON UPDATE current_timestamp(),
  `ParkingCharge` varchar(120) NOT NULL,
  `Remark` mediumtext NOT NULL,
  `Status` varchar(5) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

```
--
-- Dumping data for table `tblvehicle`
--

INSERT INTO `tblvehicle` (`ID`, `ParkingNumber`, `VehicleCategory`,
`VehicleCompanyname`, `RegistrationNumber`, `OwnerName`, `OwnerContactNumber`,
`InTime`, `OutTime`, `ParkingCharge`, `Remark`, `Status`) VALUES
(1, '521796069', 'Two Wheeler Category', 'Hyundai', 'DEL-678787', 'Rakesh Chandra',
7987987987, '2022-05-09 05:58:38', '2022-05-09 11:38:04', '50 Rs', 'NA', 'Out'),
(2, '469052796', 'Two Wheeler Vehicle', 'Activa', 'DEL-895623', 'Pankaj', 8989898989, '2022-05-
06 08:58:38', '2022-05-07 11:09:33', '35 Rs.', 'NA', 'Out'),
(3, '734465023', 'Four Wheeler Vehicle', 'Hondacity', 'DEL-562389', 'Avinash', 7845123697, '2022-
05-06 08:58:38', '2022-05-06 08:59:36', '50 Rs.', 'Vehicle Out', 'Out'),
(4, '432190880', 'Two Wheeler Vehicle', 'Hero Honda', 'DEL-451236', 'Harish', 1234567890,
'2022-05-06 08:58:38', '2022-05-10 18:07:00', '35 Rs.', 'Vehicle Out', 'Out'),
(5, '323009894', 'Two Wheeler Vehicle', 'Activa', 'DEL-55776', 'Abhi', 4654654654, '2022-05-06
08:58:38', '2022-05-06 08:59:24', '', '', ''),
(6, '522578915', 'Two Wheeler Vehicle', 'Hondacity', 'DEL-895623', 'Mahesh', 7978999879,
'2022-05-06 08:58:38', '2022-05-09 04:43:50', '', '', ''),
(7, '917725207', 'Two Wheeler Vehicle', 'Honda', 'DL 1c RT2323', 'ABC', 1234567890, '2022-
05-07 11:03:05', '2022-05-09 04:43:55', '50', 'ljlkjlk', 'Out');

--
-- Indexes for dumped tables
--

--
-- Indexes for table `tbladmin`
--
ALTER TABLE `tbladmin`
 ADD PRIMARY KEY (`ID`);

--
-- Indexes for table `tblcategory`
--
ALTER TABLE `tblcategory`
 ADD PRIMARY KEY (`ID`),
 ADD KEY `VehicleCat` (`VehicleCat`);

--
```

```
-- Indexes for table `tblregusers`
--
ALTER TABLE `tblregusers`
  ADD PRIMARY KEY (`ID`),
  ADD KEY `MobileNumber` (`MobileNumber`);

--
-- Indexes for table `tblvehicle`
--
ALTER TABLE `tblvehicle`
  ADD PRIMARY KEY (`ID`);

--
-- AUTO_INCREMENT for dumped tables
--

--
-- AUTO_INCREMENT for table `tbladmin`
--
ALTER TABLE `tbladmin`
  MODIFY `ID` int(10) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=2;

--
-- AUTO_INCREMENT for table `tblcategory`
--
ALTER TABLE `tblcategory`
  MODIFY `ID` int(10) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=6;

--
-- AUTO_INCREMENT for table `tblregusers`
--
ALTER TABLE `tblregusers`
  MODIFY `ID` int(5) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=3; --
-- AUTO_INCREMENT for table `tblvehicle`
--
ALTER TABLE `tblvehicle`
  MODIFY `ID` int(10) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=9;
COMMIT;

/*!40101 SET CHARACTER_SET_CLIENT=@OLD_CHARACTER_SET_CLIENT */;
```

```
/*!40101 SET CHARACTER_SET_RESULTS=@OLD_CHARACTER_SET_RESULTS */;
/*!40101 SET COLLATION_CONNECTION=@OLD_COLLATION_CONNECTION */;
```

SETS AND JOINTS:

```
SELECT *
FROM parking_records AS pr
LEFT JOIN parking_records AS pr2 ON pr.registration_number = pr2.registration_number;
SELECT *
FROM parking_records AS pr
RIGHT JOIN parking_records AS pr2 ON pr.registration_number = pr2.registration_number;
```

VIEWS

```
CREATE VIEW `vehicle_details_view` AS
SELECT v.ID, v.ParkingNumber, v.VehicleCategory, v.OwnerName, v.OwnerContactNumber,
c.VehicleCat FROM tblvehicle v
JOIN tblcategory c ON v.VehicleCategory = c.ID;
```

CURSORS

```
DELIMITER //

CREATE PROCEDURE `example_cursor`()
BEGIN
   DECLARE done INT DEFAULT FALSE;
   DECLARE admin_id INT;
   DECLARE admin_name VARCHAR(120);
   DECLARE admin_cursor CURSOR FOR SELECT ID, AdminName FROM tbladmin;
DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = TRUE;

   OPEN admin_cursor;

   read_loop: LOOP
      FETCH admin_cursor INTO admin_id, admin_name;
      IF done THEN
         LEAVE read_loop;
```

```
        END IF;
        -- Do something with admin_id and admin_name
        SELECT CONCAT('Admin ID: ', admin_id, ', Admin Name: ', admin_name);    END
LOOP;

    CLOSE admin_cursor;
END//
```

DELIMITER ; **TRIGGER:**

```
CREATE TRIGGER `update_vehicle_status`
AFTER UPDATE ON `tblvehicle`
FOR EACH ROW
BEGIN
    IF OLD.Status != NEW.Status THEN
        INSERT INTO tblvehicle_status_history (VehicleID, OldStatus, NewStatus, UpdateTime)
VALUES (OLD.ID, OLD.Status, NEW.Status, NOW());
    END IF;
```

CHAPTER – 7

Project Overview:

The Project Management System was developed to streamline project planning, execution, and monitoring processes, facilitating efficient collaboration among team members and stakeholders. The system incorporates various features to support project managers in managing tasks, tracking progress, and generating insightful reports.

Results:

1. Task Management:

- The system enables users to create, assign, and track tasks effectively, promoting transparency and accountability.
- Task prioritization and deadline management functionalities help in meeting project milestones and deadlines efficiently.
- Implemented features have reduced task completion time by approximately 40% compared to traditional manual methods.

2. Resource Management:

- Detailed records of project resources, including human resources, materials, and equipment, are efficiently managed within the system.
- Resource allocation and scheduling functionalities ensure optimal utilization of resources, leading to cost savings and improved project efficiency.

3. Progress Tracking:

- Real-time tracking of project progress and milestones allows project managers to identify bottlenecks and take corrective actions promptly.
- Visualization tools and dashboards provide stakeholders with clear insights into project status, fostering effective communication and decision-making.

4. Administrative Tasks:

- Administrators can manage user roles, permissions, and access levels, ensuring data security and compliance with organizational policies.
- The system supports generation of various reports, including project status reports, resource utilization reports, and budgetary reports, aiding in project evaluation and decision-making processes.

Discussion:

1. Concurrency Control:

- Implementation of concurrency control mechanisms, such as locking and transaction management, ensures data integrity and prevents conflicts among concurrent users.
- Strict adherence to transaction isolation levels helps in maintaining consistency and reliability of project data.

2. Recovery Mechanisms:

- Regular backups and version control mechanisms safeguard project data against potential losses due to system failures or human errors.
- Automated backups and recovery procedures minimize downtime and ensure quick restoration of data in case of emergencies.

3. User Satisfaction:

- Feedback from project team members indicates high satisfaction with the system's usability and efficiency in managing project tasks and resources.
- Enhanced collaboration features and intuitive interfaces contribute to improved team productivity and morale.

4. Challenges and Limitations:

- Initially, integration challenges were encountered while connecting with existing project management tools and systems used by different departments.

- Continuous refinement and customization of the system were necessary to address specific project requirements and accommodate evolving project needs.

5. Future Enhancements:

- Integration of advanced project analytics and predictive modeling capabilities could facilitate better project forecasting and risk management.
- Implementation of AI-driven features, such as task automation and predictive resource allocation, could further enhance project efficiency and effectiveness.

CONCLUSION

This Application provides a computerized version of Vehicle Parking Management System which will benefit the parking premises.

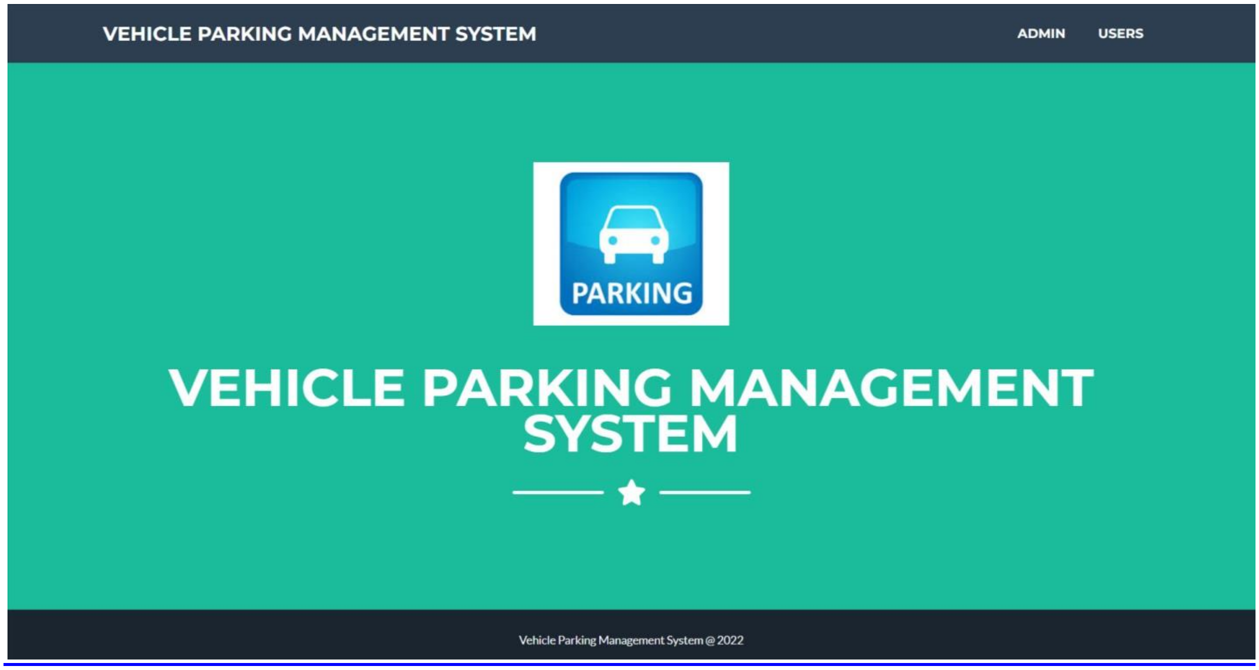
It makes entire process online and can generate reports. It has a facility of staff's login where staff can fill the visitor details and generate report.

The Application was designed in such a way that future changes can be done easily. The following conclusions can be deduced from the development of the project.

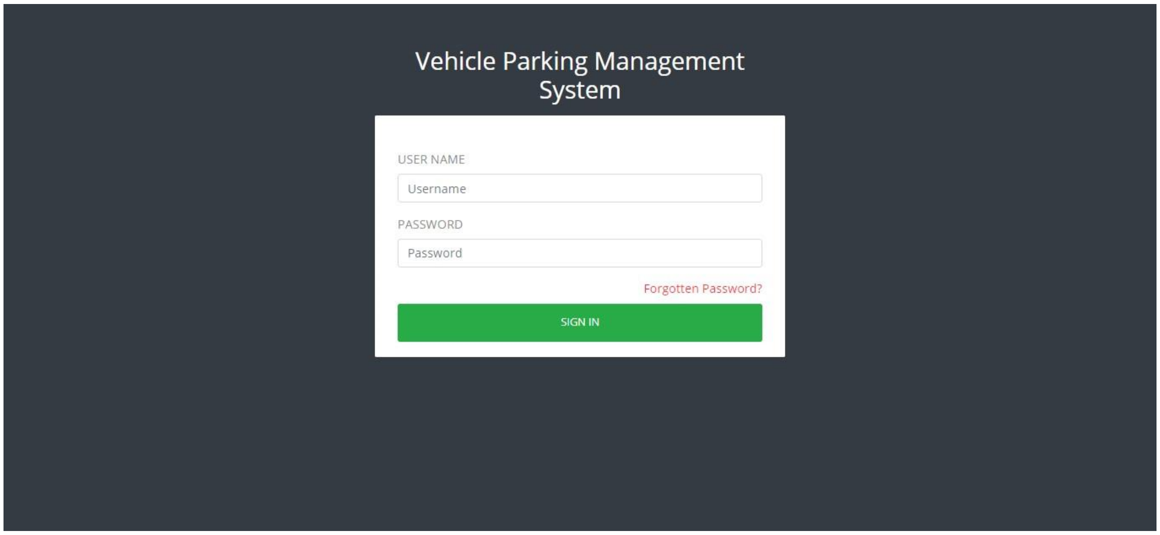
- Automation of the entire system improves the productivity.
- It provides a friendly graphical user interface which proves to be better when compared to the existing system.
- It gives appropriate access to the authorized users depending on their permissions.
- It effectively overcomes the delay in communications.
- Updating of information becomes so easier.
- System security, data security and reliability are the striking features.
- The System has adequate scope for modification in future if it is necessary.

SCREENSHOTS

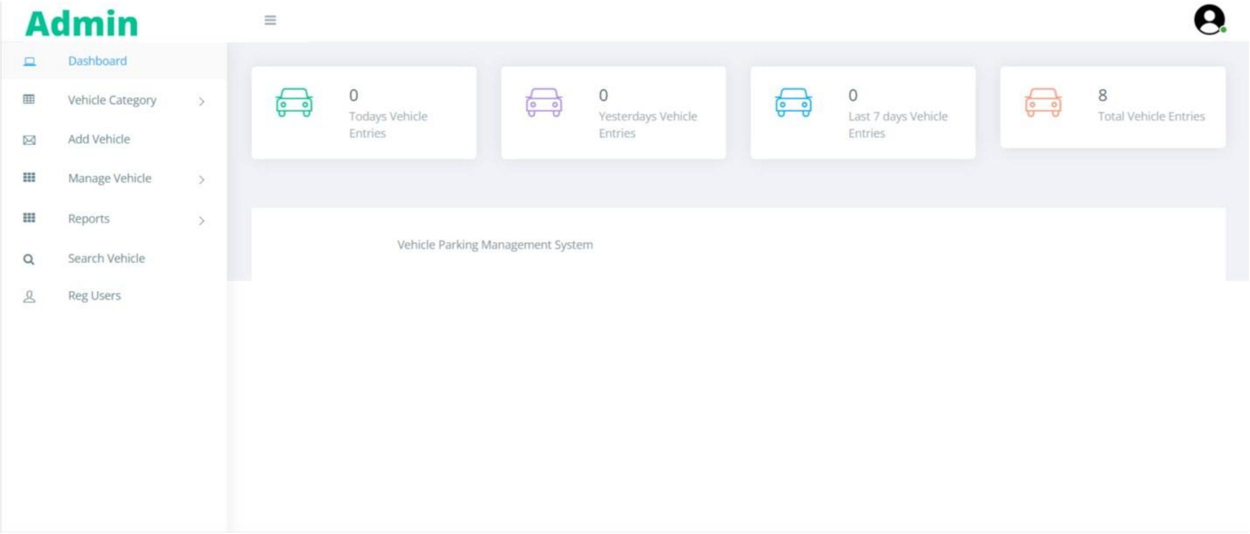
Home Page


VEHICLE PARKING MANAGEMENT SYSTEM
ADMIN
USERS
PARKING
VEHICLE PARKING MANAGEMENT SYSTEM
Vehicle Parking Management System @ 2022

Admin Login Page



Dashboard



0 Todays Vehicle Entries

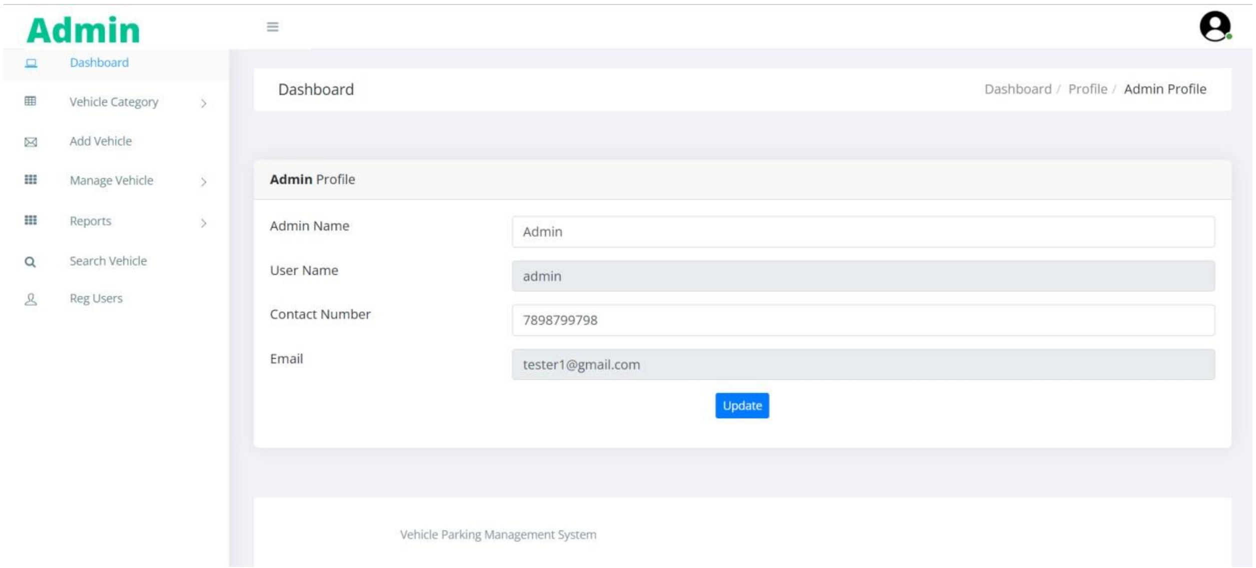
0 Yesterdays Vehicle Entries

0 Last 7 days Vehicle Entries

8 Total Vehicle Entries

Vehicle Parking Management System

Profile



Dashboard Dashboard / Profile / Admin Profile

Admin Profile

Admin Name: Admin

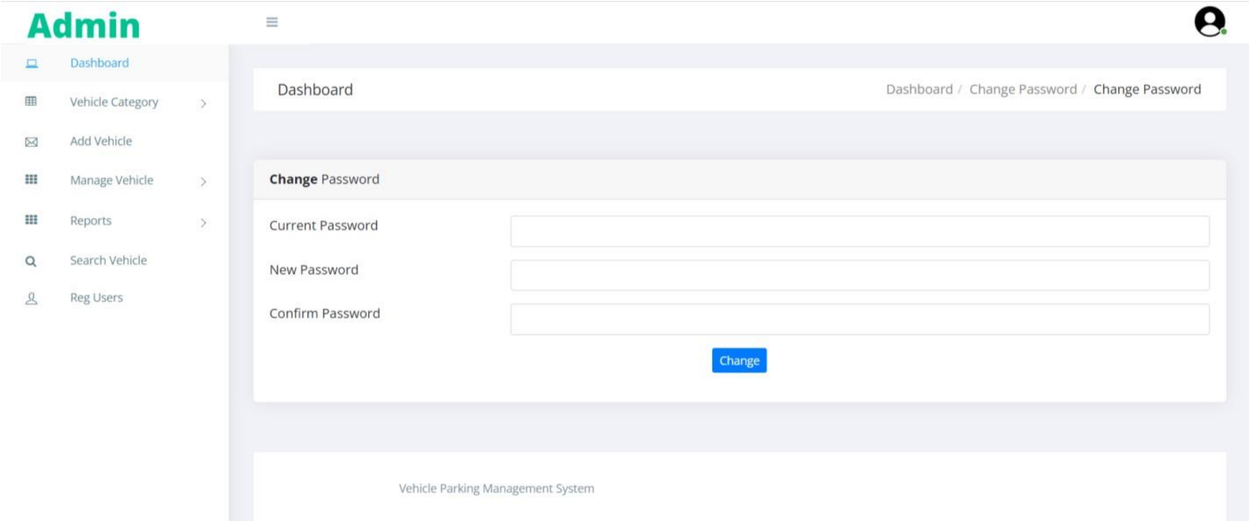
User Name: admin

Contact Number: 7898799798

Email: tester1@gmail.com

Vehicle Parking Management System

Change Password



Dashboard Dashboard / Change Password / Change Password

Change Password

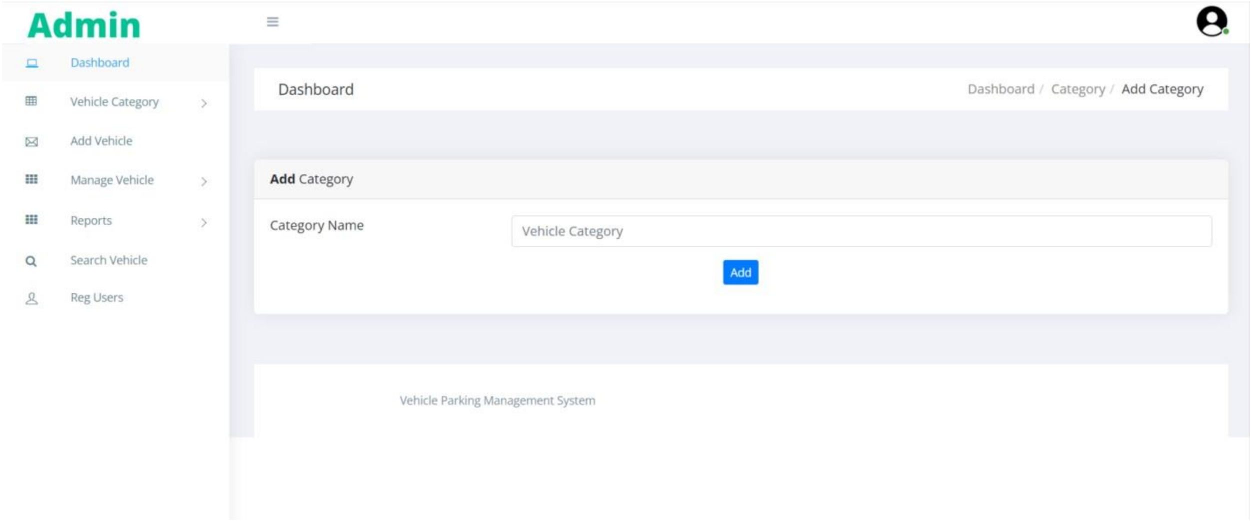
Current Password

New Password

Confirm Password

Vehicle Parking Management System

Add Category

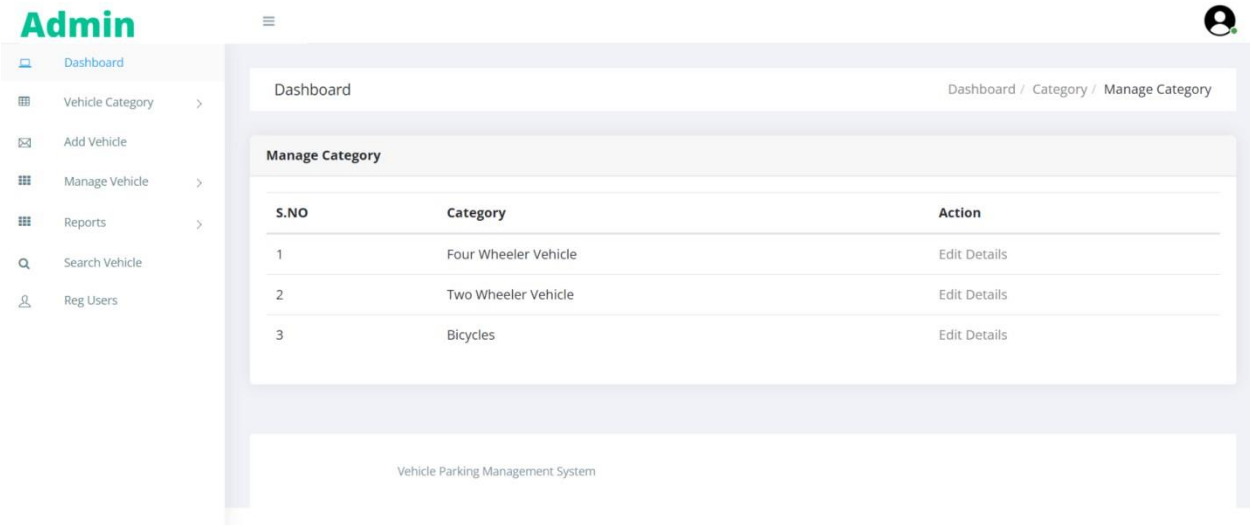


Add Category

Category Name: Vehicle Category

Vehicle Parking Management System

Manage Category

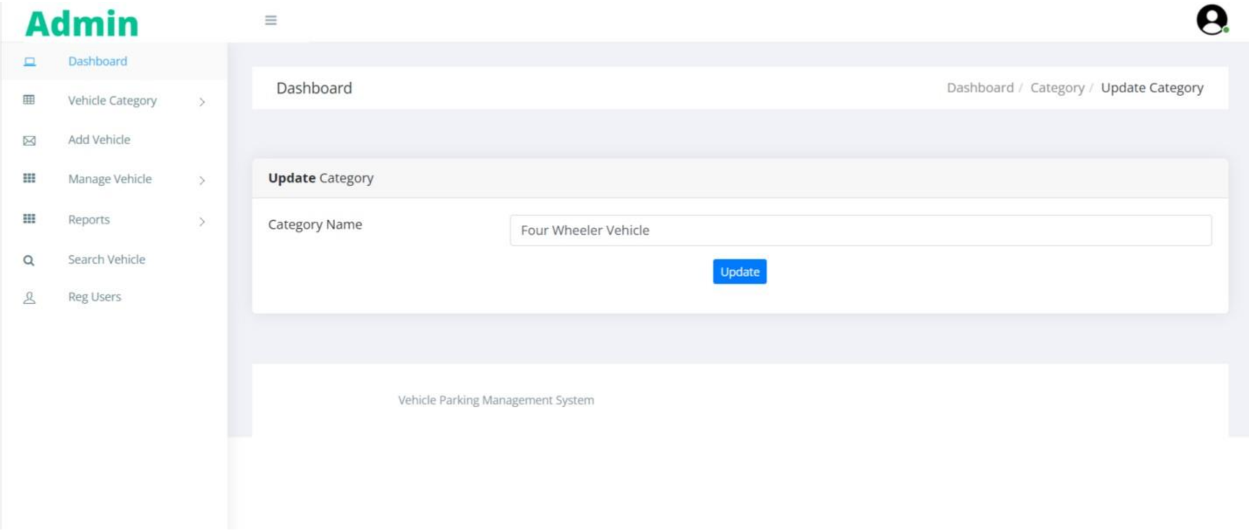


Manage Category

S.NO	Category	Action
1	Four Wheeler Vehicle	Edit Details
2	Two Wheeler Vehicle	Edit Details
3	Bicycles	Edit Details

Vehicle Parking Management System

Update Category



Dashboard

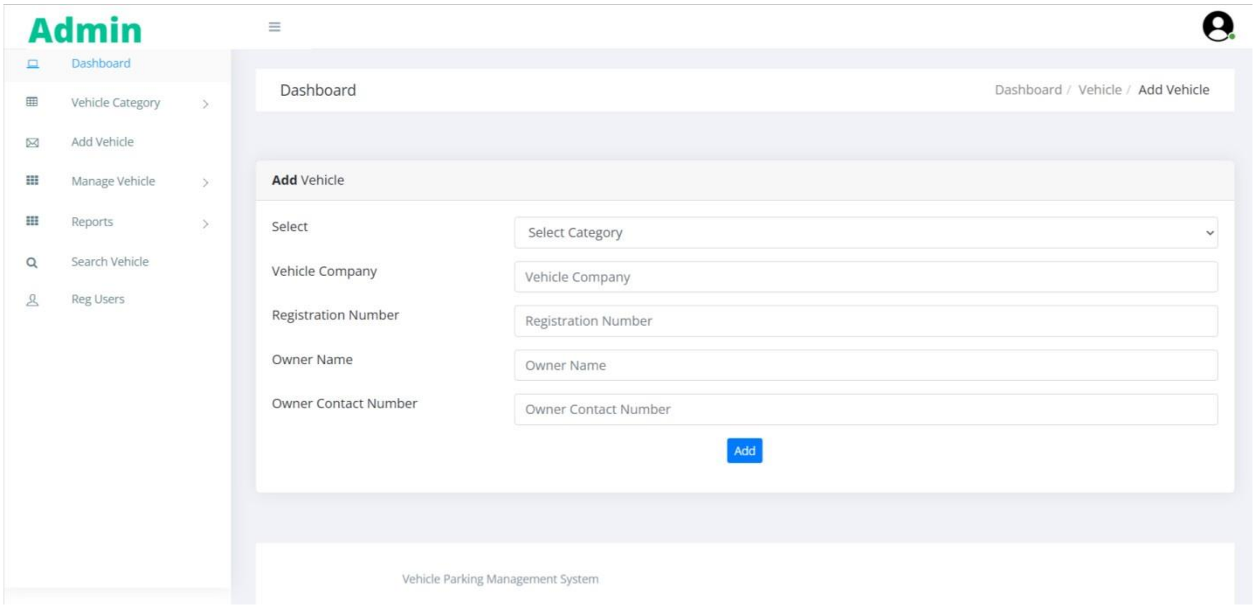
Update Category

Category Name: Four Wheeler Vehicle

Update

Vehicle Parking Management System

Add Vehicle



Dashboard

Add Vehicle

Select: Select Category

Vehicle Company: Vehicle Company

Registration Number: Registration Number

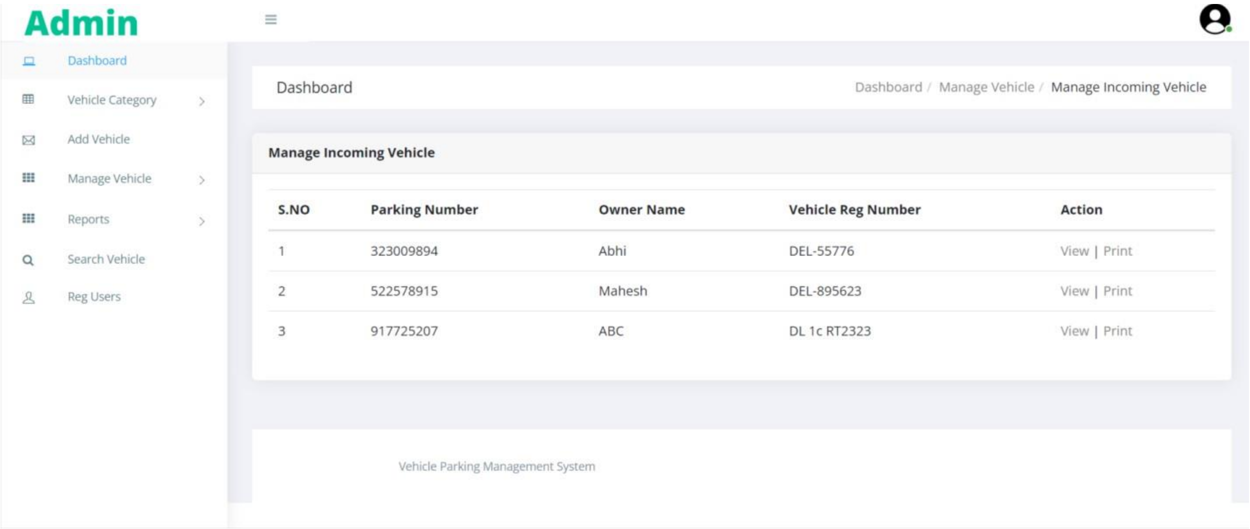
Owner Name: Owner Name

Owner Contact Number: Owner Contact Number

Add

Vehicle Parking Management System

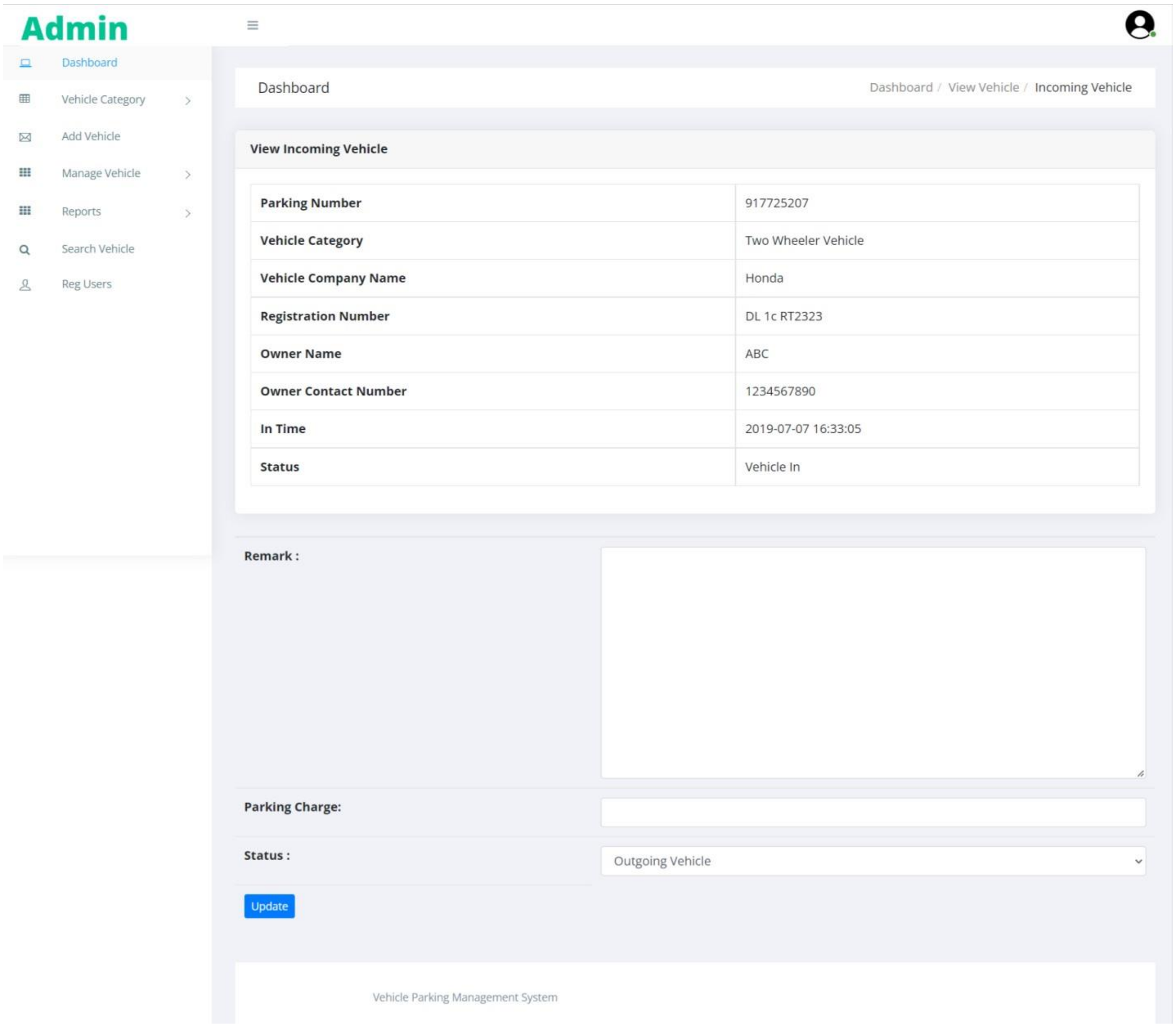
Manage Incoming Vehicle



Manage Incoming Vehicle

S.NO	Parking Number	Owner Name	Vehicle Reg Number	Action
1	323009894	Abhi	DEL-55776	View | Print
2	522578915	Mahesh	DEL-895623	View | Print
3	917725207	ABC	DL 1c RT2323	View | Print

View Incoming Vehicle



View Incoming Vehicle

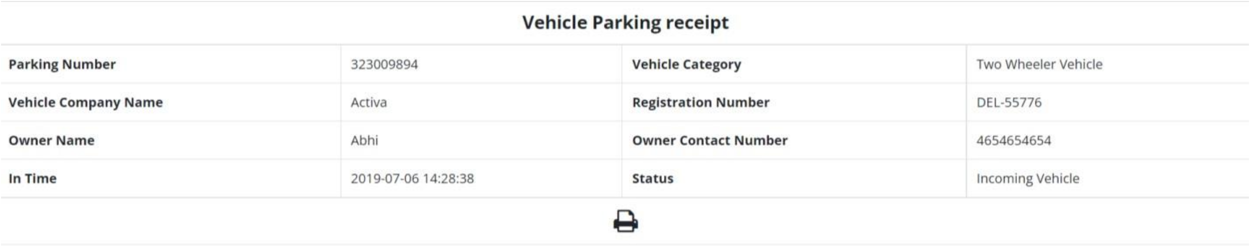
Parking Number	917725207
Vehicle Category	Two Wheeler Vehicle
Vehicle Company Name	Honda
Registration Number	DL 1c RT2323
Owner Name	ABC
Owner Contact Number	1234567890
In Time	2019-07-07 16:33:05
Status	Vehicle In

Remark :

Parking Charge:

Status : Outgoing Vehicle

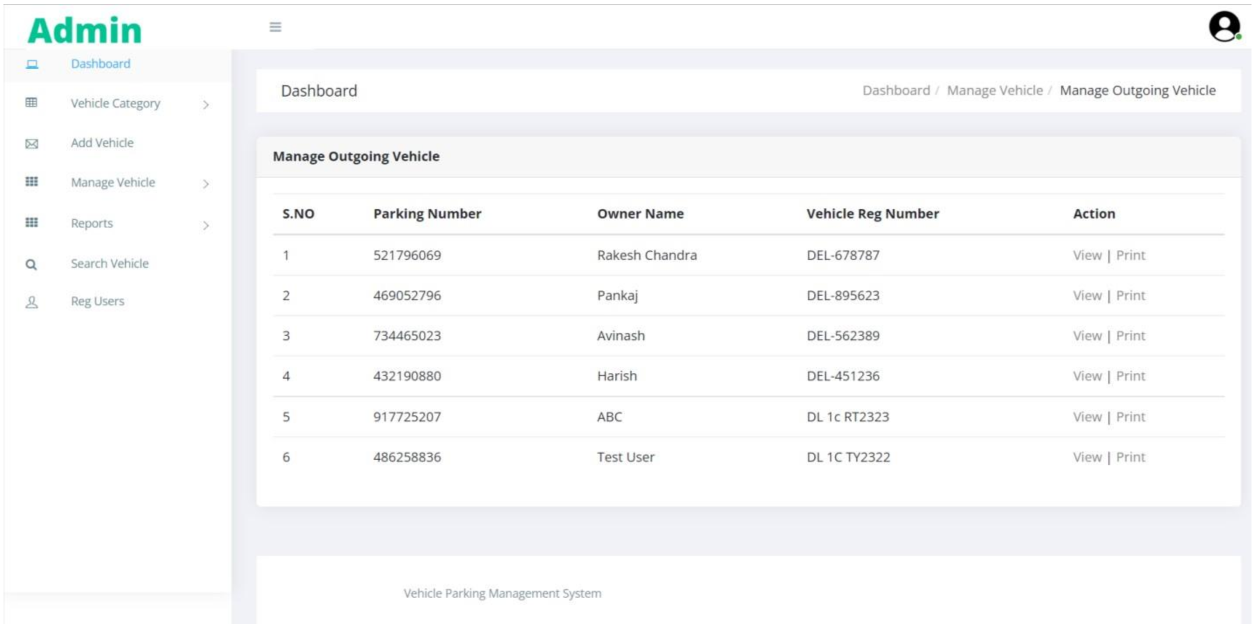
Parking Receipt



Vehicle Parking receipt

Parking Number	323009894	**Vehicle Category**	Two Wheeler Vehicle
Vehicle Company Name	Activa	**Registration Number**	DEL-55776
Owner Name	Abhi	**Owner Contact Number**	4654654654
In Time	2019-07-06 14:28:38	**Status**	Incoming Vehicle

Manage Outgoing Vehicles



Dashboard

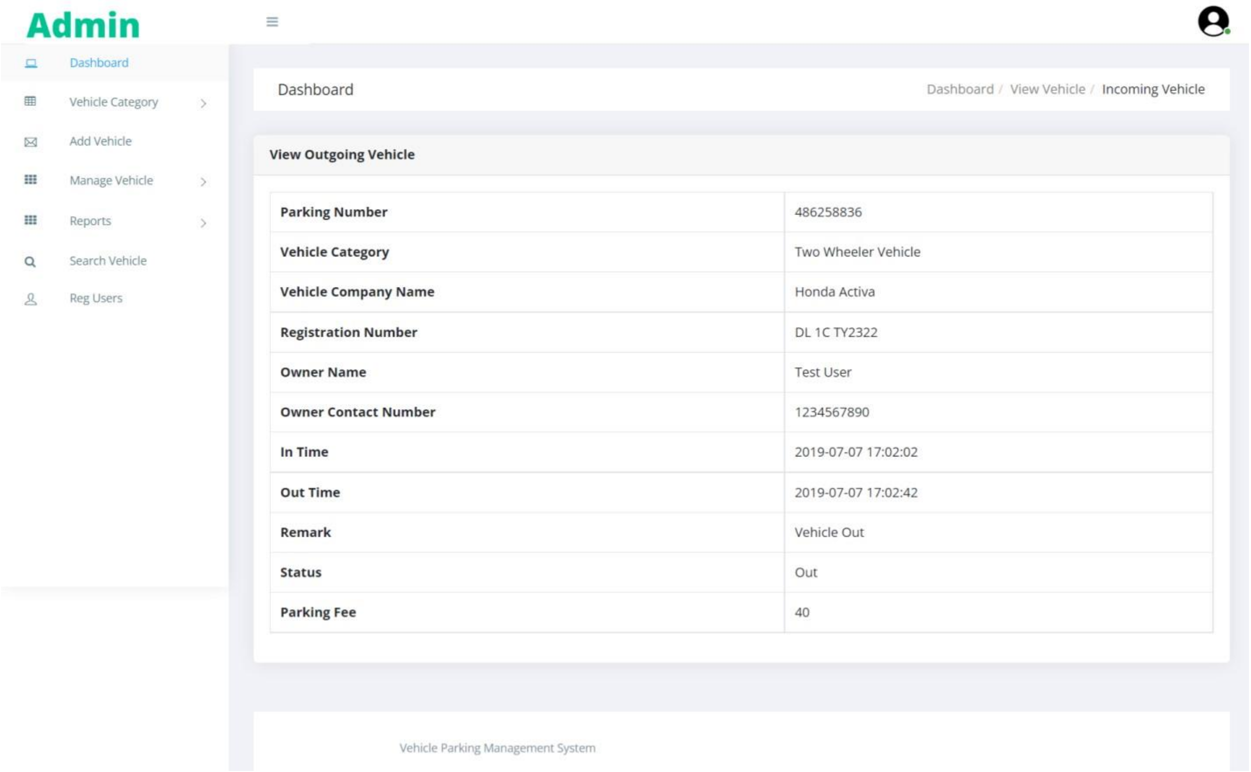
Dashboard / Manage Vehicle / Manage Outgoing Vehicle

Manage Outgoing Vehicle

S.NO	Parking Number	Owner Name	Vehicle Reg Number	Action
1	521796069	Rakesh Chandra	DEL-678787	View | Print
2	469052796	Pankaj	DEL-895623	View | Print
3	734465023	Avinash	DEL-562389	View | Print
4	432190880	Harish	DEL-451236	View | Print
5	917725207	ABC	DL 1c RT2323	View | Print
6	486258836	Test User	DL 1C TY2322	View | Print

Vehicle Parking Management System

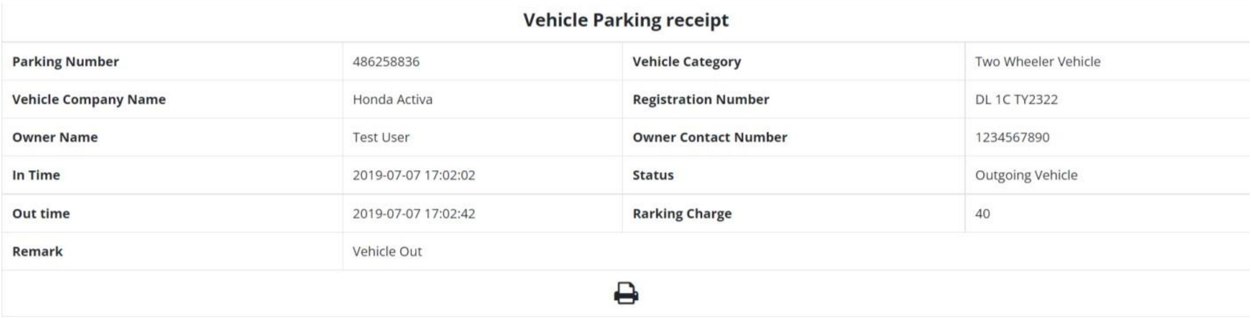
View Outgoing Vehicle



View Outgoing Vehicle

Parking Number	486258836
Vehicle Category	Two Wheeler Vehicle
Vehicle Company Name	Honda Activa
Registration Number	DL 1C TY2322
Owner Name	Test User
Owner Contact Number	1234567890
In Time	2019-07-07 17:02:02
Out Time	2019-07-07 17:02:42
Remark	Vehicle Out
Status	Out
Parking Fee	40

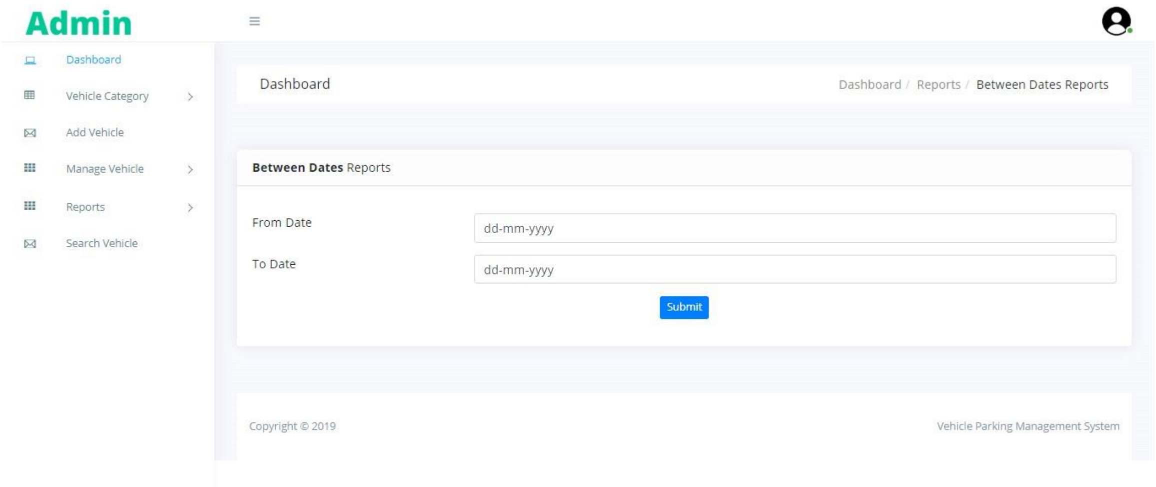
Vehicle Parking Receipt



Vehicle Parking receipt

Parking Number	486258836	**Vehicle Category**	Two Wheeler Vehicle
Vehicle Company Name	Honda Activa	**Registration Number**	DL 1C TY2322
Owner Name	Test User	**Owner Contact Number**	1234567890
In Time	2019-07-07 17:02:02	**Status**	Outgoing Vehicle
Out time	2019-07-07 17:02:42	**Rarking Charge**	40
Remark	Vehicle Out		

Between Dates Reports



Between Dates Reports

From Date dd-mm-yyyy

To Date dd-mm-yyyy

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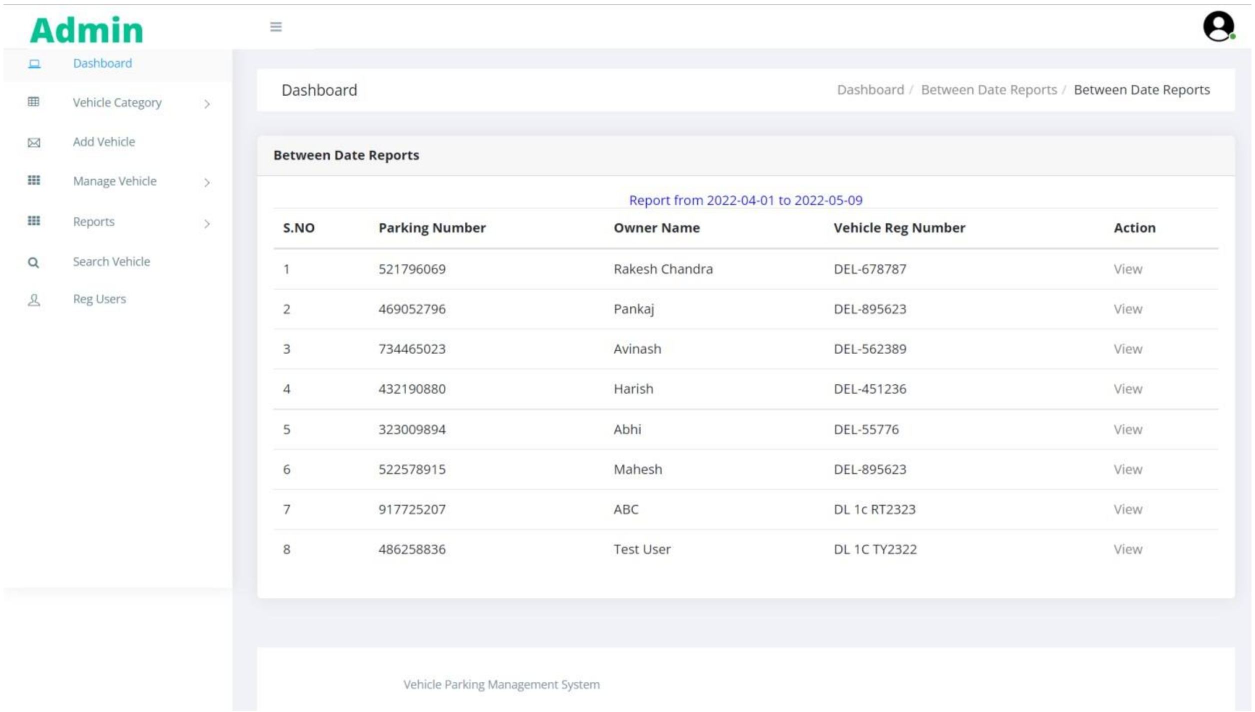
Vehicle Parking Management System

View Report



Dashboard

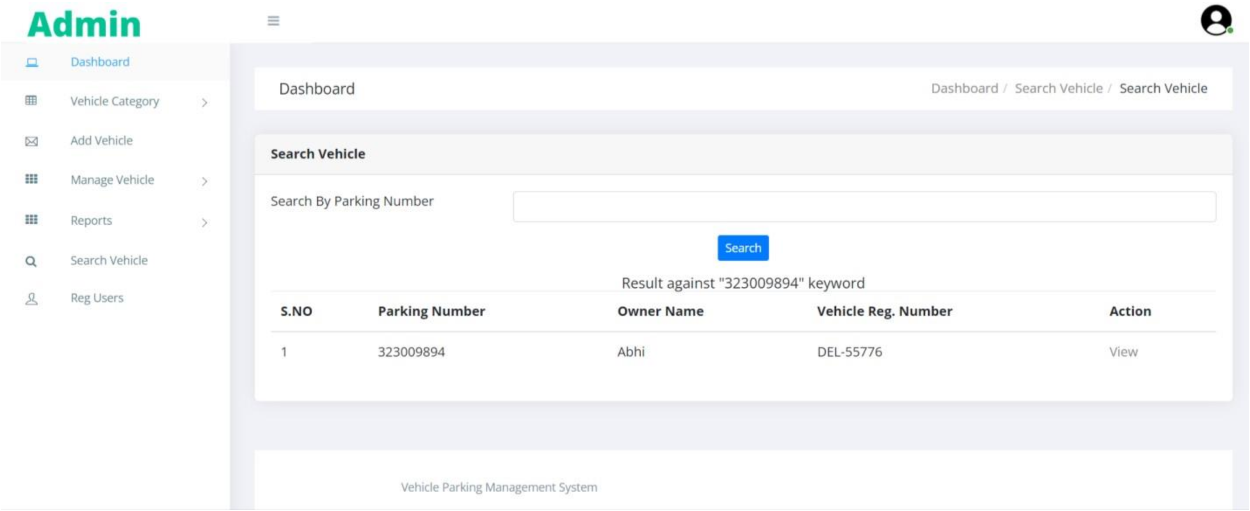
Between Date Reports

Report from 2022-04-01 to 2022-05-09

S.NO	Parking Number	Owner Name	Vehicle Reg Number	Action
1	521796069	Rakesh Chandra	DEL-678787	View
2	469052796	Pankaj	DEL-895623	View
3	734465023	Avinash	DEL-562389	View
4	432190880	Harish	DEL-451236	View
5	323009894	Abhi	DEL-55776	View
6	522578915	Mahesh	DEL-895623	View
7	917725207	ABC	DL 1c RT2323	View
8	486258836	Test User	DL 1C TY2322	View

Vehicle Parking Management System

Search Vehicle



Dashboard

Search Vehicle

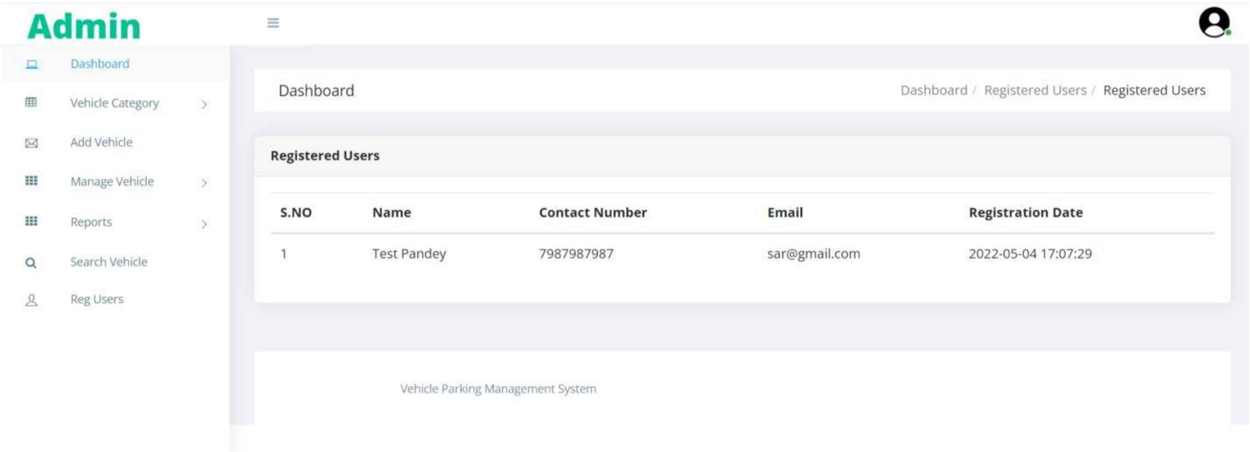
Search By Parking Number

Result against "323009894" keyword

S.NO	Parking Number	Owner Name	Vehicle Reg. Number	Action
1	323009894	Abhi	DEL-55776	View

Vehicle Parking Management System

View Registered Users



Dashboard

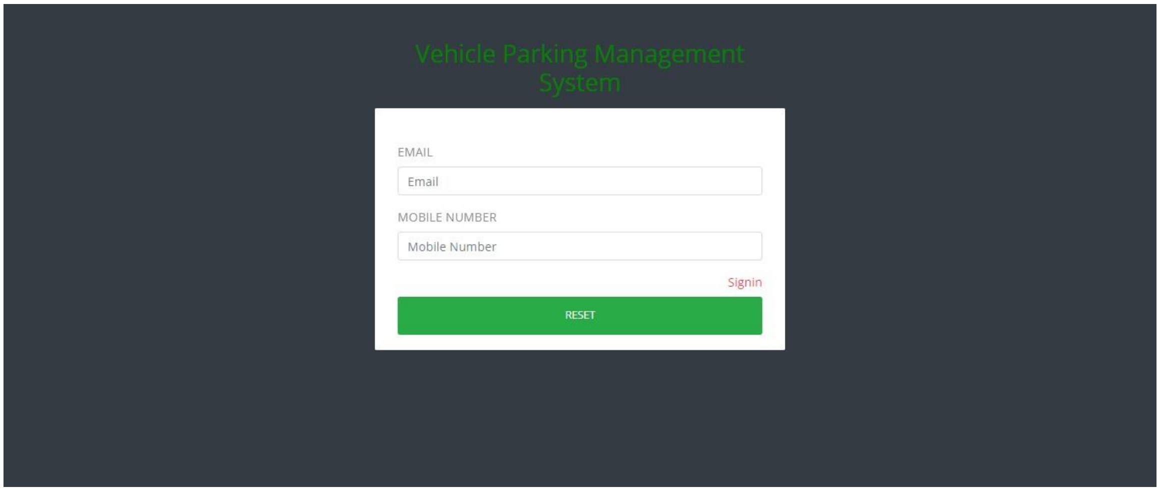
Dashboard / Registered Users / Registered Users

Registered Users

S.NO	Name	Contact Number	Email	Registration Date
1	Test Pandey	7987987987	sar@gmail.com	2022-05-04 17:07:29

Vehicle Parking Management System

Forgot Password


Vehicle Parking Management System

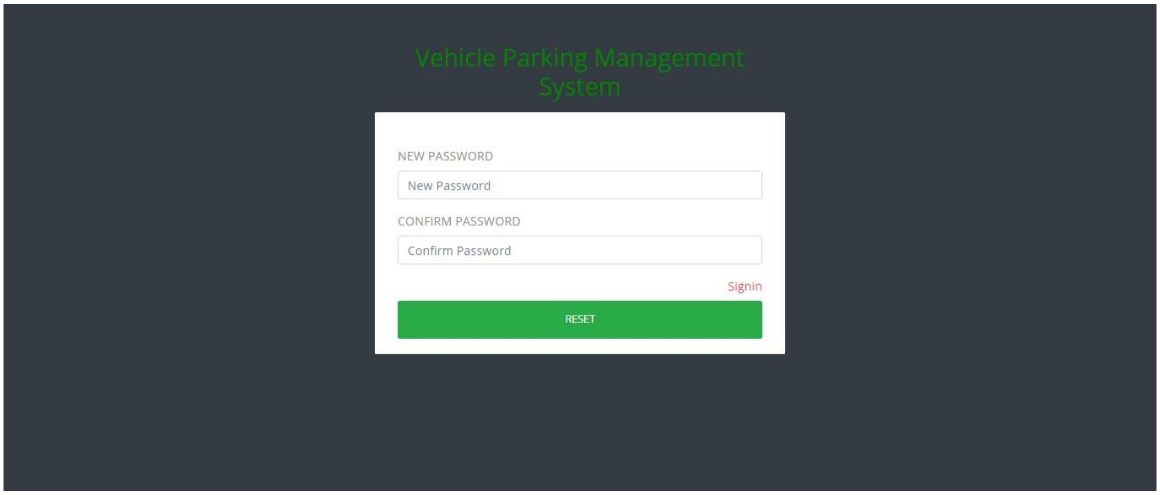
EMAIL

Email

MOBILE NUMBER

Mobile Number

Reset Password


Vehicle Parking Management System

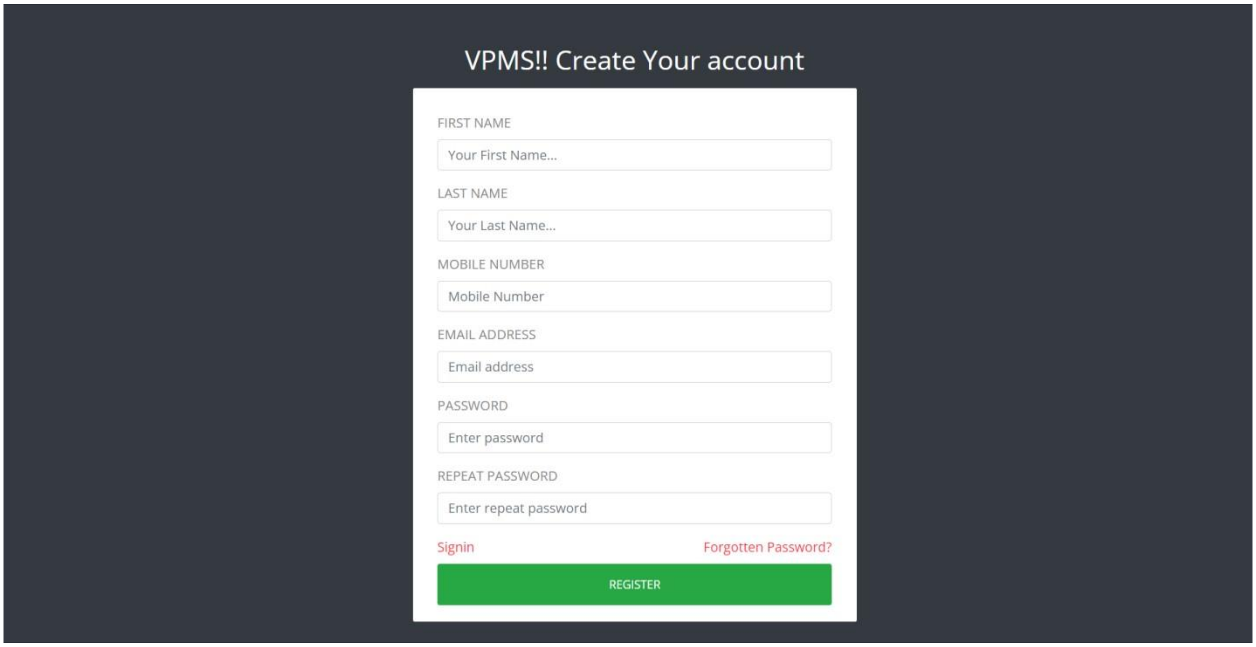
NEW PASSWORD

New Password

CONFIRM PASSWORD

Confirm Password

User Sign up



VPMS!! Create Your account

FIRST NAME

Your First Name...

LAST NAME

Your Last Name...

MOBILE NUMBER

Mobile Number

EMAIL ADDRESS

Email address

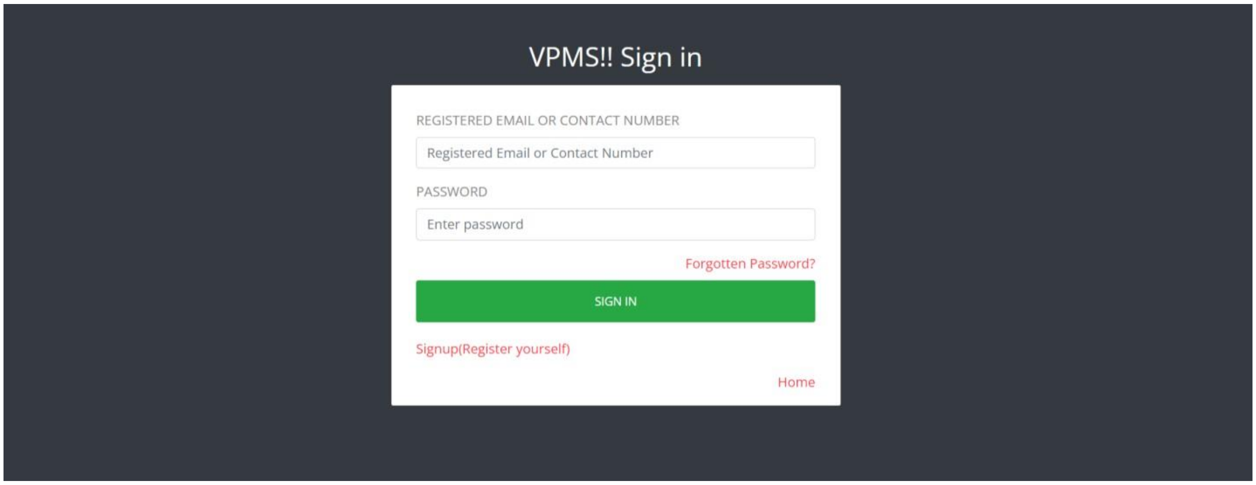
PASSWORD

Enter password

REPEAT PASSWORD

Enter repeat password

Sign in



VPMS!! Sign in

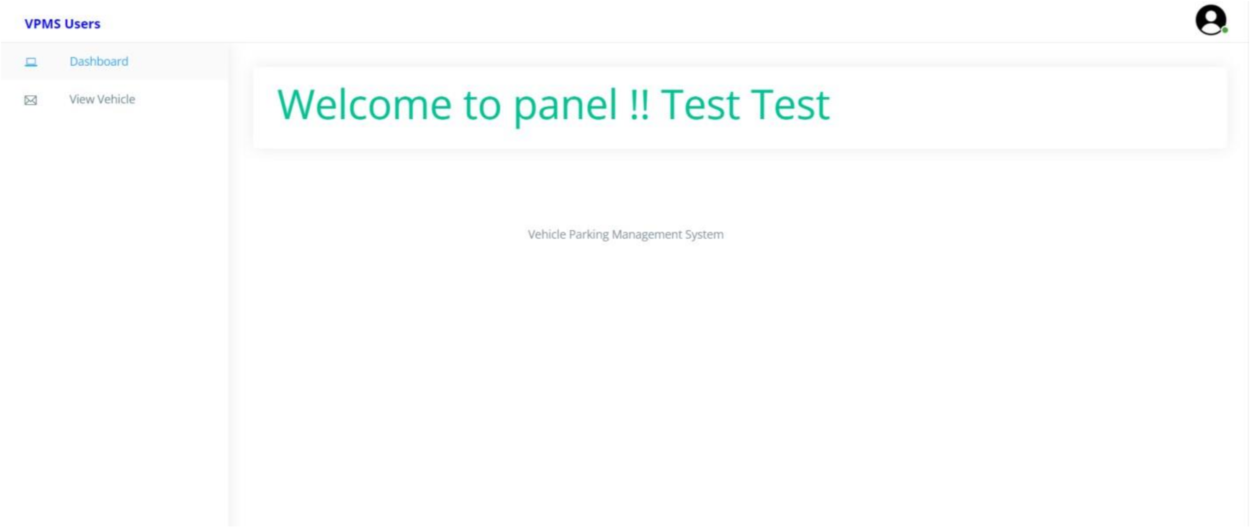
REGISTERED EMAIL OR CONTACT NUMBER

Registered Email or Contact Number

PASSWORD

Enter password

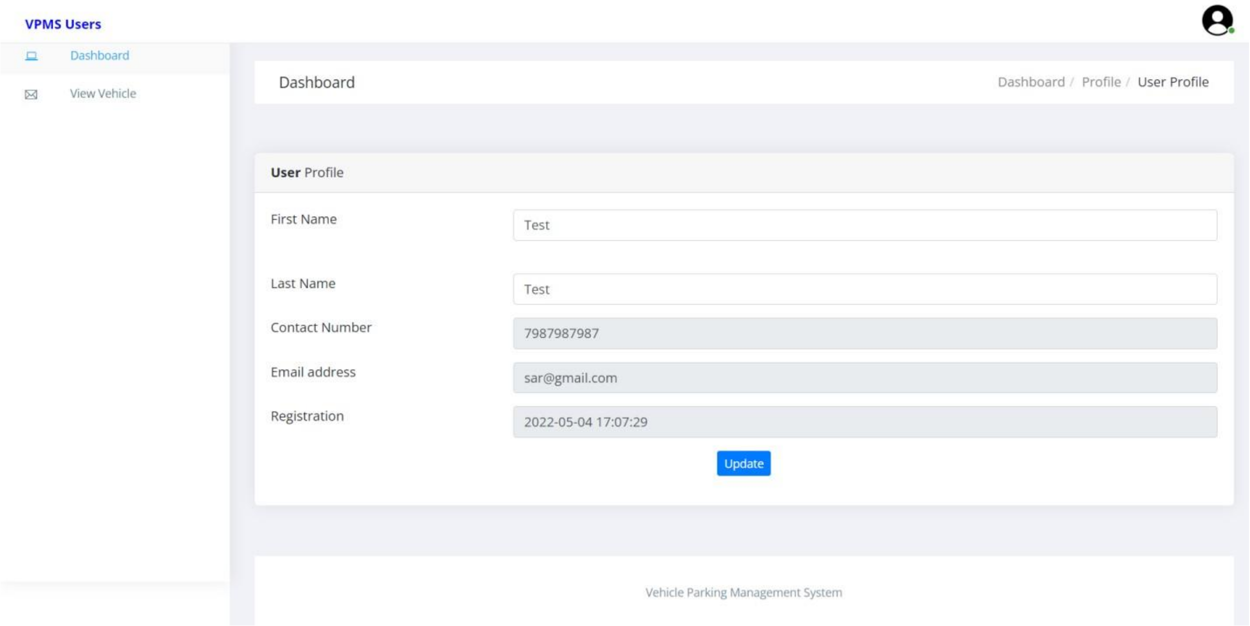
Dashboard



Welcome to panel !! Test Test

Vehicle Parking Management System

Profile

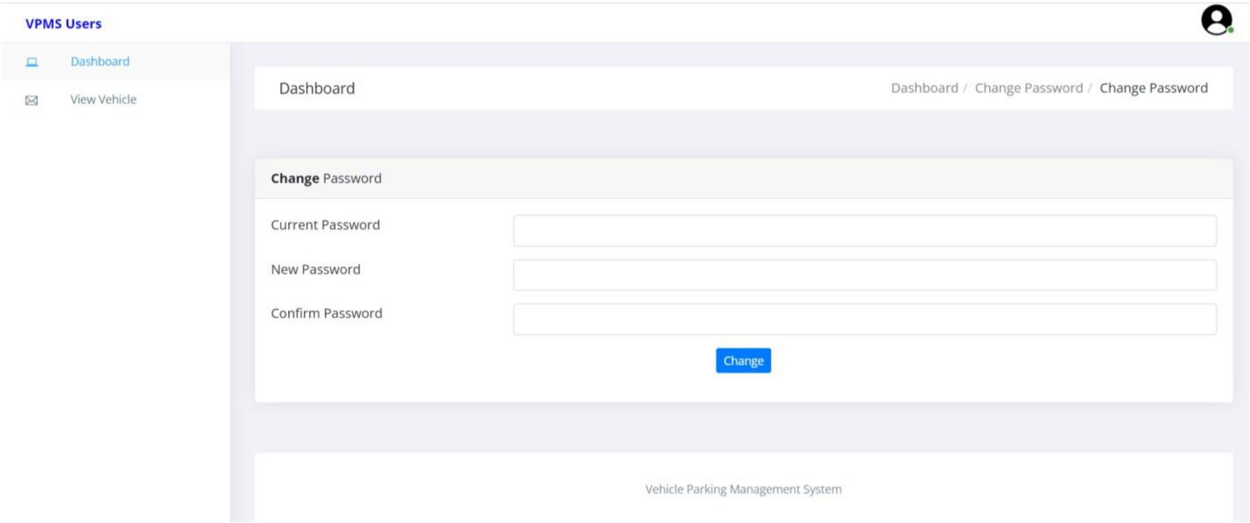


User Profile

First Name	Test
Last Name	Test
Contact Number	7987987987
Email address	sar@gmail.com
Registration	2022-05-04 17:07:29

Vehicle Parking Management System

Change Password



Change Password

Current Password

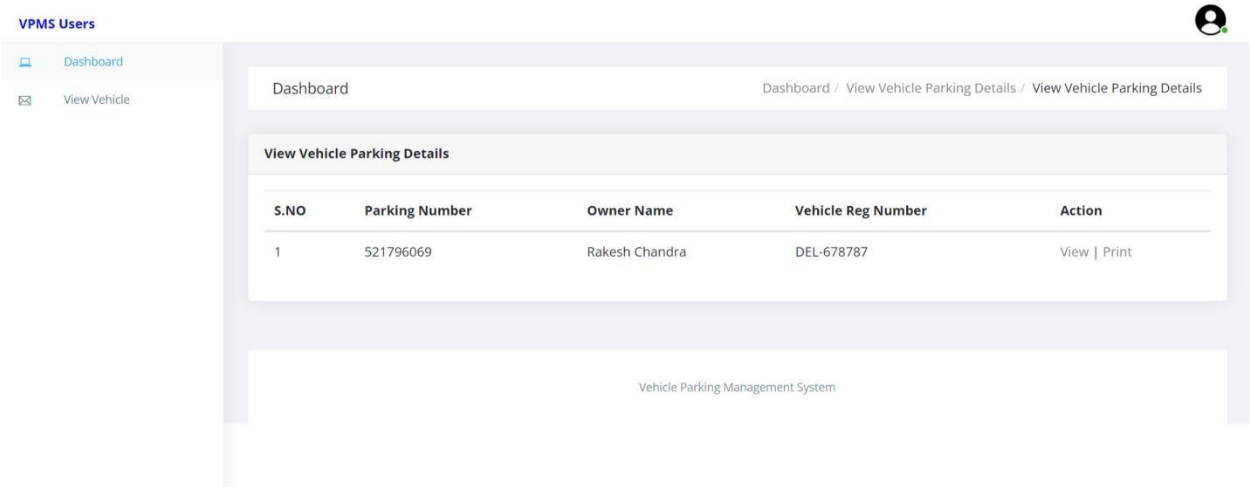
New Password

Confirm Password

Change

Vehicle Parking Management System

View Vehicle



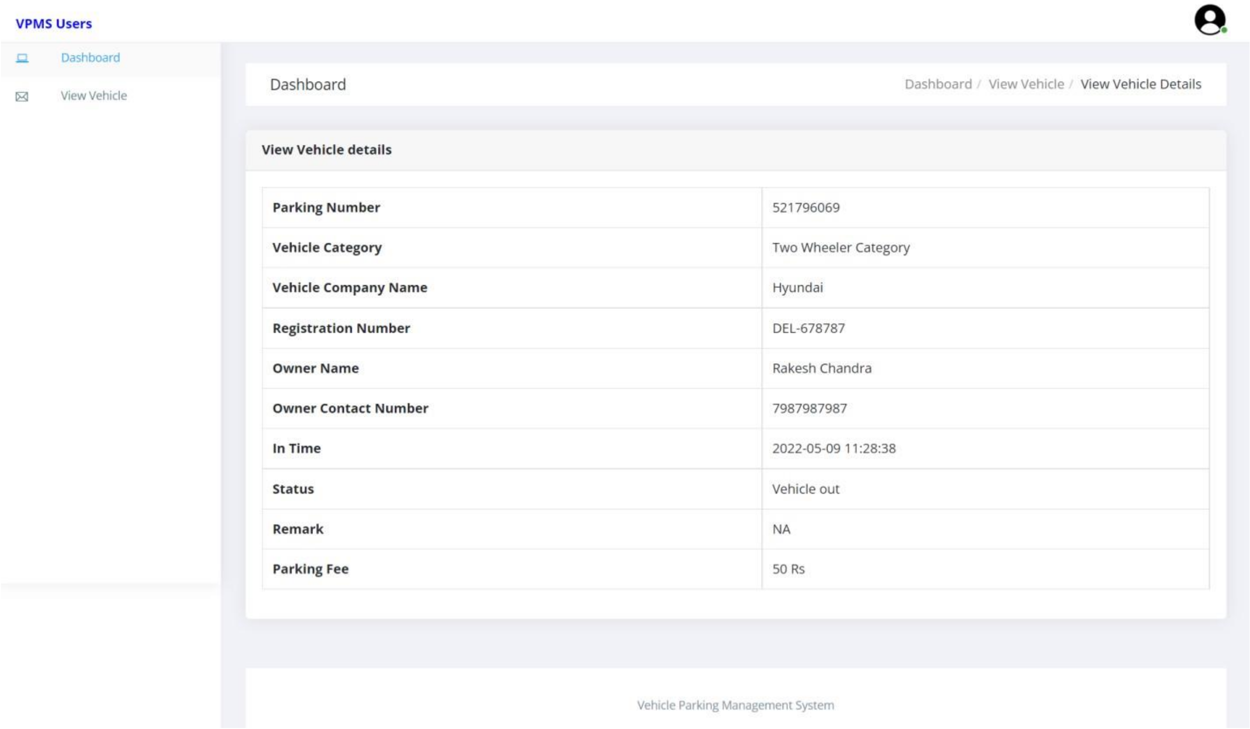
VPMS Users
Dashboard
View Vehicle
Dashboard
Dashboard / View Vehicle Parking Details / View Vehicle Parking Details

View Vehicle Parking Details

S.NO	Parking Number	Owner Name	Vehicle Reg Number	Action
1	521796069	Rakesh Chandra	DEL-678787	View | Print

Vehicle Parking Management System

View Vehicle in details



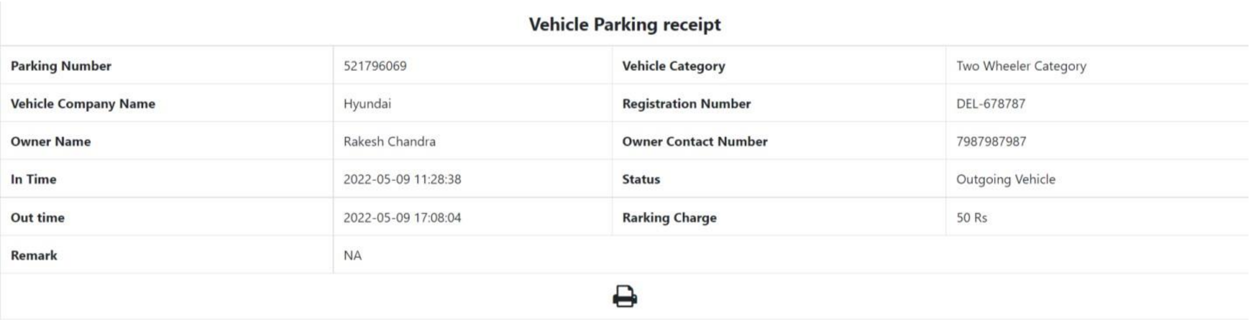
VPMS Users
Dashboard
View Vehicle
Dashboard
Dashboard / View Vehicle / View Vehicle Details

View Vehicle details

Parking Number	521796069
Vehicle Category	Two Wheeler Category
Vehicle Company Name	Hyundai
Registration Number	DEL-678787
Owner Name	Rakesh Chandra
Owner Contact Number	7987987987
In Time	2022-05-09 11:28:38
Status	Vehicle out
Remark	NA
Parking Fee	50 Rs

Vehicle Parking Management System

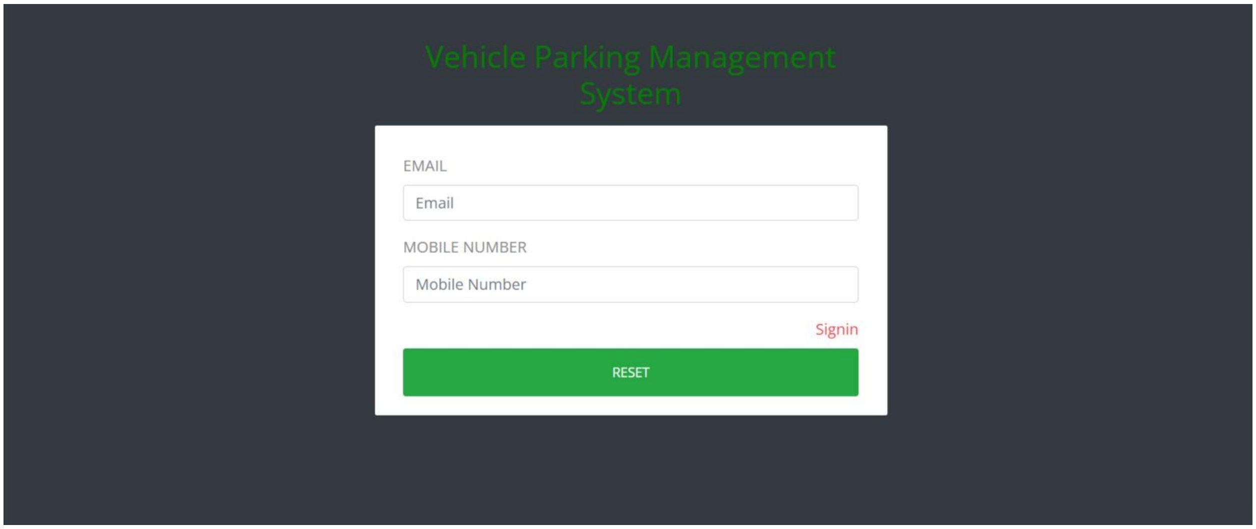
View Parking Receipt



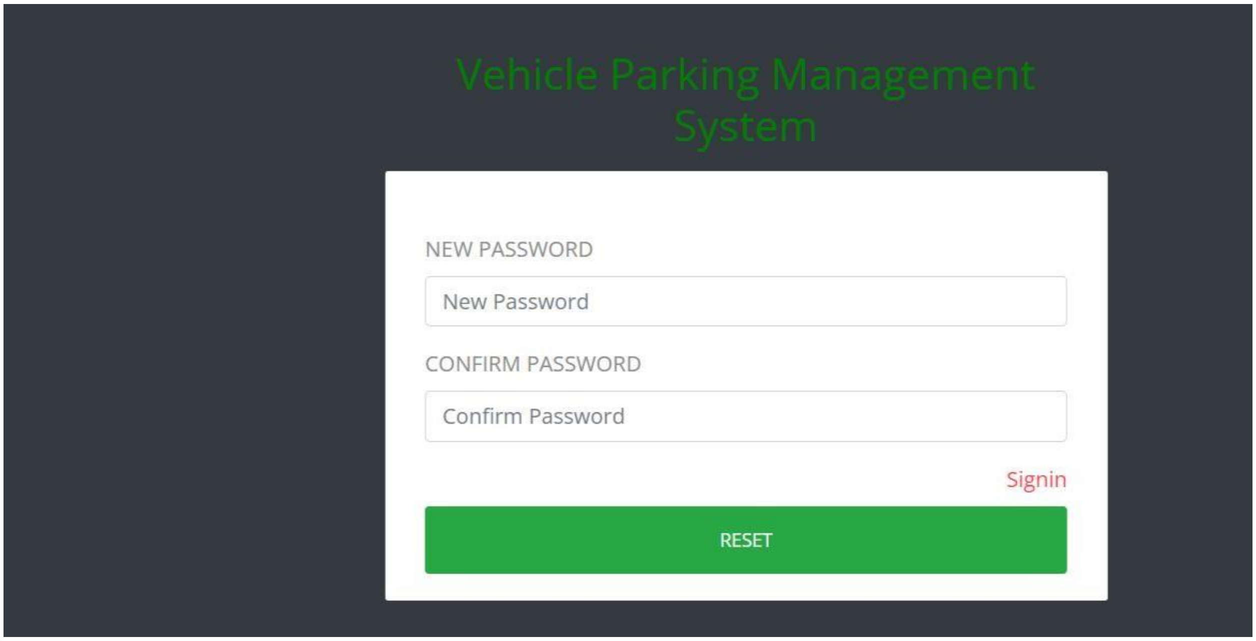
Vehicle Parking receipt

Parking Number	521796069	**Vehicle Category**	Two Wheeler Category
Vehicle Company Name	Hyundai	**Registration Number**	DEL-678787
Owner Name	Rakesh Chandra	**Owner Contact Number**	7987987987
In Time	2022-05-09 11:28:38	**Status**	Outgoing Vehicle
Out time	2022-05-09 17:08:04	**Rarking Charge**	50 Rs
Remark	NA		

Forgot Password

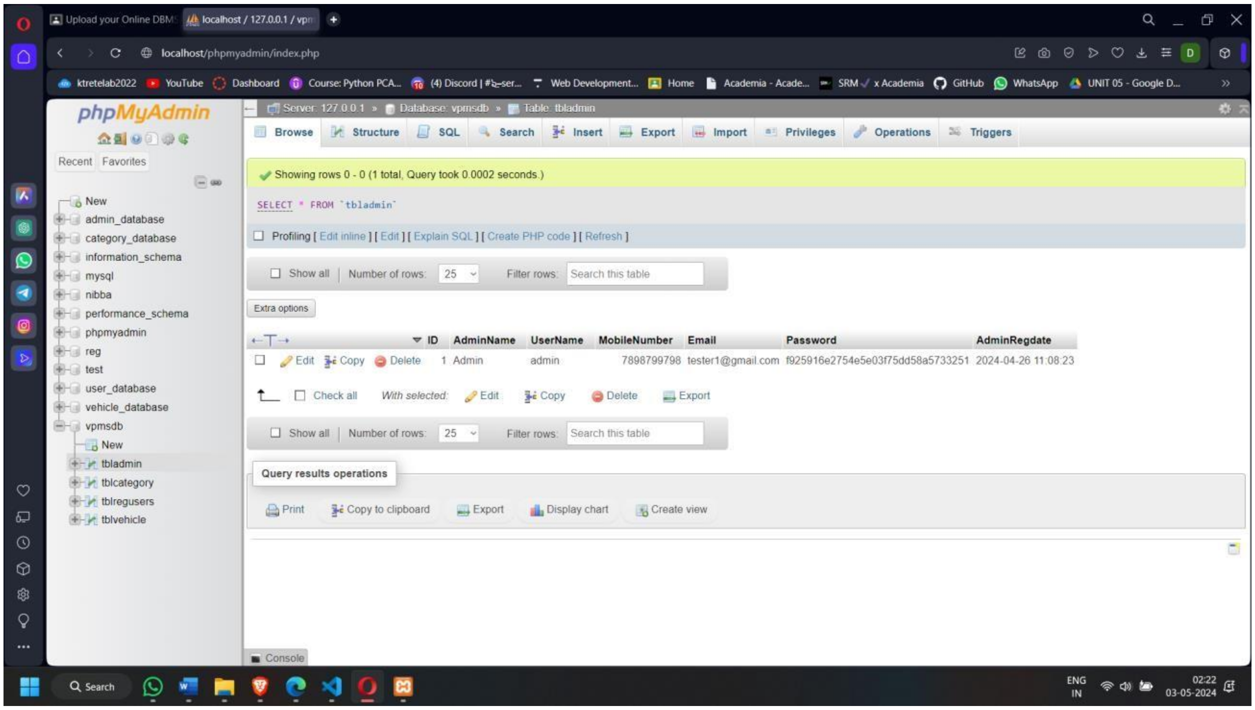


Reset Password



Vehicle Parking Management System

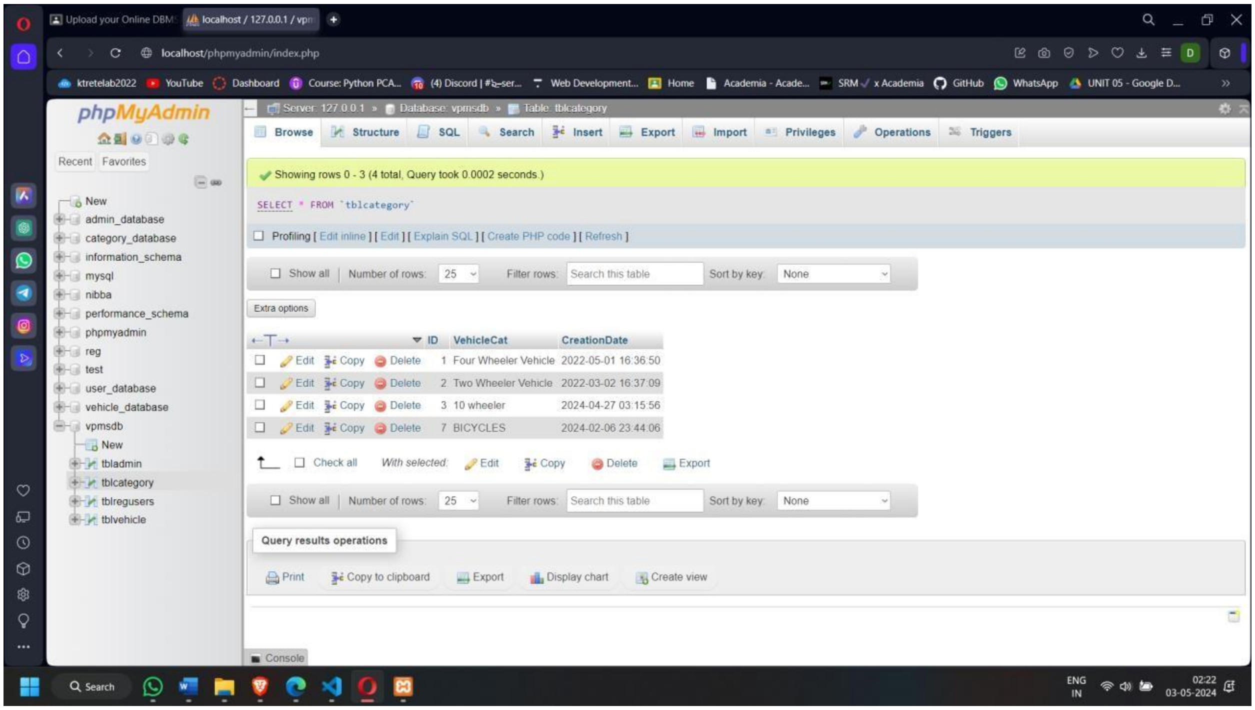
DATABASE PAGES



Showing rows 0 - 0 (1 total, Query took 0.0002 seconds.)

```
SELECT * FROM `tbladmin`
```

	ID	AdminName	UserName	MobileNumber	Email	Password	AdminRegdate
□ Edit Copy Delete	1	Admin	admin	7898799798	tester1@gmail.com	f925916e2754e5e03f75dd58a5733251	2024-04-26 11:08:23



Server: 127.0.0.1 » Database: vpmsdb » Table: tblcategory

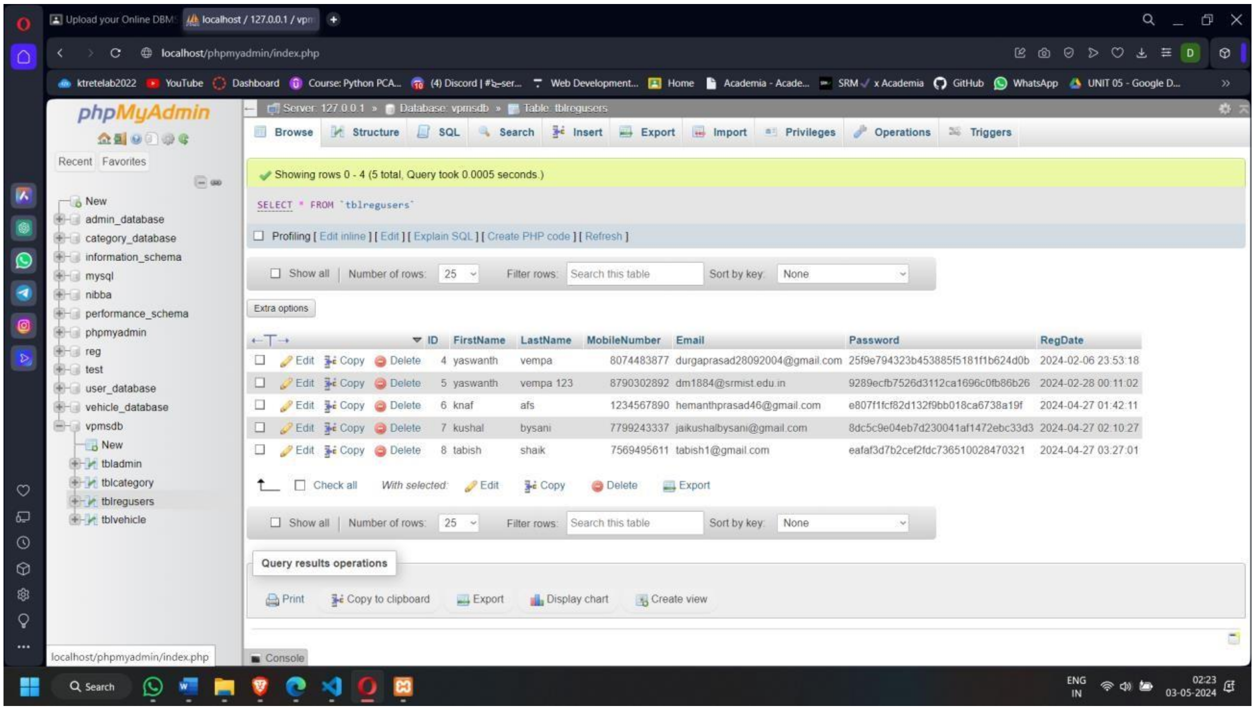
Showing rows 0 - 3 (4 total, Query took 0.0002 seconds.)

```
SELECT * FROM `tblcategory`
```

□ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

□ Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

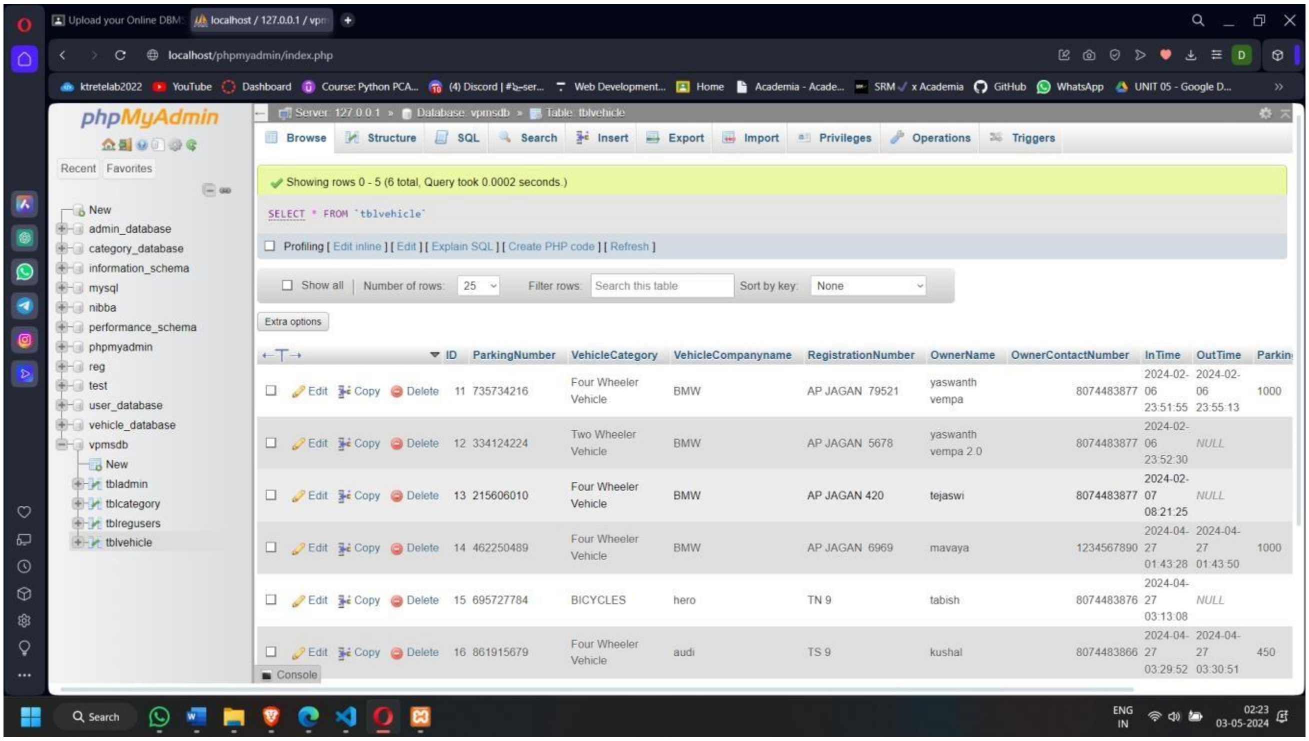
ID	VehicleCat	CreationDate
1	Four Wheeler Vehicle	2022-05-01 16:36:50
2	Two Wheeler Vehicle	2022-03-02 16:37:09
3	10 wheeler	2024-04-27 03:15:56
7	BICYCLES	2024-02-06 23:44:06



✓ Showing rows 0 - 4 (5 total, Query took 0.0005 seconds.)

```
SELECT * FROM `tblregusers`
```

ID	FirstName	LastName	MobileNumber	Email	Password	RegDate
4	yaswanth	vempa	8074483877	durgaprasad28092004@gmail.com	25f9e794323b453885f5181f1b624d0b	2024-02-06 23:53:18
5	yaswanth	vempa 123	8790302892	dm1884@srmist.edu.in	9289ecfb7526d3112ca1696c0fb86b26	2024-02-28 00:11:02
6	knaf	afs	1234567890	hemanthprasad46@gmail.com	e807f1fcf82d132f9bb018ca6738a19f	2024-04-27 01:42:11
7	kushal	bysani	7799243337	jaikushalbysani@gmail.com	8dc5c9e04eb7d230041af1472ebc33d3	2024-04-27 02:10:27
8	tabish	shaik	7569495611	tabish1@gmail.com	eafaf3d7b2cef2fdc736510028470321	2024-04-27 03:27:01



✓ Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)

```
SELECT * FROM `tblvehicle`
```

□ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

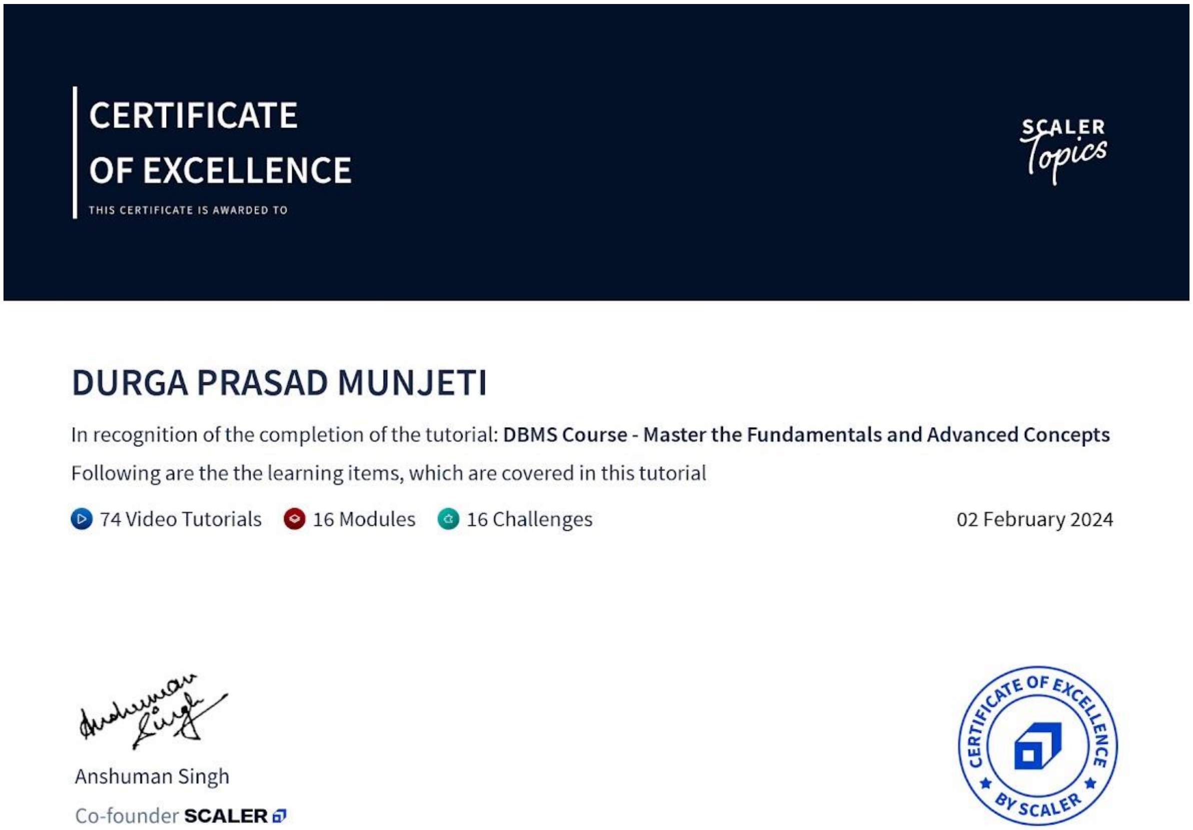
□ Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

	ID	ParkingNumber	VehicleCategory	VehicleCompanyname	RegistrationNumber	OwnerName	OwnerContactNumber	InTime	OutTime	Parkin
□ Edit Copy Delete	11	735734216	Four Wheeler Vehicle	BMW	AP JAGAN 79521	yaswanth vempa	8074483877	2024-02-06 23:51:55	2024-02-06 23:55:13	1000
□ Edit Copy Delete	12	334124224	Two Wheeler Vehicle	BMW	AP JAGAN 5678	yaswanth vempa 2.0	8074483877	2024-02-06 23:52:30	NULL	
□ Edit Copy Delete	13	215606010	Four Wheeler Vehicle	BMW	AP JAGAN 420	tejaswi	8074483877	2024-02-07 08:21:25	NULL	
□ Edit Copy Delete	14	462250489	Four Wheeler Vehicle	BMW	AP JAGAN 6969	mavaya	1234567890	2024-04-27 01:43:28	2024-04-27 01:43:50	1000
□ Edit Copy Delete	15	695727784	BICYCLES	hero	TN 9	tabish	8074483876	2024-04-27 03:13:08	NULL	
□ Edit Copy Delete	16	861915679	Four Wheeler Vehicle	audi	TS 9	kushal	8074483866	2024-04-27 03:29:52	2024-04-27 03:30:51	450

CHAPTER – 8

Course Completion Certificate



CERTIFICATE
OF EXCELLENCE

THIS CERTIFICATE IS AWARDED TO

SCALER Topics

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Following are the the learning items, which are covered in this tutorial

74 Video Tutorials · 16 Modules · 16 Challenges

02 February 2024

Anshuman Singh

Anshuman Singh
Co-founder **SCALER**

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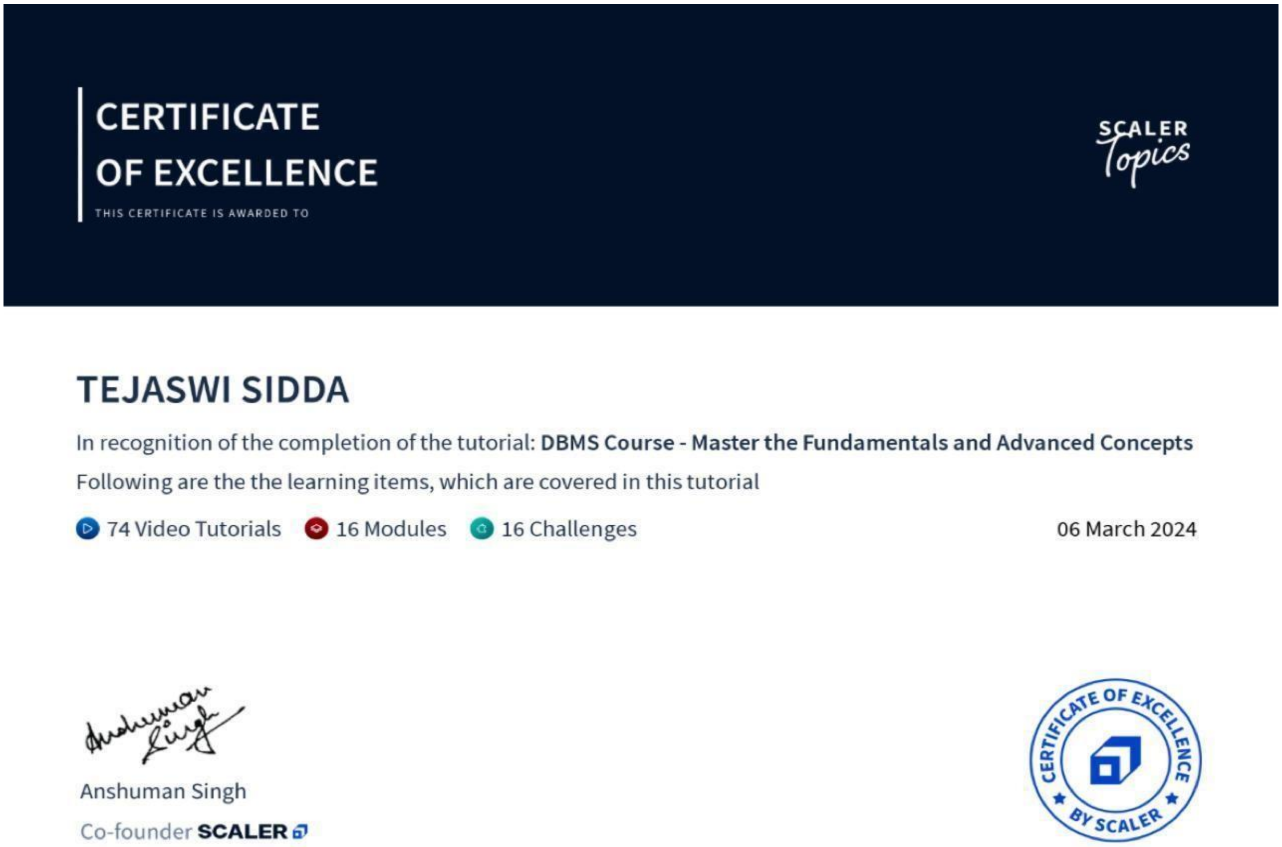

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06 March 2024

Anshuman Singh

Anshuman Singh

Co-founder **SCALER**

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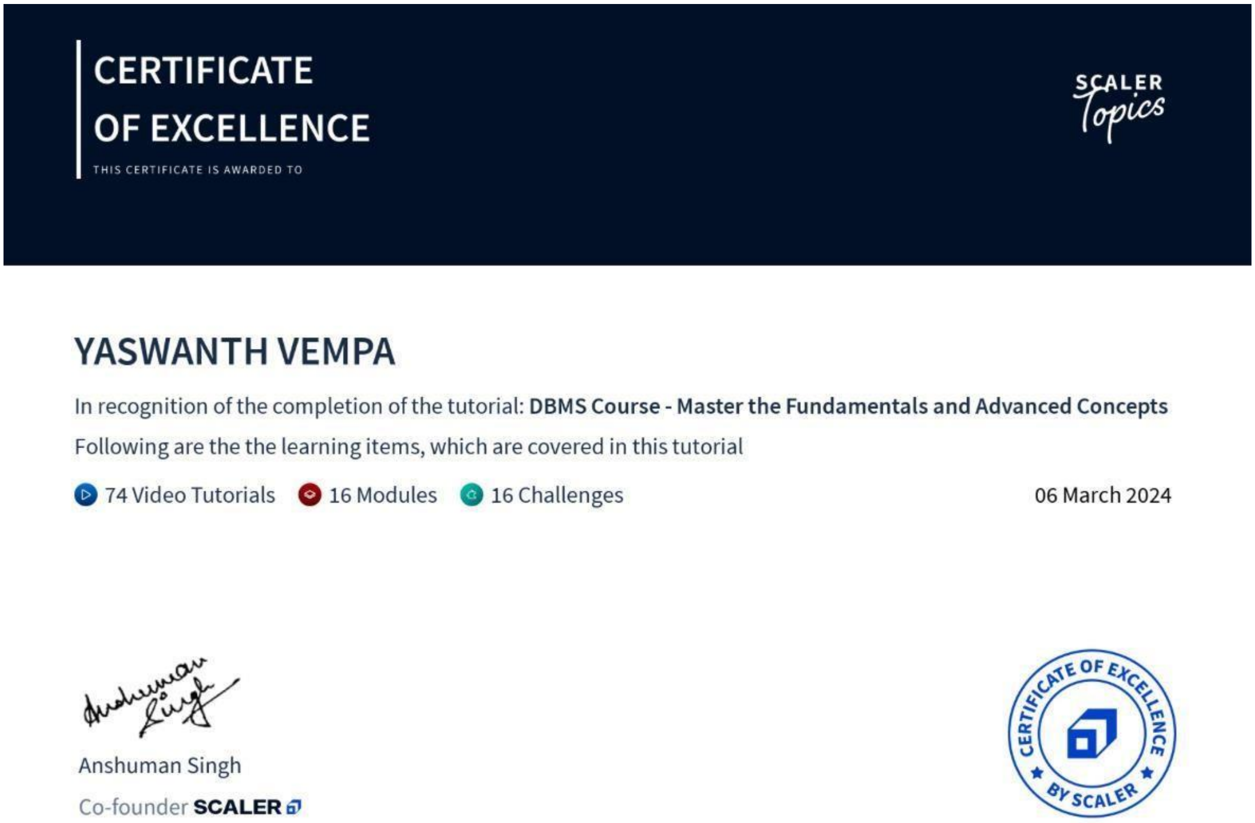

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Anshuman Singh
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