## 1.1 ABOUT THE PROJECT

This project aims to create a fully functional online car rental management system specializing renting car to customers. In this era of technology and connectivity, making a car workshop and it's booking online will greatly increase its efficiency. The system provides a very comprehensive UI and set of features that will greatly help in providing car maintenance services. The main aim of the project is to provide a hassle-free car rental management system.

The online car rental system is a system that helps customers view, register and book available cars. The customer can rent a car according to his/her requirement and budget. This system helps user to search and choose from a wide variety of cars. There will be different categories of cars. The users can check for cars and rent them for specified period. Based on the type of car required by the customers, the user shall be able to make booking. The users can directly see the information about all cars available and their prices. The users shall enter information like date and type of car. Payment is made online.

## 2.1 SYSTEM STUDY

System study refers to the process of examining a situation with the intent of improving it through better process and methods. System study is, therefore the process of gathering and interpreting facts, diagnosing problem and using the information to recommend changes in the system, in other words it meansa detailed explanation of description. Before computerizing a system under consideration, it must be analyzed. We need to study how it functions currently, what are problems and what are the requirements that the proposed software should meet.

The main components of making software are:

- System and software requirements analysis
- Design and implementation of software
- Ensuring, verifying and maintaining software integrity

The online car rental management system manages the complete administrative operations of a car rentals. It also provides a user-friendly interface which can be operated by anyone with little knowledge about the computer system. It stores the information needed by the system in a database which can be accessed by the administrator, staff and customer. It should maintain a well-organized database for storing the information regarding the system. This helpsto eliminate the storage of invalid data.

### 2.1.1 Existing System

The Existing system is based on manual work and all the process are done manually, so they maintain registers and files for recording the details of the system. They maintain several registers for recording the entry of dailytransactions such as billing. They keep the bill book or cash book to maintain the record for each sale of the transaction in the system. In current system billingis manual and time consuming and use manual searching of item on shelf because of manual based system. Also, there is a difficulty on store to check the stock and retrieve the necessary data from the manually based data system. So generally, the current system does not arrange the items in systematic way,security for the data is low and does not indicate how much stock is left.

**Disadvantages of existing system**

- Difficulty in maintenance of records.
- Time consuming.
- Editing of data becomes a tedious job.
- No security of data.
- Mistakes Occurring in long calculations.
- Proper generation of reports are not possible.
- Lack of efficiency.
- Difficult to do stock maintenance.

### 2.1.2 Proposed System

The proposed system is interactive, highly user friendly and designed exclusively for the Car rental System. The system covers almost all the functional areas of the store. The online car rental management system is a database system used to store the information regarding customer details, staffdetails, vehicle details, booking details etc.

All the operations and activities related to the Online Car rental management system can be carried out efficiently. The system manages a well-organized database for storing the resources. This helps us to eliminate the entering of invalid data. Most problems of manual systems can be solved by this system.

The computerization of the system allows the easy maintenance of the details.Large amount of data can be stored easily. In addition, updating and other changes can be done easily. The information can be retrieved with high speedand accuracy. The use of GUI oriented software makes the system user friendly.

**Advantages of proposed system**

- High processing speed.
- Easy to retrieve old records by using search feature.
- We can analyze customer details, staff details and booking details.
- Minimal errors.
- Greater portability.

### 2.1.3. Feasibility Study

Feasibility study is made to view if the project on completion will serve the purpose of the organization for the amount of work, time and effort spent on it. Feasibility study lets the developer fore view the future of the project and its usefulness. Finding out whether a new system is required or not. The study iscarried out to the best system that meet performance requirement. This entailsidentification, description and evaluation of candidate system and selection ofthe best system for the best system for the job. It simply identifies whether the proposed system is feasible to the organization or not.

There are three aspects in the feasibility study portion of the preliminary investigation.

- Technical feasibility
- Economic feasibility
- Operational feasibility

#### 2.1.3.1. Technical Feasibility

The system must be evaluated from technical viewpoint first. The assessmentof this feasibility must be based on outline design of the system requirement in the terms of input, output, programs and procedure having identified an outline system, the investigation must go on to suggest the type of equipment, required method of developing the system, method of running the system onceit has been designed. The project should be developed such that the necessaryfunctions and performance are achieved within the constraints. The project isdeveloped with latest technology. There are only minimal constraints involvedin this project.

### 2.1.3.2. Economic Feasibility

Here an evaluation of development cost weighted against the ultimate incomeor benefit derived from the developed system. The cost for the development of the project has been evaluated and we want to check that the cost does not exceed beneficial cost of the system. The economic and financial analysis is used for evaluating the effectiveness of the candidate system. This project alsoundergone economic feasibility study and found that it is feasible. So, the costfor development does not exceed its beneficial cost. This brought to as the conclusion that the system is economically feasible in the context.

### 2.1.3.3. Operational Feasibility

In operational feasibility the entire application is checked whether the systemwill be used if it is developed and implemented. Also, it is checked whether there will be resistance from user that may undermine the possible applicationbenefits. There is no barrier for implementing the system. The system also helps to access the information immediately as need arises. Thus, the system is found to be operational feasible.

## 2.2 USER CHARACTERISTICS

The Online Car Rental Management system provides the user to perform their task in an easy and much less complex way to avoid redundancy. This systemensures that the users assessing the system can ensure maximum efficiency and they can depend on the system for desired results.

There are three user characteristics in this system:

- Administrator
- Staff
- Customer

### 2.2.1. Administrator

Administrator or Admin is the super user and main controller of this system. Administrator controls all the activities of the Car Rental ManagementSystem. Admin can add and view the staff. He/ She can add the Categories of Vehicles. He/ She can add, edit, view and delete the staff and can also add and view the purchase details. Admin can view the orders and can also generate several reports.

### 2.2.2. Staff

Staffs are responsible for maintaining the system. Staff can edit their own details.Staff can add, edit and view customers.

### 2.2.3. Customer

Customer can perform various activities like registering into the account, editing his/her details, adding their vehicles, viewing the categories of vehicles, searching the vehicles and make payment through online.

## 2.3 SYSTEM SPECIFICATION

### 2.3.1 Hardware specifications

The selection of hardware is very important in the existence and proper working of any software. when selecting the hardware, the size and capacity requirements are also important. Below is some of the hardware that is requiredby the system.

| | |
|---|---|
| Processor | Intel Core i5-3220 (3.3 GHz) or above |
| RAM | 8 GB or above |
| Storage | 512 GB or above |
| Other | Keyboard and Mouse |

### 2.3.2 Software specifications

| | |
|---|---|
| Operating system | Windows 7/8/8.1/10/11 |
| Front end | Python |
| Back end | SQL |

### 2.3.3 About software tools and platforms

**Python:** Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation. Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured, object-oriented and functional programming.

**Advantages**

- Open Source which means its available free of cost.
- Simple and so easy to learn
- Versatile and can be used to create many different things.
- Powerful development libraries include AI, ML etc.
- Python is much in demand and ensures high salary

**SQL**: Server management studio is a software application first launched withMicrosoft SQL server 2005 that is used for configuring, managing and administering all components with Microsoft SQL server. The tool includes both script editors and graphical tools which work with object and features ofthe server.

**Key Capabilities of SQL**

- High Availability
- Performance and Scalability
- Security
- Manageability
- Developer Productivity
- Business Intelligence

## 3.1 MODULES AND DESCRIPTION

The Online Car Rental Management System helps the Customers to rent different vehicles online and Administrator to manage the entire system easily. There are several Modules in this system. They are:

**1.** Staff Management

**2.** Customer Registration

**3.** Vehicle Category Management

**4.** Vehicle Management

- **4.1** Insurance Management
- **4.2** Vehicle details management

**5.** Booking Management

**6.** Payment Management

**1. Staff Management**

In this module, we manage all the staffs. This is done by admin. Admin can add, edit and view the details of all staff. The details about staff stored is more secured as they can be only accessed by the admin. Staff id, Staff fname, Staff lname, Staff email id, Staff Phone number etc. are stored using this module. Staffs can log into their account using the password provided by the admin and can manage bookings and customers.

**2. Customer Registration**

To manage the registration of the customers. The customer can register themselves. They have the privilege to edit and view his/her profile after registration. While the admin and staff are given the privilege to view the details entered by the customers.

**3. Vehicle Category Management**

This module manages details about different categories of cars available to the user. The staff can add, edit and view the details about different categories.

**4. Vehicle Management**

This module contains the details of each vehicle which is available in the system including their brand name, registration number, model number and other details. This will help the user to select a car based on the information available of each vehicle.

**4.1 Insurance Management**

This module manages the insurance of the vehicle. The staff can add and remove the insurance. Customers can choose various types of insurance such as Third party liability, collision damage, personal accident cover etc. Vehicles are not available until insurance is added.

**4.2 Vehicle Details Management**

This module stores the details of the vehicle such as vehicle id, vehicle number, vehicle name, year, fuel, rate etc.

**5. Booking Management**

Deals with the details of booking. Users can view and book according to the available timeslots and their convenience.

**6. Payment Management**

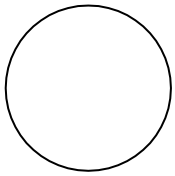
This module deals with how payment is done. This module helps the customer to pay and the payment details are displayed. Customers can add and view payments. The customer has to login to his/her account and complete the pending payments.

## 3.2 DATA FLOW DIAGRAM

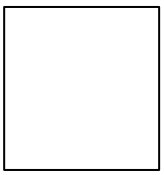
A data flow diagram is graphical tool used to describe and analyze movementof data through a system. These are central tool and the basis from which the other components are developed. The transformation of data from input to output, trough processed, may be described logically and independently of physical components associated with the system. These are known as the logical data flow movement of data between people, departments and workstations. A full description of a system actually consists of a set of data flow diagrams.

A DFD is also known as a "bubble chart" has the purpose of clarifying system requirements and identifying major transformations that will become programs in system design. So, it is the starting point of the design to the lowest level of detail. A DFD consists of a series of bubbles joined by data flows in the system.

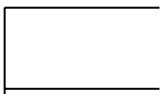
In the DFD, there are four symbols:



Process that transforms data flow



Source or Destination of data



Data store



Data flow

**Rules for drawing data flow diagrams**

Rule 1: Establish the context of the data flow diagram by identifying all ofthe net input and output data flows.

Rule 2: Select a starting point for drawing the DFD.

Rule 3: Give meaningful labels to all data flow lines.

Rule 4: Label all processes with action verbs that relate input and output dataflows.

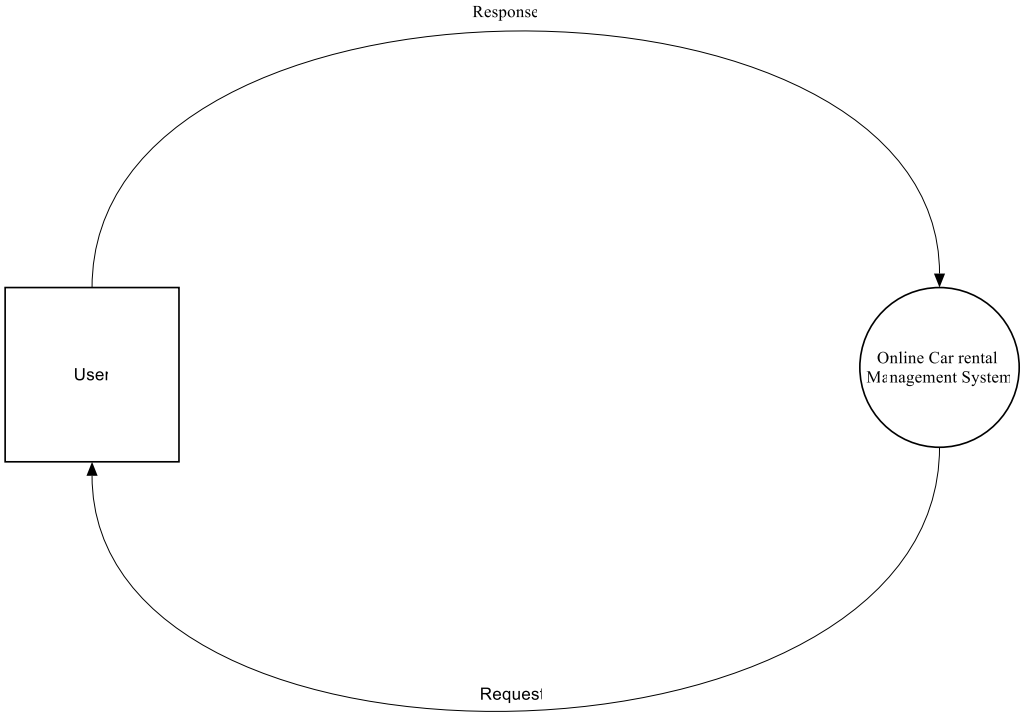
Rule 5: Omit insignificant functions routinely handled in the programmingprocess.

Rule 6: Do not include control or flow of control information.

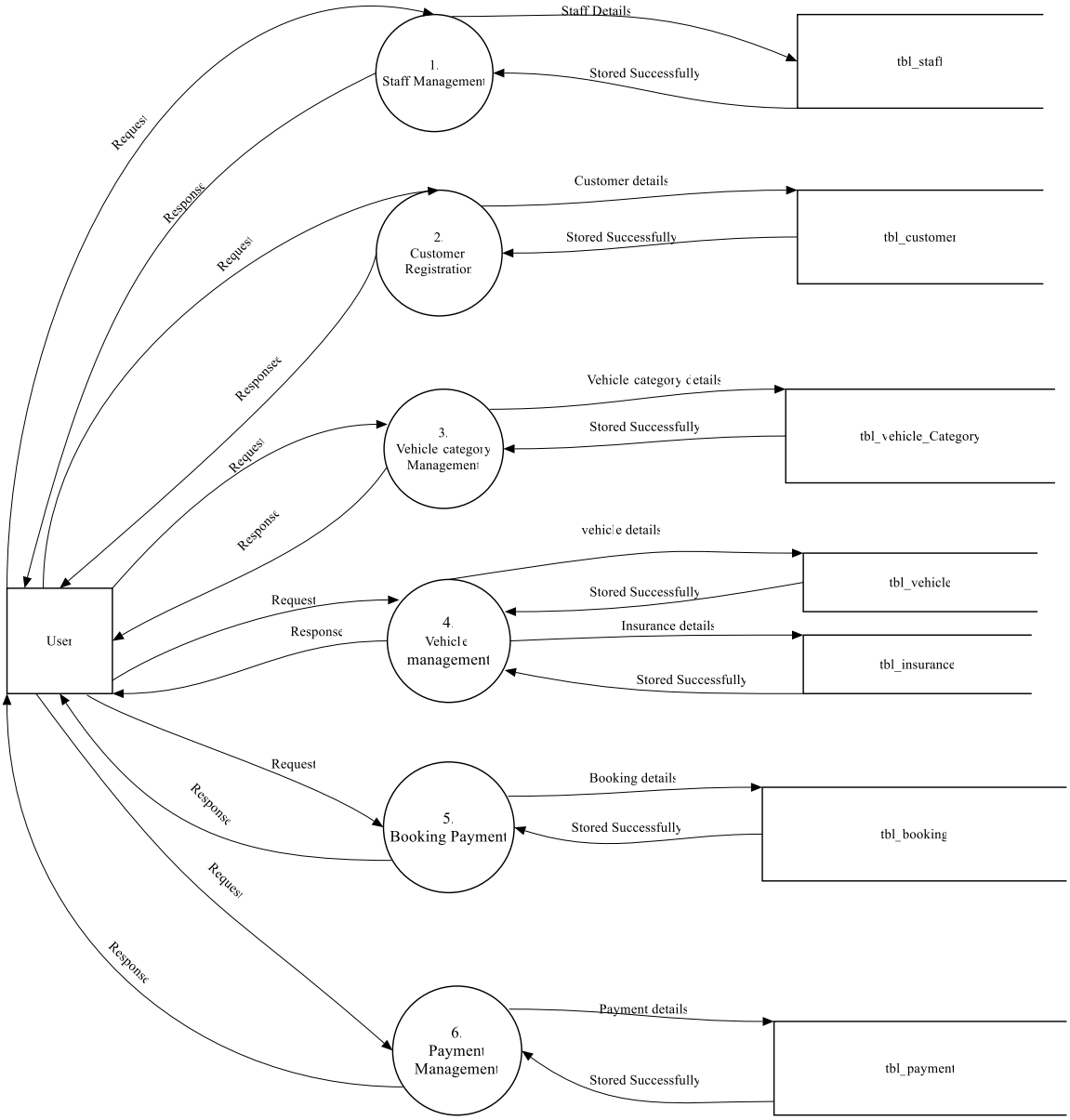
Rule 7: Do not try to put too much information in one DFD.

Rule 8: Be prepared to start over.

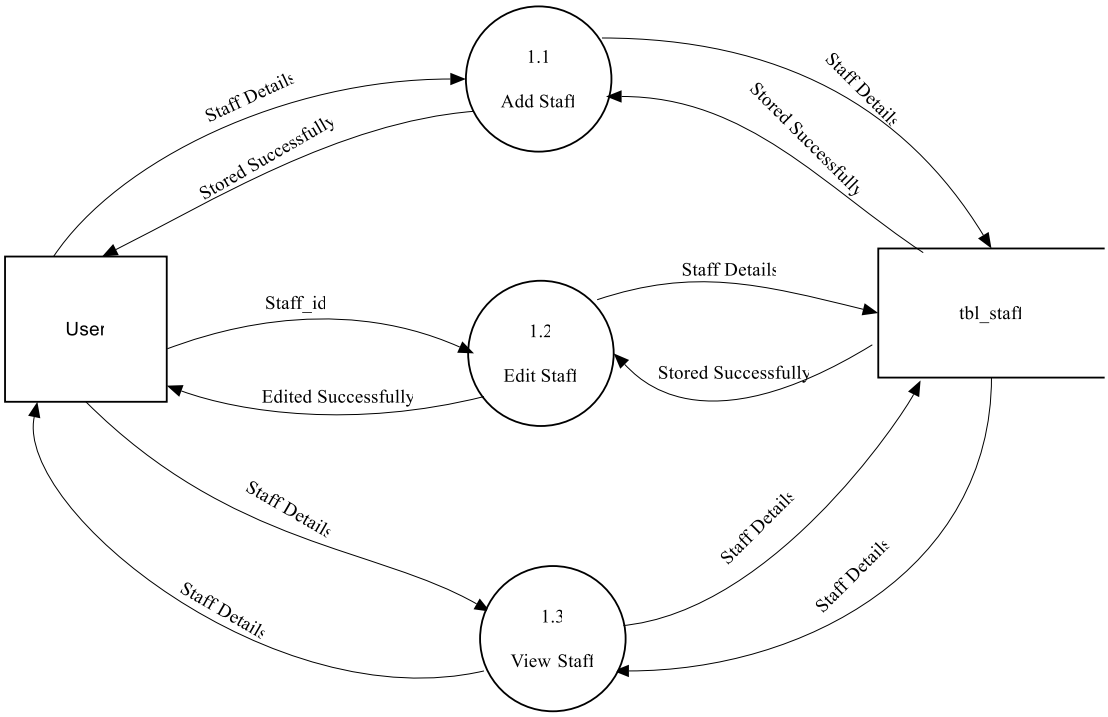
**Level 0 DFD Showing Online Car Rental Management System**



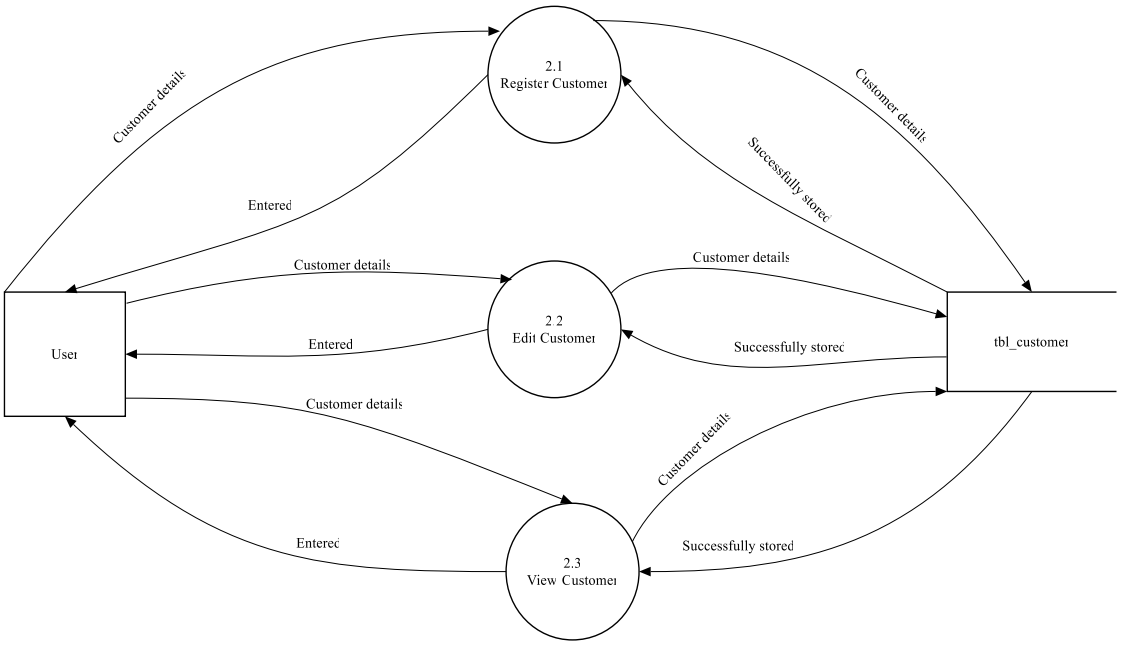
## Level 1 DFD Showing Online Car Rental Management System



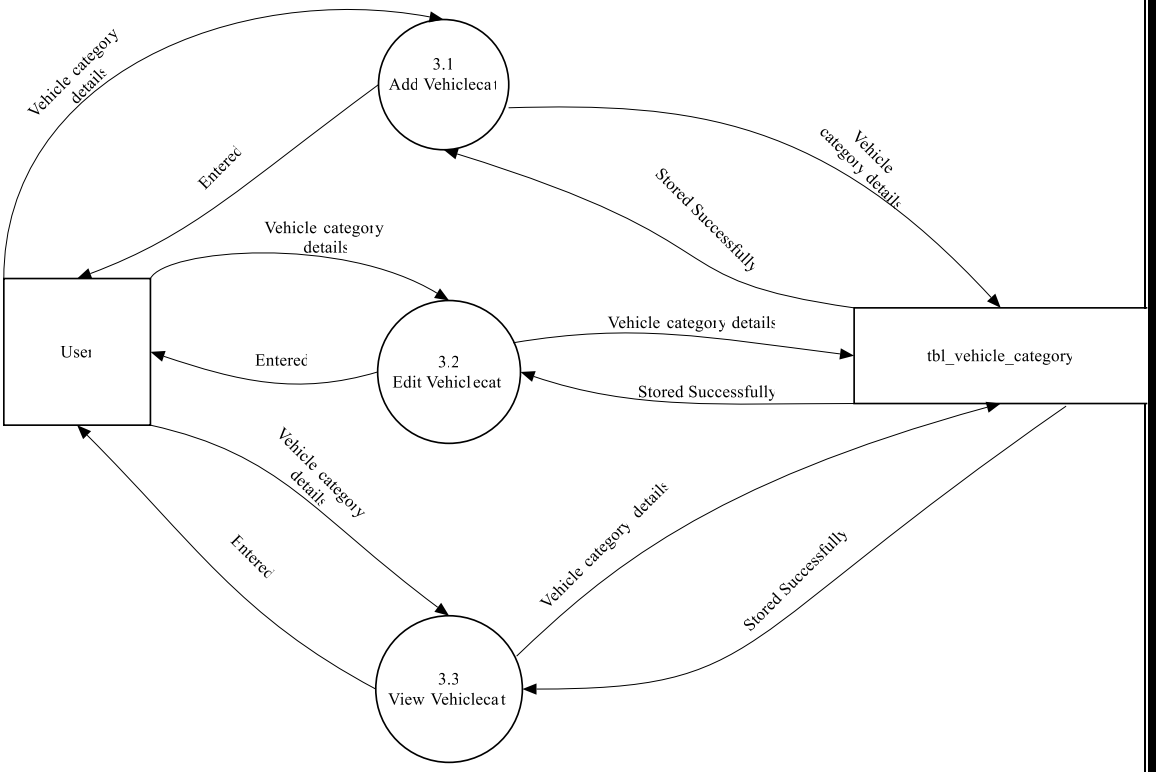
**Level 2 DFD Showing Staff Management**



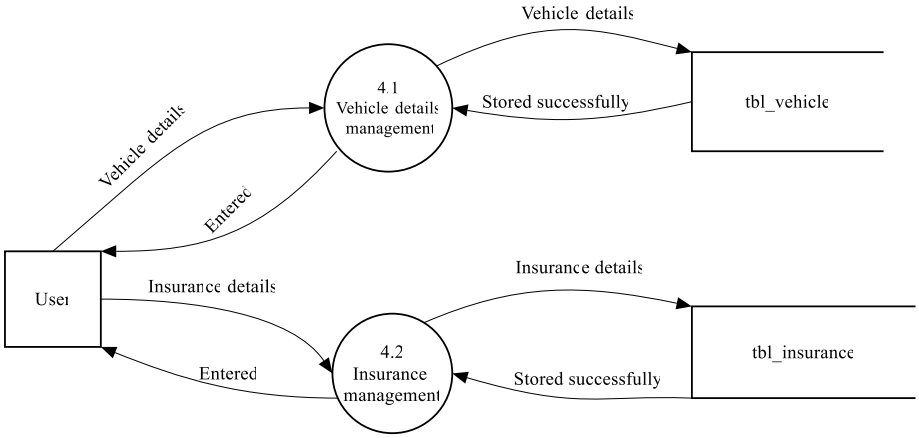
## Level 2 DFD Showing Customer Registration



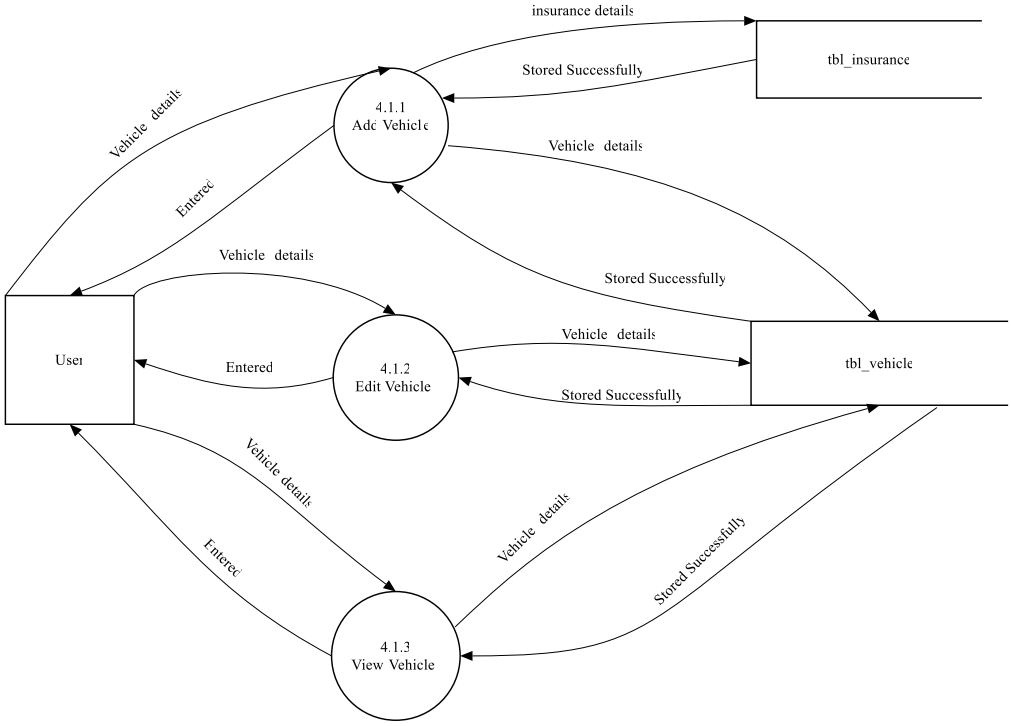
## Level 2 DFD Showing Vehicle Category Management



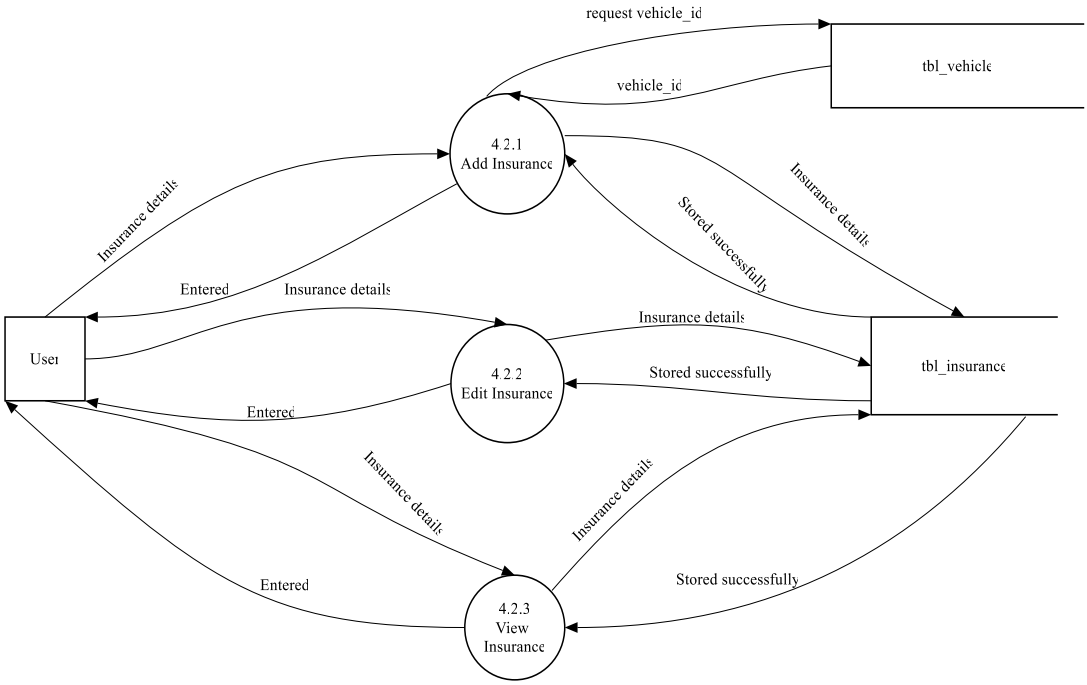

## Level 2 DFD Showing Vehicle Management



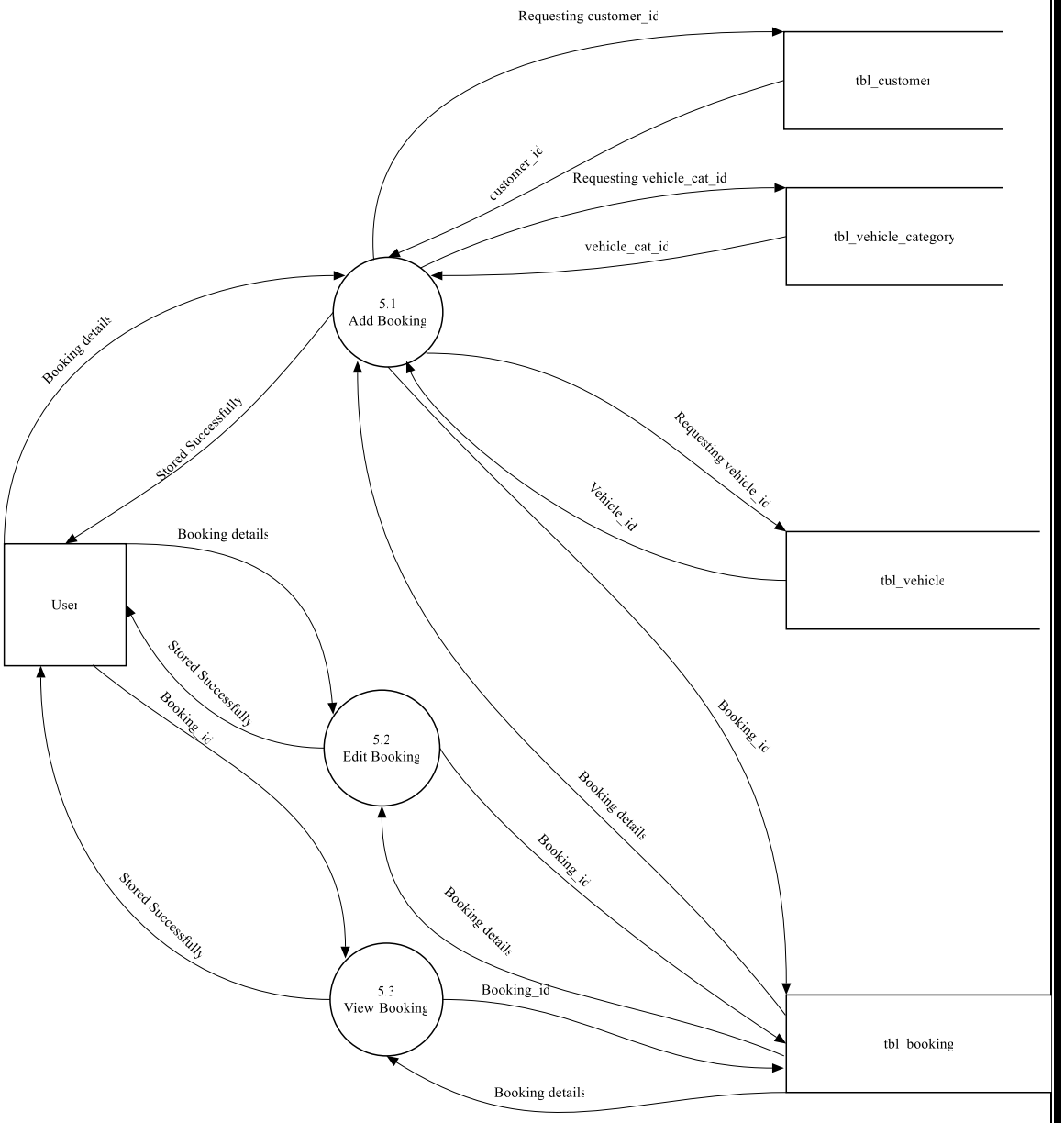
## Level 3 DFD Showing Vehicle detail management



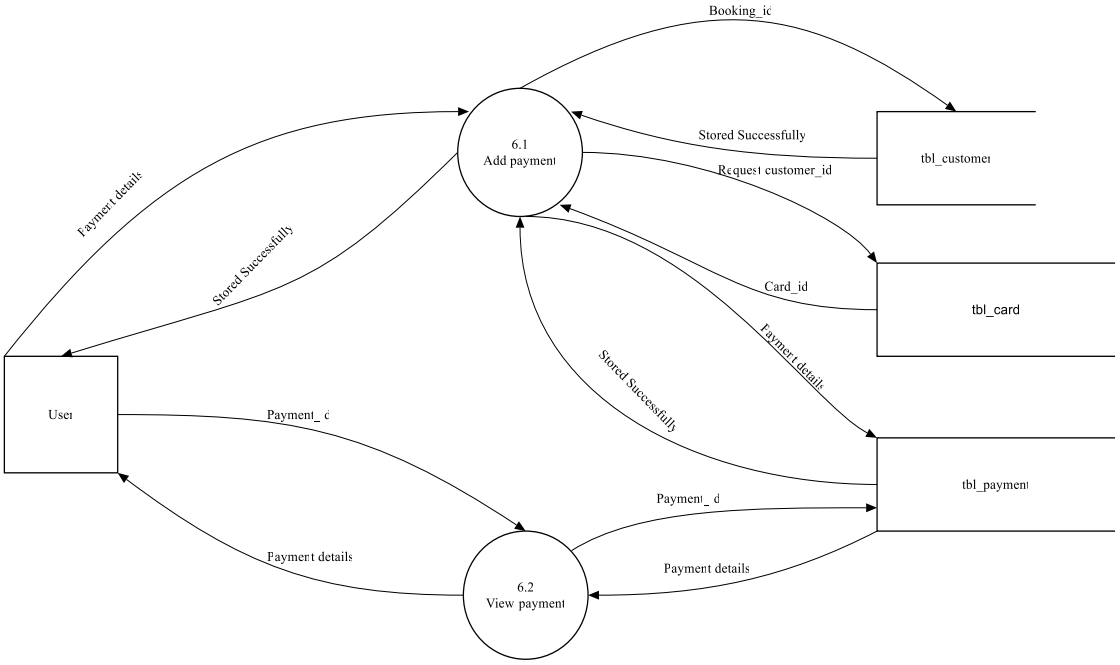

## Level 3 DFD showing insurance management



## Level 2 DFD Showing Booking Management



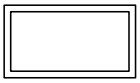
## Level 2 DFD Showing Payment Management



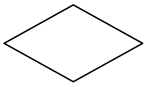
## 3.3 ENTITY RELATIONSHIP DIAGRAM

The ER model is a conceptual data model that views the real world as a construct of entities and associations or relationships between entities. A basiccomponent of the model is the Entity-Relationship diagram, which is used to visually represent data objects. The ER modeling technique is frequently usedfor the conceptual design of database applications and many database applications and many database design tools employ its concepts.

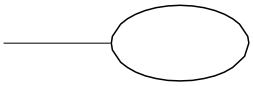
Entity Type



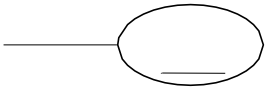
Weak Entity Type



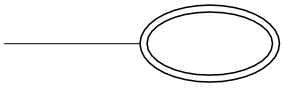
Relationship Type



Attribute

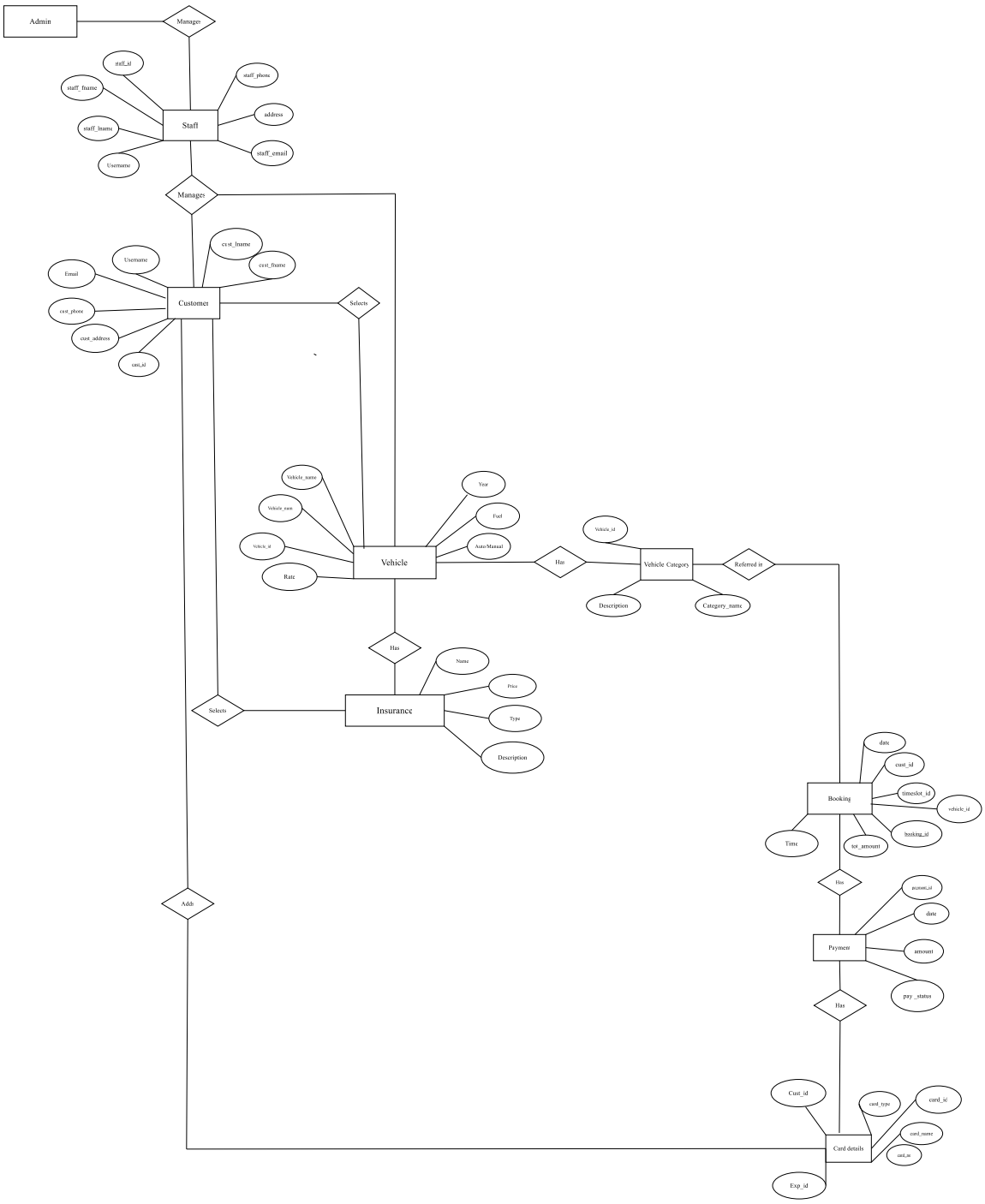


Key attribute



Multivalued Attribute

## ER Diagram Showing Car Rental Management System



## 4.3 DATABASE DESIGN

### 4.3.1 Normalization

Designing a database is a complex task and the normalization theory is a usefulaid in this design process. The process of normalization is concerned with transformation of conceptual schema into computer representation form.

A bad database design may lead to certain undesirable situations such as:

- Repetition of information
- Inability to represent certain information
- Loss of information

To minimize these anomalies, normalization may be used. If the database is in a normalized form, the data can be restructured and can maintain it easily. This is important that the databases using that we are using may free from data redundancy and inconsistency. For this need we maintain the tables in a normalized manner.

**First Normal Form**

A relation is in first Normal Form (1NF), if and only if all its attributes are based on single domain. The objective of normalizing a table is in to remove its repeating groups and ensure that all entries of the resulting table have at most single value.

**Second Normal Form**

A table is said to be in second Normal Form (2NF), when it is in 1 NF and every attribute in the record is functionally dependent upon the whole key, andnot just a part of the key.

**Third Normal Form**

A table is in third Normal Form (3NF), when it is in 2NF and every non-keyattribute is functionally dependent on just the primary key.

## TABLE DESIGN

1. **Table name:** tbl_login

   **Table description:** Login Details

| FIELD | DATA TYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| USERNAME | VARCHAR(30) | PRIMARY KEY | Username |
| PASSWORD | VARCHAR(20) | NOT NULL | Password |
| USER_TYPE | VARCHAR(10) | NOT NULL | User type |
| STATUS | VARCHAR(1) | NOT NULL | Active/Inactive |

2. **Table name:** tbl_staff

   **Table description:** Staff Details

| FIELD | DATA TYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| Staff_id | INT(5) | PRIMARY KEY | Staff id |
| Staff_fname | VARCHAR(20) | NOT NULL | Staff first name |
| Staff_lname | VARCHAR(20) | NOT NULL | Staff last name |
| Staff_phone | NUMERIC(10) | NOT NULL | Staff mobile no. |
| Staff_email | VARCHAR(20) | NOT NULL | Staff email id |
| Username | VARCHAR(30) | FOREIGN KEY | Staff username |
| Address | VARCHAR(30) | NOT NULL | Staff address |

**3. Table name:** tbl_customer

**Table description:** Customer Details

| FIELD | DATA TYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| Cust_id | NUMERIC(10) | PRIMARY KEY | Customer id |
| Cust_fname | VARCHAR(20) | NOT NULL | Customer first name |
| Cust_lname | VARCHAR(20) | NOT NULL | Customer last name |
| Cust_phone | NUMERIC(10) | NOT NULL | Customer phone number |
| Cust_address | VARCHAR(25) | NOT NULL | Customer address |
| Email | VARCHAR(15) | NOT NULL | Email id |
| Username | VARCHAR(30) | FOREIGN KEY | Customer username |

**4. Table name:** tbl_vehicle

**Table description:** Vehicle Details

| FIELD | DATATYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| Vehicle_id | INTEGER | PRIMARY KEY | Vehicle id |
| Insurance_id | INTEGER | FOREIGN KEY | Insurance id |
| Vehicle_num | VARCHAR(15) | NOT NULL | Vehicle number |
| Vehicle_name | VARCHAR(25) | NOT NULL | Vehicle name |
| Year | NUMERIC(4) | NOT NULL | Vehicle year |
| Auto/Manual | VARCHAR(15) | NOT NULL | Automatic or Manual |
| Fuel | VARCHAR(15) | NOT NULL | Fuel type |
| Rate | NUMERIC | NOT NULL | Rate of vehicle |

**5. Table name:** tbl_Vehicle_category

**Table description:** Vehicle Category Details

| FIELD | DATA TYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| Vehicle_id | NUMERIC(10) | PRIMARY KEY | Vehicle id |
| Category_name | VARCHAR(15) | NOT NULL | Name of category |
| Description | VARCHAR(100) | NOT NULL | Description |

**6. Table name:** tbl_insurance

**Table Description:** insurance details

| FIELD | DATA TYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| Insurance_id | INTEGER | PRIMARY KEY | Insurance id |
| Insurance_type | VARCHAR (30) | PRIMARY KEY | Insurance type |
| Vehicle_id | VARCHAR(30) | FOREIGN KEY | Vehicle id |
| Insurance_name | VARCHAR (15) | NOT NULL | Name of the insurance |
| Price | Decimal(10,0) | NOT NULL | Price |
| Description | VARCHAR(100) | NOT NULL | Description |

**7. Table name:** tbl_booking

**Table description:** Booking Master Details

| FIELD | DATA TYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| Booking_id | VARCHAR(10) | PRIMARY KEY | Booking id |
| Cust_id | NUMERIC(10) | FOREIGN KEY | Customer id |
| Status | VARCHAR(10) | NOT NULL | Paid/Pending |
| Date and Time | VARCHAR(10) | NOT NULL | Date and Time |
| Hours/Days | VARCHAR(10) | NOT NUL | Hour/Days |
| Tot_amount | DECIMAL(10,0) | NOT NULL | Total amount |

**8. Table name:** tbl_payment

**Table description:** Payment Details

| FIELD | DATA TYPE | CONSTRAINT | DESCRIPTION |
|---|---|---|---|
| Payment_id | NUMERIC(10) | PRIMARY KEY | Payment id |
| Pay_status | VARCHAR(20) | NOT NULL | Payment status |
| Booking_id | VARCHAR(10) | FOREIGN KEY | Booking id |
| Amount | NUMERIC(10) | NOT NULL | Amount |
| Date | VARCHAR(8) | FOREIGN KEY | Date |

**9. Table name:** tbl_card

**Table description:** Card Details

| **FIELD** | **DATA TYPE** | **CONSTRAINT** | **DESCRIPTION** |
|---|---|---|---|
| Card _id | VARCHAR(10) | PRIMARY KEY | Card id |
| Cust_id | NUMERIC(10) | FOREIGN KEY | Customer id |
| Card_no | BIGINT(20) | UNIQUE | Card number |
| Card_name | VARCHAR(20) | UNIQUE | Card name |
| Card_type | VARCHAR(15) | NOT NULL | Card type |
| Exp_date | VARCHAR(8) | NOT NULL | Expiry date |