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Title: Car Rental System

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1. ABSTRACT :

An online car rental system and services portal addresses these challenges by providing a comprehensive database of cars available for renting, as well as a range of services related to cars, such as servicing, repairs, and maintenance. They can also access detailed information about each car or service, including photos and other relevant details.

Car rental system is a software application designed to streamline and automate the process of renting vehicles to customers. This system enables rental companies to manage their fleet, handle customer reservations, track vehicle availability, and process payments efficiently. With the rise of the internet and technology, more and more people are turning to online platforms for their car related needs. Traditional methods of searching for cars or services can be time-consuming and often do not provide enough information to make an informed decision. Moreover, the pandemic has made it difficult for people to physically visit and interact with service providers in person.

In conclusion, an online car rental system and services portal simplifies the process of finding a suitable car or service, saves time and effort for users, and provides a seamless and convenient experience.

2. INTRODUCTION

Motivation : An online car rental system and services portal is a platform that provides users with a one-stop solution for all their car-related needs. The portal is designed to simplify the process of renting a car and availing services related to it. It offers a wide range of options for cars and services, as well as a user-friendly interface, secure transactions, and dedicated customer support.

A] Problem Definition :

The process of renting car or availing services related to a car can be time-consuming, confusing and often frustrating for individuals. The traditional methods of searching for cars or services through agents or other channels can be limited in their scope and may not provide the necessary information required to make an informed decision. Moreover, the pandemic has made it difficult for people to physically visit or interact with service providers in person.

To address these challenges, there is a need for an online car rental system, and services portal that can streamline the process, provide a wide range of options, and ensure transparency and convenience for users. The problem in the car rental industry involves managing the complex and often manual processes of vehicle reservations, inventory tracking, billing, and customer interaction. Rental companies struggle with ensuring that vehicles are available when needed, maintaining accurate records of reservations, and providing a seamless customer experience. Inaccuracies in vehicle availability, inefficient pricing calculations, and manual errors in billing often lead to customer dissatisfaction and loss of revenue. Furthermore, the lack of an integrated system makes it difficult for companies to track vehicle maintenance, usage patterns, and generate useful reports for business growth. A comprehensive car rental system is needed to address these challenges by automating these processes, ensuring real-time data accuracy, optimizing fleet management, and improving customer service through an easy-to-use platform.

B] SCOPE AND LIMITATIONS :

The scope of a car rental system covers a wide range of functionalities designed to streamline operations for both the rental company and its customers. At its core, the system enables customers to register, browse available vehicles, make reservations, and complete payments seamlessly. It also allows users to modify or cancel bookings as needed, with real-time updates on vehicle availability.

From the company's perspective, the system provides tools to manage their fleet, including adding, updating, and removing vehicles, tracking rental status, and scheduling maintenance. It

automates pricing based on vehicle type, rental duration, and additional services, ensuring accurate billing and invoicing. The system also facilitates customer data management, offering insights into rental history and preferences.

C] Advantages & Disadvantages of the system

Advantages:

1. Seamless vehicle reservations and payment processes
2. Real-time updates on vehicle availability and pricing.
3. Automation of fleet management and billing reduces errors.
4. Enhanced customer experience with user-friendly features.
5. Provides valuable insights into customer preferences and trends.

Disadvantages

1. High initial development and implementation costs.
2. System downtime can disrupt operations and user experience.
3. Requires regular maintenance and updates for optimal performance.
4. Customer data may face security vulnerabilities without safeguards.
5. Relies heavily on internet and technology, limiting offline access.

3. SYSTEM ANALYSIS

A] Functional Requirement

User registration and authentication: The portal should allow users to register and create an account to access its features. It should also have a secure authentication system to prevent unauthorized access.

Cars Listings: The system should allow users to search and view a comprehensive database of cars available for renting.

Services Listings: The system should allow users to search and view a range of services related to cars, such as cleaning, repairs, and maintenance.

Cars and Services Details: The system should provide detailed information about each car or service, including photos and other relevant details.

Booking and payment: The portal should allow users to book services online and make payments securely using payment options.

Car management: The portal should have a car management system that allows car owners to manage their cars, such as updating car details, managing bookings, and responding to customer inquiries.

Performance Requirements : The system should have a high-performance rate when executing user's input and should be able to provide feedback or response within a short period usually 50 seconds for the highly complicated task and 20 to 25 seconds for the less complicated task.

Security Requirements : The system should provide a high level of security and integrity of the data held by the system, only authorized personnel of the company can gain access to the company's secured page on the system, and only users with valid passwords and usernames can log in to view the user's page.

Non-Functional Requirements

a. Performance

- Response time: ≤ 2 seconds
- Support concurrent users

b. Scalability

- Handle peak users
- Transaction volumes

c. Availability

- 99.9% uptime
- Robust failover mechanisms

d. Security

- Data encryption (passwords, payments)
- HTTPS communication
- Regular vulnerability assessments

e. Usability

- Intuitive interface
- Accessibility (WCAG compliance)

a. Maintainability

- Easy updates, minimal downtime
- Modular architecture

B] System and Hardware Requirements

• Hardware Requirements

1. Server: High-performance server with sufficient storage.
2. Database: Reliable database server (e.g:- SQL).
3. Networking: Stable internet connection, firewall protection
4. Backup: Regular backup systems for data recovery.

• Software (S/W) Requirements

1. Operating System: Linux/Windows server OS.
2. Web Server: Apache/Nginx for hosting.
3. Database: MySQL/PostgreSQL.
4. Payment Gateway: Integration with secure payment system.
5. Frameworks: Web frameworks (e.g., Django, Laravel).
6. Security: firewall software.

C] Feasibility Study(Operational, Economical, Technical).

1. Operational Feasibility

Purpose: To determine whether the system will function efficiently and be accepted by users.

Feasibility Points:

- **User-Friendly Interface:** Simple navigation using HTML and CSS makes it accessible for both admins and customers.
- **Improved Booking Process:** Automates the manual process of car bookings and returns.
- **Role-Based Access:** Admins and customers have different dashboards to manage tasks efficiently.
- **Availability:** 24/7 access from any device with a browser on the local network or internet.

- **Acceptance:** Easy learning curve; no extensive training required.
Verdict: Feasible – The system can be easily adopted by users and streamlines daily operations.

2. Economic Feasibility

Purpose: To assess the financial benefits and costs of the project.

Cost Factors:

- **Development Tools:** Free and open-source (PHP, MySQL, HTML/CSS)
- **Hosting:** Can be hosted on local server or low-cost shared hosting
- **Maintenance:** Minimal – mainly database backups and occasional updates
- **Training:** Basic, if any – system is intuitive

Benefit Factors:

- **Reduces Paperwork** and Manual Work
- **Increases Efficiency** in handling bookings and vehicle availability
- **Scalable:** New features can be added as needed (e.g., payment integration, reports)

Verdict: Highly Economical – Low investment with high return in productivity and accuracy.

3. Technical Feasibility

Purpose: To evaluate whether the system can be developed with existing technology and skills.

Technical Stack:

- **Frontend:** HTML, CSS
- **Backend:** PHP
- **Database:** MySQL
- **Server:** Apache (XAMPP/LAMP – widely used and supported)

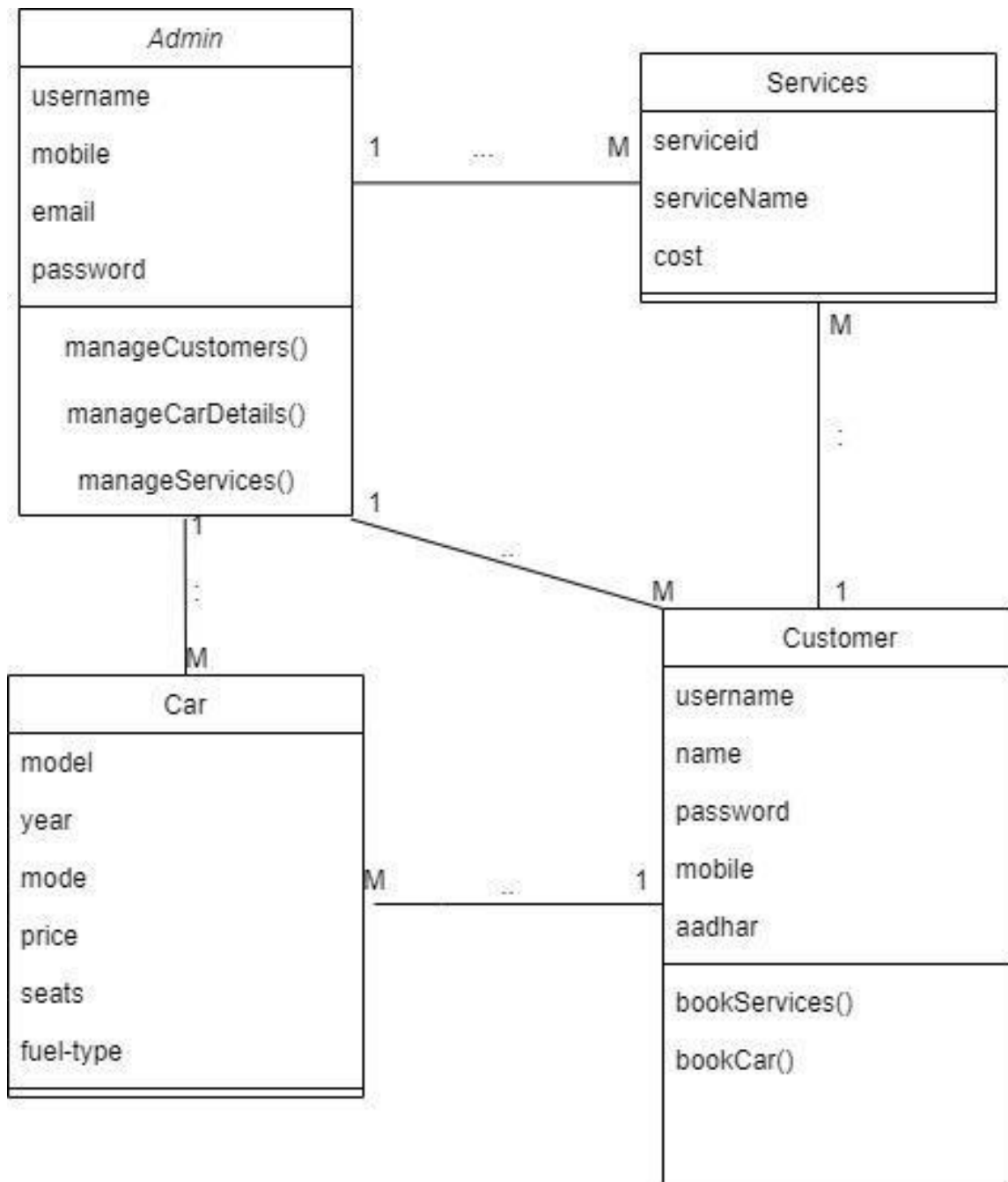
Supporting Points:

- **Easily Deployable** on Linux-based systems
- **Cross-Platform Browser Access**
- **No Special Hardware Requirements**
- **Open Source Tools** – well-documented and community-supported

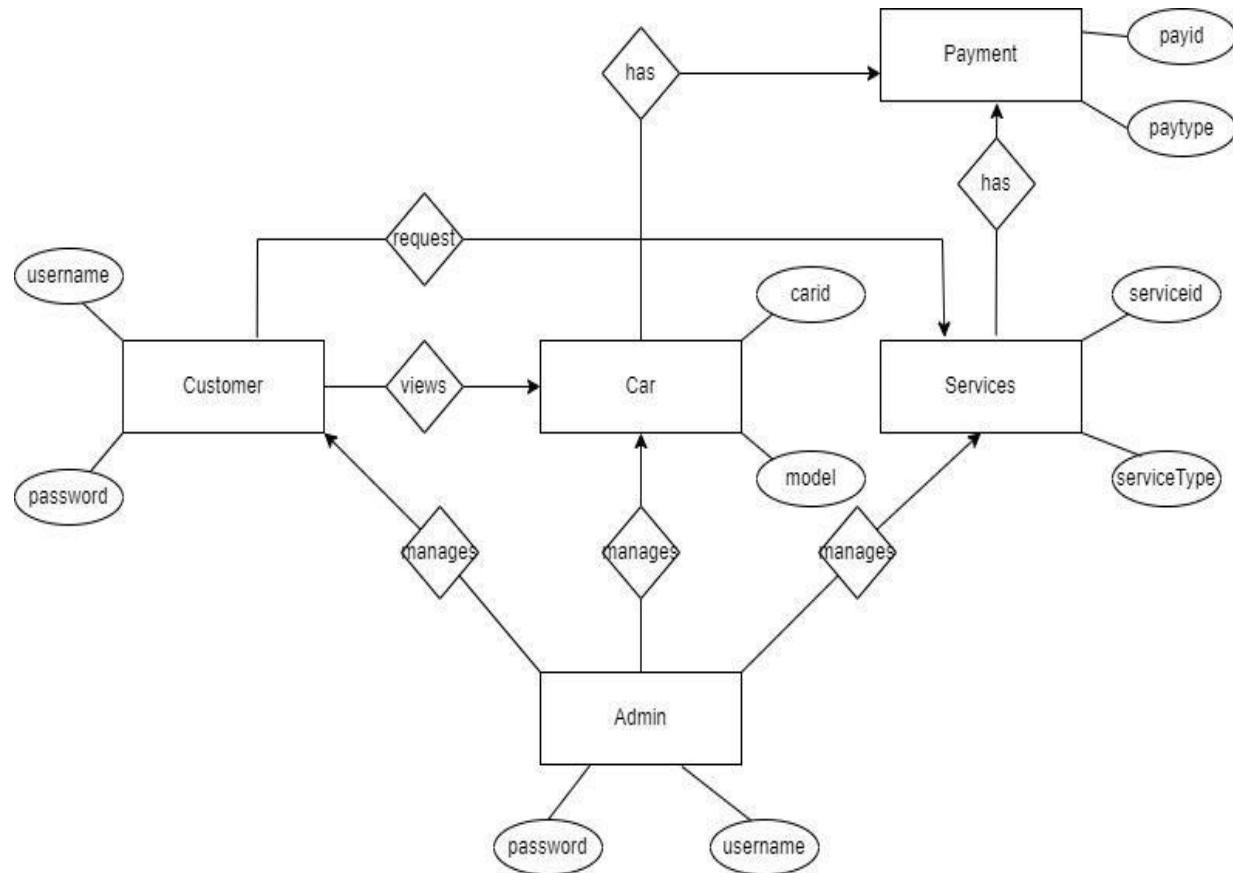
Verdict: Technically Feasible – All required technologies are stable, available, and widely supported.

4] SYSTEM DESIGN

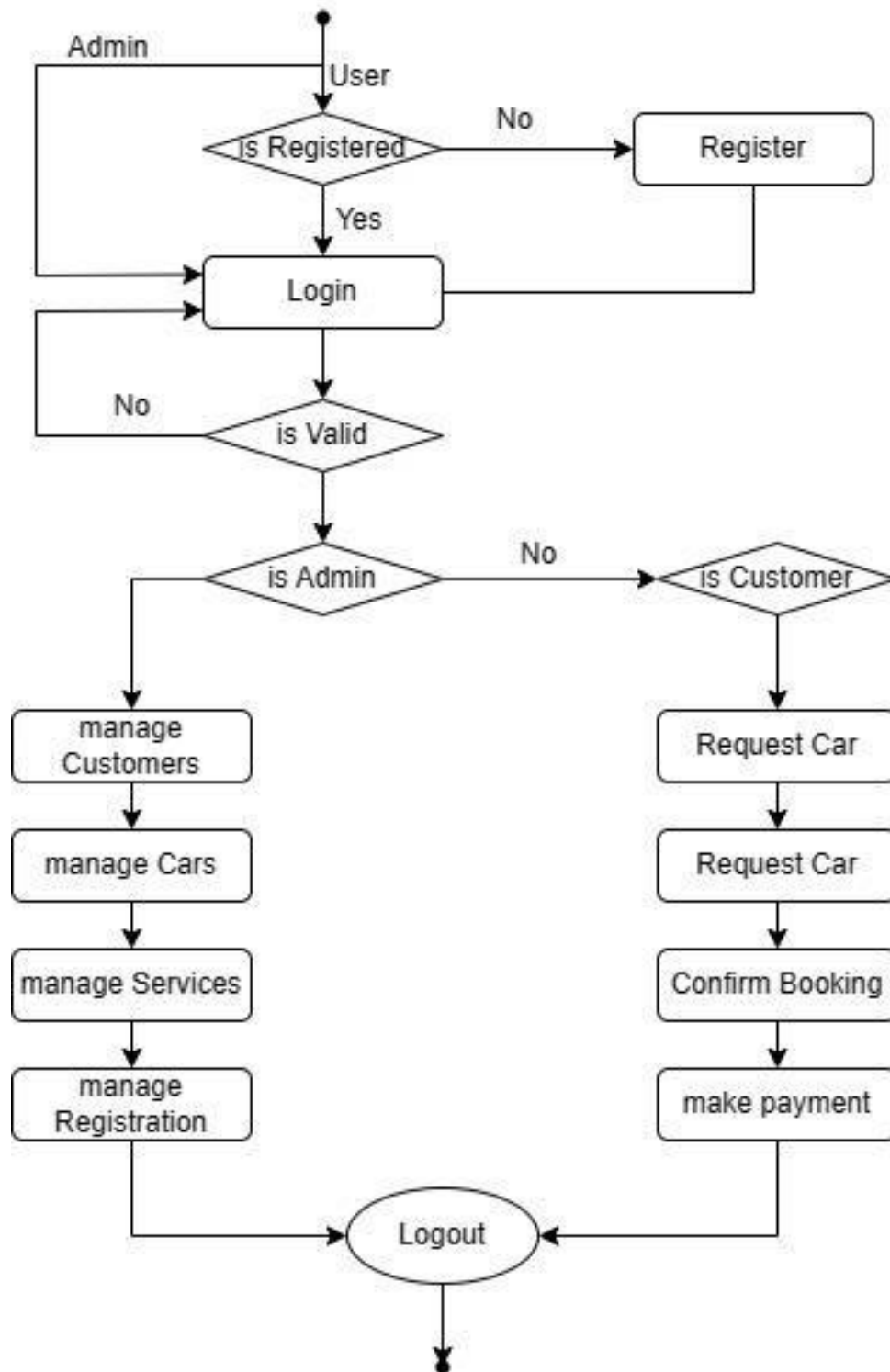
A] Class Diagram



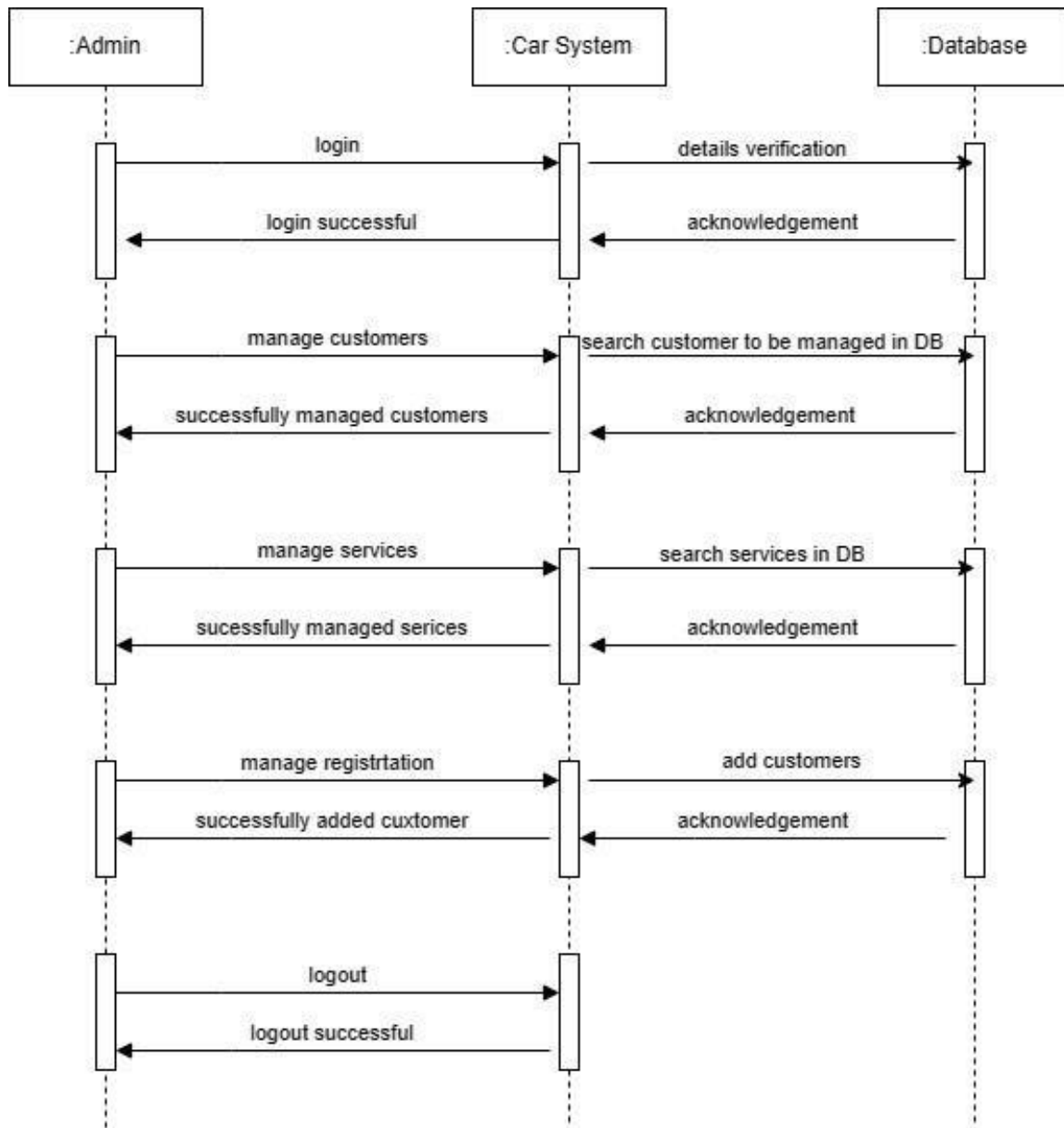
B] ER Diagram



C] Activity Diagram



D] SEQUENCE DIAGRAM



F] Data Dictionary

```
car=# \d customer;
```

Table "public.customer"				
Column	Type	Collation	Nullable	Default
email	character varying(30)		not null	
password	character varying(20)			
fname	character varying(20)			
mobilenno	character varying(15)			
aadhar	character varying(15)			

```
Indexes:
```

```
    "customer_pkey" PRIMARY KEY, btree (email)
```

```
car=# \d car;
```

Table "public.car"				
Column	Type	Collation	Nullable	Default
model	character varying(20)			
year	character varying(20)			
mode	character varying(20)			
price	character varying(20)			
seats	integer			
fueltype	character varying(10)			

```
car=# \d booking;
```

Table "public.booking"				
Column	Type	Collation	Nullable	Default
pickup	character varying(20)			
date	character varying(20)			
days	integer			
driver	character varying(10)			
payment	character varying(20)			

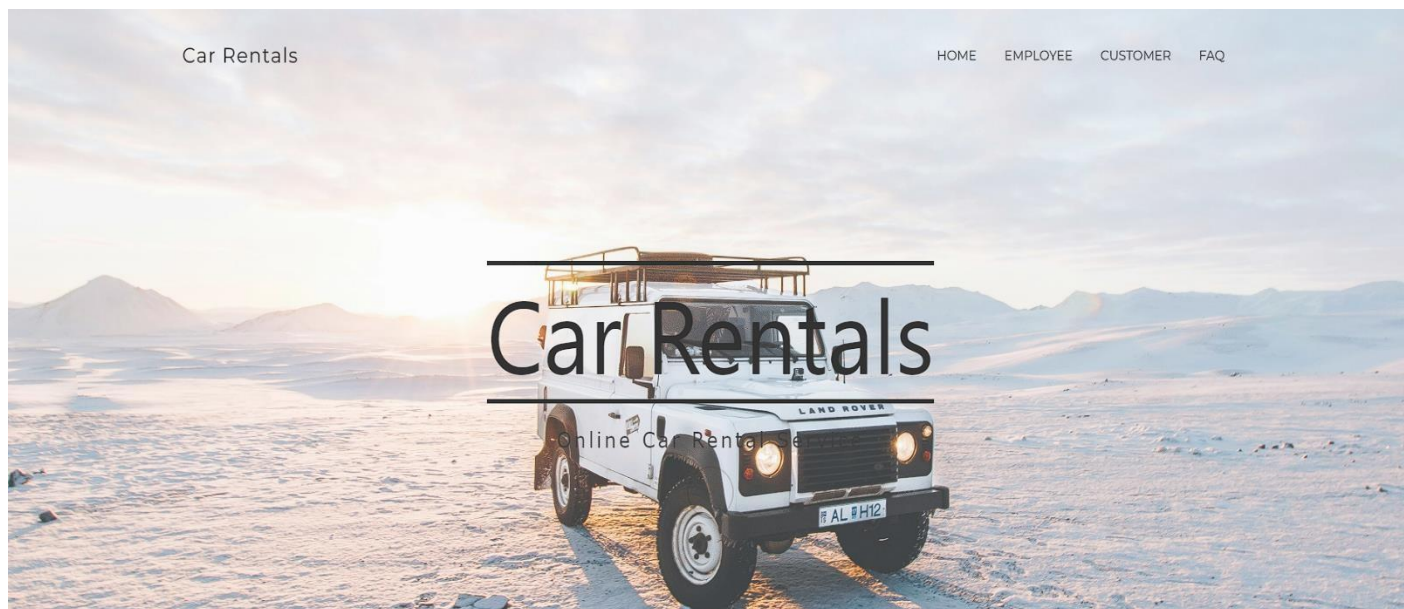
```
car=# \d payments;
```

Table "public.payments"				
Column	Type	Collation	Nullable	Default
cardname	character varying(20)			
cardno	character varying(20)			
expmonth	integer			
expyear	integer			
cvv	integer			











5. USER MANUAL

A]Operational Instruction

IMPLEMENTATION DETAIL



AVAILABLE CARS

 <p>Audi A4 AC Fare: Rs. 36/km & Rs.5200/day Non-AC Fare: Rs. 26/km & Rs.2600/day</p>	 <p>Hyundai Creta AC Fare: Rs. 22/km & Rs.2900/day Non-AC Fare: Rs. 12/km & Rs.1400/day</p>	 <p>Mercedes-Benz E-Class AC Fare: Rs. 45/km & Rs.7200/day Non-AC Fare: Rs. 30/km & Rs.5200/day</p>	 <p>Ford EcoSport AC Fare: Rs. 21/km & Rs.3890/day Non-AC Fare: Rs. 13/km & Rs.2600/day</p>	 <p>Land Rover Range Rover Sport AC Fare: Rs. 36/km & Rs.6000/day Non-AC Fare: Rs. 26/km & Rs.4600/day</p>
 <p>MG Hector AC Fare: Rs. 20/km & Rs.2800/day</p>	 <p>Honda CR-V AC Fare: Rs. 22/km & Rs.2850/day</p>	 <p>Mahindra XUV 500 AC Fare: Rs. 15/km & Rs.3000/day</p>	 <p>Toyota Fortuner AC Fare: Rs. 16/km & Rs.3200/day</p>	 <p>Hyundai Veloster AC Fare: Rs. 23/km & Rs.4500/day</p>

localhost:8080/carrentalfirst/Car_Rental-PHP/booking.php?id=6


B] INPUT SCREEN

Car Rentals - Employee Panel


Please LOGIN to continue.

Login

* Username:



* Password:



SUBMIT

or


Create a new account.

Car Rentals - Customer Panel


Please LOGIN to continue.

Login

* Username:



* Password:

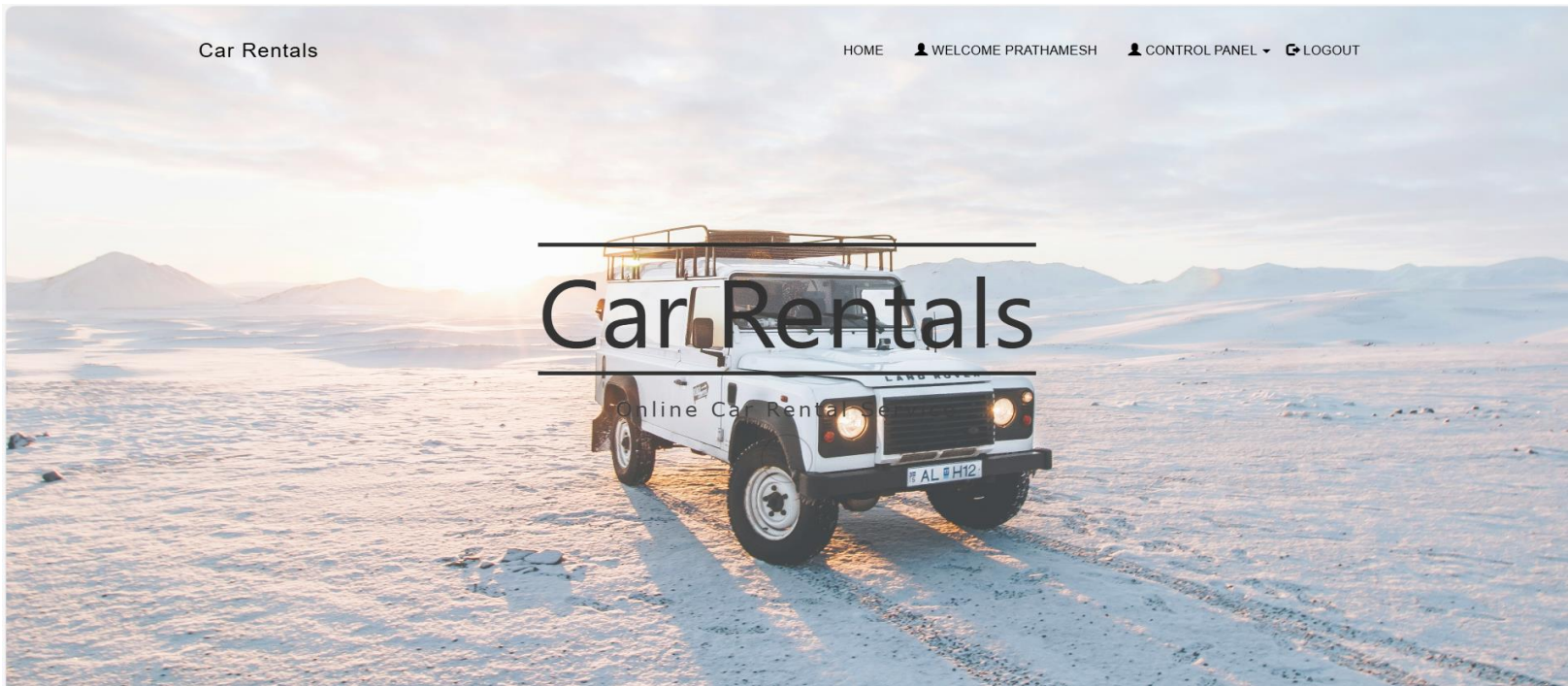


SUBMIT

or

Create a new account.

Employee Panel:



From here Employee can add their cars:

Car Rentals

Home

👤 Welcome Prathamesh

👤 Control Panel ▾

🚪 Logout

Please Provide Your Car Details.

Choose File No file chosen

SUBMIT FOR RENTAL

Here is the list of empolyee's register cars:

My Cars

	Name	Nameplate	AC Fare (/km)	Non-AC Fare (/km)	AC Fare (/day)	Non-AC Fare (/day)	Availability
>	Audi A4	GA3KA6969	36	26	5200	2600	yes
>	BMW 6-Series	BA10PA5555	39	30	6950	5999	yes
>	Honda Amaze	PJ16YX8820	14	12	2800	2400	yes
>	Land Rover Range Rover Sport	GA5KH9669	36	26	6000	4600	no
>	MG Hector	GA6PA6666	20	12	2900	1400	yes
>	Mahindra XUV 500	KA12EX1883	15	13	3000	2600	yes
>	Toyota Fortuner	GA08MX1997	16	14	3200	2800	yes
>	Volvo	MH14VV7838	14	10	1000	700	no

Employee can add driver:

Enter Driver Details

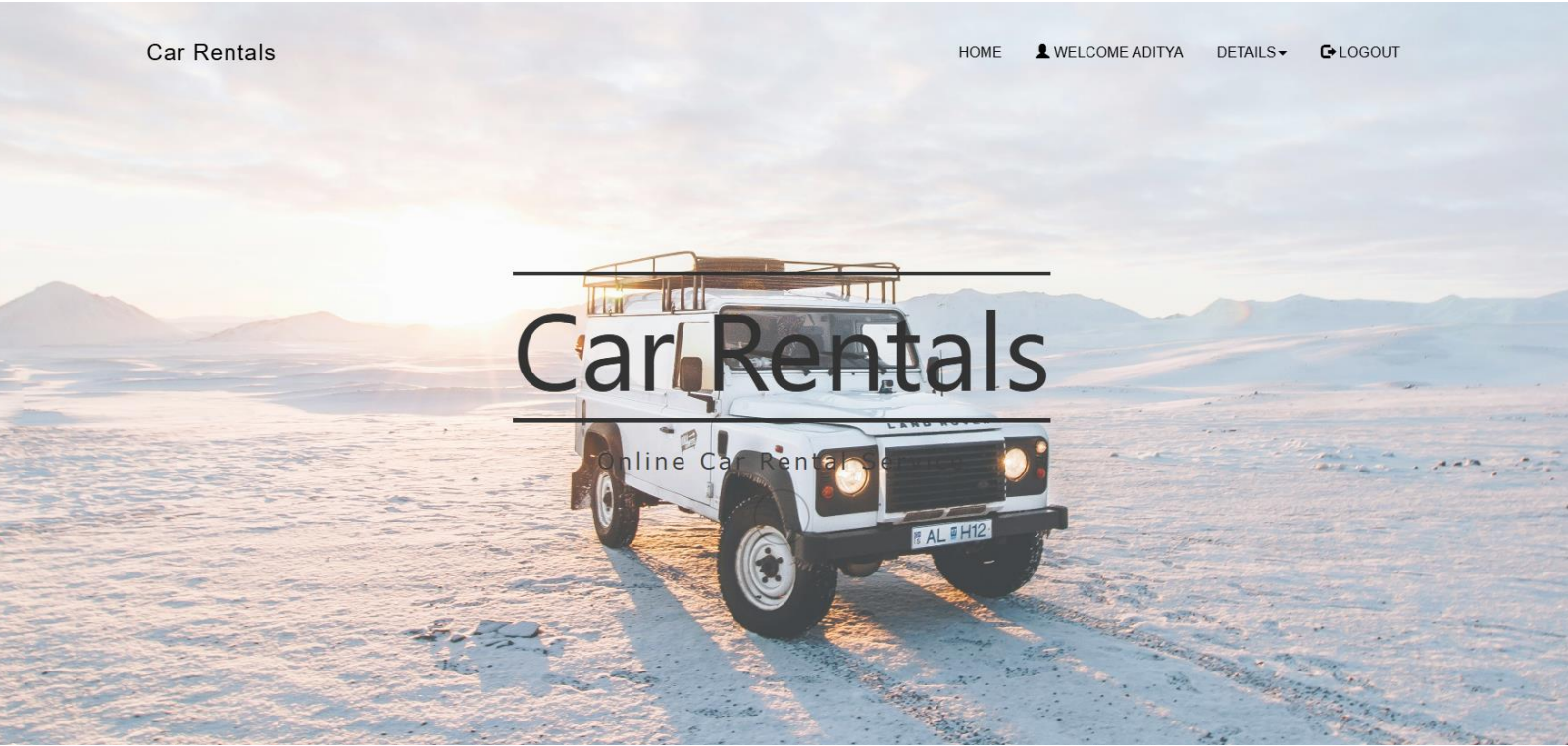
ADD DRIVER

Listed Drivers by emplopyee:

My Drivers

	Name	Gender	License No.	Contact	Address	Availability
>	Aditya G	Male	78948647932	8788331567	Nigdi	yes
>	akash	Male	32346288078	9147523682	1506 Skinner Hollow Road	no
>	omkar	Male	44919316260	7541023695	Breezewood Court	no
>	Ravi	Male	27840218658	9547863157	1782 Vineyard Drive	yes
>	yash	Male	03191563155	9147523684	4354 Hillcrest Drive	yes

Customer Panel:



Customer book cars:

Car Rentals

HomeWelcome AdityaDetailsLogout

Your Bookings

Hope you enjoyed our service

Car	Start Date	End Date	Fare	Distance (kms)	Number of Days	Total Amount
Ford EcoSport	2018-06-01	2018-06-28	Rs. 15/km	69	27	Rs. 5035
Audi A4	2018-07-24	2018-07-25	Rs. 10/km	500	1	Rs. 5000
Honda CR-V	2018-07-25	2018-07-30	Rs. 10/km	60	2	Rs. 600
Honda Amaze	2018-08-13	2018-08-17	Rs. 14/km	100	4	Rs. 484200
Audi A4	2025-03-25	2025-03-26	Rs. 36/km	100	1	Rs. 4200
Hyundai Creta	2025-04-25	2025-04-26	Rs. 22/km	100	1	Rs. 2200

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Customer return cars:

Return your cars here

Hope you enjoyed our service

Car	Rent Start Date	Rent End Date	Fare	Action
Land Rover Range Rover Sport	2025-04-26	2025-04-30	Rs. 6000/day	Return
Volvo	2025-04-26	2025-04-27	Rs. 1000/day	Return

6. Testing

A] Testing Technique Used

For the Car Rental System project, the following test techniques were used:

1. Black Box Testing:

Focused on testing the functionality of the system without looking into the internal code structure. Verified that the car booking, availability checking, service information, and payment processing features worked correctly according to the requirements.

2. Functional Testing:

Each module (user login, car search, booking system, payment gateway, admin panel) was tested individually to ensure it meets the specified functional requirements.

3. Database Testing:

Ensured that data such as user details, car details, bookings, and payment information are correctly stored, retrieved, updated, and deleted in the database.

4. UI/UX Testing:

Checked the user interface for correctness, responsiveness, and ease of use. Ensured that the portal works smoothly on different devices and screen sizes.

5. Integration Testing:

Tested the interaction between different modules, such as user registration with booking, booking with payment, and admin management with car listings.

6. Security Testing (Basic):

Verified that sensitive data like passwords are securely handle

B] Test Case

Test Case Id	Module Name	Application Role	Description	Expected Result	Actual Result	Status
TC01	Login Page	User	Verify successful login with valid credentials	User should be logged in and redirected to the home page.	Logged in successfully and redirected to home page	Pass
TC02	Login Page	User	Verify error message displayed for invalid email	An error message should be displayed indicating an invalid email.	Displays error message indicating invalid email	Pass
TC03	Login Page	User	Verify error message displayed for incorrect password	An error message should be displayed indicating an incorrect password.	Displays error message indicating incorrect password	Pass
TC04	Login Page	User	Verify error message displayed for blank email and password fields	An error message should be displayed indicating required fields.	Display error message indicating required fields	Pass
TC05	Login Page	Admin	Verify successful login with valid administrator credentials	Administrator should be logged in and redirected to the admin page.	Logged in successfully and redirected to home page	Pass
TC06	Login Page	Admin	Verify error message displayed for invalid administrator email	An error message should be displayed indicating an invalid email	Displays error message indicating invalid email	Pass

st CasesTC07	Login Page	Admin	Verify error message displayed for incorrect administrator password	An error message should be displayed indicating an incorrect password.	Displays error message indicating incorrect password	Pass
TC08	Login Page	Admin	Verify error message displayed for blank administrator email and password fields	An error message should be displayed indicating required fields.	Display error message indicating required fields	Pass

Test Case Id	Module Name	Application Role	Description	Expected Result	Actual Result	Status
TC01	Registration Page	User	Verify successful registration with valid credentials	User should be registered and redirected to the home page.	Registered successful and redirected to home page	Pass
TC02	Registration Page	User	Verify error message displayed for invalid email	An error message should be displayed indicating an invalid email.	Displays error message indicating invalid email	Pass
TC03	Registration Page	User	Verify error message displayed for invalid phone number	An error message should be displayed indicating an invalid phone number.	Displays error message indicating invalid phone number	Pass
TC04	Registration Page	User	Verify error message	An error message	Displayerror message	Pass

TC05	Registration Page	User	Verify error message displayed for invalid password	An error message should be displayed indicating an invalid password.	Displays error message indicating invalid password	Pass
TC06	Registration Page	User	Verify error message displayed for mismatched password	An error message should be displayed indicating mismatched passwords.	Displays error message indicating mismatched passwords	Pass
TC07	Registration Page	Admin	Verify successful registration with valid administrator credentials	Administrator should be registered and redirected to the admin page.	Registered successful and redirected to home page	Pass
TC08	Registration Page	Admin	Verify error message displayed for invalid Administrator email	An error message should be displayed indicating an invalid email.	Displays error message indicating invalid email	Pass
TC09	Registration Page	Admin	Verify error message displayed for invalid phone number	An error message should be displayed indicating an invalid phone number.	Displays error message indicating invalid phone number	Pass
TC10	Registration Page	Admin	Verify error message displayed for blank	An error message should be displayed indicating	Displays error message indicating	Pass

			required fields	required fields.	required fields	
TC11	Registration Page	Admin	Verify error message displayed for invalid password	An error message should be displayed indicating an invalid password.	Displays error message indicating invalid password	Pass
TC12	Registration Page	Admin	Verify error message displayed for mismatched password	An error message should be displayed indicating mismatched passwords.	Displays error message indicating mismatched passwords	Pass

7. Future Enhancement

The future scope of a car rental system is shaped by evolving technologies, customer expectations, and sustainability trends. Here are some key areas where a car rental system can expand and innovate in the future:

1. *Integration of Electric and Autonomous Vehicles (EVs & AVs)*

- **Electric Vehicles (EVs):** With the rise of electric cars and the growing demand for sustainability, car rental systems will increasingly offer a larger fleet of EVs. Partnerships with charging infrastructure providers will also be key.
- **Autonomous Vehicles (AVs):** As self-driving car technology matures, car rental companies may offer autonomous cars, allowing customers to rent a car that drives itself, reducing the need for human drivers and enhancing convenience.

2. Subscription-based Models

- Subscription models can offer a flexible alternative to traditional car ownership. Customers can subscribe to a car rental service for a monthly fee, allowing them to switch between different vehicles depending on their needs without the long-term commitment of buying a car.

3. Seamless Mobile and Web Experiences

- Future systems will continue to integrate mobile-first experiences, enabling customers to book, manage, and return cars using smartphones. Contactless transactions, keyless entry, and biometric verification are also expected to improve customer experiences.

4. Blockchain for Secure Transactions

- Blockchain technology can enhance security and transparency in transactions, especially in verifying customer credentials, handling payments, and managing rental contracts. This could minimize fraud and ensure secure digital identities for both the customer and the car rental company.

5. Sustainability and Carbon Footprint Tracking

- Future car rental platforms might provide tools for customers to track their carbon footprint, offering them options to offset their emissions or choose more eco-friendly vehicle options.

6. 5G and IoT Connectivity

- 5G technology will enable faster, more reliable connectivity between vehicles and rental systems. This will allow real-time updates on vehicle availability, traffic conditions, and predictive maintenance needs. IoT devices within cars could monitor vehicle performance, provide feedback on driving habits, and offer remote control features.

7. Global Expansion and Cross-border Rentals

- With globalization and increased travel, car rental companies will expand their networks, making it easier for customers to rent vehicles across countries. Streamlining legal and insurance requirements for cross-border rentals will be a key challenge to address.

8. CONCLUSION

The conclusion of a car rental system focuses on its importance as a vital service in modern transportation, offering flexibility, convenience, and affordability for personal and business travel. It serves as an alternative to vehicle ownership, catering to a wide range of customer needs, from short-term rentals to long-term leasing. As technology advances, car rental systems are expected to evolve significantly, integrating features like electric vehicles, autonomous driving, and seamless digital experiences. Additionally, sustainability efforts and customer-centric innovations will drive the future of car rentals, ensuring their relevance in an ever-changing transportation landscape. Ultimately, the success of a car rental system lies in its ability to adapt to emerging trends while maintaining efficiency, cost-effectiveness, and customer satisfaction.

The future scope of car rental systems will be shaped by the integration of advanced technologies like AI, IoT, and blockchain, along with trends toward sustainability, electrification, and customer-centric services. Companies that adapt to these changes will not only stay competitive but also offer enhanced customer experiences and contribute to the evolving transportation landscape.

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