

CAR PARKING SYSTEM

Project submitted to the
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CSE305L Software Engineering Lab

Submitted by

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Table of Contents

Table of Contents	1
Abstract.....	3
1. Introduction	4
ADMIN	4
USER.....	5
PURPOSE.....	5
SCOPE	5
2. Methodology.....	6
3. Discussion	7
Admin table:.....	7
Users table:.....	7
Vehicle table:	8
4. System Requirements	9
Hardware Configuration:	9
Client Side:	9
Server side:	9
Software Requirement:	9
Client Side:	9
Server Side:.....	10
APACHE.....	10
PHP	10
MYSQL.....	11
5. Analysis and Design.....	11
Analysis:.....	11
Disadvantage of present system:.....	11
Design Introduction:	12
USECASE DIAGRAMS:.....	12
ER DIAGRAM.....	14
Data Flow Diagram	15
Level 0 dfd.....	16
Level 1 dfd.....	17
6. Functional Requirements.....	17

7. Non functional requirements	19
8. Implementation and System Testing	21
System Testing	21
UNIT TESTING.....	21
INTEGRATION TESTING	21
9. Results/Screenshots	22
10. Conclusion	24
11. Future Work.....	26
References	27

Abstract

This abstract provides an overview of a car parking system project aimed at addressing the challenges associated with managing and organizing parking spaces in urban areas. It aims on developing a smart parking system that utilizes advanced technologies and automated processes to optimize parking operations. The system incorporates various components and details of the users.

The project focuses on addressing the increasing challenges of limited parking spaces, traffic congestion, and manual parking management. The car parking system maintains a good record of vehicles check in and checkout time. It will track the entry and exit of the vehicles, maintain a listing of vehicles within the parking lot, and the admin determines the parking cost of the vehicles.

By implementing this car parking system, the project aims to enhance the overall parking experience, reduce search time for parking, and minimize traffic congestion. Additionally, it seeks to improve resource utilization and contribute to a more sustainable urban environment by promoting efficient use of parking spaces.

The abstract outlines the objectives, methodologies, and anticipated outcomes of the car parking system project, highlighting its potential to revolutionize and transform parking management and provide a convenient and sustainable solution for urban dwellers. So that, parking is better managed and experienced in urban environments.

1. Introduction

Car Parking System is a web-based technology that will manage the records of the incoming and outgoing vehicles in an parking house. It's an easy for Admin to retrieve the data if the vehicle has been visited through the parking system. The admin controls what cars go in the parking system and what cars come out the parking system, the admin has the data of all the cars and the information of the users who have parked their cars in the parking area.

The Car parking management system is an automatic system which delivers data processing in very high speed in a systematic manner.

In the system, we use PHP and MySQL database. We also use Html, CSS and JavaScript. This is the project which keeps records of the vehicles which are going to parking lot in the parking area. The system has two modules admin and user.

ADMIN

Dashboard: In this section, the admin can briefly view the number of vehicle entries in a particular period. The number of vehicles which have entered the parking area today, the previous day and the last 7 days are displayed on the dashboard.

Add Car: In this section, admin can add a vehicle which is about to go to the parking area, the admin has to add the details of the vehicle which include the company of the car, the registration number of the car and some user details.

Manage Vehicle: In this section, admin can manage incoming and outgoing vehicle and admin can also add parking charges and his/her remarks. The admin observes the vehicles that go in and out of the parking lot, and updates the database accordingly.

Reports: In this section, admin can generate and view the vehicle entry reports between any two given dates.

Search: In this section, admin can search for any particular vehicle with the help of the parking number.

Admin can also update his profile, change the password and recover the password.

USER

Dashboard: It is the welcome page for users, where the name of the user is displayed. This page is displayed as soon as the user logs in.

View Car: In this section, the users can view the details of their car, which is parked by him/her. The user can also print their details or their parking receipt.

Users can also update his profile, change the password and recover the password.

PURPOSE

The purpose of developing car parking management system is to computerized the tradition way of parking. Another purpose for developing this application is to generate the report automatically.

SCOPE

In the modern age. Many people have vehicles. Vehicle is now a basic need. Every place is under the process of urbanization. There are many corporate offices and shopping centers etc. There are many recreational places where people used to go for refreshment. So, all these places need a parking space where people can park their vehicles safely and easily. Every parking area needs a system that records the detail of vehicles to give the facility. With the help of this system, we can deliver a good service to customer who wants to park their vehicle into the any organization's premises.

2. Methodology

Requirement Analysis: After a thorough analysis of the requirements and objectives of the car parking system project and inputs from stakeholders, administrators, users, and any other relevant parties. We identified the core functionalities, system constraints, and desired outcomes.

System Design: A detailed system design that encompasses both the front-end and back-end components of the car parking system are created. The system architecture, database structure, and user interface design ensure scalability, security, and usability considerations are incorporated into the design.

Technology Selection: The appropriate web development technologies for the project, considering factors such as compatibility, scalability, performance, and ease of implementation. Technologies like HTML, CSS, JavaScript, PHP, and MySQL are selected to fulfill the system requirements.

Database Design: The database schema is designed using a robust relational database management system (RDBMS) like MySQL. The necessary tables, relationships, and data attributes to store parking-related information, user details, reservations, and transaction records are defined.

Front-end Development: The user interface using HTML, CSS, and JavaScript are implemented. Intuitive and responsive web pages for user registration, login, searching for parking spaces, making reservations, and viewing payment details are developed

Back-end Development: PHP is utilized as the server-side scripting language to handle the logic and business processes of the car parking system. Implement functionalities like user authentication, reservation management, payment processing, and data validation. Integrate the back-end with the database for seamless data retrieval and storage.

Integration and Testing: Integrate the front-end and back-end components of the car parking system. Conduct comprehensive testing to ensure the system functions correctly, handles edge cases, and performs optimally. Test functionalities such as

user registration, reservation creation, payment processing, and database interactions.

Deployment and Launch: The car parking system is deployed into a production environment, ensuring compatibility with hosting requirements. Set up necessary security measures, such as SSL certificates and data encryption, to protect user information.

Maintenance and Enhancements: a maintenance plan for regular system updates, bug fixes, and security patches must be established. Gather user feedback and evaluate the system's performance to identify areas for improvement. Continuously enhance the car parking system with new features, based on user needs and technological advancements.

3. Discussion

The car parking system project uses several tech stacks, such as Html, CSS, JavaScript, Php, MySql and web servers like Xampp. We use three major database tables at the backend. The tables are as follows

Admin table:

The admin table consists of the information related to the admin such as name, mobile number, email, etc.

	ID	AdminName	UserName	MobileNumber	Email	Password	AdminRegdate
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	1	Admin	admin	7898799798	tester1@gmail.com	f925916e2754e5e03f75dd58a5733251	2023-05-17 11:08:23

Users table:

The users table contains the information of all the users that have registered through the register page of the car parking system.

	ID	FirstName	LastName	MobileNumber	Email	Password	RegDate
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	1	Amrit	Gosh	1234567890	amritg@gmail.com	f925916e2754e5e03f75dd58a5733251	2023-05-19 23:35:56
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	3	Sita	Mallipamula	8978303450	sitachandram@gmail.com	803205ab3f1b9b6fa6990393f5ac6b58	2023-05-21 18:01:13

Vehicle table:

The vehicle table contains the information of all the cars that have entered and exited the parking area. It also contains the information of the user that uses the vehicle(car).

ID	ParkingNumber	VehicleCompanyname	RegistrationNumber	OwnerName	OwnerContactNumber	InTime	OutTime	ParkingCharge	Remark	Status
1	521796069	Hyundai	DEL-678787	Rakesh Chandra	7987987987	2023-05-17 11:28:38	2022-05-17 17:08:04	50 Rs	NA	Out
2	469052796	Activa	DEL-895623	Pankaj	8989898989	2023-05-18 14:28:38	2022-05-18 16:39:33	35 Rs.	NA	Out
3	734465023	Hondacity	DEL-562389	Avinash	7845123697	2023-05-18 14:28:38	2022-05-18 14:29:36	50 Rs.	Vehicle Out	Out
4	432190880	Hero Honda	DEL-451236	Harish	1234567890	2023-05-18 14:28:38	2022-05-18 23:37:00	35 Rs.	Vehicle Out	Out

The system uses all the three tables in a database to collect information from the user and their vehicle. It helps to make a count of how many vehicle enters and leaves the parking area.

4. System Requirements

Hardware Configuration:

Client Side:

RAM	512 MB
Hard disk	10 GB
Processor	1.0 GHz

Server side:

RAM	1 GB
Hard disk	20 GB
Processor	2.0 GHz

Software Requirement:

Client Side:

Web Browser	Google Chrome or any compatible browser
Operating System	Windows or any equivalent OS

Server Side:

Web Server	APACHE
Server side Language	PHP5.6 or above version
Database Server	MYSQL
Web Browser	Google Chrome or any compatible browser
Operating System	Windows or any equivalent OS

APACHE

The Apache HTTP Server Project is an effort to develop and maintain an open-source HTTP server for modern operating systems including UNIX and Windows. The goal of this project is to provide a secure, efficient and extensible server that provides HTTP services in sync with the current HTTP standards.

The Apache HTTP Server ("httpd") was launched in 1995 and it has been the most popular web server on the Internet since April 1996. It has celebrated its 20th birthday as a project in February 2015.

PHP

- PHP stands for PHP: Hypertext Preprocessor.
- PHP is a server-side scripting language, like ASP.
- PHP scripts are executed on the server.

- PHP supports many databases (MySQL, Informix, Oracle, Sybase, Solid, Generic ODBC, etc.).
- PHP is an open source software .
- PHP is free to download and use.

MYSQL

- MySQL is a database server
- MySQL is ideal for both small and large applications
- MySQL supports standard SQL
- MySQL compiles on a number of platforms
- MySQL is free to download and use
- How to access MySQL:

<http://localhost/phpmyadmin>

5. Analysis and Design

Analysis:

In present all the visitors parking work is done on the paper. The whole year visitor parking record is stored in the registers. We can't generate reports as per our requirements because it takes more time to calculate the visitors parking report.

Disadvantage of present system:

Not user friendly: The present system not user friendly because data is not stored in structure and proper format.

Manual Control: All report calculation is done manually so there is a chance of error.

Lots of paper work: Visitors maintain in the register so lots of paper require storing details.

Time consuming

Design Introduction:

Design is the first step in the development phase for any techniques and principles for the purpose of defining a device, a process or system in sufficient detail to permit its physical realization. Once the software requirements have been analyzed and specified the software design involves three technical activities - design, coding, implementation and testing that are required to build and verify the software.

USECASE DIAGRAMS:

Use case diagrams model behavior within a system and helps the developers understand of what the user require. The stick man represents what's called an actor.

Use case diagram can be useful for getting an overall view of the system and clarifying who can do and more importantly what they can't do.

Use case diagram consists of use cases and actors and shows the interaction between the use case and actors.

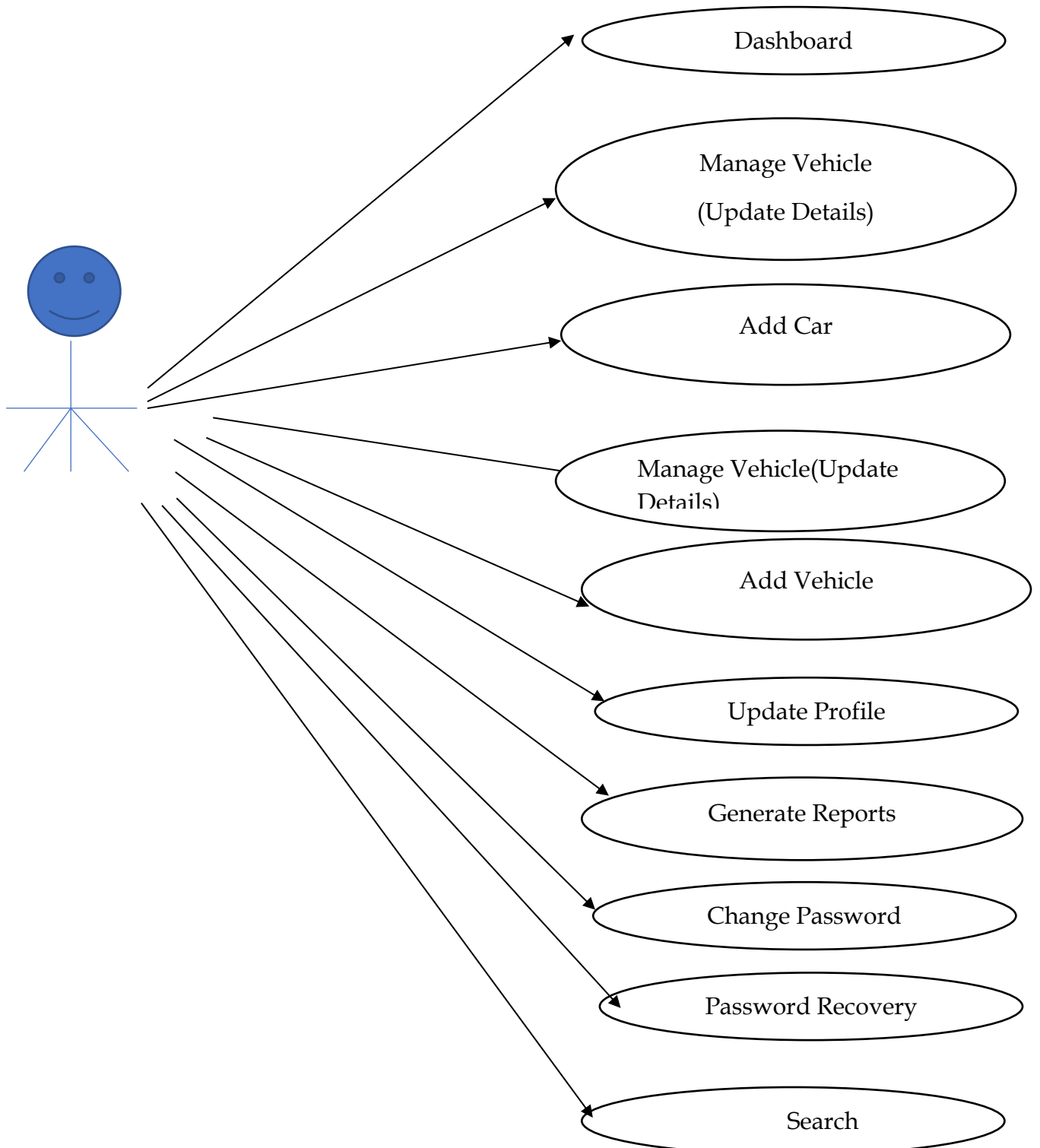
The purpose is to show the interactions between the use case and actor.

To represent the system requirements from user's perspective.

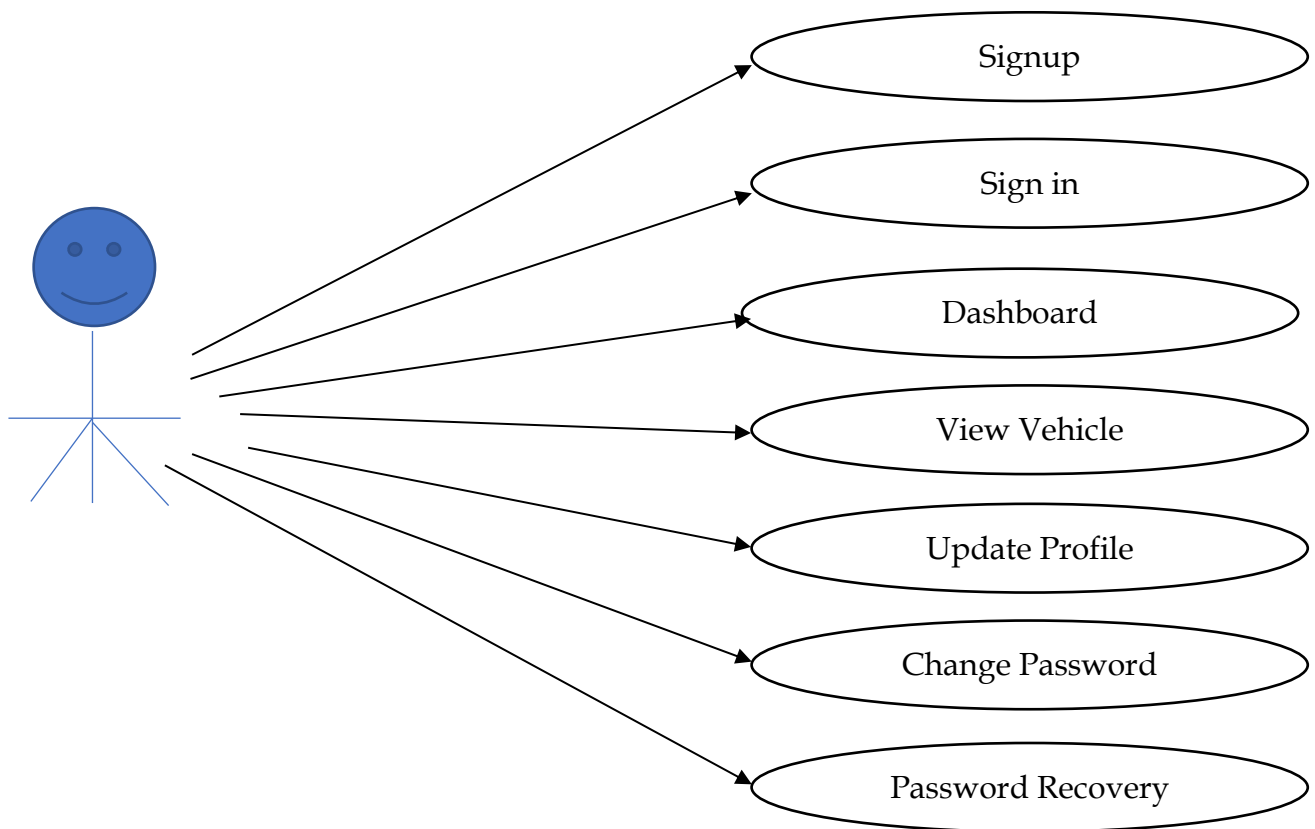
An actor could be the end-user of the system or an external system.

USECASE DIAGRAM: A Use case is a description of set of sequence of actions. Graphically it is rendered as an ellipse with solid line including only its name. Use case diagram is a behavioral diagram that shows a set of use cases and actors and their relationship. It is an association between the use cases and actors. An actor represents a real-world object. Primary Actor – Sender, Secondary Actor Receiver.

Use Case Diagrams:Admin



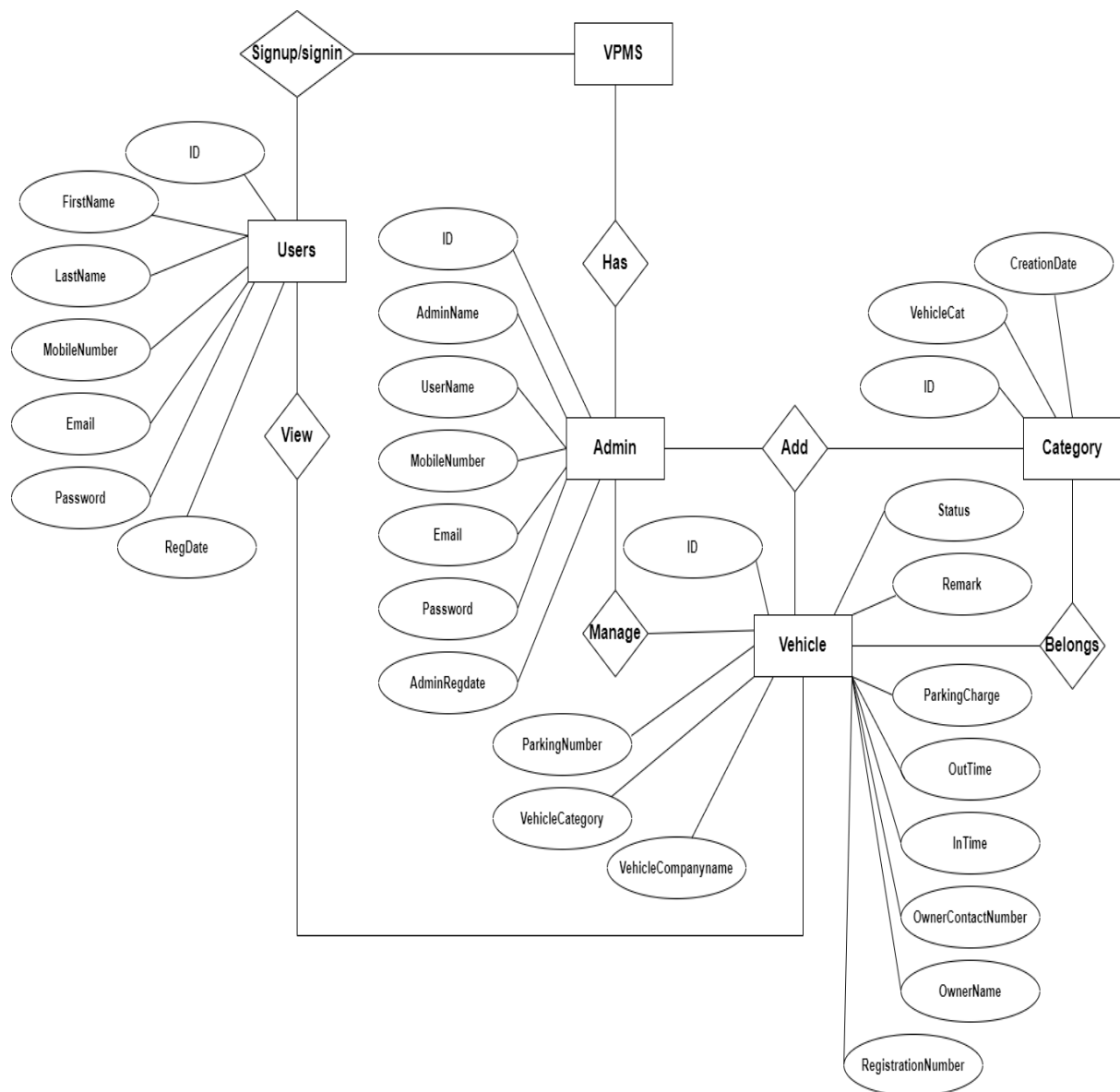
Users



ER DIAGRAM

The ER model is a conceptual data model that views the real world as entities and relationships. A basic component of the model is the Entity-Relationship diagram which is used to visually represent data objects. Since Chen wrote his paper the model has been extended and today it is commonly used for database design for the database designer, the utility of the ER model is:

It maps well to the relational model. The constructs used in the ER model can easily be transformed into relational tables.

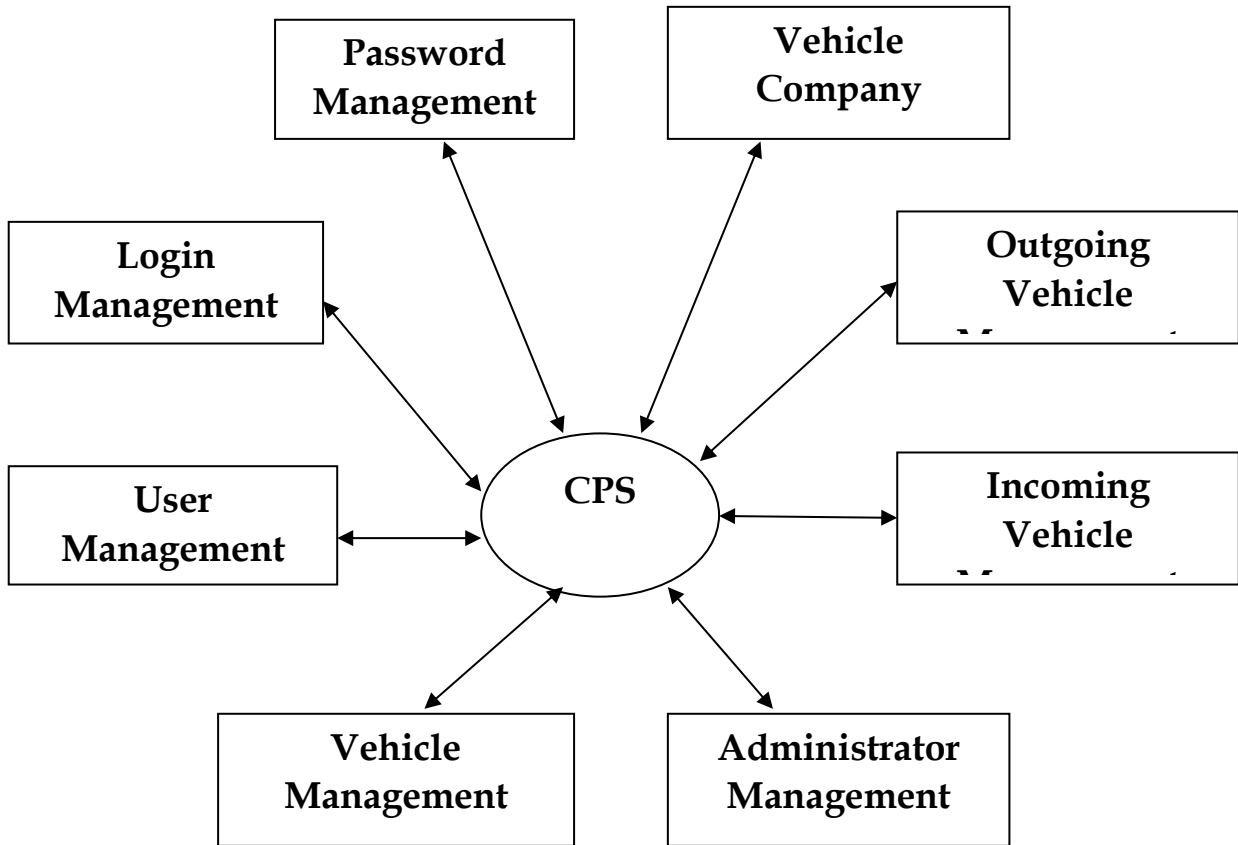


Data Flow Diagram

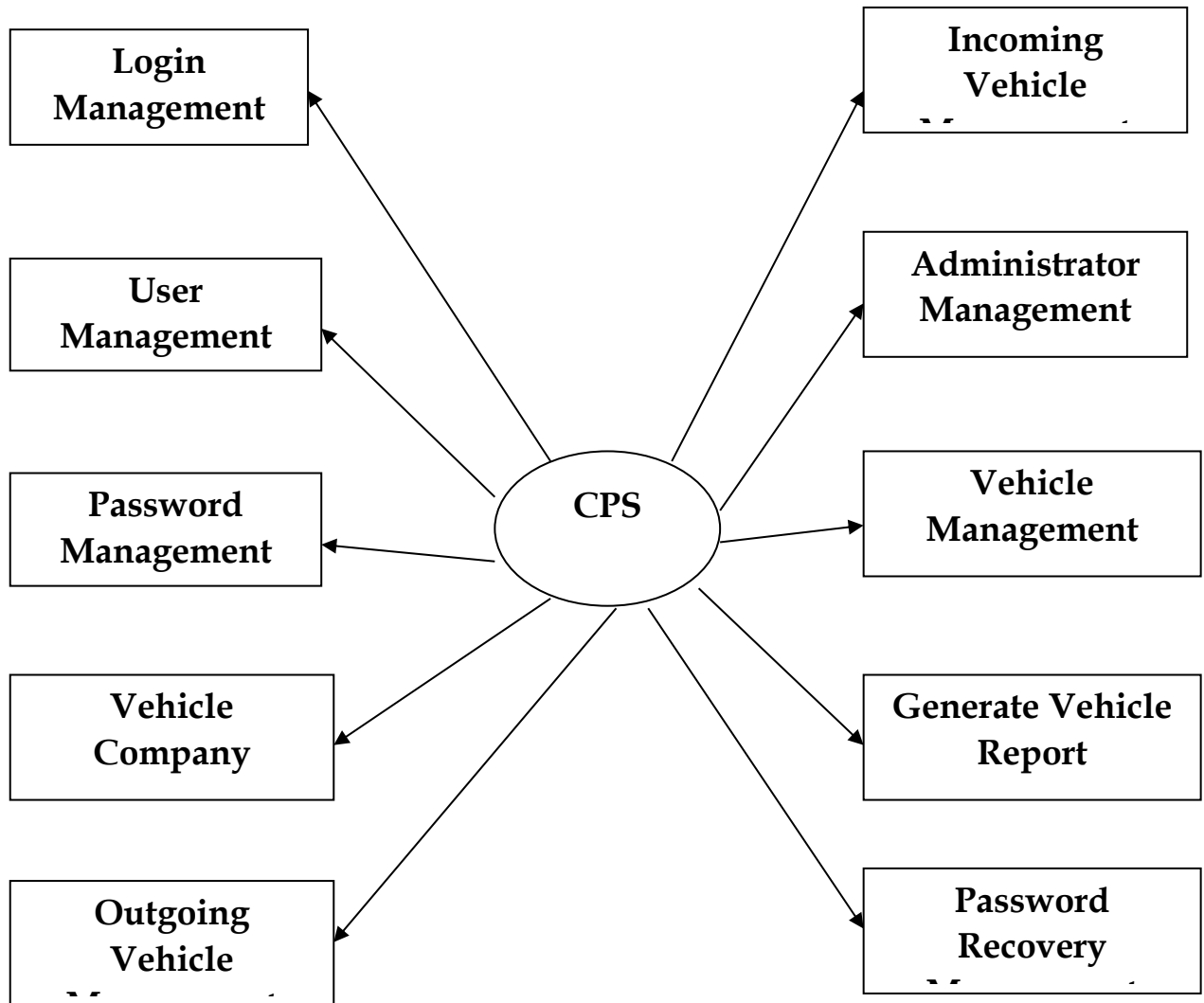
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It can be manual, automated, or a combination of both.

It shows how data enters and leaves the system, what changes the information, and where data is stored.

Level 0 dfd



Level 1 dfd



6. Functional Requirements

Functional requirements for a car parking system typically include:

User Registration and Authentication: Allow users to create accounts and securely log in to the system using unique credentials. User authentication ensures authorized access to system features and data.

Parking Space Availability: Provide real-time information on the availability of parking spaces. Users should be able to view the number of vacant parking spaces and their locations within the parking facility.

Payment Processing: Facilitate secure online payment processing for parking reservations. Integrate payment gateways to accept various payment methods and generate receipts or invoices for successful transactions.

Entry and Exit Control: Integrate with entry and exit gates to control access to the parking facility. The system should verify reservations and automatically grant access to authorized vehicles. Upon exit, the system should update the parking space availability.

Notification System: Implement a notification system to provide users with updates on their reservations, including reminders, confirmations, and any changes or cancellations.

Administrative Dashboard: Provide a centralized dashboard for parking administrators to manage and monitor parking operations. The dashboard should include features such as viewing occupancy rates, managing reservations, generating reports, and performing system maintenance tasks.

User Feedback and Rating: Allow users to provide feedback and ratings on their parking experience. This feedback can be used to improve the system and address any issues or concerns raised by users.

Reporting and Analytics: Generate comprehensive reports and analytics for parking administrators. These reports may include occupancy rates, revenue generation, popular time slots, and other relevant data to assist in decision-making and optimization.

Mobile Application: Develop a mobile application that enables users to access the car parking system on their smartphones or tablets. The mobile app should provide a

seamless user experience and offer features such as searching for parking spaces, making reservations, and viewing payment details.

System Administration: Implement administrative functionalities such as user management, system configuration, and security settings. Parking administrators should have the ability to manage user accounts, define parking rates, set operational rules, and ensure system security.

7. Non functional requirements

Non-functional requirements for a car parking system may include:

Performance: The system should be able to handle a large volume of concurrent users and provide quick response times for searching, reserving, and processing payments. It should be optimized to handle peak usage periods efficiently.

Reliability: The car parking system should be highly reliable and available at all times. It should have built-in mechanisms to handle potential failures or disruptions, ensuring minimal downtime and uninterrupted service.

Security: Ensure the security of user data, payment transactions, and system operations. Implement encryption protocols, secure user authentication mechanisms, and secure connections to protect sensitive information. Adhere to industry best practices for data privacy and comply with relevant regulations.

Scalability: The system should be scalable to accommodate future growth and increased usage. It should be capable of handling a growing number of parking spaces, users, and transactions without compromising performance or user experience.

Usability: The car parking system should have an intuitive and user-friendly interface, both on the web and mobile platforms. Users should be able to easily

navigate through the system, make reservations, view payment details, and receive notifications without requiring extensive training or technical knowledge.

Accessibility: Ensure that the car parking system is accessible to users with disabilities. Follow accessibility standards and guidelines to provide features like screen reader compatibility, keyboard navigation, and alternative text for images.

Compatibility: The system should be compatible with different web browsers, operating systems, and mobile devices to cater to a wide range of users. It should adapt to different screen sizes and resolutions for a consistent user experience across devices.

Integration: The car parking system should be able to integrate with other existing systems or services, such as payment gateways, entry/exit gates, and navigation apps. This integration enables seamless communication and data exchange, enhancing the overall parking experience.

Maintainability: The system should be easy to maintain and update. Clear and modular code structure, proper documentation, and version control practices should be followed to facilitate future enhancements, bug fixes, and system updates.

Performance Monitoring and Logging: Implement monitoring mechanisms to track system performance, identify bottlenecks, and proactively address issues. Log and store system activities and errors for troubleshooting, auditing, and compliance purposes.

Addressing these non-functional requirements ensures that the car parking system is reliable, secure, scalable, user-friendly, and adaptable to future needs, providing an optimal parking experience for users.

8. Implementation and System Testing

After all phase have been perfectly done, the system will be implemented to the server and the system can be used.

System Testing

The goal of the system testing process was to determine all faults in our project .The program was subjected to a set of test inputs and many explanations were made and based on these explanations it will be decided whether the program behaves as expected or not. Our Project went through two levels of testing

1. Unit testing
2. Integration testing

UNIT TESTING

Unit testing is commenced when a unit has been created and effectively reviewed .In order to test a single module we need to provide a complete environment i.e. besides the section we would require

The procedures belonging to other units that the unit under test callsNon local data structures that module accessesA procedure to call the functions of the unit under test with appropriate parameters

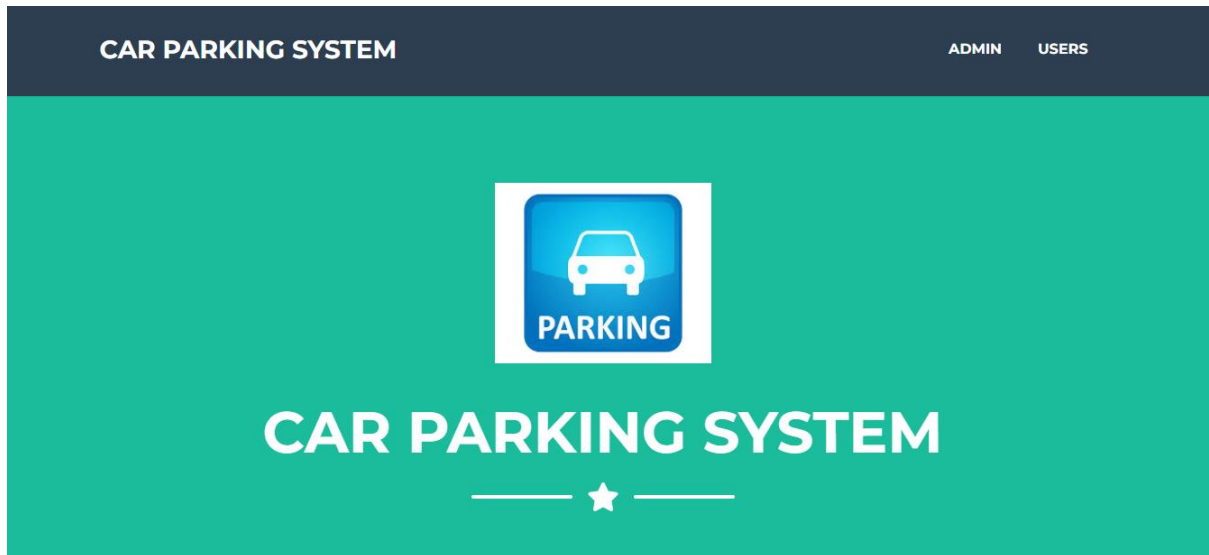
INTEGRATION TESTING

In the Integration testing we test various combination of the project module by providing the input.

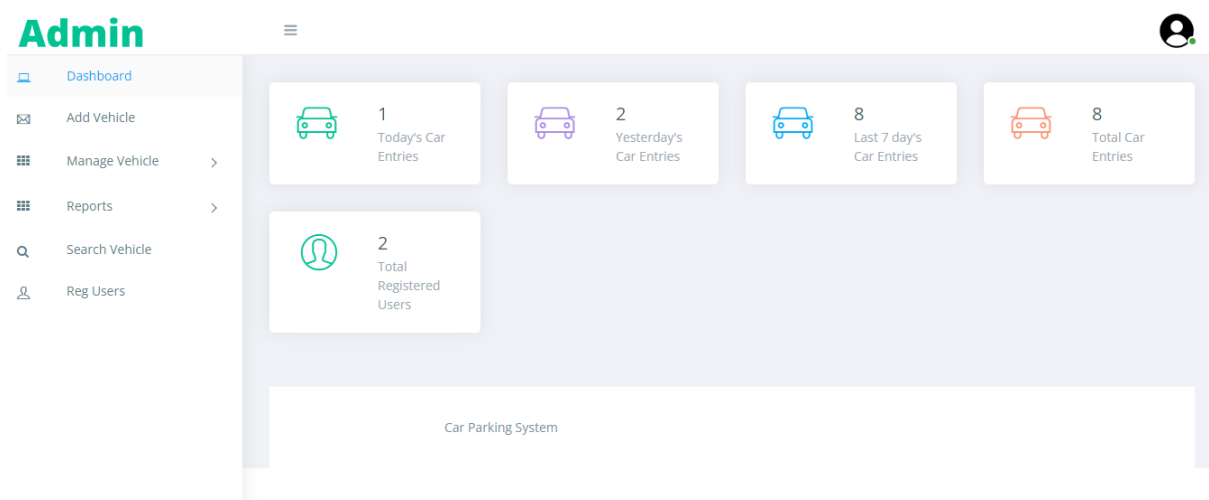
The primary objective is to test the module interfaces in order to confirm that no errors are occurring when one module invokes the other module.

9. Results/Screenshots

Home page



Admin dashboard



Manage vehicles

Admin

- Dashboard
- Add Vehicle
- Manage Vehicle >
- Reports >
- Search Vehicle
- Reg Users



Dashboard

Dashboard / Manage Car / Manage Incoming Car

Manage Incoming Car

S.NO	Parking Number	Owner Name	Car Reg Number	Action
1	323009894	Abhi	DEL-55776	View Print Delete
2	522578915	Mahesh	DEL-895623	View Print Delete
3	989180921	Sita	3699	View Print Delete

Registered users

Admin

- Dashboard
- Add Vehicle
- Manage Vehicle >
- Reports >
- Search Vehicle
- Reg Users



Dashboard

Dashboard / Registered Users / Registered Users

Registered Users

S.NO	Name	Contact Number	Email	Registration Date	Action
1	Amrit Gosh	1234567890	amritg@gmail.com	2023-05-19 23:35:56	Delete
2	Sita Mallipamula	8978303450	sitachandram@gmail.com	2023-05-21 18:01:13	Delete

User sign in

!! Sign in

REGISTERED EMAIL OR CONTACT NUMBER

PASSWORD

[Forgotten Password?](#)

SIGN IN

[Signup\(Register yourself\)](#)

[Home](#)

View car details

Users

Dashboard	View Car details	
View Car	Parking Number	989180921
	Car Company Name	Jaguar
	Registration Number	3699
	Owner Name	Sita
	Owner Contact Number	8978303450
	In Time	2023-05-21 18:00:12
	Status	Vehicle In
	Remark	
	Parking Fee	

10. Conclusion

The implementation of a car parking system project brings several benefits and opportunities for improving parking operations and user experience in urban areas. Let's delve into some key aspects to discuss:

Enhanced Parking Management: A car parking system enables efficient management of parking spaces, minimizing manual interventions and automating various processes. With real-time monitoring of parking occupancy, administrators can optimize space utilization, identify high-demand areas, and allocate resources effectively.

Reduced Traffic Congestion: By providing users with accurate information on parking availability, the system helps reduce traffic congestion caused by drivers searching for parking spaces. This not only improves traffic flow but also decreases carbon emissions and fuel consumption, contributing to a greener and more sustainable environment.

Improved User Convenience: The car parking system offers users the convenience of finding and reserving parking spaces in advance. Through a user-friendly web interface or mobile application, users can easily search for available spaces, make reservations, and receive confirmation details. This eliminates the stress and frustration of driving around in search of parking.

Streamlined Payment Processes: Integrating online payment options within the car parking system simplifies the payment process for users. Users can make secure payments for their parking reservations through various payment gateways, reducing the need for cash transactions and enhancing convenience.

Data-Driven Insights: The system collects and analyzes data related to parking occupancy, user behavior, and revenue generation. By leveraging this data, administrators can gain valuable insights into parking patterns, peak hours, and revenue trends. This information enables informed decision-making, such as adjusting pricing strategies or optimizing parking capacity.

Scalability and Flexibility: Web technologies like PHP and MySQL provide scalability and flexibility to accommodate future growth and system enhancements. The modular architecture of the car parking system allows for easy integration with additional features or integration with other systems, such as smart city initiatives or IoT-enabled devices.

Security Considerations: As the car parking system involves the handling of user data and financial transactions, ensuring robust security measures is crucial. Implementing secure protocols, data encryption, and regular security updates safeguards user information and prevents unauthorized access.

User Adoption and Support: To ensure successful implementation, user adoption is vital. Providing adequate training and support to both parking administrators and users is necessary to familiarize them with the system's features and address any queries or concerns that may arise.

Continuous Improvement: The car parking system should be treated as an evolving project. Regular feedback from users and administrators, coupled with technological

advancements, should drive continuous improvement and the addition of new features to enhance the system's functionality and address emerging needs.

In conclusion, a car parking system project holds immense potential to revolutionize parking management, reduce traffic congestion, and improve the overall parking experience. By leveraging web technologies, incorporating user-friendly interfaces, and embracing data-driven insights, the system can optimize parking operations, enhance convenience, and contribute to creating smarter and more sustainable urban environments.

11. Future Work

Future work for a car parking system may include the following:

Smart Parking Solutions: Explore the integration of smart technologies into the parking system, such as sensors and IoT devices. This can enable real-time monitoring of parking space occupancy, intelligent parking guidance, and automated payment processes. Implementing smart parking solutions can further optimize parking operations and enhance user convenience.

Advanced Reservation Features: Enhance the reservation functionality by incorporating features like flexible booking options (hourly, daily, weekly), recurring reservations, and personalized preferences (preferred parking spots, vehicle type, etc.). This allows users to have more control and flexibility in managing their parking needs.

Integration with Smart City Initiatives: Collaborate with smart city initiatives to integrate the car parking system with other urban infrastructure and services. This integration can provide a seamless experience for users, such as integrating parking availability information with navigation apps, public transportation systems, and event management platforms.

References

For PHP

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<https://www.sitepoint.com/php/>

<https://www.php.net/>

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<https://www.mysql.com/>

<http://www.mysqltutorial.org>

For XAMPP

<https://www.apachefriends.org/download.html>